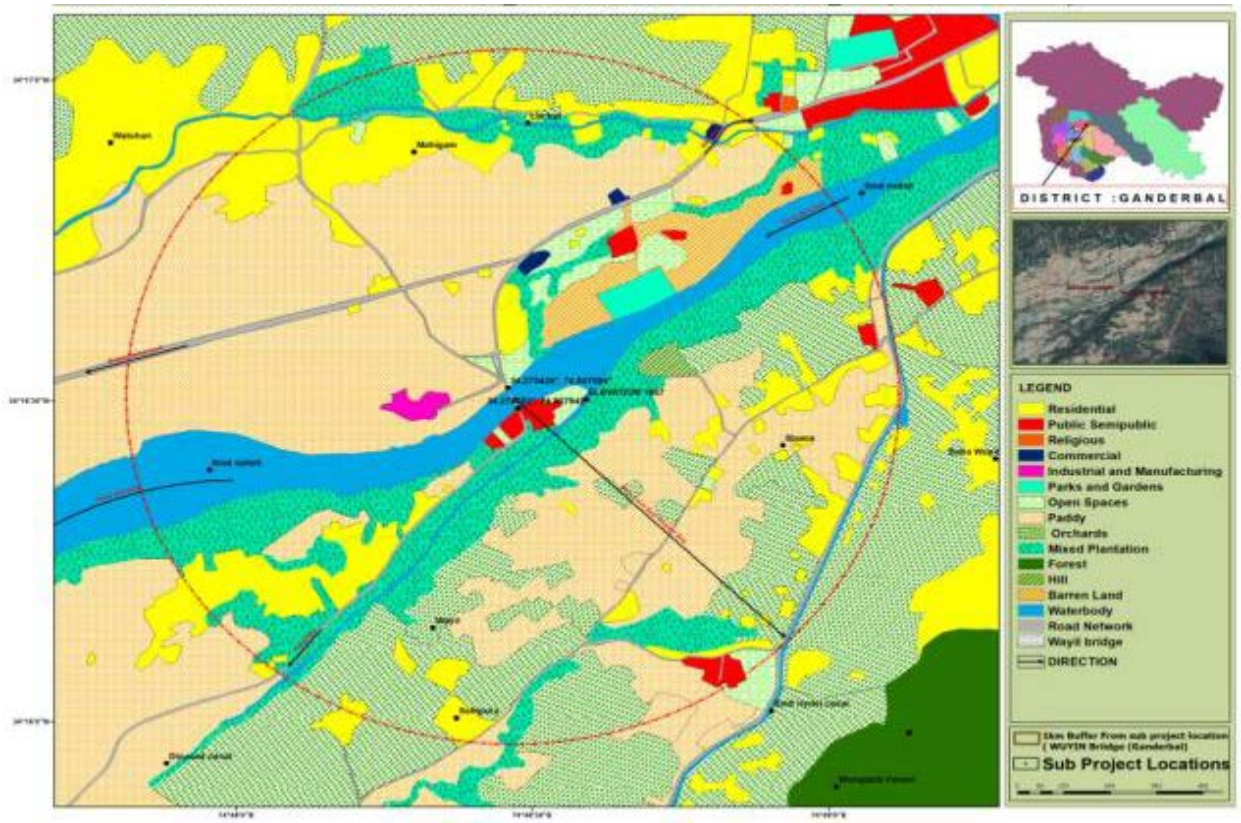
ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

Design and Construction of 1x110 meter Span Semi Arch Segmental Through Type Steel Trussed Girder Bridge Over River Sindh at Wayil in District Ganderbal,



GIS/ LULC Map of Project Influence Area (PIA) of Wayil Bridge in Ganderbal J&K

Jhelum Tawi Flood Recovery Project- The World Bank Financed Project

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Prepared By: Akhter R. Bhat (Senior Environmental Consultant) for M/s M.M Shawl Engineers and Contractors Pvt. Ltd.

Environmental Impact Assessment (EIA) Report

October 2020

Jhelum Tawi Flood Recovery Project

Design & Construction of:

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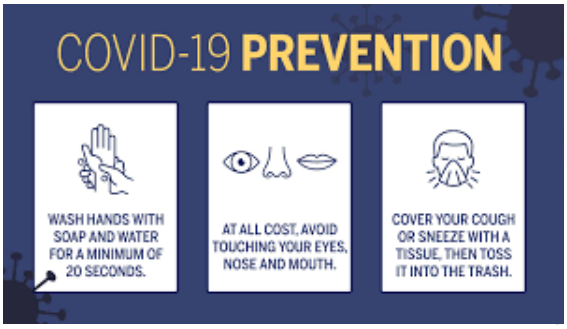

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Annexures

Acronyms & Abbreviations

AAQ	:	Ambient Air Quality
ASI	:	Archaeological Survey of India
BIS	:	Bureau of Indian Standards
CPCB	:	Central Pollution Control Board
CPR	:	Common Property Resources
COVID 19	:	Coronavirus Disease of 2019
DPR	:	Detailed Project Report
EIA	:	Environmental impact Assessment
EMP	:	Environmental Management Plan
EPC	:	Engineering, Procurement and Construction
EMP	:	Environmental & Social Management Plan
ERA	:	Economic Reconstruction Agency
GC	:	General Conditions
GoI	:	Government of India
ILO	:	International Labour Organization
IS	:	Indian Standard
J&K	:	Jammu and Kashmir
JTFRP	:	Jhelum Tawi Flood Recovery Project
MoEF&CC	:	Ministry of Environment, Forest and Climate Change
NAAQS	:	National Ambient Air Quality Standards
NOC	:	No Objection Certificate
OP	:	Operational Policy
PAP	:	Project Affected Persons
PIU	:	Project Implementation unit
PIA	:	Project Influence Area
PMU	:	Project Management Unit
PPE	:	Personal Protective Equipment
PUC	:	Pollution Under Control
PWD	:	Public Works Department
RoW	:	Right of Way
R&B	:	Roads & Building
SPCB	:	State Pollution Control Board
TAQAC	:	Technical Assistance and Quality Audit Consultants
WB	:	World Bank

EXECUTIVE SUMMARY

A catastrophic deluge of September 2014 shows negative impact on economic aspects of the State and massive infrastructure damages in which capital city Srinagar was most affected and a trail of siltation in most of the water bodies as environmental degradation which is always synonymous with major floods. In connection to a devastating flood, a mission of the World Bank visited the State during February 1-6, 2015 on request of Government of India to review and assess the damages 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 it to housing, livelihoods, and roads and bridges, which combined represent more than 70% of the damages in terms of value. Public service infrastructure and equipment of hospitals and education centres were also severely damaged and are still not fully operational. Based on the RDNA results, restoration works underway, and discussions with the GoJ&K, "Jhelum and Tawi Flood Disaster Recovery Project (JTFRP)" will focus on restoring critical infrastructure using international best practice on resilient infrastructure.

The objective of 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 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 plans (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 Environmental Assessment.

Under this component, one of the identified subproject is “Design and Construction of 1x110 meter Span Semi Arch Segmental Through Type Steel Trussed Girder Bridge Over River Sindh at Wayil in District Ganderbal, J&K”.

As per the EIA notification 2006 and subsequent amendments, this bridge does not require EIA clearance. 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 Batching plant for the subprojects. No Objection Certificate (NOC) is also required from the Irrigation and Flood Control department for the construction of Wayil Bridge over River Sindh.

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 1x110 meter Span Semi Arch Segmental Through Type Steel Trussed Girder Bridge at Wayil in District Ganderbal of Jammu & Kashmir. The bridge will be constructed on the River Sindh.

Name of the Project Road	Project Location with Coordinates
"Design and Construction of 1x110 meter Span Semi Arch Segmental Through Type Steel Trussed Girder Bridge Over River Sindh at Wayil in District Ganderbal, J&K"	Wayil village of Ganderbal Block in District Ganderbal. *Geo-Coordinates:* Latitudes of 34°16'30.00"N Longitude of 74°48´27.83"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 screening is to identify the potentially significant environmental and 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.

[1]The proposed bridge project at Wayil involves land acquisition for approaches on both sides which comprises approx. Govt. land at 3165.57 m^2 (6 kanal, 14.03 marla), Private Land at 2152.6 m^2 (4 kanal, 18.25 marla) and Shamilat land of 569.74 m^2 (1 kanal, 1.07 marla). For development of approaches, minor private land acquisition (2152.6 m^2) is involved on both sides of the bridge for which the Abbrevaited Resettlement Action Plan (ARAP) will be prepared separately.

[1] Details of the land acquisition involved for the approaches provided by the Contractor inconsultation with the Revenue Department and PIU (PWD-R&B).

Policy and Legal Regulatory Instruments

National and State Laws

- EIA Notification, 14th Sept 2006 and Subsequent amendments
- Jammu and Kashmir Forest (Conservation) Act, 1997
- Jammu and Kashmir Wildlife (Protection) Act, 1978
- Air (Prevention and Control of Pollution) Act,1981
- Water Prevention and Control of Pollution) Act,1974
- Noise Pollution (Regulation and Control Act),2000
- Construction & Demolition Waste Management Rules, 2016
- e-waste (Management) Rules, 2015
- Public Liability and Insurance Act 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
- Jammu and Kashmir Electricity Act, 2010 and amendments thereof and BIS 1255;1983 and amendments thereof
- Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules,2008 and amendments thereof
- Solid Waste Management Rules, 2016
- The Jammu and Kashmir Preservation of Specified Trees Act, 1969
- Wetland (Conservation and Management) Rules, 2017

World Bank Operational Policies

- OP/BP 4.01 Environmental Assessment
- OP/BP 4.04 Natural Habitats
- 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 1x110 meter Span 2 Lane Steel Arch Bridge over River Sindh at Wayil in District Ganderbal, Jammu & Kashmir” 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 & Construction of 1x110 meter Span Semi Arch Segmental Through Type Steel Trussed Girder Bridge Over River Sindh at Wayil in District Ganderbal, J&K .

Public Consultation

One of the important components of this study is the dissemination of project information by way of “Consultation with stakeholders and the general public”, which was conducted on

16/08/2018, 04/06/2020 and 20/06/2020 with residents/ stakeholders in the project area of Wayil village during reconnaissance and EIA survey of the project as part of the study. During the consultation process of the proposed sub-project, people have expressed keen interest in the consultation process and were aware of the proposed bridge project in Wayil village. Project was discussed in detail and and people emphasised the importance of the proposed bridge and by giving direct connectivity of villages like Wayil, Manigam, Malapora, Arch, Ganderbal, Wussan, Drag Tanga, Palang, Kangan and tourist hub Sonamarg etc.. The proposed bridge is to be constructed on Srinagar-Leh NH 1D. The bridge thus serves as an important link between these villages having approximate population of >60,000. The bridge will also serve indirectly to thousands of other souls of the other adjoining areas as it links these areas with National Highway and District head-quarter Ganderbal. Moreover, the area being tourist hub as important tourist destination of Sonamarg which falls on the same highway and district.

Besides it is the major/vital connecting road between Srinagar and Leh-Ladakh. Most of the essential and emergency services/ goods/ army movement are transported via existing single lane bailey bridge at Wayil. Hence, the construction of the proposed 2 lane bridge will provide the important connectivity and smooth flow of traffic.

Some of the responses with suggestions and support received from the residents and stakeholders during the consultation are abridged as i) the stakeholders, PIU and the Sarpanch and people in general assured/ supported fast tracking process of land acquisition for the purpose of construction of 2 Lane Wayil Bridge having immense importance. ii) people have informed about the difficulties faced by temporary old bailey type single lane bridge like traffic jams, wastage of time and other inconveniences and requested for the immediate start of the construction works on a Wayil bridge. Further the locals ensured full cooperation and support for the successful execution of the project; iii) residents who are related to the construction industry may be engaged with the proposed bridge works; iv) Locals have suggested for the Box Type Culvert with Slab for the Nangdara Canal which is coming under the ramp from the approach towards Srinagar side.

Assessment of Impacts

The environmental assessment study carried out at the proposed site for Wayil Bridge in terms of the potential environmental impacts that may occur as a result of the implementation of the project. Based on the findings during survey, there are no significant environmental impacts in the project influence area. However cutting of approximately 36 nos of Ailanthus saplings/ trees and a Willow is required for the development of approach (Sonamarg-Leh approach). For tree cutting, proper procedure shall be followed. The anticipated environment 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 temporary in nature 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 construction of 1x110 meter bridge at Wayil 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 construction of this bridge will also uplift the area as accessibility with the adjoining areas town and district headquarter of Ganderbal.

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 environmental assessment report. The comprehensive Environmental Management Plan (EMP) for the proposed bridge at Wayil has been developed, which elaborates on the mitigation measures, means of implementation for the proposed measures, monitoring strategy and the budgets about the implementation of the proposed mitigation measures.

1. INTRODUCTION

1.1. Project Background

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

Due to the unprecedented heavy rainfall, the catchment areas particularly the low lying areas were flooded for more than two weeks. Some areas in urban Srinagar stayed flooded for 28 days. Water levels were as high as 27 feet in many parts of Srinagar city. The areas from the main tributaries of river Jhelum vis-à-vis Bringi nallah, Vishav nallah, Lider nallah and Sandran nallah started overflowing due to the heavy rainfall causing water levels in Jhelum river to rise.

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

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

The project comprises of the following seven components:

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

Under Jhelum Tawi Flood Recovery Project (JTFRP), the component-2 aims at Construction of 5 bridges in Kashmir Region under Engineering, Procurement and Construction (EPC) mode contract as listed in Table 1.1 below. These bridge subprojects

were selected based on the flood damages incurred during September 2014 floods and history of submergence and findings of environment screening exercise.

One of the bridge subproject, "Design & Construction of 1x110 meter Span Semi Arch Segmental Steel Trussed Girder Bridge Over River Sindh at Wayil in District Ganderbal, J&K has been awarded to M/s M.M Shawl Engineers and Contractors Pvt. Ltd. One of the prime requirement of the bridge project is to conduct Environmental Impact Assessment (EIA) study and preparation of the report as per the World Bank guidelines. The M/s M.M Shawl Engineers and Contractors Pvt. Ltd. has entered into a contract agreement on 1st June 2020 with Mr Akhter R. Bhat as an Independent Environmental Consultant for conducting of EIA study and preparation of this assignment.

Table 1.1: List of the Bridge Projects (EPC Mode) under Component-2 of JTFRP in Jammu & Kashmir

S. No.	Project Type	Subprojects	Span/ Length (in meters)	District
Design and Construction of:				
Kashmir Region				
1.	EPC Mode	1x110 meter Span Semi Arch Segmental Through Type Steel Trussed Girder Bridge Over River Sindh at Wayil in District Ganderbal	1x110=**110**	Ganderbal, J&K
2.	EPC Mode	1x25 meter span plate girder bridge on Raine Nallah at Kaliban in District Baramulla.	1X25= **25**	Baramulla J&K
3.	EPC Mode	1x45 meter span trussed Girder Bridge on Rambiara Nallah at Village Wachi in District Shopian.	1x45= **45**	Shopian, J&K
4.	EPC Mode	1x110 m. span steel truss girder bridge on Bringi Nallah at Sadora- Asajipora Kamad Road in District Anantnag.	3x30= **90**	Anantnag, J&K
5.	EPC Mode	2 Lane bridge on Vaishav Nallah at Chamgund in District Kulgam	**400**	Kulgam, J&K

1.2. Description of the Project

Wayil is a located in the Ganderbal District of Jammu & Kashmir. It is located on the banks of Sind Nallah, around 8 km from Ganderbal and 30 Km northeast from Srinagar at NH 1D which connects Srinagar and Ladakh.

There is a temporary steel bridge over Nallah Sind at Wayil, which was constructed over two decades ago. The existing bridge, which connects Srinagar with Leh, got damaged due to the floods. The Border Road organisation (BRO) has constructed this temporary steel bridge in 1993. The existing bridge is so narrow that even a pedestrian has to go back half way if a heavy vehicle is crossing it.

Keeping in view the high volume of traffic plying on the existing national highway, a two lane, 1x110 m long bridge with carriage way width of 7.50 m and 1.50 m footpaths on either side is proposed. The alignment of the proposed bridge has been fixed downstream of the existing bridge, which involves acquiring State/ private land for construction of the approaches. A 1x110 m long bridge has been proposed keeping in

view the highly torrential nature of the Sind Nallah. The proposal has been made also to negate any effects given the Nallah has tendency to change its course.

The bridge is a major/vital connecting link between Srinagar and Leh-Ladakh besides vast areas of the Wayil and Manigam. The proposed bridge is to be constructed on Srinagar-Leh NH 1D. It also connects number of villages like Wayil, Manigam, Malapora, Arch, Ganderbal, Wussan, Drag Tanga, Palang, Kangan and tourist hub Sonamarg etc. The bridge thus serves as an important link between these villages having approximate population of 60,000. The bridge will also serve indirectly to thousands of other souls of the other adjoining areas as it links these areas with National Highway and District head-quarter Ganderbal. Moreover, the area being tourist hub as important tourist destination Sonamarg falls on same highway and district.

1.3. Scope for Conducting the EIA study

Environmental 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. The approach road 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 construction of Wayil Bridge.

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 of bridge project;
- 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

There is a temporary steel bridge over Nallah Sind at Wayil, which was constructed over two decades ago. The existing bridge, which connects Srinagar with Leh, got damaged due to the floods. The Border Road organisation (BRO) has constructed this temporary steel bridge in 1993. The existing bridge is so narrow that even a pedestrian has to go back half way if a heavy vehicle is crossing it. The importance of the

proposed bridge and by giving direct connectivity of villages like Wayil, Manigam, Malapora, Arch, Ganderbal, Wussan, Drag Tanga, Palang, Kangan and tourist hub Sonamarg etc.. The proposed bridge is to be constructed on Srinagar-Leh NH 1D. The bridge thus serves as an important link between these villages having approximate population of >60,000. The bridge will also serve indirectly to thousands of other souls of the other adjoining areas as it links these areas with National Highway and District head-quarter Ganderbal. Moreover, the area being tourist hub as important tourist destination Sonamarg falls on same highway and district.

Besides it is the major/vital connecting road between Srinagar and Leh-Ladakh. Most of the essential and emergency services/ goods/ army movement are transported via existing single lane bailey bridge at Wayil. Hence, the construction of the proposed 2 lane bridge will provide the important connectivity and smooth flow of traffic.

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 “Construction of 1x110 meter Steel bridge on River Sindh at Wayil village in district Ganderbal 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 Assessment

The EIA for the proposed Wayil bridge project includes establishing an environmental baseline in the study area, identify the anticipated environmental, 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 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 Wayil bridge project 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.

a) Field Reconnaissance Survey

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

b) 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 Environmental Assessment. This primarily comprised of reviewing all relevant documents available for the project area at Wayil in District Ganderbal.

c) Delineation of Study Area for Assessment

The above tasks identified the survey and analysis requirements for baseline data collection required for assessing the anticipated impacts of the proposed subproject activities. Based on which, the study area that is critical for assessing the project impacts was identified and delineated. The project influence area also considered

those areas that are directly or indirectly influenced by the project activities during pre-construction, construction or operation of the proposed bridge works at Wayil.

d) 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.

e) Prediction/Assessment of Potential Impacts

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

f) Environment Management Plan

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

1.9. Structure of Environmental Assessment (EIA) Report

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

Executive Summary

1. Introduction
2. Approach & Methodology.
3. Project Description
4. Policy, Legal and Administrative Framework
5. Environmental Baseline Data
6. Potential Environmental Impacts
7. Analysis of Alternatives
8. Public Consultation and Disclosure
9. Environmental Management Plan (EMP)

Annexures

2. APPROACH & METHODOLOGY

2.1. Reconnaissance Survey

The reconnaissance survey was conducted in August 2018 and June 2020 for the proposed bridge project at Wayil village. The site visits and the initial assessment have become the key elements of the schedule of preparation as a part of the screening exercise and EIA study. In addition to field investigations and observations, consultations/ field visits were held jointly with the stakeholders, consultants 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 construction of Wayil bridge in district Ganderbal in J&K and 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 Wayil Bridge over River Sindh.

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 Wayil near the proposed bridge site with locals, officials, consultants 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 environmental guidelines were also reviewed before carrying out baseline studies. A detailed survey has been carried out by the environmental consultant 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 social screening of the sub-project. The information has been gathered through primary as well as secondary sources of information, with the support of PMU and PIU team members.

2.5. Collection of Data

The construction of 1x110 meter Wayil bridge in District Ganderbal the number of 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. Literature searches were undertaken and relevant agencies were contacted and apprised of the proposed subproject. The following data were collected for the road projects during environmental screening/ assessment study: `

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

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

2.6. Environmental Monitoring Data

Environmental monitoring (Air, Noise and Water quality) of the proposed construction of 2 lane Bridge at Wayil over Sindh Ri will be conducted 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. Based on this assessment the present option of construction of new bridge having a span of 1x110 meter on River Sindh at Wayil in District Ganderbal 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 were contacted and consulted during the study. Stakeholders were informed about the subproject components and likely environmental and social 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 a 1x110 m bridge at Wayil in District Ganderbal 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

District Ganderbal is situated at a distance of 18.3 Km from Srinagar and is located extreme northern region of India in the state of Jammu and Kashmir at 34.23° N latitude, 74.78° E longitude. It has an average elevation of 1,619 m. It is bordered by the Srinagar district in the south, Bandipore to the north, Kargil in the north-east, Anantnag to the southeast and Baramulla in the south-west. The district is constituted into Six tehsils (Ganderbal, Lar, Kangan, Tullmulla, Wakura & Gund). It covers a total area of 39304 hectares. It comes under western Himalayan region having temperate agro-climatic zone, normal annual rainfall is about 676 mm with 67 rainy days and the temperature varies between 3.9 to 22.5 °C.

Wayil village is located in Ganderbal Tehsil of Ganderbal district in Jammu & Kashmir. It is situated 7.6 km away from Ganderbal, which is both district & sub-district headquarter of Wayil village. The total geographical area of village is 4.50 sq km as per 2011 census. Wayil has a total population of 8335 peoples. There are about 1429 households in Wayil village. The nearby villages of Wayil are Manigam, Malapora, Arch, Ganderbal, Wussan, Drag Tanga, Palang, Kangan, Sonamarg etc.

The proposed bridge site is located at Wayil village in Ganderbal Block in Ganderbal District of Jammu & Kashmir. The proposed subproject is an Engineering, Procurement and Construction (EPC) mode contract for “Design and Construction of 1x110 meter Span 2 Lane Semi Arch Segmental Steel Trussed Girder Bridge on River Sindh at Wayil in District Ganderbal, Jammu & Kashmir

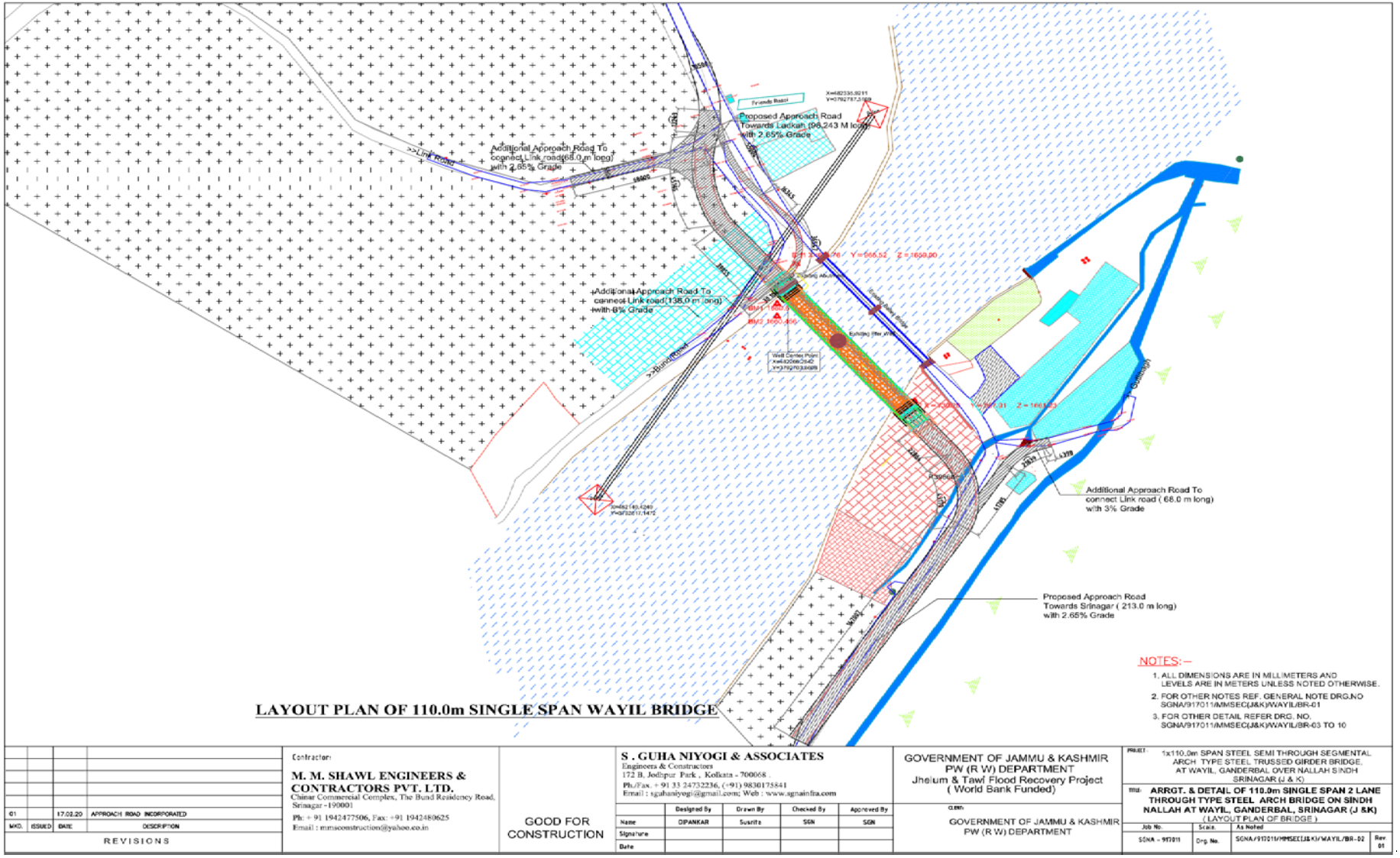


Figure 3.1: Plan and Profile of the Wayil Bridge

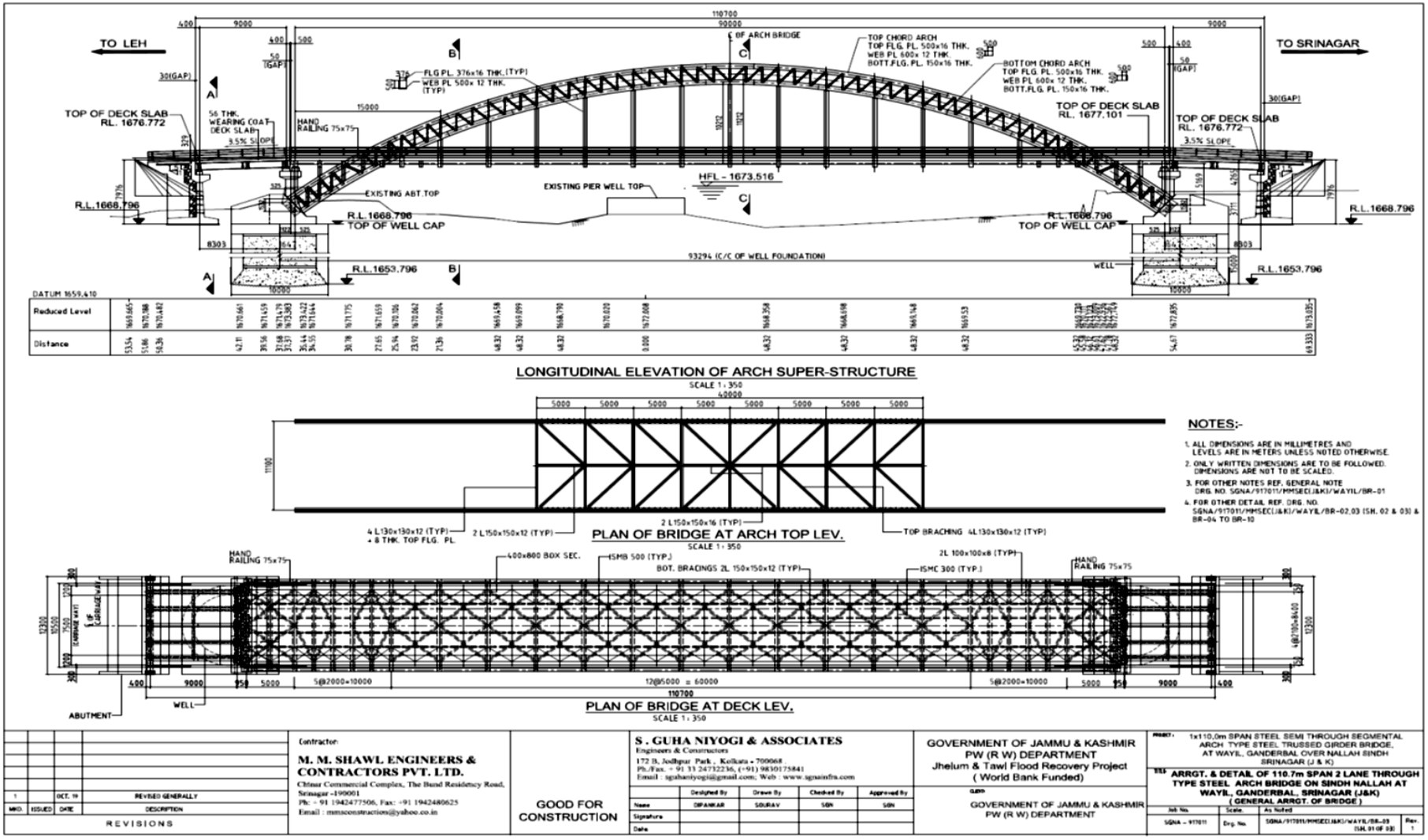


Figure 3.2: General Arrangement Drawing (GAD) of the Proposed Construction 1x110.7 meter Bridge on River Sindh at Wayil in District Ganderbal

3.2. Project Location and Outline

The project is located at Wayil Village in District Ganderbal. The project lies between the Latitudes of 34°16'30.00"N and the Longitude of 74°48´27.83"E. The proposed bridge is 7.6 Km towards N-W from District headquarters Ganderbal and 20.56 Km from State capital Srinagar.

The Wayil bridge is of double span high level minor bridge of 110 mts span on River Sindh in Ganderbal District of J&K. The bridge has the span configuration of 1x110 mts with semi arch steel trussed girder superstructure with 230 mm thick RCC deck slab and footpath topped by Av. 56.0 mm thk. wearing coat of asphalt concrete with 2.5% cross slope and also provisions for service conduits below the footpath slab.. The bridge has a clear carriageway of 7.50 mts and a provision of 1.50m wide Footpath on both side of the bridge.

3.3. Technical Description of the Project

The Super-structure of the bridge considered as double lane of 110.0m span Steel Composite Girder through type Arch Bridge of 7.5m clear carriageway with 1.50m footpath on both side of the carriageway. The Wayil bridge has been designed for a Dead Load with SIDL, along with critical Live Load either of double lane Class-A or Single Lane of Class-70R, Wheeled or Tracked Vehicles and also been checked with the Special Vehicle Loading (SV) Loading, Wind Load, Temperature effect along with Seismic Load as per the provision of IRC: 6-2016.

The Built up Steel Girder 110.0m span Steel Composite Girder through type Arch Bridge has been designed as a 'Space structure/frame' with composite effect by considering R.C.C deck slab. This R.C.C deck slab has considered to be supported over the connecting Cross Girder (transverse member) and Stringer (longitudinal member), for the composite effect. Where the stringers again to connected/supported over the Cross Girder and the Cross Girder again will be connected with the Arch members through vertical Ties for transferring the entire Dead Load and Live Loads etc. from the Deck slab.

Steel structural member considered as 'Beam member/Elements', where Deck slab as Concrete "Plate member/Element' with relevant/required boundary conditions of individual members. The Load analysis and design for the Steel Arch bridge super-structure has been designed with the help of a most popular Software in the Country like Midas Civil-Advance version along with all detail and working drawing by 'Auto Cad'. The connection between Steel girder section with steel deck slab to be done through a properly designed shear connector placed over the Cross girder and Stringer/long girders as per the provision of IRC:22-2014.

The 110.0m span Wayil Bridge has been designed as per Cl. no. 202.1 of IRC:6-2016 by considering the Loads, Forces and Load effects like dead load, liveload, snowoad, impact factor of vehicular live load, wind load, water current applicable for pier structure, longititudinal forces caused by tractive effort of vehicles or by braking of vehicles and/or those caused by restraint of movement of free bearings by friction or deformation,

buoyancy effect, earth pressure including live load surcharge, seismic force and effects of erection, deformation, temperature.

Codes and specifications used

- IRC: 5 -1998 - General Feature Of Design
- IRC: 6 -2016 - Load And Stress.
- IRC: 21-2006 - Cement Concrete (Plain And Reinforced)
- IRC: 112- 2014 - Cement Concrete (Plain And Reinforced)
- IRC: 22 - 2014 - Composite Construction
- IRC: 24-2016 - Steel Road Bridge
- IRC : 45 -1996 - Design Of Well Foundation
- IRC: 78 - 2014 - Foundation And Substructure
- IRC: 83 (Part-III) - 2016 - Pot Cum Ptfe Bearings
- SP: 13 - 2014 - Guide Lines For Design Of Bridges
- SP: 16 - Design Aids For Reinforced Concrete
- IS: 1893 - 2002 - Seismic Code
- IS: 800-2007 – General Construction In Steel-Code Of Practice
- IS: 8009 (Part-II) -2002 - Code Of Practice For Calculation Of Settlement Of Deep Foundation
- IS: 8009 (Part-II) -2002 - Code Of Practice For Calculation Of Settlement Of Deep Foundation

3.3.1. Hydrological Data of River Sindh at Wayil

Flood Discharge from X-sectional Area and observed Velocity

Distance from the existing bridge (old Bailey type) on upstreamside is 100m and HFL at this location is 1673.516m.

Cross-sectional area of river Sindh at (100m) of the proposed bridge on is as follows;

Table 3.1: Peak Flood Discharge Data of River Sindh at 100m Downstream

Distance (m)	Level (m)	HFL (m)	Depth (m)	Av depth (m)	Area (sqm)	Perimeter (m)	Top width of flow (m)
133.45	1669.982	1673.516	3.534				
125.20	1669.658	1673.516	3.858	3.696	-30.492	8.256	-8.250
102.90	1670.359	1673.516	3.157	3.508	-78.217	22.311	-22.300
95.39	1670.485	1673.516	3.031	3.094	-23.236	7.511	-7.510
91.62	1670.552	1673.516	2.964	2.998	-11.301	3.771	-3.770
89.62	1672.105	1673.516	1.411	2.188	-4.375	2.532	-2.000
87.06	1672.179	1673.516	1.337	1.374	-3.517	2.561	-2.560
83.66	1670.006	1673.516	3.510	2.423	-8.240	4.035	-3.400
75.66	1670.020	1673.516	3.496	3.503	-28.024	8.000	-8.000
74.03	1669.983	1673.516	3.533	3.515	-5.729	1.630	-1.630
72.85	1670.212	1673.516	3.304	3.419	-4.034	1.202	-1.180
64.68	1670.320	1673.516	3.196	3.250	-26.553	8.171	-8.170
60.68	1670.959	1673.516	2.557	2.877	-11.506	4.051	-4.000
54.95	1670.302	1673.516	3.214	2.886	-16.534	5.768	-5.730

50.70	1670.345	1673.516	3.171	3.193	-13.568	4.250	-4.250
44.76	1670.860	1673.516	2.656	2.914	-17.306	5.962	-5.940
39.40	1669.024	1673.516	4.492	3.574	-19.157	5.666	-5.360
35.87	1667.653	1673.516	5.863	5.178	-18.277	3.787	-3.530
28.25	1667.478	1673.516	6.038	5.951	-45.343	7.622	-7.620
14.89	1667.237	1673.516	6.279	6.159	-82.278	13.362	-13.360
0.000	1666.760	1673.516	6.756	6.518	-97.046	14.898	-14.890
13.89	1666.908	1673.516	6.608	6.682	92.813	13.891	13.890
23.66	1667.209	1673.516	6.307	6.458	63.090	9.775	9.770
33.65	1667.463	1673.516	6.053	6.180	61.738	9.993	9.990
39.40	1667.653	1673.516	5.863	5.958	34.259	5.753	5.750
39.46	1668.146	1673.516	5.370	5.617	0.337	0.497	0.060
39.61	1668.890	1673.516	4.626	4.998	0.750	0.759	0.150
39.81	1669.473	1673.516	4.043	4.335	0.867	0.616	0.200
41.93	1671.115	1673.516	2.401	3.222	6.831	2.682	2.120
47.830	1671.269	1673.516	2.247	2.324	13.712	5.902	5.900
	1672.571	1673.516	0.945	1.596	-76.337	47.848	-47.830
-48.88	1672.587	1673.516	0.929	0.937	-45.801	48.880	-48.880
-48.94	1672.707	1673.516	0.809	0.869	-0.052	0.134	-0.060
-66.07	1672.811	1673.516	0.705	0.757	-12.967	17.130	-17.130
-77.21	1672.783	1673.516	0.733	0.719	-8.010	11.140	-11.140
-80.21	1672.894	1673.516	0.622	0.678	-2.033	3.002	-3.000
-80.26	1672.322	1673.516	1.194	0.908	-0.045	0.574	-0.050
-80.88	1672.325	1673.516	1.191	1.193	-0.739	0.620	-0.620
-81.06	1672.823	1673.516	0.693	0.942	-0.170	0.530	-0.180
-81.93	1672.779	1673.516	0.737	0.715	-0.622	0.871	-0.870
-82.09	1672.644	1673.516	0.872	0.805	-0.129	0.209	-0.160
-87.75	1672.498	1673.516	1.018	0.945	-5.349	5.662	-5.660
-88.21	1672.475	1673.516	1.041	1.030	-0.474	0.461	-0.460
-88.38	1671.978 1671.637	1673.516	1.538	1.290	-0.219	0.525	-0.170
-99.38		1673.516	1.879	1.709	-18.794	11.005	-11.000
Total					-423.28	322.80	-221.83

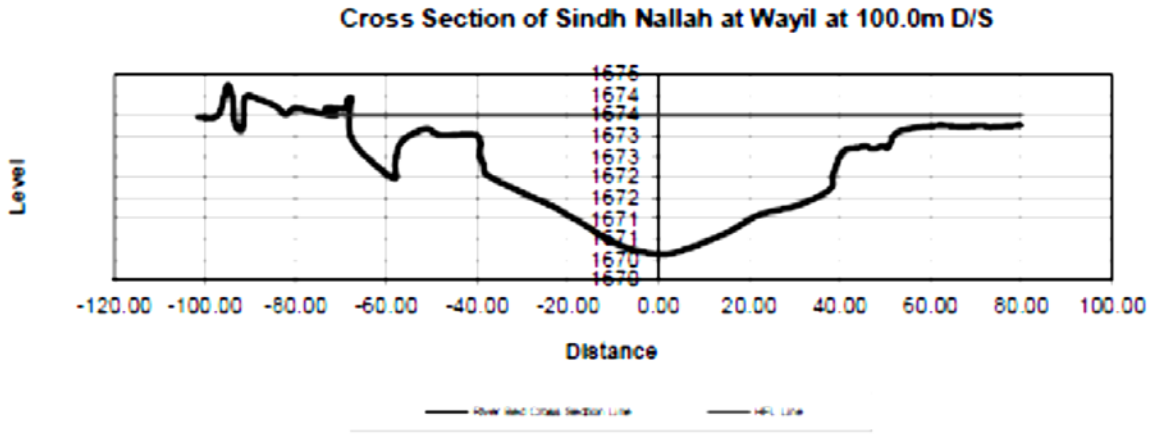


Figure 3.3: Cross-section of River Sindh at Wayil at 100m (Downstream)

Table 3.2: Peak Flood Discharge Data of River Sindh at 100m Upstream

Distance (m)	Level (m)	HFL (m)	Depth (m)	Av depth (m)	Area (sqm)	Perimeter (m)	Top width of flow
111.50	1673.832						
104.50	1673.829	1673.516					
102.20	1674.289	1673.516					
101.20	1673.881	1673.516					
90.70	1673.864	1673.516					
89.70	1673.480	1673.516	0.036				
73.15	1673.593	1673.516					
65.27	1673.132	1673.516	0.384				
64.50	1672.803	1673.516	0.713	0.548	-0.422	0.837	-0.770
59.62	1672.863	1673.516	0.653	0.683	-3.333	4.880	-4.880
55.72	1673.724	1673.516					
52.12	1673.946	1673.516					
46.92	1673.928	1673.516					
41.15	1672.317	1673.516	1.199				
39.98	1671.513	1673.516	2.003	1.601	-1.873	1.420	-1.170
39.60	1671.075	1673.516	2.441	2.222	-0.844	0.580	-0.380
24.91	1670.804	1673.516	2.712	2.577	-37.849	14.692	-14.690
9.51	1670.476	1673.516	3.040	2.876	-44.290	15.403	-15.400
0.00	1670.213	1673.516	3.303	3.172	-30.161	9.514	-9.510
-10.98	1670.745	1673.516	2.771	3.037	-33.346	10.993	-10.980
-18.95	1671.080	1673.516	2.436	2.604	-20.750	7.977	-7.970
-27.63	1671.35	1673.516	2.166	2.301	-19.973	8.684	-8.680
-39.60	1671.814	1673.516	1.702	1.934	-23.150	11.979	-11.970
-40.25	1671.879	1673.516	1.637	1.670	-1.085	0.653	-0.650
-44.10	1672.426	1673.516	1.090	1.364	-5.249	3.889	-3.850
-46.80	1672.624	1673.516	0.892	0.991	-2.676	2.707	-2.700
-48.42	1672.487	1673.516	1.029	0.961	-1.556	1.626	-1.620
-49.98	1671.781	1673.516	1.735	1.382	-2.156	1.712	-1.560
-55.40	1671.568	1673.516	1.948	1.842	-9.981	5.424	-5.420
-57.10	1673.630	1673.516					
-61.37	1673.755						
-63.90	1673.922						
-74.50	1673.890						
-78.50	1674.057						
Total					-238.70	102.97	-102.20

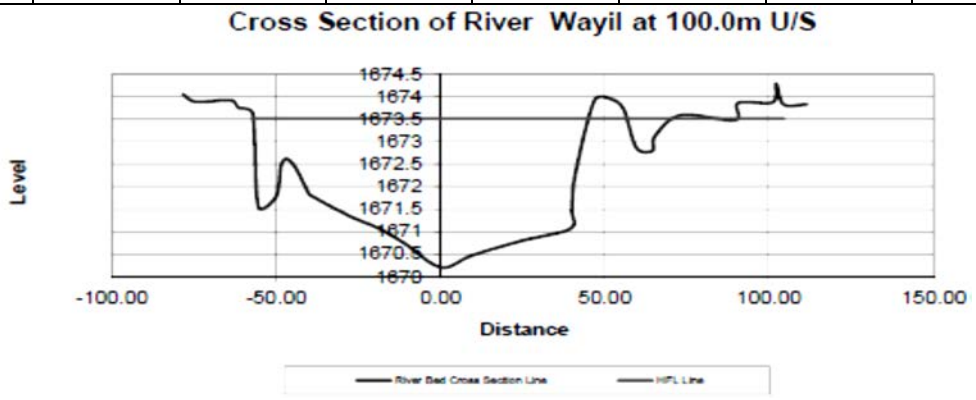


Figure 3.4: Cross-section of River Sindh at Wayil at 100m (Upstream)

3.3.2. Technical Details

1.	**Summary of Cross Section**			
	Cross-Section at	Area (sqm)	Perimeter (m)	Top width of flow (m)
	Proposed Bridge Location U/s side D/s side	-484.64 -238.70 237.74 -114.28 -473.28 -613.72 -423.28 -892.11 -1082.17	118.91 102.97 148.39 118.39 182.74 200.42 322.80 211.92 190.98	-118.14 -102.20 -147.58 -117.97 -175.65 -194.34 -221.83 -206.31 -187.79
	Average	506.66	177.50	163.53
	Cross-sectional area of flow **Width of flow** **Wetted perimeter perpendicular to direction of flow**	506.66 sqm 163.53 m 177.50 m		
	Hydraulic mean radius R=A/P Longitudinal slope as calculated Velocity by Manning's formula	2.85 m 0.0117 m per meter		
	$V=1/n\ R^{2/3}\ S^{1/2}$			
	For winding, some pools & shoals, clean ,lower stages,more effective slope& C/S & stoney section			
	n=	0.065		
	Velocity V=	3.352 m/s		
		1698.18 cum/sec		
	Discharge Q=A*V	3.36 m/s		

2.	**Design Discharge**			
	Hence design discharge	1698.18 cum/sec		
	Design Velocity	3.36 m/s		
	Water Way			
	Provide	23.5 m		
		38 m		
		3 no.		
		107.00 m		
		1.80 m		
		1.20 m		
		110 m		

3.	**Scour Depth**	
	Increase in design discharge, as per IRC:78-2000, cl 703.1.1	10%
	Increased design discharge	1868.00 cum/sec
	Mean depth of scour, as per IRC:78-2000, Cl 703.2	
	dsf = 1.34 (Db 2/Ksf)1/3	17.46 cum/sec/m
	Db = Design discharge per metre width	4.00
	Ksf = Silt factor for Gravel /Boulde Strata.	5.68 m
	dsf =	
	The maximum depth of scour below the HFL for piers having individual foundation without any floor protection	
	Maximum scour depth, as per IRC:78-2000, Cl 703.3 $=2*d_{sf}$ =	11.36 m
	The maximum depth of scour below the HFL for piers having individual foundation without any floor protection	
	Maxm. Normal scour depth, as per IRC:78-2000, cl 703.3 = 1.27*dsf =	7.21 m
	Maxm. Seismic scour depth, as per IRC:78-2000, cl 703.3 = 0.9*1.27*dsf =	6.49 m

4.	**Foundation Depth**	
	Depth of Scour below HFL for Pier Foundation	11.63 m
	HFL at site	1673.516 m
	Max. Scour level for Pier	**1662.154 m**
	Desired foundation level for Pier wall	1662.15 m
	Bottom of Pier foundation provided as	1653.796 > **1666.477 m**
	Desired Scour level for Abutment wall for Normal condn.	1666.301 m
	Bed level at site	1668.358 m
	Desired Scour level for Abutment wall for Seismic condn.	1667.023 m
	Actual foundation level for the Abutment and Pier structure will be modified as per availablity of Firm strata at site as the River bed are of mostly of Hard weatherd rock with big boulder strata, where scour may not occure, and also by providing Toe wall and abutment protection work with Boulder approne etc..	
5.	**Deck level**	
	HFL at proposed bridge site	167.516 m
	Afflux	0.441 m
	Minimum vertical clearance 1.200 m	1.200 m
	Depth of super structure	2.700 m

	Wearing coat	0.056 m
	Minimum deck level required	1677.913 m
6.	**Afflux**	
	Cross-sectional area of flow (A)	506.66 sqm
	Width of flow (W)	163.53 m
	Total water way provided (L)	107.00 m
	Design discharge (Q)	1608.18 cum/sec
	Depth of flow at d/s of bridge Dd=A/W	3.098 m
	L/W	0.654
	The afflux as per Orifice formula	0.441 m
	The afflux adopted	0.441 m

Water Current And Depth Of Scour

As per Cl. no. 219.5.3 of IRC:6-2016, Water current and depth of scour has been considered. The depth of scour under seismic condition to be considered for design shall be 0.9 times the maximum scour depth. The flood level for calculating hydrodynamic force and water current force is to be taken as average of yearly maximum design floods. For river bridges, average may preferably be based on consecutive 7 years' data, or on local enquiry in the absence of such data.

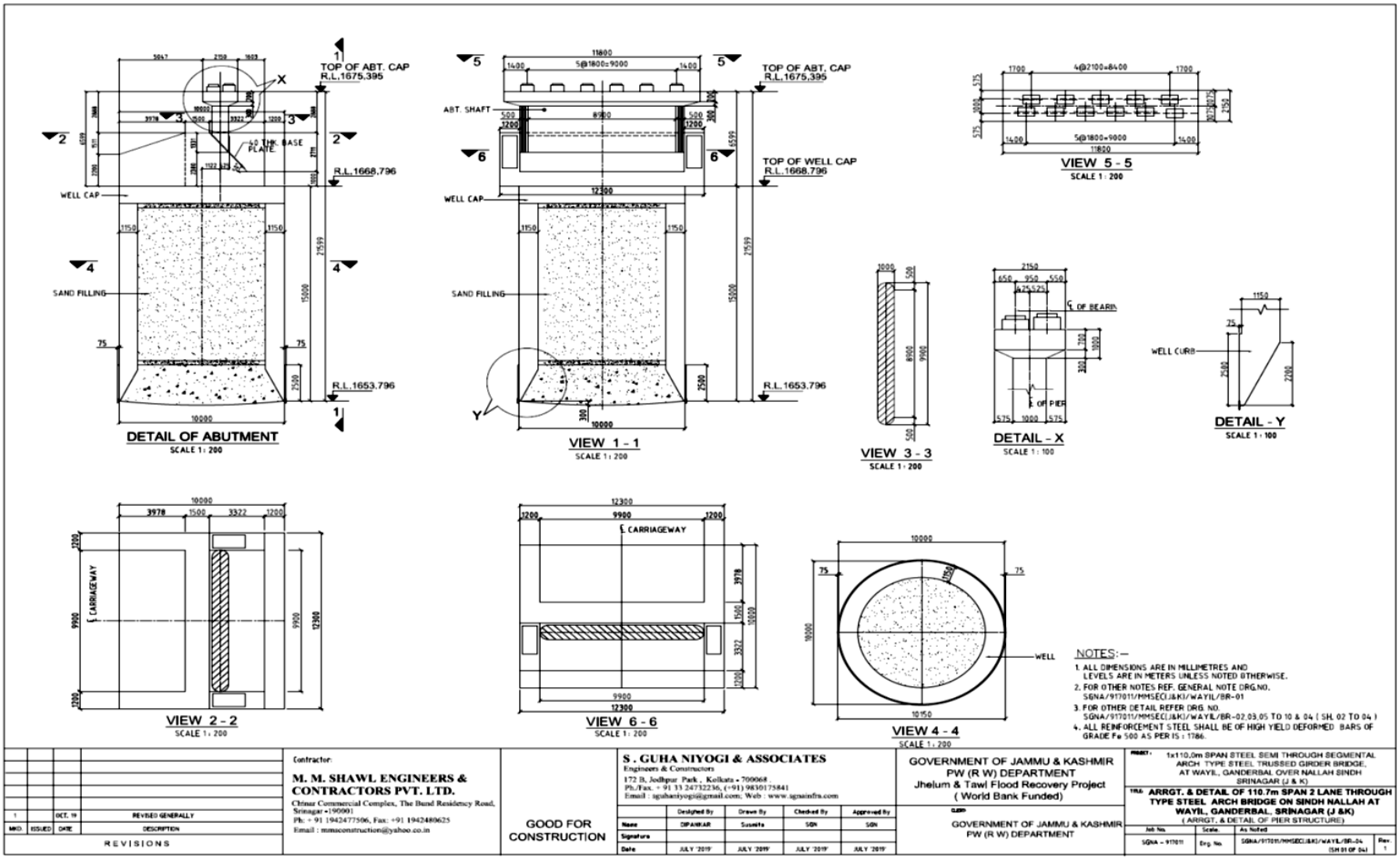


Figure 3.5: Details of the Abutment Dimensions

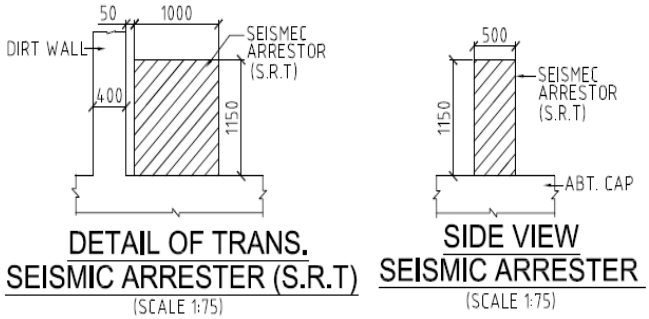


Figure 3.6: Details of the Seismic Arrester

3.3.3. Geotech Investigation and Recommendation

3.3.3.1. Proposed Design Soil / Rock Parameters

Based upon the investigations carried out including field tests and our engineering judgments, following proposed design parameters may be used for foundation design of Bridge founded with cast in-situ RCC Pile foundation or Well foundation is planned.

3.3.3.2. Design Soil / Rock Parameters for Construction of Bridge

Based on field bore log data, it reveals that the project site is completely Bouldery deposits (Residual soils) due to weathering of Slate rock. This is completely to highly weathered rock material that is decomposed and / or disintegrated to soil. This is poorly inter locked, very close to close spacing, heavily broken rock mass with a mixture of rounded to sub-rounded gravels, pebbles, cobbles and boulders of Slate rock. For the purpose of analysis, it is treated as Residual Soil.

3.3.3.3. Foundation Support

Type of Foundation

Considering the nature of soil, type of proposed structures, maximum depth of scour, expected loads on abutments of Bridge foundations, Well foundation or the cast in-situ RCC bored pile foundations is planned for foundation of Bridge.

Well Foundation

Bearing capacity for well foundations in soil has been analyzed similarly as of open foundation. Load Bearing Capacity of Well Foundation shall be determined only from the End Bearing of Foundation Strata and the Side Friction along the Well Shaft shall not be considered. The chances of well foundations (Considered as raft) failing in end bearing in boulder strata is too remote to require consideration in design, consequently the soil design of well foundation in boulders / sandy strata is always governed by settlement criteria.

Settlement for Well Foundations

The magnitude of settlement, when foundation loads are applied, depends upon the compressibility of the underlying strata and rigidity of the substructure. In cohesive deposition, the post construction settlement is caused by dissipation of pore pressures and hence is time dependent so that consolidation settlement is computed for such soils as per IS: 8009 (Part-1), depth correction factor is applied as per IS: 8009 (Part-2). The immediate settlements in clays are estimated using the elastic theory considering the effect of a rigid stratum underlying the foundation soils (Reference: "Foundation Analysis and Design" by J. E. Bowles). The Strata upto influence Zone has been considered same as observed at termination level.

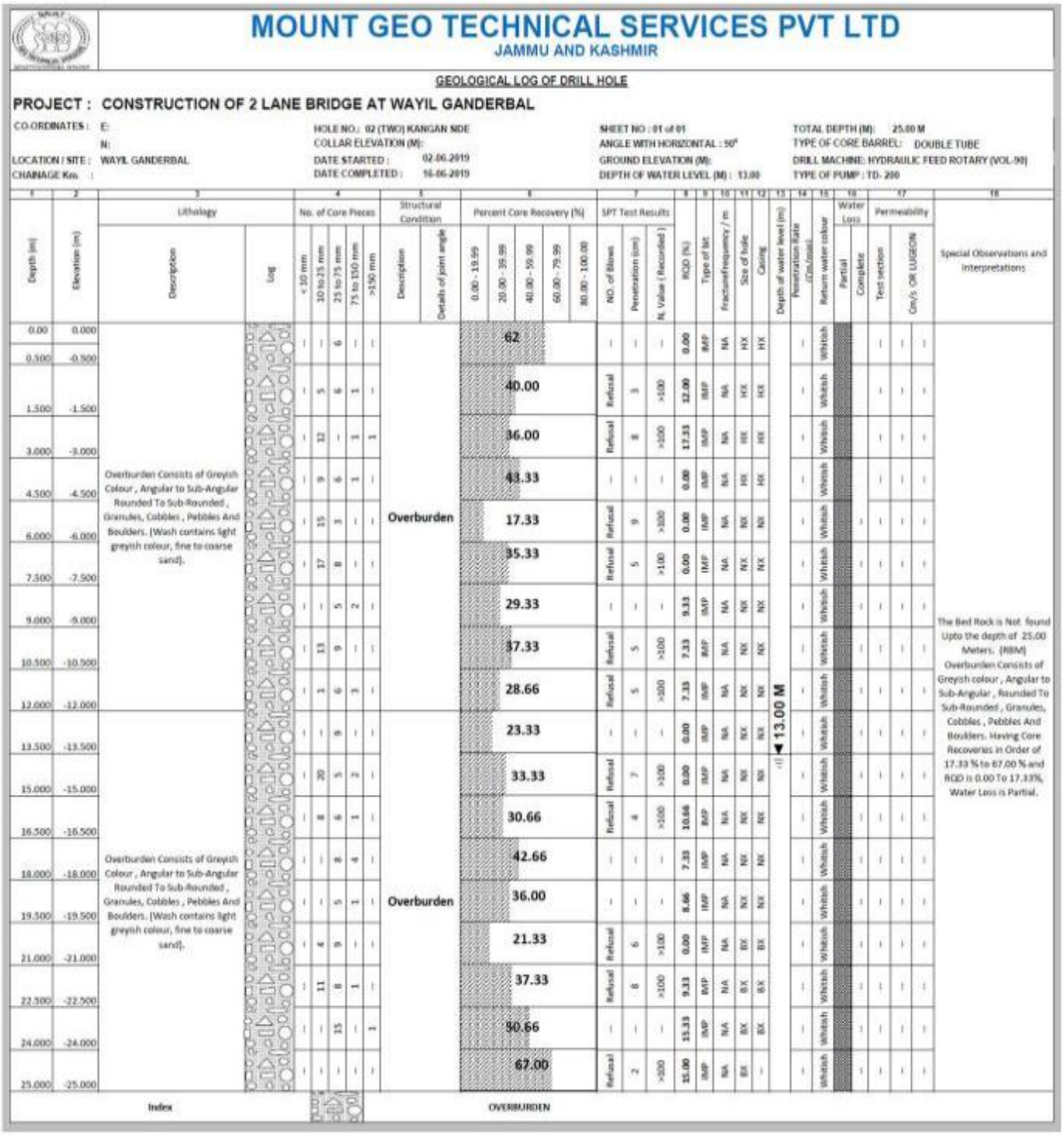
Pile Foundation

RCC bored cast-in-situ piles is recommended to support the structural loads. Based on sub-surface conditions, soil design parameters and calculations attached in Annexure - I, recommendations are presented in normal conditions. The cut-off level has been considered as 4.0 m depth (given by client) for 1200mm diameter bored piles below the ground level / bed level. Ground RL / Bed Level are taken as 100 m for the purpose of pile capacity analysis. Overburden Upto Cut off level has been ignored for design analysis.

Geotech Recommendations

The bore logs and profiles developed on the basis of sub-soil investigation work conducted at Bridge location and considering founding level of well indicate that the well is founded on Alluvium (Gravels/Pebbles / cobbles/boulders with sand matrix). As a result, immediate settlement will govern settlement analysis. The settlement due to dead load of sub-structure will take place by the time the construction is completed and the necessary adjustment in the final level can be made before erection of the super-structure. Based on soil design parameters and calculations net and gross allowable bearing capacities for 10.00m diameter circular well is calculated in normal condition.

Table 3.3: Details of the Geotech Investigations (Borehole profile information)



MOUNT GEO TECHNICAL SERVICES PVT LTD

JAMMU AND KASHMIR

GEOLOGICAL LOG OF DRILL HOLE

PROJECT : CONSTRUCTION OF 2 LANE BRIDGE AT WAYIL GANDERBAL

CO-ORDINATES : E:
N:
LOCATION / SITE : WAYIL GANDERBAL
CHAINAGE Km. :

HOLE NO.: 02 (TWO) KANGAN SIDE
COLLAR ELEVATION (M):
DATE STARTED : 02.06.2019
DATE COMPLETED : 16.06.2019

SHEET NO : 01 of 01
ANGLE WITH HORIZONTAL : 90°
GROUND ELEVATION (M):
DEPTH OF WATER LEVEL (M) : 13.00

TOTAL DEPTH (M): 25.00 M
TYPE OF CORE BARREL: DOUBLE TUBE
DRILL MACHINE: HYDRAULIC FEED ROTARY (VOL-90)
TYPE OF PUMP : TD- 200

Depth (m)	Elevation (m)	Lithology: Description	Lithology: Log	No. of Core Pieces: < 10 mm	10 to 25 mm	25 to 75 mm	75 to 150 mm	>150 mm	Structural Condition: Description	Details of joint angle	Percent Core Recovery (%): 0.00 - 19.99	20.00 - 39.99	40.00 - 59.99	60.00 - 79.99	80.00 - 100.00	SPT Test Results: NO. of Blows	Penetration (cm)	N. Value (Recorded)	RQD (%)	Type of bit	Fracture frequency / m	Size of hole	Casing	Depth of water level (m)	Penetration Rate (Cm./min).	Return water colour	Water Loss: Partial	Water Loss: Complete	Permeability: Test section	Permeability: Cm/s OR LUGEON	Special Observations and Interpretations
0.00	0.000	Overburden Consists of Greyish Colour , Angular to Sub-Angular Rounded To Sub-Rounded , Granules, Cobbles , Pebbles And Boulders. (Wash contains light greyish colour, fine to coarse sand).		-	-	6	-	-	Overburden		62					-	-	-	0.00	IMP	NA	HX	HX		-	Whitish			-	-	-
0.300	-0.300			-	-	6	-	-								-	-	-	0.00	IMP	NA	HX	HX		-	Whitish			-	-	-
1.500	-1.500			-	5	6	1	-				40.00				Refusal	3	>100	12.00	IMP	NA	HX	HX		-	Whitish			-	-	-
3.000	-3.000			-	12	-	1	1				36.00				Refusal	8	>100	17.33	IMP	NA	HX	HX		-	Whitish			-	-	-
4.500	-4.500			-	9	6	1	-				43.33				-	-	-	0.00	IMP	NA	HX	HX		-	Whitish			-	-	-
6.000	-6.000			-	15	3	-	-				17.33				Refusal	9	>100	0.00	IMP	NA	NX	NX		-	Whitish			-	-	-
7.500	-7.500			-	17	8	-	-				35.33				Refusal	5	>100	0.00	IMP	NA	NX	NX		-	Whitish			-	-	-
9.000	-9.000			-	-	5	2	-				29.33				-	-	-	9.33	IMP	NA	NX	NX		-	Whitish			-	-	-
10.500	-10.500			-	13	9	-	-				37.33				Refusal	5	>100	7.33	IMP	NA	NX	NX		-	Whitish			-	-	-
12.000	-12.000			-	1	6	3	-				28.66				Refusal	5	>100	7.33	IMP	NA	NX	NX	▼ 13.00 M	-	Whitish			-	-	-
13.500	-13.500	Overburden Consists of Greyish Colour , Angular to Sub-Angular Rounded To Sub-Rounded , Granules, Cobbles , Pebbles And Boulders. (Wash contains light greyish colour, fine to coarse sand).		-	-	8	-	-	Overburden			23.33				-	-	-	0.00	IMP	NA	NX	NX		-	Whitish			-	-	-
15.000	-15.000			-	20	5	2	-				33.33				Refusal	7	>100	0.00	IMP	NA	NX	NX		-	Whitish			-	-	-
16.500	-16.500			-	8	6	1	-				30.66				Refusal	4	>100	10.66	IMP	NA	NX	NX		-	Whitish			-	-	-
18.000	-18.000			-	-	8	4	-				42.66				-	-	-	7.33	IMP	NA	NX	NX		-	Whitish			-	-	-
19.500	-19.500			-	-	5	1	-				36.00				-	-	-	8.66	IMP	NA	NX	NX		-	Whitish			-	-	-
21.000	-21.000			-	4	9	-	-				21.33				Refusal	6	>100	0.00	IMP	NA	BX	BX		-	Whitish			-	-	-
22.500	-22.500			-	11	8	1	-				37.33				Refusal	8	>100	9.33	IMP	NA	BX	BX		-	Whitish			-	-	-
24.000	-24.000			-	-	15	-	1				50.66				-	-	-	15.33	IMP	NA	BX	BX		-	Whitish			-	-	-
25.000	-25.000			-	-	-	-	-				67.00				Refusal	2	>100	15.00	IMP	NA	BX	-		-	Whitish			-	-	-

The Bed Rock is Not found Upto the depth of 25.00 Meters. (RBM) Overburden Consists of Greyish colour , Angular to Sub-Angular , Rounded To Sub-Rounded , Granules, Cobbles , Pebbles And Boulders. Having Core Recoveries in Order of 17.33 % to 67.00 % and RQD is 0.00 To 17.33%, Water Loss is Partial.

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OVERBURDEN

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 bridge project in Kashmir region entitled as "Construction of 1x110 meter Span 2 Lane Semi Arch Segmental Steel Trussed Girder Bridge over River Sindh at Wayil of District Ganderbal". The various principles are applicable and regulatory clearances required for the proposed construction of Wayil 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 Pollution Control Board (J&KPCB) at the local level in the present context to the proposed 1x110 m span bridge at Wayil of District Ganderbal.

4.2. Applicable National and Local Regulations

The key environmental and other regulations relevant to the proposed Construction of 1x110 meter Span Bridge at Wayil Village of District Ganderbal in Kashmir region is presented in Table 4.1

Table 4.1: Environmental Regulations Relevant to Construction of 1x110 m span Bridge at Wayil Village in Disstrict Ganderbal in J&K 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 state or the Government is not triggered.	The project road is not covered under the preview of EIA Notification 2006 and subsequent amendments. However, for 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 Wayil Bridge in Ganderbal District 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 construction of Wayil Bridge in Ganderbal District 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 Wayil Bridge in Ganderbal District 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 Wayil Bridge over River Sind in Ganderbal District to manage liquid waste discharges from a work camp, concrete batch mix plant, site 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&KSPCB, Government of J&K
6.	Noise Pollution (Regulation and Control Act),2000	This act will be applicable for all construction equipment/ plant and machinery including vehicles deployed for implementation of the proposed construction of Wayil Bridge in Ganderbal District regulate	Noise levels are to be controlled during construction works for the proposed construction of Wayil Bridge in Ganderbal District in conformity	J&KSPCB, Government of J&K

		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	with the permissible standards	
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. (However, the proposed site does not involve demolition of any bridge/ culverts).	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	State 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 Wayil Bridge in Ganderbal District.	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.	State Labour Department
10.	Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 2019	This act will be applicable for all construction equipment/plant and machinery including vehicles deployed during construction of Wayil Bridge in Ganderbal District	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	To ensure safety and welfare measures for workers employed at construction sites. Compliance to provisions of	Safety and welfare measures for workforce employed at construction sites	Labour and Employment Department, Govt. of J&K

	Employment and Conditions of Service) Act, 1996/ Jammu and Kashmir Building and Other Construction Workers (Regulation of Employment and Condition of Services) Rules, 2006	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 Wayil Bridge in Ganderbal District	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	
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 on a Wayil Bridge. The rule includes storage, handling, transportation procedures and requirements for safe disposal of hazardous wastes.	Hazardous Waste Authorisation with CTE and CTO by the contractor.	J&KSPCB
13.	Solid Waste Management Rules, 2016	This rule 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.	No scheduled trees are coming withinnthe proposed bridge project.	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

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 1x110 meter span Wayil Bridge in District Ganderbal are given in **Table 4.3**.

Table 4.3: Relevant and Applicability of WB Safeguard Policies for Construction of 1x110.7 meter Wayil Bridge in District Ganderbal.

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 overallall governing policy intended to ensure Bank-financed projects are environmentally sound and sustainable	All potential impacts due to the construction of 1x110 meter span Wayil Bridge over River Sindh in District Ganderbal is assessed and necessary mitigation measures have been integrated 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 1x110 meter Wayil Bridge over River Sindh in District Ganderbal 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 1x110 meter Wayil Bridge over River Sindh in District Ganderbal is not located in any forest area.	Not Triggered
4..	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 Wayil village 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	-

65.	OP/BP 4.12 Involuntary Resettlement	The policy covers not only physical relocation but any loss of land or other assets resulting in relocation or loss of shelter; loss of assets or access to assets; loss of income sources or means of livelihoods, whether or not the affected people must move to another location.	The land coming in the approach corridor on both sides is of Government/ Private Land. The private land acquisition is of minor type. Hence, there are no significant social impacts; therefore, ARAP and Social Assessment study is required to be undertaken.	Not Triggered

4.4. MoRTH & IRC Specifications

Section 111	Precautions for safeguarding the environment
Clause 201.2	Preservation of Property/Amenities during clearing and grubbing
Clause 301.3.2	Stripping and storing of topsoil for reuse during excavation for roadway and drains
Clause 302.4	Restriction on timings for blasting operations
Clause 304.3.6	Public safety near towns/villages where excavation is carried out
Clause 305.2.2.2	Locations of borrowing and relevant regulations
Clause 305.3.3	Stripping and storing of topsoil at borrow locations
Section 306	Soil erosion and sedimentation control
Clause 407.4.2	Provisions for turfing on median and islands
Clause 701.2.1	Use of geotextiles (Jute or Coir) for control of soil erosion
Section 810	Use of Metal beam crash barriers for safety, relevant regulations and specifications

4.5. Applicability of International Conventions

4.5.1. Ramsar Convention on Wetlands of International Importance, 1971 (Not Applicable for the proposed Wayil 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.

4.5.2. International Union for Conservation of Nature (IUCN) (Not Applicable for the proposed Wayil 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.

4.6. Indian Road Congress (IRC) Code of Practices applicable for the proposed Wayil Bridge

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

Table 4.4: Indian Road Congress Code of Practices for Project Road

S. No.	IRC Code Theme	Year	Purpose	Applicability
1.	Recommendations for Road Construction in Areas Affected by Water Logging, Flooding and/or Salts Infestation	IRC:34-2011	Construction in 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
6.	Guidelines on Road Drainage	IRC: SP: 42-1994	Drainage	Yes
7.	Highway Safety Code	IRC: SP: 44-1994	Highways safety	Yes
8.	Guidelines for Use of Geotextiles in Road Pavements and Associated Works	IRC:SP:59-2002	Use of Geotextiles in Road Pavements and Associated Works	Yes
9.	Guidelines for Soil and Granular Material Stabilization Using Cement Lime and Fly Ash	IRC:SP-89-2010	Soil and Granular Material Stabilization Using Cement Lime and Fly Ash	Yes
10.	Guidelines on Requirements for Environmental Clearance for Road Projects	IRC:SP-93-2017	Requirements for Environmental Clearance for Road Projects	Yes
11.	Use of Cold Mix Technology in Construction and Maintenance of	IRC:SP-100-2014	Use of Cold Mix Technology in	To be considered

S. No.	IRC Code Theme	Year	Purpose	Applicability
	Roads Using Bitumen Emulsion		Construction and Maintenance of Roads Using Bitumen Emulsion	
12.	Guidelines on Preparation and Implementation of Environment Management Plan	IRC:SP-108-2015	Preparation and Implementation of Environment Management Plan	Yes

4.7. Environmental Standards

Various environmental standards like National Ambient Air Quality Standards, Ambient Noise Standards, Drinking Water Standards applicable to the construction of 1x110 m Span Bridge at Wayil over River Sindh in District Ganderbal 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) mg/m^3	8 hours*	02	02
	1 hour**	04	04
Ammonia (NH_3) $\mu g/m^3$	Annual*	100	100
	24 hours**	400	400

Benzene (C_6H_6) µg/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 premises as hospitals, educational institutions and courts. The silence zones are to be declared by the Competent Authority
Note-4 Mixed categories of areas should be declared as one of the four above mentioned categories, by the Competent Authority and the corresponding standard shall apply.

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^{0}C)	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 (SO_4)	400	Barium Chloride method
10	Oil and Grease	0.1	Partition -Gravimetric method
11	Nitrates	50	Chromotropic acid
12	Total Coliform (MPN/100 ml)	5000	Multiple Tube Fermentation Technique

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

5. BASELINE ENVIRONMENTAL CONDITIONS

5.1. General

Ganderbal district is situated at a distance of 18.3 Km from Srinagar and 23 Km from Bandipora. The district is Located extreme northern region of India in the state of Jammu and Kashmir. It has an average elevation of 1,619 m. Total geographical area of the district is 39304 ha and the land use is categorized as cultivated land (42.42%), forest (27.86%), non-agricultural use (14.65%), barren and uncultivable land (8.04%), permanent pastures and other grazing land (4.55%) and cultivable waste land (2.48%).The district is located between 34.23 °North to 74.78 °East of latitude & longitude respectively. It is bordered by the Srinagar district in the south, Bandipore to the north, Kargil in the north-east, Anantnag to the southeast and Baramulla in the south-west. The district is constituted into Six tehsils (Ganderbal, Lar, Kangan, Tullmulla, Wakura & Gund). It comes under western Himalayan region having temperate agro-climatic zone, normal annual rainfall is about 676 mm with 67 rainy days and the temperature varies between 3.9 to 22.5°C.

Wayil village is located in Ganderbal Tehsil of Ganderbal district in Jammu & Kashmir. It is situated 7.6 km away from Ganderbal, which is both district & sub-district headquarter of Wayil village. The total geographical area of village is 4.50 sq km as per 2011 census. Wayil has a total population of 8335 peoples. There are about 1429 households in Wayil village. The nearby villages of Wayil are Manigam, Malapora, Arch, Ganderbal, Wussan, Drag Tanga, Palang, Kangan, Sonamarg etc.

The proposed subproject is Engineering, Procurement and Construction (EPC) mode contract for the “Design and Construction of 1x110 meter Span 2 Lane Semi Arch Segmental Steel Trussed Girder Bridge over River Sindh at Wayil in District Ganderbal, Jammu & Kashmir.

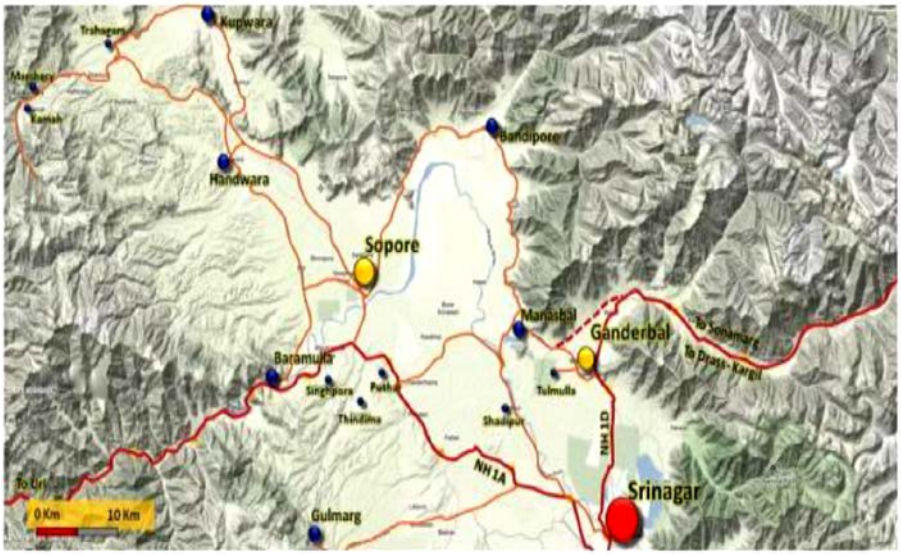


Figure 5.1: Map showing regional connectivity of Ganderbal District

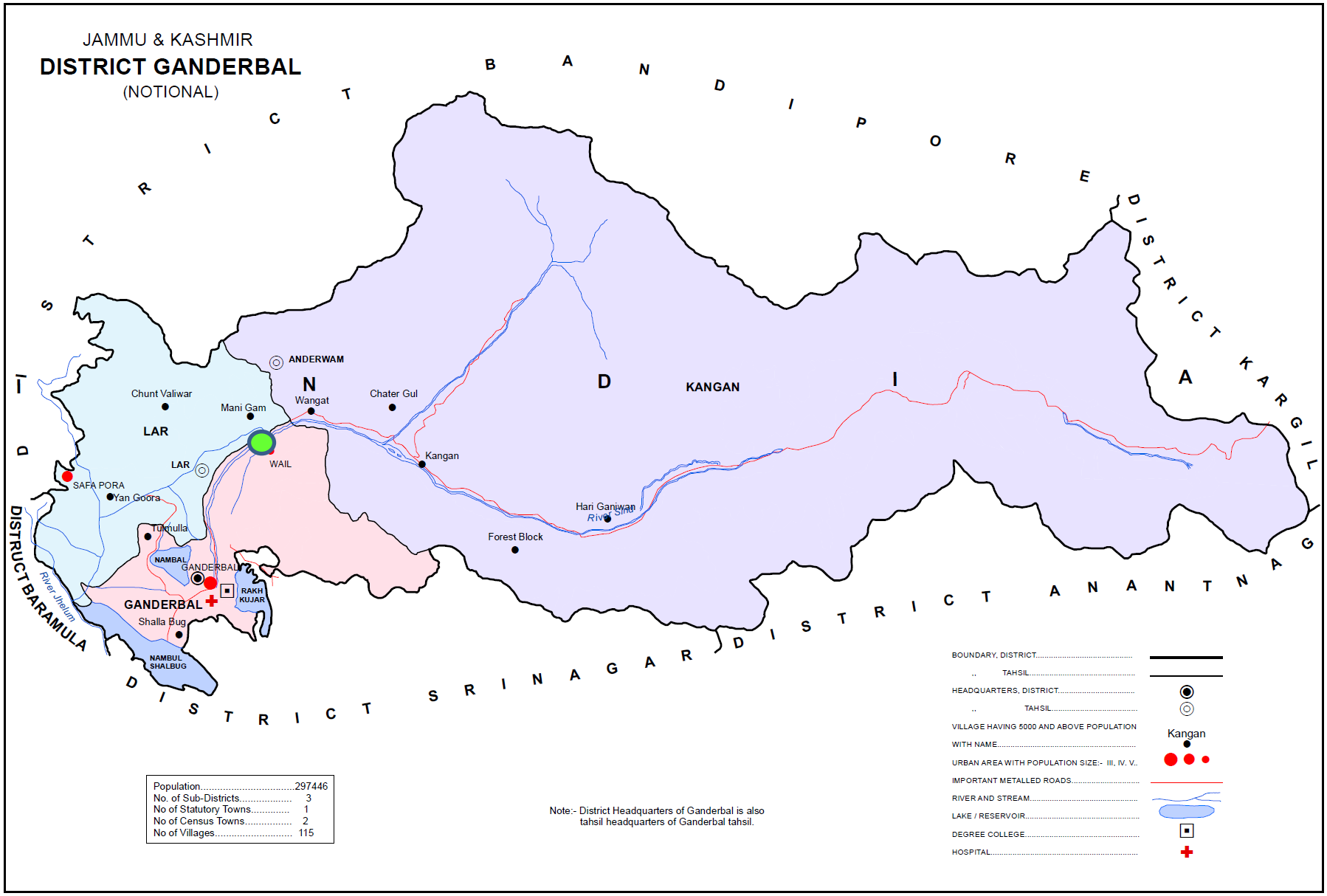


Figure 5.2: Map of District Ganderbal showing proposed Wayil Bridge site (Green dot for site reference).

5.2. Study Area

The proposed 1x110 m span of 2 lane semi arch segmental bridge on River Sindh in Ganderbal District of J&K. The project is located in Wayil Village in District Ganderbal. The proposed bridge lies between the Latitudes of 34°16'30.00"N and the Longitude of 74°48´27.83"E. The bridge site is located at Wayil in Ganderbal Block in District Ganderbal of Jammu & Kashmir State, India. Wayil village is located in Ganderbal Tehsil of Ganderbal district in Jammu & Kashmir. It is located on the bank of Sind Nallah. The proposed bridge is 7.6 Km towards N-W from District head quarters Ganderbal and 20.56 Km from State capital Srinagar. The total geographical area of village is 4.50 sq.km. Wayil has a total population of 8335 peoples. There are about 1429 households in Wayil village. The nearby villages of Wayil are Manigam, Malapora, Wussan, Drag Tanga, Arch, Palang, Kangan, sonamarg etc.

The bridge is a major/vital connecting link between Srinagar and Leh-Ladakh besides vast areas of the Wayil and Manigam. The proposed bridge is to be constructed on Srinagar-Leh NH 1D. It also connects tens of villages like Wayil, Manigam, Malapora, Arch, Ganderbal, Wussan, Drag Tanga, Palang, Kangan and tourist hub Sonamarg etc. The bridge thus serves as an important link between these villages having approximate population of 60,000. Moreover, the area being tourist hub as important tourist destination Sonamarg falls on same highway and district.

A temporary old bailey bridge over River Sindh exist at Wayil on RHS of the proposed bridge site, which was constructed over two decades ago in 1993 by the Border Road organisation (BRO). The existing bridge, which connects Srinagar with Leh, got damaged due to the floods.. The existing bridge have a single lane configuration is so narrow that even a pedestrian has to go back half way if a heavy vehicle is crossing on it. Keeping in view the high volume of traffic plying on the existing national highway, a 1x110 m span of 2 Lane, bridge with carriage way width of 7.50 m and 1.50 m footpaths on either side is proposed. The alignment of the proposed bridge has been proposed downstream of the existing bridge, which involves acquiring of State/ Private land for construction of the approaches. A 1x110 m span of 2 lane bridge has been proposed keeping in view the highly torrential nature of the River Sind and importance of its connectivity with the Srinagar-Ladakh and number of villages. The proposal has been made also to negate any effects given the River Sindh has tendency to change its course.

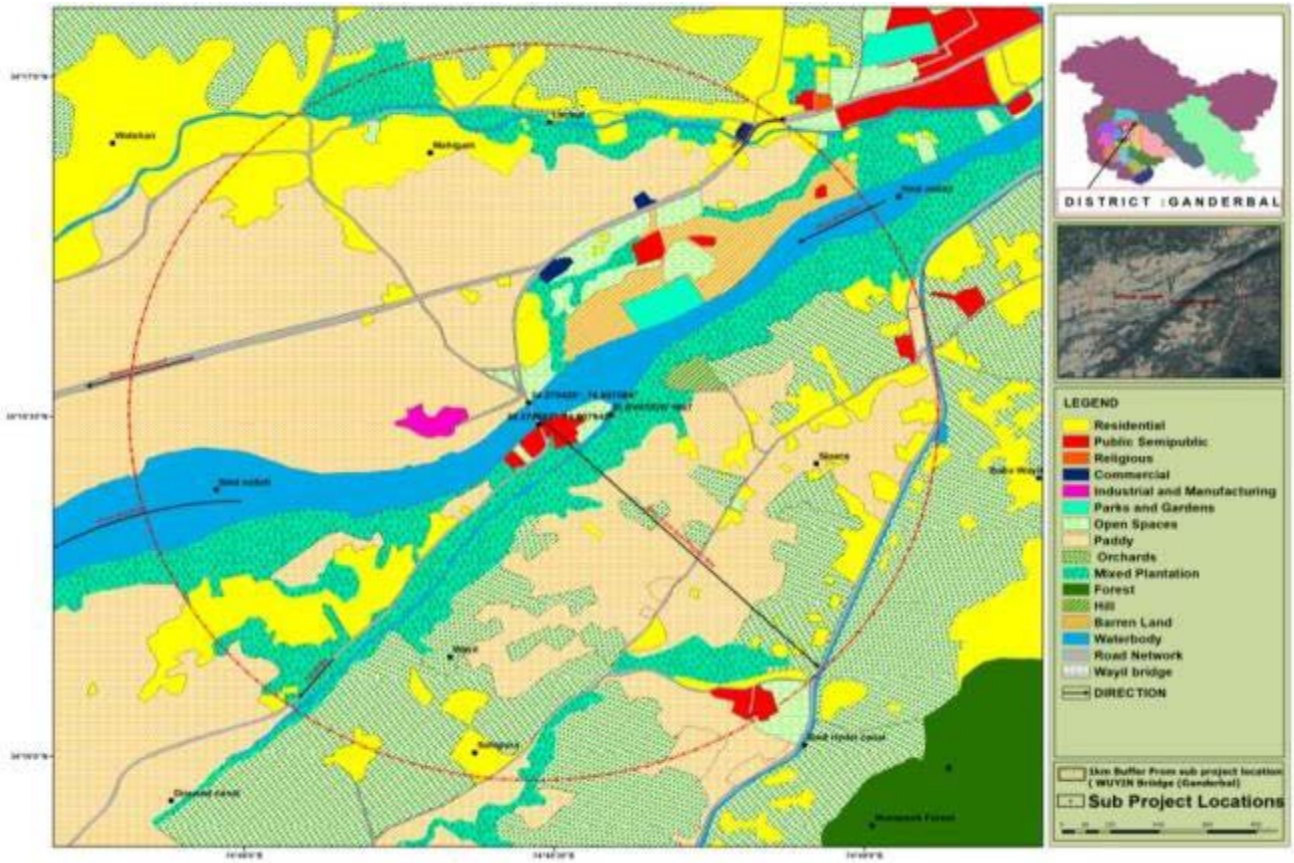


Figure 5.3: GIS/ LULC Map of Project Influence Area (PIA) of proposed bridge at Wayil.

5.3. Topography and Physiography

Ganderbal district is located at a distance of 18.3 Km North of District Srinagar. The district mostly stretches from south-west to North-east with a length of 125 kms and this stretch has a width of around 10-20 kms at an elevation of 1650 to 3000 meters above the Mean Sea Level (MSL). Nearly 70% area of the District is hilly and semi-hilly. Total geographical area of the district is 39304 ha and the land use is categorized as cultivated land (42.42%), forest (27.86%), non-agricultural use (14.65%), barren and uncultivable land (8.04%), permanent pastures and other grazing land (4.55%) and cultivable waste land (2.48%). The district is located between 34.23 °North to 74.78°East of latitude & longitude respectively.

Ganderbal District has a topography which ranges from cold desert with lofty mountains barren of any vegetation in areas adjacent to District Kargil to temperate climate in the rest of the District. Due to Funnel Effect, western disturbances bring in large precipitate in areas around Zojilla & Sonamarg. In fact these are the areas with the highest precipitation in the Valley. The Sind River, a major tributary to the Jehlum River flows through this district. The water of the river is mainly used for irrigation, and generation of hydroelectricity.

The total area under forests is 988 hectares in the district. At present there are two forest ranges viz., Manasbal Range and Sindh Forest Division. Ganderbal has been blessed by

nature with a network of water resources including River Sindh, Wangath stream, Chattergul, Markul, Tulmulla spring. Besides, high altitude lakes like Kishen Sar, Vishan Sar, Gangbal, Gad Sar, Larkul etc. In view of the topography, the district offers great potential for the development of cold water and warm water fisheries. Trout has been inhabited in the streams and lakes of district for angling purposes. Besides, the two trout rearing units' viz., Margund and Mammer have been well established in the district.

The physiography of Ganderbal can be studied with three major physical divisions; plains, plateau and maintains.

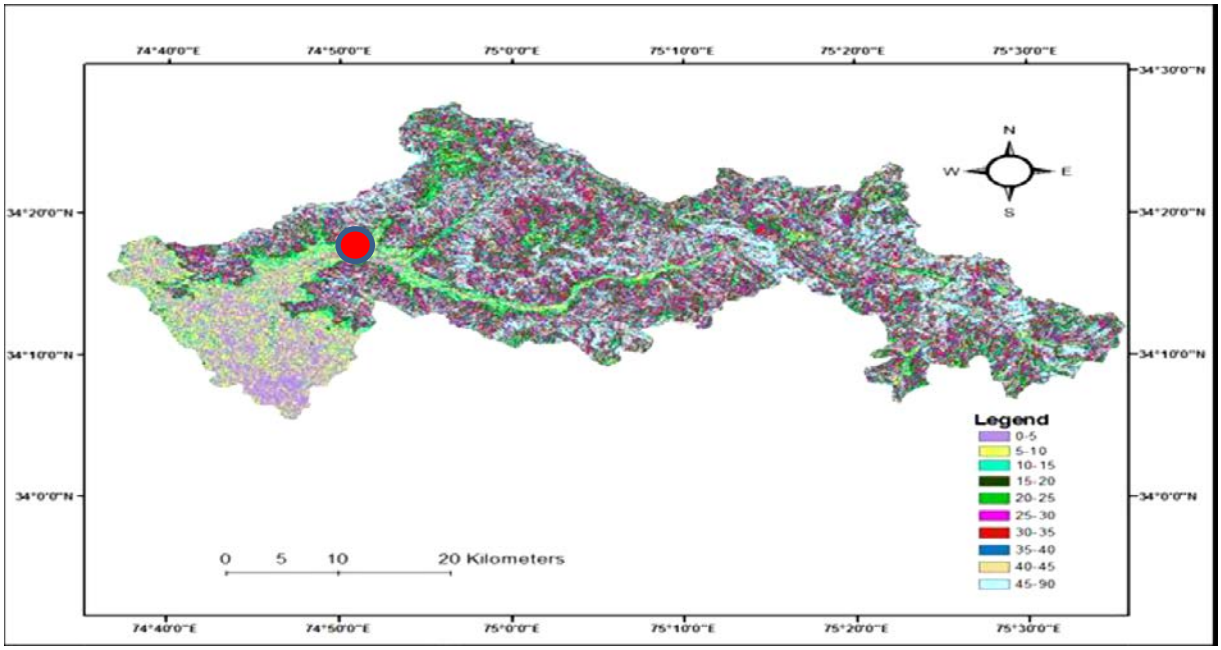


Figure 5.4: Slope Map of the Sindh Catchment (Blue dot showing proposed Wayil bridge site in flatter terrain of the Sindh floodplain)

The slope map of the area reveal that most of the area is under the slope range of 45^{o}-90^{o} having an area of 230.3 km^2 comprising 13% of the total area of the catchment. This explains why there are high percentages of land under canyons and gorges found in the area. Also due to high slope river flow velocity is always very high. The least area is under the slope range of 10^{o}-15^{o} having an area of 112.41 km^2 consists of 6% of the total area of the catchment. The River Sindh falls in the slope range between 0^{o}-20^{o}.The slopes is used to compute the direction and volume of flow. In this area, high elevated region are highly mountainous and rugged and low elevated regions are steeper.

As per aspect Map of this area the maximum aspect is in south direction having an area of 295.98 km^2 and comprising 17.793 % of the total catchment area. The least aspect is in Flat direction having an area of 0.59 km^2 comprising 0.035% of the total catchment area.
Ganderbal and River Sindh (locally known as Sendh) are inseparable entities. Lofty mountains and Glaciers being sources of this torrential river, heavy and ferocious floods have

occurred at least twice in last two decades. Great force and velocity of water has caused severe damages to villages and infrastructure like bridges and National Highway. As the river slows down near Ganderbal, where it enters plains, water logging and flooding are recurring features in villages of Sherpathri.

The proposed bridge is constructed at Wayil Village in Ganderbal block over River Sindh. The proposed site lies on a flatter terrain in a flood plain area of tributary of River Sindh. The surrounding localities in project influence area is Wayil village which connects rest of the adjoining areas. The land-use/ land-cover are mainly agricultural/ horticultural activity, residential set-up in pockets, fruit orchards- Apples, Mulberry, etc. Large Rice/Paddy fields are main agricultural actrivity in Wayil area.

Figure 5.5: Google Map showing general Land-use/ Land-cover Pattern of the proposed Bridge project at Wayil, District Ganderbal

5.4. Geology & Soil Type

The District Ganderbal comes in the Kashmir Higher Himalayas range and is comprises of formations like Granite, Panjal Traps, Slates, Phyllites, Karewas and recent alluvium. Panjal Traps, Slates and Phyllite are the important rock units in the area. Slates and Phyllites are Cambro-Silurian age while the Panjal Traps belong to Upper Carboniferous to Lower Triassic age. The Cambro-Silurian Slates which are bedded, folded, foliated, sheared and fractured while the Panjal Traps bedded lava flows are jointed, sheared, vesicular to non-vesicular (chilled). The vesicles are filled up with secondary minerals forming amygdaloidal structure in

the Panjal Traps at some places. The contact between two formational units is eruptive in nature. Several overburden units with three main bed rock formations are available in the area. The overburden units are slope debris, rock-fall debris, nallah debris, avalanche debris and river terrace deposits of Recent to Sub-Recent age and the fluvio-glacials material of Upper Pliocene to Pleistocene age. The bedrock formations in the younging order are predominantly Slate rocks of Cambro-Silurian age, the main lava-flows of Panjal Volcanics (Upper Carboniferous to Lower Triassic age) and the sedimentary sequence of Karewas (Upper Pliocene to Pleistocene). The slope debris partake constitutional characteristics of nearby upslope existing rock or pre-existing overburden units. The unit is loose and unconsolidated. The stratigraphic sequence of the geological Formations with general lithology of District Ganderbal is given in Table-5.1. The geological map of the region is shown at Fig.5.5.

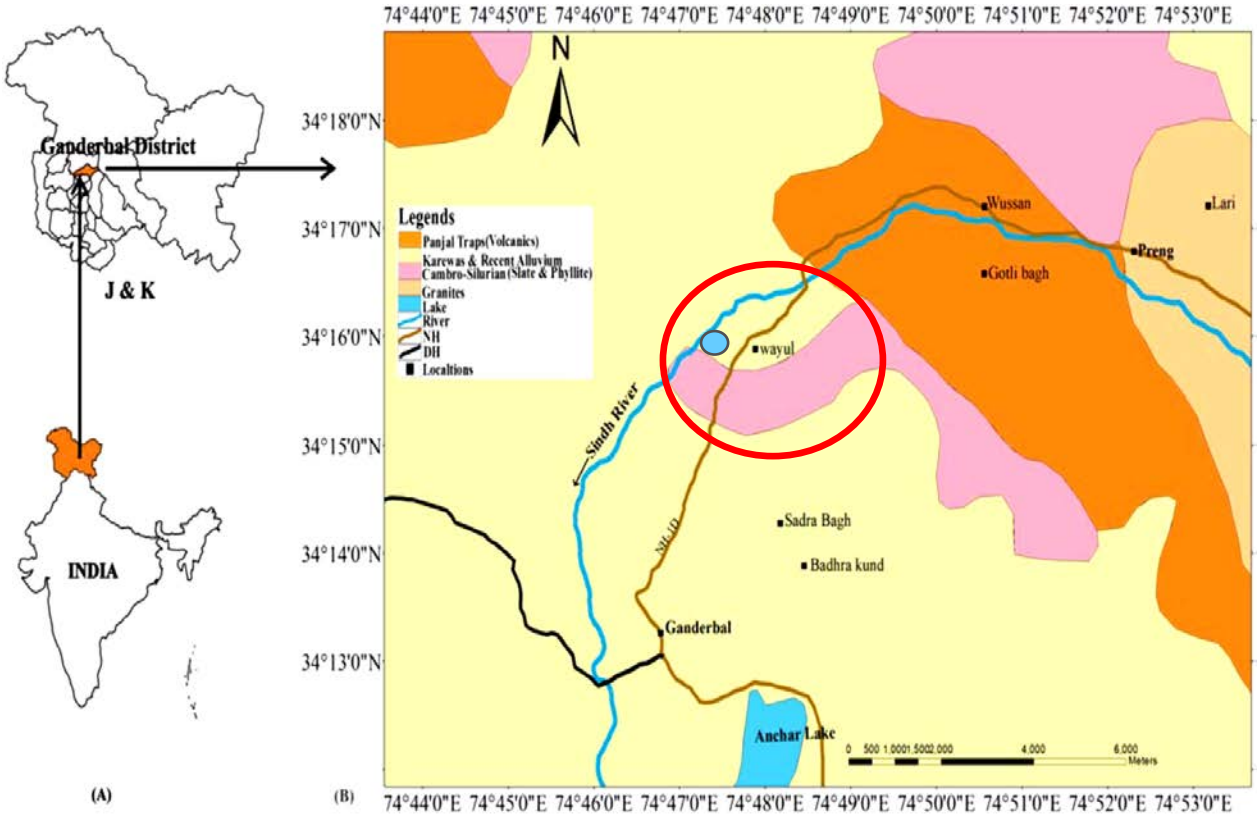


Figure 5.6: Geological map of the Ganderbal District

The brief generalized geological succession in the Ganderbal district is given below:

Table 5.1: Regional Stratigraphy of the Ganderbal District

S. No.	Formation	Lithology	Group	Age
1	Alluvium/Secree	Salt, clay, gravel, sand	-	Halocene
2	Dilpur Formation	Golden Brown Silt	Karewa group	Lower Pliocene-Pleistocene
3	Khrew Formation	Massive Limestone, Dolomite, and Quartzite	Vihi Group	Upper Permian-Triassic
4	Panjal Volcanics	Andesitic and basaltic lava flows	-	Carboniferous to late Triassic
5	Agglomeratics Slates	Pebbly slate, quartz arenite, conglomerate, pyroclast	Panjal Group	Upper Carboniferous-Permian
6	Natnus Formation	Shale with monor siltstone and arenite	Pohru Group	Cambrian-Silurian

The Geomorphological pattern of the Kashmir Himalayas is unique and presents a characteristic picture of landforms that are closely related to the orography and structure which form different drainage basins. All these basins have complex nature in their surface and subsurface topography comprising ridges and depressions, which were later covered by the Quaternary alluvium of varying thickness. The geomorphic features indicate a fluvio-glacial origin. The fluvio- glacial cover a wide expanse of this area. This unit is further divided into the following three subunits viz. Fluvioglacial of side valleys, predominantly clayey fluvio-glacial and predominantly boulder fluvio-glacial material. The Ganderbal area consists of mountain tops, plains, Canyons (Deeply incised streams) and Open slopes. The area has a very complex and rugged topography with very high relief and steep slopes the results of, slope, aspect provide a better understanding of the geomorphic processes prevailing in the area. Relief influences steepness, which controls the energy available for driving forces (runoff).

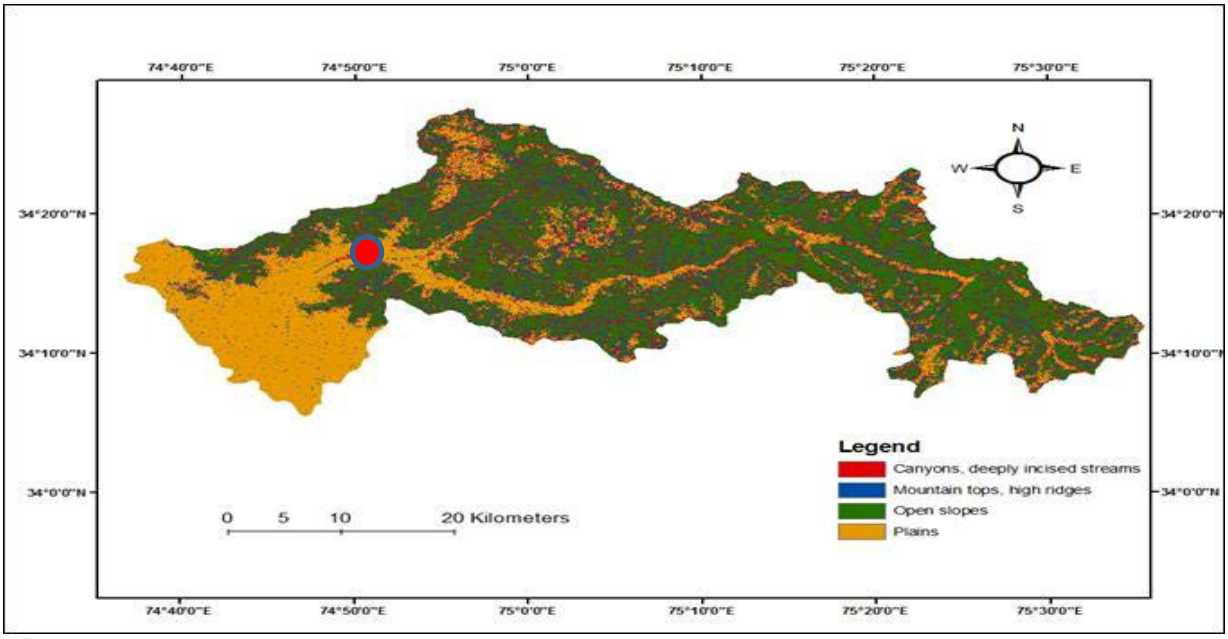


Fig 5.7: Geomorphological Map of Sindh Catchment (Red dot showing proposed bridge site at Wayil)

Table 5.2: Statistics of the Geomorphological Map shows Area occupied by each class of geomorphic unit.

Class	Area (Sq. km)	Area (%)
Canyons, deeply, incised streams	279.7	16.816
Plains	447.97	26.933
Open Slope	532.39	32.009
Mountain Tops, High Ridges	403.17	24.240

Soil Type

The soils in J&K are loamy and there is little clay content in them. Poor in lime but with a high content of Magnesia, the soil is treated with chemical fertilizers and enriched with green manure and legume before cultivation. There are sufficient organic matter and nitrogen content in the alluvium of the Kashmir valley as a result of plant residue, crops stubble, natural vegetation and animal excretion. The valley of Kashmir has many types of soils like Gurti (clay), Bahil (Loam), Sekil (Sandy), Nambaal (Peats), Surzamin, Lemb, Floating garden soils and Karewa soils. No wonder, in Kashmir, the soil is virtually worshipped as a miracle of divinity as it is a source of wealth of the land. The soils of the Kashmir Valley are of two types *viz,* Hapludalfs and Ochraqualfs.

In this district low-lying areas of south have Danez soil (marshy soil), foot hills have silty soil intermixed with silt and loam. Some areas falling in between foot hills and flood plains have loamy soil which is suited for paddy cultivation The District has mostly expanded loamy soil and foot hills.

The character of the soil in the district which is a central part of K ashmir valley has been studied with reference to broad physiographic division and accordingly the main soil types are classified as under:

1. The highlands mainly between 1850 and 3350 metres (asl).
2. The Karewa uplands.

The soil on the flanks of the River Jhelum is most fertile as it gets periodically renewed and enriched with fresh deposition of silt by recurrent floods. The soil on highlands and Karewas is different at different places and their fertility depends upon the site, nature of slope and altitude of the places. The classification on the basis of chemical properties and suitability for cultivation of different crops with local names is given as under:

- Gurti or silt: Owes its origin to floods which are frequent.
- Bahil or Loam is a prized soil and possesses great natural strength when dry it appears black.
- Sekil is an important type of soil used for growing rice. It is mixture of loam and sand.
- Surzamin is a soil used for growing vegetables.
- Lemb is a soil in which springs occur.
- Rad is a typical type of floating soil on the surface of water. These strips of artificial land are made of Lake Weed, grass and clay.
- Wudar is table lands used for fruit cultivation such as almonds, apple and cherry.
- Numbal or swamps are found in Anchar lake areas.

As per Geo-Technical Investigation carried by the M/s Mount Geo Technical Services Pvt. Ltd. Wathoora, Budgam J&K, for the Contractor- M/s MM Shawl, the proposed bridge site at Wayil comprised completely of Bouldery deposits (Residual soils) due to weathering of Slate rock. This is completely to highly weathered rock material that is disintegrated to soil. This is poorly inter locked, very close to close spacing, heavily broken rock mass with a mixture of rounded to sub-rounded gravels, pebbles, cobbles and boulders of Slate rock. For the purpose of analysis, it is treated as Residual Soil.

Table 5.3: Details of the Soil Strata Type at proposed Wayil Bridge Location

Depth (m)	Soil Type
Borehole- 1 & 2	**Location: Wayil, Ganderbal**
0.00 – 21.00	Gravelly / Bouldery in matrix of sand
0.00 – 25.00	Gravelly / Bouldery in matrix of sand

Source: Geo-Technical Investigation (Mount Geo Technical Services Pvt. Ltd for the M/s MM Shawl Engineers & Contractors Pvt. Ltd.)

5.5. Natural Hazards

The state 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 state. The project site of Wayil (Ganderbal) 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.

5.5.1. 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.

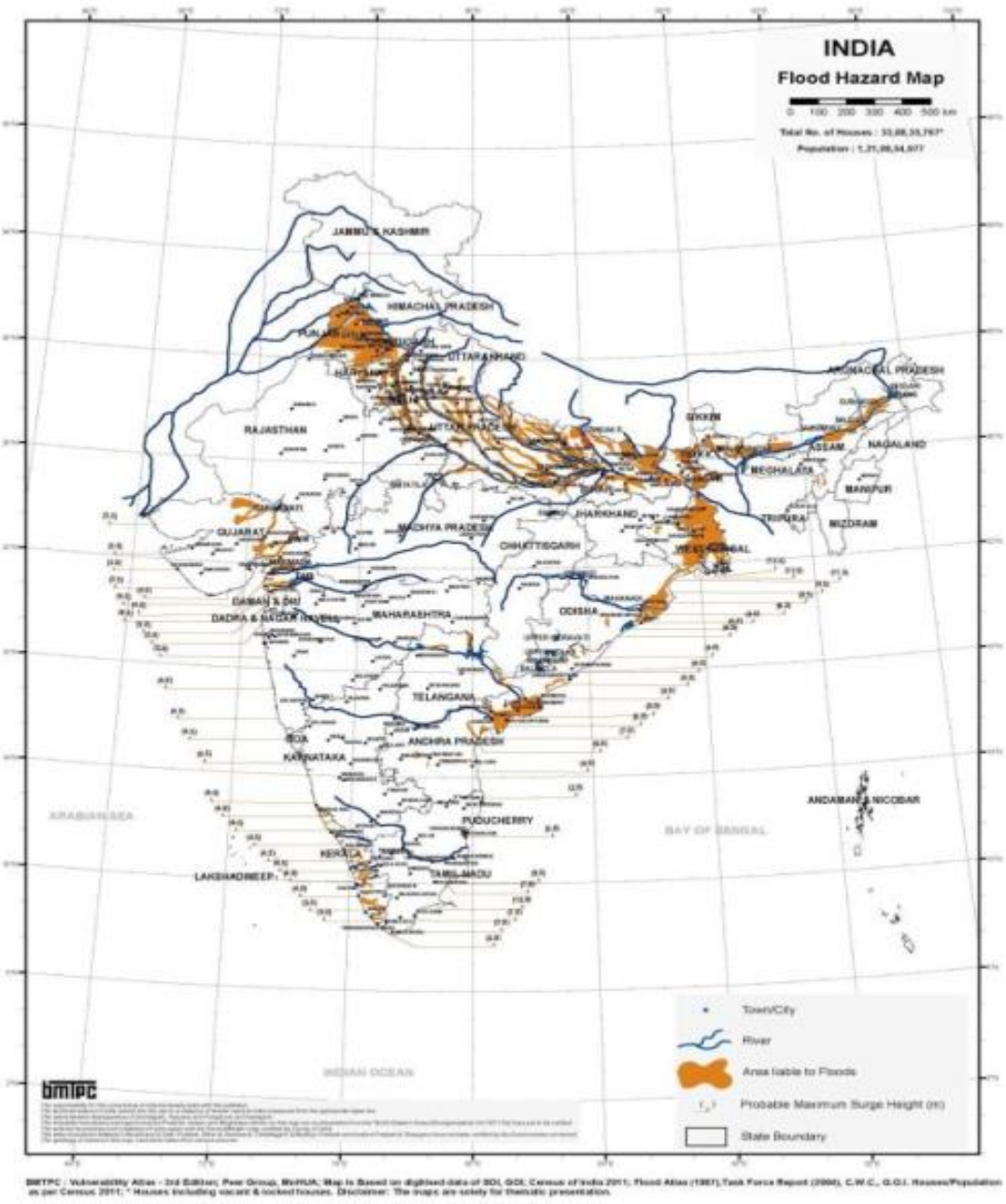


Figure 5.8: Flood Hazard Map of India

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. 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 Kashmir flooding. Dilapidated flood control infrastructure, shrinking of the wetlands, deforestation, high rate of the urbanization of Jhelum floodplains and siltation of the watercourses witnessed in the Kashmir valley during the last few decades has degraded the ability of the environment to absorb the excess rainwater in Jhelum basin and thus, increased the vulnerability of the basin to flooding which is manifest in the frequent flash floods and recurrent water logging observed in the floodplains of Jhelum

The Wayil Village and adjoining areas lies in a flatter terrain of the flood plain areas of the River Sindh hence are prone to the floods. The whole area was affected with the September 2014 floods. The construction of this bridge will provide direct connectivity with the district headquarter and adjoining areas. The proposed Wayil Bridge will be a major/vital connecting link between various villages and District headquarter Ganderbal. The bridge will also serve indirectly to thousands of other souls of the adjoining areas as it links these areas with their Paddy fields and other agricultural fields etc.

5.5.2. Earthquakes- History and Seismic Zonation

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

The 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 state. However, it must be stated that proximity to faults does not necessarily translate into a higher hazard as compared to areas located farther away, as damage from earthquakes depends on numerous factors such as

subsurface geology as well as adherence to the building codes. There are at least four regions of the Himalaya where earthquakes of magnitude 8 or above are likely to occur in the near future. 2005 earthquake of MW 7.6 has released the only 1/10th of the stress generated within the region and remaining has to go in future great earthquakes. The damage occurred in Uri, Kupwara and Ganderbal districts in Kashmir province and the Poonch town and its surrounding areas are along the line of control. This earthquake was the strongest in over 120 years in the area. Efforts at all levels need to be taken to ensure whatever new structures are built can withstand future major earthquakes.

The proposed construction of the Wayil Bridge in District Ganderbal falls in a seismically active part (Zone-V) of Kashmir Valley. The design parameters for the 1x110 meter Span bridge at Wayil village should 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-V as per the Bureau of Indian Standards (BIS) code of Practice (IS-1893-2002). These maximum credible earthquake magnitudes represent the largest earthquakes that could occur on the given fault, based on the current understanding of the regional Geo-tectonics. The earthquake zonation map of Jammu and Kashmir is given below:

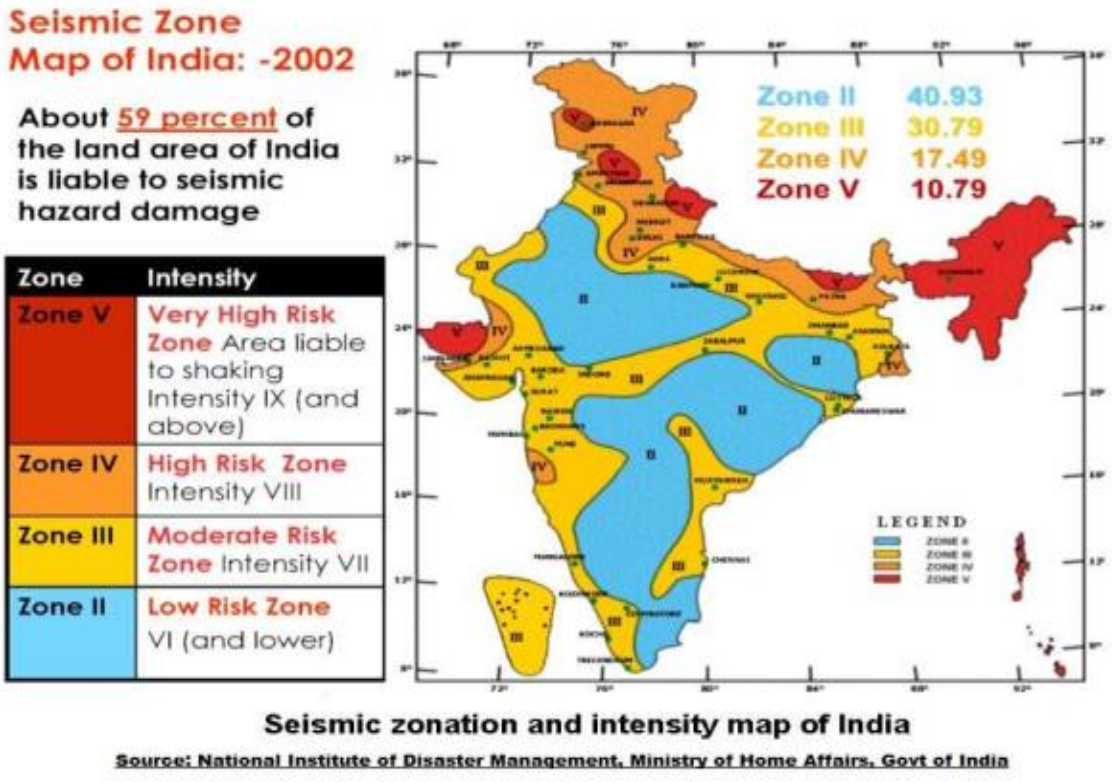


Figure 5.9: Seismic Zonation and Intensity Map of India.

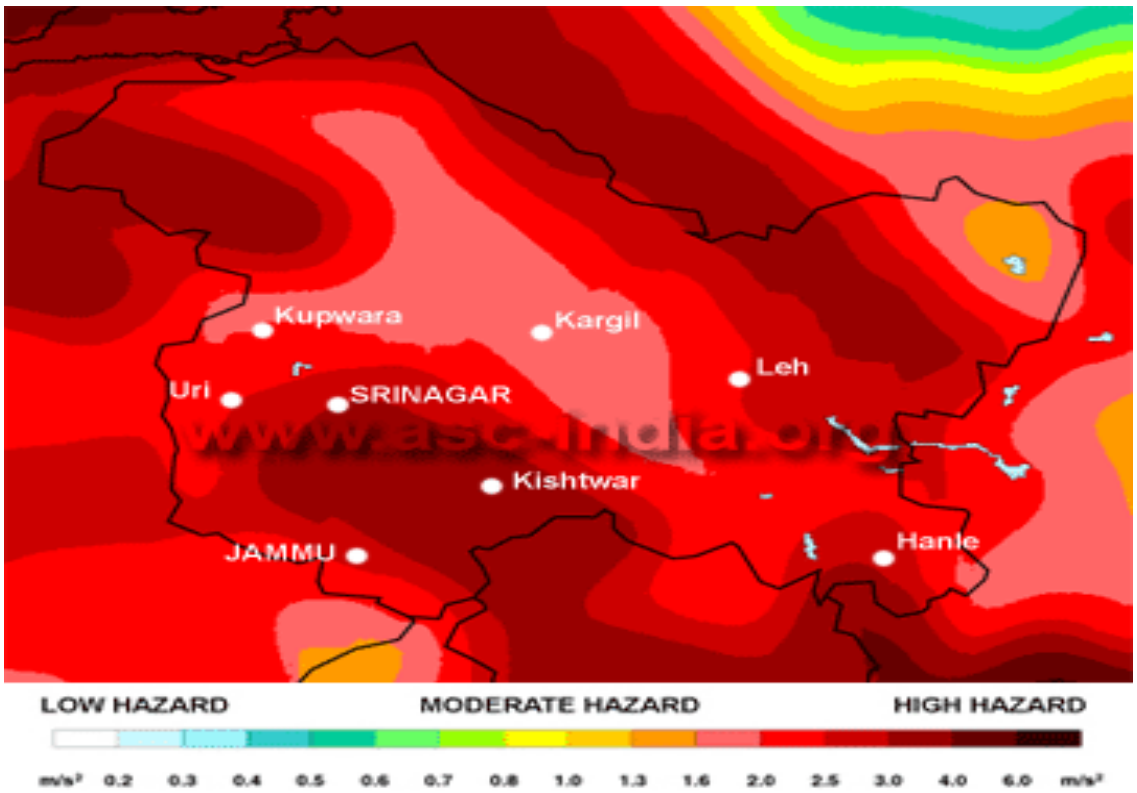


Figure 5.10: Map of Jammu and Kashmir showing earthquake zonation.

5.6. Air Environment

5.6.1. Meteorology and Climatology

District Ganderbal comes under western Himalayan region having temperate agro climatic zone. The climate of the district is more or less similar to that of other districts of the valley. Areas situated at higher altitudes experience severe cold for major part of the year and are not accessible for more than few months. It is severely cold in winter with heavy snowfall and moderately pleasant in summer. Overall, the District experiences moderate temperature varies between 29°C to 34°C in summer and between 10°C to 12°C in winter. The average annual precipitation (rain and snow) in Ganderbal varies from 500 mm to 550 mm. The strong north-westerly winds are more predominant with average wind velocity of 12-30 kms per hour. The presence of Zanskar Mountains in the west and north and north east produce substantial impact on the climate, wind direction, speed and precipitation of the town. The winter season lasts from December to February. January is the coldest month and generally the temperature goes down below the freezing point. The mean maximum and mean minimum temperature read about 7.6^0c and -2.3^0c. The snowfalls are heavier and temperature is relatively low. The mean maximum and mean minimum temperature reaches about 22.8^0c and 10^0c respectively in the month of May. The hottest months are June, July and greater part of August during which the temperature goes on rising gradually. The

temperature begins to fall from mid-September till it becomes moderate in October and tolerable in November.

Precipitation during winter is mostly in the form of snow, although at lower elevations rain may also occur. On the windward sides of the mountain, the precipitation usually increases up to the elevation of 1.5 kms above the sea level and above that it decreases due to reduced moisture in the air. The humidity is very low in the morning throughout the year. It is 40 percent during December to February which is said to be maximum. The highest humidity is 90 percent is recorded during May-June.

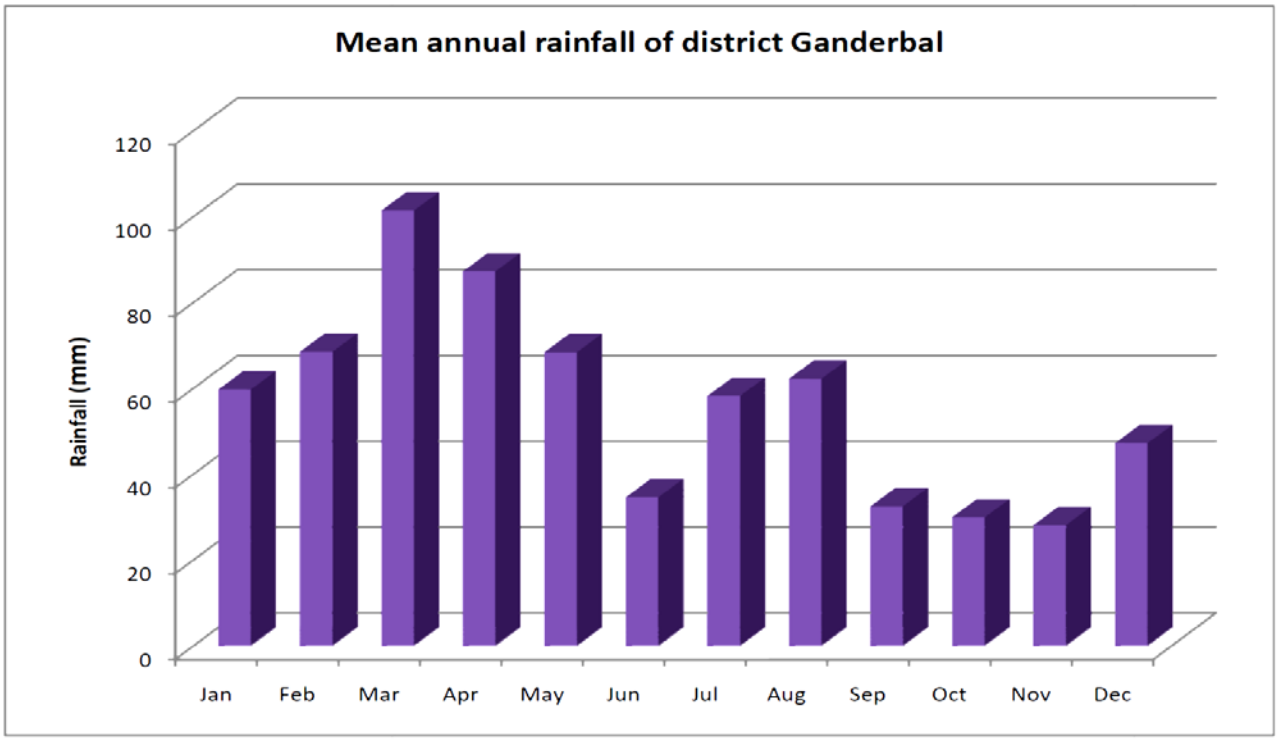


Figure 5.11: Monthly Average Rainfall Data of the District Ganderbal

5.6.2. Wind

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.

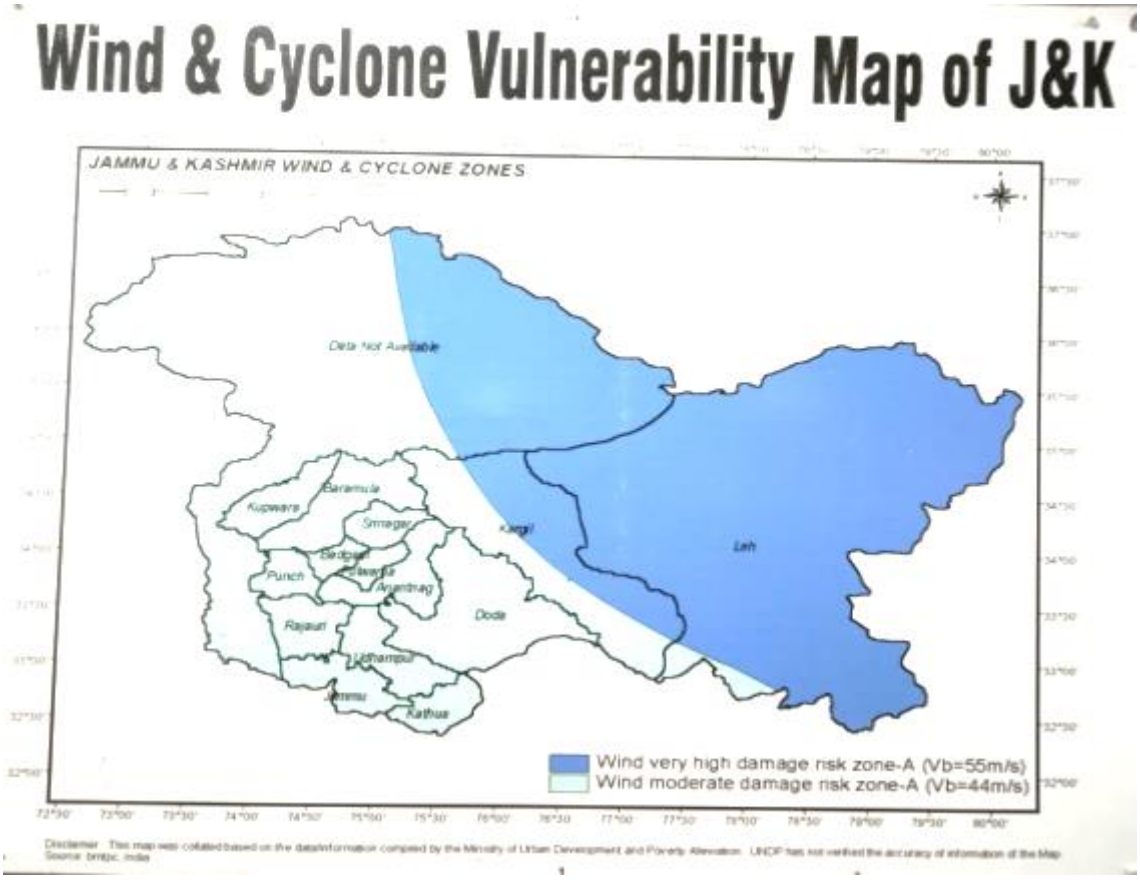


Figure 5.12: Vulnerability Map of J&K (Source: BMTPC)

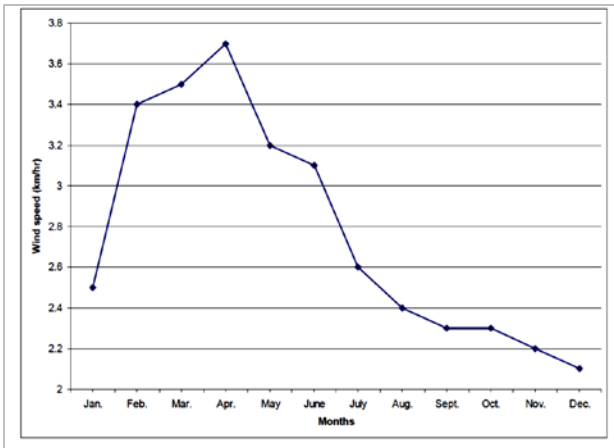


Figure 5.13: Monthly Average wind speed (Km/hr) in District Ganderbal during 2015

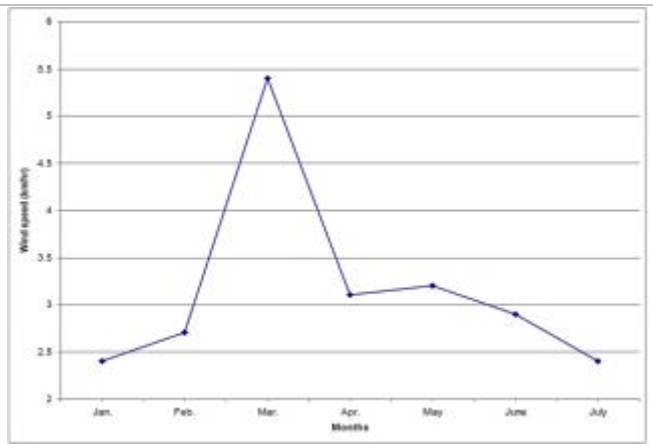


Figure 5.14: Monthly average wind speed (Km/hr) in district Ganderbal during 2016

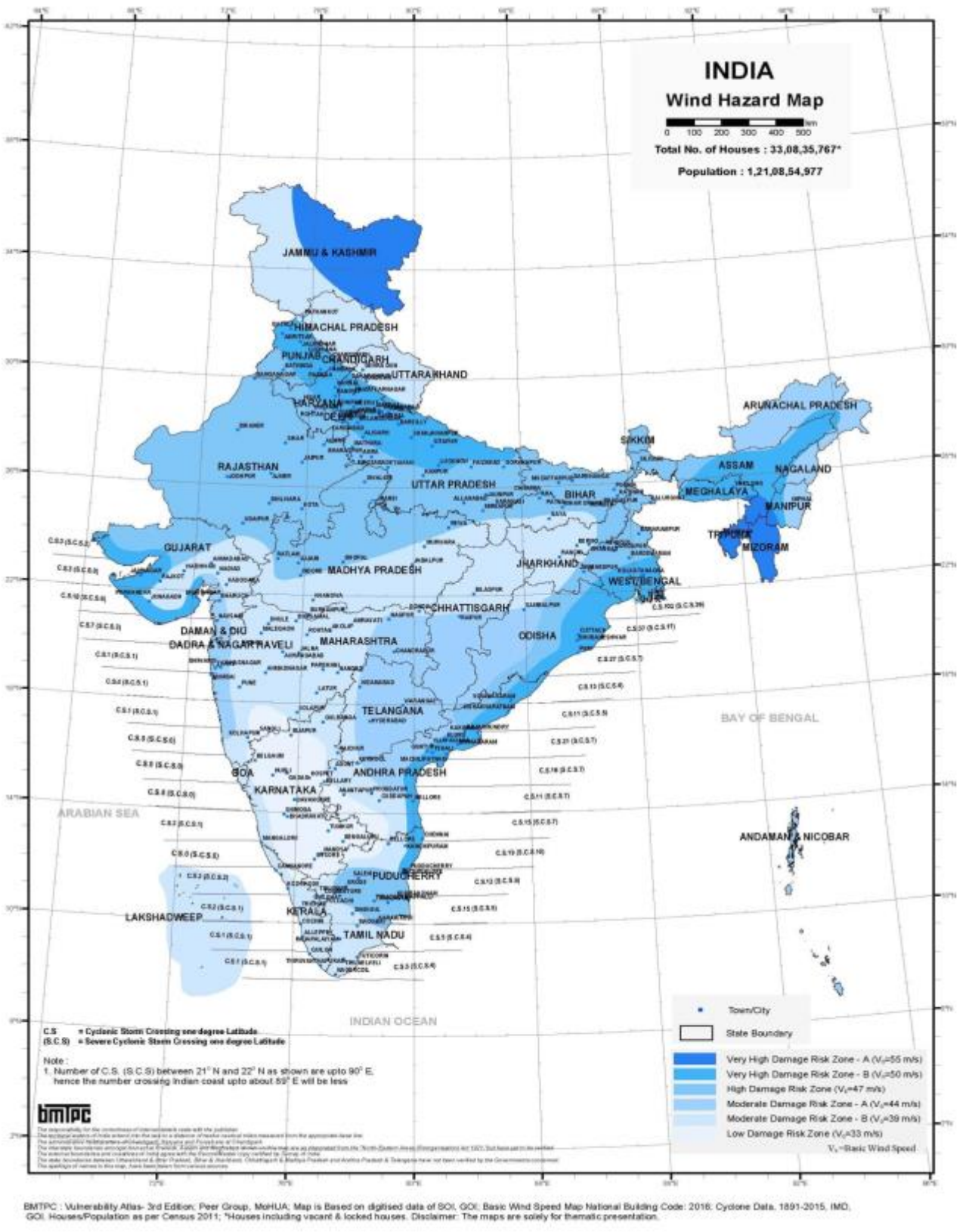


Figure 5.15: Wind Hazard map of India (Source: BMPTC)

5.7. Noise Environment

Noise is perceived as one of the most undesirable consequences of road development. Though the level of discomfort caused by noise is subjective, there is a definite increase in discomfort with an increase in noise levels. The most commonly reported impacts of increased noise levels are interference in oral communication and disturbance in sleep. The main source of noise at the proposed Wayil 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 construction as well as operation stages.

5.8. Water Environment

Box 5.1: River Sindh

Description – Surface Water Body (River Sindh- Tributary of River Jhelum)

The proposed bridge having a total span of 110 meters will be constructed over River Sindh at Wayil village in Ganderbal District. The River Sindh is the longest tributary of Veth (Jhelum) drains the highest part of Kashmir Himalayas and confluence with Jhelum at Shadipora . The Sind River forms the Sind Valley. The source of the river lies in Machoi Glacier at an elevation of 4800 m, east of Amaranth temple south of Zojila pass. The Sind with a course of about 100 km and a basin area exceeding 1,559 sq.km is perhaps the most developed side valley of Jhelum running from Panjtarni (a camping site of Amaranth yatra) southwards up to Domail where it joins a tributary which doubles its flow from Kolhoi Glacier. The Sind Valley is situated within the jurisdiction of Kangan tehsil, of Ganderbal district. It has a steep gradient of 1365 m up to Gagangir, below which the slope is relatively gentle, with a drop in level of 729 m. The River flows through the entire District passing several natural landmarks, tourist spots including Baltal, the meadow of gold, Gagangir, Naranag and Wayil. The main towns in the valley are Gund, Mammer, Kangan, Wangath, Preng, Wussan and Manigam. Its upper most feeders rise below the lofty peaks near Zoji-La (3256 m) as a number of other head streams join from the Amaranth (5003 m), Kola hoi (5425 m) and Panjtarni snow fields.

The drainage of this Sindh catchment was observed to be of dendritic type. It is characterized by a tree or fernlike patterns with branches that intersect primarily at acute angles. Dendritic drainage patterns are developed by random head ward erosion of streams. There is plenty of ground water in the district especially in Karewas and alluvial strata. The ground water exists in confined as well as unconfined conditions. The depth of water level varies from the land surface level. The outflow areas are not uncommon in Ganderbal.

The Ganderbal town has a very good natural drainage pattern. The River Sindh which bisects the town into two parts i.e. east and west caters to the storm water drainage of the town. Beside, the River Sindh the town has man-made canals and natural nallahs for drain off the storm as well as waste water of the town. The Power Canal which flows from North-East to North–West of the town acts not only as second major drain but is also utilize for irrigation

purposes. At present, only 50-60 % of the road network is covered by the storm water drainage system (open drains). The natural nallahs are mostly kuccha and encroached by the inhabitants.

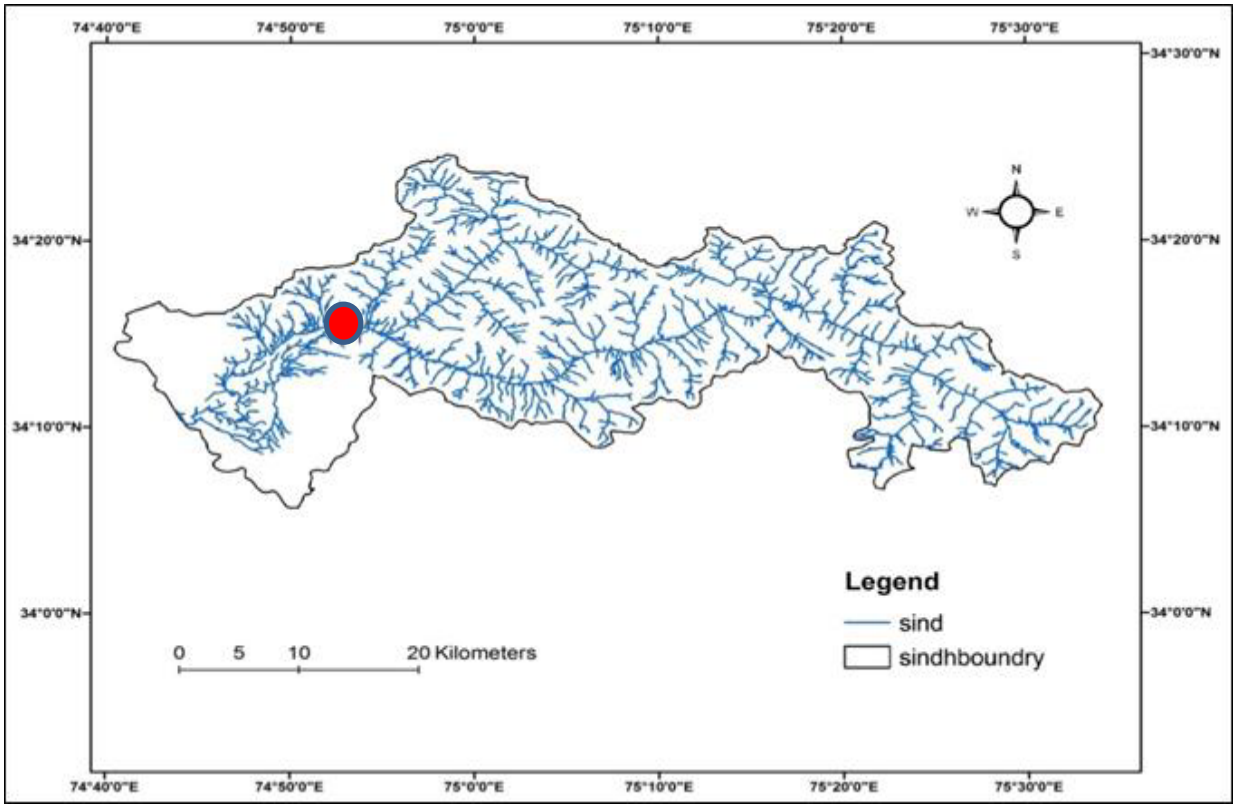


Figure 5.16: Drainage Pattern of Ganderbal District (Red Dot showing proposed Bridge site at Wayil village.

Groundwater

As per geo-tech onvestigation, the groundwater table was come across between 3.7m to 5.3m depth below the existing ground level/ bed level. The ground water table is expected to fluctuate depending upon the climatic factor, drainage conditions and other factors. Groundwater table is considered at the existing ground level / bed level for all design purposes.

5.9. 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 Wayil bridge site was undertaken.

5.9.1. Forests

The Ganderbal district is having a 988 hectares of Forest land and 18120 hectares of Cultivated land. The proposed construction is located at Wayil village which lies in the flood plain of River Sindh. There is no natural forest area like Reserved Forest, Protected Forest or natural heritage sites of national and international importance within the one km of project influence area.

5.9.2. Flora

During the field inspection of the Wayil bridge site, the predominant standing vegetative species observed in the direct project corridor/ area of influence in the study area is mainly Ailanthus species. The local flora in the study area usually denotes trees coming in the approach road mainly from the Sonamarg side The commonly observed trees are Ailanthus, Willow, Poplar, Chinar,etc spread in the area. The trees/ saplings which are coming within the approach roads (both Srinagar and Sonamarg side) are mainly Ailanthus (35 nos) and Willow tree (1 no) and needs to be cut down. However, cutting of these trees will be compensated under compensatory plantation. The prject influence area no rare or endangered plant species were observed. The dominant species observed and documented during the field study is present below;

Table 5.3: List of Flora ((Commonly found) in the Project Influence Area of bridge project at Wayil

S.No	Common Name	Scientific Name	Remarks
A	Scheduled Trees		
1	Chinar	*Platanus orientalis*	*Close to approach road towards Srinagar side*
B	Indigenous Trees		
	Ailanthus	*Ailanthus altissima*	*Coming in Approach road side, PIA*
2	Willow	*Salix alba*	*Coming in Approach road side (1 no.), PIA*
3	Poplar	*Populus alba, Populus nigra*	*Coming in Approach road side, PIA*
5	Acacia (Kikar)	*Robinia pseudo-acacia*	*Coming in Approach road side, PIA*
6	Elm (Brenn)	*Ulmus sp.*	*Coming in Approach road side, PIA*
C	Fruit Trees		
7	Apple Trees		
C	**Grasses**		
10	Grass (Bermuda Grass, Doob)	*Cynodon dactylon*	*UD*

11	Grass (Bakung)	*Poa annua*	*UD*
13	Grass (Bairan Ghaas)	*Chrysopogon gryllus*	*UD*
14	Herb/ Shrub (Camomile / Scented Mayweed/ & false *Chamomile* Phake Ghas)	*Matricaria chamomilla Anthemis cotula*	*UD*
15	Herb (Batak Nyoor)	*Trifolium repense*	*UD*
16	Shrub (Goola)	*Plantago lanceolata*	*UD*
17	Charas	*Cannabis sativa or indica*	*UD*

PIA- Project Influence Area; UD- Universal Distribution

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

As per the Jammu & Kashmir Preservation of Specified Trees Act, 1969, Chinar (*Platanus orientalis*), Mulberry (*Morus sp*.) and Walnut (*Juglans regia*) are scheduled and protected trees of Jammu & Kashmir. None of the scheduled are located within the approach roads of the Wayil bridge. However, a Chinar tree is growing close to the approach road (Ch 0+123 km) on RHS side at an approximate distance of 4 meter from an approach road towards srinagar side. No other scheduled trees were observed in or near the approach roads.

Table 5.4: List of Protected (Scheduled) Trees located close to approaches of Bridge at Wayil Village, District Ganderbal

S.No	Name of the Scheduled Tree	Girth Class (in meters)	Location	Chainage	Alignment (LHS/RHS
1	Chinar	4 M	Towards Srinagar approach road	Ch 0+123	RHS

As per site assessment, 5 Willow Trees (*Salix sp.*) and 1 Poplar Tree (*Poplus nigra are* required to be cut down as they come within or may protrude towards road pavement of approaches.. These may possess the visibility and safety issues for the traffic movement.

Loss of trees will be compensated by 1:3 ratio (i.e. for loss of 1 tree 3 trees will be planted) or greater and transplantation of the smaller trees shall be carried out wherever applicable. The total number of trees to be planted under compensatory plantation is 183 trees comprised mainly of Willow, Bren and other trees as well. These trees will be planted along the banks of the River Sindh as an environmental enhancement/ bank strengthening and protection measures.

5.9.3. 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, Poultry farms, etc. and stray dogs and cats.

Fish species are represented by trouts like Rainbow Trout *(Oncorynchus mykiss), Shuddgurn and Anyour* and in upstream by Brown Trout *(Salmo trutta)* and Snow Trout *(Schizothorax plagiostamus)* and other species.

5.9.4. Wetlands

There is no wetlands site within one km radius of the proposed Wayil bridge site.

5.9.5. Ecological Sensitive Areas

The proposed Wayil bridge site or its project influence area does not fall in any Biosphere Reserve, National Park, Wildlife Sanctuaries and ecologically sensitive areas.

5.10. Socio-Economic Profile of the Project Area

5.10.1. History

The name Ganderbal has been derived from the famous spring “GANDERBHAWAN” which once used to be the Gateway to Central Asia during ancient period. The district Ganderbal is among the eight newly created districts that came into existence in 2007 by deletion of areas of Ganderbal and Kangan from erstwhile Srinagar district. District Ganderbal is located on the north side of the world famous Srinagar city of Kashmir valley at an elevation of 1650 to 3000 meters above Mean Sea Level (MSL). The Sind River, a major tributary to the Jhelum River flows through this district.

The district abounds in the places of the historical, religious and archaeological significance, the important among which are Qamar Sahib Shrine, Khir Bhawani Temple, Sonamarg, naranag. Manasbal lake and some fresh water lake like Gangabal, Nanda sar lake, Gada sar lake, Vishan sar lake and Kishan sar lake.

5.10.2. Economy

Economy of the town Ganderbal is mostly dependent on Srinagar due to the close proximity to the capital, though the town has potential resource base to be capitalized for feature development.

Ganderbal is situated on the bank of River Sindh and its surroundings have very fertile agricultural land. Farming in Ganderbal is the main occupation as more than 80 % of the working population is engaged with it. The main crops are rice, wheat and fodders are widely grown in the region. Rearing of livestock is one of the important occupations of the population lives on the outskirts of the town. The Ganderbal town is surrounded by agriculture fields from North-west to South-east inter-spread with Nominal plantation and orchards. The marshy land is exits towards South-East and South-West side of the town. The marshy land is surrounded by Malyari land which is a source of vegetables for the inhabitants of the Ganderbal town. The horticulture plays a vital role in the economic development of the town. The salubrious climatic conditions and availability of ground and surface water are most suitable for the growth and development of various types and quality of fruits including apple, plums, apricots, cherry, strawberry, grapes and various varieties of wild herbs.

Ganderbal has its industrial area located at Duderhama, which has almost 40+ units and providing employment for over 300 people. New proposal will be provided to extend the industrial activity within the town to develop its economic condition. Availability of plain land, proximity to capital, connectivity through NH-1 and availability of man power, shows huge opportunity for development of industrial infrastructure in Ganderbal. The proposal for the town will incorporate some suitable solution to tap this opportunity.

Table 5.5: Classification of Land[2]

S. No.	Particulars	Numbers (Hectares)
1	Reporting Area	39304
2	Area under Forests	988
3	Area under Non-Agricultural Use	5758
4	Un-Cultivated Land	3161
5	Permanent pastures and other Grazing Land	1790
6	Area under Miscellanous Tree Crops	1378
7	Cultivated Waste Land	2478
8	Fallow Land other than Current Fallow Land	3901
9	Current Fallow Land	5900
10	Net Area Sown	13799

5.10.3. Administrative Set-up

Ganderbal Town, District Headquarter is situated at a distance of 15 kilometers from Srinagar and 27 kilometers from Bandipora at an elevation of 1650 to 3000 meters above the sea level. The district mostly stretches from south-west to North-east with a length of 125 kms and this stretch has a width of around 10-20 kms. The district is located between 34. 23° N to 74. 78° E of Latitude & Longitude respectively.

[2] (As per Official Website of Ganderbal District. www.Ganderbal.nic.in (Website Accessed- 18/07/2020)

Presently the District Ganderbal is having 2 Assembly Constituencies, 6 Tehsils, 7 CD Blocks, One Municipal Committee with 1 ward, and 115 villages out of which 113 are inhabited and 2 are uninhabited.

Table 5.6: Details of the Ganderbal District

S. No.	District	Ganderbal			
1	Tehsils	Ganderbal	Lar	Kangan	Tullmulla
		Wakura	Gund		
2	Blocks	Ganderbal	Sherpathri	Wakura	Safaopora
		Lar	Kangan	Gund	
3	Town	Ganderbal			
4	Villages	115			

Source: Official Website of Ganderbal District. www.Ganderbal.nic.in (Website Accessed- 18/07/2020)

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

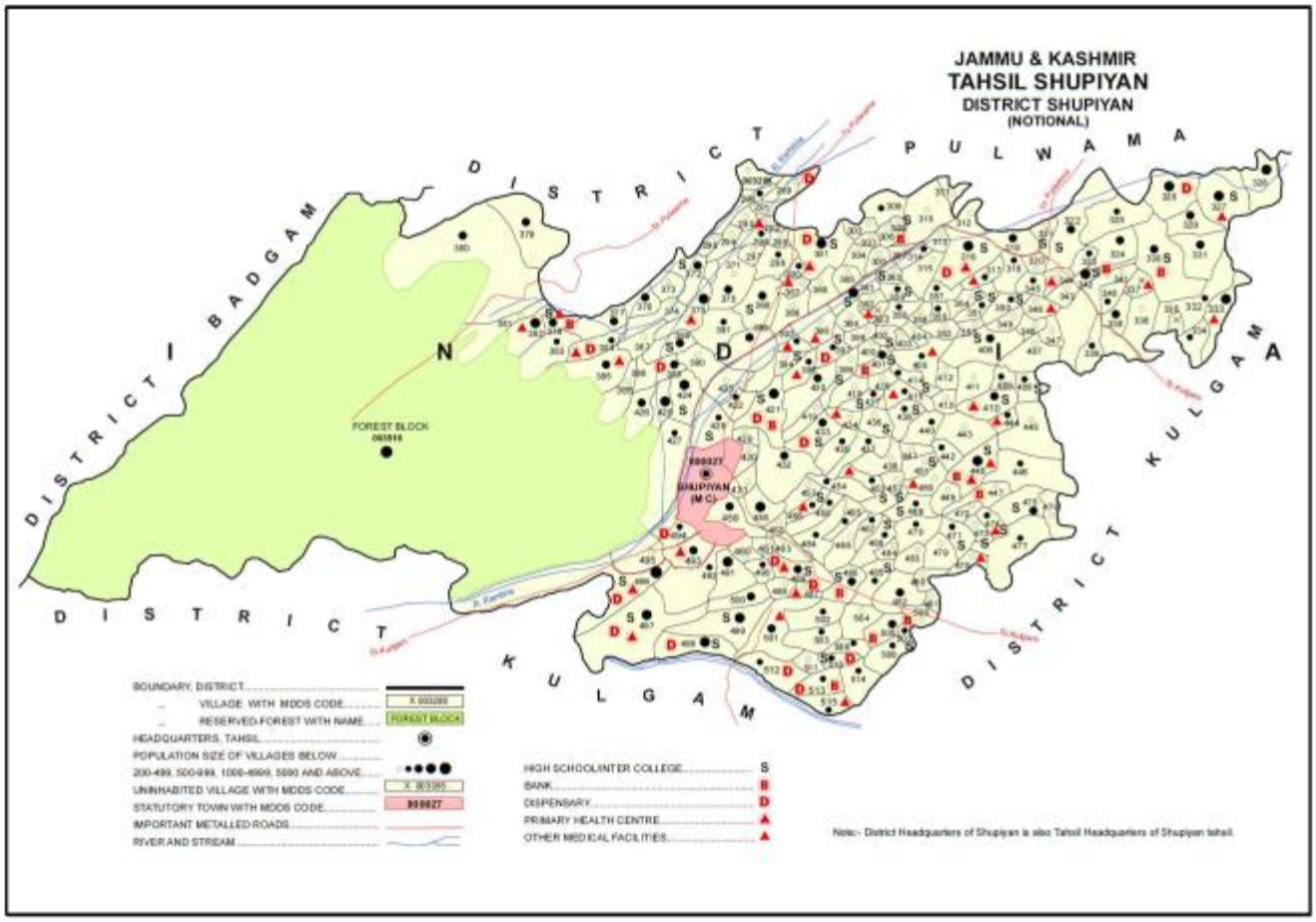


Figure 5.17: Map showing distribution of Villages in Ganderbal District

Table 5.7: Primary Census Abstract (Census 2011) of Ganderbal District and the Project Area of Wayil

Location Code Number	District/Block/ Town/ Village	Area of Village (in hectares	Particulars	Total	Male	Female
011	Ganderbal District	25,900	Total No. of Houses	45361	-	-
			Population	297446	158720	138726
			Child (0-6)	50594	27159	23435
			Scheduled Caste	117	105	12
			Scheduled Tribe	61070	32554	28516
			Literates	143276	90581	52695
			Illiterates	154170	68139	86031
			Total Workers	100890	73305	27585
			Main Worker	52949	46779	6170
002958	Wayil (Ganderbal	450	Total No. of Houses	1429	-	-
			Population	8,335	4,384	3,951

	Block)		Child (0-6)	1,559	902	657
			Scheduled Caste	-	-	-
			Scheduled Tribe	86	48	38
			Literates	3,979	2,501	1,478
			Illiterates	4,356	1,883	2,473
			Total Workers	2,665	1,786	879
			Main Worker	967	844	123

The highlighted Green section (Row) of Wayil of Ganderbal Block reflects the main project area.
Source: Primary Census Abstract 2011

To understand the socio-economic background of the project area, a socio-economic profile of Project Impact Area (PIA) has been prepared based on data from secondary sources such as Census 2011 and other published reports and studies.

5.10.4. Demographic Profile

Presently the District Ganderbal having two Assembly Constituencies consists of six Tehsils, seven CD Blocks, One Muncipal Committee with one Ward, & 113 inhabited villages. As per census-2011, the total population of the District is 297446 including 20.53% of ST population. About 84% of the population lives in its rural areas and 48.16% of the population was found literate.

Table 5.8: Population Profile of Ganderbal District

Population	Total	Persons	297446
		Males	158720
		Females	138726
	Rural	Persons	250407
		Males	133715
		Females	116692
	Urban	Persons	47039
		Males	25005
		Females	22034

Source: 2011 Census of India District Profile

The total population of the district as per 2011 Census is 297446 persons. It consists of 158720 males and 138726 females. The rural sector of the district is inhabited by 250407 persons comprising of 133715 males and116692 females spread over the 113 inhabited villages. The district constitutes Six tehsils. The number of inhabited as well as uninhabited villages are 113 and 2 respectively.

5.10.5. Population Density

The density of population in Ganderbal district is 1148 persons per km^2 as against 124 persons per km^2 for Jammu and Kashmir.

5.10.6. Sex Ratio

The Ganderbal district has a Sex Ratio of 874 as per Census 2011. In rural Ganderbal, the Sex ratio is 873 as compared urban sex ratio at 881. The Sex ratio in comparison to the average national sex ratio of 940 is not very healthy.

5.10.7. Scheduled Caste and Scheduled Tribe Population

Scheduled caste population in the district is 117 and schedule tribe population is 61070.

Table 5.9: Scheduled Castes and Scheduled Tribes Population

		J&K State		District Ganderbal	
		Number	Percentage	Number	Percentage
Scheduled Castes	Persons	924991	7.38	117	0.03
	Males	486232	7.32	105	0.03
	Females	438759	7.44	12	0.004
Scheduled Tribes	Persons	1493299	11.91	61070	20.53
	Males	776257	11.69	32554	10.94
	Females	717042	12.15	28516	9.58

Source: 2011 Census of India District Profile

5.10.8. Literacy Rate

A person who can both read and write with understanding in any language is to be taken as literate by the Indian Census. A person who can merely read but cannot write is not literate. It is not necessary that a literate person should have received any formal education or should have passed any minimum educational standard. In addition to this, all children of age 6 years or less are treated as illiterates even though they may be going to school and can read and write a few odd words. In earlier Census (before 1991) this limitation was up to the age of 4. It has also been decided to use only effective literacy rates for the 2001 Census, the ratio of literate and population excluding the age group 0-6. Percentage of literates (48.16) has been recorded lesser than the district (67.16).

Table 5.10: Total and Main Workers data of Ganderbal as per 2011 census.

	Total	Male	Female
Total Workers	100890	73305	27585
Main Worker	52949	46779	6170

5.10.9. Occupational pattern

The data also shows that out of the total population of Ganderbal district, 33.9% of the population is working and 66.1% of the population is not working. 52949 persons constituting

52.5 percent are main workers. 47941 persons constituting 47.5 percent are marginal workers.

33.9 percent of total population of the district is workers. Of these 15337 persons constituting 15.2 percent are engaged in cultivation while as 19312 persons constituting 19.1 percent do not own any cultivable land and are employed as agricultural labours. 58.1 percent workers are engaged in other services. The remaining 7.6 percent remain busy in household activities.

5.11. Recreation Resources

The recreational sites include Amusement Park, Centre for Musical & Cultural activities. There is none of any recreational sites within the project influence area of the proposed Wayil bridge project.

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

No Archaeologic monuments under ASI's listing are located in the proposed bridge site at Wayil within 1 km of project influence area.

5.13. Sensitive Environmental Receptors

The proposed bridge at Wayil does not have any sensitive receptors like Schools, religious places, community centres etc. However, from the Srinagr approach side the Centre for Disablity (NGO based) exists at an approx. distance of 70 meters from the bridge site and a Public park near Old Exisitng bridge on RHS. No other sensitive receptors were observed.

Table 5.10: Sensitive Environmental Receptors near Proposed Bridge at Wayil, Ganderbal.

S. No	Sensitive Feature	Location	Chainage	Alignment (RHS/LHS)[3]	Distance in meters (m) from the central alignment of the approach road
1	(Hope Disability Centre (NGO)	RHS of approach near existing Bailey Bridge	0+178	RHS	70 m
2.	Public Park	RHS of the existing bridge	0+010	RHS	20 m
3.	Restaurant	Srinagar approach side	0+0100	LHS	10 m
4.	Restaurant	Srinagar Approach Side	0+020	RHS	60 m
5.	Restaurants/ Dabba's	Sonmarg-Leh approach side	0+065	RHS	10 m

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

5.14. [4]COVID -19 (CORONAVIRUS) A PANDEMIC HEALTH HAZARD

Overview

The **COVID-19 pandemic**, also known as the **coronavirus pandemic**, is an ongoing global pandemic of coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The outbreak was first identified in Wuhan, China, in December 2019. The World Health Organization declared the outbreak a Public Health Emergency of International Concern on 30 January 2020 and a pandemic on 11 March. As of October 2020, more than 36 million cases of COVID-19 have been reported in more than 188 countries and territories, resulting in more than 1 million deaths; more than 27 million people have recovered

In India, as on October 2020 more than 6.5 million people have been reported for the Covid-19 (Coronavirus) Pandemic with the unfortunate death of more than 0.1 million people with a recovery of more than 5.5 million people. Government of India is taking all necessary steps to ensure that we are prepared well to face the challenge and threat posed by the growing pandemic of COVID-19 the Corona Virus. With the active support of the people of India, we have been able to contain the spread of the virus in our country. The most important factor in preventing the spread of the Virus locally is to empower the citizens with the right information and taking precautions as per the advisories being issued by the Ministry of Health & Family Welfare.

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

The best way to prevent and slow down transmission is to be well informed about the COVID-19 virus, the disease it causes and how it spreads. Protect yourself and others from infection by washing your hands or using an alcohol-based rub frequently and not touching your face. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it's important that you also practice respiratory etiquette (for example, by coughing into a flexed elbow).

At this time, there are no specific vaccines or treatments for COVID-19. However, many ongoing clinical trials are evaluating potential treatments. WHO will continue to provide updated information as soon as clinical findings become available.

[4] Covid-19 Pandemic disease informative section is included in ESIA report in order to provide information, guidelines (SOP) and awareness at project level in managing highly communicable disease.

Prevention

To prevent infection and to slow transmission of COVID-19, do the following:

- Wash your hands regularly with soap and water, or clean them with alcohol-based hand rub.
- Maintain at least 1-metre distance between you and people coughing or sneezing.
- Avoid touching your face.
- Cover your mouth and nose when coughing or sneezing.
- Stay home if you feel unwell.
- Refrain from smoking and other activities that weaken the lungs.
- Practice physical distancing by avoiding unnecessary travel and staying away from large groups of people.

Symptoms

COVID-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization.

Most common symptoms:

- fever.
- dry cough.
- tiredness.

Less common symptoms:

- aches and pains.
- sore throat.
- diarrhoea.
- conjunctivitis.
- headache.
- loss of taste or smell.
- a rash on the skin, or discolouration of fingers or toes.

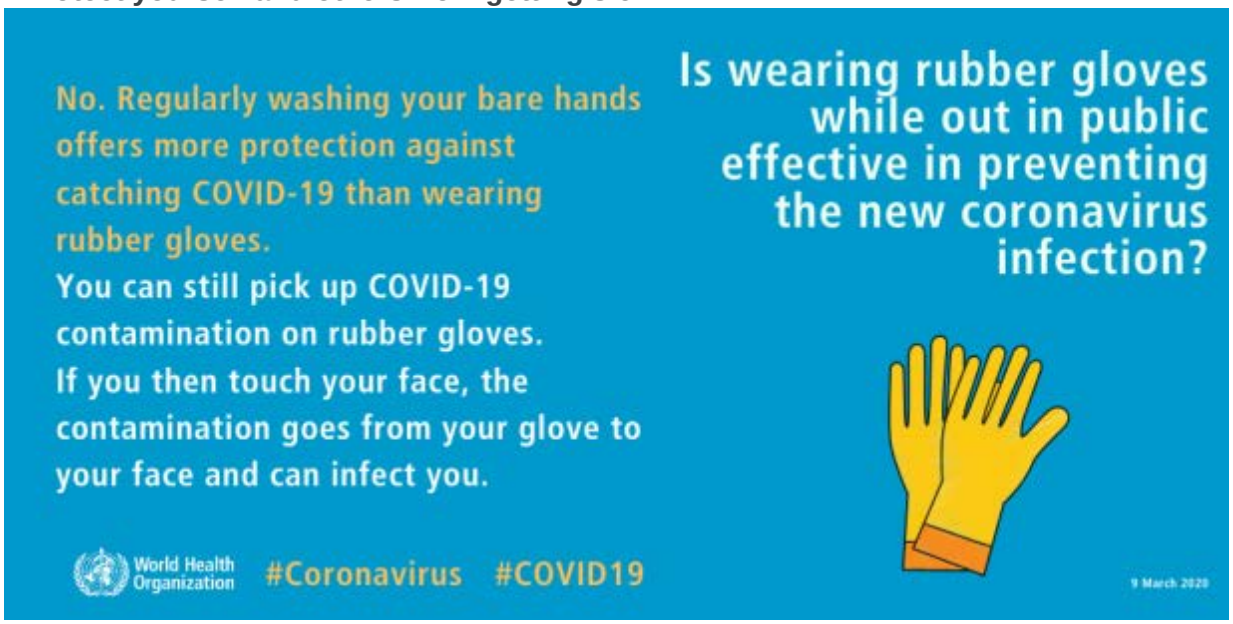
Serious symptoms:

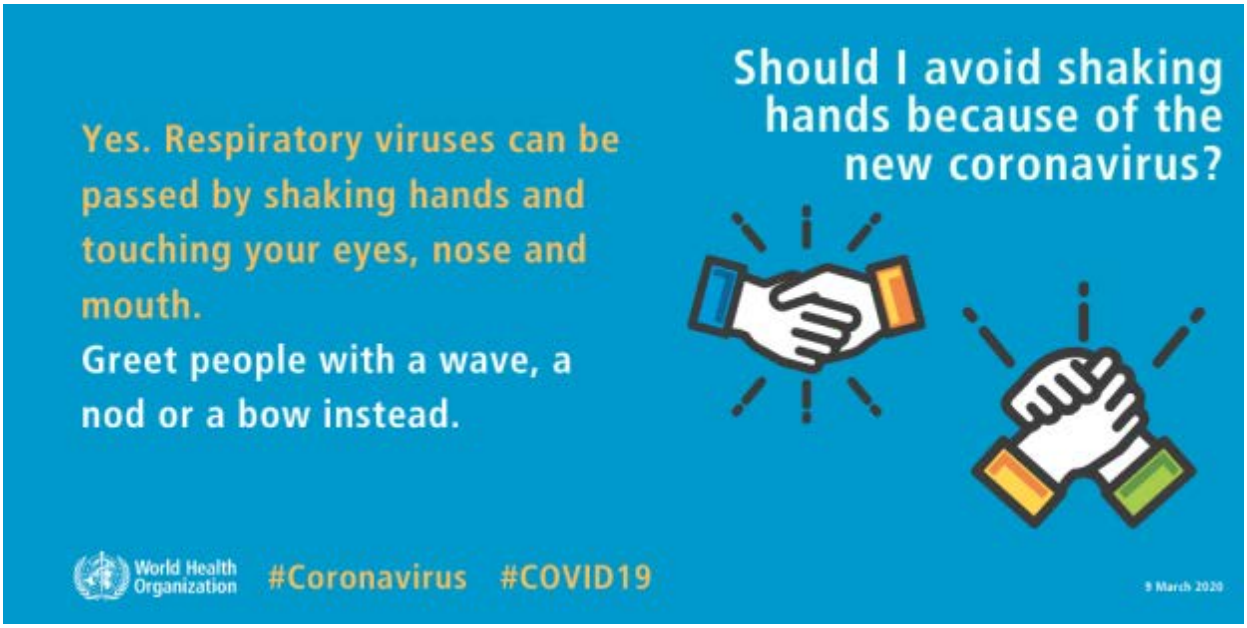
- difficulty breathing or shortness of breath.
- chest pain or pressure.
- loss of speech or movement.

Seek immediate medical attention if you have serious symptoms. Always call before visiting your doctor or health facility. People with mild symptoms who are otherwise healthy should manage their symptoms at home. On average it takes 5–6 days from when someone is infected with the virus for symptoms to show, however it can take up to 14 days.

Covid-19 (Coronavirus) Public Awareness through Info-Graphics Posters
World Health Organization (WHO) COVID-19 Info-graphics Social Safety Message

"Protect yourself and others from getting sick"

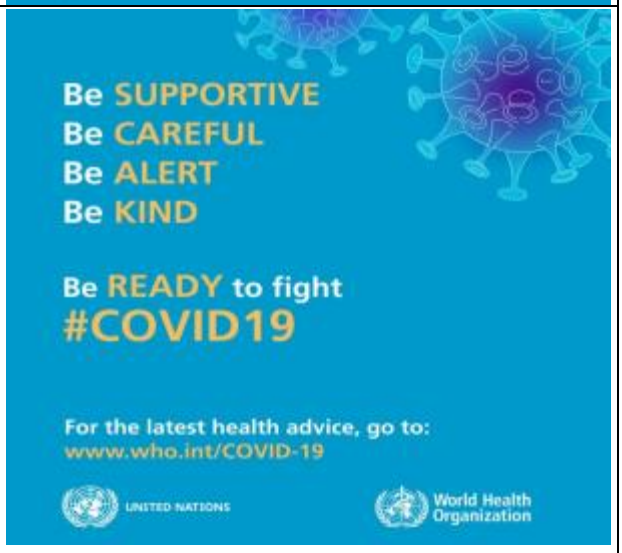


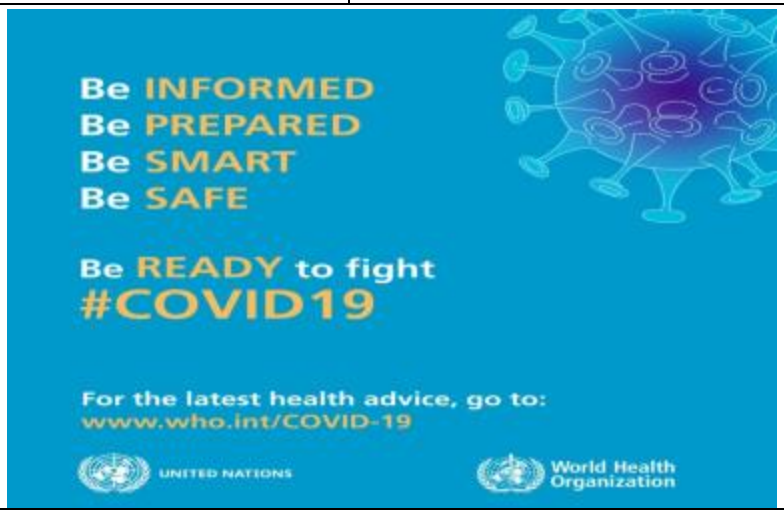



Protect yourself and others from getting sick
Wash your hands
• after coughing or sneezing
• when caring for the sick
• before, during and after you prepare food
• before eating
• after toilet use
• when hands are visibly dirty
• after handling animals or animal waste
World Health Organization


Protect yourself and others from getting sick
Wash your hands
• after coughing or sneezing
• when caring for the sick
• before, during and after you prepare food
• before eating
• after toilet use
• when hands are visibly dirty
• after handling animals or animal waste
World Health Organization


Wash your hands
Wash your hands with soap and running water when hands are visibly dirty
If your hands are not visibly dirty, frequently clean them by using alcohol-based hand rub or soap and water
World Health Organization


Be SUPPORTIVE
Be CAREFUL
Be ALERT
Be KIND
Be READY to fight
#COVID19
For the latest health advice, go to:
www.who.int/COVID-19
UNITED NATIONS
World Health Organization


Be INFORMED
Be PREPARED
Be SMART
Be SAFE
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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 1x110 meter Span 2 Lane Steel Arch Bridge over River Sindh at Wayil in District Ganderbal. 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 bridge 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 construction of the proposed bridge. Impacts have been 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 M.M Shawl Engineers and Contractors Pvt. Ltd., 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 detail in subsequent paragraphs.

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

Table 6.1: Impact Matrix for Project

S. No.	Parameters	Const. of 1x110 m Span bridge at Wayil, Ganderbal District.
	Negative Impacts	
1.	Hand Pumps	Nil
2.	Pond Area	Nil
3.	Relocation Religious Properties	Nil
4.	Transfer of Agriculture Land (ha)	Yes (Minor)
5.	Nos of trees to be felled	36 Trees (Non-scheduled Type) Ailanthus sp.(35 nos) which are Self grown and grows profusely with wild distribution. Most of these trees/ saplings coming in the approach towards Sonamarg side in floodplain of River Sindh including a 1 Willow tree.
	Positive Impact	
1.	Enhancement Sites (Nos.)	Plantation and beautification of median and incidental spaces.
A.	Cultural/Religious Properties (Nos.)	Nil
B.	Silt and debris/waste traps at the outfall of drains	Yes
C.	Safe Access/traffic calming at Educational Institutes, hospitals etc (Nos.)	Yes
D.	Trees Saving (Nos)	>60
E.	Wastes Reuse	-

F.	Proposed Plantation	Yes (Mainly Pine Plantation)
G.	Proposed Compensatory Plantation (if tree cutting requirement arises)	Total of 36 trees/saplings of Ailanthus sp. (35 nos) and Wllow tree (1 no.) to be cut mainly from the Sonmarg-Leh side approach. Compensatory plantation will be carried @ 3:1 ratio (for cutting of each tree, 3 trees will be planted) along the nallah banks to strengthen the banks, erosion control, open spaces etc.
H.	Bus bays	1 No. (LHS of approach from Srinagar side)
I.	Tree Protection (Scheduled Tree)	1 Chinar (Platanus orientalis) from LHS of Srinagr approach road)
3.	**Bridge/ Approach Road Safety Measures**	
A.	Intersection/Access Improvement	2 (both approaches). Access improvement from Sonamarg side approach proposed for the Stone Crusher Unit and Hallow Concrete Brick Unit.
B.	Signage Boards (Nos.)	As per IRC Guidelines
C.	Sidewalk	Available (1.5m both sides)
D.	Traffic Calming Measures Locations	2 (both approaches)
C.	Other Measures	

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

Table 6.2 : Anticipated Impacts on Physical & Biological Environment

Project Activity	Planning and De-sign Phase	Pre-construction Phase		Construction Phase					Bridge/ Road Operation
Environ mental com-ponent Affected		**Removal of Old Structures**	**Removal of trees and vegetation**	**Earth works in-cluding and borrow area**	**Laying of pavement**	**Vehicle & Machine operation & maintenance**	**Asphalt & crusher plants**	**Sanitation & Waste (labour campus)**	**Vehicle operation**
Air		Dust gen-eration during dis-mantling	Reduced buffering of air pollution, Hotter, drier microclimate in theproject 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	Contamina-tion and compaction of soil at camp& Plants	Contamination from Wastes and sewage	--
Water	Impact on Water Sources/ Surface Water Body (River Sindh and its off-shoot water channels	Siltation/ turbidity due to loose earth	Siltation/ turbidity due to loose earth	Alteration of drainage, Break-in conti-nuity of ditches Siltation, Stagnant water pools in quarries and borrow area.	Reduction of groundwater re-charge area	Contamination by fuel and lubricants	Contamina-tion by as-phalt leakage or fuel	Contamination from wastes and untreated sewage disposal	Spill Contami-nation by fuel, lubricants and washing of ve-hicles
Noise		Noise Pollution	High Noise due to machinery	Noise Pollution	Noise pollution	Noise pollution	Noise Pollu-tion	--	Noise from traffic movement
Flora	Tree cutting		Loss of Biomass and vegetation cover due to Removal of vegetation	Lowered pro-ductivity loss of ground for vegetation	--		Lower pro-ductivity Use as fuel wood	Felling trees for fuel	Compensatory plantation and nallah bank protection measures

Table 6.3: Anticipated Impact on Social and Cultural Environment

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

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

6.2.1. Hydrological Study

The proposed bridge is proposed to be constructed over River Sindh at Wayil village.The River Sindh is a main tributary from the District Ganderbal and carries high discharge during episodes of precipitation into River Jhelum. River Sindh crosses its banks during high discharge which results into flooding of the low lying areas including project site and whole area was affected with the devastating floods of September 2014. Therefore, based on this assessment hydrological study and runoff calculations for extreme flood/rains under the climate change scenarios is important for the porposed construction of the the bridge and same study has been carried out and considered for designing of the proposed 1x110 meter bridge at Wayil with excess runoff flow/flood safeguard.

6.2.2. Hydrological Data of River Sindh at Wayil

Flood Discharge from X-sectional Area and observed Velocity

Cross-sectional area of River at U/S (100m) of the Proposed bridge is as follows:
Distance from existing bridge on Up Stream side 100.0 m
HFL at this location 1673.516 m

Table 6.1: Hydrological Details

1.	**Summary of Cross Section**			
	Cross-Section at	Area (sqm)	Perimeter (m)	Top width of flow (m)
	Proposed Bridge Location U/s side D/s side	-484.64 -238.70 237.74 -114.28 -473.28 -613.72 -423.28 -892.11 -1082.17	118.91 102.97 148.39 118.39 182.74 200.42 322.80 211.92 190.98	-118.14 -102.20 -147.58 -117.97 -175.65 -194.34 -221.83 -206.31 -187.79
	Average	506.66	177.50	163.53
	Cross-sectional area of flow **Width of flow** **Wetted perimeter perpendicular to direction of flow**	506.66 sqm 163.53 m 177.50 m		
	Hydraulic mean radius R=A/P Longitudinal slope as calculated Velocity by Manning's formula	2.85 m 0.0117 m per meter		
	$V=1/n\ R^{2/3}\ S^{1/2}$			

	For winding, some pools & shoals, clean ,lower stages,more effective slope& C/S & stoney section			
	n=	0.065		
	Velocity V=	3.352 m/s		
		1698.18 cum/sec		
	Discharge Q=A*V	3.36 m/s		
2.	**Design Discharge**			
	Hence design discharge	1698.18 cum/sec		
	Design Velocity	3.36 m/s		
	Water Way			
	Provide	23.5 m		
		38 m		
		3 no.		
		107.00 m		
		1.80 m		
		1.20 m		
		110 m		
3.	**Scour Depth**			
	Increase in design discharge, as per IRC:78-2000, cl 703.1.1	10%		
	Increased design discharge	1868.00 cum/sec		
	Mean depth of scour, as per IRC:78-2000, Cl 703.2			
	dsf = 1.34 (Db 2/Ksf)1/3	17.46 cum/sec/m		
	Db = Design discharge per metre width	4.00		
	Ksf = Silt factor for Gravel /Boulde Strata.	5.68 m		
	dsf =			
	The maximum depth of scour below the HFL for piers having individual foundation without any floor protection			
	Maximum scour depth, as per IRC:78-2000, Cl 703.3 =2*d_{sf} =	11.36 m		
	The maximum depth of scour below the HFL for piers having individual foundation without any floor protection			
	Maxm. Normal scour depth, as per IRC:78-2000, cl 703.3 = 1.27*dsf =	7.21 m		
	Maxm. Seismic scour depth, as per IRC:78-2000, cl 703.3 = 0.9*1.27*dsf =	6.49 m		

4.	**Foundation Depth**	
	Depth of Scour below HFL for Pier Foundation	11.63 m
	HFL at site	1673.516 m
	Max. Scour level for Pier	**1662.154 m**
	Desired foundation level for Pier wall	1662.15 m
	Bottom of Pier foundation provided as	1653.796 > **1666.477 m**
	Desired Scour level for Abutment wall for Normal condn.	1666.301 m
	Bed level at site	1668.358 m
	Desired Scour level for Abutment wall for Seismic condn.	1667.023 m
	Actual foundation level for the Abutment and Pier structure will be modified as per availablity of Firm strata at site as the River bed are of mostly of Hard weatherd rock with big boulder strata, where scour may not occure, and also by providing Toe wall and abutment protection work with Boulder approne etc..	
5.	**Deck level**	
	HFL at proposed bridge site	167.516 m
	Afflux	0.441 m
	Minimum vertical clearance 1.200 m	1.200 m
	Depth of super structure	2.700 m
	Wearing coat	0.056 m
	Minimum deck level required	1677.913 m
6.	**Afflux**	
	Cross-sectional area of flow (A)	506.66 sqm
	Width of flow (W)	163.53 m
	Total water way provided (L)	107.00 m
	Design discharge (Q)	1608.18 cum/sec
	Depth of flow at d/s of bridge Dd=A/W	3.098 m
	L/W	0.654
	The afflux as per Orifice formula	0.441 m
	The afflux adopted	0.441 m

Water Current and Depth of Scour

As per **Cl. no. 219.5.3 of IRC:6-2016**, **Water current and depth of scour** has been considered. The depth of scour under seismic condition to be considered for design shall be 0.9 times the maximum scour depth. The flood level for calculating hydrodynamic force and water current force is to be taken as average of yearly maximum design floods. For river bridges, average may preferably be based on consecutive 7 years' data, or on local enquiry in the absence of such data.

6.2.3. Erosion at Bridge Abutments during Floods/Rains

The River Sindh at Wayil, which is one of the main tributary of River Jhelum experienced flooding with high discharge in September 2014 resulting into flooding of project site and adjoining areas. The total catchment area of River Sindh in the district is about 360 Sq. kms. River Sindh due to its huge basin area and discharge weathers the host rocks, transports and deposits the sediments as river bed material.

To withstand extreme flooding condition at River Sindh, 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.

6.2.4. Sliding of Backfilling with Abutments

Backfilling with abutments of the proposed bridge at Wayil may slide due to uplift pressure of percolated rainwater. Therefore, while designing of abutments, weep holes (80 mm to 100 mm dia) with minimum 600 mm filter media for draining of rainwater may be considered to prevent sliding of backfilling and uplift pressure at abutments.

6.2.5. Seismic Factor in Design Bridge

The proposed bridge site at Wayil on River Sindh in Ganderbal District is located in Seismic Zone V and prone to high-intensity earthquakes. While designing of bridge components, suitable seismic load factor must be taken into consideration. Anti-dislocation devise for slabs/spans should also be considered in bridge design/construction to withstand horizontal force during high-intensity earthquakes.

6.2.6. Snow Load on Proposed Bridge Site

The proposed bridge is located at Wayil in District Ganderbal which receives heavy snowfall which normally occurs during extreme winter. The design team of the contractor has to consider the design parameters based on the snow load.

6.2.7. Embankment Slopes and Spoils

Erosion problems may occur on exposed slopes of the River bank, newly constructed slopes and earth fills depending on soil type, angle of slope, the height of slope and climatic factors like the wind (direction, speed and frequency) and rain (intensity and duration). Soil erosion will add siltation to the runoff during the Rainy/ monsoon season.

6.2.8. Excavation Activity of River Beds (Foundation Wells)

Construction of bridges involves the excavation of water channels bed and banks for the construction of the foundation and piers. If the residual spoil is not properly disposed of,

increased sedimentation in downstream of the bridge may take place during the rainy season/ monsoon. Also, the bridge-end fills require armouring to ensure minimum gullying and slumping.

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

6.2.9. Quarries and Borrow Areas

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

6.3. Anticipated Impacts During Construction and Operation Stages

Anticipated impacts on various environmental components during construction and operation phases of the proposed bridge at Wayil in Ganderbal District are described below:

6.3.1. Impact on Topography and Physiography

The proposed 1x110 m Span bridge at Wayil Ganderbal District will be constructed in Wayil Village. The approach road from Sonamarg lies in a low lying floodplain area of Sindh River downstream and would be negligible during construction and operation phases of the proposed bridge.

6.3.2. Impact on Soil

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

Construction Phase

During construction of the proposed bridge at Wayil in Ganderbal District, 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.

Operation Phase

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

6.3.3. Impact on Water Resources

Construction Phase

The proposed construction of 110 meter span bridge at Wayil village will be constructed over River Sindh. The foundation excavation debris and construction wastes on the course of River may also affect surface water hydrology and flow. Excavation of slurry from the foundation wells may result in contamination and turbidity issue of the River Sindh. Proper management of excavation of foundation wells and disposal of the slurry.

Operation Phase

During the operation phase, drainage pattern or hydrology of the River Sindh will not be affected. Therefore, no impact is anticipated during the operation phase.

6.3.4. Degradation of Water Quality

Construction Phase

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

(i) by improper disposal of solid wastes, slurry during the excavation of foundation wells, oily wastes, used oil waste, etc.
(ii) by raw sewage generated from camp, batching plant and bridge construction site,
(iii) open defecation/ urination by workers on the course of River Sindh.

During the construction phase, debris and construction wastes, if not cleared, may deteriorate surface water quality of the River Sindh.

Operation Phase

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

6.3.5. Impact on Ambient Air Quality

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 ($PM_{2.5}$) and Respirable Particulate Matter (PM_{10}). 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 (SO_2), particulate matters, nitrogen dioxide (NO_2), 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 State 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.

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 500 m from the bridge.

6.3.6. Impact on Noise

Construction Phase

The proposed construction of the bridge at Wayil in Ganderbal District will be confined to the River Sindh as per design criteria and within the given geo-coordinates. 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 6.2: 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 also shall be localized in nature
2.	Construction Phase	• Plant Site - stone crushing, asphalt production plant and batching plants, diesel generators etc • Work zones - Community residing near to the work zones	• Plant Site: Impact will be significant within 250m. • Work zones: Such impacts again will be temporary as the construction site will go on changing with the progress of the works.

Construction - Related Noise

In connection 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 7.7**. 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 6.3: Typical Noise Levels Associated with Highway Construction

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

Operation Phase

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

6.3.7. Impact on Management of Spills and Wastes

During the construction of the proposed bridge at Wayil, demolition/ material wastes and excavated earth/ sluury 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 River Sindh. These wastes must be collected and disposed of appropriately

6.3.8. Impact on Flora, Fauna and Ecosystem

The approach road lies in a low lying floodplain area of River Sindh with self grown trees (comprising of mainly Ailanthus) which is synonymous with any flood plain area in Kashmir region. These trees can grow profusely with dense growth. For the development of bridge approach roads, 36 trees of indeginous type of 35 Ailanthus and 1 Willow trees/saplings are required to be cut down for the construction of approach roads. Cutting of these trees will be compensated with Compensatory Plantation measures @ 3:1 ratio that is >108 saplings comprising of indigenous type and Pine saplings will be planted as reflected in the EMP.

During the construction and operation phases of the proposed bridge at Wayil no adverse impact is anticipated on terrestrial fauna.

The aquatic fauna associated with the River Sindh comprised of trout fish species like Rainbow Trout *(Oncorynchus mykiss), Shuddgurn and Anyour* and in upstream by Brown Trout *(Salmo trutta)* and Snow Trout *(Schizothorax plagiostamus)* and other species. Benthic invertebrates, periphytic form (attached growth), planktons (zooplankton and phytoplankton communities). No aquatic mammals or bigger animals reported from the River Sindh.

General Bridge Structure Design consideration

In general, bridge size depends on:

- Area of drainage upstream from bridge (i.e. larger drainage areas will likely require larger bridge spans)
- Volume and flow of peak run-off
- Average stream width, depth, and gradient (slope) at the crossing site
- Amount of debris loading or scouring
- Size and species of fish expected to utilize the bridge for passage

Bridge design and materials should not degrade water quality or repel animals and fish. Therefore when constructing, make sure that materials used within the stream are clean, not prone to erosion, and non-toxic to aquatic life.

Bridges should be long enough to exceed the floodplain width, allowing flood flows expand onto the floodplain to minimize scour, erosion, and flooding. Give preference to bridge locations where streambed and banks are composed of firm, cohesive soils to minimize erosion.

Maintain a natural substrate underneath the bridge. If concrete is necessary to prevent scour, then it is recommended to cover the concrete with a natural substrate.

Rip Rap is difficult for ungulates and amphibians to traverse and should not be placed in front of or on the slopes adjacent to a passageway. If rip rap is required, then it should be buried, back-filled with topsoil, and planted with native vegetation.

Construction Considerations:

- Construct during periods of low flow to minimize impacts to fish and wildlife and their habitat.
- During construction, minimize disturbance to the length of the natural stream channel and the natural flow of the water.
- Remove temporary fills and structures when construction is complete.

Some general recommendations for the sizes of bridge openings suitable for fish and wildlife. Keep in mind that the most suitable design will differ depending on the species that require passage.

To be conducive as passage for use by fish, bridges must:

- Maintain a constant grade along the length of the bridge, and avoid large drops above or below the structure. Alternatively, if a new bridge is proposed in an area where the Department has determined a barrier to fish movement might be desirable, construction options could be explored.
- Accommodate both juvenile and adult fish.
- Maintain water depth through the bridge openings similar to those in the natural stream.
- Minimize turbulence and flow contraction because turbulence inhibits or prevents animal passage.
- Allow upstream fish passage.

Structure Placement:

Bridge crossings alignment should be similar to that of the natural nalllah/ stream. In-channel deposition and bank scour may lead to stream degradation. Drops greater than 2-4 inches or scour pools will obstruct upstream and downstream fish passage.

Internal Habitat:

Ensure water depths are sufficient to allow passage of fish and other aquatic organisms during all seasons, unless otherwise desired based on coordination with the Department. Construct bridge bottoms with natural stream substrates and design a channel under the bridge to provide fish passage during low water periods.

Operation Phase

- Monitor structures to ensure they are clear of obstructions such as detritus or silt blockages that impede movement.
- Monitor and evaluate effectiveness as a fish and make appropriate adjustments if necessary (e.g. Retrofit fencing or other modifications), and coordinate and report findings to fish and wildlife management agencies.
- Evaluate bridge impacts on erosion and riparian areas to ensure habitat integrity

6.3.9. Impact on Socioeconomic Environment

[5]The proposed bridge project at Wayil involves land acquisition for approaches on both sides which comprises approx. Govt. land at 3165.57 m^2 (6 kanal, 14.03 marla), Private Land at 2152.6 m^2 (4 kanal, 18.25 marla) and Shamilat land of 569.74 m^2 (1 kanal, 1.07 marla). For development of approaches, minor private land acquisition measuring 2152.6 m^2 is involved on both sides of the bridge for which the Abbrevaited Resettlement Action Plan (ARAP) will be prepared separately.

The construction and operation phases of the proposed bridge will have a beneficial impact on the social economic environment and direct connectivity with the adjoining villages of Wayil, District Head Quarters, Srinagar-Sonmarg-Leh (Ladakh) connectivity. The construction of Wayil bridge will also benefit the important pilgrimage of Amarnath Yatra annually Increase in income of local people is expected as some of local unskilled, semi-skilled 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.

Construction stage

6.3.9.1. The influx of Construction Workers

Although the construction contractors are likely to use un-skilled labour drawn from local communities, use of specialized road construction equipment will require trained personnel not likely to be found locally. Sudden and relatively short-lived influxes of construction workers to communities 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 proposed bridge at Wayil will be in the order of about 80-90 persons per day. However, this number will fluctuate and the number in any particular activities will be lower.

[5] Details of the land acquisition involved for the approaches provided by the Contractor inconsultation with the Revenue Department and PIU (PWD-R&B).

6.3.10. 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. Some of the local restaurant's are located on left side and right side of the Srinagar approach and right side of approach towards Sonamarg. Due to the construction activities, these outlets 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.

Operation Stage

During the operation phase, the proposed bridge at Wayil will provide safe movement of traffic and reduce the travel time of the these communities. The proposed bridge will also facilitate the movement of people and vehicles and ease of access due to the construction of Wayil Bridge. The agricultural/ horticulture produce in Wayil and adjoining villages will be easily procured and delivered to the main town and city centre. Also, the proposed bridge is more essential as the road is vital in reaching to different villages, district head quarter, Srinagar city and more importantly with National Highway of Srinagar-Leh (Ladakh). Therefore, a positive impact is anticipated on the socio-economic environment during the operation phase.

6.3.11. Impact on access route

Approach road on LHS from Sonmarg Leh side, one stone crusher plant and a hallow concrete brick unit exists 210 m and 60 m downstream from the proposed bridge. The construction of the approach may disrupt the access road for these units however, this has was discussed with the desgn team and already considered to provide the safe access road. The access road will facilitate these units and others with better facility as compared to the existing GSB road access which is already in dilapidated condition. Details of the proposed access route is provided in Figure 6.1 below;

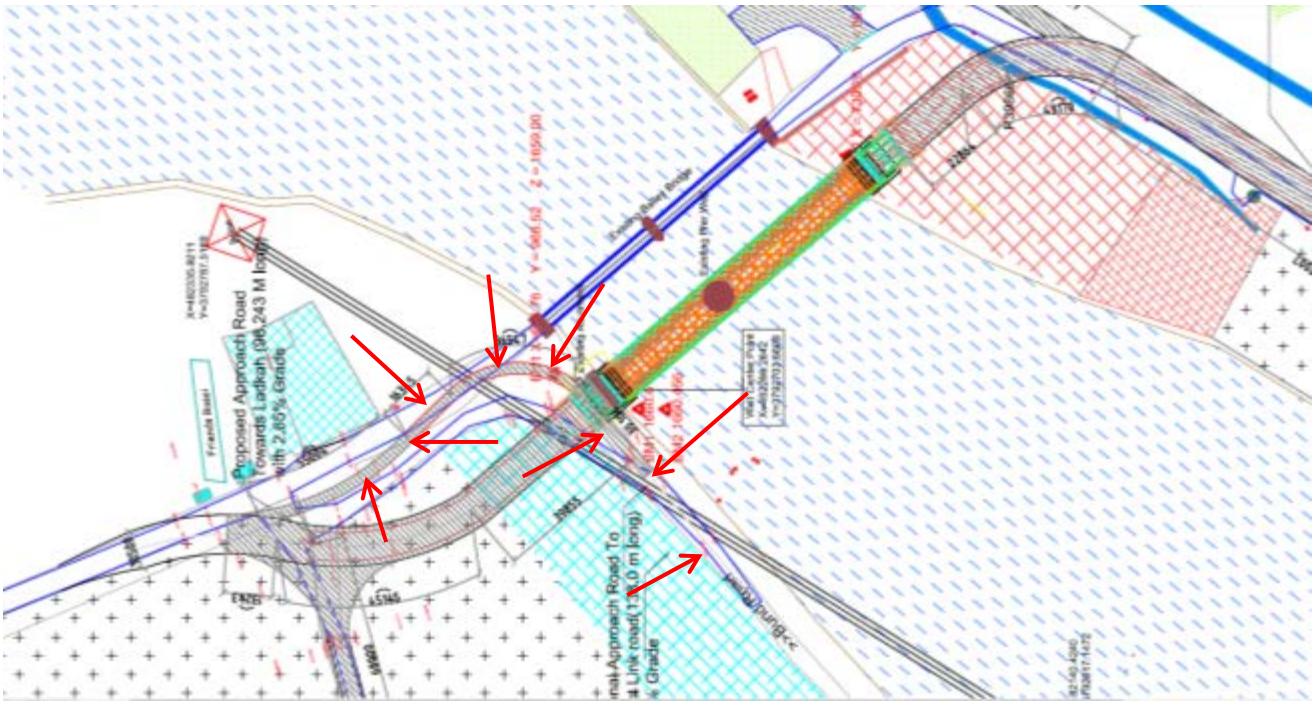


Figure 6.1: Schematic layout plan showing (red arrows) the proposed "Safe Access Route" for the Stone Crusher Unit, Hallow Concrete Brick Unit etc.

6.3.12. Impact on Religious Structures and Cultural Properties

No religious place is located near the bridge site at Wayil.

6.3.12.1. Common Property Resources

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).

6.3.13. 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.

6.3.14. Safety Aspects

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

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.

6.3.15. Impact of Pandemic Disease Covid-19 (Coronavirus)

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

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-V as per BIS standards for the construction of the proposed bridge at Wayil in District Ganderbal. The synoptic description of the design parameters is presented in Chapter 3 and 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 road infrastructure.

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

As per environmental and social screening exercise and assessment survey/ database, the vital bridge connectivity is missing between the Wayil and adjoining areas with the Wayil other habitations/ villages due to the lack of the proper bridge.

The importance of the proposed 1x110m span of 2 lane bridge is many fold by giving direct connectivity of villages like Wayil, Manigam, Malapora, Arch, Ganderbal, Wussan, Drag Tanga, Palang, Kangan and tourist hub Sonamarg etc. The proposed bridge is

constructed on Srinagar-Leh (Ladakh) National Highway-1D. The proposed bridge thus serves as an important link between these villages having approximate population of >60,000. The bridge will also serve indirectly to thousands of other nearby areas as it links these areas with National Highway and District head-quarter Ganderbal. Moreover, the area being tourist hub as important tourist destination of Sonamarg which falls on the same highway and district.

Besides it is the major/vital connecting road between Srinagar and Leh-Ladakh. Most of the essential and emergency services/ goods/ army movement are transported via existing single lane bailey bridge at Wayil resulting into the frequent traffic jams and great inconvenience to the locals. At present a temporary old bailey type single lane bridge exists which results into frequent traffic traffic jams, wastage of time. Hence, the construction of the proposed 2 lane bridge will provide the important connectivity and smooth flow of traffic.

Several alternatives are analyzed for avoiding localized environmental impacts & arriving at the best-fit alignment.

[6]Figure 7.1: Map showing existing temporary bailey bridge which was designed for the single vehicle to pass through it.

[6] Existing old temporary bridge (bailey type) is a single lane bridge on which single vehicle can pass at a time and rest of vehciles have to wait for their turn and people are facing immense problem due to the frequent traffic jams etc. The proposed bridge of 1x110 meter span (2 lane) having a clear carriageway of 7.5 meters with 1.5 meters footpath on both sides of the carriageway spread over a length/span of 110.0 meters.

7.1. With or Without Project Scenario

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

Providing better connectivity will ensure that goods and people from areas covered by the proposed bridge construction can move in and out of the areas quicker and save time. Increased trade and commerce activity are expected as agriculture/ horticulture are the main activity for growth. By construction of climate-resilient and flood-proof infrastructure, the 110 m span 2 lane bridge at Wayil has been designed to connect the various settlements with better access and smooth flow of traffic etc.

If the proposed Wayil 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 like frequent traffic jams, loss of time continue to degrade the air quality etc. and disruption of essential supplies to Srinagr-Leh (Ladakh) NH and impacted by flood further. As a present scenario of temporary old bailey bridge (narrow single lane type) exists, people will continue to suffer due to the lack of any connectivity. During floods in low lying areas it becomes very difficult to move to these areas (low lying). 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 Wayil are substantial and far-reaching both in terms of the geographical spread, importance of the NH-1D road which connects Leh (Ladakh) and time/ fuel saving which is increctly correlated with the increase in air pollution.

Therefore, 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 at Wayil.

8. PUBLIC CONSULTATION AND DISCLOSURE

8.1. Introduction

Public consultation/meeting was conducted at Wayil village near proposed bridge site in September 2018 and July 2020 for the proposed "Construction of 1x110 meter Span 2 Lane Semi Arch Segmental Steel Trussed Girder Bridge over River Sindh in District Ganderbal. Consultation has been followed in accordance with the World Bank's ESMF-JTFRP protocol which is the pre-requisite for the environmental screening process and environmental assessment. The purpose and objective of this consultation is the involvement of residents/ stakeholders and to make them cognizant about the proposed road up-gradation 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 Subproject Road	Location of Consultation	Date of Consultation	Geo-coordinates of Location
1.	Construction of 1x110m Span 2 Lane Semi Arch Segmental Steel Trussed Gider Bridge on River Sindh at Wayil.	Wayil of Ganderbal Block in District Ganderbal	12-09-2018 20-07-2020	Lat: 34°16'26.08" N Long:74°48´26.60"E

A reconnaissance survey was also conducted for the proposed bridge project in Wayil Village. Baseline information was also collected from the adjoining areas in close proximity within the Project Influence Area (PIA) in September 2018 and July 2020. 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 both primary and secondary stakeholders in the project area. The primary stakeholders consulted are usually (i) Local community having their permanent or temporary residences (ii) Roadside shop owners (iii) Road users and (iv) Community Leaders. While the secondary stakeholders are mostly the project officials, village representatives and social activists

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), PIU/ PWD (R&B, Government of J&K. • Other project stakeholders such as official of line Department

8.3. Consultations with Stakeholders

Consultation with the community was carried out at near bridge site at Wayil (refer Table 9.1) of the project to inform and educate the 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 and values of the population likely to be impacted by the project. Locations were selected which represent the predominant land uses of the project area and also included all sections of people in the project region -from agricultural labourers to landowners, employee and business community and shop keepers. In each of these consultations, the villagers were briefed about the proposed bridge project and its approach road alignments and the potential benefits of the project.

The various forms of public consultations (consultation through ad-hoc discussions on site-along project corridor) have been used to discuss the sub-project and involve the community in planning the design and mitigation measures. The signatures/photographs of participants in the public consultation is 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 Wayil in Wayil Village of District Ganderbal are given below:

- About the proposed bridge project, source of assistance and its implementation/execution etc.
- Information on perceived benefits from the proposed Wayil bridge project including travel time, fuel cost, noise and air pollution.
- People were updated about the Covid-19 Pandemic crisis happening throughout the world and its increased spread at National and State level. People were apprised about the importance of Social Distancing, wearing of masks, sanitization/ frequent washing. People were also informed that the construction works will not start unless the Contractor for this project will implement stringent measures/ Guidelines as devised/ recommended by the World Health Organization/ Ministry of Health, Govt. of India/ International Labour Organization and Local Administration guidelines.
- People were also informed that Covid-19 Marshal/ Officer will be also appointed and mobilized by the contractor during the commencement of the works until the completion of the project. This exercise will ensure that the stringent Govt. protocol and international guidelines are strictly followed.
- Covid-19 WHO/ ILO guidelines Government protocol will form the part of the EIA/ EMP report for its effective implementation in this project.
- Information on the impacts from the proposed Wayil bridge project during construction stage in terms of inconvenience to the public, air and noise pollution, etc. The occurrence of a disaster like floods and cloud bursting in past.
- Whether construction activities will cause any type of health hazard or not?
- Discussions among the public for sharing of information related to the proposed Wayil bridge project, environment policy of World Bank, direct and indirect impacts of improvement/construction work on the environment.
- Any loss of land/structure/business or other community property due to the proposed Wayil bridge project.
- Presence of any historical or cultural monuments near the project area and any impact is seen due to the proposed Wayil bridge project?
- Any impact on trees and protective measures to be taken for the safeguarding of scheduled trees in close vicinity of the proposed site.
- Any possible problems to be faced by the local people in their daily activities due to the proposed construction of Wayil bridge project.

8.6. Outcome and Feedback received from the Public Consultation

At Wayil near bridge site, local people participated in the consultation process, and both inhouse meetings (Local Restaurant and at Stone Crusher Unit) and people were also consulted at project site. The participants were mainly locals, businessman, crusher unit

owner and its staff and workers, PIU (R&B) etc. People, in general, were very enthusiastic about the benefits of the proposed Wayil bridge as it will provide direct connectivity with different villages, district head quarter and more importantly connectivity with the Srinagar-Leh (Ladakh) National Highway and annual Amarnath Pilgrimage.

As per present scenario of old temporary single lane bailey bridge, people will continue to suffer. People are ready to extend all support during the execution of the Wayil bridge and for successful completion of the project..

PIU (R&B) ensured that the requisite environmental management measures shall be incorporated in EMP and public consultation shall be a regular process during all stages of the sub-project execution to solve any issues arising out of proposed works.

The valuable feedback received from the consultation conducted in project area with the residents are summarized below;

- The owner of the Stone Crusher Unit and the hallow concrete brick unit near approach (towards Sonmarg side) on left side requested for the proper access route to be provided during construction of the approaches in order to safeguard the units. As such hundreds of people are directly or indirectly related to the livelihood. During consultation, unit holders were ensured by the contractor that the access road will be developed.
- Poor local of labour class people from Wayil Village shall be preferred for employment in the project activity. As enough labourers are available in the area which will be beneficial for the contractor.
- People suggested that the construction zone must be properly barricaded to avoid the local kids for swimming purpose which may possess safety issues during well-foundation. Contractor to ensure that safety marshals/ safety officer in place will not allow any person especially kids to enter into open trenches or excavated area
- Proper and timely disposal of construction wastes shall be ensured and all necessary measures to be properly implemented for preservation River Sindh.
- Noise generating activities should be scheduled only during working hours (Day time).

9. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

9.1. Introduction

Environmental Management Plan (EMP) has been prepared which mainly centred on the understanding of the interactions between the environmental setting and the project activities and the assessment of the likely impacts. Mitigation measures for anticipated environmental impacts have been elaborated as specific actions which would have to be implemented during the project implementation. The EMP would help the contractor and PIU to implement the project in an environmentally sustainable manner and where EPC contractor for this bridge project, understand the potential environmental impacts arising from the proposed construction of Wayil bridge over River Sindh. EPC contractor have to take appropriate actions/ mitigation measures to properly mitigate/manage such environmental impacts. EMP can thus be considered to be an overview document for the EPC contractor engaged for 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 EPC Contractor in the Contractor's Environmental Management Plan (EMP).

9.2. Proposed Works of Wayil Bridge Project

- Design and Construction of 1x110 meter Span 2 Lane Steel Arch Bridge
- Approach Roads on both sides
- Nallah Training Works etc.

9.3. Outline of EMP and its Implementation Strategy

The EMP is a guiding tool which discusses the potential environmental impacts and specific mitigation/management measures for the proposed construction of 1x110 meter Steel Arch bridge at Wayil Village Ganderbal. 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 EPC 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 (R&B) will be responsible to ensure implementation of EMP for the performance of all by the EPC Contractor of Wayil 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 EPC Contractor for effective implementation of EMP and adherence to all the mitigation measures as outlined in this EMP associated with their respective activities. The EPC Contractor will be required to comply with the provisions of the EMP.

9.4. Environmental Management Measures for the Design stage

9.4.1. Hydrological Study for Design of Proposed Bridge

The 1x110m Wayil bridge is proposed to be constructed over River Sindh at Wayil village with a geo-coordinates between the Latitudes of 34°16'30.00"N and the Longitude of 74°48´27.83"E. The River Sindh is a main tributary from the District Ganderbal and carries high discharge during episodes of heavy precipitation into River Jhelum. River Sindh crosses its banks during high discharge which results into flooding of the low lying areas and were affected during deluge of September 2014. Therefore, based on this assessment hydrological study and runoff calculations for extreme flood/rains under the climate change scenarios is important for the porposed construction of the the bridge and same study has been carried out and considered for designing of the proposed 1x110 meter bridge at Wayil with excess runoff flow/flood safeguard.

9.4.2. Sliding of Backfilling and Prevent Uplift Pressure at Abutments

In both abutments of the proposed Steel Arch bridge, weep holes (80 mm to 100 mm dia) should be provided with minimum 600 mm this filter media for draining of rainwater to prevent sliding of backfilling and to avoid any uplift pressure.

9.4.3. Seismic Factor in Design of Bridge

The proposed 1x110 meter Span bridge at Wayil in District Ganderbal is located in Seismic Zone V and susceptible to to high-intensity earthquakes. Therefore, seismic load factor must be taken into consideration while designing of bridge components.

As the bridge is located in the high seismic risk zone, therefore, seismic arresters should be provided in the bridge as an anti-dislocation device for slabs/spans to withstand horizontal force during an earthquake.

9.4.4. Snow Accumulation on the Proposed Bridge

The proposed Steel Arch bridge at Wayil in Ganderbal District observes heavy snowfall during extreme winter. Accumulation of snow on the bridge may put additional load on the proposed bridge. Therefore, the snowfall load should be considered while designing the proposed bridge.

9.4.5. Approaches for Bridge

The approach/approach slab provides a transition between the road pavement and the bridge and 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.

9.4.6. 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.

9.5. Environmental Management Plan (EMP)

The Environmental Management Plan (EMP) will guide the environmentally-sound construction of the 1x110 meter Span Bridge over River Sindh at Wayil in District Ganderbal and ensure efficient lines of communication/ coordination between the PIU, EPC 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/ Operation Stage. EMP for the above bridge project has been prepared and presented in **(Table 9.1)**. A different set of guidelines, checklists, strip mapping plan and reporting formats for implementation of EMP are given as Annexures in this EIA Report of 1x110 meter Span Bridge project at Wayil.

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 & social 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 EPC 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 EPC contractor fails to comply with corrective action measures or other instructions issued by the PIU / JTFRP-PMU within a specified timeframe and the EPC Contractor fails to respond adequately to complaints from the public.

Table 9.1: Environmental & Social Management Plan (EMP) of Construction of 1x110 Meter Span 2 Lane Semi Arch Segmental Trussed Girder Bridge over River Sindh at Wayil in District Ganderbal.

S. No.	Environmental Issues	Environmental Mitigation Measures	Responsibilities	
			Implementation	Supervision/ Monitoring
A.	**Design Phase**			
A.1	Hydrological Study for designing of Bridge	The River Sindh is a main tributary of the River Jhelum and carries high discharge during episodes of precipitation into River Jhelum. River Sindh crosses its banks during high discharge which results into flooding of the low lying areas including project site and whole area was affected during devastating floods of September 2014. Therefore, based on this assessment hydrological study and runoff calculations for extreme flood/rains under the climate change scenarios is important for the porposed construction of the the bridge and same study has been carried out and considered for designing of the proposed 1x110 meter bridge at Wayil with excess runoff flow/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 may use a combination of gabion baskets and/or mattresses for slope protection. Simple stone pitching for bridge protection may not be durable for a long time. Stone pitching may deform and collapse during heavy rains and flood.	Design Team	PIU
A.3	Sliding of Backfilling and Uplift Pressure at Abutments	In both abutments of the proposed bridge weep holes (80 mm to 100 mm dia) will be provided with minimum 600 mm filter Media for draining of water to prevent sliding of backfilling and to avoid any uplift pressure.	Design Team	PIU
A.4	Impact of Seismic Activity/ Earthquake on Bridge	The proposed bridge is located in Seismic Zone V and prone to high-intensity earthquake. Therefore, seismic load factor must be taken into consideration while designing of bridge components.	Design Team	PIU
A.5	Dislocation of Span of During Seismic Activity/ Earthquake	As the bridge is located in high Seismic Risk Zone V. Therefore, Seismic Arresters should be provided to withstand horizontal force during the earthquake and as an anti-dislocation device for slabs/spans.	Design Team	PIU
A.6	Snow Accumulation on the Proposed Bridge	The project is located in snowfall area. Accumulation of snow on the bridge may affect the integrity of the proposed bridge. Snow load should be considered while designing the proposed bridge.	Design Team	PIU

A.7	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.8	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 Mobilization of Environment & Safety Officer	• The contractor will appoint qualified and experienced Environment & Safety Officer (ESO) who will work dedicatedly and ensure implementation of EMP including Occupational, Health and Safety of workers issues at the camp, batching plant and Wayil bridge construction work site. • Contractor to inform the PIU for the appointment and mobilization of Environmental Safeguard Officer (ESO).	Contractor	PIU TAQAC
B 1.2	Appointment and Mobilization of Covid-19 “Marshal”	• The contractor will appoint and mobilize Covid-19 “Marshal” for effective implementation of the Covid-19 protocol/ guidelines issued by the Government and World Health Organization (WHO) at Workplace/ construction sites.	Contractor	PIU, TAQAC
B 1.3	Regulatory Approvals	• Permission from Irrigation & Flood Control Department for construction of the bridge on River Sindh • 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 State 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, TAQAC

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 State Pollution Control Board (as required) before the establishment and operation of batching plant.	Contractor	PIU, TAQAC
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, TAQAC
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, TAQAC
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 (SOP) while mobilizing the labourers from the local community or outside	Contractor	PIU, TAQAC
B 1.9	Construction Vehicles, Equipment and Machinery	• All vehicles and equipment to be procured for the proposed bridge work at Wayil, Ganderbal will conform to the relevant Bureau of Indian Standard (BIS) norms. The discharge standards promulgated under the Environment Protection Act, 1986 and Motor Vehicles Act, 2019 will be strictly adhered to. • The silent/quiet equipment like DG set as per regulations will be used at the construction site or labour camp. • The contractor will maintain records of Pollution Under Control (PUC) certificates for all vehicles used during the contract period, which will be produced to PIU for Monitoring and whenever required.	Contractor	PIU, TAQAC

B.2	**Pre-Construction Activities By The PIU**			
B 2.1	Tree cutting	• As per site assessment, about 36 trees (non- scheduled trees) will be affected comprising of 35 nos of Ailanthus sp. and 1 Willow trees. These trees are required to be cut down as they come within or may protrude towards approach road pavement and result in critical safety hazard/ accidents. • Loss of trees will be compensated by 1:3 ratio (i.e. for loss of 1 tree 3 trees will be planted) or greater and transplantation of the small trees may be envisaged wherever applicable.	Contractor	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	PMU, TAQAC
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 approach roads. • Information boards will also be set up at the sites of construction camps and labour camps, plants and stockyard site. Details of Nodal officer with telephone numbers will be displayed for registering complaint/grievances by stakeholder/general public	Contractor	PIU, TAQAC
B.2.4	Utility Relocation	• Before commencement of works, a joint field Monitoring will be conducted by the Contactor, TAQAC, PIU to map out the alignments, to check utility is being impacted due to the construction works.	Contractor	PIU, TAQAC
C.	**Construction Stage**			
C.1	**Protection of Trees**			

C.1.1	Safeguarding of Trees and Plantation	• 1 Chinar tree is gowing close to the existing road on LHS of Srinagar approach side. Chinar tree is a scheduled tree (protective tree) of the J&K. • Chinar trees are sensitive to construction, and these trees in the construction zone will be covered/ wrapped with protective green mesh fiber cloth around base tree trunk area by 6 feets in height. • To take sufficient care to define the root protection zone and minimize root loss especially to Chinar trees following measures will be taken; [7]For the perspective of the Chinar tree growth, pavement profile designs without a compacted subgrade and gravel base are preferable as these resulted in greater root abundance from 10-20 cm soil depth. Porous pavements are even more advantageous than impervious pavements given this profile design as they resulted in greater root biomass, as well as enhanced above ground growth of Chinar. • No concreting shall be allowed around the Chinar trees and all excavation activities shall be done only in consultation with the Environmental Specialist of PMU. • Chinar tree will be marked with horizontal reflective strip and covered/ wrapped with protective green mesh fibre cloth around the base tree trunk area by 6 feet in height before the commencement of works. • No stockpiling of any construction will be allowed around or close to scheduled trees. • Make-shift steel barricading will be provided around each tree in an active work zone where foundation/ excavation takes place. • Any other trees within the area close to proposed approach road during construction stage will be marked with same horizontal reflective strips and green mesh as per the above measures.	Contractor	PIU, TAQAC

[7] J. Morgenroth, "Root Growth Response of Platanus orientalis to Porous Pavements, Aboriculture & Urban Forestry 37 (2):March 2011

C.2	**Site Clearance (Clearing and Grubbing)**			
C 2.1	Clearing, grubbing and Levelling	• If required vegetation will be removed from the construction zone (approaches) before the commencement of construction. • All works will be carried out such that the damage or disruption to flora other than those identified for cutting is minimum. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval of PIU. • The Contractor, under any circumstances, will not cut or damage trees. • Trees identified under the project will be cut only after receiving clearance from the Forest Dept (as applicable). Vegetation with a girth size of over 30 cm will be considered as trees and shall be compensated.	Contractor	PIU, TAQAC
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 Wayil, Ganderbal: • Construction of Wayil bridge should be done during lean flow and high discharge/ precipitation episodes to be avoided.. • Curtains 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 Wayil, Ganderbal. • Flowing water will be diverted with guide bunds and cofferdams at pier locations	Contractor	PIU, TAQAC
C.3.2	Water Pollution from construction material	• The contractor will take all precautionary measures to prevent entering of wastewater into water bodies or the irrigation channel (near end of approach road- Wayil) ring construction. The contractor will avoid construction works close to the streams or water bodies during rainy season/ later effect of 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 River Sindh or water bodies near by.	Contractor	PIU, TAQAC

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 State Pollution Control Board (JKSPCB) guidelines.	Contractor	PIU, TAQAC
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, portable wet/dry toilets (bio-digestion type) shall be provided for workers.	Contractor	PIU, TAQAC
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, TAQAC

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 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 other PPE should be provided as a mandatory effort to the construction workers in dust prone areas.	Contractor	PIU, TAQAC
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, TAQAC
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, TAQAC

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, frequency of water sprinkling will be increased on both approach sides and PIU will decide the sprinkling time depending on the local requirements. • The contractor will rehabilitate the borrow areas (if any) as soon as the borrowing of soil is over from a particular borrow area following the approved borrow area Redevelopment Plan.	Contractor	PIU, TAQAC
C 6.2	Transporting Construction Materials	• All vehicles delivering fine materials like aggregate, cement, earth, sand, etc, to the bridge site at Wayil will be covered by Tarpaulin to avoid spillage of materials. Contractor to ensure no material will be • 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, TAQAC
C 6.3	Quarry Operations & Crushers	The Contractor shall obtain materials from approved quarries. The crushers will be operated after obtaining consent to establish and consent to operate from J&KSPCB.	Contractor	PIU, TAQAC

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 methods like dykes, sedimentation chambers, basins, fibber mats, mulches, grasses, slope, drains and other devices. • All temporary sedimentation, pollution control works and the maintenance thereof will be deemed as incidental to the earthwork or other items of work and as such no separate payment will be made for them. • The contractor will ensure the following aspects: - After construction protective works, 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 TAQAC
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 purpose, the trolley will be used.	Contractor	PIU, TAQAC

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 the bridge works at Wayil. • Both sides of the bridge to be barricaded and to delineate construction zone as well as material stacking areas. The bridge construction site at (River Sindh) shall be appropriately barricaded to prevent entry and accidental tress passing of workers, staff and others into the const. site. • Contractor to take necessary safety measures at the bridge construction work zone during events of torrential rains or in rainy season. River Sindh have a peak high discharge from the upper catchment area during high precipitation. • Public/ local entry to the construction will be highly restricted especially Children. No child will be allowed to enter site for the swimming/ bathing or other purposes. Contractor to erect sign boads for restriction for swimming/ bathing or other activites. • 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 on River Sindh (especially during excavation/ well foundation works) for generating awareness among the local community	Contractor	PIU, TAQAC
C 7.4	Occupational Health and Safety of Workers	• The contractor will prepare and follow the Occupational , Health and Saefty (OHS) plan, including provisions for an emergency response plan. • All workers will be provided with required personal protective equipment • Emergency Telephone Numbers shall be displayed at camp and plant site. • Medical facilities shall be provided for workers at the Labour camp and plant site.	Contractor	PIU, TAQAC

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 TAQAC
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, TAQAC
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 1x110 meter Span Bridge at Wayil; • Protective safety shoes, gumboots, hand gloves, protective goggles, etc (as required) will be provided to the workers employed in foundation/excavation, steel rebaring, and bending concrete works, etc. • Contractor to ensure availability(24x7) of Life Jackets at the bridge site of River Sindh. Contractor to further install emergency phone nos. og Disaster Management cell for immediate response in case of any drowning situation. • Welder's protective eye-shields will be provided to workers who are engaged in welding works. • Earplugs will be provided to the workers exposed to high noise levels. • Safety vests will be used by workers when on a construction site. • The Contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. The contractor will make sure that during the construction work all relevant provisions of Building and other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996 are adhered to. • The Contractor will not employ any person below the age of 14 years for any work.	Contractor	PIU, TAQAC

C 9.2	Traffic and Safety	• The Contractor will take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as proposed in the traffic control plan/drawings and as required by the Environmental Expert for the information and protection of traffic approaching or passing through the section of any existing crossroads. • The Contractor will ensure that all signs, barricades, pavement markings are provided as per the MoRTH specifications. • Before taking up of construction, a Traffic Control Plan will be devised and implemented to the satisfaction of the Environmental Expert of PIU.	Contractor	PIU TAQAC
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, TAQAC
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 all the road stretches, embankment development, protection works, works road longitudinal drains, ancillary sites to be prepared by the contractor and will identify necessary actions in the event of an emergency.	Contractor	PIU, TAQAC
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 state Factories Rules will be maintained all the time by the contractor. • Availability of first aid trained persons will be ensured at the project site during the construction phase. • Availability of suitable transport will be ensured at all times to take an injured or sick person(s) to the hospital.	Contractor	PIU, TAQAC
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 TAQAC

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, TAQAC
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, TAQAC
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: a) Supply of sufficient quantity of potable water (as per IS) at construction site/labour camp (site at suitable and easily accessible places and regular maintenance of such facilities). b) If any water storage tank is provided that will be kept such that the bottom of the tank at least 1 meter above the surrounding ground level. c) If water is drawn from any existing well/ hand pump, which is within 30 meters proximity of any toilet, drain or other sources of pollution, the well will be disinfected before water is used for the drinking. • PIU will be required to inspect the labour camp once in a week to ensure the compliance of the EMP.	Contractor	PIU, TAQAC

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, • Separate toilets/bathrooms, as required, will be provided for men and women, marked in vernacular language, • Toilets will e 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.	Contractor	PIU, TAQAC
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 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, TAQAC
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	PMU, TAQAC

C 11.2	Compensatory Plantation	• 35 Ailanthus sp and 1 Willow tree are coming in approachs of the proposed Wayil bridge mainly from the approach towards Sonamarg side. These trees are required to be cut down as they come within the approach close or protrude towards the approach of road pavement and may possess critical safety hazard. • Loss of trees will be compensated by 1:3 ratio (i.e. for loss of 1 tree 3 trees will be planted) or greater and transplantation of the small trees (if applicable) may be envisaged wherever applicable. As per compensatory plantation, 108 trees will be planted in open spaces near nallah banks on both sides. • Plantation of Pine sapling shall be planted under landscape management/ beautification in project area. This can be achieved in coordination and in association with the Social Forestry Department.	PIU	PMU, TAQAC

C 11.3	**COVID-19** (Corona-Virus) Pandemic Protocol Compliance at Workplace and Labour Camp	[8] COVID-19 Guidance for the Construction Workforce- When working in the construction industry, the following tips can help reduce the risk of exposure to the coronavirus: • Encourage workers to stay home if they are sick. • Allow workers to wear masks over their nose and mouth to prevent them from spreading the virus. • Continue to use other normal control measures, including personal protective equipment (PPE), necessary to protect workers from other job hazards associated with construction activities. • Advise workers to avoid physical contact with others and direct employees/contractors/visitors to increase personal space to at least six feet, where possible. Where work trailers are used, all workers should maintain social distancing while inside the trailers. • Train workers how to properly put on, use/wear, and take off protective clothing and equipment. • Encourage respiratory etiquette, including covering coughs and sneezes. • Promote personal hygiene. If workers do not have immediate access to soap and water for handwashing, provide alcohol-based hand rubs containing at least 60 per cent alcohol. • Use Environmental Protection Agency-approved cleaning chemicals from List N or that have label claims against the coronavirus. • To the extent tools or equipment must be shared, provide and instruct workers to use alcohol-based wipes to clean tools before and after use. When cleaning tools and equipment, workers should consult manufacturer recommendations for proper cleaning techniques and restrictions. • Keep in-person meetings (including toolbox talks and safety meetings) as short as possible, limit the number of workers in attendance, and use social distancing practices. • Clean and disinfect portable Jobsite toilets regularly. Hand sanitizer dispensers should be filled regularly. Frequently-touched items (i.e., door pulls and toilet seats) should be disinfected. • Encourage workers to report any safety and health concerns.	Contractor	PIU, TAQAC

[8] OSHA- Occupational,Safety and Health Adminintration , OSHA: COVID 19 Guidelines www.osha.gov/coronavirus

		• Contractor to follow strictly Covid-19 Guidelines as given in Annexures XVII & XVIII and Standard Operating Procedures (SOP). • Updated measures/ guidelines/ SOP will be issued to the Contractor for compliance.	Contractor	PIU, TAQAC PMU
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 camps and any other area used/affected due to the project operations will be left clean and tidy at the contractor's expense to the entire satisfaction to the PIU.	Contractor	PIU, TAQAC
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 PIU. • 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, TAQAC
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	PMU
E.1.2	Slope/ Protection Monitoring	During rains/ snowfall, regular monitoring will be carried for bridge 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.	Contractor, PIU	PMU

E.1.3	Monitoring of Compensatory Plantation and Landscape areas	Continuous watch and monitoring of plantation carried out under compensatory plantation implemented and for its performance and survival rate. The plantation will be properly guarded by watch and ward personnel. Provision will be made for manure application and watering on schedule. The compensatory plantation comprise of +108 saplings of Pine saplings (to be planted in the project area) under landscape management/ beautification of the bridge environs.	PIU	PMU

9.6. 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.**

9.7. Environmental Monitoring Plan

The monitoring programme 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 (SO_2), Nitrogen Dioxide (NO_2), Carbon Monoxide (CO), Particulate Matter (PM_{10} and $PM_{2.5}$), shall be monitored six monthly at identified locations from the start of the construction activity. The ambient air quality parameters shall be monitored 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 Table 9.2 below;

Table 9.2: Environmental Monitoring Plan

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
Air	Pre-Consuction, Construction & Operation Stage	PM_{10}, $PM_{2.5}$, SO_2,NO_2,CO	Use method specified in National Ambient Air Quality Standards (NAAQM).	National Ambient Air Quality Standards (NAAQM).	Six Monthly (Summer and Post Monsoon Seasons)	24 hours of Sampling	Along the road corridor, 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	River Sindh (Bridge site) and its water channels	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 night time	Along the road corridor, 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
Tree Cutting	Pre-Construction	Only identified/ marked trees	EMP/ Inspection	EMP	After getting approval/ permission of Walnut tree.	Once	Identified trees	Contractor/ PIU
Tree Plantation	Operation Phase	Survival Rate	Plantation of tall saplings	National Green Highways policy and IRC guidelines (IRC : SP:21-2019)	Quarterly to two years post plantation	-	Areas where the plantation is being done	Contractor/PIU TAQAC

9.8. 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 Wayil bridge, Ganderbal is provided in Table 9.3 below;

Table 9.3: The Environmental 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	Surface water body (River Sindh and 3 small water channels off shoots of River Sindh- 2 water channels from Srinagar Approach road and 1 from Sonamarg Approach), 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	Pre Construction	PIU/Contractor

		area has to be reported		
3	Tree Protection	Protective Measures of Scheduled Trees	Pre Construction/ Construction	Contractor/PIU
3	Tree Cutting	Progress of Tree removal marked for cutting is to be reported	Pre Construction	PIU/Contractor to Forest Department
4	Tree Plantation	Progress of measures suggested as part of the strategy is to be reported	By end of the Construction	PIU/Forest Department
	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

9.9. 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 9.2**. Monitoring plan does not include the requirement of arising out of regulation provision such as obtaining NOC/Consent for plant site operation.

Furthermore, periodical site monitoring should be carried out by the Environmental Expert of PIU for surveillance & monitoring of road safety during the road construction. The brief description of measures has been given in **Table 9.4** below:

Table 9.4: Brief Description of Measures

Sl. No.	Locations of Work Site	Bridge Site Safety Measures
1	Construction Sites	Barricading, Caution boards, Safety Cones, Delineators, Life Jackets, etc.
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 [Provide 'Diversion Ahead' boards at 50m, 100m and 150m ahead of diversions with reflective tape for illumination at night at the all diverted locations]
4	Safety for the Workers	Helmets, Safety-Shoes, Goggles, Dusk mask, Life Jackets etc

9.10. Reporting System

The contractor will follow the reporting system for the implementation of the environmental and social 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	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.	Top Soil 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 Wayil	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 proposed bridge work activities creating pollution to environment and other causes as a consequence of methods of operations.

9.11. Budgetary Provision for EMP

Mitigation measures proposed in the EMP will be implemented by the Contractor and under the supervision/ monitoring by the PIU/TAQAC. The works to be undertaken by the contractor have been quantified and the quantities included in the respective BOQ items. The essentials of environmental health and safety 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 Chapter 5 and Annexures XV & XVI.

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

Table 9.8: Budgetary Allocation- Indicative Cost for the EMP Implementation of "Construction of 1x110 meter Steel Arch Bridge in District Ganderbal.

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/ Settlements.	No.	7000	24 hr sample, One time monitoring 1 Location ($PM_{2.5}$, PM_{10}, SO_2 and NO_2)	7000	PMU
2	Water	Surface Water Quality sample from River Sindh (downstream), and 2 water channels from Srinagar Approach side	No.	5000	Grab Sample from River Sindh/ Water Channels Location (pH, TSS, TDS, BOD, COD, Oil & Grease, Turbidity)	15000	PMU
3	Noise	Noise Measurements at 1 location near sensitive receptors/ Settlement	No.	4000	Hourly measurements for 24 hours.	4000	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			300000	PMU
~~5~~	Protection/ Safety- Scheduled Species of Trees	Reflective strips for safety. 1 Chinar tree from Approach of Srinagar side (LHS).	No.	1000	Reflective strips on the tree (1 Chinar)	1000	PMU/ Contractor
~~6~~	Tree Cutting	Trees (about 36 trees)	No.	Cost is part of the civil works			PIU/ Contractor
7	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.	7000	24 hr sample, One-time monitoring 3 Locations (Six monthly) ($PM_{2.5}$, PM_{10}, SO_2 and NO_2)	21000	PMU
8	Water	Surface Water Quality at 3 locations (six	No.	5000	Grab Sample at 1 Location (downstream)	45000	PMU

S. No.	Component	Item	Unit	Unit Cost (INR)	Quantity	Total Cost	Responsibility
		monthly) 1 Ground Water/ Public Water Source (six monthly)		7000	at River Sindh (pH, TSS, TDS, BOD, COD, Oil & Grease, Turbidity) Parameters as per IS 10500:2012	21000	PMU
9	Noise	Noise measurements at 1 location near sensitive receptors/ Settlements within the construction zone (Quarterly)	No.	3000	Hourly measurements for 24 hours.	18000	PMU
10	Air Pollution	Dust Suppression Measures	Cost part of the 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. -				
13	Compensatory Plantation	Replantation of Trees 1:3 (36 x 3)	No.	4000	108	360000	PMU
Project Enhancement by PMU-JTFRP							
14	Embankment Protection/ Slope Stability	Plantation	Lump Sum			20000	PMU
15	Median Plantation and Beautification of the open spaces.	Pine plantation in open spaces, parks etc. Indigenous Plantation along the periphery of the Stone Crusher Unit from LHS of Approach on Leh side.	Lump Sum			200000	PMU
C.	**Operation Stage (Post Construction Monitoring)**						
17	Air	Ambient Air Quality at 1 location near the sensitive receptor	No.	7000	24 hourly sample, one-time monitoring (Post Construction-Evaluation)	7000	PMU
18	Noise	Noise Levels at 1 location near sensitive receptor	No.	4000	One time monitoring (Post Construction-	4000	PMU

S. No.	Component	Item	Unit	Unit Cost (INR)	Quantity	Total Cost	Responsibility
					Evaluation)		
19	Water	Surface Water Quality at 3 location	No.	5000	One time monitoring (Post Construction-Evaluation)	15000	PMU
Total Budget						**10,28,000**	
Rupees Ten Lac Twenty Eight Thousand Only.							

9.12. Formats For Reporting

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

9.13. Environmental Compliance Report

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

ANNEXURE-I: Environment Screening Data Sheets

Part A: General Information

1. Name of the sub-project	Design and Construction of 1x110 meter Span Semi Arch Segmental Through Type Steel Trussed Girder Bridge Over River Sindh at Wayil in District Ganderbal, J&K	
2. Type of proposed activity (tick the applicable option and provide details)		
▪ Road		-
▪ Bridge		√
▪ Fire Station		-
▪ Hospital/Health Facility		-
▪ Educational Institute		-
▪ Building for Livelihoods		-
▪ Flood Infrastructure Related		-
▪ Other Public Building		-.
▪ Any Other (Please Specify)		-
3. Location of the proposed sub-project		
▪ Name of the Region	Kashmir (J&K State)	
▪ Name of the District	Ganderbal	
▪ Name of the Block	Ganderbal	
▪ Name of the Settlement	Wayil	
▪ Latitude	34°16’30.00"N	
▪ Longitude	74°80´47.43"E	

4a. Proposed Nature of Work (tick the applicable options)	-
▪ Minor Repairs	-

▪ 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)	1x 110 mts Steel Arch Type Bridge including approach roads and Nallah Training Works.
5. [9]Land Requirement (in hac./sq.mt.)	
▪ Total Requirement	5887.91 m^2
▪ Private Land	2152.6 m^2
▪ Govt. Land	3165.57 m^2
▪ Forest Land	Nil
▪ Others	Shamilat land (Community land) of 569.74 m^2 marla)
6. Implementing Agency Details (sub-project level)	
▪ Name of the Department/Agency	Roads & Buildings Department
▪ Name of the contact person	Er. Zaffer Qureshi
▪ Designation	Executive Engineer
▪ Contact Number	+91-9419001907
▪ E-mail Id	cepwdrnbkmr@yahoo.in
7. Screening Exercise Details	
▪ Date on which it was carried out	12/09/2018
▪ Name of the Person	Yadullah Shah
▪ Contact Number	+91 9622672672
▪ E-mail Id	yaadshah@gmail.com

Part B (1): Environment Screening

Question	Yes	No	Details
1. **Is the sub-project located in whole or part within 1 km of the following environmentally sensitive areas?**			

[9] Details of the land acquisition involved for the approaches provided by the Contractor in consultation with the Revenue Department and PIU (PWD-R&B).

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		1x110 m Steel Arch Bridge is proposed to be constructed over River Sindh
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	Yes		Small water channel Nangdara to Faterpora Ganderbal on Left side and other small irrigation water channel to Manigam on right side of Sind Nallah
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?	1673.516 m		
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 Required	No
2.	Environment Clearance Required	No
3.	Forest land Clearance/Diversion Required	No
4.	Tree Cutting Permission Required	No
5.	ASI (Centre/State) Permission Required	No
6.	Permission from ULB/Local Body/Department Required	Yes, permission from Irrigation & flood control department is required.-
7	Any other clearance/permission required	Only Statutory clearances and NOC's / PUC's for establishment or operation of stone crushers, Hot Mix plants, generators, vehicles etc shall be required to be obtained by the Contractor during execution stage.

Part C (1): Social Screening

1. Does the sub-project activity require acquisition of land?			
Yes		No	√
Give the following details:	Private Land (sqmts/hac.)		2152.6 m^2
	Govt. Land (sqmts/hac.)		3165.57 m^2
	Others		Shamilat land (Community land) of 569.74 m^2)
2. Does the proposed sub-project activity result in demolition/removal of existing structures?			
Yes		No	✓
If so, give the following details:			
Number of public structures/buildings		Nil	
Number of common property resources (such as religious/cultural/drinking water/wells/etc.)		Nil	
Number of private structures (located on private or public land)		Nil	

3. Does the proposed project activity result in loss of crops/trees?			
Yes	✓ (35 Ailanthus, 1 Willow trees)	No	
4. Does the proposed project activity result in loss of direct livelihood/employment?			
Yes		No	✓
5. Does the proposed activity result in loss of community forest/pastures on which nearby residents/local population are dependent?			
Yes		No	✓
If yes, give the details of the extent of area to be lost (in acres/hac)			
6. Does the proposed project activity affect scheduled tribe/caste communities?			
Yes		No	✓

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

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

Overall Screening Outcome:

The proposed new construction of Bridge at Wayil will not have any significant environmental impact because the project will not involve diversion of forest land, destruction of ecological resources, displacement of people, but the proposed subproject involves acquisition of private land. However, the land for both sides of approaches is required and which mainly belongs to the Government land and minor private land is also involved. Hence there would be a minor social impacts because of the private land acquisition therefore, abbreviated RAP is required but no further special study or detailed / social impact assessment needs to be undertaken.

There may be some short term inconvenience to the local citizens due to construction of the bridge but it will completely for the shorter duration in comparision with its long term benefits to the local as well as general public and same shall be mitigated by implementation of EMP.

ANNEXURE-II: Site Photographs of the Bridge Location at Wayil Ganderbal

Proposed Site for Wayil Bridge

Upstream of the proposed Wayil Bridge

Downstream of the Proposed Wayil Bridge


Approach Road from Srinagar Side of the Proposed Wayil Bridge (RHS)


Approach Road from Sonmarg Side of the Proposed Wayil Bridge (LHS)


Exisitng Single Lane Bailey bridge on RHS of the porposed Wayil Bridge

	
Smal Nangdara Irrigation Canal traversing through the approach (LHS) from Srinaagr Side. Box Type Culvert is proposed for this Canal.	Small irrigation on RHS from Srinagar Side
	
Hope Disbability Centre (NGO) is located 70 m away from the approach ramp from the Srinagar Side.	Panchayat Ghar near the approach of the Srinagar Side.
	
Old damamged Bus Shelter/ Bay coming within the approach of the Srinagar Side.	Toilet blocks coming within the approach road from the Srinagar side.

ANNEXURE-III: Public Consultation/ Meeting Photographs at Wayil Bridge Site.

Arranged public consultation meeting at Wayil Village with different stakeholders of the project.





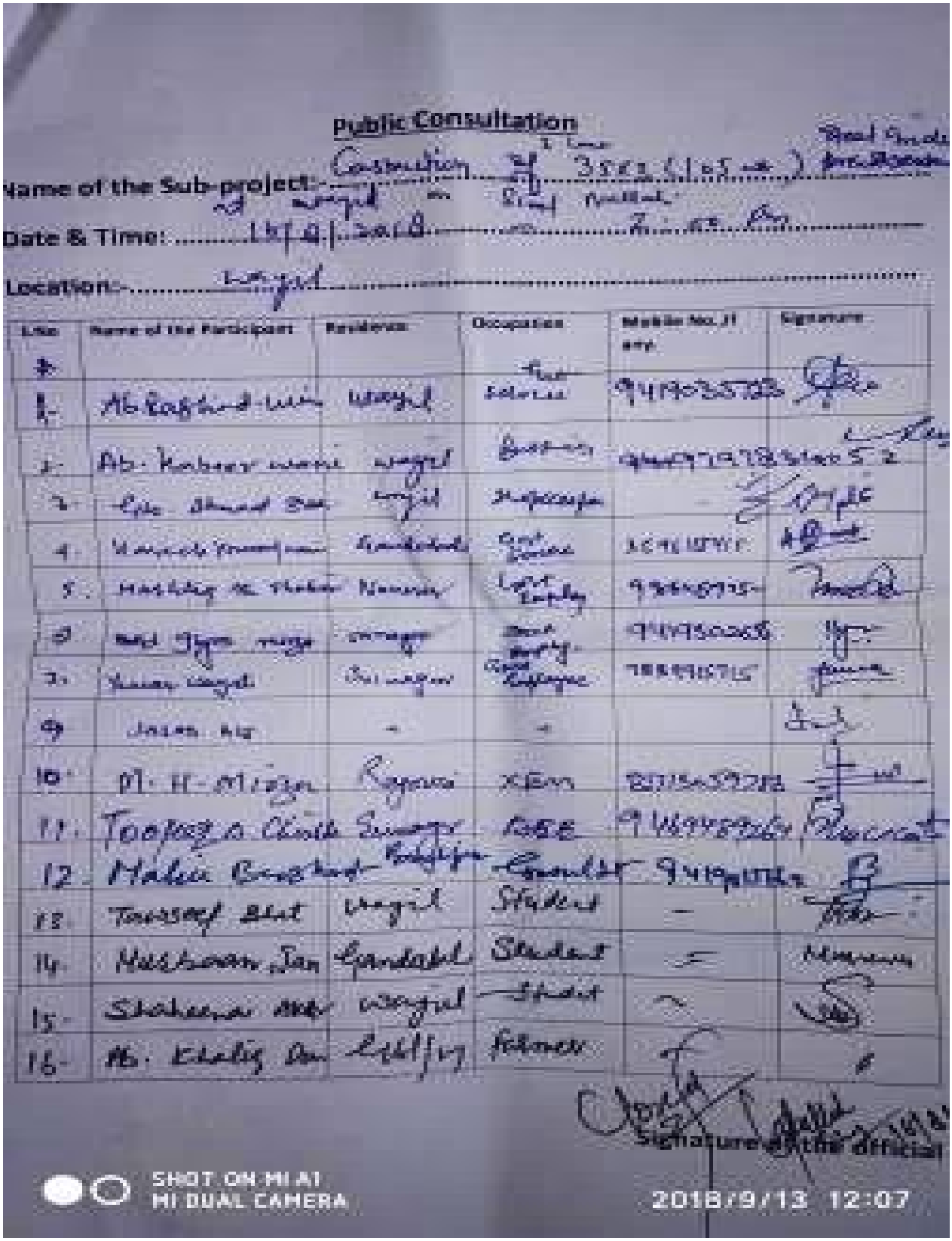



During consultation with the different stakeholders of the project.

Meeting with the Chief Engineer (Er. Sami Arif) of PWD (R&B) dated: 19/06/2020

During meeting with the Superintendent Engineer (SE) PWD R&B Dated: 20/06/2020

ANNEXURE-IV: List of consulted participants and their signatures during consultation



JHELUM TAWI FLOOD RECOVERY PROJECT (JTFRP)

LIST OF THE PARTICIPANTS IN PUBLIC CONSULTATION WITH SIGNATURES

Name of the Sub-project: Design & Const of 2 lane bridge at Wayil

Location of the Meeting/ Consultation: Wayil, Ganderbal

Date: 20/06/20 Time: 12:00 pm Consultation Conducted By: Mohsin L. Bhat

S.No	Name of the Participant	Address	Age/Sex	Occupation	Signatures
1	Showkat Ali	Lar, Ganderbal	40/M	AEE, PWD Ganderbal	[signature] 20/6/2020
2	Saba Ashraf	Hazratbal, Srinagar	31/F	JE, PWD Ganderbal	[signature] 20/6/20
3	Mudasir Ah. Bhat	Lar, Ganderbal	29/M	Engineer	[signature]
4	Mohammad Rafique Bhat	Baga, Ganderbal	26/M	Business	[signature]
5	Shahid Nadim Wani	Wayil, Ganderbal	49/M	Restaurant Owner	[signature]
6	Showkat Hussain Wani	Wayil	42/M	Sarpanch 9419000282	[signature]
7	Rafiq Ah. Mir	Wayil, Ganderbal	53/M	Restaurant owner / Farming	[signature]
8	Manzoor Ah. Parray	Wayil	40/M	Business	[signature]
9	Rehman Dar	Wayil, Ganderbal	30/M	Business	[signature]
10	Gh. Mohd Mir	Manasbal	57/M	Govt. Employee	[signature]
11	Mohd Ayaz Khan	Wayil Wakura	30/M	Govt. Employee	[signature]
12	Gowhar Bashir	Wayil	34/M	Shopkeeper	[signature]
13	Irfan Hameed Parray	STEP (Ganderbal) Wayil	32/M	STEP Owner Wayil	[signature]
14	Farooq Ah. Bhat	Gagarpora	48/M	Private employment	[signature]
15	G. Mohd Mir	Ganderbal	64/M	Ex. Employee	[signature]
16	Yasir Bashir	Ganderbal	29/M	Business	[signature]
17	Iqra Masood	Ganderbal	18/F	Student	[signature]
18	Shabana Nabi	Ganderbal	18/F	Student	[signature]

P. Consultation conducted at Restaurant / Hotel owner of Mr. Rafiq Ah. Mir Wayil (near Wayil bridge) Srinagar approach side

[signature] 20/06/20.

JHELUM TAWI FLOOD RECOVERY PROJECT (JTFRP)

LIST OF THE PARTICIPANTS IN PUBLIC CONSULTATION WITH SIGNATURES

Name of the Sub-project: Design & Const. of 2 Lane Wayil Bridge Ganderbal.

Location of the Meeting/ Consultation: Allied crusher unit - Wayil Manigam.

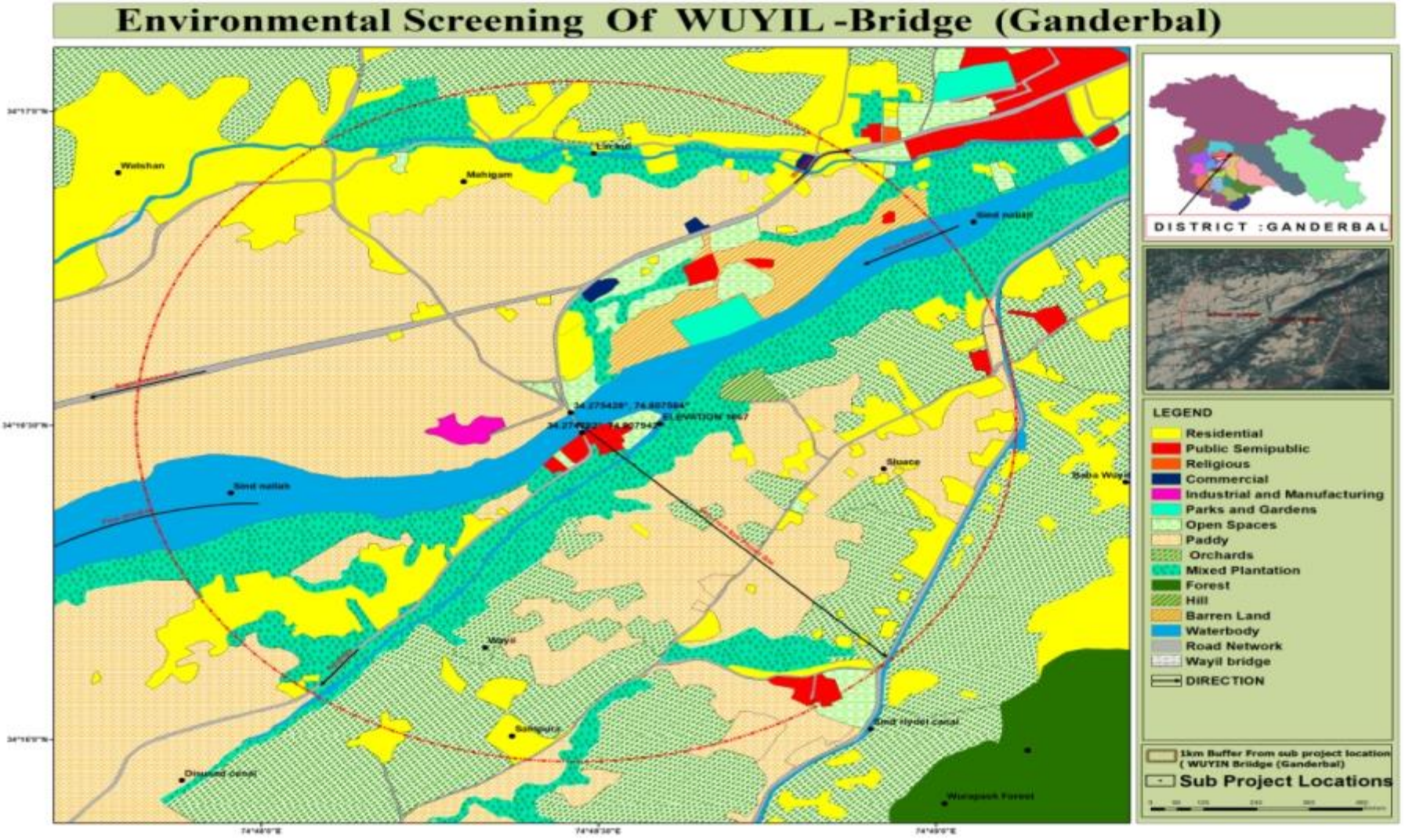
Date: 20/11/2020 Time: 1.10 PM Consultation Conducted By: Aleem A. Bhat

S.No	Name of the Participant	Address	Age/Sex	Occupation	Signatures
1	Irfan Ah Tantray	Manigam crusher unit	32/M	crusher owner	[signature]
2	Fairooz Ah Shah	Safapora	27/M	Partner crusher unit	[signature]
3	Fayaz Ahmad	Ganiwan Kangan	28/M	worker	[signature]
4	Muzaffar Ahmad	Laar Ganderbal	36/M	Manager crusher	[signature]
5	Sikander Kumar	Udampur	23/M	crusher operator	[signature]
6	Muzaffar Bhat	Wanihama Kangan	40/M	JCB operator	Mozaffar
7	Sanjay Kumar	Udampur	30/M	worker crusher operator	Sanjay
8	Pradeep Kumar	Udampur	30/M	crusher staff	[signature]
9	Arshad Ah Tantray	Yangora	30/M	Manager crusher unit	[signature]
10	Tariq Ahmad	[illegible]	32/M	worker crusher unit	[signature]
11	Umer Bashir	Yangora	26/M	second manager	[signature]
12	Mehraj ud din Bhat	Safapora	38/M	Staff Member	Mehraj ud din
13	Shaukat Ah	Ganderbal	28/M	Driver	Shaukat
14	Ali Mohammad	Watlar Ganderbal	38/M	Driver	ALI
15	Bashir Ah Tantray	Yangora	40/M	Driver	Bashir
16					
17					
18					

[signature]
ALLIED STONE CRUSHER
Manigam, Wayil, Ganderbal

Crusher owner phone no:
Irfan Tantray — 9149430166
Ab. Hameed Tantray - 7889474377
PC conducted a crusher unit (Allied Stone crusher Wayil).

ANNEXURE-V: GIS/ LULC Map of the Proposed Bridge at Wayil in Ganderbal District.



ANNEXURE-VI: Guidelines For Siting, Management And Redevelopment of Labour Camp

A. Overview

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

B. Criteria for Locating the Site

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

C. Finalization of Selected Site

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

D. Designing And Setting Up of Labour Camp

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

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

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

graded and rendered free from depressions such that water does not get stagnant anywhere. The entire boundary of the site should be fenced all around with barbed wire so as to prevent the trespassing of humans and animals.

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

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

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

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

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

Shelters shall not be constructed to a standard lower than that of thatched roof, mud walls and floor with wooden planks spread over mud floor and covered with matting. Such areas shall be safely barricaded (no sharp sheets or barbed wires that may injure a child) from rest of the camp for the safety of children. Shelters shall be provided with suitable and sufficient openings for light and ventilation.

There shall be adequate provision to keep the place clean. The size of a crèche may vary according to the number of children on a camp site.

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

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

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

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

E. Operation of Labour Camp

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

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

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

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

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

Section-3: Arrangements/ facilities within the camp: List of facilities to be provided along with its details like area, no of people to be accommodated and a layout plan showing the plan of the site with all the facilities planned like quarters, labour camp, mess, common facilities, toilet facilities, etc.

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

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

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

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

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

G. Re-development of The Labour Camp

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

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

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

Engineer-in-charge/Environmental Specialist of PIU (ERA) shall ensure, through site verification that all clean-up and restoration operations are completed satisfactorily and a written approval should be given to the Contractor mentioning the same before the 'works completion' certificate is issued/recommended. The PIU (ERA) shall ensure through site inspection that the Contractor has restored the site properly & completely. The site can then be handed over to the concerned owner or local bodies or for local communities as the case may be. Certification/documentation pertaining to approval for clean-up and restoration operations and thereafter handing-over to the owner shall be properly maintained by the Contractor.

ANNEXURE-VII: Guidelines to Ensure Worker's Safety During Construction

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

A. Labour Camp/ Site Office

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

B. House Keeping Practices

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

C. Safety During Excavation

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

D. Handling of Cement Bags

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

E. Steel Bars Reinforcement for Foundation and Roof

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

F. Operation of Trucks And Dumpers

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

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

G. Manual Handling and Lifting

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

H. Electrical Hazards

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

I. Use And Storage of Flammable Gas

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

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

J. Gas Welding

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

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

K. Fire Safety Practices

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

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

L. Noise Hazards And its Control

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

M. Personal Protective Equipment

General

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

- PPE includes, but may not be limited to, hard hats, goggles, ear plugs, gloves, air filters/masks, boots, ropes etc.

Head Protection

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

Hearing Protection

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

Respiratory (Protective) Equipment

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

Safety Footwear

- Wear suitable footwear for work
- Use safety footwear on site or in other dangerous areas.
- Wear suitable safety shoes or ankle boots when working anywhere where there is high risk of foot injuries from slippery or uneven ground, sharp objects, falling objects etc.
- All safety footwear, including safety shoes, ankle boots and rubber boots, should be fitted with steel toecaps.
- Avoid wearing flip flops, high heeled shoes, slippers, light sport shoes in situations where there is a risk of foot injury.
- Keep shoelace knots tight.

Hand Protection

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

N. First Aid

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

O. Reporting of Accident and Investigations

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

ANNEXURE-VIII: Reporting Format for Camp Site

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

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

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

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

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

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

ANNEXURE X: Checklist For Monitoring of Labour Camp Management

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

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

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

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

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

ANNEXURE XII: Reporting Format for Occupational Health And Safety Measures

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

10	All scaffolds, ladders and other safety devices shall be maintained in as safe and sound condition		
11	Regular health checkup for labour/ Contractor's personnel		
12	Ensuring the sanitary conditions and all waste disposal procedures & methods in the camp.		
13	Provision for insurance coverage to the workers		
C.	Submission Details		

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

Remarks by Environmental Expert of PIU

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

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

A	Project Details			Date of Reporting:
1.	Name of project			
2.	Name and address of the Contractor			
3.	Contract date and duration			
B	**Details of Accident and People Involved in Accident**			
	Name of site where accident happened			
	Name and address of people involved in the accident			
	Whether Contractor's personnel or General public			
	Details of Injury			
	Details of treatment given			
	Details of compensation given			
C	**Type of Accident (√)**			
	Fall of person from a height			**Expl osion**
	Slip, trip or fall on same level			**Fire**
	Struck against fixed objects			**Contact with hot or corrosive substance**
	Struck by flying or falling objects			**Contact with poisonous gas or toxic substances.**
	Struck by moving objects			**Contact with poisonous gas or toxic substances**
	Struck / caught by cable			**Hand tool accident**
	Stepping on hail etc.			**Vehicle / Mobile plant accident**
	Handling without machinery			**Machinery operation accident**
	Crushing / burying			**Other (please specify)**
	Drowning or asphyxiation			
D	**Agent Involved in Accident (√)**			
	Machinery			**Stair edge**
	Portable power appliance			**Excavation**
	Vehicle or associated equipment /machinery			**Ladder**
	Material being handled, used or stored			**Scaffolding**
	Gas, vapor, dust, fume or oxygen			**Construction formwork, shuttering and false work.**
	Hand tools			**Electricity supply cable, wiring switchboard and associated equipment**
	Floor edge			**Nail or chipping**
	Floor opening			**Other (Please specify)**
	Left shaft			
E	**Unsafe Action Relevant to the Accident (√)**			
	Operating without authority			**Failure to use proper footwear**
	Failure to secure objects			**Failure to use eye protector**

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

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

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

ANNEXURE-XIV: Reporting Format For Environmental Pollution Monitoring

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

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

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

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

ANNEXURE XV: GUIDELINES ON PREVENTIVE MEASURES TO CONTAIN SPREAD OF COVID-19 IN WORKPLACE SETTINGS (Ministry of Health & Family Welfare-MoHFW)

18th May, 2020

Government of India
Ministry of Health & Family Welfare
Directorate General of Health Services
(EMR Division)

Guidelines on preventive measures to contain spread of COVID-19 in workplace settings

1. Background

Offices and other workplaces are relatively close setting, with shared spaces like (corridors, elevators & stairs, parking places, cafeteria, meeting rooms and conference halls etc.) and thus COVID-19 infection can spread relatively fast among officials, staffs and visitors.

Thus there is a need to prevent importation of infection in workplace settings and to respond in a timely and effective manner in case suspect case of COVID-19 is detected in these settings, so as to limit the spread of infection.

2. Scope

This document outlines the preventive and response measures to be observed to contain the spread of COVID-19 in workplace settings. The document is divided into the following sub-sections

(i) basic preventive measures to be followed at all times
(ii) measures specific to offices
(iii) measures to be taken on occurrence of case(s)
(iv) disinfection procedures to be implemented in case of occurrence of suspect/confirmed case.

3. Basic preventive measures

The basic preventive measures include simple public health measures that are to be followed to reduce the risk of infection with COVID-19. These measures need to be observed by all (employees and visitors) at all times. These include:

i. Physical distancing of at least one meter to be followed at all times.
ii. Use of face covers/masks to be mandatory.
iii. Practice frequent hand washing (for at least 40-60 seconds) even when hands are not visibly dirty and use of alcohol based hand sanitizers (for at least 20 seconds).
iv. Respiratory etiquettes to be strictly followed. This involves strict practice of covering one's mouth and nose while coughing/sneezing with a tissue/handkerchief/flexed elbow and disposing off used tissues properly.
v. Self-monitoring of health by all and reporting any illness at the earliest

4. Preventive measures for offices:

Guidelines with respect to preventive measures specific to offices have been issued by DoPT. These guidelines are available at: https://www.mohfw.gov.in/pdf/PreventivemeasuresDOPT.pdf.

Any staff reportedly suffering from flu-like illness should not attend office and seek medical advice from local health authorities [e.g. CGHS wellness center, medical attendance under CS (MA) etc.]. Such persons, if diagnosed as a suspect/confirmed case of COVID-19 should immediately inform the office authorities.

Any staff requesting home quarantine based on the containment zone activities in their residential areas should be permitted to work from home.

DoPT guidelines with respect to organizing meetings, coordinating visitors shall be scrupulously followed.

5. Measures to be taken on occurrence of case(s):

Despite taking the above measures, the occurrence of cases among the employees working in the office cannot be ruled out. The following measures will be taken in such circumstances:

5.1. When one or few person(s) who share a room/close office space is/are found to be suffering from symptoms suggestive of COVID-19:

5.1.1. Place the ill person in a room or area where they are isolated from others at the workplace. Provide a mask/face cover till such time he/she is examined by a doctor.

5.1.2. Report to concerned central/state health authorities. Helpline 1075 will be immediately informed.

5.1.3. A risk assessment will be undertaken by the designated public health authority (district RRT/treating physician) and accordingly further advice shall be made regarding management of case, his/her contacts and need for disinfection.

5.1.4. The suspect case if reporting very mild / mild symptoms on assessment by the health authorities would be placed under home isolation, subject to fulfilment of criteria laid down in MoHFW guidelines (available at: https://www.mohfw.gov.in/pdf/RevisedguidelinesforHomeIsolationofverymildpresymptomaticCOVID19cases10May2020.pdf)

5.1.5. Suspect case, if assessed by health authorities as moderate to severe, he/she will follow guidelines at:

https://www.mohfw.gov.in/pdf/FinalGuidanceonMangaementofCovidcasesversion2.pdf.

5.1.6. The rapid response team of the concerned district shall be requisitioned and will undertake the listing of contacts.

5.1.7. The necessary actions for contact tracing and disinfection of work place will start once the report of the patient is received as positive. The report will be expedited for this purpose.

5.2. If there are large numbers of contacts from a pre-symptomatic/asymptomatic case, there could be a possibility of a cluster emerging in workplace setting. Due to the close environment in workplace settings this could even be a large cluster (>15 cases). The essential principles of risk assessment, isolation, and quarantine of contacts, case referral and management will remain the same. However, the scale of arrangements will be higher.

5.3. Management of contacts:

The contacts will be categorised into high and low risk contacts by the District RRT as detailed in the **Annexure I**.

The high risk exposure contacts shall be quarantined for 14 days. They will follow the guidelines on home quarantine (available on: https://www.mohfw.gov.in/pdf/Guidelinesforhomequarantine.pdf).
These persons shall undergo testing as per ICMR protocol (available at: https://www.mohfw.gov.in/pdf/Revisedtestingguidelines.pdf).

The low risk exposure contacts shall continue to work and closely monitor their health for next 14 days.

6. Closure of workplace

If there are one or two cases reported, the disinfection procedure will be limited to places/areas visited by the patient in past 48 hrs. **There is no need to close the entire office building/halt work in other areas of the office** and work can be resumed after disinfection as per laid down protocol (see para 7).

However, if there is a larger outbreak, the entire building will have to be closed for 48 hours after thorough disinfection. All the staff will work from home, till the building is adequately disinfected and is declared fit for re-occupation.

7. Disinfection Procedures in Offices

Detailed guidelines on the disinfection procedures in offices have already been issued by the MOHFW and are available on: https://www.mohfw.gov.in/pdf/Guidelinesondisinfectionofcommonpublicplacesincludingoffices.pdf.

Annexure I

Risk profiling of contacts

Contacts are persons who have been exposed to a confirmed case anytime between 2 days prior to onset of symptoms (in the positive case) and the date of isolation (or maximum 14 days after the symptom onset in the case).

High-risk contact

- Touched body fluids of the patient (respiratory tract secretions, blood, vomit, saliva, urine, faeces; e.g. being coughed on, touching used paper tissues with a bare hand)
- Had direct physical contact with the body of the patient including physical examination without PPE
- Touched or cleaned the linens, clothes, or dishes of the patient.
- Lives in the same household as the patient.
- Anyone in close proximity (within 1 meter) of the confirmed case without precautions.
- Passengers in close proximity (within 1 meter) in a conveyance with a symptomatic person who later tested positive for COVID-19 for more than 6 hours.

Low-risk contact

- Shared the same space (worked in same room/similar) but not having a high-risk exposure to confirmed case of COVID-19.
- Travelled in same environment (bus/train/flight/any mode of transit) but not having a high-risk exposure.

Figure 1: Management of the case(s) and contacts

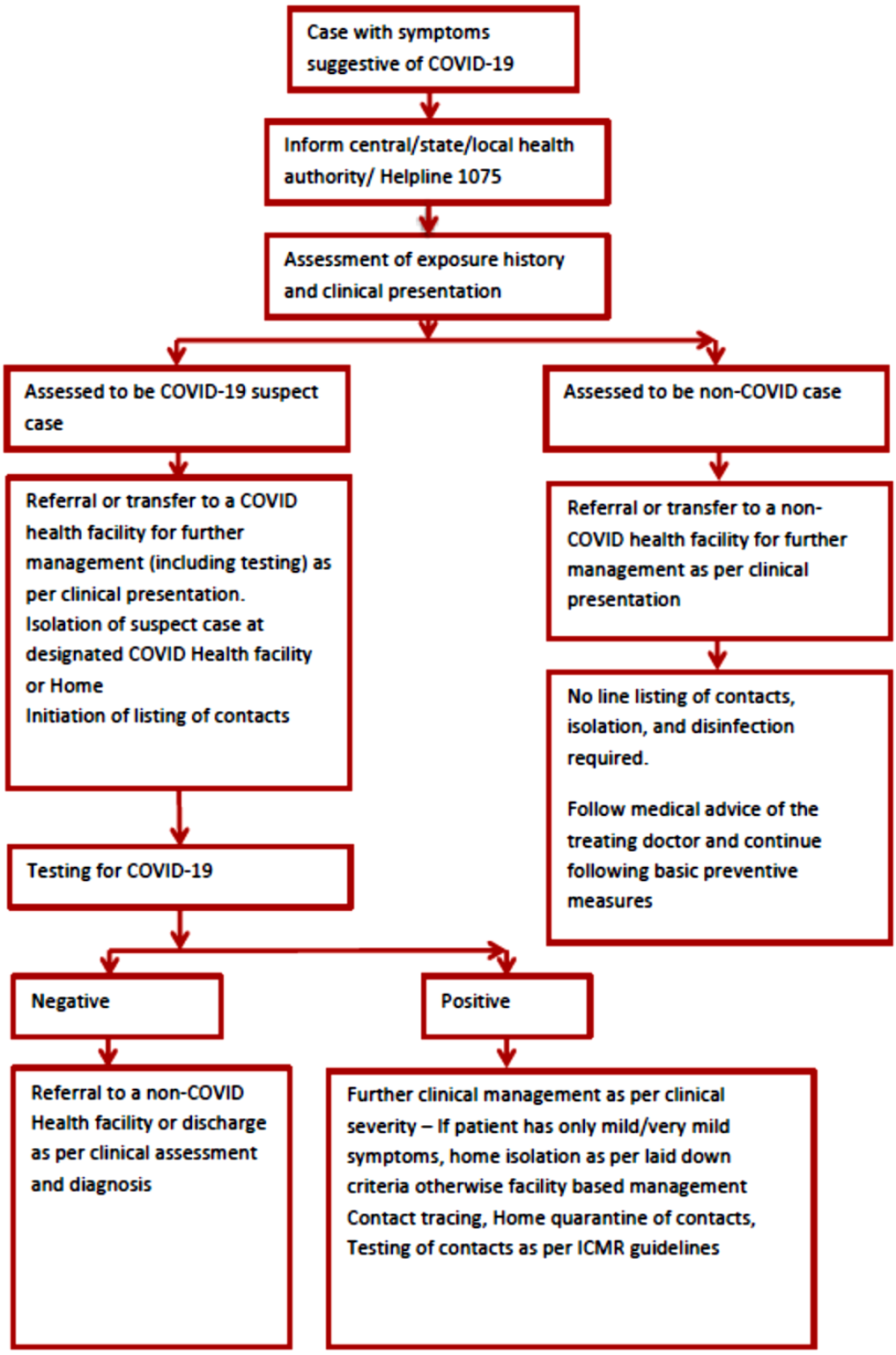
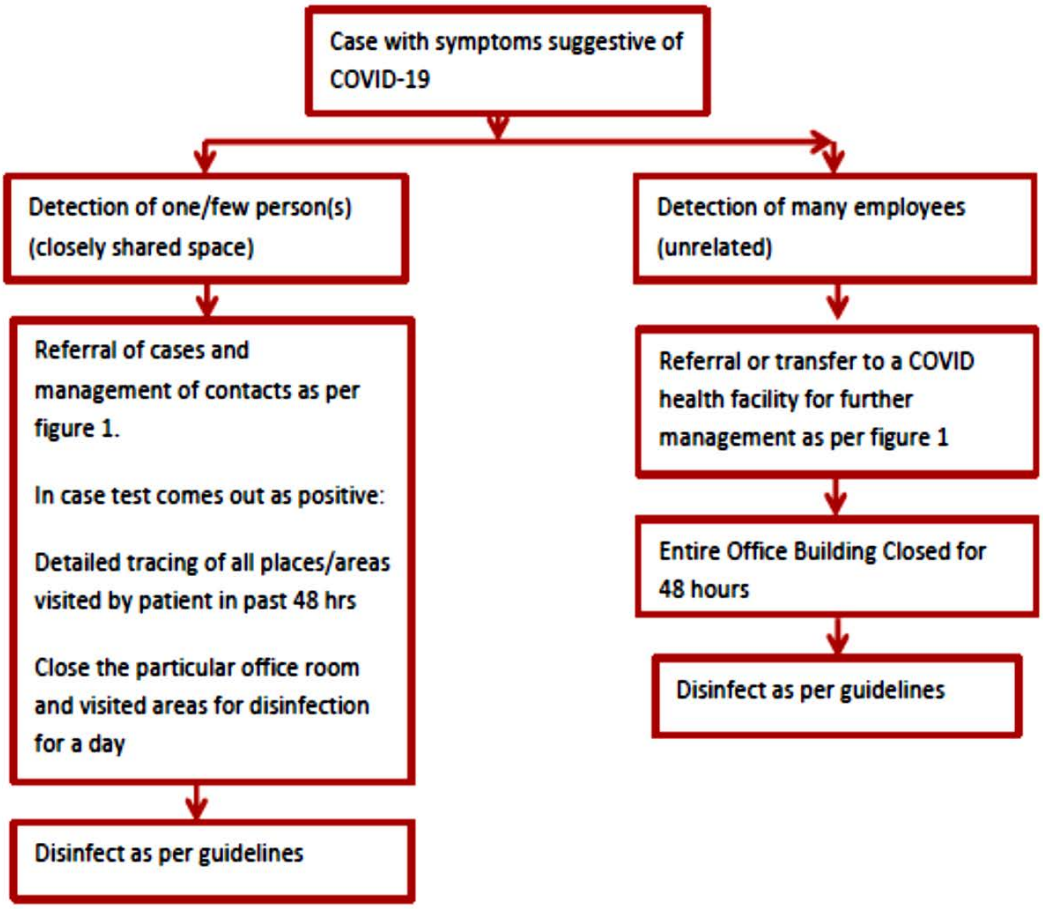


Fig-2: Disinfection of workplace



ANNEXURE XVI: COVID FAQs- Detail Question and Answers on COVID-19 for General Public -Workers, Staff, etc. (Issued through National Health Mission)

1. What is Coronavirus?

Coronaviruses are a large family of viruses which may cause illness in animals or humans. In humans, several coronaviruses are known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The most recently discovered coronavirus causes coronavirus disease COVID-19.

2. What is COVID-19

COVID-19 is an infectious disease caused by the most recently discovered coronavirus. This new virus and disease were unknown before the outbreak began in Wuhan, China, in December 2019.

3. What are the symptoms of COVID-19

The most common symptoms of COVID-19 are fever, tiredness, and dry cough. Some patients may have aches and pains, nasal congestion, runny nose, sore throat or diarrhoea. These symptoms are
usually mild and begin gradually. Some people become infected but don't develop any symptoms and don't feel unwell. Most people (about 80%) recover from the disease without needing special treatment. Around 1 out of every 6 people who gets COVID-19 becomes seriously ill and develops difficulty breathing. Older people, and those with underlying medical problems like high blood pressure, heart problems or diabetes, are more likely to develop serious illness. People with fever, cough and difficulty breathing should seek medical attention.

4. How does COVID-19 spread

People can catch COVID-19 from others who have the virus. The disease can spread from person to person through small droplets from the nose or mouth which are spread when a person with COVID-19 coughs or exhales. These droplets land on objects and surfaces around the person. Other people then catch COVID-19 by touching these objects or surfaces, then touching their eyes, nose or mouth. People can also catch COVID-19 if they breathe in droplets from a person with COVID-19 who coughs out or exhales droplets. This is why it is important to stay more than 1 meter (3 feet) away from a person who is sick.

5. Can the virus that causes COVID-19 be transmitted through the air?

Studies to date suggest that the virus that causes COVID-19 is mainly transmitted through contact with respiratory droplets rather than through the air. See previous answer on "How does COVID-19
spread?"

6. **Can COVID-19 be caught from a person who has no symptoms?**

The main way the disease spreads is through respiratory droplets expelled by someone who is coughing. The risk of catching COVID-19 from someone with no symptoms at all is very low. However, many people with COVID-19 experience only mild symptoms. This is particularly true at the early stages of the disease. It is therefore possible to catch COVID-19 from someone who has, for example, just a mild cough and does not feel ill.

7. **Can I catch COVID-19 from the feces of someone with the disease?**

The risk of catching COVID-19 from the feces of an infected person appears to be low. While initial investigations suggest the virus may be present in feces in some cases, spread through this route is not a main feature of the outbreak. The ongoing research on the ways COVID-19 is spread and will continue to share new findings. Because this is a risk, however, it is another reason to clean hands regularly, after using the bathroom and before eating.

8. **What can I do to protect myself and prevent the spread of disease Protection measures for everyone**

Stay aware of the latest information on the COVID-19 outbreak, available on the national,state and local public health authority. Many countries around the world have seen cases of COVID-19 and several have seen outbreaks. Authorities in China and some other countries have succeeded in slowing or stopping their outbreaks. However, the situation is unpredictable so check regularly for the latest news. You can reduce your chances of being infected or spreading COVID- 19 by taking some simple precautions:

- Regularly and thoroughly clean your hands with an alcohol based hand rub or wash them with soap and water. Why? Washing your hands with soap and water or using alcohol-based hand rub kills viruses that may be on your hands.
- Maintain at least 1 metre (3 feet) distance between yourself and anyone who is coughing or sneezing. Why? When someone coughs or sneezes they spray small liquid droplets from their nose or mouth which may contain virus. If you are too close, you can breathe in the droplets, including the COVID-19 virus if the person coughing has the disease.
- Avoid touching eyes, nose and mouth. Why? Hands touch many surfaces and can pick up viruses. Once contaminated, hands can transfer the virus to your eyes, nose or mouth. From there, the virus can enter your body and can make you sick.
- Make sure you, and the people around you, follow good respiratory hygiene. This means covering your mouth and nose with your bent elbow or tissue when you cough or sneeze. Then dispose of the used tissue immediately. Why? Droplets spread virus. By following good respiratory hygiene you protect the people around you from viruses such as cold, flu and COVID-19.
- Stay home if you feel unwell. If you have a fever, cough and difficulty breathing, seek medical attention and call in advance. Follow the directions of your local health authority. Why? National and local authorities will have the most up to date information on the situation in your area. Calling in advance will allow your health care provider to quickly direct you to the right health facility. This will also protect you and help prevent spread of viruses and other infections.

- Keep up to date on the latest COVID-19 hotspots (cities or local areas where COVID-19 is spreading widely). If possible, avoid traveling to places – especially if you are an older person or have diabetes, heart or lung disease. Why? You have a higher chance of catching COVID-19 in one of these areas.

Protection measures for persons who are in or have recently visited (past 14 days) areas where COVID-19 is spreading

- Follow the guidance outlined above (Protection measures for everyone)
- Self-isolate by staying at home if you begin to feel unwell, even with mild symptoms such as headache, low grade fever (37.3 C or above) and slight runny nose, until you recover. If it is essential for you to have someone bring you supplies or to go out, e.g. to buy food, then wear a mask to avoid infecting other people. Why? Avoiding contact with others and visits to medical facilities will allow these facilities to operate more effectively and help protect you and others from possible COVID-19 and other viruses.
- If you develop fever, cough and difficulty breathing, seek medical advice promptly as this may be due to a respiratory infection or other serious condition. Call in advance and tell your provider of any recent travel or contact with travellers. Why? Calling in advance will allow your health care provider to quickly direct you to the right health facility. This will also help to prevent the possible spread of COVID-19 and other viruses.

9. **How likely am I to catch COVID-19?**

The risk depends on where you are - and more specifically, whether there is a COVID-19 outbreak unfolding there. For most people in most locations, the risk of catching COVID-19 is still low. However, there are now places around the world (cities or areas) where the disease is spreading. For people living in, or visiting, these areas the risk of catching COVID-19 is higher. Governments and health authorities are taking vigorous action every time a new case of COVID-19 is identified. Be sure to comply with any local restrictions on travel, movement or large gatherings. Cooperating with disease control efforts will reduce your risk of catching or spreading COVID-19. COVID-19 outbreaks can be contained and transmission stopped, as has been shown in China and some other countries. Unfortunately, new outbreaks can emerge rapidly. It's important to be aware of the situation where you are or intend to go.

10. **Should I worry about COVID-19?**

Illness due to COVID-19 infection is generally mild, especially for children and young adults. However, it can cause serious illness: about 1 in every 5 people who catch it need hospital care. It is therefore quite normal for people to worry about how the COVID-19 outbreak will affect them and their loved ones. We can channel our concerns into actions to protect ourselves, our loved ones and our communities. First and foremost among these actions is regular and thorough hand-washing and good respiratory hygiene. Secondly, keep informed and follow the advice of the local health authorities including any restrictions put in place on travel, movement and gatherings.

11. **Who is at risk of developing severe illness?**

While we are still learning about how COVID-2019 affects people, older persons and persons with pre-existing medical conditions (such as high blood pressure, heart disease, lung disease, cancer or diabetes) appear to develop serious illness more often than others.

12. **Are antibiotics effective in preventing or treating the COVID-19?**

No. Antibiotics do not work against viruses, they only work on bacterial infections. COVID-19 is caused by a virus, so antibiotics do not work. Antibiotics should not be used as a means of prevention or treatment of COVID-19. They should only be used as directed by a physician to treat a bacterial infection.

13. **Are there any medicines or therapies that can prevent or cure COVID-19**

While some western, traditional or home remedies may provide comfort and alleviate symptoms of COVID-19, there is no evidence that current medicine can prevent or cure the disease. Doctores do not recommend self-medication with any medicines, including antibiotics, as a prevention or cure for COVID-19. However, several on-going clinical trials include both western and traditional medicines. We will continue to provide updated information as soon as clinical findings are available.

14. **Is there a vaccine drug or treatment for COVID-19**

Not yet. To date, there is no vaccine and no specific antiviral medicine to prevent or treat COVID-2019. However, those affected should receive care to relieve symptoms. People with serious illness should be hospitalized. Most patients recover thanks to supportive care. Possible vaccines and some specific drug treatments are under investigation. They are being tested through clinical trials. The most effective ways to protect yourself and others against COVID-19 are to frequently clean your hands, cover your cough with the bend of elbow or tissue, and maintain a distance of at least 1 meter (3 feet) from people who are coughing or sneezing

15. **Is COVID-19 the same as SARS?**

No. The virus that causes COVID-19 and the one that caused the outbreak of Severe Acute Respiratory Syndrome (SARS) in 2003 are related to each other genetically, but the diseases they cause are quite different. SARS was more deadly but much less infectious than COVID-19. There have been no outbreaks of SARS anywhere in the world since 2003.

16. **Should I wear mask to protect myself**

Only wear a mask if you are ill with COVID-19 symptoms (especially coughing) or looking after someone who may have COVID-19. Disposable face mask can only be used once. If you are not ill or looking after someone who is ill then you are wasting a mask. There is a world-wide shortage of masks, so We urge people to use masks wisely. We advises rational use of medical masks to avoid unnecessary wastage of precious resources and mis-use of masks The most effective ways to protect yourself and others against COVID-19 are to frequently

clean your hands, cover your cough with the bend of elbow or tissue and maintain a distance of at least 1 meter (3 feet) from people who are coughing or sneezing.

17. **How to put on use take off and dispose of a mask?**

(i) Remember, a mask should only be used by health workers, care takers, and individuals with respiratory symptoms, such as fever and cough.
(ii) Before touching the mask, clean hands with an alcohol-based hand rub or soap and water.
(iii) Take the mask and inspect it for tears or holes.
(iv) Orient which side is the top side (where the metal strip is).
(v) Ensure the proper side of the mask faces outwards (the coloured side).
(vi) Place the mask to your face. Pinch the metal strip or stiff edge of
(vii) the mask so it moulds to the shape of your nose.
(viii) Pull down the mask's bottom so it covers your mouth and your chin.
(ix) After use, take off the mask; remove the elastic loops from behind the ears while keeping the mask away from your face and clothes, to avoid touching potentially contaminated surfaces of the mask.
(x) Discard the mask in a closed bin immediately after use.
(xi) Perform hand hygiene after touching or discarding the mask – Use alcohol-based hand rub or, if visibly soiled, wash your hands with soap and water.

18. **How long is the incubation period for COVID-19?**

The "incubation period" means the time between catching the virus and beginning to have symptoms of the disease. Most estimates of the incubation period for COVID-19 range from 1-14 days, most commonly around five days. These estimates will be updated as more data become available.

19. **Can humans become infected with the COVID-19 from an animal source?**

Coronaviruses are a large family of viruses that are common in animals. Occasionally, people get infected with these viruses which may then spread to other people. For example, SARS-CoV was associated with civet cats and MERS-CoV is transmitted by dromedary camels. Possible animal sources of COVID-19 have not yet been confirmed. To protect yourself, such as when visiting live animal markets, avoid direct contact with animals and surfaces in contact with animals. Ensure good food safety practices at all times. Handle raw meat, milk or animal organs with care to avoid contamination of uncooked foods and avoid consuming raw or undercooked animal products.

20. **Can I catch COVID-19 from my pet?**

While there has been one instance of a dog being infected in Hong Kong, to date, there is no evidence that a dog, cat or any pet can transmit COVID-19. COVID-19 is mainly spread through droplets produced when an infected person coughs, sneezes, or speaks. To protect yourself, clean your hands frequently and thoroughly. We continue to monitor the latest research on this and other COVID- 19 topics and will update as new findings are available.

21. **How long does the virus survive on surfaces?**

It is not certain how long the virus that causes COVID-19 survives on surfaces, but it seems to behave like other coronaviruses. Studies suggest that coronaviruses (including preliminary information on the COVID-19 virus) may persist on surfaces for a few hours or up to several days. This may vary under different conditions (e.g. type of surface, temperature or humidity of the environment). If you think a surface may be infected, clean it with simple disinfectant to kill the virus and protect yourself and others. Clean your hands with an alcohol-based hand rub or wash them with soap and water. Avoid touching your eyes, mouth, or nose.

22. **Is it safe to receive a package from any area where COVID-19 has been reported?**

Yes. The likelihood of an infected person contaminating commercial goods is low and the risk of catching the virus that causes COVID-19 from a package that has been moved, travelled, and exposed to different conditions and temperature is also low.

23. **Is there anything I should not do?**

The following measures **ARE NOT** effective against COVID-2019 and can be harmful:

- Smoking
- Wearing multiple masks
- Taking antibiotics (See question 10 "*Are there any medicines of therapies that can prevent or cure COVID-19?*")

24. **In any case, if you have fever, cough and difficulty breathing seek medical care early** to reduce the risk of developing a more severe infection and be sure to share your recent travel history with your health care provider.