Environment Impact Assessment (EIA)

(Draft)

Consultancy Services for Undertaking Environmental Impact Assessment (EIA) for Inter-Regional Connectivity between Baltistan Division and Diamer Astore Division (Construction/ Metaling of Road from Gorikote Astore to Shagharthang Skardu)

September 2024

Documents / Report Control Form:

Project Name:	Construction/ Metaling of Road from Gorikote Astore to Shagharthang Skardu, Gilgit Baltistan, Pakistan
Project Executing Agency:	Communication & Works Department Skardu through PMU GASSR Skardu
Report Name:	Environmental Impact Assessment (EIA) Report
Report for:	Project Director, PMU-GASSR Skardu, Gilgit-Baltistan

Preparation, Review and Authorization:

Revision	Date	Prepared by	Reviewed by	Approved for Issue by
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Issue Register:

Distribution List	Date issued	Number of Copies
Project Director, PMU GASSR Skardu C&WD Baltistan	September 2024	1- Soft Copy 2- Hard Copies

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List of Abbreviations

AADT	Annual Average Daily Traffic
AASHT O	American Association of State Highway and Transportation Officials
ADT	Annual Daily Traffic
AER	Assistant to Employer's Representative
ASTM	American Society for Testing & Materials
ACI	American Concrete Institute
AKRSP	Aga Khan Rural Support Program
CC	Construction Contractor
DSC	Design and Supervision Consultant
C&WD	Communication & Water Department
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
EIRR	Economic Internal Rate of Return
EMMP	Environmental Management & Monitoring Plan
GASSR	Gorikote Astore to Shagharthang Skardu Road
GB	Gilgit Baltistan
GBEPA	Gilgit Baltistan Environmental Protection Agency
GOP	Government of Pakistan
GRC	Grievance Redressal Committee
GSS	Gas Semi-Conductors
IEE	Initial Environmental Examination
KA&GB	Kashmir Affairs and Gilgit Baltistan
KKH	Karakorum Highway
Km	Kilometer
LAA	Land Acquisition Act
LAC	Land Acquisition Collector
LSO	Local Support Organisation
MVE	Motor Vehicle Examination
NBS	National Building Codes
NEQS	National Environmental Quality Standards
NOC	No Objection Certificate
NOx	Nitrous Oxides
NPV	Net Present Value
O&M	Operation & Maintenance
PAI	Project Area of Influence
PAP	Project Affected People
PD	Project Director
PEPA	Pakistan Environmental Protection Act
PIZ	Project Impact Zone
PKR	Pakistani Rupee
PMD	Pakistan Meteorological Department
PMU	Project Management Unit
PPC	Pakistan Penal Code
PWD	Public Works Department

PSDP	Public Sector Development Program
RD	Reduce Distance
R&D	Research & Development
ROW	Right of Way
RFO	Range Forest Officer
SW	Surface Water
SSEMP	Specific Site Environmental Management Plan
WHO	World Health Organization
WWF	World Wildlife Fund
XEN	Executive Engineer

Glossary

Air Quality Sensitive Receptors	People, property, species or designated sites for nature conservation that may be at risk from exposure to air pollutants potentially arising as a result of a proposed development.
Air Quality Standard	Levels of air pollutants prescribed by regulations that may not be exceeded during a specified time in a defined area.
Average Rainfall	Average amount of rainfall falling at any catchment area over a specific number of years.
Baseline	Existing environmental conditions present on, or near a site, against which future changes can be measured or predicted.
Bentonite	Natural clay that, when mixed with water, swells and forms a thixotropic gel (a particular type of viscous behavior exhibited by some liquids). It can be used temporarily to support trenches or retaining walls and helps to prevent collapse when they are being backfilled (i.e. refilled) or concreted.
Biodiversity	The variety of life in the world or in a particular habitat or ecosystem.
Black Top	A bituminous substance used to pave roads
Climate	The climate can be described simply as the 'average weather', typically looked at over a period of 30 years. It can include temperature, rainfall, snow cover, or any other weather characteristic.
Climate Change	A change in the state of the climate, which can be identified by changes in average climate characteristics that persist for an extended period - typically over a period of 30 years.
Decibel(s)	A unit used to express relative differences in sound power or intensity. There is a million to one ratio in sound pressure (measured in Pascal (Pa)) between the quietest audible sound and the loudest tolerable sound. The decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement because of this wide range. Audibility of sound covers a range of approximately 0-140dB.
Dust	All airborne particulate matter.
Earthworks	The removal or placement of soils and rocks such as in cuttings, embankments including the in-situ improvement of soils/rocks to achieve desired properties.
Ecosystem	A biological community of interacting organisms (e.g. plants and animals) and their environment.
Effect	Used throughout this ESIA Report to refer to the consequence of an impact to the receiving environment (see also: 'impact').
Effluent	Liquid waste flowing out of a factory, farm, commercial establishment, or a household into a water body.
Environment Agency	Government agency established to protect and improve the environment and contribute to sustainable development (Responsibility include: water quality and resources, flooding and coastal risk management and contaminated land)
Environment and Social Impact Assessment	A process for predicting and assessing the potential environmental and social impacts of a proposed project, evaluating alternatives and designing appropriate mitigation, management and monitoring measures.
Environmental Impact Assessment	A process of systematically assessing the likely environmental effects of proposed development projects. EIA is a legal requirement for certain public and private projects under PEPA Act 1997, as well as GBEPA act 2015
Excavated Material	Soil, rock and other material that has been removed from the ground during construction.
Greenhouse	A gas such as carbon dioxide, methane, chlorofluorocarbons, nitrous oxide,

Gases	ozone and water vapor that contributes to the greenhouse effect by absorbing infrared radiation.
Ground Water	All water that is below the surface of the ground and within the permanently saturated zone.
Heavy Metals	A loosely defined term which refers to a group of metal and metalloids, many of which are toxic to some degree.
Initial Environmental Examination	A process of systematically assessing the likely environmental effects of proposed development projects. IEE is a legal requirement for certain public and private projects under GB EPA Act 2015.
Mitigation	The measures put forward to prevent, reduce and where possible, offset any adverse effects on the environment.
Risk Assessment	An assessment of the probability of a hazard occurring that could result in an impact.
Right of Way	To make a way over a piece of land for transportation purposes
Soil Erosion	The detachment and movement of soil by the action of water and/or wind.
Soil Profile	A vertical cross-section through a soil.
Surface Water	Water on the surface of planet such as in a river, lake, ocean, canal, stream, wet land and estuaries.
Topography	Shape and feature of the surface of the earth.
Topsoil	Surface soil usually including the organic layer in which plants have most of their roots and which the farmer turns over in ploughing.

EXECUTIVE SUMMARY

Gilgit-Baltistan (GB) is now turning to a tourist hub and every year millions of tourists both domestic and international tourists visit this area which is among the most beautiful places on the earth. Currently GB has 10 districts, and 4 more districts are at approval stage and connections between districts is poor, thus the purpose of this road is to connect two important districts with stunning scenic beautify, full of natural resources, and hub of tourists. Furthermore, this proposed road will provide a standardized road with good ride quality to reduce the vehicle operating cost with direct impact on country's microeconomics, easy access to the tourist spots, and boost social and economic status of the Gilgit Baltistan region. The proposed road starts from Kachura (connected with JSR), District Skardu to Gorikote, District Astore. Some of the larger villages which will be connected with road are Gorikote, Pakora, Lobaiye, Gudai, Bubin, Dumai, Kharbary Jall Jastero, and Bommory in Astore district, and Shagharthang, Staqchan, Bulcho, Soq and Kachura in Skardu district.

The GASSR Project will play a vital role due to its Strategic location for defence purposes in the region as well shortening the distance between Baltistan and Astore and then Islamabad via the proposed Shonter road. Owing to its great significance, the competent authority allowed to include this scheme in PSDP 2021-22. The Scheme was approved from CDWP on 24th May 2021 and administrative approval issued on 11th September 2021 with a cost of Rs. 5274.00 million. However, a revised PC-1 with a cost of Rs. 12,302.147 million has been submitted to the competent Forum for approval. The construction work for the proposed project is expected to begin in the year 2024 and the expected date of completion is July 2027.

In preparation of this ESIA study, apart from document review and site visit by the experts, a series of stakeholder consultation was carried out to develop a socio-economic baseline of the general population along the proposed road. Apart from the community meetings, a sample of 20 respondents including was selected from Astore district and 36 was from Skardu district.

The study reveals that the proposed GASSR Project will have both positive and negative impacts. Major impacts identified during construction are cutting of trees, ecological habitat disturbance, maintaining slope stability, generation of solid waste and hazardous waste, disturbance of drainage, soil erosion, surface and ground water contamination, construction camps/camp sites, deterioration of air quality, noise and vibrations, waste and hazardous waste, traffic management social conflicts due to labor influx and land related issues. Some of the important negative impacts anticipated during operational phase include invasion of timber mafia in the area, increase in air pollution and noise level due to increase of traffic, generation of solid waste due to increase in number of tourists and road safety issues due to increase in traffic and speed of vehicles due to improved road condition, and collision of wildlife with vehicles.

Mitigation measures have been suggested which include maintaining natural angle of cut slopes and embankments during design to avoid land sliding, avoid use of heavy machinery on wet soil to prevent damage to soil structure, provision of temporary runoff collection system to contain the construction runoff, safe storage of oil, lubricants, chemical and other hazardous substances removal of left-over material from site, use of Personal Protective Equipment (PPEs) like masks, goggles and gloves, regular water sprinkling, restrict construction vehicles

movement during night time; prohibition of hunting, poaching and harassing of animals and birds, strict watch on timber mafia during operational phase, provision of pedestrian bridge/underpasses for crossing of pedestrian and domestic animals, provision of special corridors for movement of wild animals, signs or warning notices of the presence of animals, adoption of work safety measures and good workmanship practices.

As such, the two most significant impacts remain disturbance to wildlife and tree cutting. This ESIA ensures that these impacts are addressed chiefly at the design stage, in the form of Wildlife Safety Plan and Tree Plantation plan to be prepared by the PMU and made part of the bidding documents for the contractors. The contractors will be required to develop site-specific versions of these plans before commencing any work.

This report also includes Environmental & Social Management Plans (ESMP). The ESMP provide institutional arrangement for the implementation of the proposed mitigation measures during the design, construction and operational phases of the proposed project. The ESMP also defines roles and responsibilities, reporting mechanism, training needs and schedules and budget to implement the ESMP. The impacts, mitigation measures, monitoring indicators, frequency and responsibility has also been documented in the ESMP.

Project Steering Committee will be responsible for overall project implementation while PMU of C&WD through PD-PMU GASSR project will be responsible for overall implementation of the mitigation and monitoring measures suggested in this report – as well as the conditions set forth by GBEPA in their Approval/NOC. The PMU will have required experts to ensure compliance of ESMP by the contractor. The supervision consultant will carry out supervision of the Project as “The Engineer” and ensure effective monitoring of the suggested mitigation measure in this ESIA including ESMP, EMP and other plans as per PD/PMU and GBEPA requirements. The Project Contractor will be responsible for the implementation of his works as per this ESIA and Approval conditions of GBEPA. The Contractor will prepare Construction-ESMP – abstracting the measures from ESIA/GBEPA Approval conditions – which will be reviewed by the Supervision Consultant and approved by the PD/PMU GASSR.

Monitoring will be undertaken during pre-construction, construction and operational phases of the Project to ensure the effectiveness of the proposed mitigation measures. Certain environmental parameters will be selected, and quantitative analysis will be carried out, including air, water and noise monitoring.

Keeping in view, the ground realities through environmental and social assessment, dire need of the area, economic benefit to GB, and being shortest and safest rout, this project is the most relevant, important and need of the time, thus recommended for implantation at its earliest.

Chapter 1:

Introduction

Chapter Contents:

- Project Background
- Scope of the Project
- Objectives of the Project
- Objectives of the EIA
- Approach & Methodology of Work
- Structure of Report
- Project Proponent and Consultant

1 INTRODUCTION

The Gilgit-Baltistan Environmental Protection Act of 2014 Part VI, Section 16 states "No proponent of a project shall commence construction or operation unless an initial environmental examination or environmental impact assessment has been filed with the Agency and approval has been obtained". Consequently, all projects must comply with the requirements of the Act.

The GB EPA has adopted Pak EPA Rules 2000 Schedule II (Transport) states "*Federal or Provincial highways or major road (except maintenance, rebuilding or reconstruing roads) with total cost of Rs. 50 million and above"* requires Environmental Impact Assessment (EIA).

In consistent with GB Environmental Act and EPA Regulations 2000, this report has been prepared assessing the "Environmental Impacts" associated with the "*Gorikote Astore to Shagharthang Skardu Road (GASSR)*" in Gilgit-Baltistan. This report is prepared by the consultant for submission to and to accord approval from the Gilgit-Baltistan Environmental Protection Agency (GB EPA). The EIA report is assessment of environmental and social impacts and related mitigation measures for the GASSR between Shagharthang and Gorikote. This report is submitted to GB EPA for review and comments before issuing the conditional approval.

1.1 Project Background

To enhance connectivity of remote areas with major commercial hubs, the Government of Pakistan (GOP) is adopting a comprehensive and strategic approach to transportation. A key initiative in this effort is the China-Pakistan Economic Corridor (CPEC), a long-term and systematic project aimed at boosting economic cooperation through collaborative development in Gawadar port, energy, transportation, and industrial sectors. The CPEC infrastructure projects will extend across Pakistan, creating a network of highways and railways that will connect Gawadar in the south-western region to Xinjiang in China's north-western autonomous region.

The GASSR off-takes from JSR near Kachura Skardu and connects with AVR near Gorikote Astore, onward linking with Karakoram Highway (KKH). The detailed design and feasibility study and design of GASSR is prepared by the selected consultant (CAMEOS and AZMEC JV). The GASSR is intended to be an all-weather road for people of Gilgit-Baltistan. The proposed road will provide an alternate road (safe and shorter) to the JSR for the local people and for the tourists (national and international) visiting Gilgit-Baltistan.

Owing to its great significance, the Competent Authority allowed to include the proposed road scheme in PSDP 2021-22. The scheme was approved from CDWP on 24th May 2021 and administrative approval issued on 11th September 2021 with a cost of Rs. 5,274.00 million.

1.2 Scope of the Project

Scope of project is to design road having a maximum travel way width of 12-meter (39-feet) and comprising of 7.3-meter asphalt wearing course surface carriageway with treated shoulders, drains, ditches, bridges and culverts and other cross drainage as well as protection and retaining works. Design criteria/technical parameters are summarized in Table 1.

Table 1: Design Criteria/Technical Parameters of GASSR

Design speed	
For Plain terrain	60 KPH
For Rolling Terrain	40 KPH
For Hilly Terrain	30 KPH
Maximum Rate of super-elevation	
For Plain terrain	4%
For Rolling Terrain	6%
For Hilly Terrain	8%
Road Formation Width	
For Plain terrain	12 m
For Rolling Terrain	12 m
For Hilly Terrain	12 m
Width of Travel way	
For Plain terrain	7.3 m
For Rolling Terrain	7.3 m
For Hilly Terrain	7.3 m
Cross slopes for Travel way cross fall	
For Plain terrain	2%
For Rolling Terrain	2%
For Hilly Terrain	2%
Cross slopes for Shoulders	
For Plain terrain	4%
For Rolling Terrain	4%
For Hilly Terrain	4%
For Vertical Alignment	
Maximum Grade	
For Plain terrain	3 to 6%
For Rolling Terrain	6%
For Hilly Terrain	6 to 10%
Right of way	
For Plain terrain	2+2 m
For Rolling Terrain	2+2 m
For Hilly Terrain	2+2 m
For Road Pavement	
Design life of carriageway	20 years
Level of Service	B
Design standard Axle load	(75 tons)
Pavement design methodology	AASHTO/ Road note 31 (BRRLT)
For Structure	
Design life of Bridges	100 years
Design life of Culverts	50 years
Design life of side drains	10 years

Source: Project Revised PC-1

1.2.1 Objectives of the Project

The objectives of the Project are:

3- To support the socio-economic sectorial development Activities of Gilgit Baltistan.

4- To have safe access to District Astore and Skardu.
5- To have an alternate strategic route for defence purposes.
6- To reduce travel time, vehicle operating cost and cost of travel along the project road.
7- To promote International Tourism by linking to the Skardu International Airport.
8- This road will also serve as an alternate route for proposed CPEC connecting Pakistan with China via Yarkand.

1.2.2 Objectives of the EIA

The main objective of this study is to evaluate the potential impacts on environmental and social (project affected people-PAP) due to the proposed project. The specific objectives include but not limited to:

- Determining relevant laws and legal requirements for the EIA.
- Establishing a baseline of the current physical, biological, and operational conditions of the project area.
- Engaging with relevant departments and stakeholders directly involved with the project.
- Identifying significant impacts that may require in-depth assessment.
- Assessing impacts during Design, Construction, and Operation phases.
- Proposing mitigation measures to minimize, eliminate, or compensate for potential adverse impacts identified during the assessment.
- Developing an Environmental Management and Monitoring Plan (EMMP).

1.3 The Approach and Methodology of Work

1.3.1 The Approach

The study relies on data gathered from primary sources, including Focus Group Discussions (FGDs) with relevant communities and government departments, field visits, and observations. Secondary data is sourced from the project design report/feasibility study, previously conducted EIAs in the region, laws, acts, regulations, guidelines and other project related data available with different sources.

The study follows the guidelines set by the “Gilgit-Baltistan Environmental Protection Agency (EPA)” and the “Government of GB IEE/EIA Regulations, 2000.” It incorporates both primary and secondary data. Primary data was collected through FGDs with local communities alongside the road alignment from Kachura (Shagharthang Valley) and Bubin Valley to interconnection of road with AR near Gorikote. Feedback and data are also collected from Govt. departments, NGOs, local knowledgeable people, religious and political persons. The report includes field observations, and sector specialists. Secondary data was obtained from project feasibility/design reports prepared by C&WD, similar nature EIAs in the area, and reports with Govt. line departments. This approach aims to provide a comprehensive understanding of public perceptions regarding the project and its environmental and social impacts.

1.3.2 Methodology

The EIA is primarily based on information and data collected from stakeholders during consultation meetings and FGDs and secondary data collected from various sources. The methodology for the EIA study includes:

Orientation: The EIA Consulting Team conducted meetings and discussions to establish a shared understanding of the various issues related to the study. This initial step was crucial for aligning the team's approach and ensuring a coherent analysis.

Field Planning: Following the clarification and understanding gained in the previous step, a comprehensive data acquisition plan was formulated for the internal use of the EIA Consulting Team. This plan outlined specific data requirements and their sources, established timelines and responsibilities for data collection, and detailed the logistical and support needs necessary for executing the data acquisition process.

The consultant, JV - M/s INTEGRATION Energy (Pvt.) Limited and INTEGRATION environment & energy GmbH subject experts have conducted thorough site visits to gather primary information on the physical environment, land use patterns, and socio-economic activities. Prior to these visits, a list of villages was prepared to conduct the FGDs and sample interviews of PAP, especially those that will be directly impacted.

Data Collection: The survey team collected both primary and secondary data as planned, focusing on the physical, biological, and socio-economic/cultural environments. This data was gathered through field observations, environmental monitoring, consultations with relevant departments, and review of published materials to establish a baseline profile of the project's environmental conditions. The following activities were undertaken for data collection:

9- Site reconnaissance
10- Literature review
11- Desk research
12- FGDs and sample PAP interviews
13- Field observations
14- Expert opinion

1.4 Structure of Report

Chapter 1: This chapter presents the detail introduction of the project including background, short description and objectives, approaches and methodology, structure of the report itself, and EIA team.

Chapter 2: Describes legal and administration Framework which includes, key national Laws, Regulations and Policies; provincial Laws, Regulations and Policies; and applicable international Conventions and Treaties.

Chapter 3: This chapter provide a detail project description which includes, need and purpose of the project; project location; salient features; project cost; project administrative jurisdiction; project implementation schedule; construction activities and required machinery; construction materials; waste generation; and construction camps.

Chapter 4: In this chapter project Alternatives will be discussed which includes Alternatives, comparison analysis of the alternatives, and selected options.

Chapter 5: Environmental & social Baseline will be presented in this chapter which consist of physical environment, environmental sensitive receptors, ecological & biodiversity baseline, socio-economic environment, socio-economic profile, social amenities, perceived socio-economic impacts, awareness regarding the proposed project, acceptability about the Project, women issues and development needs, women privacy issues etc..

Chapter 6: This chapter presents public consultation and information disclosure which includes objective and principles of consultations, project stakeholders, modes of consultations, approach adopted for the consultation, information disseminated, stakeholders concern towards the Project, consultation with institutional stakeholders, and pressing needs of the consulted villages and suggestions by the local communities and project affected people.

Chapter 7: Chapter 7 provides details about potential environmental and social impacts and mitigations, this includes, impact matrices, impacts and mitigation measures during design phase, impacts and mitigation measures during construction phase, anticipated impacts during operation phase, positive social impacts, and community development.

Chapter 8: Environment management and monitoring plan (EMMP) has been discussed in this chapter with the detail on; institutional roles and responsibilities, non-compliance of the EMMP, reporting mechanism, EMMP, environmental monitoring and performance indicators, environmental technical assistance and training plan, environmental monitoring plan (EMP) and environmental mitigation cost, tree plantation plan, and grievances redress mechanism (GRM).

Chapter 9: The last chapter presents conclusion, recommendation, and references.

1.5 Project Proponent and Consultant

The proponent of the Project is Project Management Unit (PMU) GASSR. INTEGRATION Energy (Pvt.) Limited has been assigned the responsibility of conducting EIA of the Project. The project proponent (Table 2)and consultant information is summarized Tables be.

Table 2: Details of Proponent and Consultant

Proponent Contact Address			Consultant Contact Address
Project Director Project Management Unit GASSR Skardu			Authorized Representative of JV House 13B, Street 34, F7/1 Islamabad House 5, Riaz Road Jutial Gilgit
Study Team			
S.#	**Name of Expert**	**Qualifications**	**Role in EIA Study**
1.	Sher Khan	M.Sc. Water & Env. Engg., B.Sc. Civil	Team Lead
2.	Nazir Ahmad	M.Sc. Economics, MSc Dev. Studies	Social & Gender Expert
3.	Dr. Farasat Ali	PhD Environmental Sciences	Environmental Expert
4.	Saadullah Ayaz	M.Sc. Forestry, and NRM	NRM and Biodiversity Expert
5.	Ghazala Raza	Masters in Energy Management	Climate Change Expert
6.	Mohamad Yousuf	DAE Civil	Lead Consultation Expert Skardu
7.	Sahir Iqbal	Masters (Development Studies)	Lead Consultation Expert Astore

Chapter 2:

Legal and Administration Framework

Chapter Contents:

- National Policy and Administrative Framework
- Provincial Laws, Regulations and Policies
- Other Relevant Laws
- Applicable International Conventions and Treaties
- Interaction with Agencies

2 LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 General

This section addresses the current legislation, policies, and administrative framework related to environmental protection and biodiversity conservation in Pakistan, with a specific focus on Gilgit-Baltistan (GB). Under this Framework, sectoral projects, including GASSR must adhere to all legal procedures related to environmental protection as established by Pakistani law. The GASSR project is required to undergo an Environmental Impact Assessment (EIA) in accordance with GBEPA requirements. Additionally, the section incorporates relevant environmental policies, guidelines formulated by GBEPA, and appropriate administrative frameworks. It also outlines the roles and responsibilities of the project proponent (C&WD through PMU GASSR Skardu), and other national and provincial agencies involved in environmental protection.

Since the Project is situated in the Astore and Skardu districts of GB, it is essential to consider the environmental laws and regulations enacted by the GB Government and GBEPA, alongside national and international laws, regulations, protocols, and treaties.

2.2 National Policy and Administrative Framework

Two organizations, the Pakistan Environmental Protection Council (PEPC) and the Pak-EPA, are primarily responsible for administering the provisions of the Pakistan Environmental Protection Act, promulgated by the Government of Pakistan in 1997. The PEPC oversees the functioning of the Pak-EPA. Its members include representatives of the government, non-governmental organizations, and the private sector, particularly industrial sector. The Pak-EPA is required to ensure compliance with the National Environmental Quality Standards (NEQS) and establish monitoring and evaluation systems. As the primary implementing agency in the hierarchy, it is responsible for identifying the need for, as well as initiating legislation whenever necessary. The Pak-EPA is also authorized to delegate powers to its provincial counterparts, the provincial EPAs. One of the functions delegated by the Pak-EPA to provincial EPAs is the review and approval of environmental assessment reports of projects undertaken in their respective jurisdictions.

The Federal Ministry of Environment has been devolved under 18th Amendment in the constitution of Islamic Republic of Pakistan and similarly provinces were enabled to legislate about environment, therefore Gilgit-Baltistan Assembly under schedule 4 of “Gilgit- Baltistan (Empowerment and Self-Governance) Order 2009” can make laws on the list of subjects provided in it. In that context, Gilgit-Baltistan has its own Environmental Protection Act and hence the GBEPA is the responsible Agency for policy making on environmental protection in Gilgit-Baltistan. The proposed Project will be financed by Govt. of GB, which requires compliance to the GB Environmental Protection Act 2014, therefore it is obligatory on the part of the Proponent to ensure environmental assessment as per rules and regulations of GBEPA.

Gilgit-Baltistan has its own Environmental Protection Agency i.e., GBEPA, who is the responsible Agency for policy making on environmental protection according to the Environmental Protection Act, 2014. Subsequently, there are several policies and acts those that are applicable to the provinces, including GB. Additionally, Pakistan is signatory of several

international treaties and protocols, related to environment those also applicable in the local context. **Table 3** provides a brief overview of the main project relevant laws and regulations.

Table 3: Acts, Regulations, Policy, Strategies, Standards and Procedures

Pakistan Environmental Protection Act, 1997	The Pak-EPA has empowered the provincial EPAs to manage the environmental concerns of their respective provinces. The provincial EPAs can frame environmental regulations tailored to the requirements of their province, provided these regulations meet or exceed the minimum standards set by the Pak-EPA. They are also required to review and approve EIAs of all development projects undertaken in their respective provinces, including those projects implemented by federal agencies.
The Gilgit-Baltistan Environmental Protection Act, 2014	This act provides the provincial framework as well as roles and responsibilities of the Giglit-Baltistan Environmental Protection Agency (GBEPA). Furthermore, it provides general regulations to almost all environmental parameters such as air, water, soil, and noise pollution, as well as to the handling of hazardous wastes. Part VI Section 16(1) requires that "*No proponent of a project shall commence construction or operation unless it has been filed with the GB-EPA an initial environmental examination or, where the project is likely to cause an adverse environmental effect, an environmental impact assessment, has to be obtained from the GBEPA for approval in respect thereof*."
Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000	A project falling under any category specified in Schedule I (SRO 339 (I)/2000), requires the proponent to prepare an IEE (Appendix A). Projects falling under any category specified in Schedule II require the proponent to prepare an EIA. The proponent is required to file IEE or EIA with the provincial environmental protection agency (EPA). For this Project the concerning provincial EPA is that of Gilgit-Baltistan. Within ten working days of the IEE or EIA having been deposited, the EPA will confirm that the document submitted is complete for the purpose of review. During this time, should the agency require the proponent to submit any additional information, it will return the IEE or EIA to the proponent for revision, clearly listing those aspects that need further discussion. Subsequently, the agency shall make every effort to complete an IEE review within 45 days and an EIA review within 90 days of filing. Pak-EPA regulations (SRO 339 (I)/2000) state that an IEE is required for dam/ hydropower projects where the capacity of the storage reservoir is less than 50 M m^3 or having power installed capacity less than 50 MW. An EIA, on the other hand, is required for major dam/hydropower projects with installed capacity exceeding 50 MW or a storage capacity of more than 50 M m^3. EIAs are also required in cases where projects are to be implemented in environmentally sensitive areas or are likely to cause adverse environmental effects.
Procedures for Environmental Assessment, Pak-EPA, 2000.	The Pak-EPA has published a set of environmental guidelines for conducting environmental assessments and the environmental management of different types of development projects. The guidelines that are relevant to the proposed project are listed below, followed by commentary on their relevance to the proposed project: Policy and Procedures for Filing, Review and Approval of Environmental Assessments includes Schedules A, B and C defining development projects in terms of requirements for EIA and IEE. Schedule A defines projects which require an EIA, major projects which have the potential to affect a large number of people whose impacts may be irreversible and could lead to significant changes in land use and in the social, physical and biological environment (roads above Rs. 50 million require an ESIA). It deals with projects where the range of environmental issues is comparatively narrow, and issues can be understood and managed through less extensive analysis. Furthermore, it contains the forms of registration.

	Guidelines for the Preparation and Review of Environmental Reports target the project proponents, and specify: • The nature of the information to be included in environmental reports • The minimum qualifications of the EIA conductors appointed • The need to incorporate suitable mitigation measures at every stage of project implementation • The need to specify monitoring procedures The terms of reference for the reports are to be prepared by the project proponents themselves. The report must contain baseline data on the project area, a detailed assessment thereof, and mitigation measures. **Guidelines for Public Consultation:** These guidelines deal with possible approaches to public consultation and techniques for designing an effective program of consultation that reaches out to all major stakeholders and ensures that their concerns are incorporated in any impact assessment study. **Sectoral Guidelines:** The guidelines for 'water sector development' are structured to assist in identifying key environmental issues related to water development projects, as well as the various mitigation measures and alternatives that should be considered and applied accordingly. These guidelines are aimed at intermediate-level projects where the impact is likely to be more significant, as opposed to minor works such as the maintenance, repair, and improvement of existing structures. **Sectoral Guidelines (Major Roads):** These guidelines present issues/impacts commonly arising due to the approaching road project, the mitigations to reduce/eliminate these impacts and the need for environmental management and monitoring plan to protect the environment.
National Environmental Quality Standards (NEQS), 2000/2010	The Pakistan Environmental Protection Council first approved the National Environmental Quality Standards (NEQS) in 1993. The NEQS revised later in 1995, 2000 and 2010 respectively provide information on the permissible limits for discharges of municipal and industrial effluent parameters and industrial gaseous emissions in order to control environmental pollution. The same NEQS were followed by the GB-EPA. **Drinking Water Quality Standards:** In pursuance of the statutory requirement under clause (c) of sub-section (1) of section (6) of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency with prior approval of the Pakistan Environmental Protection Council, has published the National Standards for Drinking Water Quality in 2010. WHO Drinking water quality guidelines and USEPA standards are being used for bench marking purpose along with the National Standards for Drinking water quality since January 2013. **Air Quality Standards:** In pursuance of the statutory requirement under clause (e) of sub-section (1) of section (6) of the Pakistan Environmental Protection Act, 1997(XXXIV of 1997), the Pakistan Environmental Protection Agency with prior approval of the Pakistan Environmental Protection Council, has revised the NEQS for Ambient Air in 2010, which became effective in January 2013. **Noise Quality Standards:** In pursuance of the statutory requirement under clause (c) of sub-section (1) of section (6) of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency with prior approval of the Pakistan Environmental Protection Council, has revised the NEQS for Noise in 2010. These standards have been established for four different

	categories which include residential area, commercial area, industrial area and silent zone. These standards vary according to the day and night timing, day time hours are 6:00 am to 10:00 pm and night time hours are 10:00 pm to 6:00 am. USEPA standards and World Bank guidelines along with National Environmental Quality Standards for Noise are being used as bench mark purpose since January, 2012.
Land Acquisition Act (LAA) of 1894	The LAA is limited to a cash compensation policy for the acquisition of land and built-up property, and damage to other assets, such as crops, trees, and infrastructure. The LAA does not consider the rehabilitation and resettlement of disrupted populations and the restoration of their livelihoods. Experience with large-scale infrastructure development projects has demonstrated the need for a cohesive national policy for resettlement. In spite of the fact that a National Resettlement Policy and related legislation have been drafted, these have not been officially notified. In the absence of such notification the safeguard policy of the World Bank as spelled out in ESS5: Land Acquisition, Restriction on Land Use and Involuntary Resettlement will form the basis for managing the resettlement needs arising from the project.
National Resettlement Policy, March 2002 (Draft)	The draft policy identifies key objectives (avoidance and/or minimisation, compensation and assistance, provision of development opportunities with special assistance to vulnerable groups, benefit sharing). In general project affected people should be able to improve or as a minimum to restore to pre-project levels. The policy includes compensation (as replacement value as of the cut-off-date) and income restoration (long-term and short-term strategies), relocation in general and with special attention for indigenous. It contains chapters on the required institutional framework including roles and responsibilities, the implementation of a grievance mechanism, public participation and information, monitoring and evaluation as well as reporting and documentation. A brief description on subjects to be covered in a RAP is given. As already stated, it is still a draft version however published on the PAK-EPA webpage, but an official notification has not taken place.
Pakistan National Conservation Strategy (PNCS, 1992)	The Pakistan National Conservation Strategy, 1992 is the principal policy document for environmental issues in the country that was developed and approved by the Government of Pakistan. This strategy works on a ten-year planning and implementation cycle. It deals with fourteen (14) core areas such as maintaining soils in cropland, protecting watershed, conserving biodiversity, managing urban waste, preserving the cultural heritages and so on. Project specific mitigation prescriptions cannot be expressed in the Strategy, however, the principles of environmental protection, conservation and management provided in the Strategy have to be used as guidelines during the planning and execution of Project.
National Environment Policy, 2005	The National Environmental Policy (2005) provides an overarching framework for addressing the environmental issues (particularly pollution of freshwater bodies and coastal waters, air pollution, lackof proper waste management, deforestation, loss of biodiversity, desertification etc.) confronting Pakistan. It recognizes the goals and objectives of the Pakistan National Conservation Strategy (PNCS, 1992), National Environmental Action Plans, and other existing environment related national policies, strategies, and action plans. It also provides broad guidelines to the federal government, provincial governments, federally administered territories and local governments to address their environmental concerns and to ensure effective management of their environmental resources.

Pakistan Environmental Protection Ordinance, 1983	Pakistan Environmental Protection Ordinance, 1983 was the first piece of legislation designed specifically for the protection of the environment. In 1984, the promulgation of this ordinance was followed by the establishment of the Federal EPA, the primary government institution dealing with environmental issues. Provincial EPAs were also established at about the same time

2.3 Other Relevant Laws

Besides those laws specific to the execution of IEE or ESIA there are several laws which have to be taken into account to be in compliance with local legislation throughout the project circle (planning, construction and operation). The most important once are listed in **Table 4**.

Table 4: Other Relevant Policies, Acts, Ordinances, Rules and Regulations

The Forest Act, 1927; (and Provincial Acts and Rules)	The Act, inter alia, deals with the matters related with protection and conservation of natural vegetation/habitats. In that matter it empowers the concerned agency to declare protected and reserved forest areas and maintaining these. In spite of the fact that it recognizes the right of people for access to the natural resources for their household use, it prohibits unlawful cutting of trees and other vegetation. Therefore, for cutting trees for the construction purposes or otherwise, prior permission is required from the Forest Department of the concerned province.
Gilgit Baltistan Fisheries Act, 1975	Thee act mainly describes the prohibition of destruction of fish by explosive and destruction of fish by poisoning water. The act also describes the fish size not to be kill and capture specified in the second column of the First Schedule as well as penalties in case of violation.
Gilgit-Baltistan Forest Rules, 1983	It controls protected forests. However local people may have some concessions and user rights. They may be able to use these forests for grazing and collection of fuel wood and other non-timber products.
Antiquities Act, 1975	The Antiquities Act relates to the protection, preservation and conservation of archaeological/ historical sites and monuments. It prohibits construction (or any other damaging) activity within 200 ft of such sites unless prior permission is obtained from the Federal Department of Archaeology and Museums. The Antiquities Act also binds the project proponent to notify the department should anything of archaeological value be excavated during project construction.
Provincial Local Government Ordinance, 2001	These ordinances, issued following the devolution process, establish regulations for land use, the conservation of natural vegetation, air, water, and land pollution, the disposal of solid waste and wastewater effluents, as well as matters related to public health and safety.
Regulation of Mines and Oil Fields and Mineral Development Act, 1948	This legislation provides regulatory procedures for the quarrying and mining of construction material on state-owned as well as private land.
Factories Act, 1934	The sections of the act relevant to the project are those that concern the health, safety and welfare of workers, disposal of solid waste and effluent, and damage to private and public property. The Factories Act provides regulations for handling and disposing of toxic and hazardous materials. Given that construction activity is classified as 'industry', these regulations will be applicable to the project contractor.
Pakistan Penal Code, 1860	The Pakistan Penal Code deals with offences where public or private property and/or human lives are affected due to the intentional or accidental misconduct of an individual or body of people. In the context of environment, the Penal Code

	empowers the local authorities to control noise, noxious emissions and disposal of effluents. The NEQS enforced by the EPAs supersede the application of this legislation on industries and municipalities. The Penal Code, however, can provide a basis for the WAPDA to coordinate its activities with the local authorities to ensure that its construction activities do not become a cause of public nuisance or inconvenience.
National Drinking Water Policy 2009	Access to safe drinking water is the basic human right of every citizen and that it is the responsibility of the state to ensure its provision to all citizens, is committed to provision of adequate quantity of safe drinking water to the entire population at an affordable cost and in an equitable, efficient and sustainable manner.
Pakistan Occupational Health and Safety Act 2018	Act is to ensure safe and healthy working conditions for the people at work; by authorizing enforcement of the rules and regulations developed under the Act; by assisting and encouraging the organizations, institutions and geographic areas governed by the federal government in their efforts to ensure healthy and safe working conditions; by providing for research, information, education, and training in the field of occupational health and safety. https://www.pec.org.pk/Downloadables/buildingCode/Draft%20Modle%20OHS%20Act%202018.pdf
Hazardous Occupations Rules 1963	They shall apply to all factories in which any operation specific in the Schedule is carried on. Schedule are declared to be hazardous operation when carried on in a factory.
Workmen's Compensation Act 1923	If personal injury is caused to a workman/woman by accident arising out of and in the course of his/her employment, his/her employer shall be liable to pay compensation in accordance with the provisions of the Act
Dock Laborers Act 1934	No single comprehensive piece of legislation deals with occupational or community safety and health.
The Explosive Act, 1884	It provides regulations for handling, transportation and use of explosives. The contractors must abide by the regulation during quarrying, blasting and for other purposes.
Motor Vehicle Rules, 1969	Motor Vehicle Rules 1969 (MVR 1969) define powers and responsibilities of the Motor Vehicle Examiner (MVE). The establishment of MVE inspection system is one of the regulatory measures that can tackle the ambient air quality problems associated with the vehicular emissions during operation phase.
Cutting of Trees (Prohibition) Act, 1975	This Act prohibits cutting or chopping of trees without permission of the Forest Department, Gilgit-Baltistan.
Highways Safety Ordinance, 2000	This ordinance includes provisions for the licensing and registration of vehicles and construction equipment; maintenance of road vehicles; traffic control, offences, penalties and procedures; the establishment of a police force for Motorways and National Highways charged with regulating and controlling traffic on National Highways and keeping the highways clear of encroachments.
Labor Laws	Construction and operational activities during the course of the project may affect occupational health and safety of workers. The health and safety issues of the workforce during construction/operation of project need to be ensured by the Employers in accordance with the relevant labor laws.
Canal and Drainage Act, 1873	This Act entails provisions for the prevention of pollution of natural or man-made water bodies.

Project Implementation and Resettlement of APs Ordinance, 2000	Project Implementation and Resettlement of Affected Persons Ordinance, 2000
Environmental Protection Council	The Gilgit-Baltistan Environmental Protection Council is the apex decision-making body of Gilgit-Baltistan. As per Gilgit-Baltistan Environmental Protection Act 2015, the council has been set up under the chairmanship of Chief Minister of Gilgit-Baltistan with Members from other relevant Departments. Functions of the Council are listed below: Co-ordination and supervision of the provisions of the Act and other Laws related to the environment in the province. Approval of comprehensive provincial environmental and sustainable development policies, guaranteeing their implementation within the framework of a conservation strategy and sustainable development plan approved by the Government as and when required. Approval of the Gilgit-Baltistan Environmental Quality Standards. Provision of guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources and new emerging environmental challenges like Climate Change and its mitigation. Coordinating integration of the principles and concerns of sustainable development into socio-economic and development policies, plans and programs at the provincial, District and local levels. Consideration of the annual Gilgit-Baltistan Environment Report, giving appropriate directions thereon and causing it to be laid before the Provincial Assembly. Dealing with inter-provincial and federal-provincial issues, liaising and coordinating with other Provinces through appropriate inter-provincial forums regarding formulation and implementation of standards and policies relating to environmental matters with an inter-provincial impact, and Provision of guidelines for bio safety and for the use of genetically modified organisms.
Gilgit-Baltistan Sustainable Development Fund	Gilgit-Baltistan Sustainable Development Fund has been established following the guidelines of the GBEPA, 2015. The fund is to be used to financially aid and support projects aimed at environmental protection, conservation, rehabilitation and improvement. It is administratively headed by the Chief Secretary as the Chairperson along with members from other relevant departments.
Environmental Courts	Government of GB exercises the power to formulate as many Environmental Courts as it deems fit under the GBEPA, 2015. In case of more than one Environmental Courts, it is mandatory to specify the territorial limits within which their jurisdiction falls. An Environmental Court shall consist of a Chairperson who is, or has been, or is qualified for appointment as a Judge of the Session Court to be appointed after consultation with the Chief Justice of the Chief Court and two members to be appointed by the Government, of which at least one shall be a technical member with suitable professional qualifications and experience in the environmental field as may be prescribed
Forest, Wildlife and Environment	The Project implementation will involve clearing of vegetation and trees within the Right of Way (RoW). This might have a direct or indirect impact on the wildlife of the

Department, Gilgit-Baltistan	project area as well. Therefore, the project contractors will be responsible for acquiring a 'No-Objection Certificate' (NOC) from the Forest, Wildlife and Environment Department, Gilgit-Baltistan based on the approved EIA. The application for the NOC will need to be endorsed by the C&WD. Tree Avenue plantation will be carried out by C&WD itself or through work awarded to Forest, Wildlife and Environment Department of Gilgit-Baltistan. C&WD-PMU GASSR will also be responsible for liaising with the aforesaid department regarding the types of trees to be planted and other matters concerning plan for plantation as a measure to compensate for the loss of trees and to mitigate the damages caused to the environment during the course of the project.
Department of Inland Revenue, Gilgit-Baltistan	As per Land Acquisition Act (LAA) of 1894, the Department of Inland Revenue (GB) is authorized to carry out the acquisition of private land or built-up property for public purposes. For this purpose, the proponent of the Project (i.e. GB-C&WD-PMU) needs to make a request in writing to the respective District Administration to depute a Land Acquisition Collector (LAC) and other revenue staff incorporating members from other relevant departments, who will eventually be responsible for handling matters related to land acquisition and the disbursement of compensation for the respective provincial jurisdiction.

2.4 Applicable International Conventions and Treaties

Pakistan is a member of several international organizations such as United Nations Organization (UNO), Organization of the Islamic Conference (OIC), South Asian Association for Regional Cooperation (SAARC), and the Economic Cooperation Organization (ECO). The conventions, and obligations related to the proposed Project are summarized in **Table 5.**

Table 5: Multilateral Agreements

Ratification or signing	Conventions and Objectives
Environment	
1976	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITIES). Cooperation among the signatory countries for protection of certain endangered species of wild animals and plants to prevent their over exploration.
1976	Convention on Wetlands (Ramsar Convention): The broad aim is to halt the worldwide loss of wetlands and to conserve those that remain through wise use and technology transfer. (Including amendments on the Waterfowl Habitat, 1988)
1987	The Convention on Conservation of Migratory Species of Wild Animals. The Convention requires the countries to take action to avoid endangering migratory species. Species covered in the Convention should be given special attention during EA and monitoring, and any impacts identified should be mitigated to acceptable levels.
1992	The Rio Declaration. The Convention on Biological Diversity contains principles which address such important issues as; sustainable development to integrate environmental protection into the development process (IEE); common but differentiated responsibilities to conserve, protect and restore the earth's ecosystems; public participation and information access at the national level, reduce and eliminate unsustainable patterns of production and consumption.
1997	Convention of the Law of Seas (preservation and protection of the marine environment)
1992	Vienna Convention on the Protection of the Ozon Layer.
1992	Montreal Protocol on Ozone Layer Depleting Substances.
1994	Basel Convention on Control of Transboundary Movement of Hazardous Waste

Ratification or signing	Conventions and Objectives
1992	UN Framework Convention on Climate Change (UNFCCC). Stabilization of greenhouse gas concentrations in the atmosphere.
2005	Kyoto Protocol UNFCCC. Mitigation of climate change furthermore it promoted the carbon sequestration and credits (Credit Emission Reduction trading)
2009	Rotterdam Convention on prior informed consent for certain hazardous chemicals and pesticides
2009	Cartagena Protocol on Bio-Safety to the CBD
2008	Stockholm Convention on persistent organic pollutants
2016	Paris Agreement is an agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future
Cultural Heritage	
2005	Convention for the Safeguarding of the Intangible Cultural Heritage.
1981	Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property.
1976	Convention concerning the Protection of the World Cultural and Natural Heritage,
Human Rights	
2010	Convention against Torture and Other Cruel Inhuman or Degrading Treatment or Punishment
2010	International Covenant on Civil and Political Rights
1996	Convention on the Elimination of all forms of Discrimination against Woman
1996	Convention on the Elimination of all forms of Racial Discrimination
2008	International Covenant on Economic, Social and Cultural Rights
1990	International Convention on the rights of the Child including Optional Protocols (on the involvement of Children in armed conflicts, 2016; on the sale of children child prostitution and child pornography, 2011)
2011	Convention on the Right of Persons with Disabilities
International Labour Standards	
1957	Forced Labour Convention
1951	Freedom of Association and Protection of the right to Organise Convention
1952	Right to Organise and Collective Bargaining Convention
2001	Equal Remuneration Convention
1960	Abolition of Forced Labour Convention
1961	Discrimination Convention
2006	Minimum Age Convention (Minimum Age Specified :14 Years)
2001	Worst Forms of Child Labour Convention

2.5 Interaction with Agencies

The C&WD through PMU-GASSR is responsible for ensuring that the project complies with the laws and regulations controlling the environmental concerns arising during construction and operation of the Project. Moreover, it is desirable pre-construction requisites are met. These include obtaining necessary permits and clearances from various government agencies. This section describes the nature of the relationship between the proponent and the line departments concerned.

2.5.1 Project Management Unit GASSR

The C&WD the Project Management Units (PMU) GASSR will be responsible for providing the complete environmental documentation required by the GBEPA and remain committed to the

approved project design. No deviation is permitted in design once it is finalized and incorporated in the environmental documents. Should there be any modification during project implementation stage, this is not allowed without the prior and explicit permission of the GBEPA concerned.

2.5.2 Forests and Wildlife Department

The project will involve tree cutting (farm and forest) and other vegetation clearing for construction purposes. The project contractor will, however, be responsible for acquiring a 'No-Objection Certificate' (NOC) from the Forest Department. The application for an NOC will need to be endorsed by the C&WD-PMU.

C&WD-PMU will carry out tree plantation to compensate the cutting of the trees. This will be implemented either through a contractor or could be assigned to the Forest Department or an NGO. It is necessary to liaising with the provincial forest department on the types of trees to be planted and other matters. C&WD-PMU will seek assistance from the Forest Department. Where construction is to be carried out in proximity of protected forests and wildlife areas, the C&WD-PMU is required to coordinate with these departments to ensure that impacts on vegetation and wildlife are minimized.

2.5.3 Provincial Revenue Department

According to law, land is a provincial subject. Thus, the matters relating to land fall under jurisdiction of the GB Revenue Department that keeps the record of land use and ownership and collection of land revenues. Even under the law the acquisition of land and other assets thereon, like built-up properties, trees and crops for development projects for any federal or provincial agency or otherwise is carried out by the GB-Revenue Department. As such, the proponent is required to lodge an application with the GB government to depute a land acquisition collector (LAC) in case it is required and other revenue staff who will be responsible for handling matters related to acquisition and the disbursement of compensation.

C&WD-PMU will provide logistical support and assist in preparing the documents necessary for notifications. It will also need to liaise with the provincial departments of agriculture, and forestry in order to evaluate affected vegetation resources, such as trees and crops, etc., for compensation purposes. Where public buildings/infrastructure is involved, C&WD-PMU will approach the concerned departments that own the affected building or infrastructure before removing or relocating the facilities.

2.5.4 Local Government and Administration

The contractor must ensure that the project meets the criteria of the GB Government for the establishment of construction camps and plants, use of water resources and safe disposal of wastewater, solid waste and toxic materials. These matters lie in the jurisdiction of the Local Government/district administration. Therefore, the contractor should liaise closely with the concerned body. In that matter, C&WD-PMU will however assist the contractor for developing the contacts. C&WD-PMU will also be responsible for monitoring the environment-related issues.

C&WD-PMU will also liaise with local government/administration and line departments on matters relating to resettlement of disrupted population and supply of utilities and social amenities.

Chapter 3:

Project Description

Chapter Contents:

- Aims and Objectives
- Project Area
- Salient Features
- The Project Design
- Construction Works Arrangements
- Project Cost

3 PROJECT DESCRIPTION

3.1 General

The construction/metaling of road from Gorikote Astore to Shagharthang Skardu is to provide a safer, and shorter travel facility between two districts of Gilgit Baltistan (Astore and Skardu). This important route will provide an economical travel from Astore to Skardu and later via AVR-Shounter Tunnel, it will connect GB with AJK and then rest of the country.

3.2 Aims and Objectives

The main aim of the project is to develop an efficient and safe transportation facility for the people of Gilgit Baltistan especially for District Astore, Skardu, Shigar, Kharmang, Ghanche and Tourists from all over the world. It will attract the tourist traffic from all over Pakistan. The other targeted objectives include provision of a standardized road with good ride quality to reduce the vehicle operating cost with direct impact on country's microeconomics, easy access to the tourist spots. Promotion of social and economic uplift of the Gilgit Baltistan region. The Highway starts from Kachura falling in Skardu district and ends at Astore district.

This project will also play a vital role due to its Strategic location for defense purposes in the region. This project will also serve as an alternative route for proposed CPEC connecting Pakistan with China through Yarkand.

Owing to its great significance, the Competent Authority allowed to include this scheme in PSDP 2021-22. The Scheme was approved from CDWP on 24th May 2021 and administrative approval issued on 11th September 2021 with a cost of Rs. 5274.00 million. The objectives expected to be achieved and the benefits gained on completion of the project are:

15- To support the socio-economic sectorial development Activities of Gilgit Baltistan;
16- To have safe access to District Astore and Skardu;
17- To have an alternate strategic route for defence purposes;
18- To reduce travel time, vehicle operating cost and cost of travel along the project road;
19- To promote International Tourism by linking to the Skardu International Airport;
20- This road will also serve as an alternate route for proposed CPEC connecting, and; Pakistan with China via Yarkand.

3.3 Project Area

Gilgit-Baltistan is located in Northern part of the county between world's highest mountain ranges i.e., the Karakorum, Hindokush and Himalayas and covers a surface of 72,496 square kilometers area. This area shares its borders with four countries and a province which include, China in the North, Tajikistan across the Wakhan corridor in the North-West, Afghanistan in the West, Indian held Kashmir in the East and Khyber Pakhtunkhwa province in the South.

This mountain area is administered under the three major Divisions, further distributed into fourteen Districts. First, the Gilgit Division encompasses the areas of Gilgit, Ghizer, Gupis/Yasin, Hunza and Nagar Districts, second, the Baltistan Division consists of Skardu, Shigar, Kharmang, Rondo and Ghanche Districts and third, the Diamer Division covers the areas of Astor, Tangir, Darel and Diamer Districts. The proposed project falls under the jurisdiction of Astore District in Diamer Division and Skardu District in Baltistan Division. Historically, the territory of GB became a separate administrative unit in 1970 under the name of "Northern Areas". In 2009, it was granted

limited autonomy and renamed as Gilgit-Baltistan.

District Astore[1]: Astore Valley is one of the beautiful valleys of GB and located in Diamer Division. The valley is at an altitude of 2,600 meters above sea level (m.a.s.l). The total area is spread over 5,000km² and possess many beautiful and scenic places attracting thousands of visitors annually. Astore is famous for its stunning natural beauty, including the famous Rama Meadows. It serves as a gateway to Daeosai National Park, known for its unique wildlife and landscapes. The region offers trekking and mountaineering opportunities, particularly to Nanga Parbat. Astore is also known for its rich cultural heritage and diverse ethnic groups. Currently the main approach for Astore is a 115kms long metaled road from Karakoram Highway (KKH). However, in summers Daeosai road can also be used for travel which connects Astore with Skardu district. This road is around 140 km from Astore city to Skardu city. The climate of Astore Valley is moderate during summer; neither hot nor cold, however in winters heavy snowfalls up to 4-6 feet (ft) cause temperatures to drop drown and in minus for most of the winter season.

District Skardu[2]**:** Skardu is the capital of Baltistan Division and is surrounded by three world-famous ranges, Karakoram, Himalaya, and Ladakh range. Skardu has the most spectacular and fascinating mountainous region of the world, where hundreds of virgin peaks still there unclimbed and inviting climbers to submit.

Skardu Valley is accessible from various cities of Pakistan both via road and by air. Currently Skardu has several flights daily in summer mainly Pakistan International Airline coming from Islamabad, Karachi and Lahore while occasionally international flights are also come to Skardu in summers. Skardu is connected with Gilgit through Jglote Skardu Road (JSR) and with Astore through Daeosai road.

Skardu features a cold semi-arid climate and during the summer the temperature remains moderate because the intense heat of lowland Pakistan does not reach Skardu due to high mountain ranges. The mountains block out the summer monsoon, and summer rainfall is thus quite low. The temperature in winter is usually drops below 15 Celsius making people's life miserable.

3.4 Salient Features

3.4.1 Present Road

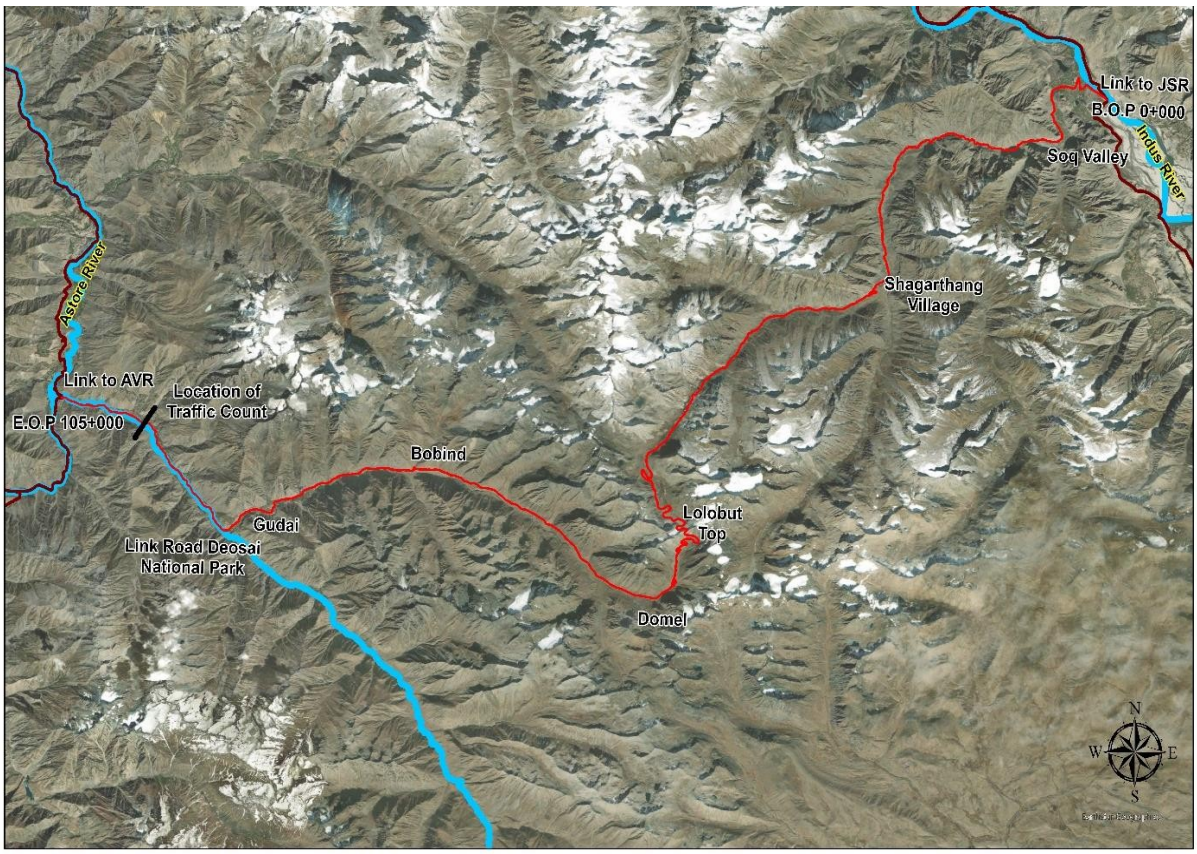
The construction and metaling of road from Gorikote Astore to Shagharthang Skardu is to provide a safer and comfortable travel facility between two districts of Gilgit-Baltistan and later on, between GB&AJK through Shounter Tunnel. This project provides mostly a mountainous route along the valley as well as rolling/plain terrain. There is no metaled road existed in the proposed corridor however, 28km Kutcha track exist from lower Kachura to Shagharthang in Skardu District, whereas 30km kutcha track exist from Gorikote till Bubind in District Astore.

3.4.2 Project Alignment

The project starts from JSR at Lower Kachura, Skardu and ends in Gorikote Astore and the total length of the proposed road is 105km. The Google earth alignment of the GASSR is given in **Figure 3-1.**

[1] https://guidetopakistan.pk/destination/astore-valley/#google_vignette
[2] https://guidetopakistan.pk/destination/skardu-valley/

Figure 3-1: Google Earth Alignment of GASSR



3.4.3 Design Standards

The design standards those shall be used for the detail design and implementation of GASSR are summarised in **Table 6.**

Table 6: Design Standards

Description	Standards
For Geometric Design	AASHTO
For Pavement Design	AASHTO, TRL Road Note 31 1993 AASHTO Mechanistic-Empirical pavement design (TOR)
For Materials & Testing	ASTM, AASHTO
For Structural Design	AASHTO ACI
For Live Loads	West Pakistan Code of Practice for Highway Bridges 1967. For deck slab NHA abnormal load of 21 kips on a contact area of 300mm*600mm shall be used. Structural analysis and design have been carried out using SAP 2000 software
For Seismic Design	For Seismic Design National Building Codes (NBC) and seismic zone Map of Pakistan and AASHTO.

Source: Project Revised PC-1

3.4.4 Design Procedures

The design procedure of AASHTO guide for design of Pavement structures (1993) is based on cumulative expected 18-kips equivalent single axle loads (ESAL) during the design life.

The same procedure is applied for its design. Pavement Thickness by AASHTO 1993 is summarised in **Table 7.**

Table 7: Pavement Thickness by AASHTO 1993

Pavement layer	Design Thickness
Asphalt Wearing Course	5cm
Aggregate Base Course	20 cm
Granular Sub-Base	20cm
Cement Stabilized Base	20 cm

Source: Project Revised PC-1

3.5 The Project Design

Scope of project is to design road having a maximum travel way width of 12m (39 ft) and comprising of 7.3m asphalt wearing course surface carriageway with treated shoulders, drains, ditches, bridges and culverts and other cross drainage as well as protection and retaining works.

The salient features, design criteria/technical parameters are summarized in **Table 8.**

Table 8: Salient Features

Sr.#	Salient Features	
1	Total Road Length	105 Km
2	Type of Terrain	Hilly, Rolling, Plain
3	Culverts	92 Nos
4	RCC Bridges	10 Nos
5	Rigid Pavements	12 Km
6	Side Drains	4000 m
7	Road Work (Earth Work, Masonry Work)	-

Source: Project Revised PC-1

The design criteria/technical parameters are summarized in **Table 9.**

Table 9: Design Criteria

S.#	Design Criteria/ Technical Parameters	
1.	**For Horizontal Alignment**	
	For Plain Terrain	60 KPH
	For Rolling Terrain	40 KPH
	For Hilly Terrain	30 KPH
2.	**Maximum rate of Super-Elevation**	
	For Plain Terrain	4%
	For Rolling Terrain	6%
	For Hilly Terrain	8%
3.	**Road Formation Width**	
	For Plain Terrain	12m
	For Rolling Terrain	12+1 m
	For Hilly Terrain	12+1 m
4.	**Width of Travel way**	
	For Plain Terrain	7.3 m
	For Rolling Terrain	7.3 m
	For Hilly Terrain	7.3 m

S.#	Design Criteria/ Technical Parameters	
5.	**Cross Slopes for Travel Way Cross Fall**	
	For Plain Terrain	2%
	For Rolling Terrain	2%
	For Hilly Terrain	2%
6.	**Cross slopes for Shoulders**	
	For Plain Terrain	4%
	For Rolling Terrain	4%
	For Hilly Terrain	4%
7.	**Maximum Grade**	
	For Plain Terrain	03 to 06%
	For Rolling Terrain	06 to 06%
	For Hilly Terrain	06 to10%
8.	**Right of way**	
	For Plain Terrain	As available
	For Rolling Terrain	2+2 m
	For Hilly Terrain	2+2 m
9.	**For Road Pavement**	
	Design life of carriageway	50 years Single Road and 20 Years for Pavement
	Level of Service	B
	Design Standard Axle Load	50 tons
	Pavement Design methodology	AASHTO/Road
	Design life of Bridges	100 Years
	Design life of Culverts	50 Years
	Design life of Side drains	10 Years
10	**Pavement Structure for Rolling & Hilly Terrain**	
	Asphaltic Wearing Coarse	50 mm
	Aggregate Base Coarse	200 mm
	Sub Base	200 mm

Source: Project Revised PC-1

The raw material to be used is summarized in **Table 10**.

Table 10: Description of Raw Materials

Sr.#	Raw Materials	Description
1.	Source of Coarse Aggregate	Coarse Aggregate from surrounding of the project area in the range of 5 Km Radius
2.	Source of Sand	Sand from River Indus and Mountain Sand available within the proximity of Project's concerned area
3.	Source of Power Supply	Generators with total Installed capacity of 3,000 kW
4.	Bitumen	From local markets in Region
5.	Asphalt	Asphalt plant will be installed
6.	Reinforcement Steel	Nearby Market
7.	Galvanized Iron Pipes	Nearby Market
8.	Cement	Nearby Market
9.	Water for compaction and sprinkling	Seasonal nullahs crossing the road

Source: Project Revised PC-1

The requirement of water for construction activities as well as for the consumption of camps is estimated at 3,85,000 liters per day (l/d), which is proposed to be supplied through water

pumps from existing water channels/ small tributaries of river Indus available in the project area.

It is estimated that 150kg per day of solid waste and 7,450 liters per day (20% of water consumption is considered to be converted into waste) of wastewater would be generated during the construction phase of the project. It may be noted that estimation of solid waste quantity is based on standard requirement of number of maximum persons available in the camps. The actual requirement cannot be accessed as the staff / labors are continued to move all along the length of the project road. Solid waste would be disposed of at designated places and water in the septic tanks temporarily built for this purpose.

Work force of about 1,250 staff including qualified and experienced Engineers covering all disciplines of civil, mechanical, communications, mining and geo- tech engineering along-with middle and lower-level technicians and operators, specialized in their fields are estimated to be mobilized for the implementation of the project.

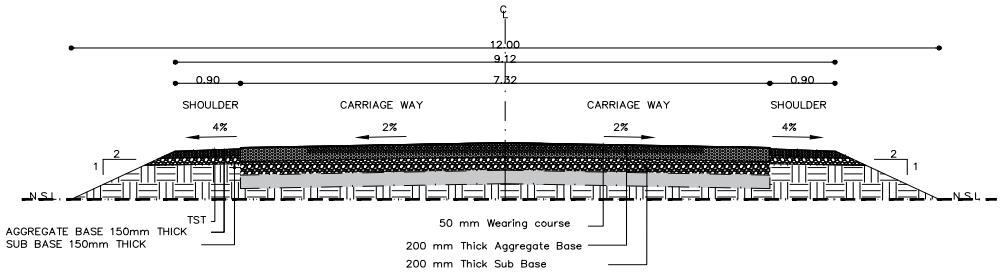
3.5.1 Pavement Design

The pavement existing thorough out the project length is flexible in nature. The project envisages widening to two lanes with paved shoulder of the existing 2-lane carriageway for augmenting the capacity of the project road and significantly extending its service life.

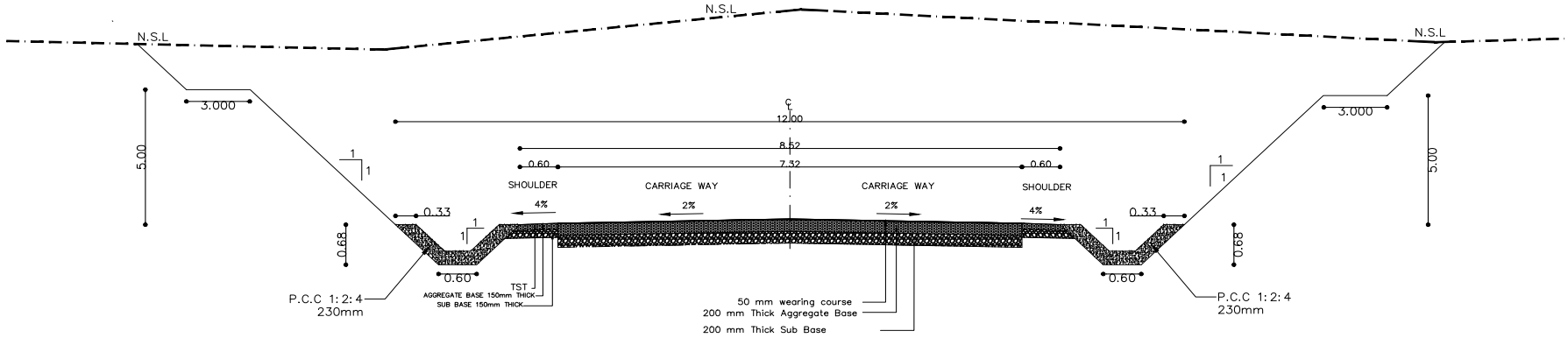
3.5.2 Culverts, Retaining Walls and Bridges

Along the length of GASSR, several culverts, retaining walls and bridges are proposed to be constructed. The design of these structures have been prepared considering the hydrological, and natural hazards. Additionally, environmental and social aspects have been considered wherein construction of the road structures will have minimum impact on the environment and being safe from the natural hazard. Typical sections of the structures are shown in the following figures.

Figure 3-2: Typical Drawings of Road, Culverts, Retaining Walls and Bridges



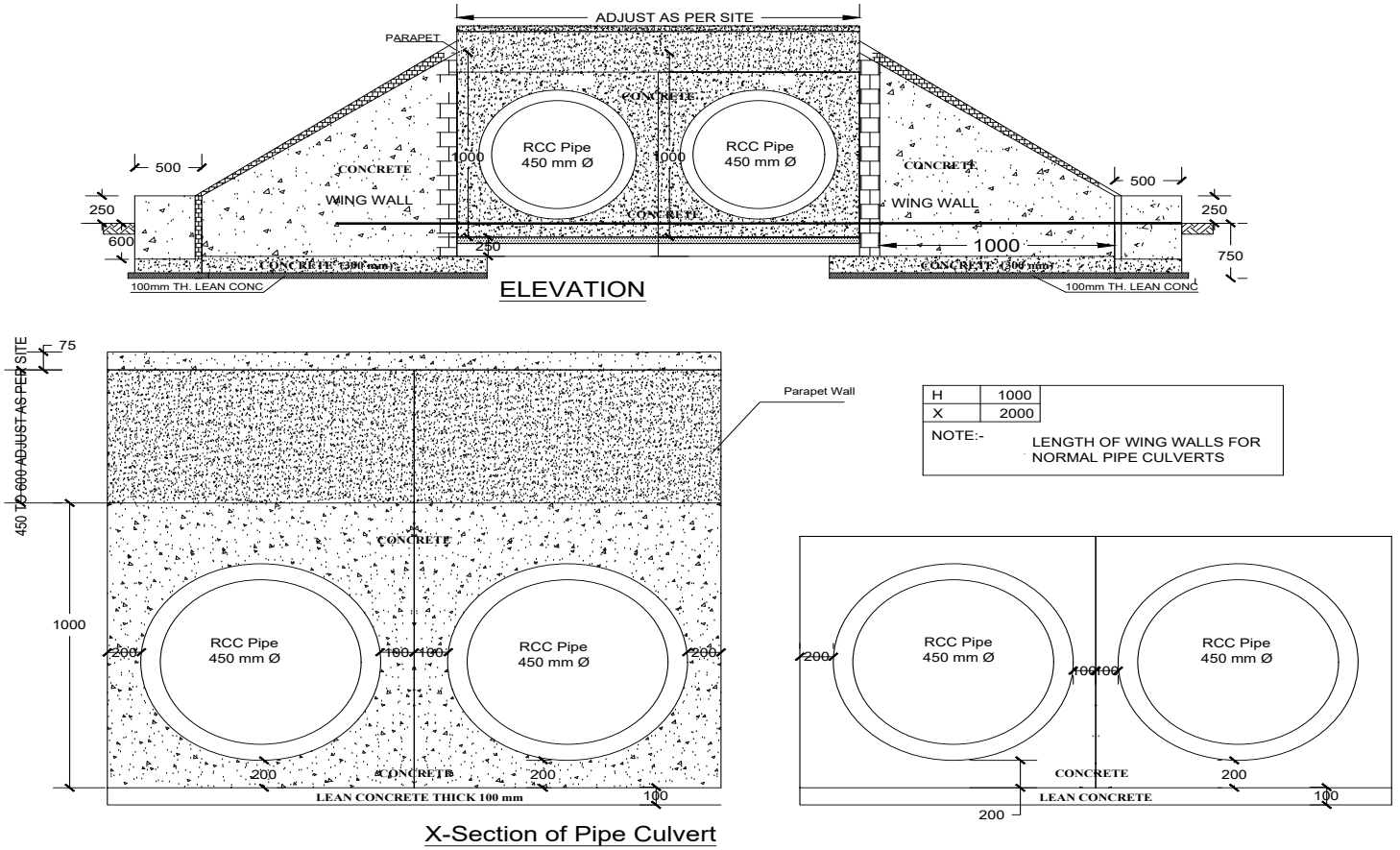
TYPICAL SECTION OFSKARDU ROAD IN FILL



TYPICAL SECTION OF SKARDU ROAD IN CUT

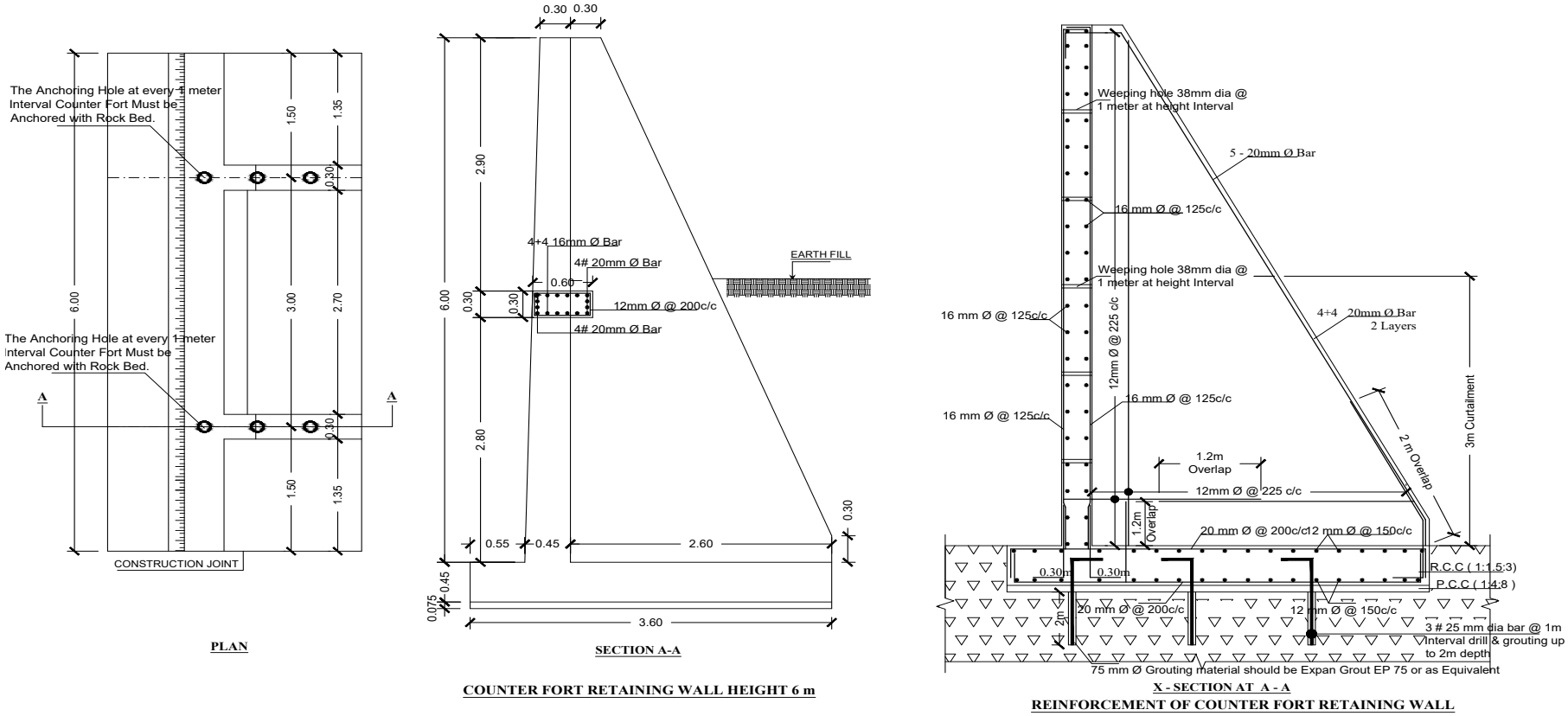
MINISTRY OF KASHMIR AFFIARS & GILGIT-BALTISTAN through PROJECT DIRECTOR - PMU	CONSULTANTS: CAMEOS CONSULTANTS JV azmec CONSULTING ENGINEERS. CAMEOS-AZMEC JOINT VENTURE. JV OFFICE: HOUSE # 1-0/20, ZULFIQAR ABAD, JUTIAL, GILGIT CITY. PH# +92- 5811- 551619, Email: cameosgb@gmail.com, to.azmec@gmail.com				DRAWN	JAVED IQBAL	PROJECT: Inter-Regional Connectivity between Baltistan Division And Diamer-Astore Division (Construction/Metalling of Road from Gorikote Astore to Shagharthang Skardu)	DRAWING TITLE:– TYPICAL SECTION OF ROAD	SCALE NTS
					SUBMITTED				
					RECOMMENDED				
					CHD./VER.	ALI RIZWAN		DATE January, 2023	DWG NO. SSGA–R1/PD/RTS
	REV.	DATE	DESCRIPTION	APPROVED	APPROVED				

Figure 3-3: Typical Drawings of culverts



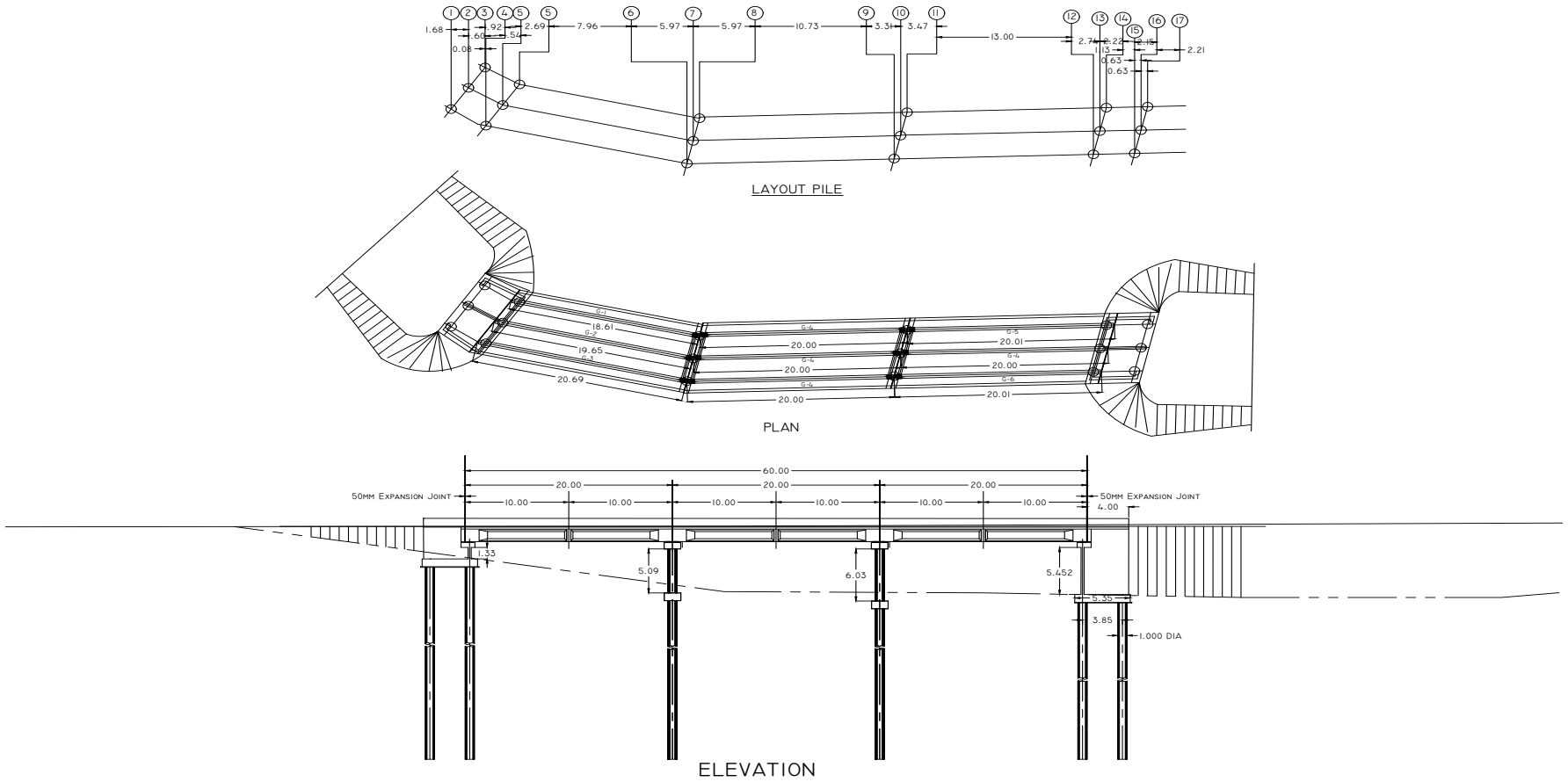
MINISTRY OF KASHMIR AFFIARS & GILGIT-BALTISTAN through PROJECT DIRECTOR - PMU	CONSULTANTS: CAMEOS CONSULTANTS JV azmec. CAMEOS-AZMEC JOINT VENTURE. JV OFFICE: HOUSE # 1-0/20, ZULFIQAR ABAD, JUTIAL, GILGIT CITY. PH# +92- 5811- 551619, Email: cameosgb@gmail.com, to.azmec@gmail.com					DRAWN	JAVED IQBAL	PROJECT: Inter-Regional Connectivity between Baltistan Division And Diamer-Astore Division (Construction/Metalling of Road from Gorikote Astore to Shagharthang Skardu)	DRAWING TITLE:– PIPE CULVERT DOUBLE CELL DETAIL 450mm DIA PIPE	SCALE NTS
						SUBMITTED				
						RECOMMENDED				
						CHD./VER.	ALI RIZWAN			
	REV.	DATE	DESCRIPTION		APPROVED	APPROVED			DATE January, 2024	DWG NO. SSGA–R1/PD/PCDC

Figure 3-4: Typical Drawing Retaining Wall



MINISTRY OF KASHMIR AFFIARS & GILGIT-BALTISTAN through PROJECT DIRECTOR - PMU	CONSULTANTS: CAMEOS CONSULTANTS JV azmec. CAMEOS-AZMEC JOINT VENTURE. JV OFFICE: HOUSE # 1-0/20, ZULFIQAR ABAD, JUTIAL, GILGIT CITY. PH# +92- 5811- 551619, Email: cameosgb@gmail.com, to.azmec@gmail.com	REV.	DATE	DESCRIPTION	APPROVED	DRAWN	JAVED IQBAL	PROJECT: Inter-Regional Connectivity between Baltistan Division And Diamer-Astore Division (Construction/Metalling of Road from Gorikote Astore to Shagharthang Skardu)	DRAWING TITLE:– COUNTER FORT RETAINING WALL 6 METER HEIGHT	SCALE NTS
						SUBMITTED				
						RECOMMENDED				
						CHD./VER.	ALI RIZWAN		DATE January, 2023	DWG NO. SSGA–R1/PD/CFW
					APPROVED	APPROVED				

Figure 3-5: Typical Drawing of a Bridge



3.5.3 Hydrological Design

3.5.3.1 Design Criteria Used

Peak flood discharges are estimated using rainfall data by two methods. Synthetic unit hydrograph technique can be used for estimation of peak floods and developing flood hydrographs for the streams with catchment areas greater than 1km^2, whereas rational formula has been used for the catchment area less than 1km^2.

Rational Formula Method: Peak discharges of the catchments having drainage area smaller than 1km^2 have been determined by using rational formula as mentioned below.

Q= CIA

Where:

Q = Peak discharge is cusecs (m^3/s)

C = Coefficient of discharge

I = Rainfall intensity, mm/hr

A = Catchment area, km^2

By using the formula:

Tc= (11.90*L3/H)0.385

Where:

Tc = the time of concentration (hrs)

L = the length of the watercourse, (miles)

H = Height drop (ft)

3.5.3.2 Hydrology and Hydraulic Design

The climatic conditions in Astore are mostly characterized by a frigid and moderate climate. The precipitation levels in the city of Astore are not worthy and receives about 86.6 millimeters (*3.41 inches*) of precipitation and has 201.87 rainy days (*55.31% of the time*) The annual mean temperature for Astore is 9.8°C and ranges from -2.3°C (January) to 20.8°C (July).

The flood study for project area depends upon the hydro-meteorological data of the area. In case of non-availability of rainfall data, the data of nearest station with similar characteristics is synthesized. The flow data of streams in the proposed project alignment are not available, therefore rainfall data of Skardu (**Table 11**) have been used to carry out using Gumbel's Extreme Value Type-1 Distribution.

Table 11: Climatic Data of Skardu Gauging Station

Description	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Avg. Temp. °C(°F)	-13.7 °C (7.4) °F	-10.5 °C (13.1) °F	-7.6 °C (18.2) °F	-3.8 °C (25.2) °F	0.4 °C (32.8) °F	6.6 °C (43.8) °F	14.6 °C (58.3) °F	15 °C (59) °F	9 °C (48.3) °F	-1.8 °C (28.7) °F	-9.1 °C (15.5) °F	-13 °C (8.5) °F
Min. Temp. °C(°F)	-17.4 °C (0.6) °F	-14.2 °C (6.4) °F	-12.3 °C (9.8) °F	-8.8 °C (16.1) °F	-4.9 °C (23.1) °F	0.5 °C (32.8) °F	8.6 °C (47.4) °F	9.3 °C (48.7) °F	3 °C (37.3) °F	-8.4 °C (16.8) °F	-14.5 °C (5.9) °F	-17.2 °C (1) °F
Max. Temp. °C(°F)	-10.9 °C (12.4) °F	-7.7 °C (18.1) °F	-4 °C (24.7) °F	0.3 °C (32.5) °F	4.4 °C (39.8) °F	10.9 °C (51.7) °F	19.2 °C (66.6) °F	19.5 °C (67.1) °F	14 °C (57.2) °F	3.6 °C (38.5) °F	-5 °C (23.1) °F	-10 °C (14.1) °F
Ppt./Rainfall mm (in)	81 (3.2)	106 (4.2)	119 (4.7)	114 (4.5)	93 (3.7)	88 (3.5)	152 (6)	142 (5.6)	118 (4.6)	65 (2.6)	56 (2.2)	69 (2.7)
Humidity (%)	63%	66%	67%	71%	75%	72%	67%	66%	69%	72%	66%	64%
Rainy days (d)	11	12	12	11	9	8	13	14	13	8	7	9
Avg. Sun hours(hrs.)	7.0	7.5	8.9	9.7	9.9	9.9	8.8	8.3	7.8	8.0	7.7	7.2

Source: Project Revised PC-1

3.6 Construction Works Arrangements

3.6.1 Machinery to be used

An estimate of machinery of different types like graders, batching plants, asphalt mixing plants and others is given in **Table in 12**.

Table 12: Required Machinery

Sr.#	Description
1	Graders
2	Tractors
3	Vibratory Rollers
4	Asphalt Mixing Plants
5	Stone Crushers
6	Water Browsers
7	Oil Tankers
8	Water Sprinkling Water Carcass
9	Haulage Trucks
10	Excavators / Loaders
11	Small Vehicles
12	Dozer D–9, D–10 01+01
13	Shift Roller
14	Asphalt Machine

Source: Project Revised PC-1

3.6.2 Equipment and Installations

The equipment and installation required for project is given in the **Table 13.**

Table 13: Equipment

Sr.#	Equipment /Installation	Quantity
1	Fire Extinguishing Equipment	4
2	Electricity Generators	5
3	Water Pumping Equipment	4
4	Telephone System	3

Source: Project Revised PC-1

3.6.3 Work base and Camp Site

The camp site location will be decided by the contractor and will be bound to establish camp site at an appropriate place keeping in view the minimum disturbance to the local residences, it is recommended to fix camp at 100 meters away from the population along the roadside.

3.6.4 Supply of Labor

The contractor should be bound to hire maximum local people except for those jobs where the local expertise is not available or not willing to work. All the labor wages must be according to the prevailing labor law.

3.6.5 Security Arrangements

Coordination with security agencies is important and necessary security staff need to be in place at the camp site, material stores and equipment yards.

3.6.6 Health Care

Since, there would a large number of workers and employees at the project therefore, small accidents and other health issues are expected which needs to be taken care. A first aid treatment facility will be established by the contractor while major cases will be shifted to the nearest basic health unit or district hospital in both the districts.

3.6.7 Work Uniform and Health Safety Equipment

Road construction is a special job and the labor working on such work requires special protective uniforms and special Environmental, Health, and Safety (EHS) measures. It will be ensured that the labor engaged in breaking of stones, handling bricks, mixing concrete or mixing and laying asphalt will have long safety boots, overall dresses, goggles and safety helmets. As an overall EHS measure anyone going into the construction area will also wear safety hat and safety boots. The training on basic First Aid will be provided to the workers in order to help the onsite injuries. Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for laborers. Personal Protective Equipment (PPEs) will be provided to the workers operating in the vicinity of high-risk area. Provision will be made for adequate sanitation, washing, cooking and dormitory facilities including light up to satisfaction. The contractor will ensure the use of wearing these protective clothing during work activities.

3.6.8 Signage and Diversion Roads

During execution on construction site in particular and on the entire road length in general, suitable signboards and traffic signs will be displayed at all along the length of the project road. This will help in forestalling any possible accidents. During the construction or where the construction will under process the diversion paths will also be provided, if required, for continuous flow of the traffic.

3.7 Project Cost

The GASSR project cost has been revised in 2024. The PC-1 is currently under process of approval by the competent authorities. Details of Revised PC-1 cost has been summarised in **Table 14.**

Table 14: Project Revised PC-1 Cost

Sr.#	Description	Approved PC-1 Cost (million)	Revised PC-1 Cost (million)
1	Road work		
i.	Earth Work	1281.214	2636.227
ii.	Masonry Work	700.872	512.002
2	Flexible Pavement		
i.	Sub-Base & Base Course	844.033	1405.237
ii.	Wearing Surface	1191.105	1175.667
3	Rigid Pavement	188.233	274.094
4	Side Drain	50.00	155.050
5	RCC Culverts (Box)	11.613	315.386
6	Causeways	30.975	0.00
7	Bridges	67.580	1502.160
8	RCC Retaining Walls	0.00	540.393

Sr.#	Description	Approved PC-1 Cost (million)	Revised PC-1 Cost (million)
9	RCC Plum Walls	0.00	710.081
10	Pipe Culverts	0.00	22.340
11	Ancillary Works	0.00	136.923
12	Tourist Facilitation Centre (2Nos)	0.00	12.901
	Sub-Total (1 to 12)	**4365.625**	**9398.460**
13	Purchase of Machinery	106.500	550.00
14	Consultancy Chargers for dwg/design	30.00	30.00
15	Consultancy Charges for Resident Supervision	0.00	300.00
16	Add Escalation for 2nd & 3rd year @6.5% & 13%	300.449	701.570
17	Land Compensation	293.00	675.470
18	1% Climate Fund	0.00	93.985
	Sub-Total (13 to 18)	**729.949**	**2,351.025**
	Total - 1 to 18	**5095.574**	**11,749.485**
19	Add 3% Contingencies	89.213	281.954
20	Establishment of PMU	89.213	270.708
	Sub-Total (19 to 20)	**178.426**	**552.662**
	Grand Total (1 to 20)	**5274.00**	**12,302.147**

Source: Project Revised PC-1 (2024)

Chapter 4:
Project Alternatives

Chapter Contents:

- Project Alternatives
- Selected Option

4 PROJECT ALTERNATIVES

Analysis of alternatives in an Environmental and Social Impact Assessment is very important and it takes into account practicable strategies that can advance the elimination or minimize negative environmental and social impacts if identified. This chapter is a requirement of GB Environmental Protection Agency and is critical in consideration of ideal project development with minimal environmental and social disturbance. Since the major aim of this report is identification of major impacts regarding all aspects of the projects, the findings can be utilized for analysis of all possible options for final development.

Efforts have been made using all appropriate and available options of engineering design in identifying the road alignment to minimize the resettlement impacts. The Project route is selected in such a way that it passes through thinly populated area and weather wise feasible. The Project passes through mixed land uses, agricultural land, hilly and bed of nullah. This Chapter covers the project alternatives which were examined for the construction of the GASSR and explains the selection of the most feasible alternative in terms of socio-economics, environment and weather wise.

4.1 Project Alternatives

The following alternatives have been identified for the project:

21- No project option.
22- Project road to follow exactly the existing route with no alteration.
23- Alternative new alignment route.

An analysis of all above alternatives is as follows:

4.1.1 Option I: No Project Option

Description: The “No project option” considers continuation of utilizing existing road and no further development would be done. It reflects no apparent change to the physical, cultural and social environment. There is no continuous paved road available from JSR Kachura to Minimarg Astore road and the present condition of some stretches of approach from Kachura to Shagharthang and Minimarg road Astore to Bubin nala are unpaved (kacha) which makes the track risky for people and vehicles as well. Most of the track is single lane and in very poor condition. From Skardu side, the *kacha* Road ends at Shagharthang and in Astore it ends at Bubin. There is no connection between the districts except via Daeosai or through JSR and both takes over 7 hours.

Advantages: If the project is not taken up at all, then this money, efforts and time resource allocated for the proposed activities will be diverted to other roads such as improving Daeosai Skardu road. No land will be required, and no disturbance will be caused to people through the land acquisition and resettlement processes because the road is already existed from Astore to Skardu via Daeosai plains.

Disadvantages: No project option may result difficulties in connecting two districts with a short time and safe travel. The existing *kacha* roads on both districts will cause degradation of air, dust and noise pollution due to unpaved shoulders, bumpy road and deteriorated road conditions etc. The deplorable conditions of road will result in wear and tear of vehicle and increased probability of accidents.

Due to the hilly terrain, approach to the main city by nearby villages will remain difficult and access to better educational and health facilities will also remain limited. In case of emergencies, rescue services will also not reach easily to the affected areas or safe areas if needs evacuation. Improvement in tourism, trade and development will also remain slow.

The existing tracks on both sides comprise of steep curvatures, a situation that poses travel hazards for traffic using this track. Continued use of the existing road section would not only mean an increase in travel risks but will also result in higher transportation costs and more travel time. Additionally, the maintenance costs due to wear and tear on vehicle that would occur due to travel on depreciated road conditions. The "No Project'' option would result in lack of efficient transportation, discourage local trade and tourism that is requisite for economic development and growth for the vicinity as well as in entire Astore and Skardu.

Hence, no project option will further deteriorate the condition and people of the area will continue to suffer socially, economically and environmentally.

Conclusion: For the No-project option, the analysis reveals that the weaknesses and threats far outweigh the potential strengths and opportunities. Therefore, the "No project option" is not recommended.

4.1.2 Option II: Improvement of Daeosai road

Description: This Alternative provides an alternate communication link from Astore to Skardu. A half *kacha* road is already existed and it goes through Daeosai plain. This road is used only during summers while more than 6 months it remains close due to heavy snow in Daeosai.

Advantage: This option will allow the tourists to explore Daeosai plain and adjacent area which is full of natural beauty. The cost of the project will save because there is already a kacha road, thus the saved money can be spent on other projects in the area.

Disadvantage: This alternative will result in increasing travel time. This will keep the area cut off for more than six months because of heavy snow fall in Daeosai. The construction activities will result in noise, vibration, dust and air pollution in Daeosai which is national park and restricted area.

Conclusion: Due to weather condition which is too harsh and heavy snowfall in winter as well as because of restricted are being national park which requires less disturbance therefore, this option is not recommended.

4.1.3 Option III: Proposed Project (GASSR) Alignment

Description: This alternative consists of Construction/rehabilitation of existing road from Kachura to Shagarthang in District Skardu and Minimarg Road to Bubin in Astore district, and then passing through Shagarthang pass. This alternative will also directly link Minimarg road (later on Shonter road) to JSR at Kachura Skardu.

Advantages: This option will allow the tourists to explore a new area, provide the communication links between inhabitants of Astore and Skardu will directly help in enriching cultures of both Districts. This will also help in promoting tourism by providing a direct link between Astore and Skardu with a safe and short travel. This project will provide access to dozens of villages to main cities (Gorikote and Skardu) which will help in improving the educational and health facilities available in the cities. These villages will also be able to avail

better business opportunities improving trade and development, as well as, farmers can easily transport their products to these two main cities.

Shonter road via AJK to Islamabad is already in pipeline and this GASS road will be connected with Shonter road which will bring an economic revolution in Gilgit Baltistan in general and Astore and Baltistan in particular. The short and safe access to other cities of country will not only boost the economy but also helpful in accessing social sector facilities in bigger cities of the country such as education and health facilities.

Disadvantages: This route has to go through Shagarthang pass where heavy snowfall is expected every year which need to clean frequently by heavy machines.

Conclusion: This alternative is envisaged to be most environmentally and socially feasible as it provides a safe and short distance travel between Astore and Baltistan. Connecting this road with Shonter will bring prosperity in the area make it feasible for fast and safe trade, attacking millions of tourists every year, and being most feasible for construction and remain open in winters. Therefore, this alternative is recommended.

4.2 Selected Option

After analyzing all the considered alternatives, the most environmentally sound, socially acceptable and economically beneficial alternative considered is Option-III (Gorikote Astore to JSR Kachura via Shagarthang Pass) as it involves lesser land acquisition, weather wise suitable, short and safe travel distance, and connecting Baltistan with Shonter road. Therefore, Option III is considered as most feasible therefore recommended for construction.

Chapter 5:
Environmental and Social Baseline

Chapter Contents:

- Physical Environment
- Biological Environment
- Socio Economic and Cultural Environment

5 ENVIRONMENTAL & SOCIAL BASELINE

5.1 General

This chapter describes the baseline conditions with respect to *Physical, Biological and Socio-economic and Cultural Environment* prevailing in the project impact zone (PIZ) or project area. The baseline conditions include qualitative and quantitative information which is gathered through primary and secondary data sources.

The proposed project area is the longitudinal range of area along the entire road length of 105 Km, located in the right of way (RoW) of the proposed *Gorikote Astore to Shagharthang Skardu Road* (i.e., 3.0m on either side from the central line of the road).

The primary data is collected directly through field/site surveys as well as through consultative process i.e., stakeholder meetings and interviews with the persons/public residing along the road within its ROW. For the proposed project, a field survey of the PIZ was conducted to collect environmental data on *Physical, Biological and Socio-economic* parameters. Furthermore, interviews with local people were held and stakeholders/ institutional consultations were carried out to seek their opinion regarding the implementation of the proposed Project.

Accordingly, a *database* thus established is used for the assessment/management of potential impacts during *Construction and Operation* of the proposed GASSR Project. The EIA of the proposed Project covers a comprehensive description of the project area, including regional resources, which are anticipated to be affected adversely or otherwise by the implementation of the Project.

5.2 Physical Environment

5.2.1 Methodology to Assess Physical Environmental Conditions

The methodology used for the physical environment baseline included collection and review of relevant documents including policy and previous study documents, use of satellite imagery and Google Earth, onsite environmental investigation, and consultation with public and stakeholders. Various qualitative and quantitative data collection tools were used to develop an environmental baseline for the proposed area.

5.2.2 Data from Secondary Sources

Data from secondary sources were collected for environmental and social perspectives. Secondary sources used for environmental data collection include Govt. census report, sector report, Project feasibility report, PC-1, other EIA's conducted in the proximity to the project area, research articles, reports prepared by INGOs (IUCN, WWF, CKNP), NGOs (AKRSP, BRSP), revenue department records, meteorological data from credible sources, and bibliographical data. Furthermore, documents including relevant policy and development statistics of the project area were collected and reviewed. The documents reviewed included but not limited to the following:

24- Project Feasibility and Detail Design Report
25- Project Revised PC-1
26- Development Statistics of GB
27- Statistical information about the project area prepared by the National Statistical Bureau; Islamabad, Pakistan

28- Meteorological Department, Government of Pakistan
29- EIA of Shonter (Nelum valley AJ&K) – Rattu (Astore Valley GB) Road Tunnel
30- EIA of Shatung Nala Skardu
31- IEE of 34.5 MW HPP Ghowari

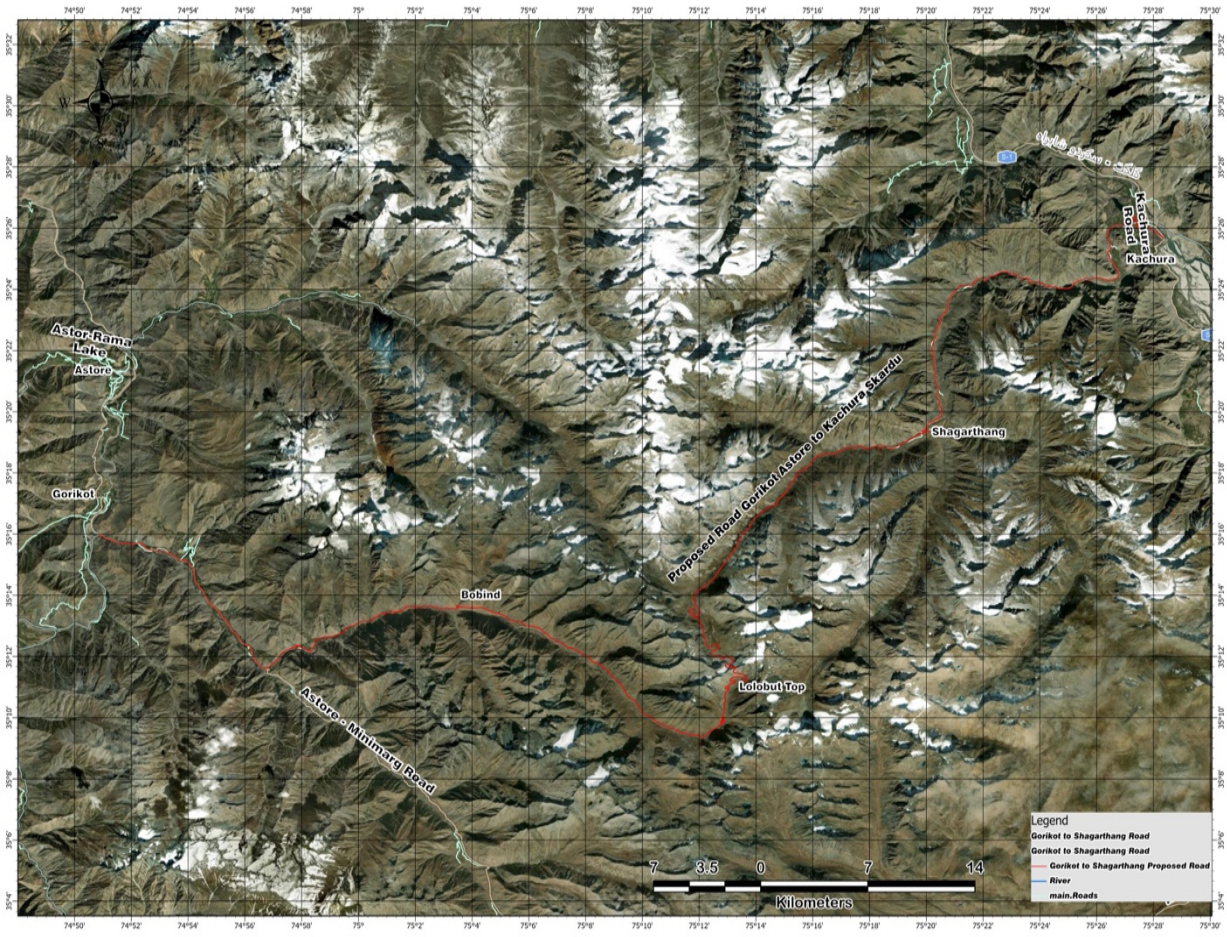
5.2.3 Topography

Project area is located in Gilgit-Baltistan province. The road is located at Himalayan Mountains belongs to the typical mountain topography and landform. The mountains are continuous with perennial snow or glacier on high-altitude mountain peaks. The region has a diverse topography mostly comprised of snow-covered peaks with perennial water streams.

The highest level of the region is 8,100m whereas as lowest level is shown as 600m above mean sea level (msl). The area has a mix of plains, plateaus, hills, streams, lakes, and mountains. The project road traverses along the valley starting from lower Kachura Skardu off taking from JSR and terminating at AVR near Gorikote, Astore.

Topography revealed that site terrain is hilly, rolling and prone to natural landslides and erosion. The starting point, lower Kachura, alongside Indus River is at an altitude of around 2,236 m and the end point bisects AVR, near Gorikote Astore is about 2,360 m. The highest elevation crossing is 4,777m uphill of Domel village Astore. Google earth based topographic map of the project alignment is in **Figure 6.**

Figure 5-1: Topography Map



Source: Project Revised PC-1

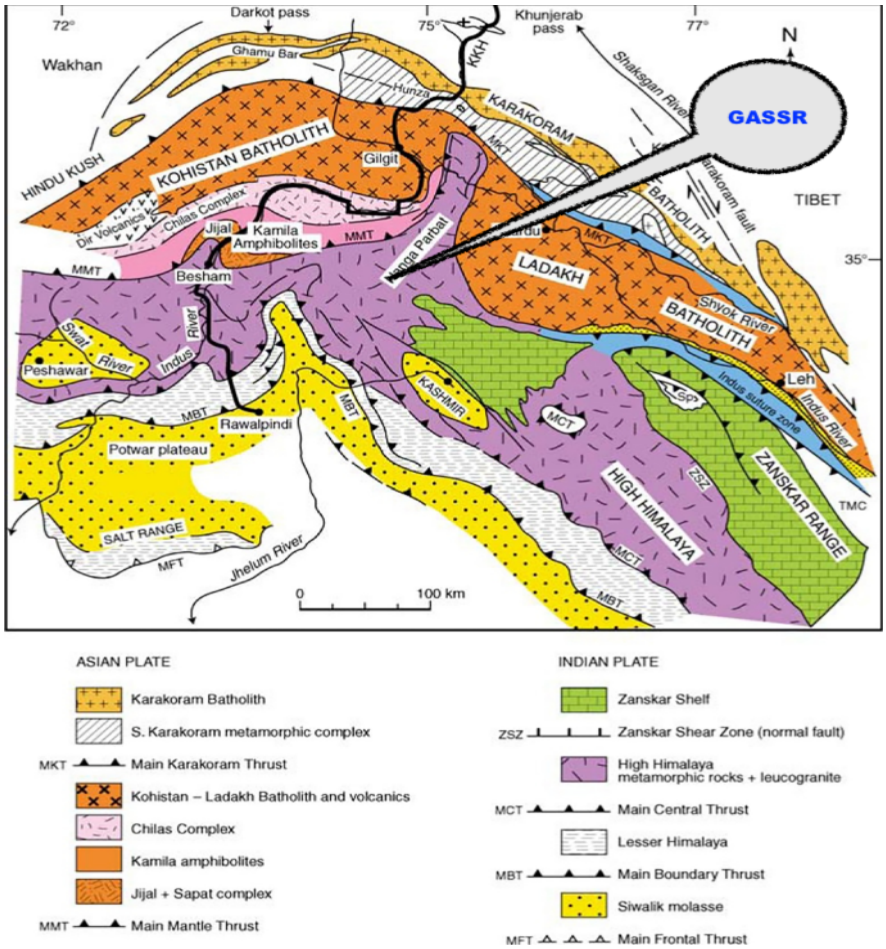
5.2.4 Geology

Geologically the project area falls in the Himalayan range, and it is full of natural resources. The study area is mountainous and rugged with high relief. The great Karakoram Range north and east comprises high peaks including K-2 (8,611m) and Nanga Parbat (8,126m) to it west-south contains large glaciers. The geological conditions of the project site are decisive for the design and layout of a hydropower project, and for this reason, geology must be investigated as part of the technical studies for the project. However, the geology as such will not be influenced by the project. This Chapter only provides a short description of the situation.

For EIA of GASSR, geology is of high concern. The main risks are from the geology to the project in relation to landslides and rock falls. The project area belongs to the Darkot Karakorum methomorphic range. The predominant rocks are of igneous and metamorphic origin of Cretaceous-Early Tertiary age, covered by Quaternary glacial, fluvial sediments and landside debris.

The Karakorum is represented by high grade (meta) sedimentary Tethyan sequence intruded by Karakorum batholith. The Karakorum Metamorphic complex (KMC) comprises of the unsorted Darkot group, Dumordo formation, Chalt formation, Ganchen formation, Ashkore/Ashkole amphibolite, Panmah ultramafics, Hushi complex and Dassu gneiss. Regional geological map is in **Figure 7.**

Figure 5-2: Regional Geological Map



Source: https://link.springer.com/article/10.1007/s12371-021-00617-0

5.2.5 Seismology

Teleseismic data for northern Pakistan shows a concentration of seismic activities in Himalayan main zones around the Project area are:

32- The Hindukush region in the NW;
33- The Daral - Tangier – Haran valley region in the NE, and ;
34- The Indus – Kohistan seismic zone in the SE.

In general, deep seismicity (70 to 300 km) is related to the Hindukush zone, while shallow seismicity (<50km) is dominant in the Kohistan area. The strongest earthquake occurred in November 20, 2002 in the Nanga Parbat syntaxis with a magnitude of 6.2 mb with epicentre near Doyan in Astore valley and this event is closely associated with Raikot Sassi Fault Zone. The theoretical PGA values vary between 43 cm/s^2 (0.04 g) and 210 cm/ s^2 (0.22 g). Considering the important Main Boundary Thrust as a source for future earthquakes with an intensity of M = 7 at a depth of 20 km (200,000 m) and a minimum horizontal distance of 30 km (300,000 m) an assessment of the PGA at Gilgit would result in a maximum value of 262 cm/ s^2 (0.27g). Probabilistic analyses have been carried out using the approach developed by Cornell. It is based on:

35- Definition of earthquake sources Hazara Arc, Kohistan Island Arc, Hindukush Seismic Zone;
36- Magnitude frequency relationship keeping in view the tectonic setting of the area and its historical development, and upper bound magnitude of M = 8 has been used;
37- Attenuation relationship, and;
38- Upper bound magnitude assessment to each earthquake source.

The assessment of the seismic probabilistic hazard in the Project Area affected by fault ruptures during the earthquake shows the following results for 50% (10%) of probability of exceedance:

39- Design life 50 years: 0.15 g (0.24g);
40- Design life 100 years 0.18 g (0.28g).

The seismic design parameters for the project (50 years lifetime) are recommended as a Maximum Design Earthquake (MDE) of 0.25 g with 10% probability of exceedance with a corresponding return period of 475 years, and an Operation Basis Earthquake (OBE) of 0.15 g with 50% probability of exceedance and 75 years return period.

According to the 'Seismic Zone Map of Pakistan' by Geological Survey of Pakistan-2006 the project area lies within the moderate to severe damage zone and Peak Ground Acceleration (PGA) values ranges in between 0.1 to 0.32. It has been concluded that PGA value for the Maximum Credible Earthquake (MCE) range between 0.5 to 0.6g. Likewise the PGA values for Maximum Design Earthquake (MDE) range 0.30 to 0.35 g. The PGA values for Operating Basis Earthquake (OBE) to range in between 0.20 to 0.24g. Details of Seismic Zones of Pakistan are in **Table 15.**

Table 15: Seismic Zoning

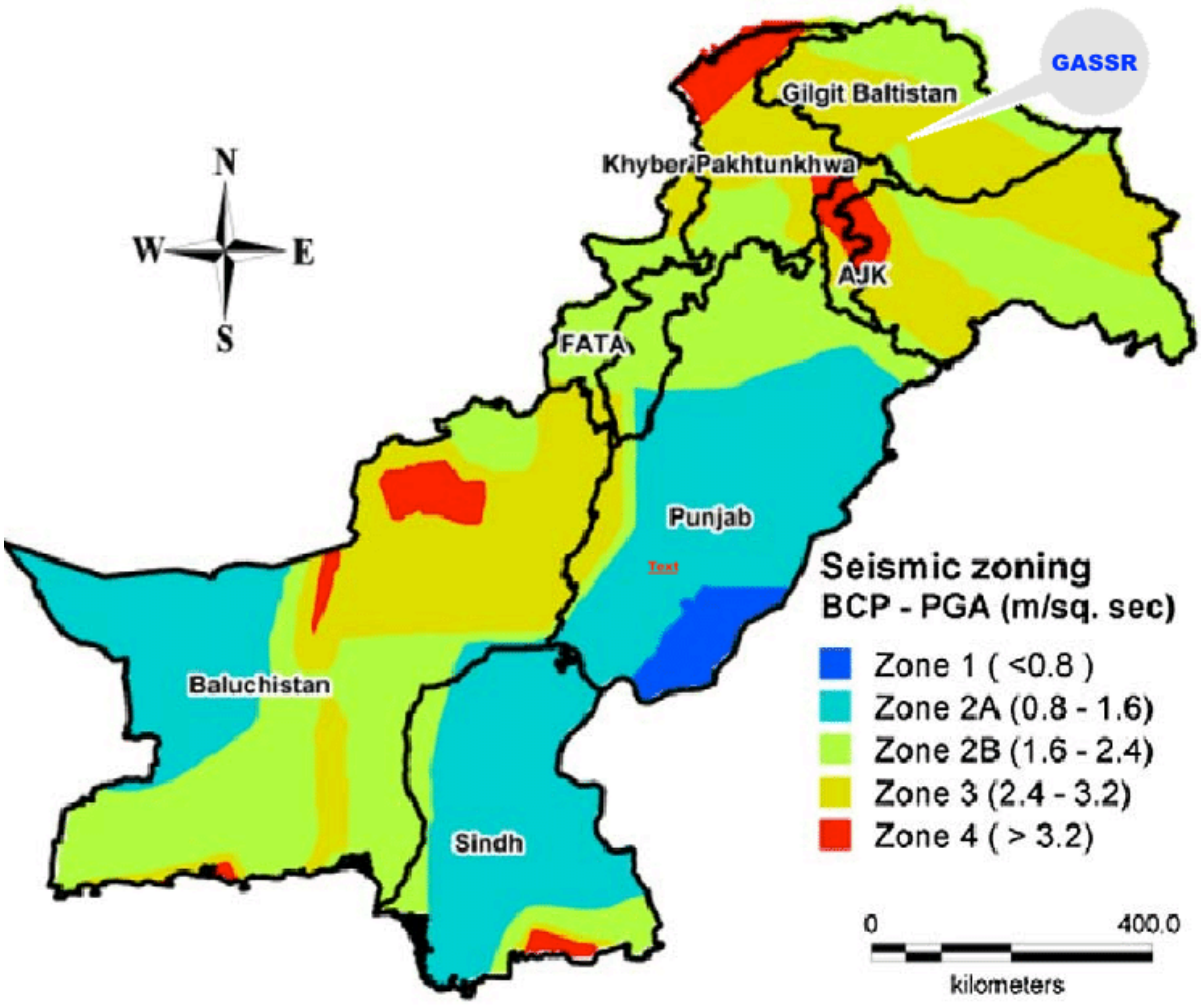
Zone	PGA (g)	Zone	PGA (g)
1	0.05 to 0.08	3	0.24 to 0.32
2A	0.08 to 0.16	4	Above 0.32
2B	0.16 to o.24		

Source: Building Code of Pakistan (Seismic Provisions – 2007), Ministry of Housing and Works

The recommended horizontal Peak Ground Acceleration (PGA) associated with Operating Basis Earthquake (OBE) is 0.22g.

The recommended horizontal Peak Ground Acceleration (PGA) associated with Maximum Design Earthquake (MDE) is 0.41g for all critical water retaining structures and 0.33g for all other appurtenant structures including bridges and culverts.

Figure 5-3: Seismic Map of Pakistan



Source: SHA report of the project

The GASSR area falls in Indus Kohistan Seismic zone and Main Karakorum Thrust (MKT) Seismic Zone. The Hindu Kush seismic zone along the borders of NW Pakistan, far NE Afghanistan, and Tajikistan is one of the most active regions of intermediate depth seismicity and by far the most active such region not associated with the subsection of oceanic lithosphere. The Pamir–Hindu Kush seismic zones have been the subject of numerous studies (e.g., Billington et al. 1977; Chatelain et al. 1980; Roeker 1982), and a variety of models have been proposed to account for the three-dimensional pattern of seismicity. According to USGS and PMD reports, there were four earthquake events happed in the project area but none of them was above 5 MW. Since the area is tectonically active collision zone of the Indian and Eurasian plates, therefore numerous studies have already been conducted. During the project design phase an in-depth analysis of seismology of the area has been conducted using secondary data. The design report states that the seismicity of the area is depicted by

moderate to major earthquake activity and governs the ground motion at the project site because of Main Karakoram Thrust (MKT).

Along the GASSR Seismic Region the seismicity largely coincides with the surface traces of the Main Karakoram Thrust (MKT) and the Main Mantle Thrust (MMT). The Region is characterized by fractured and weathered rock masses, diverse lithologies, high seismicity, deep gorges, high relief, and locally high rates of tectonic activities. The seismic map of Pakistan (figure 7 & 8) indicates that GASSR and surrounding areas lies in active seismic zone. The seismic factor in this neighborhood according to Building Code of Pakistan, Seismic Provision-2007, has been evaluated as Zone-3 of noticeable seismic danger with acceleration values of 0.24 to 0.32 g. Along to the immediate north and north-west lies the Zone-IV of significant seismic danger with acceleration values of ≥ 0.32g.

5.2.6 Land Use

Land cover plays an important role in planning and management of land resources. The land cover of Gilgit-Baltistan region has been shown below. Except for sporadic distribution of cultivated land partly appearing along road sections crossing villages, there is almost no cultivated land along the Road. Construction of the proposed project may require acquisition of cultivated land. Due to subsistence/small land holdings, the cultivated sources/agricultural production are scarce but are regarded as highly valuable by the local residents. Considering the scarce availability of land and demand of the locals, efforts need to be made to keep the requirement of land acquisition as minimum as possible.

The project area along the road is observed to have three main types of surroundings: residential and commercial areas (including shops and small markets), cultivated lands (including areas privately owned by inhabitants on which different fruit trees and other crops are grown), and a high mountain slope as well. Sparsely populated human settlements are located in the vicinity of the project area.

5.2.6.1 Land use in Astore

Agricultural Land Use: Agriculture is the primary livelihood for the people of Astore. The valley's arable land, though limited in area, is intensively cultivated. The primary crops grown include wheat, barley, maize, and potatoes, which are staple foods for the local population. These crops are typically cultivated in the valley's lower elevations, where the land is more fertile and the climate is milder.

The agricultural practices in Astore are largely traditional, with farmers relying on organic fertilizers and crop rotation to maintain soil fertility. The short growing season, which lasts from May to September, requires efficient and intensive use of the land. Irrigation is critical to agriculture in the valley, with water sourced from rivers, streams, and glacial meltwater. Traditional irrigation system, main flood irrigation, is commonly used in Astore.

Pastureland and Livestock Grazing: Livestock farming is a significant component of land use in Astore, with pastoralism being a traditional way of life for many families. The valley's extensive alpine pastures provide ideal grazing grounds for sheep, goats, yaks, and cattle. These animals are a vital source of meat, milk, wool, and hides, which are essential for the sustenance and economic well-being of the local population.

During the summer months, herders move their livestock to higher-altitude pastures, where the grass is abundant. This seasonal migration, known as transhumance, helps to prevent

overgrazing and ensures that the lower-altitude pastures are not depleted. The sustainable management of these pastures is crucial for maintaining the ecological balance and supporting the livelihoods of the herders.

Forest Land: Astore is home to some of the most extensive and well-preserved forests in Gilgit-Baltistan. These forests, primarily composed of pine, deodar, fir, and juniper trees, play a crucial role in the region's ecology. They help prevent soil erosion, regulate the water cycle, and provide habitat for a diverse range of wildlife, including the endangered snow leopard and Himalayan brown bear.

The forests of Astore are also a valuable resource for the local communities, who rely on them for timber, fuel wood, and non-timber forest products such as medicinal plants and wild fruits. However, deforestation and illegal logging pose significant threats to these forests. In response, efforts are being made to promote sustainable forest management practices, including community-based forest conservation initiatives and reforestation programs.

5.2.6.2 Land use in Skardu

Agricultural Land Use: Agriculture is the primary livelihood for the majority of the population in Skardu Valley, despite the harsh climatic conditions and limited arable land. The valley's agriculture is predominantly subsistence-based, with local farmers cultivating crops mainly for their own consumption. The fertile plains along the Indus River and its tributaries are the main agricultural areas, where crops like wheat, barley, and maize are grown. In addition to these staples, farmers also cultivate vegetables such as potatoes, peas, and beans, as well as fruits like apricots, apples, and mulberries.

Due to the short growing season, which lasts from May to September, agricultural practices in Skardu are intensive, with farmers making the most of the limited time and space available. The traditional methods of farming, including crop rotation and the use of organic fertilizers, help maintain soil fertility and ensure sustainable agricultural practices.

Orchards and Fruit Cultivation: One of the notable features of Skardu Valley's land use is the extensive cultivation of fruit orchards. The valley is famous for its apricots, which are a major part of the local diet and economy. In addition to apricots, the valley produces a variety of other fruits, including apples, cherries, and walnuts. These orchards not only provide food and income for local families but also contribute to the region's biodiversity.

The fruit from these orchards is often dried and stored for winter consumption or sold in local and regional markets. The apricots from Skardu, in particular, are highly prized for their flavor and are an important source of income for many households.

Livestock and Pastureland: Livestock farming is another critical component of land use in Skardu Valley. The region's high-altitude pastures are ideal for grazing sheep, goats, yaks, and cattle, which are integral to the local economy. These animals provide meat, milk, wool, and hides, which are essential for the subsistence of the local population.

In the summer months, pastoralists move their herds to higher-altitude pastures, known as "alpine pastures" or "Broq," where the grass is abundant. The movement of livestock between different grazing areas helps prevent overgrazing and ensures the sustainable use of the valley's natural resources.

Forest Land: Skardu, like much of Gilgit-Baltistan, has limited forest cover due to its arid

climate and high altitude. However, small patches of forest land can be found in certain areas, particularly in the northern side of Skardu. These forests are composed mainly of willow, poplar, and juniper trees, which are well-adapted to the region's climatic conditions.

The forests in Skardu are crucial for maintaining ecological balance, preventing soil erosion, and providing fuel wood and timber for local communities. However, deforestation is a growing concern, driven by the increasing demand for wood and the expansion of agricultural land. Efforts are being made by local authorities and NGOs to promote reforestation and sustainable forest management practices to preserve these vital ecosystems.

5.2.7 Environmental Sensitive Receptors

Air & Noise Quality: The project feasibility consultant (M/S CAMEOS) has engaged the services of AES (Asian Environmental Services Pakistan), an approved laboratory by EPA Punjab, to undertake Environmental Monitoring of Air, Noise and Water Quality in the proposed project area in compliance with the National Environmental Quality Standards (NEQS). The date, location and parameters to check the air and noise pollution are provided in the **Table 16.**

Table 16: Monitoring Locations Air Quality and Noise Level

Date	Location	Points (No.)	Test Description
12.06.2022 to 15.06.2022	**Kachura Skardu** (Latitude: 35.437084, Longitude: 75.454791)	1	Ambient Air Monitoring • Noise Level Monitoring • Air Quality
	Shagharthang Village (Latitude: 35.321279, Longitude: 75.330417)	1	
	Gudai Village (Latitude: 35.193951, Longitude: 74.947234)	1	

Ambient Air Quality monitoring is conducted at selected locations to assess the concentration of priority pollutants Nitrogen dioxide (NO2), Sulphur dioxide (SO2), Carbon monoxide (CO), Ozone (O3), PM2.5 and PM10. Selection of sampling location was based on the environmental factors including wind direction on the particular day and amount of turbulence in the air etc. Results of environmental testing of ambient air quality monitoring are presented in **Table 17.**

Table 17: Air Quality Monitoring Results

Sr.#	Parameters	Avg. Sampling Time	Unit	NEQS for Ambient Air	Average Concentration Kachura Skardu	Average Concentration Shagharthang Village	Average Concentration Gudai Village
1	Sulfur Dioxide (SO2)	24 hr.	µg/m3	120	0.91	0.80	0.96
2	Nitrogen Dioxide (NO2)	24 hr.	µg/m3	80	5.52	6.03	5.85
3	Nitric Oxide (NO)	24 hr.	µg/m3	40	1.44	1.47	1.44
4	PM 2.5	24 hr.	µg/m3	35	27.44	27.30	27.23
5	PM 10	24 hr.	µg/m3	150	90.37	81.14	91.53
6	Carbon Monoxide (CO)	24 hr.	mg/m3	5	0.32	0.23	0.32
7	Ozone (O3)	24 hr.	µg/m3	80	3.24	3.96	3.32

Noise level monitoring was conducted using *Extech Sound Meter*. All noise monitoring was conducted in accordance with the guidance set out in standard methods. The meters were

calibrated and checked before and after each measurement period by using sound level calibrator. Despite of occurrence of different activities and situated at junction, overall noise levels are within the prescribed limits (**Table 18**).

Table 18: Noise Level Result3

Sr.#	Monitoring time	Kachura dB(A)	Shagharthang dB(A)	Gudai dB(A)
1	6:00 AM (Day)	34.8	33.2	37.4
2	9:00 AM (Day)	65.2	35.1	62
3	1:00 PM (Day)	41.4	38.3	54.7
4	5:00 PM (Day)	53.2	42.4	64.7
5	9:00 PM (Night)	39.6	30.1	50.2
6	12:00 AM(Night)	31.2	35.2	38.4
NEQS (day time)		Not More than 65 dB(A) Leq		
NEQS (night time)		Not More than 55 dB(A) Leq		

Water Quality Analysis: Sources of water samples include tap water connected with streams. Water from the mentioned sources is used for various purposes including drinking and domestic/agricultural purposes. Water was sampled from three sites in the project area namely Kachura, Gudai Village, and Shagharthang village. Details are enlisted in Table 20 below. Samples for water quality of tap water (TW) have been collected from 3 different locations and submitted for physical, bacteriological and chemical testing to GB-EPA laboratory. The results are summarized in Tables below. Result shows water is fit for drinking purpose and for daily usage.

Table 19: Water Sampling Locations

Sr. #	Location	Water Sample collected
1	Kachura	Tap water coming from a stream
2	Shagharthang	Tap water coming from a stream
3	Gudai	Tap water coming from a stream

5.2.8 Hazard Assessment

Following hazards were assessed in this project:

1 Land sliding
2 Snow Avalanche

Land Sliding and Rock Fall: Landslide hazard is a common phenomenon in the mountainous terrain during the monsoon season, due to high intensity rainfall. Slope failure has been reported as the main trigger of landslides in the region. Landslide susceptibility assessment and determination of causative factors for landslide are the first step. Many factors such as rainfall, drainage, and proximity to roads may contribute to slope failure. But not all data for these variables can be acquired, mapped, and used cost-effectively in landslide hazard assessment. Therefore, following six landslide conditioning factors were considered in this study:

- Slope angle
- Slope aspect
- Distance from streams
- Distance from roads
- Stream power index (SPI)
- Land cover

Landslide hazard can be defined by means of a landslide hazard index using these causative factors. Weights were assigned to each class of these parameters and factor weight was assigned based on the relative influence of the parameter. More detailed description of these factors is described as:

Landslide: Susceptibility wap was combined to extract the land areas of the landslide susceptible classes in the whole region. Many locations in along the project road are susceptible to landslide and rock/snow fall.

Avalanches: As among the highest mountains in the world, the Himalayas, Karakorum, and Hindu Kush Mountain range in northern Pakistan are home to the largest glaciers outside the Polar Regions (UNDP, 2014). Heavy snowfall on top of these glaciers and on steep slopes can accumulate and, in suitable conditions, can trigger snow avalanches. Unfortunately, detailed recording of snow avalanche occurrences was not recorded well. Whatever available data on areas prone to snow avalanche were used and mapped. Google Earth satellite image for Astore District was also visually interpreted to delineate glacier and permanent snow areas, snow-covered areas, and snow-free areas.

5.3 Biological Environment

Gilgit-Baltistan is rich in biological diversity due to the extreme altitudinal differences and associated changes in climate, soil conditions and variation in aspects and exposure of slopes to solar radiation. A number of globally significant species of mammals are found in the area including some of the endangered species like the snow leopard, Himalayan brown bear, Marco Polo Sheep, Ladakh urial, flare horned markhor, musk deer, and woolly flying squirrel. Similarly, a number of plant species of great economic and conservation values found in the area, including wild cumin, thyme, pine nuts and several other species of medicinal values. Keeping in view the significance of the flora and fauna 05 national parks, 02 wildlife sanctuaries, 04 game reserves and 48 *Community Controlled Hunting Areas* (CCHA) have been created in Gilgit-Baltistan to protect biological resources of the region. Based on ecological zonation five main types of forests exist in Gilgit-Baltistan, namely, mountain sub-tropical scrub, mountain dry temperate coniferous, mountain dry temperate broadleaved, sub-alpine and northern dry scrub.

The proposed GASSR Project is situated in two districts of Gilgit- Baltistan region i.e., Astore and Skardu. The project area with its vicinity, comprising of Rocky Mountains and valleys along the river Indus, is rich in biodiversity which is adapted to the extreme variations in climate (- 2°C to 35°C) and geographical conditions. Biological environment prevailing in the vicinity of the project road consists of Flora and Fauna. The flora includes vegetation and flowers that are found in human settlements/agricultural fields along the riverbanks/shops and mountain cliffs. The fauna comprises of the wildlife habitat, endangered/rare species, livestock etc. Land use map of Gilgit-Baltistan is in **Figure 9.**

Figure 5-4: Land Use

Land Use	Area Sq. km	%
Natural Forest	2492.05	3.6
Agroforest, Farm forests & Orchards	427.55	0.6
Agricultural Land	382.22	0.55
Winter Pastures	3281.65	4.7
Barren land	6600.00	9.46
Total Potential & productive area	13183.47	18.13
Glaciers, Mountains, Rocky etc.	56784.53	81.13
Total Area	69,683	100

Source: Forest, Wildlife & Environment Department Government of Gilgit-Baltistan

5.3.1 Flora

Covering about 5,120 sq. kms, Astore District's ecology is mixed with Western Himalayan subalpine temperate coniferous forests in the southern parts, with higher elevations covered with alpine shrub and meadows of montane grasslands and shrublands. Whereas southern parts are mostly dry alpine zones with patches of alpine meadows. Overall, the district has less than 6% land under forest or tree cover (including farm forests and plantations), with 43% of the land comprising of alpine and winter pastures. About 0.7% of the land is used for agricultural and settlement purposes. About half of the remaining land area is either barren or permanently snow covered.

With land area of about 7,290 sq. kms, Skardu ecology is mostly dry alpine zones & glaciers, montane grasslands and shrublands mainly in Daeosai area. The district also has sub-alpine scrub consisting of small deciduous plant species. Valleys in the northern parts of the district have some temperate coniferous forests. Overall, the district has about 1% land under forest or tree cover (including farm forests and plantations), with 27% of the land comprising of alpine and winter pastures. Only half a percent of the land is used for agricultural and settlement purposes. The remaining 71% of the land area is either barren or permanently snow covered.

Vegetation appeared in different areas mentioned above is bundles together as wood trees, fruit trees, shrubs, herbs, grasses etc. Most dominant flora observed during survey include timber, firewood, and fruit trees. As the natural forests are scarce, the local residents have planted Poplar trees which are utilized as timber and firewood. In addition to the crops, high alpine plants and weeds (wildflower and plants) are found near agricultural fields, along the roadside, stream/riverbanks and mountain tops. Most of the fruit trees are found in the residential areas owned by people. Apples, apricots, peaches, plums mulberry, walnuts and grapes are fully ripe from June to October and almonds from October to March.

Several Varieties of roses, lilies, and pansies were also observed during baseline surveys. Apart from the fruit trees, many other tree species are also commonly found in the proposed project regions including deodar, pine, poplar, and willow. These floral species are an important habitat for the wildlife of the area and play a crucial role in landscaping and scenic

beauty to the place. Detail list of flora found in the project area and larger region is sumamrised in **Table 20.**

Table 20: List of Flora

S.#	English Name	*Scientific Name*
1.	Pencil cedar	*Juniperus communis*
2.	Sea buckthorn	*Hippophae rhamnoides*
3.	Berberry	*Berberis lycium*
4.	Tamarix	*Tamarix gallica*
5.	Wild rose	*Rosa webbiana*
6.	Goose berry	*Ribes alpestris*
Herbs		
1.	Trifolium	*Trifolium repens*
2.	Dandelion	*Taraxacum officinale*
3.	Wild thyme	*Thymus serphyllum*
4.	Berginia	*Berginia stracheyi*
5.	Mullein	*Verbescum thapsus*
6.	Wild strawberry	*Fragaria vesca*
7.	Ephedra	*Epherdra intermedia*
8.	Cumin seed	*Cumium cyminum*
9.	Coriander	*Coriandrum sativum*
Medicinal Plants		
1.	Worm seed	*Artemisia aritime*
2.	Stinging nettle	*Urticadioica*
3.	Capper	*Capparis spinosa*
4.	Safflower	*Carthamus tinctorious*
5.	Wild rue	*Peganum harmala*
6.	Sea buckthorn	*Hippophae rhamnoides*
7.	Curled sock	*Rumex hastatus*
8.	Puncture wine	*Triblus terristris*
9.	Thorn apple	*Datura stramonium*
10.	Horse mint	*Mentha sylvestris*
11.	Chicory	*Cichorium intybus*
Wood Trees		
1.	Pine	*Pinus gerardiana/ Pinus pinea* etc.
2.	Poplar	*Populus alba*
3.	Deodar	*Cedrus deodara*
4.	Willow	*Salix alba/ Salix babylonica*
5.	Red Cedar	*Cedrella toona*
6.	Seeta	*Artemesia scoparia*
7.	Indian/Himalayan Juniper	*Juniperus macropoda*
8.	Himalayan White Pine	*Pinus wallichiana*
9.	Indian/West HimalayanSpruce	*Picea smithiana*
10.	Turkestan Juniper	*Juniperus excelsa*
11.	Himalayan Birch	*Betula utilis*
Fruit Trees		
1.	Apple	Malus domestica/ Malus sylvestris/ Malus communis/ Pyrusmalus
2.	Peach	*Prunus persica*
3.	Pear	*Pyrus communis*

S.#	English Name	*Scientific Name*
4.	Almond	*Prunus dulcis*
5.	Plum	*Prunus domestica*
6.	Apricot	*Prunus armeniaca*
7.	Grapes	*Vitis vinifera*

Source: Forest, Wildlife and EPA Gilgit Baltistan

5.3.2 Endangered Species

No endangered or vulnerable species of flora have been reported in the project area. However, it was reported that the species of Haplophyllum juss (a medicinal plant for fever treatment with vernacular (English name as plant mosquito), which was common in the past is now rare in Gilgit- Baltistan area. As a result of the construction of proposed Gorikote-Shagharthang Road, some floral species might get affected i.e., their number might reduce. So, more plantation of all kinds of trees including proper management/maintenance would be required in the project area.

5.3.3 Medicinal Plants

Since the road pass through the part of Daeosai plains which has rich in hundreds of medicinal plants. Some of the plants found in this area are given in **Table 21**.

Table 21: List of Medicinal Plants

Name/Family/Voucher No.	Local Name	Habit	PU	DF	Ad	Disease(s) Treated	RSU	RFC
Aconitum violaceum Jacquem. ex. Stapf./Ranunculaceae/DNP71	Buma (B/S)	Herb	Root (B/S)	Decoction (B); Powder (S)	Oral (B); Oral and topical (S)	Abdominal pain, flatulence (B); Ringworm, typhoid (S)	No	78.26
Allardia tomentosa Decne./Asteraceae/DNP41	Tarkhan (B)	Herb	Flowers (B)	Decoction (B)	Oral (B)	Menstrual cramps abdominal pain (B)	No	41.30
Allardia tridactylites (Kar. and Kir.) Sch. Bip. /Asteraceae/DNP42	Patkanstwa (B)	Herb	Whole plant (B)	Decoction (B)	Oral (B)	Food poisoning (B)	No	28.26
Allium carolinianum DC./Amaryllidaceae /DNP35	Refor (B); Kachpauk (S)	Herb	Bulb (B); Leaves (S)	Infusion (B); Boiled leaves (S)	Oral (B/S)	Pharyngitis, bronchitis (B); Constipation (S)	Yes	67.39
Arnebia benthamii Wall. ex G, Don/Boraginaceae/DNP51	Thang marsi (B); Kazaban(S)	Herb	Root (B/S)	Mixed with oil (B); Decoction (S)	Topical (B); Oral (S)	Hair tonic (B); Diabetes; pneumonia (S)	No	43.47
Artemisia brevifolia Wall./Asteraceae/DNP43	Bursay (B); Zoon (S)	Herb	Aerial parts (B/S)	Decoction (B); Powder (S)	Oral (B/S)	Vermifuges (B); Hypertension (S)	Yes	71.73
Artemisia scoparia Waldst. and Kitam./Asteraceae/DNP45	Khobursay (B); Zoon (S)	Herb	Flowers (B); Leaves (S)	Decoction (B); Paste (S)	Oral (B); Oral and topical (S)	Vermifuge, urethritis (B); Ring worm, indigestion (S)	Yes	56.52
Berberis pseudumbellata R Parker/Berberidaceae/DNP48	Skiurbu (B); Ishkeen (S)	Shrub	Root (B); Root, Leaves (S)	Decoction (B/S); Leaves eaten (S)	Oral (B/S)	Hepatitis, diabetes (B/S)	Yes	32.60
Bergenia stracheyi (Hook. f. and Thomson) Engl./Saxifragaceae/DNP76	Shapur (B); Sansper (S)	Herb	Root (B/S)	Decoction (B/S)	Oral (B/S)	Stomach ulcer (B); Hepatitis, hypertension (S)	No	60.86
Betula utilis D. Don/Betulaceae/DNP49	Jongi (S)	Tree	Bark (S)	Powder (S)	Oral and topical (S)	Back ache, leg pain (S)	Yes	34.78
Bistorta affinis (D. Don) Greene/Polygonaceae/DNP67	Chomoi (S)	Herb	Rhizome (S)	Powder	Oral (S)	Powder Oral (S) Diarrhea, fever (S)	No	54.34
Carum bulbocastanum (L.) Koch/Apiaceae/DNP39	Karpho thalay (B); Hayyo (S)	Herb	Seeds (B/S)	Decoction (B/S)	Oral (B/S)	Gastric ulcer (B); Abdominal pain (S)	Yes	43.47

Name/Family/Voucher No.	Local Name	Habit	PU	DF	Ad	Disease(s) Treated	RSU	RFC
Carum carvi L./Apiaceae/DNP38	Naqpo thalay (B); Hayyo (S)	Herb	Seeds (B/S)	Decoction (B); Seeds eaten (S)	Oral (B/S)	Gastric ulcer, gastric trouble (B); Abdominal pain (S)	No	60.80

Source:https://www.researchgate.net/profile/Rainer-Bussmann?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6Il9kaXJlY3QiLCJwYWdlIjoiX2RpcmVjdCJ9fQ

5.3.4 Fauna

About 362 bird species are found in Gilgit-Baltistan, more than half, about 200 among these are Passeriformes (perching birds), ranging from small birds like Goldcrest (Regulus regulus) to Common Raven (Corvus corax). A significant number of warblers, finches, buntings, redstarts, larks and pipits are also included in this group. The region is also home to a great variety of waterfowl, especially during spring and autumn passage, with no less than 17 ducks & geese species, 33 waders, 10 gulls & terns, with more than 26 species of crakes, grebes, egrets and herons. In terms of predatory birds there are up to 19 hawks & eagles, 5 vultures, 9 owls and 6 falcon species in the region. Other birds in the region include 9 pheasant and 11 pigeon & dove species, with some woodpeckers, swifts and bee-eaters.

Daeosai is home to about 24 mammalian species. Predators other than Brown bear, like Snow leopard, Himalayan wolf and Tibetan *Red Fox* and associated prey species mostly ungulates i.e., Himalayan ibex, Musk dear, and Golden marmot; in or around Daeosai National Park (DNP) play a significant role in maintaining the ecological balance and health of the park. Major Fauna species are given below:

Himalayan Brown Bear (Ursus arctos isabellinus): The Himalayan Brown bear is a highly threatened species in Pakistan. Its population is sparse and scattered throughout the Gilgit-Baltistan, KPK and AJK. The largest population in South Asia has been recorded in the DNP, which is more than 88 individuals, which indeed is quite below the minimum viable population size established by past researchers.

Himalayan Ibex (Capra ibex sibirica): The habitat is degrading in lower areas due to presence of livestock and upper edges it is good for wildlife. The shepherds are taking care about the habitat of wildlife; they do not take livestock in the habitat of wildlife. Himalayan ibex mainly occupies peripheral hills of the park. A survey by DNP field staff shows overall 559 Himalayan ibexes were sighted during the survey period of 2019. Out of which 233 were male, 184 female, 93 yearlings and kids.

Golden Marmot (Marmota caudata): The Golden marmot, seen widely across the whole of Daeosai Plains, is the most common mammal living in colonies appearing as large earth mounds with multiple inlets. Marmot spends most of the summer by feeding and basking and then hibernates by mid-September until March.

Carnivores Daeosai National Park: This park is not a well-preferred area for Snow Leopards, mainly due to its landscape and geography. This species is reported to inhabit the steep high elevation areas surrounding Daeosai plateau including the slopes of Nanga Parbat, Skardu and Astore valley. Snow leopards, foxes and wolves were recorded.

Avifauna: A total of 130 species of birds have been recorded (Mirza, 2005, 2008) including 58 species 10 of migratory waterfowls, from Daeosai plains. These include passage migrants, vagrant, resident, breeding and irregular visitors. Many of the species breed in Daeosai and are found over a large range. Commonly seen birds in Daeosai include the Horned lark, Citrine wagtail, Mountain finch, Shy lark, Eastern swift, Crag martin, White capped redstart and

Dippers. Waterfowls observed in Daeosai include the Common teal, Shoveler, Merganser, Shanks, Curlew, Sandpiper and Great black headed gull. A few rare species of raptor also occur in the area; these including Golden eagle, Booted eagle, Common kestrel, Long-legged buzzard and Northern hobby are also seen in the park area.

Fresh water Fish: The freshwater resources of Daeosai harbor several fish species, which are predominantly Palaearctic with elements of central Asian Highlands and some mix of one species called Diptychus pakistanicus (Mirza & Khan, 1987). Three species have been reported from the water bodies of Daeosai (Rafique, 2000, 2001) viz., High Altitude Loach (Triplophysa stoliczkae Steindachner, 1866), Tibetan Snow Trout (Diptychus maculatus Steindachner, 1866), and Indus Snow Trout (Ptychobarbus conirostris Steindachner, 1866). The high- altitude Loach is abundant in Gultari River whereas, Tibetan Snow Trout and Indus Snow Trout are abundance in the waters of Daeosai National Park (HWF, 2014).

Small Mammals: A total of 13 small mammals have been recorded from different areas of Daeosai Plateau. They include Sorex thibetanus, Crocidura pergrisea, Crocidura pullata, Mustela erminea, Ochotona roylei, Hyperacrius fertilis, Alticola royali, Sicista concolor, Apodemus rusiges, Rattus turkestanicus, Marmota caudata, Eoglaucomys fimbriatus, and Pipistrellus pipistrellus (HWF, 2014).

Reptiles and Amphibians: Daeosai and adjust area has relatively fewer species of reptiles and amphibians than the lower mountains and plains. According to Woods et al. (1997), three species, including one amphibian namely Ladakh Toad (Scutiger occidentalis) and two lizards (skinks) viz., Himalayan Ground Skink (Asymblepharus himalayanus) and Ladakh Ground Skink (Asymblepharus ladacensis) have been recorded from DNP.

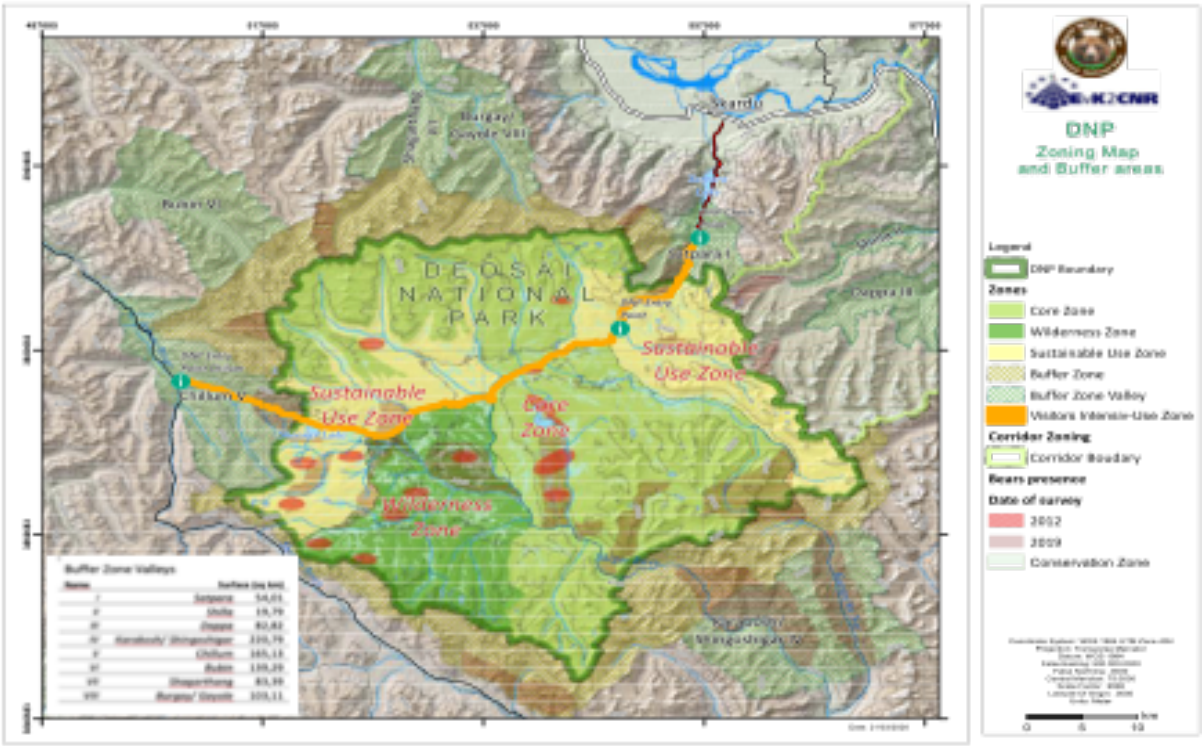
Invertebrate Fauna Invertebrates: It is found in the area as it has potential food source for Brown bear. According to HWP, survey (mid-June-mid-September 1999), a total of 43,751 specimens represented 4 classes, 13 orders and 102 families. Arthropods also represent a potential food source for Brown bear and contribute to all over functioning of the ecosystem of Daeosai.

5.3.5 Protected Areas

Pakistan has around 400 notified protected areas, comprising of 31 national parks (NP), 01 UNESCO-MAB reserve, 92 wildlife sanctuaries (WS), 97 game reserves (GR), 19 Ramsar sites and 160 community reserves. Much of this biodiversity is protected by three big National Parks (CKNP, DNP, and KNP), and Baltistan host the first two national parks. However, this project does not fall within a protected area. Central Karakorum National Park and Daeosai National Park are in Baltistan, but both the parks are far away from the project area.

Daeosai National Park (DNP) is an alpine plateau of exceptional beauty and ecological value located in the western massif of the Himalayas, east of Nanga Parbat Peak and near to the Central Karakoram Range. DNP is located where two biogeographical provinces merge, in the Himalayan and Karakorum-Pamir highlands, and as a result is a place of very rich biodiversity. It is recognized as an internationally important site for the protection and conservation of the Himalayan Brown Bear, a critically endangered species. The Daeosai plateau hosts the only stable population in the region and is important for its continued survival (UNESCO). The map of DNP is in **Figure 10**.

Figure 5-5: Map of Daeosai National Park



Source: https://info.undp.org/docs/pdc/Documents/PAK/MANAGEMENT%20PLAN%20Deosai%20National%20Park.pdf

Daeosai plateau, in the Gilgit-Baltistan Province of Pakistan, for its average elevation of 4,114 meters, with an altitude of 3,500 to 5,200 m., is an area of 358,400 ha. is the second highest plateau in the world after Changtang Tibetan Plateau. The area was designated as Daeosai National Park by the Government of Pakistan in 1993 with the primary objective of protection and conservation of the Himalayan Brown Bear (*Ursus arctos Isabellinus*) recently designated as critically endangered in IUCN's Red List of Mammals of Pakistan, where about 72 bears are currently reported.

The plateau is also home to the Siberian ibex, Snow Leopard, Kashmir Musk Deer, Himalayan wolf, Himalayan marmot and over 124 types of resident and migratory birds. Birds in the park include the Golden eagle, Lammergeier, Himalayan vulture, Laggar falcon, Peregrine falcon, Eurasian kestrel, Eurasian sparrowhawk, and Himalayan snowcock.

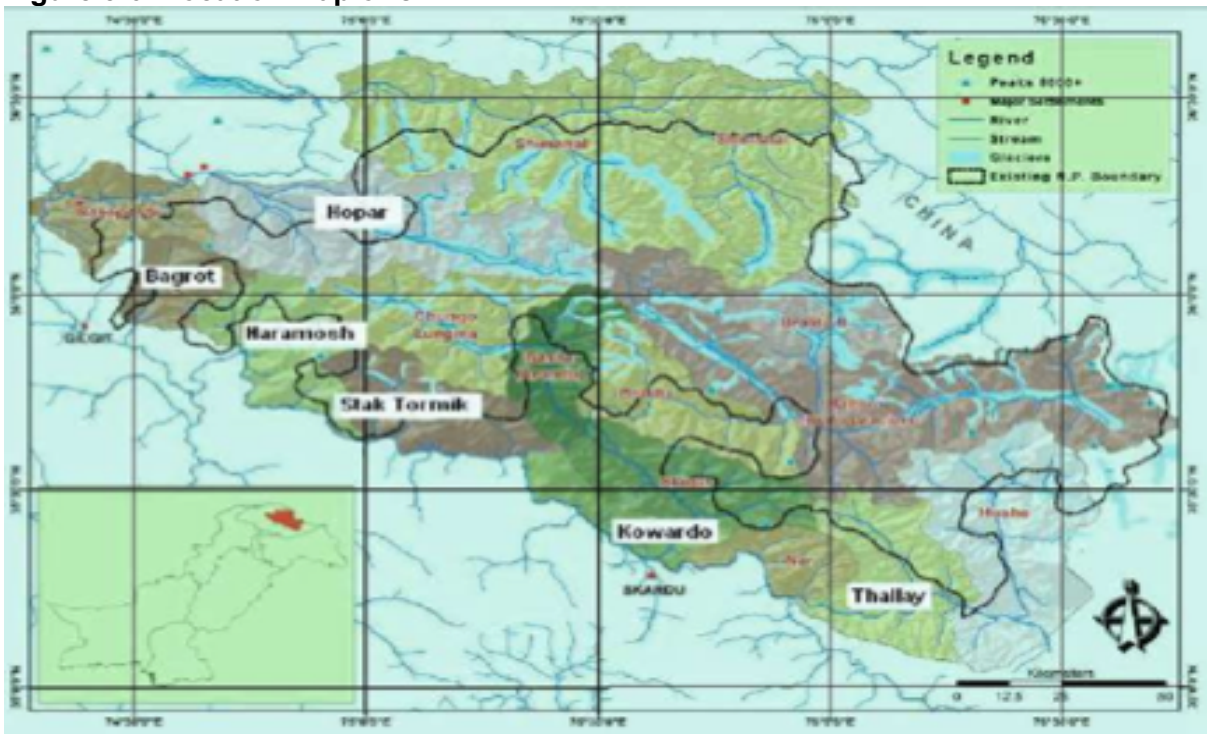
The plant species found in Daeosai are; Polygonum affine, Thalictrum alpinum, Bromus oxyodon, Saxifragaflagellaris, Androsace mucronifolia, Asterflaccidus, Barbarea vulgaris, Artemisia maritima, Elymus longiaristatus, Nepeta connata, Carex cruenta, Ranunculus laetus, Arenaria neelgherrensis, Astragalus leucocephalus, Polygonum amplexinade, Echinops niveus, Senecio chrysanthemoides, Artemisia spp., Dracocephalum nutans, Taxus contorta, Chrysopogon gryllussubsp. Echinulatus and Dianthus crinitus. There were also observed some medicinal plants which are locally famous i.e. Thymus linearis (Reetumburuk), Saussurea lappa (kuth), Ephedra gerardiana (Say), ViolaPilosa (Skora-mindoq), Pleurospermum candoll (Shamdun) and Artemisia brevifolia (Bursay) etc. which are used as traditional drug therapies. Large expanses of alpine meadow alternate with drier stony areas, and there are patches of dwarf willows along the rivers and streams with many species of Poa, Saxifraga and Euphorbia. During summer season (July-August) it is covered by sweeps of wildflowers and a wide variety of butterflies (UNESCO).

The Daeosai Plateau receives higher rainfall than adjoining northern and north-eastern valleys of Baltistan due to its geographical location facing the monsoon affected outer Himalayas. Annual precipitation varies from 350 to 550 mm., mostly received during winter as snow. These factors combine to create high altitude wetlands characterized by Shosar Lake, at 4,250m which represents a unique category of alpine wetlands that is confined to the Himalaya, Hindukush and Karakoram Mountain cordilleras. Three important river systems originate from Deosai National Park namely, Shatung, Bara Pani and Kala Pani which form the Shingu Shigar River, an important tributary of Indus River.

The DNP is located adjacent to the GASSR project area, therefore implementation of activities of the project will have significant environmental impacts.

Central Karakoram National Park (CKNP) was notified in 1993 is the largest National Park of Pakistan, with a core area of approximately 10,000 Km^2. It is a highly glaciated part of the Karakoram, with altitudes ranging between 1,500 m and 8,611 m (at the summit of K-2) m.a.s.l. It has 17 main valleys holding population of 212,000 and a total area covering all the valleys including buffer communities is 19,000 Km^2. The park falls within administrative boundaries of the five districts of Gilgit- Baltistan, viz. Ghanche, Skardu, Shigar, Gilgit and Nagar. Location map of CKNP is in **Figure 11.**

Figure 5-6: Location Map of CKNP



Source: https://www.semanticscholar.org/paper/Phytosociology-and-Structure-of-Central-Karakoram-Hussain-Farooq/a160d32f5ff958092891d51eea0f4fcfbde5edbc/figure/0

The varied range of altitude makes CKNP a unique hub of diverse ecosystems harbouring several threatened species of flora and fauna, which are indigenous to the Karakoram. CKNP is home to 33 mammal species (12 carnivores, 9 rodents, 5 artiodactyls, 5 chiropterans, 2 lagomorphs) including, Himalayan ibex (Capra ibex sibirica), snow leopard (Unci-auncia), Himalayan lynx (Felis lynx), musk deer (Moschus chrysogaster), black bear (Ursus thebatinus), Ladakh urial (Ovisvingei) and blue sheep (Pseudois nayaur). Pipistrelle, Asian barbestelle,

desert long eared bat and tube nosed bat, Indian grey wolf, Kashmir or hill fox, Tibetan red fox, Alpine weasel, common otter and Lynx are also present within the park limits.

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The project area does not fall directly in the park, but located in buffer zone (Kachura-Kowardu), therefore the project activities will have little or no negative impacts on the wild life, flora and fauna, instead the project will have positive impact by providing clean energy and saving the degradation of natural forest and vegetation.

Endangered species and IUCN Red List: No formal exercise of Conservation Assessment and Management Planning (CAMP) has been done in Pakistan as per criteria defined by IUCN for specie red listing. However, the key specie of *Brown Bear, Markhor and Snow Leopard* has been considered as 'engendered species' during 1987- 2000 by independent population assessment methods. However, in recent past the population of Markhor has been termed as 'Stable' and 'Growing' due to community conservation practices introduced between years 1996- 2002. However, no defined conservation area lies within the project area and there are no likely impacts on the population of wildlife species during project construction and operation phases.

Illegal Hunting and Poaching: The GASSR Project is to be constructed mostly new and through wild mountain ranges from Shagharthang to Domel/Bubind. Meanwhile, the project will be in proximity to the DNP; therefore, the project area falls within or adjacent to the protected areas. There is probability that illegal hunting and poaching activities will be carried out due to this project, especially during construction. Therefore, the project proponent (PMU-GASSR) is to closely coordinate with the wildlife department and community, especially during construction stage to provide awareness to the outside labour engaged at work to abstain from illegal hunting and poaching and disturbing the wildlife.

The Wildlife Department is supporting community conservation for trophy hunting, while the local community plans an important role in conservation, especially Markhor and Brown Bear. Therefore, the PMU through Wildlife department shall promote community conservation by the communities from Kachura to Gudai, to ensure minimum impacts on the project area, especially DNP being in proximity during construction (influx of labour in the area) and during operation stage of the project.

5.4 Socio-Economic and Cultural Environment

5.4.1 Demography:

The GB comprises three divisions (Gilgit, Baltistan and Diamer) with an area of 72, 496 square kilometers. These three divisions are the administrative divisions, and are further divided into 14 districts i.e., five districts in Baltistan, five in Gilgit, and four in Diamer. While Rondu is shown as a district in the updated maps headed by the Assistant Commissioner but has not

yet been functional as an administrative unit. The number of districts has changed time and again in the past ten years. Before 2012, there were only two divisions i.e., Gilgit and Baltistan with a total of 7 districts. In 2012, Diamer was given the status of division, further consisting of Diamer and Astore districts. Since 2012, these two divisions were already there in Gilgit, therefore the number of total districts remained same as 07 in total districts in Gilgit. The number of districts rose from 7 to 10 districts because two more districts of Shigar and Kharmang were further added to the Baltistan division, and in Gilgit Division, the previous Hunza-Nagar district was split into 02 districts. Gilgit Baltistan presently has three divisions, and 14 districts and division wise detail is given in **Table 22.**

Table 22: List of Districts in GB

Gilgit Division	Baltistan Division	Diamer Division
1. Gilgit	6. Skardu	11. Diamer
2. Ghizer	7. Shigar	12. Astore
3. Hunza	8. Kharmang	13. Darel
4. Nagar	9. Ghanche	14. Tangir
5. Gupis Yasin	10. Rondu	

Skardu and Gilgit are the main administrative towns in the region. Skardu is the capital of Baltistan also. The region has snow-clad high mountains, rivers, nullahs and streams. River Indus flows through the whole region of Gilgit Baltistan. Four of the world highest mountain ranges- the Himalaya, Karakoram, Pamir and Hindukush lies in this region and the height of the region is mostly above 03 thousand meters and communities are settled on it. The region is always located with a very complicated weather; yearly long and the access remains always disconnected to those communities, making it difficult to let the government aware of these problems under the prevailing contemporary circumstances. The population of Gilgit Baltistan is currently estimated at 1.5 million (Projected on MICS, 2017). A large number of populations is rural i.e., 81.7% and a very small number of populations is allocated to urban locality (MICS 2016-2017). The population is dispersed in 20 different valleys and divided over 650 settlements. Detail are sumamrised in **Table 23**.

Table 23: Population of Gilgit-Baltistan

Description	Census	
Year	**1998**	**2017**
Population	884,000	1,492,924
Male Population	462,000	773,057
Female Population	422,000	719,845
Urban Population	127,000	246,332 (16.5%)
Rural Population	757,000	1,246,592 (83.5%)
Population Density/Km^2	12	20.6
Annual Growth Rate	2.56	2.56 (1998)
Sex Ratio	109	107
Average Household Size	08	7.6
Number of Households	110,500	196,426

Source: GB-MICS 2016-17 (projected figures)

The Human Development Index (HDI) of the region is low in the three dimensions: Education, Health and Standard of Living.

5.4.2 Education:

According to a literacy survey conducted in 2020, the total literacy rate of GB is around 53 % with an estimate of 66% in males and 42 % in females (Diamer = 36.9% Ghanche = 53.6% Hunza Nagar = 72.2% Skardu = 59.4% Astore = 62.8% Yasin = 65.0% Gupis = 66.1% Gilgit = 67.2%)3. There are 18 colleges in Gilgit District, while in Skardu district; there are 8 colleges for girls and 10 colleges for boys. There are 07-degree colleges; eight are intermediate colleges, while the remaining two are elementary colleges. The higher educational institutional facilities in Gilgit Baltistan are very limited. There are only two universities which have few departments only. Alongside of these higher educational institutions, Gilgit Baltistan is still devoid of education not having medical and engineering universities. The students used to travel to cities for studies which is of high cost for them and by no mean be afforded, so they drop out their studies. Due to less opportunities of education, there is no betterment in economic conditions of the people of Gilgit Baltistan. Government has announced time and again to establish or give opportunities to people to enlist with education, but their efforts have remained in vain all the time. However, both the project districts are among the high literacy rate districts in Gilgit Baltistan.

The educational infrastructure in Astore is relatively underdeveloped compared to more urban areas while in the project impact zone (the surveyed villages it is further weaken). Schools are often basic, and many are situated in remote locations, making access difficult for students, especially during harsh weather conditions. Enrolment rates for primary education have improved over the years, but surveyed villages are still facing challenges in maintaining high levels of attendance and completion. Dropout rates can be significant, particularly at the secondary level, due to factors such as economic constraints, lack of local schools, and the need for children to assist with family duties. To overcome this issue, local communities are often actively involved in supporting education. In some areas, community-based schools and educational initiatives help bridge gaps in formal education.

In Skardu although there are colleges and other higher educational institutions, but in the survey, villages lack higher educational facilities except a high school in Kachura. Almost all villages have the primary school in their village while for higher education the students have to go outside the village. Girl's education is far behind the boys education in the surveyed villages.

In Skardu enrolment rates for primary education are relatively high, and efforts have been made to increase access, especially in rural areas. However, attendance can be affected by seasonal migration, economic factors, and family needs in the surveyed villages which are far away from the city center. Furthermore, community efforts and local support play a crucial role in education in these villages. Many communities are involved in running schools and supporting educational initiatives, which helps bridge gaps in formal education.

5.4.3 Health

The Gilgit Baltistan Health department currently provides multi-health care to sparse population over harsh weather. The health department is operated with around 499 health facilities with the help of 248 medical officers and specialists. Health department comprises of

3 https://www.google.com/search?q=edcuation+rate+in+GB+by+districts&oq=edcuation+rate+in+GB+by+districts&gs_lcrp=EgZjaHJvbWUyBggAEEUYOTIJCAEQIRgKGKAB0gEKMTA2MTFqMGoxNagCCLACAQ&sourceid=chrome&ie=UTF-8

3 district headquarter hospitals (DHQs) 37 civil hospitals (CHs), 22 Basic Health Units (BHUs) and 3 Rural Health Centers (RHCs) in the region. There are two types of dispensaries, 61 are A-Class and 242 are C-class dispensaries.12 According to data reported in 2020, many of pregnant women have shown iron deficiency i.e., 70 % of women suffering from anemia diseases. Children also face many health issues. About 36 % children are under the age of five and are lying short of their age, while 12.6 % are reported underweight for their age compositions. The health issues for both the people of Pakistan in general and Gilgit Baltistan in particular are very desperate. Likewise, the status of women with respect to their empowerment is also very low. They are deprived from their right of education.

Water sanitation and hygiene issues are also very rampant and have led to various health issues in the region. A public health facility assessment was conducted in all hospitals and health care centers to make government aware about the quality of health facilities and services in the region. It also further evaluates the infrastructure of the hospitals, provision of staff training, supervision, maternal care and delivery work coordination, disease control and monitor death rates. This has also further evaluated that all BHUs were unable to provide 8 hours a day service in 6 days a week in terms of preventive maternal, Neonatal and child Health (MNCH) services due to deficiency of one or more components of preventive MNCH services package.13 Similarly, the RHCs (Rural Health Centers) and CHs (Civil Hospitals) are examined for provision of 24 hours service (7 days in a week time) as additional complementary services, but none of them is found fully functional to provide a package of complete Basic Emergency Obstetrics and Newborn Care (EMONC) services.

There is a lack of one or more facilities, there has been hardly any hospital which has provided health service in 24/7 comprehensive (EMONC) services package. It is also reported that GB has a high maternal mortality i.e., 600/100,000 live births. Moreover, the increase in GB population has also demanded for an increase in availability of more drinking water resources. However, there are reported that 60% have access to improved drinking water and 82% population have improved sanitation facilities. The National Program for lady health workers has 1,588 LHW and LHVs against the sanctioned 1613 posts. However, the villages along the project are not fully equipped with heath care facilities as these villages are far away from the city centers.

Astore has several basic healthcare facilities, including primary health centers (PHCs), basic health units (BHUs), and a few small hospitals. These facilities provide essential medical services; however, the surveyed villages have fewer health centres and with low quality facilities. The District Hospital in Astore, which serves as the main healthcare facility for the PIZ villages. However, it often faces limitations in terms of medical equipment, specialist services, and overall capacity. Furthermore, access to this hospital from PIZ villages such as from Bubin remain a challenge for the people being rugged terrain and remote location.

Similarly, district Skardu has several healthcare facilities, including the Skardu District Hospital, which is the main healthcare provider in the region. However, the PIZ villages particularly Shagharthang, Staqchan etc. are far away from the district hospital. There are also several Basic Health Units (BHUs) and Rural Health Centers (RHCs) scattered throughout the district and some of them are located in the survey villages.

Common health issues in PIZ villages include respiratory infections, gastrointestinal diseases, and conditions related to altitude. There are also concerns related to maternal and child health and chronic conditions such as diabetes and hypertension. Women related diseases are also

common in the PIZ villages particularly towards highlands. In the PIZ villages, there is a shortage of trained healthcare human resources such as trained Birth Attendants and nurses. This impacts the quality and availability of healthcare services.

5.4.4 Languages

Astore: The primary language spoken in Astore valley is Shina, an ancient Dardic language with deep roots in the region's history. Shina is not just a means of communication but also a repository of the valley's oral traditions. Folktales, songs, and poetry passed down through generations play a significant role in preserving the cultural heritage of the people. These oral traditions often reflect the valley's close relationship with nature, the harshness of life in a mountainous environment, and the values of bravery, hospitality, and community. The national language “Urdu” is also widely used by in the valley.

Skardu: Balti, a sub-Tibetan language, is the primary language spoken in Skardu along with Shina dialect in many villages. The Balti language is not only a means of communication but also a vital part of the valley's cultural identity. It has a rich oral tradition, with poetry including folk songs and stories. Balti poetry, known for its lyrical beauty, often explores themes of love, nature, and spirituality. The preservation of the Balti language and its literary traditions is a source of pride for the people of Skardu, as it connects them to their ancient Tibetan roots.

In recent years, there has been a growing movement to document and promote Balti literature, with local poets and writers gaining recognition for their contributions. The revival of traditional Balti scripts and the promotion of Balti as a medium of education and media are also important cultural developments in the region. A local organization (Baltistan Culture and Development Foundation – BCDF) has been formed to preserve the culture heritage exclusively. The villages alongside the road in Skardu site has a mix culture of Balti and Shina. Shagharthang, Bulcho, and Mohallahs in Kachura are Balti speaking villages while Staqchan and Soq are Shina speaking areas, however both the villages speak Balti language too. Urdu is widely used in all village while educated people can also speak English.

5.4.5 Religion

Astore: Islam is the predominant religion in survey villages in Astore, with two dominated sects (Sunni and Shia). Religious practices are deeply integrated into the daily lives of the people, and mosques and immambaraghs are central to community life. However, the valley's spiritual landscape is also shaped by pre-Islamic beliefs and customs that have been adapted over time. For instance, certain festivals and rituals, such as those related to agriculture and the changing seasons, still carry traces of ancient traditions and belief system.

Skardu: 100% surveyed villages follow Shia Isnaashari (Jaffari fiqa). Religious practices are deeply rooted into the fabric of daily life, and mosques and immambargahas play a central role in the community. Religious festivals such as Eid-ul-Fitr, Eid-ul-Adha, Eid-e- Ghadeer and Nowruz are celebrated with great enthusiasm in Skardu. These festivals bring the community together, with communal prayers, feasts, and acts of charity being central to the celebrations. The Nowruz festival, in particular, reflects the region's historical ties with Persian culture and is marked by traditional music, dance, and the preparation of special dishes.

5.4.6 Traditional clothing and Handicrafts

The traditional clothing of the people of Astore is now fading out which was not only practical but also symbolic. The traditional woolen cap called "pakol," is widely used by men. Women

were used to wear colorful dresses decorated with embroidery, reflecting the region's rich textile traditions. However, due to influence from outside the region particularly from down country now men wear. In the villages in Skardu district, traditional attire is now faded out and influence from down country as well as due to millions of tourist visiting the areas every year, has shaped the dresses. Shawal Kameez is widely used while the young generation wear pant and shirt.

5.4.7 Music and Dance

Astore: Music and dance are vital expressions of cultural identity in Astore. Traditional music, played on instruments like the rabab (a stringed instrument) and the dhol (a type of drum), is an essential part of celebrations and gatherings. The music is often accompanied by dance, with the "Shina dance" being particularly popular. This dance, characterized by rhythmic movements and graceful footwork, is performed by men during weddings, festivals, and other social events.

Skardu: Music and dance are integral to the cultural life of Skardu. Traditional Balti music, played on instruments like the "Surnai" (a type of oboe), "Dhol" (drum), and "Sitar" (a stringed instrument), is central to celebrations and communal gatherings. The music often accompanies traditional dances, such as the "Broqchhos, Ragi car (sort dance)" which is performed by men during festivals and after polo matches.

The dances of Skardu Valley are characterized by rhythmic movements (usually using hands) and graceful gestures, often telling stories of love, heroism, and the beauty of nature. The music and dance traditions of Skardu are not only forms of entertainment but also serve as important vehicles for cultural transmission, connecting the community to its past and reinforcing social bonds. In the past music was used as communication mean especially during wars

5.4.8 Cuisine

Astore: The cuisine of Astore reflects its harsh environment and the need for sustenance in a cold climate. Traditional dishes are nutritious, often made from locally produced ingredients such as wheat, barley, maize, and dairy products. One of the staple foods is "chapati," (flatbread), which is served with "dal" (lentils) or meat, while tea (salted and with sugar) is also common.

Another popular and common dish is "Goli," a type of pancake made from wheat flour, often enjoyed with "butter tea," a traditional beverage made from tea green leaves, butter, and salt. The simplicity of the cuisine reflects the valley's agricultural lifestyle and the importance of self-sufficiency in a remote and rugged environment.

Skardu: The cuisine of Skardu is a reflection of the region's harsh environment and the need for sustenance in a cold climate. Traditional dishes are nutritious but simple, often made from locally grown grains, vegetables, dairy products, and dry fruits. It is said that over hundred kinds of food are found in Baltistan. One of the famous traditional foods is "Prapu," made of wheat or buckwheat flour. Lentils soup is also famous and widely used in winters.

The people of Skardu also enjoy a variety of dried fruits and nuts, which are harvested in the summer and stored for the winter months. Tea, particularly butter tea (a traditional Tibetan beverage made with green tea leaves, butter, and salt), is a staple in Skardu, providing warmth and energy in the cold climate.

5.4.9 Family Life

Mostly people live with their parents in joint families, they share house and share all productive resources such as land, crops, trees and cattle. The internal domestic management and arrangements are in the hands of the elder women of the family. She can be a mother, grandmother or wife of an elder brother. The external matters are dealt by the head of the household, a man who can be the father, grandfather or elder brother.

Family life in Astore and Skardu is characterized by close family ties, traditional roles, and a strong adherence to cultural customs. However, like many places, modernization and education are gradually influencing these traditional practices.

5.4.10 Social Organization

In both the districts particularly in the PIZ villages, the traditional social organization revolves around the village elders, and they made most of the decisions about the village, however, there are other formal and non-formal organizations such as men and women village organizations at village level and Local Support Organizations at valley or Union Council level formed by Aga Khan Rural Support Programme (AKRSP). Furthermore, many faith based and youth organizations are also working in these villages.

5.4.11 Cropping and irrigation patterns

Most of the village along the proposed road fall under the single cropping zone and land are irrigated through irrigation channels. Flood irrigation is common and given the plenty of water available in most of the villages thus excessive use of water for irrigation is common. Wheat, barley and maize are common crops however, maize is cultivated as fodder. Potato is also very common and farmers receive a handsome amount every year.

5.4.12 Livestock

Among livestock cow, sheep and goats are common while some of other breads such as Jersey cows and few Yak family animals are also rare by the farmers. The PIZ villages have comparatively higher number of animals because of rich pastures in their surroundings.

5.4.13 Social Amenities

Water: Almost all the villages use water from the natural springs for potable and domestic use along pipe in few villages. Being situated near to the main water sources (as these villages are upstream of the watershed) therefore, they have clean, less polluted and fresh water coming from snowmelt lakes and glaciers.

Electricity: 100% villages have access to electricity provided by government, however there are load shedding but less than the main cities because there are hydel power plants in their area.

Fuel: The common source of fuel is wood which is collected from the natural forests. Although few of households in each village has LPG but still they use wood for cooking and heating. Giving the harsh climate and long winter wood are used excessively.

5.4.14 Awareness and Acceptability of Proposed Project

People in the area is well aware of the proposed project and possess a fair knowledge. Most of the people in the area are in view that this project will bring positive changes in their lives

by improving their economic condition and connecting them with main cities in a faster and safer way. Most of the people living in project villages on both sides of the districts are aware of the benefits and very much receptive, however, in few villages potential conflict may arise because of the land dispute among groups particularly in Skardu site where a conflict over land ownership has already been in place among villagers and the Raja family. Having this conflict, people are not opposing the road construction and requested the authorities to resolve the issue before land compensation process.

5.4.15 Women Issues

Women population in both districts are less aware of the project and its benefits and they foresee that this project might become hurdle between them and their natural resources such as stocking fuel wood and grass for animals which are mainly women's job in most of the villages. Other issues that pointed out by women are related to health, education, vocational trainings, fetching water and looking after animals. They are in view that the proposed road might add up hurdlers in few women chores such as animal grazing, fetching water while might resolve some of issues related to health and education because of easy and quick approached to cities where health and educational facilities are much better compared to their villages.

Traditional gender roles in the villages of Astore as well as in Skardu often place women in the role of primary caregivers and homemakers and involve in agriculture activities. These roles restrict women's participation in public life and decision-making processes. In both the districts particularly in the survey villages, instances of domestic violence and abuse is very low because of stick Islamic traditions. However, access to legal protections is difficult for women to seek help or justice in both the districts.

Similarly, women's representation in local and regional decision-making bodies is often limited which affect the development of policies and programs that address women's specific needs and concerns. Despite these challenges, there are ongoing efforts to improve the situation for women in both the districts. The non-government organizations are taking initiatives, and community-based programs are working to address issues such as education, health, and economic empowerment. Additionally, increased awareness and advocacy are helping to promote gender equality and women's rights in these villages.

Chapter 6:

Stakeholders Consultation

Chapter Contents:

- Objectives and Principles of Consultation
- Project Stakeholders
- Approach Adopted for the Consultation
- Stakeholders Concerns towards the Project
- Identified Issues and Suggested Solutions

6 STAKEHOLDER CONSULTATIONS

6.1 General

Generally, stakeholders are project affected communities, government departments and non-governmental organizations that are actively involved in the project or whose interests may be affected as a result of project execution or after project completion. In construction of a road, stakeholders include but not limited to owners of land needed for the project, users of the project, project financier, project implementing agencies, line departments, revenue department, district administration, religious and political leaders, non-governmental organizations, village notables, contractors, and consultant in the project impact zone (PIZ).

The consultation with stakeholders is the key to a sustainable development in general and sustainability of the proposed project. Likewise, participation of stakeholders is essential to meet the objectives of the project on time with any hurdle and delay.

This section describes the outcomes of the public consultation sessions held with different stakeholders two districts of the project (Astore and Skardu) that may be affected by the project. The consultation process was carried out using stakeholder analysis. In order to meet the criteria of meaningful consultation process, at first consultations were held with PMU staff before consulting the other stakeholders. The consultation meetings generated some of the very useful information which has helped in understanding of the area as well as suggesting specific socio-economic and environmental mitigation measures.

6.2 Objectives and Principles of Consultation

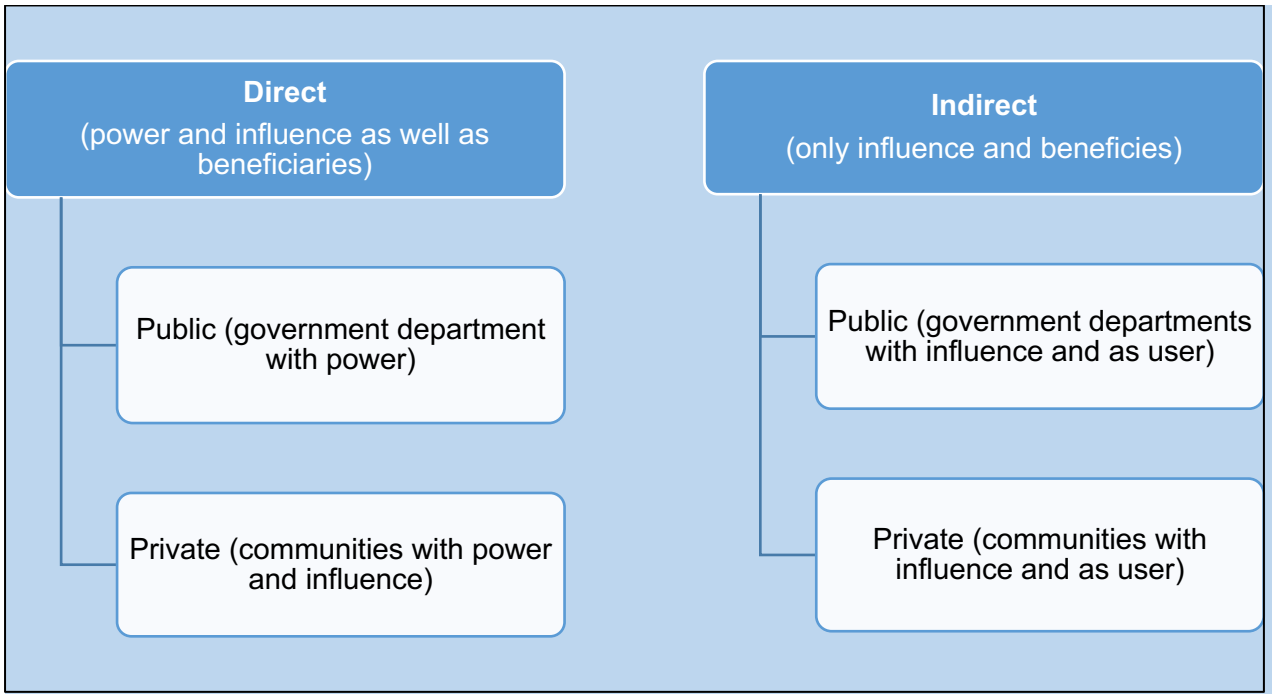
The stakeholder consultation process provides a forum where information relevant to the project is disseminated and discussed with those who are influence by the project. This participation is necessary because it paves a pathway between the investor and the public and enables the provision of much needed local knowledge and indigenous know-how which must be integrated into the project design and then in completing the project on time. This not only fosters goodwill and success in the project but also leads to a conflict- free project implementation. The specific objectives of the public consultations are given below:

41- Share information with stakeholders on the construction of the proposed road and expected impacts on the physical, biological and socio-economic environment of the project corridor;
42- Understand stakeholders' concerns regarding various aspects of the project, including the existing available transport facilities, construction of the new road and the likely impacts of construction related activities and on the surrounding environment.
43- Understand the perceptions, assessment of social impacts and concerns of the people living in PIZ
44- Provide an opportunity to the communities to provide valuable suggestions in the project design in a positive manner;
45- Reduce the chances of conflict through the early identification of controversial issues and consult them to find acceptable solutions.
46- Provide suggestions from Government relevant departments keeping in view the government interest and priorities in terms of development the area.

6.3 Project Stakeholders

Project stakeholders were engaged in the review and discussions on several aspects related to environmental and social issues at the early stage of impact assessments for feedback. Type of stakeholder consulted in GASSR Project are summarised in **Figure 12**.

Figure 6-1: Type of Stakeholders



The direct and indirect stakeholders consulted in both public and private sectors as well as in Astore and Skardu are given below but not limited to:

Direct public sector stakeholders

- C&WD-PMU Skardu
- C&WD Astore and Skardu
- Environmental Protection Agency GB
- Revenue departments of Astore and Skardu

Direct private sector (community) stakeholders

- Communities living in project PIZ
- Individuals affected by the project
- Business community in PIZ (shopkeepers etc.)
- Traders and business community in PIZ
- Political and Religious Representatives
- Project feasibility and design consultant

Indirect public sector stakeholders:

- Agriculture Departments of Astore and Skardu
- Forest departments of Astore and Skardu
- Animal Husbandry Departments of Astore and Skardu
- Education Departments of Astore and Skardu
- Health Departments of Astore and Skardu
- Police Department of Astore and Skardu

- Tourism Departments of Astore and Skardu

Indirect private sector stakeholders:

47- General public of Baltistan and Astore (users)
48- Tourists coming to Astore and Skardu
49- Transporters
50- Communities living outside the PIZ

Names and roles of identified stakeholders are summarized in **Table 24**.

Table 24: Names of Stakeholders and their Role in the Project

S.#	Name of Stakeholder	Role of Stakeholder
1	C&W Department Gilgit-Baltistan	Executing Agency and owner of the project
2	Environmental Protection Agency, Gilgit-Baltistan	Ensure environmental standards and regulations
3	Forest and Wildlife Departments Astore District	Assessment of natural forest, forest tree, and wildlife, protected area, endangered species.
4	Planning & Development Department GB	Project costs and approvals
5	Fisheries Departments Astore District	Fish and acro-vertebrates in the river
6	Agriculture and Water Management Department Astore	Assessment of fruit trees, crops and irrigation water
7	Education Department Astore	School timing during construction phase
8	Health Department Astore	Health facility at the project site to be considered during construction and operation phase
9	Revenue Department Astore	Land compensation and land status record
10	LG&RDD Gilgit	Disposal of waste and community infrastructure
11	Disaster Management Authority	Flood records and early warning in case of any potential flood/GLOF events in the catchment
12	Political Representative(s) of PIZ	Conflict management intra and inter villages as well as create enabling environment for the project execution
13	Religious Leaders and Community Elders & Notables in PIZ	Create enabling environment at village level. Conflict management intra and inter households and villages
14	Local NGOs in PIZ	Create enabling environment and cross check of the data provided by the communities
15	Any other relevant Department and Agency if necessary	To consider the needed support, identification of issues and support required in project implementation

6.4 Approach Adopted for the Consultations

The community groups, individuals, public and private sector organizations were consulted during consultations process, which includes but not limited to:

51- General community and sector specialists in the PIZ in both districts;
52- Focus group discussions with community groups and informers in PIZ villages;
53- Individual consultations with key informers in both public and private sector.

In order to conduct stakeholder consultations two teams were formed (one for Astore and one for Skardu) by the consultant. Both the teams have completed a series of discussions and meetings with relevant stakeholders using the standard questioners developed by the subject specialists. After completion of the meetings, discussions and interviews, the data collected is

organized and analyzed using computer software. The results of consultations have incorporated in the relevant chapters/sections of this report.

6.5 Stakeholders Concerns

From the stakeholder consultations it was clear that there were two distinguish interest groups, (a) those who gave their best input for the success of the project and (b) those who have their vested (self) interest in the project. Thus far there is both positive and negative feedbacks received from the concerned stakeholders. In general, the communities cooperated with the survey team with a friendly attitude and depicted about the importance of the GASSR project. One of the main community concerns was paying appropriate and timely payment of the land compensation which will be used for the GASSR Project. Several other concerns were also raised by the stakeholders, particularly with regard to environmental and social impacts of the project as well as such as delay in executing the project. The concerns and apprehensions of the stakeholders are summarized in **Table 25**. Sample Questionnaire filled (sample) and list is people consulted is in **Appendix 2.**

Table 25: Concerns and apprehensions of the Stakeholders

Stakeholders	Stakes/apprehensions
Communities, Businesses, Religious leaders and NGOs	
Communities living in PIZ including individual affected	54- Size of farmland will shrink 55- Access to farmland due to division of land 56- Dust will affect quality of fruits 57- Water channels will affect 58- Grazing of animal would be difficult (need to cross the road) 59- Incident of theft of animals and fruits will increase 60- Delay in disbursing land compensation amount 61- Local culture and tradition will be on stake 62- Deforestation will take place 63- Lifestyle will be changed and unity and integration of the community will be suffered
Local Business community (shopkeepers and hotel owners etc.)	64- Dust pollution will affect the business 65- During construction phase supply chain will remain disturb 66- Water supply remain disturb during construction 67- Noise pollution will affect the business particularly hotels and guest houses 68- Natural beauty will be compromised 69- Historical and cultural heritage sties will be threaten
Other traders (supply chain) and farm and off farm traders	70- Supply chain will be disturbed 71- Loss of goods due to under construction road
Contractor(s)	72- Conflict inter and intra communities over land compensation will affect the project 73- Conflict with individuals over land used for camps 74- Shortage of skill labour locally and outside labour will destroy the culture and the environment
Religious and traditional institutions	75- Traditional integrity will suffer 76- Religious practices will be compromised due to engage in economic

Stakeholders	Stakes/apprehensions
	activities 77- During construction movement of people will be suffered 78- Social sector facilities will be over burdened
Local and national NGOs (AKRSP and LSOs)	79- Economic loss of few households 80- Tree cutting will impact overall environment 81- Bifurcation of land will reduce crop yield 82- Waste production by camps and machines
Public Sector	
Forest department	83- Ecosystem will be disturbed 84- Natural habitats will be disturbed 85- Road will provide easy access to natural forest which increase deforestation in the area 86- Incidents of illegal hunting and forest cutting will increase 87- Due to noise birds and some other wild life might migrate
Agriculture and Water Management Departments	88- Size of farmland will be reduced 89- Cropping pattern will change because of road and easy access to market such as use of chemical fertilizer and use of contaminated seeds 90- Irrigation channels and natural water courses will be disturbed 91- Quality of fruit will be compromised due to dust pollution because heavy traffic 92- Due to blasting rock falling will happen in crop fields
Animal Husbandry and Fishery Department	93- Shortage of fodder for animals may arise 94- Movement of animals in grazing area may be affected 95- Use of explosive may cause migration of birds and wildlife 96- Rock cutting near to stream may affect breeding of fish 97- Rock fall may kill fish in the stream 98- Due to easy access illegal fishing will happen
Communication and Water Department, and LG&RD	99- Issues related to financial matters such delay in disbursing fund by finance 100- Contractual issues 101- Conflict over land 102- Damage of local people's property by the staff deployed by contractor(s) 103- Demand of irrigation channel will increase due to damage during construction
Education department	104- School buildings along the road will be disturbed 105- Heavy traffic will affect students' movement 106- Pollution may affect people particularly students 107- Heavy machines and blasting will affect students' study
Health Department	108- Road side health care centre will affect 109- Pollution related diseases will emerge 110- Road accidents incidents will increase

Stakeholders	Stakes/apprehensions
Revenue Department	111- Government land compensation rate is lower than market which will a source of conflict between land owners and Revenue department and project contractor(s) 112- Job related conflict may arise in the project area 113- Conflict over timely compensation payment
Disaster management authority	114- Impact on natural environment 115- Tree cutting may cause avalanches and flood
Political Leader	116- Incidents of accidents will increase 117- Easy access to cities may lead to high migration

6.6 Identified Issues and Suggested Solutions

The main issues raised by the communities in PIZ and suggested solutions are presented in the in following lines.

6.6.1 Land compensation:

Land compensation issue has been highlighted across the villages. There are two concerns associated with land compensation: (a) timely compensation and (b) compensation rate. The communities were of the view that government land compensation rate is not according to the open market rate. They suggested that the land compensation rate should be as per current market rate, instead of the one notified by the district land collector/DC.

In villages of Skardu district *(Shagharthang, Staqchan and Soq villages)* issue raised about ownership of land and payment of compensation. According to the Revenue Department record the land belongs to the Raja family and people of these villages are permanent tenants. The Raja family is claiming the entire land compensation of the land, where the people of these affected villages suggest that compensation should be paid to them instead of Raja Family. In case this issue is not resolved, the project may face social problems and protest by the permanent tenants.

The community/permanent tenets were of the view that the matter is in the court therefore, till the decision from the court, compensation amount should not be paid to the Raja Family. The community is afraid that Raja Family will politically influence the decision. According to Revenue Department Skardu, there is a rule for such cases where 70% of the payment will go to the person who has land title in the revenue record, while 30% amount goes to land holding person (permanent tenants).

6.6.2 Delay in paying compensation:

People were of view that Revenue Department normally takes longer time to pay the land compensation to the landowner. This issue was commonly raised by the communities across villages. They have demanded quick and fair payment of the land compensation. They also requested and suggested to pay the amount in the village instead of the Revenue Department offices in Skardu or Gorikote.

6.6.3 Inconvenience during construction:

During the construction phase the project will result in causing inconvenience to the community reside nearby the project area which will affect their daily routine and more importantly those who will be dislocated. These include watering crop fields, grazing cattle,

collecting fuel wood, collecting grass from pastures for animals, fetching water, and school going children as well as women privacy in participating communal work and going to pastures because many labour and staff will be from outside the village.

To minimize inconvenience during construction, the community suggested to hire labour and other staff from the local area so that women and children will feel more secure. They have also suggested to build overhead walking bridge at least one in each village so that they can easily cross the road with their animals.

6.6.4 Traffic:

The heavy traffic after construction of the road as well as heavy machinery during construction will hamper their daily life. Noise and dust will also be an issue, as at the moment the area is naturally clean and quite in both the districts. Heavy traffic will endanger life of women and children who are not familiar to such heavy traffic. Therefore, the community representatives suggested to fix sign boards to aware drivers about the villages coming ahead and speed limits. In each village there should be bus and car stand, where people especially school going children can easily sit on the transport facility. They have also suggested to make speed breakers at crossing areas within the village proximity.

6.6.5 Loss of income sources:

Loss of income to local people due to acquisition of land or bifurcation of their cultivated land which reduce their animal crop leading to food security issue. Furthermore, trees including fruit and forest trees will be cut down for road construction, this will not only affect their income but also their animals will face feeding shortage during winter because tree leaves are used as feed for animals in winter season.

The community have suggested that there should be a proper compensation for such losses through generating alternate income sources including employment opportunities. They emphasis that poor families should be given special attention for employment during construction stage and establish vocational training centers for local people.

Chapter 7:
Potential Environmental and Social Impacts and Mitigations

Chapter Contents:

7 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND MITIGATION MEASURES

7.1 General

This chapter presents potential environmental impacts to be considered in the baseline conditions of Physical, Biological and Socio-economic and Cultural Environment in the PIZ during Design, Pre-construction, Construction and Operational phases. Based on the data collected from the field during consultation with communities, consultation with government line departments, revenue department, district administration and secondary sources including project documents such as PC1 etc., the potential environmental and social impacts and their mitigation measures have been considered

7.2 Methodology

The methodology used is to identify and assess the potential impacts of the Project. After the identification of the impacts the magnitude of the impacts was assessed. The assessed magnitude of impacts is categorized as:

- **direct – indirect;**
- **total – partial;**
- **permanent – transient;**
- **important – negligible;**
- **positive – negative;**
- **acceptable – not acceptable.**

The first three categories are rather clearly identifiable, therefore undisputed in most cases. The question whether an impact is important, positive, or acceptable can be, to a certain degree, a matter of conventions, agreed upon values, or even personal opinion or judgement which in certain instances is debatable among the subject experts/specialists.

Based on a description of the project siting, dimensions and values accorded to certain habitats, the importance of each impact was identified and required mitigation measure is defined accordingly. To be as objective as possible and to use the best practice for IEEs, impacts have been rated. Impact ratings are derived in to:

126- Provide a basis for prioritization of impacts to be addressed;
127- Provide a method of assessing the effectiveness of proposed mitigation measures;
128- Provide a scale which shows the level of impact both before and after a proposed mitigation measure has been applied.

A consistent system for rating impacts to apply analytical rigor to the assessment and rating process has been considered for this EIA. It must be remembered that any outcome about reducing major negative impacts or enhancing positive impacts, is dependent on the selection, applicability, implementation, and effectiveness of mitigation measures.

7.3 Steps in Impact Assessment

The impact assessment process is completed through a series of steps. In general, these steps are as follows:

- Characterize the baseline – the existing condition before the Project is undertaken and any effects are generated;
- Describe the Project components throughout the Project lifespan (construction and operation);
- Evaluate alternatives to the Project to see if impacts can be reduced;

- Based on the Project description and evaluation of alternatives, identify sources of impacts and the impacts themselves that are generated by any aspect of the Project;
- Rate impacts before any mitigation (for negative impacts) or enhancement (for positive impacts) is implemented, and;
- Identify mitigation and enhancement measures to address the impacts.

7.4 Criteria for Rating Impacts

Potential environmental and social impacts are rated based on two elements:

a) the severity and enhancement of the potential impact, and;
b) the likelihood that the impact will occur.

The derivation of these elements is described in the next sections. This methodology has been devised by the EIA evaluators and is adapted from an Environmental, Health and Safety (EHS) risk rating system and adapted to EIAs. No standards or guidelines can be found for the same. Ranking impacts is useful because it helps a project to address the major impacts first and then prioritize mitigation measures.

7.5 Severity and enhancement criteria

The severity or enhancement of each potential impact has been rated using the criteria identified in **Table 26** and **Table 27.**

Table 26: Severity Criteria (Negative Environmental Impacts)

Severity	Duration	Description
Low	Short-term, Low frequency	Affects environmental conditions, species, and habitats over a short period of time, is localized and reversible.
Medium	Medium-term, Medium or intermittent frequency	Affects environmental conditions, species and habitats in the short to medium term. Ecosystem's integrity will not be adversely affected in the long term, but the effect is likely to be significant in the short or medium term to some species or receptors. The area/region may be able to recover through natural regeneration and restoration.
High	Long-term, Irreversible Constant frequency	Affects environmental conditions, species and habitats for the long term, may substantially alter the local and regional ecosystem and natural resources, and may affect sustainability. Regeneration to its former state would not occur without intervention. Affects environmental conditions or media over the long term, has local and regional affects or is irreversible.

Table 27: Severity Criteria (Negative Social or Health Impacts)

Severity	Duration	Extent	Ability to Adapt	Socio-cultural Outcome	Health Outcome
Low	Short-term (<1 year) Low frequency	Individual/ Household	Those affected will be able to adapt to the changes with relative ease, and maintain pre-impact livelihoods, culture, quality of life and health.	Inconvenience but with no consequence on long-term livelihoods, culture, quality of life, resources,	Event resulting in annoyance, minor injury or illness that does not require hospitalization

Severity	Duration	Extent	Ability to Adapt	Socio-cultural Outcome	Health Outcome
				infrastructure, and services.	
Medium	Medium-term (1-7 years) Medium or intermittent frequency	Small number of households	Those affected will be able to adapt to change, with some difficulty, and maintain pre-impact livelihoods, culture, quality of life and health but only with a degree of support	Primary (direct) and secondary (indirect) impacts on livelihoods, culture, quality of life, resources, infrastructure and services	Event resulting in moderate injuries or illness, which many require hospitalization
High	Long-term (> 7 years)/ Irreversible Constant frequency	Large part or entirely	Those affected will not be able to adapt to changes and continue to maintain pre-impact livelihood	Widespread and diverse primary and secondary impacts likely to be impossible to reverse or compensate for.	Catastrophic event resulting in loss of life, severe injuries or chronic illness requiring hospitalization.

7.6 Identification of Potential Impacts

The nature of environmental impacts is that they have far reaching primary, secondary and tertiary consequences on the surrounding environment. It is therefore difficult to classify, group or define their limit as natural systems are linked in many ways. Potential impacts identified during the construction and operation phases of the project are broadly categorized according to their receptors. The activity/activities contributing to the impact and the primary and secondary recipients are provided for each impact.

7.6.1 Assessment of impacts caused by construction activities

The presence of the work force causes several impacts on water quality (wastewater) and on the local population, can be positive (by small business and income in the area) as well as negative (by conflicts with locals and restricted mobility of women). The construction activities as such (including use of heavy machinery, transports etc.) are an important cause of environmental impacts. Problems with air quality, water quality, and noise could arise as result of these activities. However, all these impacts are limited, restricted to the construction site (and, given the difficult terrain, without much risk of spreading) and matter of concern during the construction period only. The construction activities causing the largest impact, some of which are limited to the construction period, such impacts are:

Geology and topsoil: temporary occupation of areas for construction site installations, risk of increased erosion on surfaces where vegetation will be cleared;

Risk of soil and water contamination due to storage and use of fuels, lubricants and other potentially toxic substances, and by activities like maintenance of vehicles and machines;

Risk of water contamination with concrete (cement), which can increase pH to a level, which is toxic to fish and other aquatic organisms;

Air pollution is expected to be generated from construction machinery and equipment, working of heavy earth moving machinery, drilling, blasting operations, concrete mixing, pouring equipment, stone crushers and vehicles movement etc. The impact on air quality is considered as short duration and its negative impact of moderate magnitude;

Noise and vibrations stemming from traffic and the operation of machines (e.g., excavators); dust from the same sources;

Generation of solid waste of different types and wastewater; excavation work will be of limited scale as well as domestic waste since the workforces will be in the limited area and restricted to the construction camp site. Wastewater will mainly be domestic sewage.

Social and health impacts from the work forces at the construction site, coming from other areas of the country is rated as moderate. The workforce will vary between 50 to 300 persons. It is assumed that most of the unskilled labour will be recruited from the local communities.

Risk of accidents by construction sites and construction traffic. All construction sites must be properly signed and in cases of trenches fenced off.

Restricted mobility of women, since women will need to come out for their agricultural activities, especially in Harpoon, they might need to be accompanied by a male member of the family because of the outsider and strangers at the project weir site construction and during operation stage.

Loss of land, limited land is required permanently (ROW), temporary land acquisition will be needed at site, (i.e., construction camping, workshop, material storage etc.) Whatever land required (permanent or temporary) for the Project will be compensated as per Govt. Rules and/or negotiated settlement with the landowners among the community.

Given this number of effects specific to the construction period, the contractor needs to prepare construction environmental and social management plan (CESMP) and specific plans with number of mitigation measures and action required during the construction period. The positive impacts which need to be mentioned are:

Employment Opportunities: The construction of the GASSR Project will create employment opportunities both directly and indirectly during the construction phase. People will gey employed as unskilled, semi-skilled and skilled workers. The semi-skilled and skilled workers not available within the project area villages will come from other areas, including down country.

Improved Local Economy: The communities acknowledged that the project will contribute to the growth and development of the local area population. At the same time the project will benefit entire Gilgit-Baltistan, which will result in (a) reduced travel time, b) increased business opportunities; (b) employment of locals during the construction phase; and (c) tourism will promote, being the GASSR route having natural beauty thus far improve the quality of life of local people, including hotel industry and transport sector.

7.7 Overall Impact Evaluation

As a result of GASSR Project negative impacts are foreseen as minor due to project construction and operation activities. Instead, this project will provide safe, short and scenic travel route for the people of Baltistan regional and Astore district, as well as the tourists visiting the area. Even though, during the construction phase, there will be limited negative impact (short period) on the surrounding communities, these impacts are manageable and can be mitigated through appropriate mitigation measures.

7.7.1 Impact Matrices

Impacts assessment is done using impact matrix for construction and operation stages of the infrastructure project. The identified impacts are categorized based on the magnitude of the impact and the probability of its occurrence. Following tables provide impacts of various activities on the environment at design, construction and operation stages, respectively.

Considering the baseline conditions of the overall project features, the consultant has also developed a project impacts evaluation Matrix. Significance of positive and negative cumulative impacts caused by the GASSR Project are colored (Table 28).

Table 28: Impact Matrix

Negligible/No Impact:	**O**	The impact which has unapparent and negligible influence on natural and socio-economic environment.
Low Adverse Impact:	**LA**	The impact which has a slight influence on the natural and socio-economic environment.
Medium Adverse Impact:	**MA**	The impact which can be eliminated/ mitigated after applying the appropriate mitigation measures.
High Adverse Impact:	**HA**	The impact which can be partially/ but not fully mitigated by applying the mitigation measure.
Lower Positive/ Beneficial Impacts	**LB**	
Positive/Beneficial: Impact	**B**	The impact which improve/enhance the natural and socio- economic environment.

7.7.2 Summary of Potential Impacts

The potential impacts are sumamrised in Table 29.

Table 29: Summary of Potential Impacts

Project Activities / Issue	Potential Impact
A. Design & Planning Phase	
Topographical survey and Geotechnical investigation of the area	**129- No potential impact**
Acquisition of land and other private assets/ Route Selection(alignment)	**130- Acquisition of land for the construction of road.** **131- Other social issues related to resettlement** **132- Change in Land Value** **133- Disruption of public utilities**
Land and landscape transformation	**134- Impact of taking materials from the borrow sites** **135- Soil Erosion** **136- Change in hydrologic regime** **137- Destabilization of mountain slopes** **138- Topographic change**

Project Activities / Issue	Potential Impact
	139- Clearing of vegetation and cutting of trees **140- Disruption to Wildlife**
B. Construction Phase	
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	**141- Socio–economic and cultural issues, like women privacy, child labor, burden on local health services and other social sector services etc.** **142- Land degradation due to solid waste disposal of camp site and other allied facility like asphalt and concrete plant** **143- Deterioration of air quality due to machinery & equipment as well as during excavation of the road** **144- Potential for spread of oils & chemicals from Workshop facilities on the camp site** **145- Noise and air Pollution** **146- Loss of vegetation** **147- Soil erosion** **148- Contamination of soil and water body** **149- Burden on available local resource, like water** **150- Changes in land use pattern** **151- Influx of external work force** **152- Health and Safety issues**
Transportation of construction materials	**153- Soil erosion and contamination** **154- Air pollution** **155- Noise pollution** **156- Occupational Health and Safety issues** **157- Community health & safety issues**
Construction Work Cutting of rocks, large scale excavation, dumping of soil and blasting, etc.	**158- Blockage of natural drainage** **159- Land sliding** **160- Soil erosion and impact on top fertile soil** **161- Blockage of irrigation system & natural drainage** **162- Pollution from asphalt and concrete plant** **163- Water body contamination** **164- Noise, air and vibration issues** **165- Loss of vegetation** **166- Burden on available water resource** **167- Ecology and biodiversity disturbance** **168- Land degradation due to solid waste disposal** **169- Blocked of access due to earth works and stockpiling of excavated material** **170- Resource efficiency and conservation issue** **171- Disruption of Existing Public Utilities/ Infrastructure**
Health and safety issues	**172- Occupational Health and Safety issues** **173- Traffic management issue** **174- Community health & safety issues**
C. Operation Phase	
Road and traffic management and	**175- Surface and groundwater contamination** **176- Land Sliding**

Project Activities / Issue	Potential Impact
maintenance activity	**177- Road and traffic safety issues** **178- Noise pollution** **179- Air pollution** **180- Ecology and biodiversity disturbance** **181- Land degradation due to solid waste** **182- Social & cultural change** **183- Health and Safety**

7.7.3 Impact Assessment Matrix

Table 30: Overall Impact Evaluation Matrix

Impact Assessment Matrix for Construction Phase																		
Sr.#	Description	Physical Environment						Biological Environment			Socioeconomic Environment							
		Topography	Soil Erosion/ Contamination	Landscape	Air quality	Hydrology and Drainage	Groundwater Quality	Habitat Change	Vegetation	Animal Movement	Health & Safety for Public Worker	Disruption of Public Utilities	Employment	Population Disturbance	Cultural/Religion Values	Noise Vibration	Local Economics/ Benefits to	Traffic Management
1	Construction camps, workshops etc.	O	LA	O	LA	O	LA	O	O	LA	LA	O	LB	LA		LA	LB	O
2	Excavation operations	LA	LA	LA	MA	LA	O	LA	LA	LA	LA	LA	B	LA	O	MA	LB	LA
3	Transportation of construction Material	O	LA	O	LA	LA	O	O	O	LA	LA	O	LB	LA	O	MA	LB	LA
4	Use of construction materials etc.	O	LA	O	LA	O	LA	O	O	O	LA	O	O	O	O	LA	LB	LA
5	Earthwork/ Concrete work operations	LA	LA	LA	LA	O	LA	LA	O	LA	LA	LA	B	LA	LA	MA	B	LA
6	Operation of Concrete Batch Plant	O	LA	LA	HA	O	O	O	O	O	LA	O	B	O	O	MA	B	O
7	Disposal of Wastewater	O	MA	LA	MA	LA	LA	O	O	O	LA	O	B	LA	O	MA	LB	O
8	Solid Waste Management	O	LA	LA	LA	LA	LA	O	O	O	LA	O	LB	O	O	O	O	O
9	Storage of oil/diesel	O	LA	O	LA	O	LA	O	O	O	LA	LA	LB	LA	O	O	O	O

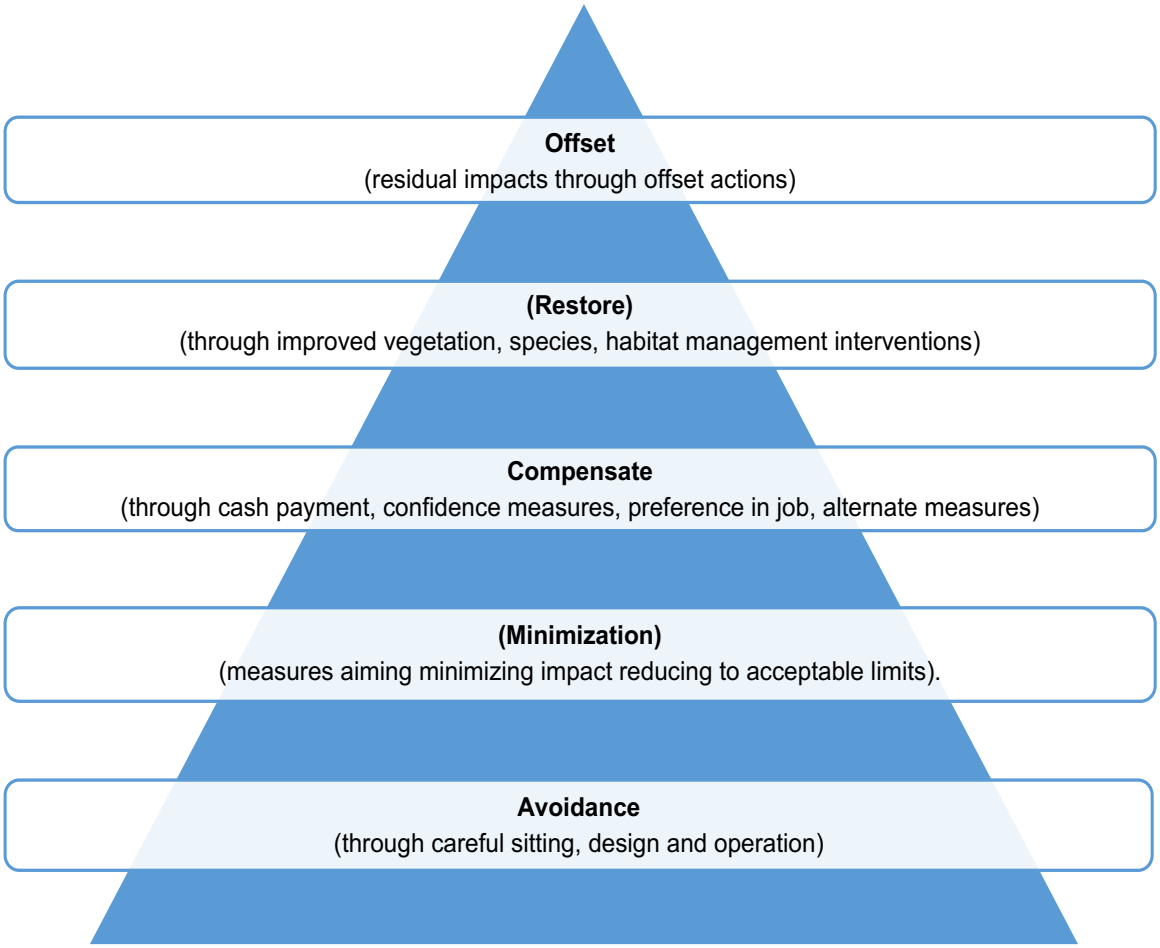
7.8 Impacts and Mitigation Measures

7.8.1 Basic Approach to Mitigation

Mitigation measures, where necessary, were identified with the following priorities:

- **Avoidance:** if possible, e.g., by modifications of the Project, measures will have to be sought which can avoid relevant impacts altogether; such measures must be checked with the technical team of the Consultant to ensure that they are feasible, acceptable for the Project, and actually integrated in the planning and design.
- **Minimization**: measures to reduce impacts to an acceptable level (e.g., avoiding the road alignment passing through hazard and land/avalanche sliding areas, and noise reduction measures to ensure that legally defined noise levels are respected).
- **Compensation**: if avoidance and minimization is not possible, then adequate compensation will have to be provided; this will be the case mainly for the human population presently using the land (compensation for field and other uses).
- **Restore and Offset**: if avoidance, minimization, and compensation is not possible, then measures to restore and offset through repair and alternate measures.

Figure 7-1: Hierarchy of Mitigation Measures Considered



Source: Self-compiled

7.8.2 Impacts and Mitigation Measures during Design Phase

The design phase mainly comprises of comprehensive feasibility study of the proposed road alignment. No major physical interference such as construction and movement of heavy machinery during this phase except site inspection and other investigations for the completion of the feasibility study.

The feasibility study of the GASSR project has been completed by the consultant, and currently the feasibility study with a revised PC-1 is under process of approval. However, as standard practice potential impacts and suggested mitigations measures to be considered in the Design Phase have been summarized as under:

Route Selection (alignment): Improper route selection for the road alignment could lead to social issues of resettlement/relocation of assets and displacement of people. This impact would be of high significance.

Mitigation Measures:

Most of the significant environmental and social impacts of the project can be addressed at the design phase, which is mainly the responsibility of the Design Engineers. The location of various components and structures, nature of construction technology etc. predominantly determine the environmental and social implications of the project. Despite having examples of other similar projects, the exact quantum of environmental and social impacts cannot be predicted at times. Hence, the efficacy of the design will finally be tested only when the results of follow up monitoring become available. The Design Engineers must also add all features for safety of the workers during operation and maintenance (O&M).

After analyzing all the considered alternatives route, the most environmentally sound, climatically suitable and most economical alternative considered is Gorikote to Kachura via Bubin Astore passing through Shagarthang valley in Skardu. This option involves lesser land acquisition and resettlement as well as can be all weather route.

The location of road alignment can have a substantial impact on the wildlife and natural vegetation is due to Wildlife Vehicle Collisions (WVC) events that may occur during construction and after the road is constructed. Thus, integration of transportation and conservation planning at the initial design stages, when location /alignment is discussed, is essential to addressing the WVCs. With this integration, the routes can be laid out with consideration of animal presence, animal movements and ecological process. Typically, these efforts are aimed at conservation, but they can also substantially reduce WVCs.

Road Design Considerations: Consideration of some basic WVC mitigation principles in designing various elements of the proposed road could minimize the potential for WVCs. Some of the mitigations are wildlife fencing (which includes fence types, height, mesh size, overhangs and dig barrier, posts etc.), wildlife underpasses and overpasses, multiple use underpasses and overpasses, vegetation management in the ROW etc. These concepts could also be used as part of the initial road alignment and design.

Seismic Hazard: The project falls under Seismic Zones 3 and a high intensity earthquake impacting the project site can adversely impact the development. This factor requires special consideration of the designers keeping in view the earthquake of October 08, 2005 and most recently a series of earthquake in Rondu which is in proximity to the project area. This will be a major negative impact on the project.

Mitigation Measures:

184- The proposed road will be designed and constructed to withstand earthquake hazards considering the peak ground acceleration of the area. In this Zone, designing of various types of structures will be done based on Peak Ground Acceleration (PGA).

185- Retaining walls will be constructed along the road and also included in the project design.

186- For seismic hazard analysis, updated structural and seismic evaluations will be carried out.

Drainage: The project area has high frequency of snowfall especially during winter and water flows through the hills passing (summer season) through the road which may deteriorate the road surface decreasing the life of the road. This has moderately negative impact on the project.

Mitigation Measures:

Box culverts and causeways will be provided on the water courses, whereas pipe culverts will be provided for disposal of water from side drains. Adequately wide bridges shall be constructed on the major nullahs.

Slope Stability: Slope stability may be affected by construction of road cuts or embankments. Excessive slope of steep cuts, changes in drainage capacity and pattern can result in landslides as the project area is prone to land sliding. This will be major negative impact.

Mitigation Measures:

187- Design will consider maintaining natural angle of cut slopes and embankments to avoid land sliding;

188- Minimum clearance of vegetation especially tall trees shall be considered in the design;

189- Engineering measures will be incorporated in design to control runoff and increase slope stability e.g., Rip Rap and Retaining wall etc.

Tree Cutting and Uprooting: Thousands of trees to be cut for construction of the road which includes farm forest trees, fruit trees and natural forest trees. The number of trees to be cut will be finalized at the detailed technical design stage.

Though the project proposes to offer monetary compensation for the trees to their respective owners, its ecological impact for the area will remain.

Mitigation Measures:

190- Comprehensive tree plantation plan will be developed after final alignment and prior to start of the road construction and updated inventory will also be carried out. Tree plantation plan should be prepared in consultation with Forest Department Skardu and Astore and the local communities, clearly defining the quantum, roles and responsibility with concrete financial plans.

191- Site specific Tree Plantation Plan will be prepared by the contractor prior to the commencement of construction activities at each site in collaboration with local communities.

192- Compensatory plantation of ten trees in place of one tree must introduce in PIZ and a strong community mobilization should be taken using local NGOs and Community-based Organizations, Local Support Organizations.

193- Use of native and zone-specific species where needed and non-native species to be

strictly avoided. However, within the villages high value fruit trees may be introduced and provided to the communities to plant in their fields.

Disruption to Wildlife: The project area is rich in biodiversity, both floristic and faunal. Numerous occasions of human interaction with wildlife have been reported around the proposed project vicinity particularly in high altitude areas such as Shagharthang, Domel, Bubin, Gudai etc. The construction of proposed road might result in disturbance to wildlife habitats in the area. However, the impact is likely to be mitigated through roadway engineering design measures and wildlife will be able to adjust its niche using its intrinsic phenotypic plasticity.

Mitigation Measures:

The torrential run off nullahs and other natural passages are used by the ungulates and other fauna to reach the water sources. Considering the needs and keeping in mind to minimize the natural conflicts of the system, sustainable provisions in the form of elevated structures, culverts and other crossings shall be planned.

Topography: The topography in the project area will change because of the construction of road and other project related structures. Decreasing the road gradient will result in considerable earthworks resulting in significant change in the topography. Earthwork and excavation operation will cause high adverse impact on the topography.

Mitigation Measures:

Visual changes to the topography will be of permanent but slightly adverse in nature and need no mitigation measures except that the project design should consider aesthetic concerns. In the proposed design measures shall be taken minimize these impacts.

Change in Land Value: The proposed project is expected to increase the land value, especially in villages where little or no road infrastructure is present. Landowners will have an opportunity to sell their land on increased prices and invest into new businesses, like hotels and shops alongside the road. This impact will be major positive in nature but also will have a negative impact because of land size for agriculture will be reduced.

Mitigation Measures:

Although this is a positive impact but selling land will have a negative impact on the affected households (AHHs) in the long run. Therefore, through local community organizations, awareness of land use planning in a beneficial way shall be carried out, such as using it for commercial purposes on rent instead of sell.

Public Utilities: Due to the proposed project, public utilities affected may create disruption of public services and economics. This impact is however temporary and minor negative in nature.

Mitigation Measures:

194- Incorporate technical design features to minimize effect on public utilities.

195- All public utilities likely to be affected by the road project need to be relocated well ahead of the commencement of construction work.

196- For the construction of the proposed road, a provision will be kept for a cable duct for fiber optic cables in road's engineering design. This provision shall be in case the Special Communication Organization (SCO) intends to lay fiber optic line along this road.

Poor Design leading to Reduced Project Life: The project area being a hilly terrain, is prone to strong water currents, flash floods, land sliding, avalanches, etc. If the design is poor, it may cause erosion leading to reduced project life. This impact is permanent and negative in nature.

Mitigation Measures:

197- Review design to ensure that it incorporates design related mitigation measures such as surface water body crossing for easy flow of discharge produced by upstream, appropriate selection of sites for waste dumping and borrow, slope stabilization, etc.

198- Edge scouring of earthen embankments or concrete work must first be dealt at design stage. Wherever such a situation is anticipated, aprons should be provided to secure edges and specifications must be kept of high standards, at minimum NHA standards.

Settlements: The settlements include structures, shops, mosques, houses etc. found to be encroached within the ROW are detailed out in the project detail design and assessment of the revenue department. The final list of the structures and PAPs on ROW will be determined prior to contractor mobilization and construction starts.

Mitigations Measures:

199- Efforts need to be made to align the road in a way to avoid the minimum damages to **the structures and other settlements within the villages.**

200- In case it is essentially required to remove the settlements, adequate compensation may be made to the affected people as per Revenue Department notifications.

201- Religious/Cultural Resources: Being 100% Muslim population, in the vicinity of project area there are mosques, Imam-Bargahs and graveyards. During construction of the proposed road, it is anticipated that these religious and physical cultural resource may be affected.

Mitigations Measures:

202- During designing of the road, alignment must be adjusted keeping in view the location of religious and physical cultural resources.

203- If unavoidable, a suitable alternate site must be allocated to the affected mosques, Imam-Bargahs, shrines and monuments. For this the local people particularly religious leaders need to be involved.

7.8.3 Impacts and Mitigation Measures during Construction Phase

A brief explanation of the impact of the proposed road during construction phase is given and possible mitigation measures have been suggested.

Land Acquisition, Resettlement and Compensation: The proposed road is constructed in a corridor where most of the areas do not have existing road except in populated areas/lower reaches. The existing roads are very small in size with steep slopes, land will be acquired for widening and realignment of the existing roads. This will result in loss of infrastructure, commercial activities and affect the people livelihoods.

Mitigation Measures:

204- Careful alignment to minimize the impact by avoiding the houses and shops especially in Gorikote and Kachura villages.

205- A detailed Resettlement Action Plan need to be developed

206- The compensation for the structures, houses, shops, trees, private and public properties etc. must be paid to the affected households as per Resettlement Action Plan

and Revenue Department standards.

207- Mitigation measures will involve land management and providing judicious compensation to the affected people by allocating sufficient budget in the project cost. The process of land acquisition and compensation will be followed in a transparent manner to minimize the social impacts.

208- Adequate budget will be allocated in the Project cost for the compensation to the project affected people as per Land Acquisition Act, 1894 and Revenue Department standards. A judicious and fair compensation package at least the prevailing market rates.

Soil: Soil may be affected by erosion, compaction, and contamination. Soil erosion may occur on roadside, at contractors' camps and at embankment works, because of uncontrolled run-off from equipment washing yards, excavation of earth/cutting operations and clearing of vegetation. Soil may also be impacted due to unauthorized use of borrow areas and quarries, resulting in degradation of landscape. Whereas contamination of soil may be caused by oil and chemical spills at asphalt plant sites, workshop areas and equipment washing yards. This may limit the future use of land. This impact is high adverse negative in nature.

Mitigation Measures:

209- Soil contamination by asphalt will be minimized by placing all containers in a bonded area away from water courses;

210- Provision of impervious platform with oil and grease trap for collection of spillages during equipment and vehicle maintenance;

211- All spoils shall be disposed of safely and the site shall be restored back to its original conditions;

212- Non-bituminous wastes from construction activities shall be dumped in approved sites, in line with the legal prescriptions for dumpsites;

213- In areas with strong sheet flow, high embankments will be provided with chutes and drains/culverts to minimize soil erosion. Stone pitching and retaining walls will be made at high embankments in critical areas;

214- As applicable and needed, plantation of grasses and shrubs will be done for slope protection;

215- Soil erosion control measures such as the formation of sediment basins, slope drains, etc., shall be adopted;

216- Productive land or land adjacent to agricultural/irrigated land shall not be preferred for excavation. Non-productive, barren lands in broken terrain, nullahs and publicly recognized waste lands will be given preference for borrowing materials, and;

217- Aggregate required for construction procured from quarries and river beds will need approval from authorities.

Excavation of Earth, Borrowing and Stone Quarrying: The excavation of earth from borrows areas and for clearance of ROW may result in erosion of soil. Erosion results in change of edaphic characteristics of soil. Loss of fertile topsoil may affect adversely on the productivity of the project area. The impact is high adverse in nature.

Mitigation Measures:

218- Avoid agriculture land for borrow materials;

219- Contractor needs to obtain approval for excavation and submit the plan of rehabilitation

of the site after excavation;

220- In case soil excavation from agricultural land is unavoidable, the top 1 ft soil will be stored at stockpile area for future use in rehabilitation of the site;

Blockage of Natural Drainage/Water Channels: The alignment also crosses streams, nullahs and water channels. These streams, nullahs, and water channels may be blocked and the catchment of the downstream may be disturbed during construction phase.

Mitigation Measures:

To minimize the impact of the project on the geophysical environment, a number of measures must be included in the design review and subsequent construction that will need to be taken into account when constructing the project facilities. A second class of measures is related to the day-to-day management of the project during construction. Following specific measures are required to minimize potential impacts:

221- Unnecessary widening beyond the proposed design of the road shall be avoided at straight portions and on bends to minimize physical, biological, social and cultural aspects.

222- The natural drainage pattern must not be disturbed and culverts will be constructed where required.

223- Surplus soil and cleared vegetation will be disposed of so as to avoid disturbing the natural drainage.

224- Borrow sites would not be deeper than 5ft. at any location to avoid alteration in drainage pattern and reduce the risk of soil erosion;

225- The contractor will ensure that the borrowing does not cause slope instability, loss of soil/land productivity, uneven terrain and altered drainage, and;

226- Wherever necessary, these places will be levelled and planted with trees using appropriate planting methodology.

Surface and Groundwater: The surface water may get contaminated due to the surface runoff during construction phase. Construction activities may result in debris entering water body resulting in sedimentation. Storage and transport of construction material may also result in spills of chemical and contamination of water bodies. Groundwater may also get contaminated from the wastewater generation from the construction camps, leachate from improper dumping of solid waste. Consumption of water for construction activities may also affect other designated uses of water especially drinking water. The impact is high adverse in nature.

Mitigation Measures:

227- Take precautions and construct temporary or permanent structures to prevent water pollution due to increased sedimentation;

228- Maintenance workshop, material yard, crushers, asphalt plant and construction camps shall be setup at least 1.0Km away from water bodies;

229- Septic tanks and soakage pits shall be designed to cater the wastewater from the construction camps.

230- Water required for construction shall be obtained in such a way that the water availability and supply to nearby communities remain unaffected, and;

231- Regular water quality monitoring should take place according to determined sampling schedule.

Location of Labour Camp, Material Depots, Equipment Yards and Approach Roads: Location of camps near sensitive receptors like water bodies and use of private lands without prior consent of landowners for dumping and storage of construction material and equipment can result in adverse environmental impacts and create server social issues. Location of labor camps, material depot, equipment yard and approach roads will not cause any serious problem if selected in consultation with local communities and landowners and impacts can easily be mitigated.

Mitigation Measures:

232- The contractor will, in consultation with Supervision Consultant and Environmental Officer of PMU GASSR, select the location of all these facilities after a rapid assessment. Satellite imagery can also be used to select the suitable sites, to record the pre-construction conditions and to monitor the condition of these sites during and after the construction phase.

233- The labor camps/other site facilities will be established on a flat land without much natural vegetation, at least 500m away from the communities and surface water bodies.

234- The contractor will prepare a Camp Site Management Plan, get it approved by the Supervision Consultant/PMU and abide by its provisions. The plan will include measures for rehabilitation of site upon completion. It will also include the photographical and botanical inventory of vegetation before clearing the site.

Air Quality: Air quality will be affected by fugitive dust emissions from construction machinery, dust from the unpaved surface and construction vehicles. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability. Besides, multifarious construction activities and increased vehicular traffic (construction vehicles) would also contribute to the localized airborne dust. Once in the air, the larger sized particles under influence of gravity tend to settle down in the immediate vicinity of the source. The *Suspended Particulate Matter (SPM)* of the size smaller than 10micro-meter (PM10) tends to remain suspended in the environment for much longer and persistent time and is an environmental hazard. The objectionable impacts of settling of the suspended dust would be its dry deposition on vegetation, motor vehicles, structures and other exposed surfaces. Exhausts from fossil fuel burning in the construction machinery will also deteriorate local air quality. Similarly, exhausts from generators can also have impacts on air quality in the vicinity. The overall impact on the quality of air during the construction phase will be highly adverse, however, it will be temporary and limited to the project's construction phase only.

Mitigation Measures:

235- All vehicles, machinery, equipment and generators used during construction activities shall be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;

236- Blowing of dust from potential sources at the worksite shall be avoided by shielding them from the exterior, for example using polythene curtains or raising a fence of corrugated sheets around areas of active constructions;

237- Blowing of dust and particulate matter from stockpiled loose materials (e.g., sand, soil) shall be avoided either by sheeting them with tarpaulin or plastic sheets or by sprinkling them with light shower of water;

238- Open burning of solid waste from the contractor's camps shall be strictly banned;

239- Preventive measures against dust will be adopted for on-site mixing and unloading operations. During non-rainy times, water sprinkling of the site shall be carried out to suppress excessive dust emission(s);

240- Only good quality oils, petroleum products, additives and spares shall be used in the machinery, generators, and the construction vehicles. Usage of used oil shall be strictly prohibited, and;

241- Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair are needed to minimize the hazardous emissions.

Noise and Vibrations: Sources of noise during construction are heavy machinery such as bulldozers, excavators, stabilizers, concrete mixing plant, pneumatic drills, stone crushers and other equipment. This impact is temporary and high adverse in nature.

Mitigation Measures:

242- Selection of up-to-date and well-maintained plant or equipment with reduced noise levels ensured by suitable in-built damping techniques or appropriate muffling devices;

243- Confining excessively noisy work to normal working hours in the day, as far as possible;

244- Providing the construction workers with suitable hearing protection like ear cap, or earmuffs and training them in their use;

245- Preferably, restricting construction vehicles movement during nighttime and prayers time;

246- Heavy machinery like percussion hammers and pneumatic drills shall not be used during the night without prior approval of the client;

247- Vehicles and equipment used shall be fitted, as applicable, with silencers and properly maintained;

248- Contractors shall comply with submitted work schedule, keeping noisy operations away from sensitive points. Implement regular maintenance and repairs and employ strict implementation of operation procedures, and;

249- Noise barriers shall be provided where necessary in the form of high boundary walls (concrete or wood), earth berms, etc. in front of schools, hospitals and mosques if they are in proximity.

Borrow Areas/ Open Pits: Borrow/open pits and its excavation activities may result in land disputes, soil erosion, loss of potential cropland, loss of vegetation, landscape degradation and damage to road embankments. Borrow/open pits may also result in potential sources of mosquito breeding and may prove hazardous to human beings, livestock and wildlife. This will also degrade hygienic condition of the project area. This impact is permanent and high adverse in nature.

Mitigation Measures:

250- Conversion of borrow pits into fish farms and care in selection of borrow areas;

251- Necessary permits shall be obtained for any borrow pits from the competent authorities;

252- No excavations are allowed within distance of 500m to ROW;

253- In borrow pits, the depth of the pit shall be restricted up to 5ft and the sides of the excavation will have a slope not steeper than 1:4;

254- Soil erosion along the borrow pit shall be regularly checked to prevent/mitigate impacts

on adjacent lands, and;

255- In case borrow pits fill with water, measures must be taken to prevent the creation of mosquito breeding sites.

Impacts on Geology of the Area: The activities for the construction/installation of proposed project components involving cutting and blasting of rocks may disturb the stable geological formation of the area. As a result, features of the geological formation will be damaged at some places.

Mitigation Measures:

The aforementioned activities cannot be avoided during the construction phase. Therefore, following mitigation measures should be considered in order to minimize the adverse impacts:

256- It is suggested that blasting should be minimized where possible. If inevitable then low intensity explosive material should be used instead of high intensity explosive material;

257- Controlled blasting, i.e., increased number of blasts with low intensity explosive material should be preferred rather than high intensity single blast to avoid excessive damage to the surrounding rocks, and;

258- Retention walls must be provided where rock cutting for construction or widening of road is carried out. At a few places, rock cutting is likely to cause erosion, directly impacting the houses located in proximity.

Waste and Hazardous Waste: Waste will be generated at construction and contractors camp sites. The construction waste will include wastewater, oil spillage from machinery, domestic waste, and solid waste etc. Though no significant hazardous waste generation is envisaged during construction of the road, but the handling and storage of oil, asphalt/bitumen may be a source of environmental pollution as a hazardous waste. This will result in unhygienic conditions and health risk to work force and public at the camp site. This impact is temporary and moderate negative in nature.

Mitigation Measures:

Solid waste (including food waste) will be segregated and disposed of as follows:

259- Materials suitable for recycling will be stored separately and sold to approved recycling contractors;

260- Combustible waste, non-combustible, non-recyclable rubbish will be sent to a landfill;

261- Contractor will apply strict rules on his workers and labor to ensure that no spill or leakages are caused. All fuels, oils and bitumen will be stored appropriately, with concrete padding and bonding for containment in case of leakage;

262- Training of work force in the storage and handling of materials and chemicals that can potentially cause soil contamination;

263- Solid waste generated during construction and camp sites will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan;

264- Proper labelling of containers, including the identification and quantity of the contents, hazard contact information etc.;

265- Emergency Response Plan shall be prepared by the contractor to address the accidental spillage of fuels and hazardous goods;

266- Immediate collection of spilled oils/fuels/lubricants by collection of contaminated soils and skipping oils from surface water by applying appropriate technologies, and;

267- Used oil shall be collected in separate containers stored on impervious platform with restricted access and shall be sold to licensed contractor and the burning of waste oil shall be strictly restricted.

Contamination of Soil and Water due to Effluent: Effluents released because of the project activities, if not contained properly, may contaminate the soil and water bodies. If allowed to leach into the ground, the contaminants may also pollute groundwater. There is a causal link between effluent discharge and health, the impact of which is analyzed based on:

268- The nature of pollutants (oil and grease, chemicals, organic substances, etc.)
269- Discharge rate and duration
270- Discharge conditions
271- Characteristics of surface drainage and receiving water body e.g., water quality, flow rate etc.
272- Location of receptors (communities) with respect to the discharge point
273- Communities' exposure to pollutants (concentration of pollutants in water)
274- Current and potential uses of water in the community
275- Health risks due to pollutants.

Mitigation Measures:

Mitigation measures to reduce the impact of waste effluents produced during project activities are:

276- The camps will be located as to avoid proximity drinking water sources, maintaining a minimum distance of 500m away from such natural resources;
277- Wastewater from contractor's workshop and equipment washing yards shall be pre-treated before discharging it into natural streams; No contaminated effluents will be released into the environment without having been treated;
278- Sewage and other waste effluents will be handled to avoid contaminating surface and groundwater;
279- Water from washing areas and kitchen will be released into sumps;
280- An appropriately designed septic tank will be used to treat sewage and outlets will release treated effluents into sumps. The integrity of the entire system will be maintained and monitored;
281- Septic tanks and sumps will be built at a safe distance from any water hole, stream or dry streambed, so as to prevent the entry of surface water and the bottom of the sump will be kept above groundwater level;
282- Sumps will be located in a position such that they are:
    - Fixed in absorbent soil,
        - Down-slope and away from the camp (and downwind, if practical),
        - Downstream from the camp water source and above the high-water mark of any nearby water body (if any),
        - When abandoning sumps, an extra cap of soil will be placed over them to allow compaction,
        - Vehicle and equipment maintenance, including washing, will be allowed only in designated areas underlain with concrete slabs and a system to catch runoff.

Waste Management from Asphalt and Concrete Plants: Concrete and asphalt have limited usable life, after which they become waste. If not used within the time span, their wastage will

have major financial implications. Further, their disposal will become very difficult because of the large quantities involved.

Mitigation Measures:

283- The contractor will develop specific environmental management plans for asphalt plants and concrete batching plants. These plans will incorporate the general measures as applicable to the entire project but will also have focused mitigations for solid waste from these plants;
284- The plan will be reviewed and approved by Supervision Consultant and PMU;
285- Reusing bitumen spillage;
286- Disposing non-usable bitumen spills in a deep trench providing clay linings at bottom and filled with soil at the top (for at-least 0.5 m);
287- Segregating and stockpiling scarified/ milled bituminous material and reusing this material in sub grade/shoulders.

Green House Gas (GHG) Abatement: The main sources of greenhouse gases (CO2, CH4, NOx etc.) during the construction activities of the proposed project will include both mobile and stationary sources. The mobile source will be the construction and transportation vehicles while the stationary source will be the batching and asphalt plants. Emission of GHG cause global warming and other climatic changes on regional and global scale.

Mitigation Measures:

288- Regular motioning of the vehicles for engine efficiency;
289- Avoid idling of construction vehicles;
290- Alternative energy resources (Solar PV) shall be considered as much as possible, and;
291- NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery shall be enforced during construction works.

Resource Conservation: Almost all the materials to be used in the construction of project are non-renewable, therefore their sustainable use is necessary for the future use. Large quantities of water are used in the construction of concrete structures and in watering the unfinished surfaces. Excessive use of water might affect the water availability for community. Bitumen and other construction material are not locally produced, and its sources are not locally available so its sustainable use is prerequisite. The impact is moderate adverse in nature.

Mitigation Measures:

292- Wastage of water shall be reduced by training the workers involved in water use;
293- Wastage of water shall be controlled through providing proper valves and through controlling pressure of the water;
294- Water jets and sprays shall be used for watering surfaces rather than using overflow system;
295- Source of water shall be carefully selected. Water use shall not disturb the existing community water supplies;
296- Unnecessary equipment washings shall be avoided, and;
297- Use optimum amount of bitumen for road surfacing.

Energy Efficiency: Use of electricity will be insignificant. Diesel and residual fuel oils will be used to operate construction machinery and asphalt and batching plants. Sustainable use of energy resources is very important not only to continue future use, but it will also help to reduce

air emissions. For conservation of energy, efficiency of the engines and burning processes is very important. Sustainable use of diesel and residual fuel is necessary. The impact is moderate adverse in nature.

Mitigation Measures:

298- Ensure adequate insulation to reduce heat loss through batching plants;
299- Regularly monitor CO and CO2 content of the flue gases to verify that combustion systems are using practical excess air volumes;
300- Maintain clean heat transfer surfaces in asphalt batching plant, and;
301- Regular service of the vehicles and batching plants will reduce the mechanical losses of energy.

Disposal of Mucking Material: Inevitable cut and fill earthwork operations will open up scars on the land around the project area. This impact is temporary and minor negative in nature.

Mitigation Measures:

302- Mitigation measure will include proper landscaping, which should be given due consideration along with re-establishment of the local/indigenous vegetation.
303- The excavated materials that are unsuitable for use will need to be stored, transported and reused and the residual material shall be disposed of appropriately at designated sites.

Impacts of Heavy Vehicles on the Existing Road: The plying of heavy vehicles on the existing road may result in air pollution (due to unpaved roads), noise pollution due to tire road friction, especially near sensitive receptors (residential areas, school, health facility etc.) and damage to roads and traffic congestion. However, the impacts would be temporary and moderately negative in nature for which the following mitigation measures are proposed.

Mitigation Measures:

304- Any vehicle with an open load carrying area used for transport of potentially dust producing materials shall have properly fitted side and tailboards. Materials having potential to produce dust shall not be loaded to a level higher than the side and tail boards and shall be covered with clean tarpaulin in good condition. The tarpaulin shall be properly secured and extended to at least 300mm over the edges of the sideboard and tailboard;
305- Where dust emissions are high, diversion tracks, if required, shall be overlain with shingle or surface treated;
306- The Contractor shall not use any vehicles either on or off road with grossly excessive noise pollution. In case of built-up areas, noise mufflers shall be installed and maintained in good condition on all motorized equipment under the control of the Contractor;
307- The Traffic Management Plan shall be implemented and communicated to the Supervision Consultant and PMU.

Impact on Flora: The most significant adverse impact of this road will be destruction of forest habitat that hold a variety of plant including herbal and mechanical plants. This will be a major adverse impact of the proposed project.

Mitigation Measures:

308- Implementation of tree plantation plan developed at design phase will be ensured;
309- Site Specific Tree Plantation Plan will be prepared by the contractor prior to the commencement of construction activities;

310- Vegetation will only be cleared where it is absolutely necessary;
311- Construction workers will not be allowed to use wood from the area are cooking fuel;
312- Compensatory plantation of ten trees in place of one tree should be ensured, and;
313- Use of native and zone-specific species where needed; non-native species to be strictly avoided.

Impact on Wildlife and Threatened / Endangered Species: Construction activities accompanied with construction camps may affect fauna prevailing in the project area. The cutting of trees for the construction camp sites and road widening will have a negative impact on the fauna as well. Construction activities involving excavation, movement of labor, carriageway of goods and machinery to various sites along the project area will negatively impact fauna. Most animals will avoid these areas. Some reptiles might be killed during digging and piling operations. Edible and refuse goods of the contractor's camps may attract wildlife that might be hunted by the workers. This will be a major negative impact.

Mitigation Measures:

314- Enforcement of project policy of a complete ban on hunting, transport of hazardous substances and removal of plant materials;
315- Advanced and efficient machinery will be employed for construction work in order to keep a check on noise pollution that affect fauna negatively;
316- The wildlife department will be taken on board and consulted whenever any interaction with wildlife is envisaged;
317- Dumping of construction material will be avoided in areas of dense vegetation. Dumping areas selection will be done in consultation with the wildlife department and supervision consultant.
318- The camps will be properly fenced and gated to check the entry of wild animals in search of eatable foods. Similarly, wastes of the camps will be properly disposed of to prevent the chances of eating by wild animals, which may become hazardous to them;
319- Awareness will be created among the construction workers on wildlife conservation and its importance, and;
320- Low speed limits shall be maintained for construction vehicles to avoid disturbing wildlife in their habitats, particularly in access roads to quarries and camps sites.

Impacts on Aquatic Life: In both the districts, the natural streams are full of fish and other aquatic species, therefore, if debris or spoil is dumped in to surface water bodies during construction, it may negatively impact the aquatic life.

Mitigation Measures:

321- The contractor will be bound not to dumped spoil/debris in the streams, and nullahs;
322- Areas shall be designated for dumping and disposal of Muck, which should be in consultation and approval of Supervision Consultant and PMU.

Accessibility Issue: Closure of existing unpaved road and other pathways during the construction phase of the project will cause inconvenience to the local residents and affecting their daily life activities. It might be difficult for the students to reach their schools/colleges. Similarly, the patients may also face difficulty of access to the basic health units and hospitals.

Mitigation Measures:

323- Mitigation measures will include public awareness through media, proper traffic diversion plans, appropriate sign boards and timely completion of the project, and;

324- Alternate temporary road will be constructed to keep access to villages.

Traffic Management: Due to the proposed construction activities, on site traffic management may pose a challenge on the road since it is single lane road and hilly terrain. Movement of heavy machinery and construction activities may result in temporary traffic restriction or may result in accidents and cause inconvenience to the people passing through the road. This impact is temporary and moderate negative in nature.

Mitigation Measures:

325- Movement of vehicles carrying construction materials will be restricted during the daytime to reduce traffic load and inconvenience to the local residents;

326- Coordinated planning with the traffic police in accordance with the construction program for advance warnings to the residents and road users;

327- Construction vehicles, machinery and equipment will move or be stationed in the designated project boundary;

328- Diversions shall be suggested and well communicated to the road users clearly and well ahead of construction commencement;

329- Availability of continuous emergency services to deal with accidents, and;

330- The PMU and Contractor is required to maintain liaison between the Traffic Police, local residents/travelers and the contractor to facilitate accident free traffic movement during construction stage.

Social impacts of labor Influx: This can be particularly acute in smaller communities hosting a largely male workforce and/or non-local workforce which may result in conflicts between locals and non-locals concerning employment opportunities, wages and natural resources. Mobile workers can also contribute significantly to gender-based social impacts and risks.

Risk of social conflict: Conflicts may arise between the local community and the construction workers, which may be related to religious, cultural, or ethnic differences, or based on competition for local resources. Tensions may also arise between different groups within the labor force and pre-existing conflicts in the local community may be exacerbated. Ethnic and regional conflicts may be aggravated if workers from one group are moving into the territory of the other.

***Increased risk of illicit behavior and crime*:** The influx of workers and service providers into communities may increase the rate of crimes and/or a perception of insecurity by the local community. Such illicit behavior or crimes can include theft, physical assaults, substance abuse, and sexual harassment. Local law enforcement may not be sufficiently equipped to deal with the temporary increase in local population.

Increased burden on and competition for public service provision: Presence of construction workers and service providers (and in some cases family members of either or both) can generate additional demand for the provision of public services, such as water, electricity, medical services, transport, education, and social services. This is particularly the case when the influx of workers is not accommodated by additional or separate supply systems.

Increased risk of communicable diseases and burden on local health services: The influx of people may bring communicable diseases to the project areas. The incoming workers may be exposed to diseases to which they have low resistance. This can result in an additional burden on local health resources. Workers with health concerns relating to substance abuse,

and mental issues. Local health and rescue facilities may also be overwhelmed and/or ill-equipped to address the industrial accidents that can occur in a large construction site.

Inadequate waste disposal and illegal waste disposal sites: Large populations of workers generate increased amounts of waste, for which no sufficient local waste management capacities may exist, which would likely lead to improper disposal practices.

Camp related land use, access roads, noise, and lights: The camp use can result in increase in noise and light pollution, especially at night. The construction of new access roads can also lead vegetation removal and landscape transformation.

Mitigation Measures:

331- Local population will be given preference in construction workers related jobs. The unskilled workers will be preferred from the local communities, while for skilled workers, the first choice will be given to local people;

332- The Contractor will prepare the construction camp management plan which, in addition to other components, will include the labor influx management plan;

333- The Contractor will select the specific timings for the construction activities particularly near the settlements, to minimize disturbance to the local population, particularly women and girls;

334- Contractor and supervision consultant will take due care of the local community and observe sanctity of local customs and traditions by his labour force. Contractor will warn the workers and staff strictly not to involve in any unethical activities and to obey the local norms and cultural restrictions;

335- During construction activities, if privacy of the local people and nearby households is affected, the Contractor will inform the house owner to make appropriate arrangements. Similarly, Contractor will take care as much as possible that the construction activities should not affect the household's privacy;

336- The Contractor will also ensure that solid waste and wastewater is disposed of in an environmentally friendly manner in the designated areas and approved by Supervision Consultant;

337- The Contractor will explore alternative water sources and ensure that water usage by the project does not affect or compete with water requirements of the local community, and;

338- The Contractor will also ensure that noise and light pollution from the labor camps is kept at minimal levels, especially at night.

Gender Issues: Due to the project activities local women and girls many not be able to perform their daily outdoor chores and schools attendance. The induction of outside labor may create social and gender issues due to the labor force being unaware of local customs and norms. It may also cause hindrance to the mobility of local women and girls for working in the field, herding livestock, picking fuel wood, and fetching water etc.

Sexual harassment: Construction workers are most of the time younger males. Those who are away from home on the construction job are typically separated from their family and act outside their normal sphere of social control. This can lead to inappropriate and criminal behavior, such as sexual harassment of women and girls, exploitative sexual relations, and illicit sexual relations with minors from the local community. A large influx of male labor may also lead to an increase in human trafficking, whereby women and girls are forced into sex work.

Child labor and school dropout: Increased opportunities for the host community to sell goods and services to the incoming workers can lead to child labor to produce and deliver these goods and services, which in turn can lead to enhanced school dropout.

Mitigation Measures:

339- The Contractor will be required to provide qualified key personnel to address the specific risks identified in the project including SEA risks. Contractors will specify key staff with the technical skill and experience to implement the SEA Action Plan;

340- The Bidding Documents must include specific requirements that minimize the use of non-local workers and encourage hiring of local workers, thereby minimizing labor influx;

341- The Bidder will be required to submit Codes of Conduct (CoCs) with their bids. The CoCs will set clear boundaries for acceptable and unacceptable behaviors of all individuals and companies and will be signed by companies, managers and individuals;

342- The Contractor will be required to establish anti-sexual harassment policies that governs conduct in the workplace;

343- The Contractor will be required to provide mandatory and repeated training to workers on local tradition and norms, and;

344- Provisions will be set in Contract Agreement for dedicated payments to contractors for SEA prevention activities (e.g. training) against evidence of completion.

Rise in the Prices of Essential Commodities: Due to induction of outside labor for project works, the demand for basic items will increase thereby causing an increase in the prices of essential commodities. Additionally, the road improvement activities during the construction phase may disrupt the normal flow of trade and supply of essential goods.

Mitigation Measures:

In terms of labor induction, the project will exert no significant impacts on the prices of essential commodities. To avoid risk of such price hikes, majority of the unskilled and semi-skilled labor will be recruited from the local areas and specific clauses will be added in the Contract Agreement of the Contractor. The Supervision Consultant and the Contractor will ensure that normal trade routes remain open, and supply of goods is not severely impacted. Additionally, the Contractor should normally procure the field camps supplies from the main markets or any nearby commercially active town or city.

Health and Safety

a) Occupational Health and Safety: Health risks and work safety problems may result at the workplace if the working conditions provide unsafe and/or unfavorable working environment and due to storage, handling, and transport of hazardous construction material. This is moderate negative impact.

Mitigation Measures:

345- Obligatory insurance against accidents for laborers/workers;
346- Providing basic medical training to specified work staff and basic medical service and supplies to workers;
347- Layout plan for camp site, indicating safety measures taken by the contractor, e.g., firefighting equipment, safe storage of hazardous material, first aid, security, fencing and contingency measures in case of accidents;
348- Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for laborers;
349- Provision of adequate sanitation, washing, cooking and dormitory facilities including light up to satisfaction;
350- Provision of appropriate PPEs to workers, e.g., helmet, adequate footwear for bituminous pavement works, protective goggles, gloves, earmuffs etc.;
351- Ensure strict use of wearing these protective clothing during work activities;
352- Elaboration of a contingency planning in case of major accidents;
353- Adequate signage, lightning devices, barriers, yellow tape, and persons with flags during construction to manage traffic at construction sites, haulage and access roads.

b) Community Health and Safety: The construction activities and vehicular movement at construction sites and access service roads may also result in roadside accidents particularly inflicting local communities who are not familiar with presence of heavy equipment and machinery. This is a temporary and moderate negative impact.

Mitigation Measures:

354- There shall be proper control on construction activities and oil spillage leakage of vehicles;
355- Efforts will be made to create awareness about road safety among the drivers operating construction vehicles;
356- Timely public notification of planned construction works;
357- Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity & social links;
358- Seeking cooperation with local educational facilities (school teachers) for road safety campaigns;
359- Provision of proper safety and diversion signage, particularly at sensitive/accident-prone spots;
360- If identified, consider additional guard rails at accident-prone stretches and sensitive locations (schools & hospitals), and;
361- During construction work pedestrian and vehicular passages shall be provided for crossing near settlement.

Impacts on Archaeological Sites (Physical Cultural Resources-PCR): So far, there is no known Archeological sites exist along the project corridor or its close vicinity which could be affected by the project. However, during construction, there is always a chance of finding

archeological remains. In that case, the Contractor shall immediately report it to the Supervision Consultant and PD/PMU.

Mitigation Measures:

362- Utmost care will be taken during construction to not disturb any sites that fall close to the alignment;

363- The Contractor will be required to instruct the construction workers and site supervisors to report the Contractor in case of any PCR is identified and physical work at the site shall not proceed before appropriate approvals are not obtained;

364- In case of a chance find during excavation, the Contractor will halt work at the site immediately, inform the Supervision Consultant and PD/PMU, and;

365- Legal provision should be met (the minimum distances of the archaeologically important sites to be maintained in accordance with the provisions of the Antiquities Act 1975).

7.8.4 Anticipated Impacts and Mitigation Measures during Operational Phase

Significant negative as well as positive impacts are expected during the operation of the project. Most of the associated impacts relate to road/traffic safety and the socio-economic benefit of the beneficiary community and tourists. The anticipated environmental, social and safety impacts related to the proposed project have been studied for the operational stage are:

Impacts on Land Sliding: Seismic risk, unstable geological formations, heavy rains-flash floods are major causes of land sliding in the hilly areas. It might have impact during construction and operation phases. The formation at some places of the project area may become loose due to the blasting of rocks. This will increase the risk of land sliding on proposed alignment. This impact has been considered in the design phase and would remain relevant even after construction of the project. The impacts of land sliding will be in the category of medium to high negative impact.

Mitigation Measures:

366- Review the feasibility design to cater the seismic activities up to relevant category earthquakes, land sliding and flash flood aspects;

367- Proper road safety instruction signage at sensitive location;

368- Reinforcement measure at such places by appropriate wire mesh lining and retaining wall will be provided to prevent land sliding, and;

369- Ensure tree plantation/bio-engineering measures before taking over the project.

Air Quality: Construction of road increase traffic related emissions due to traffic flow. The increased traffic levels and congestion might lead to increased vehicular (CO, NOx, SOx, PM10) pollution levels, which may result in causing public health risks, nuisance and other impacts on bio- physical environment. This impact is medium to high negative in nature.

Mitigation Measures:

370- Setting up of a system to monitor air quality along project route in accordance with the applicable standards/limits;

371- Helping the owners and occupants of the affected premises to identify and implement special measures such as hedges and vegetation to reduce air pollution;

372- Roadside tree plantations as part of the compensatory tree plantation exercise; plants should be selected in accordance with their ability to absorb emissions;

373- Regular road maintenance to ensure good surface condition;
374- Restricting speed limits at sensitive locations;
375- Monitoring air quality at defined points, intervals as schedule;
376- Regular vehicle checks to control/ensure compliance with NEQS, and;
377- Enforcement and penalties against traffic rules violators.

Noise: During the operational phase, the noise levels are anticipated to increase due to traffic related noise pollution, vibrations from engines and tires and mainly use of pressure horns. This impact is permanent and moderate negative in nature.

Mitigations Measures:

378- According to noise level results, additional sound barriers in the form of trees and hedges will be discussed with the affected people and planted if agreed;
379- Signs for sensitive zones (health centers/educational institutions etc.) to disallow the use of pressure horns, and;
380- Enforcement and penalties against traffic rules violators.

Wastes/ Hazardous Waste: Due to increased number of tourists using this road, solid waste and municipal waste is expected to be generated during operation phase. No hazardous waste is expected to generate in operation phase except during road maintenance works.

Mitigations Measures:

381- Solid waste generated shall be properly disposed of through local solid waste management system in coordination with the local government;
382- Provision of separate waste bins for different types of wastes, including plastic, recyclables etc.;
383- Coordination with the local administration for banning use of polythene bags in the area, and;
384- Management of hazardous waste during road maintenance works will be similar as given for construction phase.

Disruption to Wildlife: The project area is rich in wildlife. Few occasions of human interaction with wildlife have been reported by local people. The proposed road can impact wildlife movements by direct mortality or avoidance behavior. However, the impact is likely to be mitigated through design measures and wildlife will be able to adjust its niche using its intrinsic phenotypic plasticity.

Mitigation Measures:

385- If deem necessary, safety fencing and signage will be provided at wildlife hotspots;
386- Safe speed limit will be strictly implemented, to ensure fatal accidents involving wildlife or humans could be avoided;
387- Caution boards would be erected at crossing areas of wild animals. The exact location for boards would be determined through a survey of crossing animals;
388- Roadside reflectors may be used to scare animals away from the road when vehicles approach at night;
389- Pedestrian overhead bridges should be constructed in the populated areas for pedestrians and livestock crossings, and;
390- Fencing or plant barriers can reduce the risk of collisions between animals and vehicles.

Terrestrial Habitat Alteration: The existing ecosystem in this zone is very fragile. The accessibility to the natural forest for illegal tree cutting could in long run change the vegetation pattern of the area naturally or through management practices.

Mitigation Measures:

391- Strict watch and ward against timber mafia.
392- Rotational or restriction on grazing in pine zone to enhance regeneration rate.

Role of the Road as Ecological Corridor: The roadside margins can increase habitat diversity, they can support abundant populations of some small mammals, insects and birds, as well as native plant species. Roadsides can also be important habitats for rare native plant species and have the potential to restore native grass and wildlife communities. The proposed road can, therefore, provide ecological corridor through which there is a link between different habitats.

Mitigation Measures:

393- Restriction on construction of settlements along the road;
394- Restriction on clearance of vegetation from the margins of the road, and;
395- Restriction of grazing along the road sides.

Road Safety: Enhanced vehicular movement and speed may result in road safety issues like road side accidents. This impact is permanent but moderately adverse in nature, since the frequency of accidents may be lowered, but their intensity may be quite severe due to speeds at which vehicles will move. The impact may be considered permanent and high adverse in nature.

Mitigation Measures:

396- Strict enforcement of speed limits, installation of speed guns and channelization of traffic with respect to categories (heavy vehicle traffic and light vehicle traffic) and enforcement of penalties for the violators;
397- Installation and maintenance of all signs, signals, markings and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions which are susceptible to accidents;
398- Installation of speed guns/ cameras;
399- Enforcement of penalties for the violators;
400- Road marking should be done immediately after completion construction work, and;
401- Regular maintenance of vegetation within road ROW is necessary to avoid interference with vehicle travel and road maintenance.

Emergency & Disaster Preparedness: Emergency situations most commonly associated with road operations include accidents involving single or multiple vehicles, pedestrians and/or the release of oil or hazardous materials. Disasters such as earthquakes, flooding and other disasters such as fires, accidents may also occur.

Mitigation Measures:

- Emergency preparedness and response plan will be prepared in coordination with the local community, local emergency responders (Rescue 1122) and the traffic police to provide timely first aid response in the event of accidents and hazardous materials response in the event of spills, and;
- The *Emergency Response Plan* for earthquakes and manmade

disasters shall be implemented in close consultation with the Rescue Services (1122), and paramedics. In addition, training of the staff/employees regarding the emergency procedures/plans will be regularly conducted.

Use of Renewable Energy: The proposed road and allied infrastructure will require electrical energy, mainly for lighting purposes, during its operations. Following recommendations are made to ensure energy efficiency of the project.

Mitigation Measures:

The lights along the corridors, including lighting at the junctions, bus stops, truck layby etc., are proposed to be battery mounted solar lights. Budgetary provision for the proposed solar light will be given in the project cost and the specification for the same will be provided in the Biding Documents.

7.9 Positive Impacts

7.9.1 Employment Opportunities

Due to the construction of the proposed Project, economic activity will be generated in the project area as the laborers and semi-skilled staff will have an opportunity to work for the construction of the proposed project. This will help in developing their skills and capacities. This is a moderate positive impact.

7.9.2 Increase in Land Value

The proposed Project is expected to increase the land values, especially in villages where little or no road infrastructure is present. Landowners will have an opportunity to sell their land on increased prices and start new businesses. This impact will be major positive in nature.

7.9.3 Decrease in operating cost of vehicles

During the operation of the road, lesser wear and tear of the vehicles will occur and it will also result in lesser fuel consumption and decrease in operating cost. This impact is permanent and has a major positive impact.

7.9.4 Safe Travel Conditions

Short and better road conditions will result in smooth vehicular movement providing safer conditions for people of Gilgit-Baltistan, and tourists from mainland in general and Baltistan Division and Astore in particular. This is high positive impact.

7.9.5 Business Opportunities

This new road will promote new business opportunities for the people of project area, particularly Baltistan Division and Astore district. In addition, the local community will be benefited with economic opportunities due to the road passing through, tourists visiting the area, establishing small businesses, better employment, which will help improve the overall economic condition of local population. This impact will be permanent and major positive in nature.

7.10 Economic Development

Due to the construction of the proposed project, access mobility to other area especially Islamabad and Rawalpindi will be easy and safe. This road will be linked with the AVR near

Gorikote which in future will be linked to AJ&K and onward to Islamabad via Shonter tunnel. With the construction of this road and AVR linking with AJ&K and Islamabad will create new economic and commercial opportunities for the people of this area (employment opportunities and standard of living of the local people will be improved).

Connection between Baltistan and Astore will be strengthened, and people have easy and safe access neighboring districts. This road also provides a quick and safe access to the people of Astore to avail flights from Skardu International airport to other cities of country and abroad.

Chapter 8:
Environmental and Social Management Plan

Chapter Contents:

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

8.1 General

Environmental and Social Management Plan (ESMP) consists of the set of mitigation, monitoring and institutional measures to be taken during implementation and operation of the project to eliminate adverse environmental and social (E&S) impacts, offset them, or reduce them to acceptable levels.

8.2 Objectives of ESMP

The main objectives of ESMP are to:

409- Provide details of the project impacts along with the proposed mitigation measures and the corresponding implementation arrangements;
410- Define the role and responsibilities of the Project Proponent, Consultant, Contractor (s), and other Stakeholders and effectively communicate E&S issues among them, and;
411- Define a monitoring mechanism, reporting frequency and identify monitoring parameters to ensure that all the mitigation measures are completely and effectively implemented and identify the resources required to implement the EMP and outline the corresponding financing arrangements.

8.3 Institutional Responsibilities

Institutions and functionaries involved in the implementation of the ESMP will be:

412- C&WD through Project Management Unit (PMU) GASSR;
413- Supervision Consultant (SC);
414- Contractor (s), and;
415- Other relevant stakeholders

8.3.1 Responsibilities of C&WD (through PD/PMU GASSR)

The C&WD through PD/PMU GASSR will be responsible for the E&S management during the construction phase of the proposed project. The Project Director/PMU GASSR would designate an Environmental Expert/Officer (EE/O) would look after the E&S issues of the project during the construction phase. The responsibilities of Environmental Expert/Officer will be as follows:

- Monitoring E&S activities of the project as per GBEPA approved EIA;
- Exercising oversight over the implementation of E&S mitigation measures by the Contractor;
- Providing advice on E&S aspects to the SC and Contractor;
- Documenting the experience in implementation of the E&S process
- Assist the SC in preparing training materials and plans;
- Maintaining interfaces with the communities, Govt. Departments, and other stakeholders, and;
- Reporting to the GBEPA on status of ESMP implementation

8.3.2 Responsibilities of Supervision Consultant (SC)

Environmental Expert/Officer (EE/O) would oversee the performance of Contractor to make sure that the Contractor is carrying out the E&S measures in construction in accordance with ESMP as mentioned in the Contract Agreement. The EE/O would also provide assistance to the Contractor's staff to implement ESMP. Site Specific/Construction Environmental Management Plan (C-ESMP) would be prepared by the Contractor under the supervision of PMU and SC. The C-ESMP would be approved by the SC/PD PMU GASSR. The SC would provide guidance to the Contractor for implementing the C-ESMP activities during construction. The SC would be responsible for record keeping providing instruction through the "*Project Manager*" of Contractor for corrective actions and would ensure the compliance of various statutory and legislative requirements. The SC would maintain the close coordination with the Contractor and PD/PMU for successful implementation with E&S safeguard measures. The overall responsibilities of SC will be follows:

416- Discuss various E&S issues and mitigations measures and monitoring actions with all concerned directly or indirectly;
417- Review Contractor's C-ESMP as part of their work program;
418- Inspect, supervise and monitor all the construction and allied activities related to the ESMP and C-ESMP for the project;
419- Assist the EE/EO and Contractor to ensure good E&S and engineering practices;
420- Assist Contractor and EE/O and PMU in all matters related to public contacts including public consultation pertaining to E&S and community EHS issues;
421- Assist EE/O of PMU to carry out E&S – EHS and OHS monitoring;
422- Organize training for the environmental engineer/inspector of Contractor and staff, and;
423- Review monthly and quarterly E&S compliance reports of the Contractor and submit to the PD/PMU for onward submission to GBEPA.

8.3.3 Responsibilities of Contractor

Environmental Engineer of Contractor would carry out the implementation of the mitigation measures at construction sites. The Contractor would be bound through Contract Agreement to appoint the Site Environmental and Social Engineer with relevant educational background and experience. The responsibilities Contractor are as follows:

424- Prepare C-ESMP, monitoring plan, traffic control/diversion plan, and asphalt and batching plant area plans and would submit all the plans to the SC for review.
425- Implement the approved ESMP and C-ESMP and take effective measures against corrective actions plan;
426- Prepare the compliance reports as per schedule and submit it to PMU through SC;
427- Provide proper Personal Protective Equipment (PPEs) to the workers that includes breathing equipment in overalls in dust and blasting areas, face shields for flying particles, helmets, goggles, footwear in areas where expose to falling, rolling and piercing objects, hearing protection like ear buds and ear muffs in noisy areas and train them for their proper use, and;
428- Conduct the environmental and health & safety trainings to the workers /labor.

8.3.4 Construction Environmental and Social Management Plan (C-ESMP)

The Plan with sub-plans are site-specific and contract-specific and will be prepared by the Contractor by hiring a subject Specialist prior to the commencement of construction activities. The Plans to be prepared by the contractors for various aspects of the E&S management will mostly include the detailing of the measures included in the GB-EPA approved EIA's ESMP, developed as part of the report.

A brief description of other plans to be ensured by the Contractor are provided below:

Site Specific Wildlife Management Plan will be prepared by the contractor aligned with the Wildlife Safety Management Plan and as per the given mitigation measures during construction and post construction phase. The plan will be submitted to the PMU for review and approval before contractor mobilization.

Site Specific Tree Plantation and Management Plan will be prepared by the contractor as per the final tree inventory after finalization of the road alignment. It will specify the final number of trees to be cut for the specific site, the number of trees to be planted, specific spots of replantation, species to be planted etc. The plan will be submitted to the PMU for review and approval prior to contractor mobilization.

Erosion and Drainage Control Plan will be prepared by the contractor. The Plan will be submitted to PMU for review and approval before contractor mobilization.

Pollution Prevention Plan will be prepared and implemented by the Contractor according to mitigation plans given in EIA. The Plan will be submitted to the PMU for review and approval before contractor mobilization.

Waste Disposal and Effluent Management Plan will be prepared and implemented by the Contractor on the basis of the mitigation plans given in EIA. The plastic waste management will be included in the waste management plan. The Plan will be submitted to the PMU for review and approval before contractor mobilization.

Traffic Management Plan will be prepared by the Contractor on the basis mitigation plans given in EIA, after discussion with authorities responsible for roads and traffic. The Plan will be submitted to the SC and PMU for their review and approval before contractor mobilization.

Borrow Area Management and Restoration Plan for management and restoration of borrow areas will be prepared by the Contractor on the basis requirements described in the mitigation plans. This Plan will aim at minimizing the environmental and social impacts during borrowing activities and restoring as much as possible the original natural situation of these sites by various measures (refill, leveling or smoothening). Restoration methodologies will be included in the Plan. The Plan will be approved by the PMU.

Occupational Health and Safety Plan will be prepared and implemented by the Contractor on the basis relevant standards. The Plan will be submitted to the PMU for review and approval before contractor mobilization.

Drinking Water Supply and Sanitation Plan for water supply and sanitation provisions will be needed for the temporary facilities, labor camps and workshops, in order not to cause shortages and/or contamination. A plan will be prepared by the Contractor and submitted to the PMU for review and approval before contractor mobilization.

Construction Camp Management Plan will be prepared by the Contractor on the basis of the mitigation plans given in EIA. The Plan will include the camp layout, details of various facilities including supplies, storage and disposal. The Plan will be submitted to the PMU for review and approval before camp establishment.

Fuel and Hazardous Substances Management Plan will be prepared by the Contractor on the basis of the mitigation plans given in EIA and in accordance with the standard operating procedures, relevant guidelines and where applicable, material safety data sheets. The Plan will include the procedures for handling oils and chemical spills. The Plan will be submitted to the PMU for review and approval before contractor mobilization.

Emergency Preparedness Plan will be prepared by the Contractor after assessing potential risks and hazards that could be encountered during construction of road. The Plan will be submitted to the PMU for review and approval before contractor mobilization.

Communication Plan will be prepared by the contractor to demonstrate how they will communicate with local community leaders, provide details regarding employment opportunities and traffic management throughout the construction period. The contractor's communication plan should define a process for receiving, recording and responding to complaints and also monitoring of the success of any responsive action taken to prevent the escalation of any conflicts.

8.4 Environmental and Social Management Plan (ESMP)

8.4.1 Environmental & Social Management Plan (Design Phase)

Table 31: Environmental & Social Management Plan (Design Phase)

Impacts	Related Activities	Mitigation	Responsibility of Implementation
▪ Physical Scarring of landscape and topography. ▪ Loss of vegetation and fertile top layer of soil.	▪ Selection of Alignment ▪ Shifting of Public Utilities ▪ Excavation of Earth ▪ Identification of site for construction camps, asphalt & batching plant and crushers	• Careful alignment and route selection to minimize the impact.	Design Consultant
		• Assure minimum tree cutting and vegetation clearance during alignment selection, shifting utilities.	Contractor
		• Project design to consider aesthetic concerns.	Contractor
		• Agricultural areas will be avoided for borrowing of materials, unless requested by the landowner for lowering the land to create new irrigation polders.	
		• Contractor needs to obtain approval for excavation and for plan of rehabilitating the site after excavation.	
		• Identify locations where excavated material should be transported or to be reused or dumped.	
▪ Land sliding and Deterioration of road	▪ Earthquake ▪ Rainfall ▪ Flood/ upstream and water body crossing ▪ Poor design	• Ensure Seismic provision in all engineering and structural design.	Design Consultant
		• Retaining walls and adequate drainage structure will be constructed along the road and also included in project design.	
		• Design structures for easy flow of discharge produce by upstream.	
		• Avoid construction through flood prone area, if not possible; in design provide flood protection embankment/ RCC Retaining wall.	
		• Slope Stabilization and edge sourcing of earthen embankments or concrete work will first be dealt at design stage.	
		• Wherever such a situation is anticipated, aprons will be provided to secure edges.	
▪ Resettlement issues of local people and ▪ Disturbance to public and	▪ Selection of Alignment ▪ Land Acquisition ▪ Shifting of Public Utilities	• Selection of the route with minimum resettlement of the structures/people (if required).	Design Consultant
		• Adequate budget in the project cost for the compensation to the affected people as per Land Acquisition Act, 1894.	Design Consultant
		• Incorporate technical design features to minimize disturbance / interference with	Design Consultant

Impacts	Related Activities	Mitigation	Responsibility of Implementation
cultural properties or loss of properties/ businesses/ structures/ crops	▪ Identification of site for construction camps, asphalt & batching plant and crushers	cultural site and public property and public utilities as far as possible.	
		• In case of unavoidable interference to cultural site and public property prior notification and consultation needs to be made to reach consensus on procedures and options or any other form of agreed compensation.	PMU
		• All public utilities likely to be affected by the proposed project need to be relocated well ahead of the commencement of construction work.	Design Consultant
		• Construction camps, asphalt & batching plant and crushers sites must be 500 m away from the localities & cultural sites and 100 m away from the existing road.	
		• Asphalt, batching and crushing plants must be installed in the downwind direction of residential areas.	
▪ Vehicle and Road accident	▪ Selection of Alignment ▪ Poor design of road	• Adjust steep gradients and sharp curves/turns in the design.	Design Consultant
		• Provision of retaining walls in the design.	
▪ Change in Land Value	▪ Selection of Alignment	• Positive Impact, no mitigation required.	-

8.4.2 Environmental & Social Management Plan (Construction Phase)

Table 32: Environmental & Social Management Plan (Construction Phase)

Impacts	Related Aspect/ Activities	Mitigation	Responsibility of Implementation
Tree cutting / uprooting	• Construction related work. • Establishment of construction camps, asphalt & batching plant and crushers.	• Implementation of tree plantation plan developed at design phase should be ensured.	Contractor
		• Site Specific Tree Plantation Plan will be prepared by the contractor prior to the commencement of construction activities.	
		• Trees will only be cut/ cleared where it is absolutely necessary.	
		• Construction workers will not be allowed to use wood from the area are cooking fuel as well as for heating.	
		• Compensatory plantation of ten trees in place of one tree.	
		• Use of native and zone-specific species where needed; non-native species to be strictly avoided.	
Physical Scarring of landscape and topography.	• Excavation of Earth. • Material extraction quarrying/ borrow areas. • Construction work. • Establishment of construction camps, asphalt & batching plant and crushers.	• Excavation of borrow sites as per specifications.	Contractor
		• Borrow sites would not be deeper than 5 ft. at any location to avoid alteration in drainage pattern and reduce the risk of soil erosion.	
		• Install temporary erosion control features when permanent ones will be delayed. Use erosion control measures such as hay bales, berms, straw, or fabric barriers.	
		• Stockpiling spoil at designated areas and away from road.	
		• Cover stockpile with plastic sheeting, prevent run-off with hay bales, or use similar measures.	
		• Remove any left-over construction material/wastes from the construction sites.	
		• These sites shall be restored to its original conditions as far as possible.	
Loss of fertile top layer of soil and soil erosion.	• Excavation of Earth. • Material extraction quarrying/ borrow areas. • Construction work. • Establishment of	• Selection of borrow area with least vegetation cover.	Contractor
		• Assure minimum disturbance to native flora (vegetation clearance) during construction.	
		• Minimize the amount of clearing. Clear small areas for active work one at a time.	
		• Clear without destroying large plants and turf where possible and preserve them for replanting in temporary nurseries.	

Impacts	Related Aspect/ Activities	Mitigation	Responsibility of Implementation
	construction camps, asphalt & batching plant and crushers.	• Move earth and vegetation only during dry periods. Store topsoil for re-spreading. If vegetation is required to be removed during wet periods, disturb ground only just before actual construction.	
		• The contractor's staff and labor will be strictly directed not to damage any vegetation such as trees or bushes. They will use the specified paths and tracks for movement and will not be allowed to trespass through farmlands.	
		• Contractor will supply gas cylinders at the camps for cooking/heating purposes and cutting of trees/bushes for fuel will not be allowed.	
		• Re-vegetate with recovered plants and other appropriate local flora immediately after equipment is removed from a section of the site.	
		• The photographical and botanical inventory of vegetation before clearing the site will be done.	
Contamination of land, ground & surface water due to effluent, hazardous materials of waste.	• Operation of batching/ concrete and asphalt plant and crushers. • Camps • Spillage of lubricants, fuel and chemicals during • Operation, repairing and maintenance of machinery and equipment. • Excavation of earth. • Blasting. • Material extraction quarrying.	• Camps will not be located in close proximity of drinking water sources, maintaining a minimum distance of 500 m.	Contractor
		• Water from washing areas and kitchen will be released into sumps.	
		• Wastewater from contractor's workshop and equipment washing yards shall be pre-treated before discharging it into natural streams	
		• No contaminated effluents will be released into the environment without treatment.	
		• Septic tanks and sumps will be built at a safe distance from any water hole, stream or dry streambed, so as to prevent the entry of surface water and the bottom of the sump will be kept above groundwater level.	
		• Provide septic tanks for treating sewage from toilets before discharging through soakage pit.	
		• Prevent dumping of hazardous materials especially near Rivers and seasonal nullahs.	
		• Emergency Response plan is prepared to address the accidental spillage of fuels and hazardous goods.	
		• Appropriate arrangements such as usage of concrete base drip pans to avoid spills during fueling/oil change and for storage.	

Impacts	Related Aspect/ Activities	Mitigation	Responsibility of Implementation
		• Segregating and stockpiling scarified/ milled bituminous material and reusing this material in sub grade/shoulders.	
		• Non-usable bitumen and used oil shall be collected in separate containers stored on impervious platform with restricted access and shall be sold to licensed contractor and the burning of waste oil shall be strictly restricted.	
		• Soil erosion control measures such as the formation of sediment basins, slope drains, etc., shall be adopted.	
		• General refuse should be stored in enclosed bins to separate from construction material.	
		• A reputable waste collector should be employed by the contractor to remove the general refuse from the site.	
		• Proper storage and site practices to minimize the potential for damage or contamination of construction material.	
		• Material transport in closed vehicle or covered with canvas sheets;	
		• Recording system for the amounts of waste	
Land sliding and Instability of geological formation	Cutting and blasting of rocks	• Blasting should be minimized where possible; if inevitable then low intensity explosive material should be used instead of high intensity explosive material.	Contractor
		• Controlled blasting, i.e. increased number of blasts with low intensity explosive material should be preferred rather than high intensity single blast to avoid excessive damage to the surrounding rocks.	
		• Retention walls must be provided where rock cutting for construction or widening of road is carried out. At a few places, rock cutting is likely to cause erosion, directly impacting the houses located in proximity.	
Disruption to wildlife	• Construction work. • Construction Camps. • Operation and movement of machinery and equipment.	• Enforcement of Wildlife Safety Plan as included in the bidding documents.	Contractor
		• Develop and implement a site-specific wildlife safety plan.	
		• Advanced and efficient machinery will be employed for construction work in order to keep a check on noise pollution that affect fauna negatively.	
		• The wildlife department will be taken onboard and consulted whenever any interaction with wildlife is envisaged.	

Impacts	Related Aspect/ Activities	Mitigation	Responsibility of Implementation
	• Transportation of construction material. • Excavation of Earth.	• Dumping areas selection will be done in consultation with the wildlife department.	
		• The camps will be properly fenced and gated to check the entry of wild animals in search of eatable goods.	
		• Wastes of the camps will be properly disposed of to prevent the chances of eating by wild animals, which may become hazardous to it.	
		• Awareness will be created among the construction workers on wildlife conservation and its importance.	
		• Low speed limits shall be maintained for construction vehicles to avoid disturbing wildlife in their habitats, particularly in access roads to quarries and camp sites.	
Air, noise and dust pollution	• Operation of batching/ concrete and asphalt plant and crushers. • Operation and movement of machinery and equipment. • Transportation of construction material. • Construction work. • Excavation of Earth. • Blasting.	• Selection of up-to-date and well-tuned construction machinery, equipment or vehicles with reduced noise and stack emissions.	Contractor
		• The Contractor shall not use any ill-maintained and noisy construction machinery, equipment and vehicles especially near communities.	
		• Dust control system on asphalt plant.	
		• Water sprinkling at dust prone areas particularly near the communities.	
		• The Contractor will also ensure that noise and light pollution from the labor camp is kept at minimal level	
		• Regular inspection, tuning and maintenance of construction machinery, equipment and vehicles should ensure.	
Safety/ accident & health risk to local population living within/near the subproject especially women, children and elderly people.	• Operation and movement of machinery and equipment. • Transportation of construction material. • Construction work. • Excavation of Earth.	• Asphalt & batching plant and crushers sites must be 500 m away from the localities & cultural sites and 100 m away from the existing road.	Contractor
		• Asphalt, batching and crushing plants must be installed in the downwind direction of residential areas.	
		• The Contractor will select the specific timings for the construction activities particularly near the settlements, so as to cause least disturbance to the local population.	
		• Restriction on movement of machinery on the designated haulage routes for transportation of materials.	

Impacts	Related Aspect/ Activities	Mitigation	Responsibility of Implementation
	• Material extraction quarrying.	• Public awareness campaigns through displaying sign board at site and haulage routes.	
		• Adequate signage to manage traffic at sites, haulage and access roads.	
		• During construction work pedestrian and vehicular passages shall be provided for crossing near settlement.	
		• Strict enforcement keeping non-working persons particularly children, away from work sites.	
		• Avoid movement of construction and transportation vehicles at night near communities.	
Traffic Jams & congestion may take place and cause inconvenience to the people.	• Construction work. • Operation and movement of machinery and equipment. • Blasting. • Excavation of Earth. • Transportation of construction material.	• Efforts should be made to accommodate the traffic along the road/interchanges as far as practically possible.	Contractor
		• Provision of signboards directing the drivers about the diversion.	
		• Providing and maintaining traffic management comprising diversion warning, guiding and regulatory signage, channelizes and delineators, lightening etc.	
		• Movement of vehicles carrying construction material should be restricted	
		• Availability of continuous services of the police in the diversion and control of traffic.	
		• Temporary bypass, if possible, should be avoided if it involves clearing of land.	
Health and Safety of Laborers/ Workers	• Construction Camps • Construction work	• Provision of drinking water should ensure, which meet the WHO Guidelines.	Contractor
		• Screen construction workers for major communicable diseases.	
		• Use of safety sign board at construction site	
		• Training of drivers and construction workers.	
		• Usage of Personal Protective Equipment (PPE) during work.	
		• Provision of first aid facilities.	
		• Provision of emergency vehicle.	
		• Underage employment is not allowed.	
		• Proper fencing of the camp site.	
		• Deployment of guards for security.	
Loss of	• Establishment of	• State land shall be preferred for worker camp locations, camp shall be established	Contractor

Impacts	Related Aspect/ Activities	Mitigation	Responsibility of Implementation
properties/ businesses/ structures/ crops.	construction camps, asphalt & batching plant and crushers. • Construction work. • Excavation of Earth. • Material extraction quarrying.	at least 500 m away from nearest community. Explore off- site accommodation for crew. Keep camp size to a minimum.	
		• In case of unavoidable interference to public property e.g. re-location / re-building; compensation will be given to affected person/ owner in accordance with market rate.	
		• Compensation for trees/ crops required to be cut on account of their coming in the ROW of the road must be paid to farmers/owners in accordance with market rates.	
		• Restoration/ rehabilitation of damaged infrastructure to the entire satisfaction of the affected persons.	
Social conflicts due to influx of external workforce	• Establishment of construction camps, asphalt & batching plant and crushers. • External workforce	• Majority of the unskilled and semi-skilled labor will be recruited from the nearby villages.	Contractor
		• The contractor will prepare a Camp Site Management Plan, get it approved by the PD PMU and abide by its provisions.	
		• Strictly prohibit hunting, poaching and cutting of trees.	
		• Contractor will take care as much as possible that the construction activities should not affect the privacy. If unavoidable, ensure prior and proper communication with the concerned property owner.	
		• Explore alternative water sources and ensure that water usage by the project does not affect or compete with water requirements of the local community.	
		• Underage employment is not allowed.	
Rise in the Prices of Essential Commodities	• Establishment of construction camps, asphalt & batching plant and crushers. • External workforce	• Contractor will ensure that normal trade routes remain open, and supply of goods is not severely impacted.	Contractor
		• The contractor should normally procure the field camps supplies from the main markets or any nearby commercially active city such as Gorikote and Skardu.	

8.4.3 Environmental & Social Management Plan (Operation Phase)

Table 33: Environmental & Social Management Plan (Operation Phase)

Impacts	Related Aspect/ Activities	Mitigation	Responsibility of Implementation
Chances of damage of saplings.	• Road accidents. • Improper maintenance	• The saplings planted in the project area against the trees cut should be properly maintained throughout their initial growth period in terms of water requirement and necessary nutrients. Therefore, proper care of newly planted trees will need special care.	C&WD
		• Enforcement and penalties against traffic rules violators.	
		• An awareness campaign targeted on the neighborhood farmers will be carried to popularize the planting of trees and saplings should be provided on subsidized costs.	
		• Organic farming will be encouraged to minimize the use of chemical fertilizers and pesticides.	
Disruption to wildlife	• Moment of traffic on roads during operation phase • Improper pathways for wildlife movement • Improper maintenance and blocked culverts/ underpasses	• Proper maintenance and cleaning of blockages from culverts/ underpasses for easy movement of wild animals especially near water points.	C&WD
		• Fencing or plant barriers can reduce the risk of collisions between animals and vehicles.	
		• Roadside reflectors may be used to scare animals away from the road when vehicles approach at night.	
		• Caution boards would be erected at crossing areas of wild animals.	
		• Speed limit caution boards would also erect at specific crossing areas of wild animals.	
Air emissions or air degradation	• Moment of traffic on roads during operation phase	• Setting up of a system to monitor air quality along project area in accordance with the applicable standards/limits.	C&WD
		• Roadside tree plantations as part of the compensatory tree plantation exercise.	
		• Plants should be selected in accordance to their ability to absorb emissions.	
		• Regular vehicle checks to control/ensure compliance with relevant authorities	
Noise	• Moment of traffic on roads during	• According to noise level results, additional sound barriers in form of trees and hedges will be discussed with the affected people and planted if agreed.	C&WD

Impacts	Related Aspect/ Activities	Mitigation	Responsibility of Implementation
	operation phase	• Signs for sensitive zones (health centers / educational institutions etc.) to disallow the use of pressure horns.	
		• Enforcement and penalties against traffic rules violators.	
Solid waste & generation	• Moment of traffic on roads during operation phase. • Road accidents.	• Solid waste generated shall be properly disposed off through local solid waste management system.	C&WD
Terrestrial habitat alteration	• Timber mafia.	• Strict watch and ward against timber mafia.	C&WD, Forest Dept.
		• Restriction on grazing in pine zone to enhance regeneration rate.	
Deterioration of road and associated structures and accidents of hazardous material	• Poor road maintenance	• Monitor and maintain drainage structures and ditches including culverts. Clean out culverts and side channels when they begin to fill with sediment and lose their effectiveness.	C&WD
		• Regular road maintenance to ensure good surface condition.	
		• Fill mud holes and pot-holes with good quality gravel; remove fallen trees and limbs obscuring roadways.	
		• Use water from settling basins and retention ponds for road maintenance.	

8.5 Compliance Monitoring

8.5.1 Compliance Monitoring

Compliance monitoring is a key component of any effective environmental compliance and enforcement program. It encompasses all of the means used to make a compliance determination. The primary goals of compliance monitoring include:

429- Assessing and documenting compliance with permits and regulations,
430- Supporting the enforcement process through evidence collection,
431- Monitoring compliance with enforcement orders and decrees,
432- Creating deterrence and
433- Providing feedback on implementation challenges to permit and rule writers.

Monitoring of physical environmental parameters will be carried out with the help of checklists prepared on the basis of the mitigation plans provided in the following sections. All non-compliances recorded and will be followed up for remediation and rectifications.

8.5.2 Effects Monitoring

Effects monitoring is a key component which monitors Environmental Effects of the project in Construction and Operational phase. C&WD will engage a competent consultant to conduct effects monitoring on a periodic basis. The overall objective of the effects monitoring is to ensure that the key E&S parameters in the project area remain within the acceptable limits specified by the National Environmental Quality Standards (NEQS) and other relevant benchmarks throughout the project execution. For this purpose, the Independent Environmental Monitor (IEM) will carry out the periodic sampling, monitoring and analysis of the key environmental parameters specified in the ESMP and provide their results to the SC and PD-PMU GASSR.

8.5.3 Third Party Monitoring

C&WD PD/PMU GASSR will engage a suitable consultant to carry out environmental audit of the project on annual basis. During these audits, the ESMP and C-ESMP compliance and its effectiveness will be assessed. This monitoring will help identify weaknesses in the ESMP and C-ESMP implementation and also recommend the corrective measures.

8.5.4 Site Visits

The monitoring program will comprise site inspection designed to determine contractor(s) compliance with ESMP and applicable regulations and statutes. The proposed site inspections by PMU EE/O will be carried out on regular basis as per their own time schedules. However, the minimum level of M&E activities is outlined in **Table 34**.

Table 34: Site Minimum Visit Plan

Project Phase	Proposed Minimum Inspections
Pre-Construction	• One visit to project site • One visit each to proposed Borrow site, Camp site, Material Depot site, proposed machinery yard and other proposed sites in both districts. • One visit to each community in both the districts • One visit to proposed water sources in both the districts
Construction	• Visits to main project site at 20%, 50%, 75% and 100% completion stage. • At least two visits to project site every month.

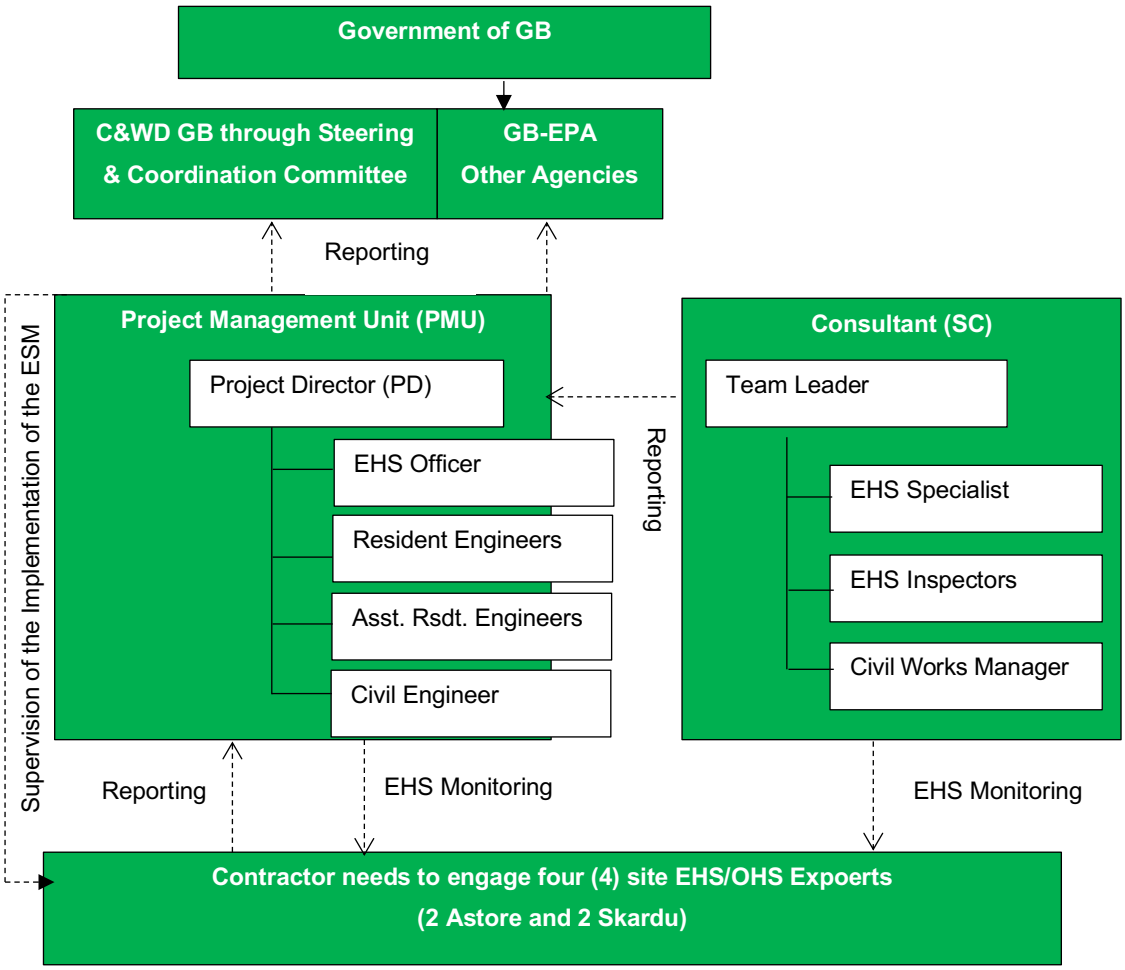
Project Phase	Proposed Minimum Inspections
	• Two visits per quarter in response to complaints
Post-Construction	• Two visits per quarter on response to any complaints

It is also anticipated that additional inspection will be required in response to any complaints by local communities.

8.5.5 Basic Organization for Implementation

The basic organisation for implementing the ESMP including EHS measures for the GASSR Project is displayed in the following diagram (**Figure 9-1**).

Figure 8-1: Basic Organigram for Implementation



8.6 Environmental and Social Monitoring

8.6.1 Environmental Monitoring Checklists

For the purpose of conducting E&S monitoring, the Checklists will be prepared and used at the site:

Campsite & Nearby Communities Checklist

434- Location of labor camps, material dumps, equipment yards and approach roads

435- Pollution from diesel and other oil spills from machinery

436- Smoke from burning of waste material or burning firewood
437- Soil Compaction due to Labor Camps and machinery yards.
438- Infection diseases in Labor employees and nearby public.
439- Water sources used and its impact on community water sources
440- Noise monitoring on labor camp sites and on nearby communities.
441- Air quality monitoring due to machinery exhaust discharge and other vehicles on the labor camp sites as well as on nearby public or communities.

Borrow Area and Quarries Checklist (for each site)

442- Impact of taking borrow material from earth borrow site.
Access to other construction materials.

Waste Material Disposal

443- Site for disposal of waste construction material.
444- Material and construction waste management after completion of road construction.
445- Diesel and other fluids spilling over to the construction site machinery.

Construction Site Checklist

446- Adjustments with unstable locations appearing during construction.
447- Limitations of construction sites resolved appropriately.
448- Earthen embankment or concrete work edge Scouring.
449- Discharge to unstable slopes or leakages on construction.
450- Any damage / discharge diversion of water to any spur/bund avoided.
451- Any discharge spill or dumping on any building or house on any surface water body
452- Effect on surface flow conditions in case of rain.
453- Dust smoke and other polluting impacts from construction machinery.
454- Dust or other pollutants from stored material / spoil heaps.
455- Noise from use of old or outdated machinery.
456- Noise due to blasting in hilly tract.
457- Public safety at construction site.
458- Tree plantation as compensation to trees cut.
459- Health and safety of labor and employees at construction site.
460- Impacts on sources of drinking water.

Road Checklist

461- Drains, paths roads crossed by moving machinery and the damage suitably repaired.
462- Impacts on roads used for transport of construction material.
463- Impact of stone quarrying.

Operational Checklist

464- Strict application of prescribed M&E plan.
465- Continuous evaluation of design efficiency.
466- Understanding and training of operational manual.
467- Annual environmental audit.
468- Regular maintenance.
469- Staff welfare.
470- Continued public consultation.
471- Continued mitigation of gender issues and women consultation.
472- Refresher courses for operational staff.
473- Staff and labor colony reconstruction.

Biological Checklist

474- Damage to Flora.

475- Damage to Fauna habitat.
476- Animals killed by Road accidents.
477- Impact on adjacent open lands.
478- Impact on Endangered species.

Sociological Checklist

479- Impact on existing services, education, health, electricity, water supply, communication.
480- Impact on local ethnicity, tribal tension, community rivalries and canal water disputes.
481- Impact on land ownership.
482- Adverse effect on cultural and archaeological heritage.
483- Chance find during construction.
484- Graveyards or burials.
485- Employment.
486- Women status, exposure to employment and education opportunities
487- Cultural reunion through better communication.
488- Market opportunities.
489- Recreation opportunities and Tourism.

8.6.2 Monitoring Plan

Proposed monitoring plan to be carried out during pre-construction, construction and operation phases of the project to establish the baseline condition and ensure Contractor's compliance with the mitigation measures and evaluation of the Project impact on post-completion is given in **Table 35** along with the monitoring indicators and frequency.

Table 35: Environmental Monitoring Plan

Parameter	Location	Means of Monitoring	Frequency	Responsible for monitoring	Supervising agency
Surface water quality	2 locations in Astore (Astore River and Bubin Nalah) and 2 in Skardu (Shagharthang and Kachura)	Sampling and analysis of river water quality according to NEQS	Biannually	Contractor	PMU
			Annually	External Monitor (through EPA certified laboratory)	PMU
		Spot measurements of pH, conductivity, turbidity; visual inspection of presence of petroleum products	Monthly	Contractor	PMU
Ground water quality	2 places in Astore and 2 in Skardu near the road	Sampling and analysis of ground water quality according to NEQS	Biannually Annually	Contractor External Monitor (through GBEPA certified laboratory)	PMU
Air Quality (dust, smoke)	Along the access and haul road	Visual inspection to ensure good standard equipment is in use and dust suppression measures	Daily	Contractor	PMU
	Along the access and haul road	Visual inspection to ensure dust suppression work plan is being implemented	Daily	Contractor	PMU
Air Quality (PM_{10}, NO_2, SO_2, CO_2, CO)	4 on various locations in both the districts	Air quality monitoring for 24 hours for the parameters specified in NEQS	Annually	Contractor	PMU
				External Monitor (EPA certified lab)	PMU
Emissions from plant & equipment	Close to construction area	Visual inspection	Monthly	Contractor	PMU
Noise and vibration	Close to noise generating equipment and road	24 hours noise monitoring through and GBEPA certified laboratory	Annually	Contractor	PMU
		24 hours noise monitoring through and GBEPA certified laboratory	Annually	External Monitor (through GBEPA certified laboratory)	PMU
		Spot measurements	Monthly		PMU

Parameter	Location	Means of Monitoring	Frequency	Responsible for monitoring	Supervising agency
Waste Management	Storage and camp area	Visual inspection that solid waste is disposed of at designated sites	Monthly	Contractor	PMU
Spills from hazardous liquid storage	Storage area	Visual inspection for leaks and spills	Monthly	Contractor	PMU
Operation of borrow sites	Borrow and quarry areas	Visual inspection of quarry sites	Monthly	Contractor	PMU
Road Traffic safety	Along the road	Visual inspection to ensure Traffic Management implemented at project site	Monthly	Contractor	PMU
Local roads/adjace- nt roads	**---**	Visual inspection to ensure local roads are not damaged	Monthly	Contractor	PMU
Drinking water and sanitation	At construction camps	Visual inspection	Weekly	Contractor	PMU
Safety of workers	At active construction sites	Visual inspection in all areas where run off leaves bare and at important drainage features after major rainfall/ snowfall events	Monthly	Contractor	PMU
Erosion	**-**	Visual inspection to ensure local roads are not damaged	Weekly	Contractor	PMU
Reinstatement of work sites	-	Visual inspection	After completion of all works	Contractor	PMU
Wildlife Safety Plan	Project area	Visual inspection, verify proposed physical structures for Wildlife safety, verifying design documents, verifying the budget in the overall costing of the road construction.	Monthly	PMU, Contractor	**PMU**
Tree Plantation Plan	Project area	Visual verifying with documents, number of trees planted, sample of mortality and survival	Monthly	PMU, Contractor	PMU

8.7 Reporting

Environmental and social experts of Contractor will prepare monthly reports covering various aspects of the ESMP and C-ESMP implementation including compliance and effects monitoring, capacity building and grievance redressal during project implementation.

A 3rd Party independent consultant (individual/firm) will prepare reports during post-completion. List of reports to be prepared during Construction and Operation stages are presented in the **Table 36.**

Table 36: List of Reporting Requirements

Report	Contents	Prepared by	Distribution
Monthly Progress Report for ESMP Compliance	Non-Compliances observed on sites and actions required	E&S Expert	PMU, TPV Consultant; Contractor
Monthly Progress Report for ESMP Compliance	• Actions taken on site in response to monthly report • Project progress and works to be under taken in the coming three months • Details of training delivered Details of accidents reported and actions taken	Contractor	PMU, SC
Quarterly Progress Report for ESMP Compliance	• Quarterly review on implementation of ESMP and C-ESMP including compliance and monitoring, capacity building and grievance redressal	E&S Expert	PMU, GBEPA Contractor
Biannual Progress Report for ESMP Compliance	• Biannual reporting including work hours, number of lost- time accidents/incidents, serious injuries and fatalities, amount of lost time, root cause and investigations, etc. There should also be few incident reporting requirements, such as for major spills, fatalities, local unrest etc.	E&S Expert	PMU, GB EPA Contractor
Annual TPV Report for ESMP Compliance	• Results of effects monitoring; Independent review and verification of ESMP & C-ESMP implementation performance; recommended actions required by all parties	SC	PMU, C&WD, Contractor

8.8 Grievances Redress Mechanism (GRM)

The main objective of the grievance redressal procedure will be to provide mechanisms to resolve project related grievances to avoid delays. It will also provide to PAPs a public forum to raise their objections and through conflict resolution, address these issues adequately. During land acquisition, valuation, compensation, and resettlement process various grievances may arise that might require mitigation. Major possible grievances are;

490- Losses not identified correctly;
491- Compensation/assistance inadequate or not as per entitlement matrix;
492- Dispute about ownership;
493- Delay in disbursement of compensation/assistance, and;
494- Improper distribution of compensation/assistance in case of joint/communal ownership.

The GRM will focus on the following during the implementation process:

495- Record grievances, both written and oral, categorizing and prioritizing them and providing solutions within an agreed timeframe;
496- Discuss the grievances on a regular basis with relevant authorities and identify decisions/actions for issues that can be resolved at that level;
497- Informing the PMU and Project Steering Committee of any more serious issues;
498- Reporting to the aggrieved parties about the developments regarding their grievances and the decisions;
499- All expenses incurred in arranging grievance negotiations and meetings of Grievance Redress Committee (GRC) as well as logistics required, shall be arranged by the C&W Department being the executing agency and
500- All information about grievance procedures, grievance forms and responses will be available in languages readily understandable to the locals.

8.8.1 Grievance Redress Committee (GRC)

C&WD will be set up a GRC with a two-tiered structure; one GRC will be set up at PD/PMU (C&WD) level and one GRC will be set up at the field level enabling immediate local responses to grievances and higher-level review addressing more difficult cases not resolved at the field level. The GRCs will continue to function for the benefit of the PAPs, till complete implementation of the project. GRC composed at two (02) levels are explained as:

First Tier GRC at Field Level

The 1st tier of GRC will comprise the following members and each district will have its own field level GRC:

a) Resident Engineer PMU (Chair)
b) Local Revenue Department Official
c) Environment Expert/Officer
d) Representative of SC
e) 02 Representatives of PAPs
f) Any other member as requested by the Chairperson

Second Tier GRC at PMU Level

The 2nd tier GRC will comprise the following members and will deal both districts:

a) Project Director PMU-C&WD (Chair)
b) Revenue Department Official
c) Environment Expert/Officer
d) A Representative of PAPs Committee
e) Any other member as suggested by the Chair

The GRC will address affected people concerns and complaints promptly using an understandable and transparent process. The terms of functioning of GRC will be as follows:

501- Provide support to the affected persons and stakeholders in solving the problems
502- Resolve grievances preferably on the first day of hearing or within a period of one week, in case of complicated issues may require additional time
503- Coordinate with the Affected Persons (APs), getting proper and timely information on the solution worked out for grievances
504- Study the normal occurring grievances and advise Project Director of the Project on remedial measures / actions to avoid further occurrences.

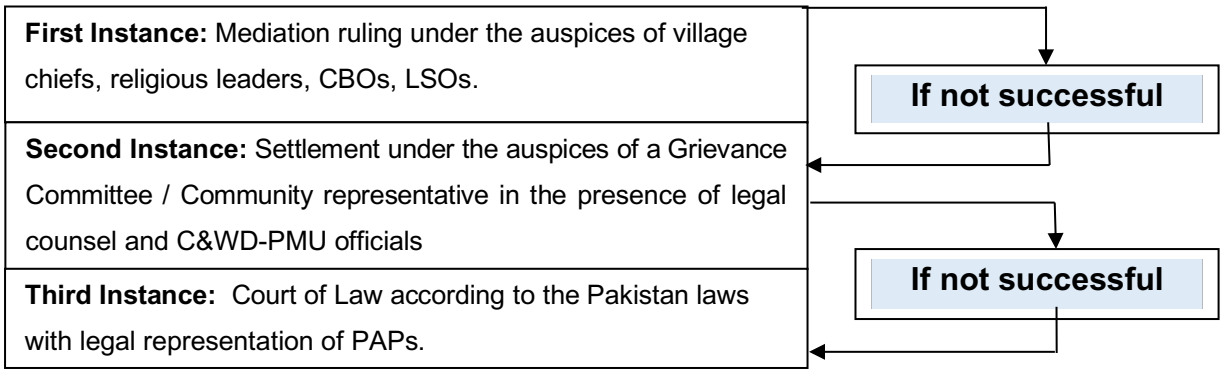
8.8.2 Grievance Redress Process

PAPs or the affected Community can submit a formal complaint to the Grievance Redress Committee (GRC) located at the sub-project site at the field level. The Social Development Specialist will serve as the Secretary to the GRC and will maintain its records. Once the complaint is submitted, it shall be recorded in the complaints register and uploaded to a computer excel sheet without delay and an acknowledgement sent to the complainant within three (3) business days. Project technical staff will be assigned to investigate the complaint by visiting the site location to meet complainants and all related stakeholders and submit a fact-finding report and recommendations to the GRC within seven (07) business days of receipt of complaint. The GRC will have weekly meetings and will take decisions on all complaints and their fact-finding reports in accordance with the agreed entitlements and provisions in the LC/DC Office entitlement matrix. A decision will be communicated to the complainant within fifteen (15) business days and recorded in the complaint register and excel sheet.

If the complainant is not satisfied with the decision received, he/she can elevate the complaint to the 2nd Tier GRC located at the PMU C&WD. The PMU Level GRC will receive support from the District Administration to resolve the issue. The 2nd Tier GRC will acknowledge the complaint within three (03) business days, scrutinize the record of the 1st Tier GRC, meet with the complainant(s) and relevant departments and investigate the remedies available. After thorough review and scrutiny of the available record and conducting a visit of site to collect additional information if required, the 2nd Tier GRC will inform the complainant of the GRC's decision within thirty (30) business days of receipt of the complaint.

If the complainant is still dissatisfied with the decision, he/she can go to the Court of Law. The grievance/complaints process including settlement mechanism is based on a three-tier system as shown in **Figure 5-1.**

Figure 8-2: Grievance Processing Mechanism



8.8.3 GRM Implementation and Monitoring

The PD-PMU will be overall responsible for the implementation of all GRM tasks and cross-agency coordination and shall be tasked with day-to-day GRM related activities. S/he will also be responsible to monitor compliance with the established Grievance Redressal Mechanism. The PD PMU GASSR shall be assisted by the SC E&S Expert.

8.8.4 Grievance Reporting

Complainants should be able to submit grievances to EPC Contractor and/or directly to Project Director PMU, in writing (including letter or email), over the phone or in person. Individuals will have the option of raising their grievance with a community representative it may be Village Head (*Numbardar*), village chief, community organisation rep, or who can then forward the issue to the EPC Contractor or Project Proponent/C&WD-PMU on behalf of the individual. The EPC contractor is to maintain a Complaint Register at the work site to document all the complaints received from aggrieved persons/community and others relevant. The information recorded in this Register will include but not limited to the followings:

- Date of the complaint;
- Description of grievance/issue;
- Particulars of the complaint; and
- Actions required and persons responsible to take the actions.

The grievances and complaints are to be recorded in a Grievance Register on the day of receipt and a named person within the company will be allocated to it. An acknowledgement will be sent to the complainant within 10 working days of the grievance being received, with an explanation of the process to be undertaken and the expected response period. Each grievance will have a tracking number that will be shared with the complainant.

The Project Proponent/C&WD-PMU will investigate the grievance and formulate an appropriate response that will be shared with the complainant no more than 4 weeks from receipt of the grievance. The investigation period may necessitate meetings with the complainant or other parties. The final documentation on the complainant's response will be agreed and signed off by both the parties that submitted the grievance to ensure that all parties are satisfied that the grievance has been resolved.

Chapter 9:
Land Acquisition and Environmental Cost

Chapter Contents:

9 LAND ACQUISITION AND ENVIRONMENTAL COST

9.1 Land Acquisition

The total estimated cost of land acquisition in PC-1 is 675.470 million/-. Details of land required and tree cutting will be determined once the detail design and project actual alignment is completed. A detailed land acquisition and and fresttlement plan (LARP) is therefore needed in this project. Without LARP, the exact details cannot be sorted out, in such a long stretch, which is not in the scope of this EIA.

The PMU will be responsible for payment of land compensation as early as possible.

9.2 Environmental Monitoring and CBMs

There is provision of and Environmental Engineer in PMU Staffing plan for the Project. The mitigation measures related to engineering measures will be ensured by PMU, and Consultant through project Contractor.

The other costs will include slope stabilization and tree plantation, and confidence building measures (CBM). The cost of CBMs is estimated approx. 200.0 million. The demands of the communities are high; however, the PMU may rationalize these demands and implement essential measures where preference shall be given to the demands from the women, girls education and general livelihood improvement.

9.3 Cost Implications

The total estimated (environmental and social) cost of GASSR Project is Rs. 875.47 million. This includes land compensation, project E&S monitoring and CBMs costs.

Chapter 10:

Conclusion and Recommendations

Chapter Contents:

10 CONCLUSION AND RECOMMENDATIONS

10.1 Conclusion

This ESIA study is conducted for the proposed project for construction of GASSR (road). Standard protocols were followed during the ESIA preparation process, which included field surveys, verification, and assessment of expected impacts, as well as mitigation strategies.

The PMU, project communities, government departments, NGOs were also consulted for collection of relevant environmental and socio-economic and cultural information. The proposed project's ESIA study finds that there will be minor to major negative and positive impacts on natural, physical, or socio-economic environment associated with its execution the Project. The major impacts are concluded as under:

510- The planned road passes through no environmentally sensitive areas.

511- Noise, dust, and air pollutants emitted by vehicle/machinery movements and asphaltic plants are primarily connected with construction activities and would have a negative impact on water quality, air pollution, and home disruption. The consequences are transient and can be managed and reduced.

512- Several trees/plants, including fruit trees, herbs/shrubs, and other plants, are expected to be removed as a result of construction within the existing road alignment (ROW).

513- Local residents affected due to earlier projects in the area complained that they have yet to be paid compensation for damage inflicted to their property as well as loss of their livelihood. It was pointed out with concern that this time too they would face the same problem (i.e., non-payment of compensation or delayed payment or payment to Raja Family).

514- Social issues such as safety of workers and general public, security and social problems including disturbance to local residents, risk of communicable diseases are of temporary nature and can be controlled or avoided.

515- Residents in the PIZ have expressed concerns about disruption to their movement and intrusion into their privacy particularly that of women, which must be adequately addressed during project construction.

516- Environmental Officers/Inspectors of the Contractor, in close coordination SC and EE of PMU, shall clearly outline impacts by preparing C-ESMP with necessary mitigation measures at the pre-construction, as well as defined monitoring responsibilities to monitor the activities during the construction phase.

517- Overall, the proposed project is regarded favorable and would have the minimum negative impacts compared to its benefit.

10.2 9.2 Recommendations

The proposed road should be built after the potential environmental and social impacts are mitigated/controlled by adopting appropriate mitigation measures identified in this EIA report.

The suggested mitigate on measures are based on the type and scope of the proposed project, the projected local level disturbance because of the proposed project construction and operation. Major recommendations are summarized as under:

518- PAPs or the affected communities should be compensated before construction start of the project. Additionally, payment process (entitlement) should be completed amicably, so that the peoples trust in the relevant authorities can be established.

519- Temporary labour camps should be established in location (500m away from population) and provided with sufficient sanitation and drainage amenities.

520- During the construction and operation of the project, soil contamination, water contamination, air pollution, and high noise levels should be controlled using good engineering practices/techniques, as well as machinery/plant equipped with controlling devices and different laboratory tests for water, air, and noise quality.

521- Before start of construction activities, the Contractor should prepare C-ESMP and other essential plans that includes but not limited to; traffic management, pedestrian/animal crossings, solid waste management, Ohs plan, ESH plan etc.

522- The Contractor should plan construction activities so that they cause the least amount of disturbance to the wildlife, local community, particularly women and girls, who normally move in the project area during day hours as routine daily works.

523- The ESMP and C-ESMP is expected to follow the recommendations to protect local people and the wildlife in the project area.

524- The cost to be spent on ESMP/EMP should be adequately provided for in the project/budget by the PMU.

525- Construction supervision staff on site should be trained to promote a greater understanding and knowledge/awareness of environmental and social requirements, as well as the benefits of usage of devices while they are at construction works.

526- Medicinal plants need to be documented. The uprooted plants need to be planted nearby under the guidance of the subject specialist for maximum survival.

527- A comprehensive land acquisition and resettlement plan (LARP) for GASSR Project shall be prepared and its effective implementation must be ensured.

Chapter 10:

Annexures

Chapter Contents:

11 APPENDIXES

11.1 Appendix 1: Sample Consultation Form Filled (Community)

GUIDE QUESTIONS FOR DISCUSSION WITH COMMUNITY MEETINGS.

Name of Community: __**Kachura**__ Date: __**10/07/2024**__

Total households in the community: **325** Respondent __**M. Hassan Jaffari**__ Age: __**45**__ Sex: **M**

1.0 HISTORICAL PROFILE OF THE COMMUNITY

1. Where did you come from, when and why? How did the community develop?
Based on oral traditions passed down from our forefathers, our community has been settled in this region for the last 500 years. The majority of our community members are Balti-speaking, reflecting our rich linguistic and cultural heritage. This heritage is further enriched by the migration of various Balti tribes from regions like Kargil and Ladakh. The majority of the population belongs to the Tibetan stock, as the mother tongue is Balti, an archaic branch of Tibeto-Burman. However, there is a tradition that some tribes have Aryan roots. The major clans are Syeds and Balti. Initially, these clans restricted themselves from merging with others but gradually integrated. These migrations were driven by the search for better opportunities, safety, and fertile lands. Over the centuries, these tribes integrated into the region, bringing with them their unique traditions, customs, and stories. This integration has contributed to the diverse cultural landscape we appreciate today. Our community's development has been marked by a strong sense of resilience and adaptability. The blending of different Balti-speaking tribes has created a rich tapestry of cultural practices and social structures. As families settled, they established agricultural practices, built homes, and created social structures that supported communal living and mutual assistance. Through generations, our community has preserved its heritage while also adapting to changing times. Our forefathers' wisdom, reflected in the oral traditions and cultural practices, continues to guide us. This enduring legacy has shaped our community's identity and ensures that we remain connected to our roots while moving forward together.

1.1 Demography/General Profile

1. How many people are in this community? How many households/family heads and how many house?
Total No. 3292 people in this village; Female 1574 Male 1718 Total No HH 325: No. HH heads male 319 No. HH heads female 6 and Total no. houses 325 : fulltime residing 325 part time residing -0 Rental residents:
2. How many different ethnic groups/tribes and clans are living in this community? which tribes is predominant?
Total No. ethnic groups/tribes/clan___2_____ 1._____**Balti**_____ 2._____Syed_____ **Total no. Sects___1_____ Sect Name:** _**Shia**_____
3. Has there been migration of people in to this community in the last ten years
If yes: how many? No migration in last ten years. Mainly where? Purpose of the migration: Total Permanent migrants: Total temporary/partially migrants: Is there any immigrants: yes If yes, How many: Purpose immigration: Total permanent immigrants Total partially/temporary immigrants

Governance

1. How do you as a community decides on using forest/grazing land or other natural resources?

Our community initially holds meetings among members to discuss the use of forests, grazing lands, and other natural resources. If no consensus is reached, a committee of respected elders is formed to make the final decision. These elders emphasize sustainable practices, balancing immediate needs with long-term conservation.

In addition to resource management, the elders oversee the irrigation system, organize religious gatherings, and manage grazing lands to prevent overuse. This dual approach ensures that our traditions are upheld, our resources conserved, and our community remains resilient and organized.

1. Do women participate in community level and household level decision making? If yes how**?**

Community Level:

At the community level, women play a significant and active role in decision-making, especially regarding land-related activities and agricultural production. Their involvement is seen in various community gatherings and councils where crucial decisions about land use, farming practices, and resource management are made. Women bring invaluable insights and traditional knowledge to these discussions, ensuring that decisions are well-rounded and consider diverse perspectives.

In many cases, women lead or co-lead community groups focused on agricultural development, environmental conservation, and local economic activities. Their leadership in these areas helps drive initiatives that benefit the entire community, from improving crop yields to implementing sustainable farming practices.

Household Level:

Within households, women are pivotal decision-makers. They take charge of key aspects such as:

- **Agriculture:** Deciding which crops to plant each season based on factors like soil health, climate conditions, and market demand. They also determine the types of livestock to raise, considering the family's needs and potential income.
- **Resource Allocation:** Managing household finances, including budgeting for daily expenses, education, healthcare, and savings. Women often decide how much of the agricultural produce to sell at markets and how much to retain for household consumption.
- **Health and Nutrition:** Ensuring the family has access to nutritious food and healthcare. They make decisions about meal planning, food storage, and medical care, prioritizing the well-being of all family members.
- **Education and Social Matters:** Making choices about children's education and extracurricular activities. Women also mediate social and familial relationships, fostering a supportive and harmonious household environment.

Women's roles in decision-making are deeply rooted in their extensive knowledge and experience in agriculture, resource management, and family welfare. Their contributions ensure that decisions at both the community and household levels are informed, practical, and beneficial to the overall development and well-being of their families and communities.

Additionally, the increasing recognition of women's contributions has led to more structured and formal opportunities for them to participate in decision-making processes. Various local initiatives and programs aim to empower women, providing them with training, resources, and platforms to voice their opinions and lead community projects.

How is the community governance structure? Traditional, religious, community as well as government?

Traditional:

The community relies on a group of esteemed members known as **Tsarma** to make important community-level decisions. These elders are highly respected for their extensive experience and deep knowledge of local customs, traditions, and sustainable practices. The Tsarma ensures that the decisions made are in line with preserving cultural heritage and promoting long-term community welfare. Their role includes:

- **Mediation and Conflict Resolution:** Acting as mediators in disputes and conflicts within the community, ensuring fair and just resolutions.
- **Sustainable Practices:** Guiding the community in sustainable agricultural and environmental practices to maintain the ecological balance.
- **Cultural Preservation:** Upholding and passing down traditional knowledge, customs, and practices to future generations, ensuring the community's cultural identity remains intact.

Religious:

The **Religious Scholar or Leader** plays a pivotal role in the community by organizing religious activities and awareness events based on Islamic principles. This leader ensures that the spiritual well-being of the community is maintained. Key responsibilities include:

- **Spiritual Guidance:** Providing religious education and guidance to community members, helping them adhere to Islamic teachings.
- **Organizing Religious Events:** Planning and leading religious ceremonies, festivals, and awareness programs that foster a sense of unity and spiritual growth within the community.
- **Community Support:** Offering counsel and support to individuals and families in times of need, reinforcing the moral and ethical framework of the community.

Additionally, **women's organizations and village groups** operate under the Local Support Organization (LSO), playing a crucial role in supporting religious and social activities. These groups empower women to actively participate in the community's spiritual and social life. Their contributions include:

- **Social Welfare:** Organizing and participating in initiatives that address social issues such as healthcare, education, and economic development.
- **Religious Activities:** Supporting and leading religious programs, ensuring that women have a platform to engage in and contribute to the community's spiritual activities.
- **Community Building:** Fostering a sense of solidarity and mutual assistance among women, strengthening the social fabric of the community

What institution is responsible for which decisions? Traditional, religious and governmental/community?

Traditional:

Tsarma:

- This group of notable community members is responsible for making decisions related to land issues and agricultural matters. They ensure that practices are sustainable and that the community's agricultural activities are managed efficiently.

Religious:

Imam Jummha Jmat :

- The Paish Imam organizes and conducts religious activities and festivals, ensuring they align with Islamic principles. This individual plays a key role in maintaining the community's spiritual well-being by leading prayers, offering religious guidance, and promoting moral values.

Governmental/Community:

Elders:

- The elders manage the use of forests, grazing land, and other natural resources, ensuring these are utilized sustainably and equitably. They oversee irrigation systems, ensuring that water resources are distributed fairly and efficiently.
- They also organize religious gatherings and handle pasture management, ensuring that community resources are maintained and that traditions are upheld.
- These elders serve as the bridge between the community and government entities, advocating for the community's needs and ensuring that governmental policies are implemented in a way that benefits the community.

Together, these groups form a robust decision-making framework that addresses various aspects of community life, ensuring sustainability, spiritual well-being, and effective management of resources.

1. What kind of CBOs/NGOs do you have in your community? And what are their main activities?

The community has established several organizations dedicated to its improvement and welfare. These include:

Anjuman-e-Tahfuz-e-Kachura:

- This organization focuses on protecting and preserving the local heritage, culture, and environment. It plays a critical role in safeguarding the community's interests and promoting sustainable practices.

Kachura Basho Local Support Organization:

- This local support organization works on a variety of community development projects. It collaborates with other local and regional entities to implement initiatives aimed at improving the community's infrastructure, education, healthcare, and economic opportunities.

Women's Organization:

- This organization empowers women within the community by providing them with resources, training, and support to participate actively in social, economic, and religious activities. It aims to enhance the role of women in decision-making processes and ensure their voices are heard and respected.

Village Organization Kachura:

- This organization focuses on the overall development of the village. It works on projects related to agricultural development, irrigation management, and the sustainable use of natural resources. It also plays a role in organizing community events and fostering a sense of unity and cooperation among villagers.

1.2 Local Economy/ Livelihoods

1. What are the main livelihood sources?

Subsistence farming: 80%

Government job: (army and civil) 6%

Private job: 5% Business: 3% Laborer: 5 % Others: -1%
2. How many people in the community are engage in business activities?
Farming **290** Husbandry 50 Small scale mining **1** Export/import _____**-**_____ Tourism **40** Petty trading **77** Seasonal/hired labor **87** Employed public/private **229** Self-employe –**4** -Others (pls. specify) Over Sea empplyment **6**

Female activities

1. What are the main Activities of women?
Farming: Harvesting and planting Household level: Cooking, Cleaning, child care, meetings of majlis, tabaruk, madrasa etc Community level: n/a
2. What are the main business activities?
Farming 110 husbandry **40** export/import _____-_____tourism _____-_____ Petty trading 4 seasonal/hired labor 0 Employed public/private **29** Self-employed 1 Others (pls. specify) _____
3. What are the main social obligations of women?
Women in the community fulfill several vital social obligations, contributing significantly to the well-being and cultural continuity of the community. These responsibilities include: 1. **Looking After the Family:** ○ Women are primarily responsible for the upbringing and care of children, ensuring their physical, emotional, and educational needs are met. They create a nurturing environment that fosters the development and growth of their children. 2. **Participation in Religious and Cultural Activities:** ○ Women actively participate in religious and cultural activities, preserving and promoting the community's spiritual and cultural heritage. They engage in and often lead rituals, festivals, and cultural events. 3. **Farming:** ○ Women play a crucial role in agricultural activities, from planting and tending to crops to harvesting. Their contributions are essential for the community's food security and agricultural productivity. 4. **Cooking:** ○ Women are responsible for preparing meals for their families, ensuring that food is nutritious and culturally appropriate. Cooking is a central aspect of their daily routine, reflecting their care and dedication to their family's well-being. 5. **Meetings of Majlis:** ○ Women attend and participate in Majlis (community gatherings or councils) where they discuss and make decisions on various community matters. Their involvement ensures that women's perspectives and concerns are considered in community decision-making. 6. **Tabaruk:** ○ Women are involved in the preparation and distribution of Tabaruk (blessed food) during religious events and gatherings. This practice is an expression of their faith and commitment to communal solidarity. 7. **Madrasa:** ○ Women contribute to religious education by teaching and managing Madrasas (religious schools). They play a crucial role in imparting religious knowledge and values to the younger generation, ensuring the continuity of the community's spiritual traditions.
4. In which areas do women participate in decision making? Please give examples
Farming Activities: • **Sowing of Crops:** Women decide on which crops to plant and the optimal sowing schedule.

- **Agricultural Management:** They influence crop rotation, pest management, and harvesting techniques.

Marriages and Family Matters:

- **Marriage Arrangements:** Women play a key role in selecting suitable matches and planning wedding ceremonies.
- **Family Dynamics:** They resolve family disputes and make decisions about children's upbringing and education.

Household Management:

- **Resource Allocation:** Women manage household budgeting and savings.
- **Nutrition and Health:** They decide on family nutrition and healthcare needs.

Community Engagement:

- **Community Events:** Women organize and lead community festivals and religious gatherings.
- **Social Welfare Initiatives:** They participate in women's organizations and support social welfare projects.

Environmental and Resource Management:

- **Sustainable Practices:** Women influence decisions on water management, forest conservation, and grazing land usage.

5. What are the main challenges for women? Please give examples

The major challenges faced by the women in this locality include:

1. **Lack of Agriculture Education and Knowledge:** Limited access to training and resources for improving agricultural practices.
2. **Limited Opportunities for Formal and Technical Education:** Insufficient access to higher-level and technical education.
3. **Health Issues:** Absence of a Lady Health Visitor (LHV) leads to inadequate healthcare support.
4. **Lack of Job Opportunities:** Few employment options specifically for women, affecting economic independence.
5. **No Separate School for Girls:** Lack of educational facilities exclusively for girls, limiting their educational opportunities.
6. **Scarcity of Drinking Water:** Insufficient access to clean drinking water, particularly during winter.

Additional challenges include:

7. **Cultural and Social Norms:** Traditional gender roles and cultural expectations restrict women's participation in decision-making and public life.
8. **Limited Access to Financial Resources:** Difficulty in obtaining credit or financial support for personal and entrepreneurial needs.
9. **Inadequate Infrastructure:** Poor infrastructure, including inadequate transportation, affects access to education, healthcare, and job opportunities.
10. **Lack of Support Services:** Insufficient services for victims of domestic violence and abuse.
11. **Limited Representation in Leadership Roles:** Underrepresentation in local governance and decision-making bodies.
12. **Limited Awareness of Rights:** Lack of knowledge about women's rights and available support systems.
13. **High Workload:** Balancing household chores, childcare, and agricultural work with limited support.

6. What are the main diseases? Please give examples

1. Water borne diseases like dysentery
2. Blood pressure issues
3; Blood Sugar

4: Fever and cough
7. Which kind of mobility do you, as a women have? For which purposes you are allowed to travel within the district and outside the district? Are you allowed to travel without male accompany?
Women folk mobility is carried out for medical treatment purposes but there is no any norm to travel a woman without any male companion.
8. What kind of School are women/girls visiting? Up to which grade
There is a girls and Boys ' High school in the locality for students but for secondary level education the girls and boys folk are compelled to get admission in the Skardu. Number of students are studying there in education system.

1.3 Forest Resources / Landownership

1. Do people in this community own land? If yes how and use of land (agriculture, commercial etc.)
Yes, the community owns lands and they use it for agriculture, manmade forest and for grazing purposes.
2. How does this differ for settlers (Pakistani from other district/ foreigners)?
There is no any settle in this community.
3. Does the village/group or individual have any legal title to the land? (y/n)?
Yes, the settlement that occurred in the year 1914 has defined the right of lands which are; Right of the property Common Land Community owned land Graveyards
4. How large is the community land? What is the min. average, average and max average land sizes of individuals
Total Community: **2418** kanal. Individual avg. min **4** average____8_____ avg. max_____**12**_____ kanal
5. Is land rented out to others? How is renting of land arrange? Are there formal or informal agreements? If so, with whom?
No
6. Are there any farm laborers employed by individuals? If so, where are they from and how are they paid?
No, the individuals don't employed farm labors, the community people carried out their farming work by themselves

2.0 PROFILE OF PEOPLE ENGAGED IN FARMING

1. Besides farming, how many of you do other activities to earn money or obtain things for household consumption? What are these activities? Do this change according to the season? What is your primary and secondary activity?
Primary: Our primary activity is farming and livestock rearing. **Secondary:** Secondary activity is daily wages laboring. In summer season besides farming number of male community member work as daily wages labor to earn money for fulfillment of their household expenditure while Some people are government employ. Government Employment is another earning to obtain things for households. Some are out of Pakistan for wotk .. mostly in Kuwait, Bahrain and dubai etc.
2. What are the main crops? Do they change from season to season or from year to year? What is the average yield? What is the value per Unit?
The main crops of this locality are barley and potatoes Our area falls in Single cropping zone, we cultivate barleys and potatoes. Average yield and their per unit value are as under. Crop Average HH Production Per Unit Value

1: potatoes	= 120 kg/hh	Rs. 80/kg
2: Barley	= 20 kg/hh	Rs.120/kg
3: Wheat	= 300]kg/hh	Rs 140/kg
4: Onion	= 20 kg /hh	Rs 130/kg

3. What are the main food and forest trees? Number of trees? Value of trees? Average value of harvest?

Fruit trees

1: Apricot	130 kg/hh	Rs 150/kg
2: Walnut	20 kg/hh	Rs 300/kg
3: mulbary	15 kg/hh	Rs 60/kg
4: Apple	20 kg/hh	Rs 120/kg
5: Cherry	15 kg/hh	Rs 300/kg
6: Pear:	10 kg/hh	Rs 100

Forest trees

The forest trees are willow and safaida the main forest trees

1: Popular	50 /hh	Rs 20000/tree
2: Willow	29 /hh	Rs 15000/tree

4. Is the produce used for self-consumption or selling in the market? What portion? Does this differ from crops to crops?

Mostly production used for self-consumption. Yes this differ from crop to crop.

5. Where is the field located? Indicate the walking time of the HH/community to the farmland.

Fields are located at surrounded to community. About 1km to 2 km. The walking time of the community to the farmland is 15 to 30 minutes .

2.1 Farming Inputs

1. What farming tools are used?

Tractors, harvesting machine, thrashing machine, local /traditional tools are used in farming purposes.

2. How do farmers get water for their fields?

Farmers get water for their fields/crops through earthen water channel from stream.

3. Where do farmers get seeds?

The farmers keep seeds from their own produc and mostly get from skardu market.

4. Do farmers use any fertilizers or pesticides? If so, where do farmers get them from?

Yes, farmers use fertilizers like urea, nitrophast and pestcides. get them from Skardu.

5. If farmers need credit, is it possible for them? Where do they go for it?

There is no any custom of credit or loan for farming purposes in this community.

6. Do farming extension workers come to trained farmers in this community? If so, how often? What else do the extension workers help farmers with?

No

7. How many farmers in your community studied agriculture at school?

No.

8. Is there any farmer's association in the community? If so, what is the benefit of being a member of this association?

Yes, Kachurah Farmer Cooperative Society also operate.

9. What are the main challenges for farmers in your area?

Major challenges face by farmers are as under;

1: Un availability of certified seed

2: lack of modern technology/means of farming

3: No Access Road to farm land

4: Un availability of Pesticide

2.3 Livestock

1. Which are the main livestock in the community? How many of each kind do you have in the community? Which do you use for self-consumption which are sold? How much is the average price per type?

Type	Nos	use/sell	Average price
Goat	5	75%selfcompsumption and 25% sell	Rs 32000/no
Sheep	4	50%selfcompsumption and 50% sell	Rs 25000/no
Cow	2	100%selfcompsumption and 0% sell	---
Zumo	1	100% Self compsumption and 0% sell	-----

2. How many families raise livestock?

All household raise livestock it is 100% of total household.

3. How much milk, cheese, butter and yoghurt are you producing?

Milk ____**12**_____ liter ___180_____ value, cheese ____0_____ kg _____ value

butter __2_____ kg __**2500**_____ value, yoghurt _____0_____kg _____ value

Others_____

4. Are you moving your livestock to summer pastures? If yes, distance to summer pasture?

Yes, the farmer move their livestock to summer posture which is located at 15 to 20 km away from the village and at 12 hours waking distance.

5. Which kind of poultry do you have? What do you produce? you use them/is for self-consumption and or sold

Eggs____150___ Chickens____3/hh_____

2.4 Information in relation to wild animals

1. Which kind of wildlife animals and birds do you have in the area? Name as many as possible

Wild animal found in this area are as under;

Snow leopard, Fox, Ibex (Markhor), Wolf, Chakor

2. Do these vary from season to season?

No

2.5 Gathering of Non-Timber Forest Product (NTFPS):

1. What are the things that you gather from the forest? Does this change from season to season? Who is collecting?

There are no natural forests in the area, but the community has actively planted many trees on barren and communal lands. Small shrubs and plants, such as Artemisia, grow in the mountains and are gathered by women for heating and cooking. Due to widespread poverty, families rely on collecting these plants, especially during winter. This collection is overseen by the elders who handle community matters.

2. From where is it collected (pastures or forest)? Identified distance and walking time from community

From the barren lands and from the mountain. The distance is 1 km and time is 55 mints from village.

3. Which products are used for subsistence?

N/A

4. Which products are sold in the market?

N/A

5. What type of mining are you doing? What is the average annual income from mining activities?

No

2.5 Market/Transport/ Supply Chain

1. What do you sell at the market?

Yes, Potato, Apple Charry, Mulberry

2. Where is the next market?

The next market is Skardu market.
3. What kind of transport (private or public) is used to carry these products to the market?
Private Transport is used for the transportation of these products.
4. Who is responsible for selling? Is it the men or women?
Men folk of the community is responsible to sell out these products.
5. Is selling done in group or by individuals?
Selling is done by individuals.

Energy sources

1. How many are engaged in Fuelwood collection
All Community
2. Where do you get the wood? How much from each source?
The community people get fire wood from their own forest tree and mountains.
3. Where is the main market for purchase and selling of fuel wood?
Kachura and Skardu
4. How much transportation do you pay for one mon or Kg of fuel wood?
The transportation charges are Rs 100/mon of fuel wood.
5. How much income do you receive from fuel wood production?
The community people not sell out fuel wood.
6. How many mon or Kg do you produce in one year? Do you need to buy per year in average
We produce 30 mond average/HH per year. No need
7. What other sources do you use as energy? How much do you spend per year in Average?
People use 20% natural gas as an alternative source of energy. A household spends 20,000 PKR a Year on average.
8. Do you have road in your village, if yes who construction (govt,NGO self –help basis etc.)
Yes, the road is constructed by Government.
9. Type of communication mean in Village (Care,jeep, Van.etc.)
Car, jeep, van etc
10. Type of road (mettled, kacha single road double road)
mettled
11. Do you have mobile coverage, if yes, which net works
Yes, Scom ,Telenor U phone
12. Do you have post office or any courier service?
Yes
13. Any other

Health, Sanitation, Education and Infrastructure

1. What are the common health problems?
1: Water borne diseases 2:; high blood pressure is becoming very common in the locality 3: Acute gastro 4: heart diseases
2. Where do you go for treatment? How long is the walking distance? 1 Dispensary, 2 BHU, RHC, DHQ, Clinics
Civil Dispensary is located at 20 mint walking distance and the BHU is at distance of 20Km while and RHQ Skardu is situated 32 km away from the locality
3. Where do people get drinking water from and where farming water?
People get drinking water from pipe line.
4. Do you have a toilet in the HH? How many?

90% flush toilet 10% pet latrine
5. Is there a school in the village? If no, where do the children go to?
Yes, there is High school for boys and Girls and average 30 minutes walking distance.
6. What is the level of school? 1 primary, 2 elementary ,3 secondary, 4 college, 5 university Private / Public school (level)
The students have High School level facility in the village.
7. Will the project interrupt any of your commonly used access routes e.g. to school, hospital, etc.?
Yes school

Potential impact and risks of the road

1. What kind of impact do you foresee?
- Promote tourism - improve the transportation system - Boost agricultural productivity - Strengthen community cohesion and cooperation - Increase renewable energy u - Promote women's empowerment and participation in the economy - Improve food security and nutrition - Increase community resilience to climate change and natural disasters - Transform lifestyles - Access essential living facilities - Improve the education system - Enhance healthcare services - Gain better market access - Expand job opportunities - Create business prospects - Foster cultural exchanges with other regions
2. Which income category (rich, middle, poor) will most benefit from the road?
Everyone will get benefit from the road.
3. How women will benefit from the road?
- Improve the health issues - Get the facilities to fulfil their business activities - Get better education system for women - Get modern tools for farming
4. What are the potential risks of the road?
- It may impact the environment. - It could damage farmland and lead to deforestation. - It might disrupt community engagement and cohesion. - Local tourism could suffer if the area's natural beauty is compromised. - There are potential threats to cultural heritage sites and historical landmarks. - Traditional practices and ways of life might be lost due to modernization. - Local ecosystems and wildlife could be harmed. - Pollution and disturbances to natural habitats could increase. - There is a risk of soil erosion and changes in water flow patterns.
5. How you mitigate potential risks?
- Create buffer zones to protect farmland from construction impacts. - Use sustainable farming methods to prevent land degradation. - Provide compensation and assistance to farmers affected by changes. - Enhance reforestation efforts to replace lost trees. - Establish wildlife corridors for safe animal passage. - Perform regular environmental impact assessments and monitor pollution levels. - Create jobs through infrastructure projects like road construction and maintenance. - Develop local skills and offer training programs for community members. - Promote eco-tourism to create sustainable jobs. - Enforce safety measures to reduce risks of landslides and other hazards. - Install efficient drainage systems to prevent flooding and erosion. - Plan for future growth to ensure long-term sustainability.

- Encourage community involvement in environmental conservation efforts.
- Implement renewable energy projects to reduce reliance on fossil fuels.
- Create awareness programs about environmental protection and sustainability.
- Strengthen local governance to ensure effective implementation of risk mitigation strategies.
- Collaborate with governmental and non-governmental organizations for resources and expertise.
- Develop emergency response plans to handle natural disasters and other crises.
- Adapt agricultural practices to cope with climate change.
- Partner with research institutions to use scientific advancements in risk mitigation.

Other infrastructure and services

Type: any in village?	yes = 1/no = 0	distance to nearest (km)
Veterinarian	N/A	
Mosque/jamat khana	8	
Market	Yes	0.5km
Cemetery	Yes	
Water mills	0	
other (what?)		

Additional Comments:

- Land compensation pay according to Market Rate
- Minimize property damage and other disruptions as much as possible.
- Establish a clear code of conduct for all project-related activities.
- Resolve education issues by building new schools if existing ones are affected. Ensure continuous education for children in Kachura and other affected places.
- Provide timely and fair compensation based on the current land value.
- Ensure that high authorities and project personnel cooperate with the community and landowners.
- Distribute compensation directly to affected community members rather than through intermediaries.
- Construct a link road to facilitate easier access for the community.
- Form a committee comprising representatives from Shagharthang to Kachura to communicate with project leaders.
- Conduct a thorough environmental impact assessment and implement measures to mitigate environmental damage, such as reforestation and wildlife protection programs.
- Develop supporting infrastructure such as roads, bridges, and communication networks to enhance connectivity and support local development.
- Ensure that promises made by AC, DC, and other high-ranking officers are fulfilled.
- Employ local labor from areas impacted by the project.
- Implement strict safety protocols and provide safety training for all workers. Ensure that the community is informed about safety measures and emergency procedures.
- The raja has been taking all the compensation, and a land dispute case is ongoing between the raja and the community.
- Implement measures to control noise and air pollution, such as using low-emission machinery and scheduling work to minimize disruption.
- Prioritize affected locals for employment opportunities created by the project.
- Ensure that social services are maintained and improved during and after the project, with additional facilities if necessary.
- Ensure alternative water supply arrangements to guarantee continuous availability.
- Construct a basic health unit (BHU) to offer accessible healthcare services to the community.
- Establish a dedicated school for girls to support female education in the area.
- Provide training programs to enhance the skills of local workers, ensuring they can take advantage of employment opportunities created by the project.
- Offer training and skill development programs to local workers to benefit from the project's job opportunities.
- Develop infrastructure to improve transportation and access to essential services.
- Provide support for small businesses and entrepreneurs affected by the project.

- Implement community engagement programs to address concerns and gather feedback.
- Set up a fund for ongoing community development and maintenance of newly established facilities.
- Ensure environmental protection measures to mitigate any negative impacts of the project.
- Facilitate regular communication and updates between project authorities and the community.
- Develop and communicate a clear timeline for resettlement activities, ensuring that affected individuals have adequate time to prepare and relocate.
- Create buffer zones to protect farmland from construction impacts.
- Use sustainable farming methods to prevent land degradation.
- Enhance reforestation efforts to replace lost trees.
- Establish wildlife corridors for safe animal passage.
- Perform regular environmental impact assessments and monitor pollution levels.
- Promote eco-tourism to create sustainable jobs.
- Enforce safety measures to reduce risks of landslides and other hazards.
- Install efficient drainage systems to prevent flooding and erosion.
- Plan for future growth to ensure long-term sustainability.
- Encourage community involvement in environmental conservation efforts.
- Implement renewable energy projects to reduce reliance on fossil fuels.
- Create awareness programs about environmental protection and sustainability.
- Strengthen local governance to ensure effective implementation of risk mitigation strategies.
- Collaborate with governmental and non-governmental organizations for resources and expertise.
- Develop emergency response plans to handle natural disasters and other crises.
- Adapt agricultural practices to cope with climate change.
- Partner with research institutions to use scientific advancements in risk mitigation.
- Ensure fair and transparent processes for resolving land disputes and other conflicts.
- Develop recreational and cultural facilities to enhance community well-being.
- Monitor social impacts and provide support to vulnerable community members.

11.2 Appendix 2: Sample Consultation Form Filled (Govt. Department)

Sample from Astore District

Stakeholders for Consultations

Key Questions to be asked during Stakeholder Consultations

A. C&W Department/PMU – Project Director

Name of Person(s) Interviewed: Ghulam Hussain

Designation: SDO/ FA

Contact Number: 03555205644

Key Questions?

1. What are the anticipated benefits of the Project?

   The whole public of Astor Skardu Visitor benefit.

2. Any Social Dispute in Land Acquisition or anticipated?

   No dispute in land Acquisition

3. What is the stage of approval of the revised feasibility?

   Related to PD

4. How the PMU/Department intends to acquire land and how much land (kanal) is required for the project as per assessment?

   N/A

5. Key issue related or suggestion to improve to environment during construction and O&M and suggestions to improve?

   No any Issue

6. Grievance/complains received from the PIZ community, so far?

   No any complain received by the Community.

7. Documents required
   (a) Feasibility report and Drawings (revised and latest)
   (b) Status of Land Compensation and Award

   Related to PD

Sample from Skardu District:

A. Forest and Wildlife Department

Name of Person(s) Interviewed: Sajjad /Muhammad Salahuddin

Designation: DFO / Range Forest Officer Skardu

Contact Number:

Key Questions to be asked

1. Names of Farm and Forest tree species found in the project area? Especially Shagarthang valley!

   1: Poplar 2: willows 3: Snobbier 4: Russian olive 5: Juniper

2. Names of Rangeland tree species and grasses found in the lager area? And in the project impact zone (PIZ).

   Alfa Alfa and Juniper

3. Names of Fruit Trees in the project area?

   1: Apricot 2: cherry 3: Apple 4: Pear 5: Walnut 5: Mulberry 7: Almond etc.

4. What type of wildlife (animal, birds, reptiles, etc.) found in the project area, and in the larger region (List!!)?

   1: Chakhor 2: Ram Chakor 3: Duck 4: Flacons 5: Raptor
   1 Ibex 2; Snow leopard 3: Markhor 4 : wolf 5: Brown Bear 6: Fox 7 : Cat

5. Kind of migratory avian birds cited in the area?

   1: Mallards 2: Corm vent 3: Cranes

6. Names of Natural Forest and flora found in the Astore (especially, PIZ area)?

   Juniper forest there in no any natural forest in the area. There are shrub and small size natural plants in mountain and one of them is called Artemisia.

7. What kind of support department provides to the communities in forestry and wildlife, range lands?

   Conservation Of Wild life, Conservation of Jungle, Social forestry ,farm forestry, protection of flowra and flowra slop .erosion control measures.

11.3 Appendix 3: List of Community Persons Consulted

Details of Community Persons Consulted

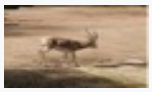
FGD Participation Kachura to Shagharthang district Skardu				
1	Name	Nature of contract	CNIC or Contract No	Village
1	Shabir Hussain	CINC	71103-1864605-9	Shagarthang
2	Sakawat Ali	CINC	71103-8907992-3	Shagarthang
3	Mohammad Afzal	CINC	71103-4110800-5	Shagarthang
4	Mohammad Yousuf	CINC	71103-4362166-3	Shagarthang
5	Mohammad .Nazir	CINC	71103-4036447-7	Shagarthang
6	Mohd Sadiq	CINC	71103-2132592-5	Shagarthang
7	Staqchan	CINC	711033832162-7	Bulchoo
8	Muhammad Ayoob	CINC	71103-5611637-3	Bulchoo
9	Akbar	CINC	71103-4425804-7	Staqchan
10	Ali	CINC	71103-9115482-7	Staqchan
11	Azam	CINC	71103-3524895-5	Staqchan
12	Ibrahim	CINC	71103-2269440	Staqchan
13	Hassan	CINC	71103-2395235-5	Staqchan
14	Hassan	CINC	71103-4323529-7	Staqchan
15	Mohammad	Mobile No	03554109923	Sooq Kachurah
16	Ghulam	Mobile No	03555852327	Sooq Kachurah
17	Shabir Hussain	Mobile No	03555702691	Sooq Kachurah
18	Zakir Hussain	Mobile No	03554428715	Sooq Kachurah
19	Mohammad Hussain			Sooq Kachurah
20	Mohd Habib	Mobile No	03555765442	Sooq Kachurah
21	Sadiq			Sooq Kachurah
22	Amran	Mobile No	03328854272	Sooq Kachurah
23	Mohammad Hassan Jaffari	Mobile No	03555454141	Manager LSO Kachurah
24	Akhond Mohammad Hassan	Mobile No	03555219433	Kachurah
25	Zakir Hussain	Mobile No	03465379714	Kachurah
26	Mohammad Kazim	Mobile No	03475152624	Kachurah
27	Gulzar Hussain	Mobile No	03480101388	Kachurah
28	Ali Mohammad	None		Kachurah
29	Mohammad Nazir	None		Kachurah
30	Mohammad Hussain	None		Kachurah
31	Haji Ali	None		Kachurah
32	Sulaman	None		Kachurah
33	Mohammmad Sadiq	None		Kachurah
34	Abbas Ali	None		Kachurah
35	Iftikhar Ali Ghazi	None		Kachurah
36	Syeed Hussain Shah	None		Kachurah

List of Community persons Consulted in Astore District			
Sr.No	**Name**	**Village**	**Tribe**
1	Mohd Iqbal	Maikal Astor	Shaikay
2	Ashraf	Makyal	Dudaai
3	Asghar Khan	Pakora	Malik
4	Muhabbat khan	Nogam pakura	Mustaay
5	Zahir iqbal	Khume dass	Wazir
6	Fida Hussain	Khume dass	Wazir

7	Jamsheed Ali	Wazir Abad	lobaiye
8	Liaqat Hussain	Kharbay	Numberdar
9	Tariq Hussain	Kharbay	Jastero
10	Tariq Latif	Bimuri	Khusal wazir
11	Mohd Nawaz	Nogam pakura	cnuttai9 Makmali)
12	Sarfaraz Hussain	Bumori	Khusal wazir
13	Muhammad hanif	Bumori	Khusal wazir
14	Mohsin Ali	Bubine	Rustumaai
15	Mohs shafa	Bubine	Husani
16	Akbar Hussain	Yagam	Aalamay
17	Sher Ghazi	Wazir Abad	Lobaiye
18	Kalimullah	Gudai	Mughal
19	Mohd Hamayun	Gudai	Gulsher khan Famaily
20	Jumma Khan	Makyal	Maiky

11.4 Appendix 4: IUCN Red List of Endangered Species in Pakistan

Common name	Scientific name	Image	Description
Wild goat	Capra aegagrus		The subspecies Capra aegagrus blythi and Capra aegagrus chialtanensis are endemic to Pakistan.
Striped hyena	Hyaena hyaena		National status: critically endangered
Snow leopard	Panthera uncia		National status: critically endangered
Smooth-coated otter	Lutrogale perspicillata		
Sand cat	Felis margarita		Endemic. The subspecies Felis margarita scheffeli is endemic to Pakistan.
Red deer	Cervus elaphus		
Pallas's cat	Otocolobus manul		
Mountain weasel	Mustela altaica		
Mountain sheep	Ovis ammon		
Markhor	Capra falconeri		
Marbled polecat	Vormela peregusna		The species is mostly found in desert areas and is facing major threat in the form of habitat destruction.
Leopard	Panthera pardus		National status: critically endangered
Kashmir vole	Alticola montosa		The Kashmir vole is found in a few places in Khyber Pakhtunkhwa and Azad Kashmir. Habitat loss due to human activities is the main threat to this species.
Kashmir muskdeer	Moschus cupreus		

Common name	Scientific name	Image	Description
Indus river dolphin	Platanista minor		Endemic
Indian wild ass	Equus hemionus khur		National status: critically endangered
Indian pangolin	Manis crassicaudata		
Honey badger	Melivora capensis		National status: critically endangered
Himalayan musk deer	Moschus leucogaster		
Himalayan marmot	Marmota himalayana		National status: critically endangered
Himalayan goral	Naemorhedus goral		
Hairy-footed gerbil	Gerbillus gleadowi		
Goitered gazelle	Gazella subgutturosa		National status: critically endangered
Fishing cat	Prionailurus viverrinus		
European otter	Lutra lutra		The species is found in the Himalayan river systems of Pakistan where it is listed as an endangered species.
Chinese white dolphin	Sousa chinensis		
Caracal	Caracal caracal		National status: critically endangered
Burrowing vole	Hyperacrius fertilis		The species is endemic to Kashmir and Khyber Pakhtunkhwa regions. Depletion of habitat due to livestock grazing and human activities are the major threats to this species.

Common name	Scientific name	Image	Description
Brown bear	Ursus arctos isabellinus		National status: critically endangered
Black finless porpoise	Neophocaena phocaenoides		The finless porpoise is often caught in fishing nets across the coasts of Pakistan. Other threats to the species include habitat loss, boat traffic, and pollution.
Balochistan forest dormouse	Dryomys niethammeri		Endemic. The species is only found in juniper forests near Ziarat in Baluchistan. The major threats to this animal are deforestation and degradation of its habitat.
Asian black bear	Ursus thibetanus		

11.5 Appendix 4: Sample Sub Plans and Contract Clauses

Measure	**Waste Management Plan**	**No.**	**1**
Impact	Waste		
Phase	All activities		
Project component			
Affected part of environment	Environment		
Place	On site (construction site)		
Description of impact	Domestic waste Solid waste including excavated material Liquid waste Hazardous waste		
Characteristics	Domestic waste will occur mainly during on all sites. Solid waste may also occur mainly during construction and demolition of old structures. There will be liquid waste from the maintenance of all lorries and plant machinery. Hazardous wastes can occur during construction time for the maintenance of the Machinery Transient and permanent; high probability; high importance		
Measures	The following mandatory waste handling procedures have to be included as clauses in the tendering documents for all construction and operation works: Install garbage cans for temporary waste disposal of domestic waste. Those have to be collected and disposed according to the regulation of solid waste management and approved by the local authorities. No waste shall be disposed of or buried on the site. Illegal dumping, either at the construction camp, along the roads or in the surrounding areas, or into the river shall not be allowed. The different types of solid waste have to be separated and disposed of separately according to the environmental guidelines and best practice. Solid waste generated during construction (e.g., excavated material) and at campsites will be properly treated and safely disposed of only in demarcated waste disposal sites. Waste should be reduced, re-used, recycled and the disposal should be controlled. Hazardous waste (oil, chemicals, etc.) has to be stored in a designated closed tank and/or area. Until it will be delivered to companies specialized on the proper disposal or recycling of those hazardous wastes. Containers have to be available at the workshops for the disposal of used filters, gaskets and other spare parts. The maintenance of machinery and lorries have to be done in workshops, liquids and including the cleaning water to be collected in tanks and transported to the waste-water treatment plant. Oil contaminated water to be treated with an oil skimmer. A full clean-up of the site has to be carried out after construction. All wastes accumulated during construction and all demolishment wastes from temporary structures have to be disposed properly. A continuous monitoring of the proper waste handling by the contractor and by the C&WD PMU GASSR is indispensable to ensure that problems are identified and addressed early		

Measure	**Waste Management Plan**	**No.**	**1**
	Instruct workforce on appropriate measures to minimize waste and raise the awareness of the workforce.		
Effects	Appropriate waste handling measures result in minimization of contamination of the environment and in improved health protection		
Responsibilities	C&WD PMU to include the clauses in the tender document; Contractors to comply with the clauses in their tender.		
Detailed plan	The excavated material shall be either reused (stone & soil stabilization) or disposed of at the designated places in consultation with the *EE/O-SC Expert*, which must be away from water bodies. Detailed plan on how to adhere to the clauses in the tender document and how to implement the different waste handling procedures on site has to be provided by the Contractor. This plan is to be approved by the Consultant and the PD PMU.		
Implementation	Starting with preparation of all sites, lasting continuously including demobilization		
Monitoring	A continuous monitoring of proper waste handling by the EHS unit is indispensable to ensure that problems are identified and addressed early, thus minimizing the risk of unnecessary waste producing and uncontrolled waste disposal.		
Cost estimate	Has to be included in the cost proposals of contractors. Based on experience of construction sites of similar size, the mentioned waste handling procedures mainly consist of good working practice and therefore do not require additional costs. Exemplary waste handling practices on construction sites normally have the opposite effect: they reduce the amount of waste and save on costs.		

Measure	**Wastewater Management Plan**	**No.**	**2**
Impact	Pollution of surface waters		
Phase	All sites and general activities		
Project component			
Affected part of environment	Water Quality		
Place	Vicinity of construction site		
Description of impact	The potential environmental implications of certain activities on surface water quality include: Effects on general water quality through construction activities such as painting, grouting, concreting, drilling, use of lubricants and grease etc.; and Effects on general water quality though instream activities such as placement of rock, piling, dredging and reclamation; The release of waste into the waters near the construction area. Concrete contaminated; waters, washing waters of equipment, used lubricants, sewage waste, litter and other waste; Discharge of poorly treated wastewater from fuel pumping and storage activities.		
Characteristics	Construction and other activities temporarily and locally deteriorate the water quality as a part of the works. If the mitigation measures to prevent/minimize the input of sediment load, concrete runoff, oily and otherwise harmful liquids into the surface water are enforced, the construction will only have a minor adverse impact.		
Measures	The following mandatory water pollution control measures have to be included as clauses in the tendering documents for all construction, demolition and other works:		

Measure	**Wastewater Management Plan**	**No.**	**2**
	All necessary steps have to be taken to ensure that oil is not released into the river or allowed to seep into the ground. Storage of fuel and lubricants away from the river, in designated areas, tight containers placed on sealed surfaces. Storage areas shall be designed such that they will contain 110 % of the largest container/ vessel stored in the storage area and waterproof, to isolate them from near-by drains; have available on-site equipment and materials to execute clean-up (sufficient absorbent). Good maintenance of vehicles and machines to prevent oil losses. No cleaning or maintenance of vehicles or machines in close proximity to the river. This must be done on specially prepared places (workshops) equipped with oil skimmers. the use of biodegradable oils the provision of waste oil reception facilities (or oil banks). Unnecessary dangerous chemicals and/or toxic substances are forbidden to use. Where water quality endangering liquids are handled for any purpose, the methods employed have to meet accepted standards for health, safety and the environment. Adequate training for appropriate site personnel is imperative. For in-stream works, using isolation techniques such as berming or diversion during construction to limit the exposure of disturbed sediments to moving water. Restricting the duration and timing of in-stream activities to dry season, and avoiding periods critical to biological cycles of valued flora and fauna (e.g., migration, spawning, etc.). Do not install a deposit even for uncontaminated gravel from the quarry near anybody of surface water All the water draining down from the quarries need to be lead to sedimentation and neutralization ponds and has to be treated before releasing it to the river. All the waters from the batching plants, the concrete mixer washing facilities and the crusher plants needs to be collected and treated before releasing to the environment. Sewage effluent is not allowed to be discharged into surface waters without treatment, again due to the effects on the natural and human environment, meaning that suitable facilities have to be provided for the reception of all sewage waste resulting from the construction site. In addition, disposal of strong cleaning agents, cooking oils and general litter/waste to proper reception facilities has to be implemented Waste-water from camp sites must be collected in portable latrines or septic tanks and has to be treated before releasing into a river.		
Effects	The water pollution control measures during construction and operation will considerably reduce the discharge of water deteriorating substances and thus improving quality of the surface waters		
Responsibilities	C&WD PMU to include the clauses in the tender document; Contractors to comply with the clauses in their tender.		
Detailed plan	Detailed plan on how to adhere to the clauses in the tender document and how to implement the different water pollution control measures on site has to be provided by the Contractor. This plan has to be approved by Consultant and the C&WD PMU.		
Implementation	Starting with preparation of construction sites, lasting for construction and other project works. This is to continue when operations commence.		

Measure	**Wastewater Management Plan**	**No.**	**2**
Monitoring	Water quality needs to be monitored at each location where used water (treated water) enters into natural surface water. An online monitoring or a daily sampling is recommended with a reduced set of parameters (pH, TSS, temperature, conductivity, dissolved oxygen) to be able to detect any spills or leakages fast and to react adequately. A continuous regimen of maintenance and technical monitoring of processes by the EHS Unit is indispensable to ensure that problems are identified early on, thus minimizing the risk of oil accidentally entering the surface waters or ground.		
Cost estimate	Costs for waste-water collection and treatment (inclusive of suitable container held WWTPs) have to be included in the Contractor's proposal.		

Measure	**Erosion Prevention Plan**	**No.**	**3**
Impact	Soil erosion		
Phase	Construction Phase (on some projects)		
Project component			
Affected part of environment	soil		
Place	On site (construction site), off site (roads, quarries and dumping sites for excavation material)		
Description of impact	Soil erosion will result from all construction activities where the vegetation cover is removed.		
Characteristics	Main soil erosion will result from transport, burrow areas, dumping sites and the construction site itself. transient; high probability; low importance		
Measures	Good engineering practices will help controlling soil erosion both at construction sites and in peripheral areas, particularly in borrow and dumping areas and along access roads. The following erosion control measures have to be included as clauses in the tendering documents for all construction works: The Contractor needs to identify sensitive areas, so that these can be avoided, if possible, if not possible state of the art techniques needs to be used to reduce erosion were possible: Install sediment traps Drainage channels where necessary Prevent steep slopes, define optimum height of work evaluating the instability of the rock, soil etc. Slope properly, stabilize, compact and strengthen steep slopes Adequate selection of road tracks, taking into account the landscape, technical environmental and social aspects Construct drainage ditches at roads if there are passing through mountainous area If the slope is more that 16 % they have to be paved install culverts with enough capacity for strong rains, drainage pipes and channels have to be of an adequate size and should be equipped with screens at entrance and exit points to reduce the risk of clogging Re-vegetation as soon as possible deep rooting trees for slope stabilization Areas sensible to erosion should be monitored		

Measure	**Erosion Prevention Plan**	**No.**	**3**
Effects	The erosion prevention control measures during construction and operation will considerably reduce the soil erosion and therefore also the suspended solids in surface water and thus improving quality of the habitats and water quality		
Responsibilities	C&WD PMU to include the clauses in the tender document; Contractors to comply with the clauses in their tender.		
Detailed plan	Detailed action plan on how to adhere to the clauses in the tender document and how to guarantee the compliance with best practice has to be provided by the Contractor. This action plan has to be approved by the Consultant and the PMU.		
Implementation	Starting when construction starts, ending by completion of construction and re-vegetation works		
Monitoring	Steep slopes, excavation material disposal areas and river banks where the vegetation has been cleared have to be monitored periodically.		
Cost estimate	Has to be included in the cost proposals of contractors.		
Observations	Re-vegetation has to start as soon as possible with native species.		

Measure	**Hazardous Material Management Plan**	**No.**	**4**
Impact	Soil contamination, water contamination		
Phase	Construction Phase and Operation Phase.		
Project component			
Affected part of environment	Soil, water, work force		
Place	On site (construction site), off site (roads, quarries and dumping sites for excavation material)		
Description of impact	contaminate the soil and water, risk for occupational health		
Characteristics	Spillages and/or leakages can occur during the construction and operation due to improper maintenance of equipment, storage tanks of oil or any other toxic substances. Toxic or flammable gases Flammable liquids Flammable solids Oxidizing substances Toxic and infectious substances Corrosive substances Miscellaneous dangerous materials. transient; high probability; low importance		
Measures	Hazardous materials (oil, chemicals, etc.) have to be stored in a designated closed tank, storage and/or area. Prohibition of dumping of any contaminating material product into the environment is prohibited (including oil, waste oils). Storage and routine handling of fuels, lubricants, and other contaminating substances in workshops with sealed floor and equipped with a drainage system with oil skimmer. Storage areas shall be designed such that they will contain 110% of the largest container/vessel stored in the storage area; suitable clean-up equipment and material needs to be on site (fuel tank farm at Bushrod)		

Measure	Hazardous Material Management Plan	No.	4
	Supply agreement will include responsibility for supplier to take waste oil. The Contractor will verify each supply/disposal subcontractor(s) has adequate arrangements or facilities for proper disposal, treatment or recycling of these wastes. Each storage container should be marked visible with the necessary precaution signs and the Material Safety Data Sheet needs to be readily accessible to the workers. Hazardous wastes have to be stored in a designated closed tank, storage and/or area (do not mix anything). Until it will be delivered to companies specialized on the proper disposal or recycling of those hazardous wastes. All employees working with Hazmats should be provided with suitable personal protection equipment (footwear, masks, protective clothing and goggles in appropriate areas), emergency eyewash and shower stations, ventilation systems, sanitary facilities, pre-employment and scheduled periodic medical examinations. All employees working with Hazmats should be trained in hazard identification, safe operating procedures, appropriate materials handling procedures, safe work practices, basic emergency procedures, and (if applicable) special hazards unique to their jobs. A continuous monitoring of the proper hazardous material handling by the contractor and by the PMU is indispensable to ensure that problems are identified and addressed early. Transportation procedures should be prepared to be consistent with internationally accepted standards and should cover, at a minimum the following: (i) ensuring that the nature, integrity and protection provided by packaging and containers used for transport are appropriate for the kind and quantity of hazardous material involved; (ii) ensuring adequate transport vehicle specifications; (iii) routes used; (iv) loading and unloading procedures; (v) informing employees involved in the transportation and training them as appropriate to handle normal operations and emergencies; (vi) using labelling and placarding (external signs in transport vehicles) as required; and (vii) providing the necessary means for emergency response; and (viii) compliance audit procedures.		
Responsibilities	WPD to include the clauses in the tender document; Contractors to comply with the clauses in their tender.		
Detailed plan	Detailed action plan on how to adhere to the clauses in the tender document and how to guarantee the compliance with best practice has to be provided by the Contractor. This action plan has to be approved by the Consultant and the PMU.		
Implementation	Starting when construction starts, ending by completion of construction and re-vegetation works		
Monitoring	Monitoring records must be made available to employees handling Hazmats and PMU; records should be kept for Lenders review and reports on Hazmat management.		
Cost estimate	Has to be included in the cost proposals of contractors.		

Measure	Occupational Health and Safety Plan	No.	5
Impact	Work accidents, occupational diseases (skin irritation, noise, etc.)		
Phase	Mainly Construction Phase and Operation Phase		

Measure	**Occupational Health and Safety Plan**	**No.**	**5**
Project component			
Affected part of environment	Workers		
Place	On site (construction site), off site (roads, quarries and dumping sites for excavation material)		
Description of impact	Accidents can occur for instance due to careless driving, bad maintenance of machinery, careless handling of hazardous material on the construction site, etc.		
Characteristics	Transient and permanent; high probability; high importance		
Measures	Carry out a risk assessment to identify activities and areas of high risk. Develop a Health and Safety Manual, including all necessary procedures Ensure a safety and emergency training for all employees. Ensure a qualified person responsible for all health issues and equipment for first aid. First aid kits need to be available at the construction site for fast action if an accident occurs. Accessible consultation sheets for review in case of contingency or emergency situations. These should have phone numbers for police, fire-fighters, hospital, personal supervisor or project leader. All workers have to use the relevant PPE (helmet, gloves, goggles, work boots, masks, ear plugs, etc.) Workers handling hazardous material have to be trained and material safety data sheet should be provided. All restricted plant facilities have to be labelled with caution signs, especially those with potential risk for workers. All construction areas like excavation pits, quarries etc shall be marked and fenced to avoid accident from unauthorised people. Machinery has to be equipped with warning alarms while reversing. Machinery has to be maintained in good working order. Driver has to follow road safety rules. Driving has to be done only in designated areas. Lifesaving vests have to be available. Lifesaving rings have to be installed at the work site near the water. Evacuation plan for emergency cases (identification of an arrangement with referral hospital; organisation of alarming system; ensuring availability of ambulance). Prepare a scheme of the evacuation routes and where the fire extinguishers are located within the plant and place them at on conspicuous places. Provide sufficient portable water. Assign during construction special areas for the food intake. The minimum distance of such areas, as well as (temporary) housing and recreation areas, from work areas (mechanical workshops etc.) should be 10 m. Toilets for workers, in the vicinity of working areas and at a rate of one toilet for every 10 workers, should be installed, whereby a distance of at least 15 m to open water sources have to be kept. The toilets need to be maintained and disinfected regularly, wastewater must be collected and treated before being resituated to the environment Workshops and camp site must have acceptable conditions of light, ventilation and safety for workers.		

Measure	Occupational Health and Safety Plan	No.	5
Effects	Reduction of accidents. Health protection. Appropriate reaction in case an accident happens.		
Responsibilities	PMU to include the clauses in the tender document; Contractors to comply with the clauses in their tender.		
Detailed plan	Detailed action plan on how to adhere to the clauses in the tender document and how to guarantee the compliance with best practice has to be provided by the Contractor. This action plan has to be approved by Consultant and the PMU.		
Implementation	Starting when construction starts, ending by completion of construction and re-vegetation works		
Monitoring	Responsible person for health and safety has to monitor during the whole work activity period. Health and Statistics have to be kept on site and reported to Consultant and the PMU on a monthly basis. Statistics on non-compliance with PPE carried out. Any major accident has to be reported suddenly away to Consultant and the PMU.		
Cost estimate	Has to be included in the cost proposals of contractors. (if applicable)		
Reporting	General measures taken, normal procedures: to be integrated in pre-defined periodic (monthly, quarterly, annual) report; this also includes the cases of minor accidents and "normal" diseases. Major accidents (especially fatal ones, accidents with severe injuries and/or involving several persons and/or severe damage to the environment) as well as cases of dangerous or highly contagious diseases (e.g. cholera) have to be reported immediately. An accident protocol has to be established for each such accident.		

Measure	Public Health	No.	6
Impact	Communicable Diseases		
Phase	Before and during construction phase		
Project component			
Affected part of environment	Permanent and temporary work force, local population		
Place	Fixed sites and network areas.		
Description of impact	Transmission of communicable diseases		
Characteristics	Transient, high probability, high importance		
Measures	During the first week of employment all workers should attend a workshop on communicable diseases. How to get infected, how to recognize symptoms, what should be done and on the prevention measures. Communicable diseases: Dissemination of information. Voluntary counselling and testing. Every worker has to have the necessary vaccinations (Hepatitis A and B; Typhus; Tetanus, Covid 19 etc.). Overall good housekeeping contributes to maintaining hygienic and safe conditions on the construction site. Do not create additional breeding places at the construction site for arthropods and snail's e.g. unnecessary ponds, tires etc. Assessment of the most nearby clinics, and the provision of minimum equipment is necessary to take care of emergency.		

Measure	Public Health	No.	6
	A campaign on hygiene and sanitation must be maintained regularly to promote healthy behaviours. This is of High importance in relation to Covid 19. Disinfection materials need to be on site. Similarly, it is important to develop devices for household waste collection, disposal and wastewater treatment and latrine maintenance Dedicate one person for providing project information and prepare a Community Relation Plan and inform the population about the Project. Speed limits and a safety driving training should be implemented Improve infrastructure in the area directly affected by the project (maintenance of access roads) Control activities affecting waters, soil and air.		
Effects	Minimization of transmission of diseases Health protection for the local population and for the work force.		
Responsibilities	C&WD PMU to include the clauses in the tender document; Contractors to comply with the clauses in their tender.		
Detailed plan	Detailed Plan related housekeeping, workers health, reduction of breeding places in the construction area, etc. has to be provided by the Contractor		
Implementation	Before work commences and during construction		
Monitoring	Responsible person for health and safety should monitor during whole construction period.		
Cost estimate	Has to be included in the cost proposals of contractors		
Observations	Provision for Public Health as accompanying duty should be included in the ToR for work activities.		
Reporting	Normal (monthly, quarterly, annual) reports Keep medical records on all cases, treatments, workdays lost, etc.		

Measure	Traffic Management Plan	No.	7
Impact	Air, work force, population		
Phase	Construction Phase (if applicable)		
Project component	Transport		
Affected part of environment	Air, population, safety		
Place	On site (construction site), off site (roads)		
Description of impact	Air emissions, risk of accidents		
Characteristics			
Measures	A Traffic Management plan will have to be developed, which has to be compulsory for all contractors and subcontractors on roads within the project area as well as on all public roads. Regular maintenance of the vehicles (brakes, wheels, lights, brakes and power lines, etc.) The driver has to adapt his/her driving style to type of charge and the weight of the charge (braking distance increases with the weight), special caution has to be taken in front of schools where children suddenly cross the street. In the villages animals and pedestrians have the right of way. Procedures if an accident occurs (whom to call, which is the next hospital, etc.) including reporting procedures. Actions to be taken if the driver does not comply with the set guidelines.		

Measure	Traffic Management Plan	No.	7
	Adequate signing, warnings and controls have to be implemented like speed limits. Enforce maximum load restriction Implement a maintenance program for access roads carried out before rainy season (cleaning gutters, improvement of the road, if necessary, etc.) Develop procedures for parking and on-site traffic movement No drugs during working time Use if feasible project buses to transport workers to the site.		
Effects	reduce the risk of accidents and injuries to persons reduce air emissions (exhaust gas, dust) Reduce lubricant and oil losses.		
Responsibilities	WPD to include the clauses in the tender document; Contractors to comply with the clauses in their tender.		
Detailed plan	Detailed action plan on how to adhere to the clauses in the tender document and how to guarantee the compliance with best practice has to be provided by the Contractor. This action plan has to be approved by Consultant and the WPD.		
Implementation	Starting when construction starts, ending by completion of construction and re-vegetation works		
Monitoring	Periodic check of vehicles and machines. Immediate removal of lorries and other vehicles visibly emitting "black clouds".		
Cost estimate	Has to be included in the cost proposals of contractors.		
Reporting	Normal (monthly, quarterly, annual) reports Immediate reporting of accidents		

Measure	Air pollution	No.	8
Impact	Air pollution		
Phase	Construction Phase and fixed site activities (where applicable)		
Project component	Construction site and transport		
Affected part of environment	Air quality		
Place	On site (construction site), off site (roads and surroundings due to traffic)		
Description of impact	Air pollution (mainly emission of nitrogen oxides (NOx) and particulate matter) will result from all construction activities related to the project. The three main sources are (i) emissions related to the construction activities, (ii) emissions resulting from transport of material and personnel from/to the construction sites, and (vi) emissions of burrow areas, quarries and dumping sites		
Characteristics	Main air pollution will result from construction machinery and delivering of construction material transient; high probability; low importance		
Measures	The following air pollution control measures have to be included as clauses in the tendering documents for all construction, demolition and construction works: Use only adequate and well maintained construction and transportation equipment including diesel fuel of good quality. The reduction of particulate (soot) emitted by diesel engines is by far the most efficient measure for keeping the air pollution low. Organize the sequence of construction activities in a way that the use of construction equipment powered by diesel fuel is optimized and the duration of use is minimized.		

Measure	Air pollution	No.	8
	Take appropriate measures for dust suppression; this includes among other good housekeeping and water sprinkling especially on unpaved access roads. Optimize storage on-site of materials that are known to be whirled up by wind. Trucks which transport construction material for longer distances (quarry to construction site) should be covered. Do not exceed speed limits Do not burn waste Avoid burning of inopportune or hazardous combustible material. Instruct the workforce on the appropriate measures to minimize air pollutants and dust.		
Effects	Up to 50% less dust produced compared to construction site without specific precautions for dust suppression About 30% less emission of NOx and up to 95% less emission of soot compared to heavy duty traffic and civil construction works without enforcing of proper maintenance		
Responsibilities	C&WD PMU to include the clauses in the tender document; Contractors to comply with the clauses in their tender.		
Detailed plan	Detailed action plan on how to adhere to the clauses in the tender document and how to guarantee the compliance with best practice has to be provided by the Contractor. This action plan has to be approved by Consultant and the PMU.		
Implementation	Starting when transport for construction material starts, ending by completion of construction and re-vegetation works		
Monitoring	All organizational measures for dust minimizing and proper maintenance of the Corporation's machinery and the lorries should be monitored continuously by the EHS unit		
Cost estimate	Has to be included in the cost proposals of contractors. Based on experience of similar construction sites, the financial proposals for construction and certain fixed site activities including the mentioned measures for minimizing air pollution are about 1 to 2% higher than without a commitment to meet these measures.		
Observations	Provisions for air pollution control should be included in the tender documents for all construction, demolition and maintenance works.		

Measure	Noise and Vibration	No.	9
Impact	Noise		
Phase	Construction Phase and certain fixed site activities		
Project component	Construction site and transport		
Affected part of environment	Noise		
Place	On site (construction site), off site (roads and surrounding due to traffic). Generation		
Description of impact	The significant impact of the project on the noise environment will be limited in time to the construction and generation activities. The three main sources are (i) noise related to activities (vehicles, machines), (ii) heavy duty traffic noise along roads crossing inhabited areas, generated by transport of material from/to the construction sites, and (iii) power plant activities when running.		

Measure	Noise and Vibration	No.	9
Characteristics	(i): no major negative impact on noise sensitive areas is expected because of the distance between construction site and noise sensitive areas that are 500 m plus to the local community. (ii): potentially harmful effects on workers exposed to high noise levels in their workplace (crushing plant, generators,).		
Measures	The following noise control measures have to be included as clauses in the tendering documents for all construction works: Use only well maintained construction and transportation equipment including state-of-the-art built in systems to reduce the noise. Workers exposed to excessive noise have to wear PPE (ear protectors). Separate installation areas, for example mechanical workshops etc., from areas that are used by people for temporary housing and recreation. Avoid any noise-intensive works such as piling, demolition, metalworking and blasting (in quarries) etc. during night-time. Avoid transporting of material (rock, concrete, steel, machinery) during night-time. Use adequate and state of the art techniques for blasting, which do not exceed the exposition time to the noise. Noise and vibration associated with the use of explosives needs to be monitored. Max 136db Restrict access during blasting events. Instruct the workforce to avoid unnecessary noise.		
Effects	Maintaining the noise standards set by international organizations such as WHO.		
Responsibilities	C&WD PMU to include the clauses in the tender document; Contractors to comply with the clauses in their tender.		
Detailed plan	Detailed action plan on how to adhere to the clauses in the tender document and how to guarantee the compliance with the standards has to be provided by the Contractor. This action plan has to be approved by the ESMP implementation unit.		
Implementation	Starting when transport for construction/generation starts, ending by completion of activities and clean-up/re-vegetation works		
Monitoring	All organizational measures for noise preventing and proper maintenance of the construction machinery and the lorries should be monitored continuously by the Consultant and the C&WD PMU.		
Cost estimate	Has to be included in the cost proposals of contractors. Based on experience of similar construction sites, the financial proposals for construction and demolition works including the mentioned measures for noise protection are less than1% higher than without a commitment to meet these measures		
Observations	Provisions for noise control should be included in the tender document for all construction and maintenance works.		

Measure	Equipment Maintenance Management	No.	10
Impact	Soil contamination, water contamination, occupational health and public health		
Phase	Construction Phase and Operation Phase		
Project component			
Affected part of environment	Soil, water, population		

Measure	Equipment Maintenance Management	No.	10
Place	On site (construction site), off site (roads, quarries and dumping sites for excavation material). Generation – HFO sludge being a by-product.		
Characteristics	Improper maintenance of equipment leads to spillages, unnecessary high air emissions, and unsafe working conditions. transient; high probability; high importance		
Measures	The Equipment Maintenance Management Plan needs to contain: the processes for the maintenance of the different construction equipment, with respect to the manual of each equipment or vehicle, used on-site and off-site, maintenance protocols should be developed for the different equipment, machine and vehicle types, the periodicity in which the maintenance inspections needs to be carried out for the different equipment, machines and vehicles types needs to be determined. Procedures will have to be set up to take not maintained equipment and or unsafe equipment out of operation until it has been repaired and is in compliance with the safety standards. All maintenance protocols needs to be kept on the construction site and a copy should be carried within the vehicle and need to be shown if they are inspected.		
Effects	Safe construction work and transportation reduction of air emissions, noise, contamination of soil and water. Also the safe disposal of HFO sludge by an approved company		
Responsibilities	C&WD PMU to include the clauses in the tender document; Contractors to comply with the clauses in their tender.		
Detailed plan	Detailed action plan on how to adhere to the clauses in the tender document and how to guarantee the compliance with best practice has to be provided by the Contractor. This action plan has to be approved by the Consultant and the PMU.		
Implementation	Starting when construction starts, ending by completion of construction and re-vegetation works		
Monitoring	Periodical monitoring time frequency depends on the construction machinery itself, should be in the manual of each equipment		
Cost estimate	Has to be included in the cost proposals of contractors.		

Measure	Pollution Spill Contingency Plan	No.	11
Impact	Soil contamination, water contamination		
Phase	Construction Phase		
Project component			
Affected part of environment	Soil, water		
Place	On site (construction site), off site (roads, quarries and dumping sites for excavation material)		
Description of impact	Accidental spillages or leakages will contaminate the soil, ground and surface water		
Characteristics	Spillages and/or leakages can occur during the construction and operation due to improper maintenance of equipment, storage tanks of oil or any other toxic substances. transient; high probability; low importance		
Measures	The Contractor's Pollutant Spill Contingency Plan will outline the procedures for proper handling of potential pollutants and procedures to be carried out in the		

Measure	**Pollution Spill Contingency Plan**	**No.**	**11**
	event of a pollutant spill. It will also specify equipment procurement and training of construction personnel. The most important pollution mitigation measures are shown below: The Contractor needs to identify sensitive areas, so that these can be avoided if possible. Prohibition of dumping of any contaminating material product into the environment is prohibited (including oil, waste oils). Storage and routine handling of fuels, lubricants, and other contaminating substances in workshops with sealed floor and equipped with a drainage system with oil skimmer. Storage areas shall be designed such that they will contain 110% of the largest container/vessel stored in the storage area. Suitable clean-up equipment and material needs to be on site, All wastes recovered during clean-up operations to be collected and stored for subsequent disposal. Supply agreement will include responsibility for supplier to take waste oil. The Contractor will verify each supply/disposal subcontractor(s) has adequate arrangements or facilities for proper disposal, treatment or recycling of these wastes. Personnel will be educated on proper use and disposal of hazardous materials.		
Effects	Unexpected spills and leakages will be treated properly and fast, the contamination of soil will be locally and due to clean-up mechanisms not spread into the surrounding or drained into the water and/or groundwater.		
Responsibilities	C&WD PMU to include the clauses in the tender document; Contractors to comply with the clauses in their tender.		
Detailed plan	Detailed action plan on how to adhere to the clauses in the tender document and how to guarantee the compliance with best practice has to be provided by the Contractor. This action plan has to be approved by the Consultant and the PMU.		
Implementation	Starting when construction starts, ending by completion of construction		
Monitoring	Regular visual control of fuel containers etc. Water quality monitoring including detection of oil.		
Cost estimate	Has to be included in the cost proposals of contractors.		
Reporting	Normal (monthly, quarterly, annual) reports Exceptional events (e.g., major oil spills) have to be reported immediately (event, measures taken, and impacts, follow-up).		

11.6 Appendix 6: Sample of Contract Clauses

[The Contractor] shall provide a Constructional Environmental and Social Management and Monitoring Plan (Construction-ESMP) including a Constructional Occupational Health and Safety and Labour Condition Management Plan in a form and substance satisfactory to PD/PMU GASSR and Supervision Consultant before construction (including mobilization) starts. The OHS Management Plan should be based on a risk assessment taking into account site specific issues and project phases, it will include the obligation that periodical risk assessments will be carried out and that the ESMP will be updated and implemented.

[The Contractor] shall take all responsible steps to ensure the occupational health and safety of its' workforce including those of sub-contractors and non-employees as well as the security of the public (both on and off the Site). [Contractor(s)] will be responsible to ensure that all workers including those of sub-contractors and non-employees receive an EHS induction prior to starting work, a work-site orientation and on-the-job or formal training prior to being assigned to a job. The [Contractor] is obligated to equip its' workforce with the required personal protective equipment at no cost to the workers, to supervise and to train its' workforce related to international safety standards (National and ILO Standards), GBEPA Guidelines) and to report any incidents to C&WD PMU. [The Contractor] will apply best practice international standards to occupational safety with regard to the use of personal protective equipment, work procedures and equipment movement. In case of non-compliance, it can be considered as breach of contract.

[The Contractor] has to regularly conduct safety induction meetings and has to maintain incident statistics. A comprehensive Constructional Occupational Health and Safety and labour Condition Management Plan including site (camp and construction site) management plan, including accommodation requirements, health & safety plan, including training, hygiene, emergency response and hazardous material/waste management plans is obligatory to be developed and implemented before construction starts. Health and safety staff will be appointed and present on the construction site during working hours and will include an on-site first aid emergency capacity.

[The Contractor] will have to include these conditions in all the contracts with its subcontractors and suppliers, and the contractor will be responsible for the compliance of the subcontractors and suppliers with these conditions.

Contract Addendum for Reference.

11.7 Appendix 7: Photo Gallery

Consultations in District Skardu

FGD at Village Staqchan

FGD at Village Shagharthang

FGD at Vilage Soq

FGD at Village Kachurah

Consultation with Government Department and NGOs Skardu

C&W Department Skardu:

Fishery Department Skardu

Forest wildlife Department Skardu:

Agriculture department Skardu:

Education Department Skardu

Health Department Skardu:

DC Office Skardu:

LGRD Skadru

DMA Skardu

AKRSP

Religious Leader

Consultations in District Astore

Bobin Astore:

Profiling Yagham:

FGD group Bomroi:

Profiling and FGD Kharbay:

FGD Group Gudai:

Profiling Gudai

Profiling Pakorah:

FGD Mohallah Wazirabad:

Profiling Makiyal:

FGD Makiyal:

Consultations with Govt. Department in Astore

Assistant Director Education Astore

Deputy Director Fisheries Astore

Assistant Director DMA Astore

Forest Department Astore

Health Department Astore:

Livestock Department Astore:

AKRSP Astore:

Agriculture Department Astore: