State Institution "Project Implementation Unit for Access to Green and Rural Development Finance"

under the Ministry of Finance of the Republic of Tajikistan

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT / ENVIRONMENTAL MANAGEMENT PLANS

STRENGTHENING CRITICAL INFRASTRUCTURE AGAINST NATURAL HAZARDS PROJECT
For 18 bridges

SEPTEMBER 2018

DOHWA ENGINEERING CO.,LTD.

List of Abbreviations

BP	Bank Procedure
CEP	Committee for Environmental Protection
DRM	Disaster Risk Management
GBAO	Gorno-Badakhshan Autonomous Oblast
GRT	Government of the Republic of Tajikistan
DSR	District of Republican Subordination
EA	Executive Agency
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
FS	Feasibility Study
IDA	International Development Association
ISO	International Standard Organization
msl	Medium Sea Level
MT	Ministry of Transport
MPC	Maximum Permissible Concentration
NGO	Non-governmental Organization
OP	Operation Policy
PIG	Project Implementation Group
PIU	Project Implementation Unit
PSC	Project Supervision Consultant
RT	Republic of Tajikistan
SEAP	Special Environmental Action Plan
ECTS	Engineering Company for Technical Supervision
UN	United Nations
IUCN	International Union for Conservation of Nature
WB	The World Bank

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ENVIRONMENTAL ASSESSMENT

1 Project Introduction

The Republic of Tajikistan (RT) is a continental mountainous country with significant geographical barriers that severely limit its ability to effectively participate in international trade.

Country geological features make it prone to many natural disasters, such as floods and landslides. Floods are the most common hazard in Tajikistan. As a rule, floods occur either in spring after heavy rains or during snowmelt in summer. Currently, however, off-season hazards arise due to climate change. For example, high temperatures in mid-July in 2015 led to the rapid snow melting and glaciers, which led to landslides in the Gorno-Badakhshan Autonomous Oblast (abbreviated GBAO). In addition, heavy rains in combination with melting of glaciers caused mudslides. As a result of floods and mudflows, not only houses, but also infrastructures, including power lines, were destroyed. Many sections of road alignment Dushanbe-Kulyab-Khorog-Murgab-Kulma were also destroyed, which were the key trade route with China, as well as local roads laid in close proximity. During this period, almost 80% of GBAO population did not have access to electricity. According to the UN, in 2015 the total economic damage of Tajikistan due to floods and mudflows in 2015 was about 100 million US dollars.

In order to address these challenges and upon the request of the Government of the Republic of Tajikistan (GRT) the International Development Association (IDA) provided funds for implementation of "Project on Strengthening Critical Infrastructure against Natural Hazards", hereinafter referred to as the "Project". The proposed project is envisioned to establish the foundation of the GRT's long-term disastrous risk management (DRM) program and is based on a high demand for support for overall DRM and reconstruction of critical infrastructure in the country, such as bridges and flood protection and riverbank erosion–prevention infrastructure, through the "building back better" principle.

As an initial step, the project will target areas in GBAO and in the Khatlon Oblast that were affected by floods and mudflows in July 2015 and finance reconstruction of infrastructure (including bridges and flood protection and riverbank erosion–prevention infrastructure) to reduce disaster risks and avoid potential damage in the long term, given the area's exposure to natural hazards

This document relates to the Project Component covering rehabilitation of 18 bridges, mainly located in GBAO. The task of this Project Component is to improve the transport connection with remote jamoats (administrative-territorial unit of third level in Tajikistan) GBAO, by building eighteen (18) bridges to replace existing bridge structures, damaged by natural phenomena that occurred in July 2015 of the year.

Implementation Agency for the overall project is the Ministry of Finance of RT which implements the project through the Project Implementation Unit (PIU) for Access to Green and Rural Development Finance. PIU was responsible for Feasibility Study (FS) and

Detailed Design (DD) including preparation of safeguards documents. Environmental safeguards prepared for this project comprise Environmental Framework Document, Environmental Impact Assessment (EIA) reports prepared by Design Consultant **Dohwa Engineering** in cooperation with **LLC Vali** on basis of studies undertaken during FS&DD phases. This document prepared as part of bidding package of documents for procurement of Construction Contractor for bridge sub-Component.

The Executing Agency for implementation of the Bridges sub-component of the Project will be Ministry of Transport (MT) of RT, acting through its Project Implementation Group (PIG).

1.1 Environmental Impact Assessment Procedure in Tajikistan

The EIA procedures adopted in RT based on the "Law on the Procedure of Environmental Impact Assessment". The EIA is required in planning of economic and other activities that can indirectly or directly affect the environment and human health. Impact assessment for facilities whose impact possibility is likely to be high (Category I facilities) is developed as an Environmental Impact Assessment Report. Impact assessment includes the following stages:

- Development and approval of the Environmental Impact Assessment Program;
- Development of Environmental Impact Assessment Report (EIA);
- Discussion of EIA Report with public, whose rights and legitimate interests may be affected in implementation of project decisions;
- Finalization of EIA Report by public comments and proposals;
- Submission of finalized project documentation for planned economic activities, including EIA Report, to the State Ecological Expertise(Review);
- EIA for facilities that have medium and low probable harmful impacts (II and III Categories) is developed as "Environmental Protection" section in the design documentation, and for sites with local impact (IV Category) is prepared as "Statement of Environmental Impact Assessment".
- "Environmental Protection" section in design documents should contain the following parts:
- Environmental conditions prior to commencement of planned work, density of population, land conversion, analysis of environmental characteristics;
- Situational plan indicating the existing recreational zones, populated areas, irrigation, reclamation facilities, farmland, electric transmission lines, transportation, water supply, gas pipelines and other information on the terrain;
- Expected emissions, discharges, solid and industrial wastes, their negative impact on environment and methods of their neutralization;

- Warehousing, storage and utilization of waste;
- Organizational and technical, technological solutions and activities that exclude negative environmental consequences and reducing the impact of facility on environment;
- Forecast of environment changes and ecological consequences of commissioning of planned project.

Environmental Impact Assessment (EIA) is part of the process to ensure that the project meets the World Bank (WB) policy requirements for the Project subcomponent.

1.2 Brief Summary of the Document

This document comprises Environmental Impact Assessment (EIA) report and Environmental Management Plan (EMP) with site-specific environmental management profiles (plans) for each individual bridge site rehabilitated under the project.

EIA provides detailed description of the expected direct and indirect impacts of the project to the environment during the main periods of its implementation and can serve as a guide for the application of measures and activities necessary to prevent or minimize negative environmental impacts associated with the implementation of proposed project.

The EMP section includes site specific environmental management profiles for each bridge site providing the basic environmental information and highlighting the environmental issues characteristic for each site and proposed mitigation with references to EMP(A. The document also includes the detailed guidelines for preparation of Site-Specific Environmental Management Plans (SSEMP) by Contractors (Appendix 2).

1.3 Project Structural Components

Eighteen (18) bridges that need reconstruction are located on the territory of GBAO and connect the remote areas of region with the rest of the country with a year-round traffic connection, thereby playing an important role both for the economy of the Republic and for GBAO.

The Project comprises the following structural components:

1. Construction of new 34.1 m bridge over river of Yezgulem near the village of Jamak with 288 m of access road
2. Construction of new 19,4 m bridge over river of Camochdara near the village of Andarvak with 210 m of access road
3. Construction of new 25.m bridge over the river of Yezgulem near the village of Vishharv with 254 m of access road
4. Construction of new 24m over the river of Udob near the village of Udob with 160m of bank enforcement and 321 m of access road.

5. Construction of new 13.1 m bridge over the river of Chihoh, near the village of Chihoh with 160m of bank enforcement and 127m of access road.
6. Construction of new 61.1m bridge over the river of Vanch near the village of Chihoh with 301m access road
7. Construction of new 25.1m bridge over the river of Obi-Sed near the village of Obi-Sed with 100m of flow diverting dams and 584m of access road
8. Construction of new 20 m bridge over the river Ardobak near the village of Ardobak with 100m of bank enforcement and 260 m of access road
9. Construction of new 21.4m bridge over the river of Barushondara on the road Dushanbe –Chorog with 200m of bank enforcement and 414m of access road.
10. Construction of a new bridge 58.2 m long across the Alichur River of Murghab District, near the village of Alichur and 538m of access road;
11. Construction of a new bridge 16.1 m long across the River Kobrigen in Murghab District and 381m of approach road;
12. Construction of a new bridge 16.1 m long across the Okbaytal River in Murghab District and 352m of approach road;
13. Construction of a new 16.1 bridge across the Eastern Pshart River in Murghab District and 517m of approach road;
14. Construction of a new 32.6 m span of bridge over the Yakhchipun River in Shokhin District, near Zigar village and 377m of approach road;
15. Construction of a new 44m culvert-like structure over Guldara River, Darvaz District, near Zigar village and 555m of approach road;
16. Construction of a new suspension bridge 62.1 m long across Bartang River , Rushan District, near Darzhomj village and 433m of approach road;
17. Construction of a new suspension bridge 62.1m long across Bartang River, Rushan District, near Basid village and 557m of approach rpad;
18. Construction of a new suspension bridge 62.2 m long across Bartang River, Rushan District, near Gurkhum village and 433m of approach roads.

The sizes, dimensions and quantities of work were determined at the design stage. The Project will be implemented in GBAO, the Republic of Tajikistan in Shohin District (Zigar village), Davraz District (Zigar village), Rushan District (Barrushon,Basid, Darzhom, Gurkhum villages), Murghab District (Alichur village and jamoat K. Berdybaev) and in of three jamoats of Vanj district (Jovidon, Teharv and Yazgulom)

1.4 Key Conclusions of EIA

Based on the current WB policy, the Project is classified in Category B. The results of EIA confirm that the implementation of the Project will not result in significant environmental impacts that could not be prevented or whose results could not be mitigated to an acceptable level in accordance with the norms of the Republic of Tajikistan or International Standards.
The overall cumulative impact of the Project to the natural environment will undoubtedly be positive. The new bridges will accelerate trade development, agriculture and traditional crafts and, most likely, will give impetus to the development of new spheres of activity. The Project implementation will facilitate geological exploration and development of rich

mineral resources in the region, including precious and semiprecious stones, iron, nickel, etc. The Project will no doubt make local infrastructure more sustainable to natural disasters and climate change.

PIU of Ministry of Finance has signed the contract with International Consulting Company for preparation of Feasibility Study (FS) and detailed project. Later the Ministry of Transport as Implementation Agency responsible for bridge Sub-Component will sign a contract with the Construction Company for rehabilitation and construction works.
The Ministry of Transport (MT) of RT through its PIG as an Executive Agency for the bridge component of the Project carries responsibility for the overall implementation of EMP.

1.5 Public consultations

Extended consultations with stakeholders were held in period from November 2016 until April 2018. During the meetings the population and other stakeholders received information on the Project and the EIA process, as well as potential impacts of the Project were discussed. People's comments and complaints, issues of their concerns, as well as recommendations and suggestions were collected and documented. The Appendix 2 provides Matrix of Public Consultations undertaken within the Design stage with a list of the major consultations, date, location, and number of attendees by gender.
.
Household's surveys adjacent to the Project of settlements (10 target jamoats) did not reveal potential negative impacts on environment, which can not be prevented or mitigated by the application of measures provided for by EMP. In addition, consultations were held with the Heads of Environmental Departments of four Districts and other representatives of local authorities who also did not reveal any significant environmental impacts expected because of the Project, including potential impacts on the environment protected natural areas.

Local communities strongly support Project action. People welcomed the Project ideas and expressed the hope that the project will be implemented in accordance with national and international standards relating to social and nature protection.

Based on consultation`s results and field visits to the Project sites, it was established that the Project will not only have irreversible adverse effects on the environment, but will bring positive social and environmental benefits.

1.6 Recommended actions:

To prevent complaints uprising, special attention should be paid to public relations issues. Building relationships and engaging the public before and during the Project implementation can reveal previously unknown problems, which will allow timely changes in EMP. Complaints and claims received during the design, construction and operation of the projected facilities/structures will be mainly considered at the district administrative level or

at the jamoat level, however, if necessary, IA and central authorities will also be included in the problem-solving process.

The EMP implementation and measures to be taken on mitigation of environmental impact of the Project will mainly be related to the construction phase of the Project.

After the completion of the detailed design, it will be necessary to overview the degree of environmental impacts and Contractor should develop a Detailed Site-Specific EMP (SSEMP), taking into account all aspects and problems.

In preparation for the construction phase, future Contractors will be notified and prepared for cooperation with IA, Project Management, Consulting Company and local population in implementing mitigation measures on negative impacts in accordance with developed and agreed SSEMP.

Regular monitoring by PIG, Consultant and Contractor's Specialists will ensure the implementation of all measures taken in accordance with approved SSEMP.

1.7 EIA Methodology

During conducting the EIA, the following methodology was adopted:

All available basic information was collected, studied and analyzed, including all components of the current legislation and regulatory framework and related reports on previously completed infrastructure projects in Tajikistan. During the preparatory and design period field trips to the project implementation area were conducted to study the environmental and social conditions in the project impact zone and initial information disclosure to the main stakeholders. All project sites were investigated by the project environmental specialist jointly with representatives of local environmental authorities and other stakeholders.

1.8 Project location

The proposed Project is located in Gorno-Badakhshan Autonomous Oblast (GBAO) of Tajikistan. GBAO is located in the Eastern part of the country and occupies about 64.1 km² or 44.9% of the area with population of about 221.4 thousand people (estimated in 2014), which is only about 3% of the country's population. GBAO is predominantly a rural region, only 13.8% of the population lives in the regional center, Khorog city, which is the only city in the autonomous region. Project sites are located within the Shokhin District of Khatlon region, Darvaz, Vanj, Rushan and Murghab Districts of GBAO.

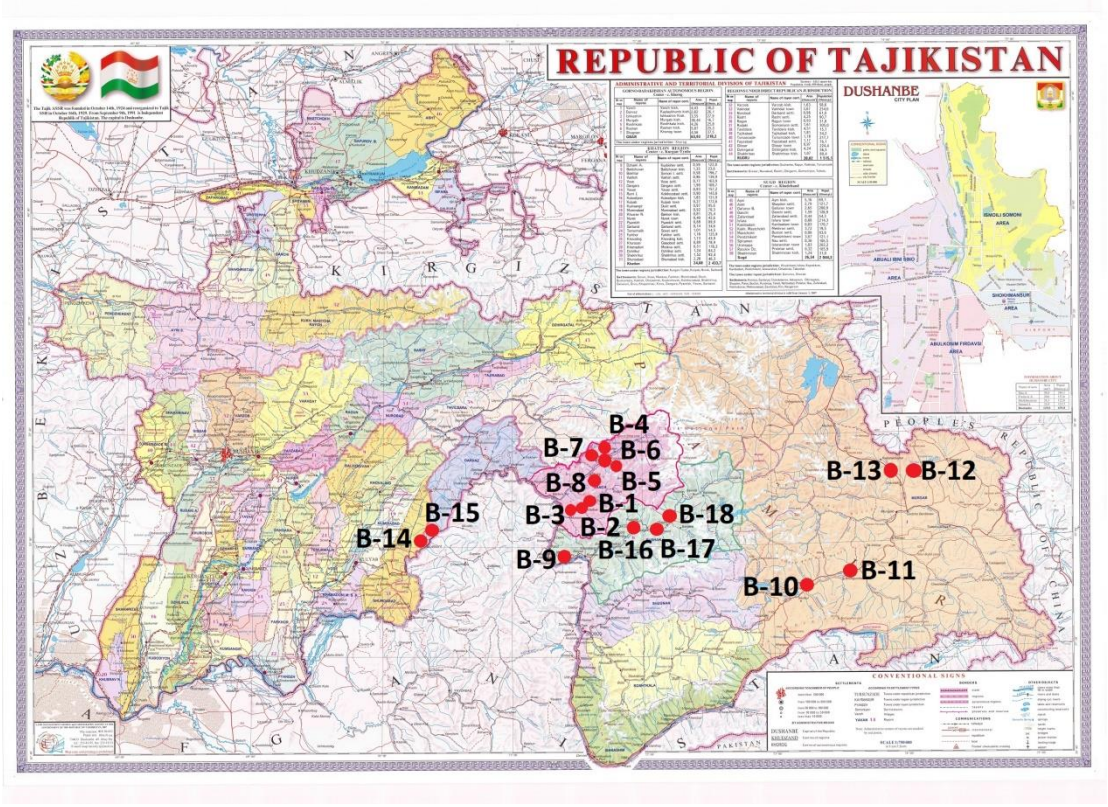

Figure 1 Location of the Project sites within the Republic of Tajikistan

The project will be implanted in the following jamoats: Davraz District (Zigar village), Rushan District (Barrushon,Basid, Darzhom, Gurkhum villages), Murghab District (Alichur village and jamoat K. Berdybaev) and in of three jamoats of Vanj district (Jovidon, Teharv and Yazgulom)

Darvaz District: Darvaz District is located on the both sides of Darvaz mountainous range which extends on 200km between the valleys of Vanj and Hingob. Darvaz district borders Sangvor district from the north, Vanj district from the east, Khatlon region from west and by the Panj river with Badakhshan province of Afghanistan from the south. Darvaz is known with incised terrain with high steep mountains, narrow gorges with fast rivers and the absent of the internal road network. The International M41 road is the only transport artery passing through the district.

Vanj District: Vanj district is located between the Darvaz and Yazgulym ranges. In the north it borders with Sangvor district, in the east with Murghab district, in the south with Rushan district, in the west with Darvaz district of Tajikistan and Badakhshan province of Afghanistan. The Vanj district from the north-east to the south-west crosses the rivers Vanj and Yazgulam.

Rushan district: is located between the Yazgulemsky and Rushansky ranges. In the north it borders with the Vanchsky district, in the east with the Murghab district, in the south with the Shugnan district of Tajikistan, in the west with the Shugnan district of Afghanistan

Murghab District: Murghab District occupies the eastern part of GBAO and it is a largest by the area district of Tajikistan (38.5 thousands km^2). It borders the Kirgizstan from the north; China from the east; Afghanistan from the south, Ishkashim, Roshtkala, Shugnan and Vanj areas of GBAO from south-west and Sangvor and Lyahsh districts of the Republican subordination from north-east. Murgab is the largest by area district of Tajikistan, however with population of 14,700 (Tajstat, 2017) it has a smallest population density with only 0,4 of person per square kilometer.

1.9 Need in Project Implementation

According to the information provided by the Committee for Emergency Situations of Tajikistan, since 1998, 830 natural disasters have been registered on the territory of GBAO, which led to the death of 66 people. Some of the bridges were completely destroyed, others were damaged, which do not allow them to perform their functions in full quantities.

Improving Transport Infrastructure is an essential element in ensuring security, development and welfare of residents of remote villages in Darvaz, Vanj, Rushan and Murghab Districts of GBAO.

2 Legislative and Regulatory Frameworks

This section reviews the regulations and laws applicable to environmental management of the proposed project. The Environmental Management issues of this project based on the requirements of the legislation of Tajikistan and World Bank Environmental policies.

2.1 The Basic Legislation of Tajikistan

Tajikistan developed a comprehensive set of environmental legislation including laws, regulations and special governmental resolutions. The tables below show the list of legislation relating to the Environment.

Table 1The list of legislation of Tajikistan relating to Environmental Protection

№п/п	Items of documents	When document is approved
In the field of environmental protection		
1.	Law of RT "On Environmental Protection"	2 /08/2011
2.	Law of RT "On Environmental Expertise"	16/08 /2012
3.	Law of RT "On protection of atmospheric air"	28 /12/ 2012
4.	Law of RT "On production and consumption wastes"	10/05/2002
5.	Law of RT "On Environmental Audit"	26 /12/2011
6.	Law of RT "On Specially Protected Natural Territories"	26/12/2011
7.	Law of RT "On Environmental Monitoring	25/03/ 2011
8.	Law of RT "On Radiation Safety"	1/08/2003
9.	Law of RT "On protection and use of flora"	17 /05/2004
10.	Law of RT "On Biological Security"	1 /03/ 2005
11.	Law of the Republic of Tajikistan "On Wildlife"	5 /01/ 2008
12.	Law of RT "On soil protection"	16 /10/2009
13.	Law of RT "On Hydro-meteorological Activities"	2 /12/ 2002
14.	Law of RT "On collection, conservation and rational use of genetic resources of cultivated plants"	1/08/ 2012
In the field of health, social protection and emergency situations		
1.	Law of RT "On protection of public health"	15 /05/1997
2.	Law of RT "On Ensuring Sanitary and	8 /12/ 2003

	Epidemiological Safety of the Population"	
3.	Law of RT "On Counteracting HIV and Acquired Immunodeficiency Syndrome"	28 /12/ 2005
4.	Law of RT "On protection of the population and territories from natural and man-made emergency situations"	15 /07/2004
5.	Law of RT "On Fire Safety"	29 /12/2010
In the field of energy, industry and minerals		
1.	Law of RT "On Energy Saving"	10/05/2002
2.	Law of RT "On Subsoil"	20 /07/1994
3.	Law of RT "On Precious Metals and Precious Stones"	12/05/ 2001
4.	Law of RT "On Industrial Safety of Hazardous Production Facilities"	28/02/2004
5.	Law of RT " About Environmental Impact Assessment"	7/6/2017
In the field of water and land matters, agriculture		
1.	Law of RT "On Drinking Water and Drinking Water Supply"	29/12/ 2010
2.	Law of RT "On Land Reform"	5 /03/1992
3.	Law of RT "On land assessment"	12 /05/2001
4.	Law of RT "On land management"	5 /01/ 2008
5.	Law of RT "On the production and safe handling of pesticides and agrochemicals"	22 /04/ 2003
Codes		
1.	The Land Code of the Republic of Tajikistan	13 /12/ 1996
2.	Water Code of RT	20 /10/ 2000
3.	Forest Code of RT	2 /08 / 2011

2.2 International Environmental Conventions

Tajikistan also joined and ratified the following International Conventions relating to the Environmental Protection

Table 2 The List of International Conventions relating to Environmental Protection signed by Tajikistan

№ п/п	Наименование документа	Когда утверждён документ
1.	Vienna Convention for the Protection of the Ozone Layer	4 /11 /1995
2.	Convention on Biological Diversity	15 /05 / 1997
3.	United Nations Framework Convention on Climate Change	13 /12 / 1997
4.	Convention on Combating Desertification	28 / 12 / 1998
5.	Convention on Wetlands of International Importance especially as a Waterfowl Habitat.	24 /10 / 2000
6.	Convention on the Conservation of Migratory Species of Wild Animals	24 / 10 / 2000
7.	Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters	9 /06 / 2001
8.	Convention on Environmental Impact Assessment in a Transboundary Context	17 / 02 / 2004
9.	Convention on Persistent Organic Pollutants	6/12/ 2006

2.3 Review of the Tajikistan legislation relating to Environmental Protection

The following clauses provide description of the main laws relating to the project

2.3.1 The Constitution of the Republic of Tajikistan

- Guarantees exclusive state ownership of land, subsoil, water, airspace, flora and fauna and other natural resources, and their effective use in the interests of the whole people. (Article 13).
- Declares freedom of economic and business activities and legal protection of all types of activities, including private. (Article 12).
- Ensures the protection of health of all citizens and the adoption of measures to improve the environment. (Article 38).
- It imposes on each citizen and legal person responsibilities for the protection of environment, historical and cultural monuments (Article 44).

2.3.2 Law on Environmental Protection

It is the basic law regulating the issues of environmental protection. The Parliament adopted the law on June 22, 2011 (No. 485), replacing the Act on the Protection of Nature of the Republic of Tajikistan (No. 905, 27/12/1993), with amendments (No. 30, 10/2002, No. 75 2/12 / 2002; No. 58 15/4/2004):

- The law defines the main goals, principles and tools of environmental protection in Tajikistan and determines the priority of environmental values in the process of Tajikistan's sustainable development.
- Defines the procedure for compensation of damage to the environment by enterprises and individuals.
- The law also introduces the definition of emergency environmental situations and environmental disaster zones and prescribes also the procedure for actions in such situations, defines the obligations of state authorities and enterprises to prevent and eliminate their consequences, as well as the responsibility of individuals and organizations guilty of environmental disruption or violating this Law.
- The Law establishes various levels of enforcement of environmental legislation: State Control, Department Control, Enterprise and Public Control. Detailed steps to implement the provisions of the law are set out in the following laws and other legislative acts:

Detailed steps to implement the provisions of the Law are set out in the following Laws and other Legislative Acts:

2.4 Overview of the World Bank Environmental Requirements

Projects financed by the World Bank are subject to compliance with internal environmental guidelines issued by the Bank. The purpose of these documents is to prevent negative impacts on population and environment in the process of implementing projects implemented by the funds of the World Bank. They provide guidance to the Bank and the Borrower on definition, preparation and implementation of programs and projects.

The package of WB environmental documents includes the following guidelines:

OP/BP 4.01 Environmental Assessment
OP/BP 4.04 Natural Habitats
OP 4.09 Pest Management
OP 4.11 Physical Cultural Resources
OP/BP 4.12 Involuntary Resettlement
OP 4.10 Indigenous Peoples
OP/BP 4.36 Forests
OP/BP 4/37 Safety of Dams
OP/BP 7.50 Projects on International Waterways.

2.4.1 OP/BP 4.01 Environmental Impact Assessment

The main objective of the operational policy document is to ensure compliance with the environmental and social sustainability of Projects funded by the World Bank and full consideration of environmental and social issues at all stages of decision-making. The document also includes requirements for consultation and dissemination of information about the Project to the public and describes tools and procedures to prevent or mitigate the negative economic, social and environmental consequences that may result from the Project implementation. The WB requires a definition of the Project Category in order to select the type and scope of work on conducting Environmental Impact Assessment. The WB divides the proposed projects into 4 categories depending on the type, location, the presence of sensitive areas near the project areas and the scale of expected environmental impacts.

This Project is classified in Category B, because the expected negative impacts are small and relate mainly only to the areas where the design actions will be carried out, they are few and small in scale, mostly reversible and effectively mitigated, or completely eliminated by conducting certain and approved activities.

2.4.2 OP 4.11 Physical Cultural Resources

This policy requires the protection of "cultural property" (including archaeological, historic, religious sites). Cultural property comprises remains left by previous human inhabitants. Projects that will significantly damage non-replicable cultural property will be excluded from funding. Projects shall include a plan for the protection and/or enhancement of cultural properties accidentally encountered (chance findings). The assessment did not reveal any cultural resources the project may likely damage, except the part of old cemetery between the bridges No 2 and 3 near the village of Andarvak. Although tin he design optimization eliminated the need in relocation of several graves for rehabilitation of the access road to the bridge No 3, the OP/BP may be triggered during the project implementation

2.4.3 OP 7.50 – Projects on International Waterways

This policy applies to the following types of international waterways:

Any river, lake, canal, or similar water body that forms a boundary between, or any river or surface water body that flows through, two or more states;

- any tributary or other surface water body that is a component of any waterway described in (a) above; and

- any bay, gulf, strait, or channel bounded by two or more states or, if within one state, recognized as a necessary channel of communication between the open sea and other states- and any river flowing into such waters.

This policy applies to the following types of projects:

a) hydroelectric, irrigation, flood control, navigation, drainage, b)water supply and sewerage, industrial, and similar projects that involve the use or potential pollution of international waterways, and c) detailed design and engineering studies of projects under a) above.

The Bank requires that the international aspect of a project on an international waterway is dealt with at the earliest possible opportunity. If such a project is proposed, the Bank requires the beneficiary state, if it has not already done so, to formally notify the other riparian states of the proposed project and its project details.

However, the project is granted an exception from notification requirements under the OP 7.50 since it will be implemented in the "ongoing schemes, involving additions or alterations that require rehabilitation, construction, or other changes that in judgment of the Bank will not adversely change quality and quantity of water flows to other riparians; and will not be affected by the other riparians' possible water use. The project will also not cover works and activities that would exceed the original water scheme, or so alter or expand its scope and extent as to make it appear a new or different scheme. Therefore, the project will still trigger OP 7.50 but no notifications for riparian countries are required.

2.4.4 OP/BP 4.36 Forests

The Bank's current forests policy aims to reduce deforestation, enhance the environmental contribution of forested areas, promote reforestation, reduce poverty, and encourage economic development. This policy includes adoption of a comprehensive and environmentally sound forestry conservation and development plan that clearly defines the roles and lights of the government, the private sector, and local people.

Although local forest authority clams the availability of spots of forest within the Vanch and Yezgulem valleys it is heavily modified and located far outside of the project sites. As natural forests do not exist within the project area this OP/BP will not be triggered by this project.

2.4.5 OP/BP 4.12 Involuntary Resettlement

This policy covers the direct economic and social impacts that are caused by the involuntary taking of land resulting in (i) relocation or loss of shelter; (ii) loss of assets or access to assets; or (iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on livelihoods.

Resettlement Policy Framework was prepared for the project, covering impacts under activities for 18 bridges. Site-specific Resettlement Action Plans describe specific impacts and mitigation measures in more detail.

The project likely will not cause physical resettlement, however, some land acquisition, including assets (e.g water mill, trees) will be required for the bridges and access road and location of construction camp. Therefore, the policy is applied to the project.

3 Project Description

The section provides a general description of the proposed design work, including technical details.

3.1 Project Scope

The proposed Project includes rehabilitation of the 18 bridges in Darvaz, Vanj, Rushan and Murghab Districts of GBAO.

At this stage, an analysis of alternative design solutions are completed, consequently, the types and exact parameters of the projected bridges are identified. Consequently, the sequence of construction activities, types and quantities of building materials used will significantly differ at different sites depending on specific conditions and requirements.

The bridges were designed to provide the service life for 50 years. All components of structures comply with the standards for the bridges design, as specified in the Special Requirements for the Contractor. Designed bridges after completion should have an aesthetic appeal and fit into the environment.

3.2 General sequence of work

In general the construction work on the bridges will include the following operations;

a) Determining of axes of abutments and bridges on the site by coordinates ;

b) Dismantling of the old bridge structure will be carried out at the beginning of physical construction works, when the transfer of bridge location is not feasible or impossible. In case if the change of bridge location is advisable, the old bridge structure will be retained until the completion of new bridge construction, in order to ensure an unclosed passages of population during the construction period.

c) Site clearing will include the vegetation removal, as well as topsoil removal for temporary storage.

d) Construction of ramps;

e) Excavation of pits for supports by excavators with manual trimming;

f) Installation of pile foundations, concreting of supports. Concreting will be undertaken with installation of appropriate reinforcement according to approved drawings. Membrane waterproofing of buried parts of supports and excavation backfill.

g) Preparation of erecting platform. Installation of bearing beams, pylons and ropes. Construction of bridge decks and bridge conjugations with the approaches

h) Installation of superstructures including railings, signs and other elements of bridges

i) Painting of bridges and provision of protection against corrosion.

j) Backfilling and landscape restoration

3.3 The types of the designed bridges

All the bridges designed under the project are mainly span bridges and cable stray bridges with improved dimensions and durability, Span bridges are designed for the side tributes of the main rivers, while the cable stray bridges with suspension system designed for wide rivers with the significant distance to water surface The designed bridge parameters also depend on road category determined by anticipated traffic and economic significance. The length of bridges is varying from 10 to 62 m.

Table below shows designed parameters of new bridges projected under this Project.

Table 3 Characteristics of the Project Bridges

No of Bridge	Name & road section km	River name	Length of new bridges (m)	Width of new bridges including sidewalk, (m)	length of access road, (m)
1	Vanj-Yazgulom	Yazgulom	35	7	288
2	Vanj-Yazgulom	Andarvak (Kamochdara)	20	7	210
3	Vanj-Yazgulom	Yazgulom	35	7	254
4	Upper Vanj	Udob	26	7	321
5	Chikhoh-Ravgada	Obi Chikhoh	17	7	127
6	Upper Vanj	Vanj	38	7	301
7	Upper Vanj	Obi Sed	35	7	584
8	Upper Vanj	Ardobak	20	7	260
9	Dushanbe-Kulyab--Kulma, km 538	Barushondara	20	13	414
10	Dushanbe-Kulyab-Kulma,	Alichur River	48,2	7,8	538
11	Dushanbe-Kulyab-Kulma	Kobrigen River, Boztere River	4,0	9,9 9,8	381
12	Dushanbe-Kulyab-Khorog-Kulma	Okbaytal River	12,4	4,0	352
13	Murgab-Osh	East Pshart River			517
14	Dushanbe-Kulyab-Khorog-Kulma	Yakhchipun River	32,6	12,0	377
15	Dushanbe-Kulyab-	Guldara River			555

	Khorog-Kulma				
16	Rushan-Bartang-Guldara-Muzkul	Bartang River	38,6	3,5	433
17	Rushan-Bartang-Guldara-Muzkul	Bartang River	35,8	4,1	577
18	Rushan-Bartang-Guldara-Muzkul	Bartang River	41,0	39,0	433

3.4 Description of Project Sites and Potential Impacts

The bridge sites cover a huge area with diversity of socio-economic, topographic, climatic, hydrological and ecological conditions. The description of Site-Specific Environmental Conditions for each bridge provided in Site-Specific Environmental Management Profiles attached to the Environmental Management Plan (Appendix 3). These profiles will include the detailed overview of the bridges sections, including the description of the existing condition, types of work required, the possible consequences for the environment and mitigation measures with references to appropriate clauses in EMP and Bidding Documents.

3.5 Bank protection works

Bank protection works consists of straightening slopes with large-sized stones with the size depending on the water flow speed during floods or mudflows passage. Over the stacked stones the filling of gaps with concrete will be done

.

The riverbed and slopes of the crossed water bodies with large slopes and high water flow velocities in confined space will be strengthened with in situ reinforced concrete in thickness of 25 cm upstream and downstream from the bridge alignment. The proposed bank protection of channels is shown on the drawings.

Design proposes three types of bank protection the bottom and slopes of the riverbed:

Type 1 – designed for large rivers, such as Yazgulem, Vanj, Bartang, Yahchipun,Udob, Obi-sed. It is planned to strengthen the slopes with a large stone with filling of gaps by reinforced concrete. The lower part of structure will be provided with an apron from the same stones.

Type 2 – designed for small rivers such as Guldara, Chihoh, Camochdara, Ardobag, Barrushondara prone to sudden mud-streams and envisages the reinforcement of the bed and slopes by the in situ casted monolithic reinforced concrete.

Type 3 – designed for the sites located at the severe climatic conditions with the winter temperatures below (-40°C) such as Alichur, Kobrigen, Okbaital and Eastern Pshart. The design proposes reinforcement of the slopes with flexible gabion boxes.

3.6 Environmental Consideration Integrated into Detailed Design

Design Consultant integrated the following environmental solutions into the detailed design of the bridges and approaches:

3.6.1 Erosion control

In order to reduce erosion the design included the following:

- Slopes of undercuts and embankments are arranged to take into account the strength of the soils and other conditions in accordance with the project specifications to prevent landslides and erosion;
- in vicinity to steep mountain slopes, the technical design includes a protection device against rockfalls, rock embankments, barrier structures and gabions;
- At the foot of the slopes, in the places of the cuts, ditches with gutters or drains for water drainage are arranged. Intercepting channels are built at the tops of slopes of cut slopes, or on berms.
- In locations of steep slopes, drainage systems are built to intercept water flows and their diversion from slopes

3.6.2 Seismicity risk

Seismic parameters of potential impact zones were taken into account during the detailed design phase of the operation. The load from earthquakes was included in design parameters of structures, including bridges, in order to avoid destruction of the structure during operation.

3.6.3 Road safety

The traffic safety issues for the bridges and approaches roads were integrated into design which includes : Road signs, Crossroads, Lying policemen (barriers), Speed limits

3.7 Description of Project Alternatives, including Refusal Alternative from Project

Alternative solutions within the project components, including the exact location of bridge, types of bridges and possible changes in the access road route, were considered at the feasibility stage. The bridges parameters and access roads have been optimized at the detailed design stage, taking into account the balance of earth works and other aspects, including requirements for environmental protection.

3.7.1 No-action Alternative from Project Implementation

The No-action alternative is intended to represent the most likely future expected in the absence of implementing an action alternative. No action alternative means that existent bridges which are already seriously damaged by the natural disasters will continue to deteriorate with reducing of load capacity. Eventually they will not be able to ensure safe river crossing even for pedestrians. The population of remote villages will lose communication links and access to the markets, education and health services. Supplies of goods and services will be limited. Eventually the river crossings will be completely destroyed leaving the people in transport isolation from district center and the rest of country. Population will become more dependent from local resources, especially wood that will cause their further depletion.

Refusal from the project implementation is not an acceptable alternative, both from a socio-economic and environmental point of view.

In particular, refusal from bridges rehabilitation in Darvaz and Murghab Regions will worsen the carrying capacity of strategic road of Dushanbe-Khorog-Murgab-Kulma Pass, which connects GBAO with the southern regions of the country, including Dushanbe and provides access to international markets. The road provides an economical and reliable transportation of goods and passengers throughout the country.

4 Description of the Environmental Conditions

The section briefly describes the existing physical and socio-economic conditions of the zone of project implementation.

4.1 Terrain and Geological Conditions of the Region

Regional: Mountains occupy 93% of the area of Tajikistan and comprise South Tyan-Shan and Pamir mountain systems. Geographically the project region relates to: (i) Western Pamir where combination of geological and hydrological features formed exclusively irregular, rugged terrain with alternation of rocky steep mountainous and deep narrow valleys with prominent differences in true altitudes, and (ii) Eastern Pamir with elevated (over 3,500 above msl) vast valleys limited by relatively gentle sloping mountainous ranges. The complexity of geological structure of the project implementation area is determined by location near the main tectonic boundary of overthrust type between the structures of the Central and Northern Pamirs. The project locations are located within Darvaz, Vanj, Rushan and Murghab of GBAO, composed of different types of rocks

.

Photo 1 General view of Bartang river valley

There are mineral deposits in the region, including nickel, molybdenum, gold, iron, piezoquartz, marble, and precious stones but a lack of investment and a weak infrastructure are hindering their development, only one small mining enterprise operates in the Vanjsky

region. There is information about the presence of an abandoned mine for the extraction of iron and ruins of ancient melting furnaces and smithies near one of the project sites.

4.1.1 Orography

The core of the Pamir system is the 108 km sub-meridional range of the Academy of Sciences within which the highest peak of Tajikistan is Somoniyon peak 7495 m above sea level.

The project sites are located within the bottoms of fairly wide U-shaped valleys of the Vanch and Pyanj rivers, formed mainly by the movements of glaciers, relatively narrow V-shaped valley of the Yazgulem and Bartang rivers and within the very wide (up to 5km) gently sloping valleys of the Eastern Pamir. Project bridges are located in the lower parts of deeply embedded valleys with significant amplitudes of excess watersheds above the bottoms. For example, the elevation mark of bridge No. 8 is 1969 m, while the adjacent Arnavad peak, located on the Darvaz Ridge, is located at an altitude of 6,083 m above sea level

Photo 2 Dominated landscape in Alichur valley

4.2 Seismic risks

Tajikistan is located in a zone of relatively high seismic risk. The project implementation area mainly refers to the "zone of 8-9 ballistic earthquakes", which is a zone of high risk of occurrence of the most intensive earthquakes in Tajikistan. All project bridges are located in this seismic zone (8-9 points on the MSK-64 scale).

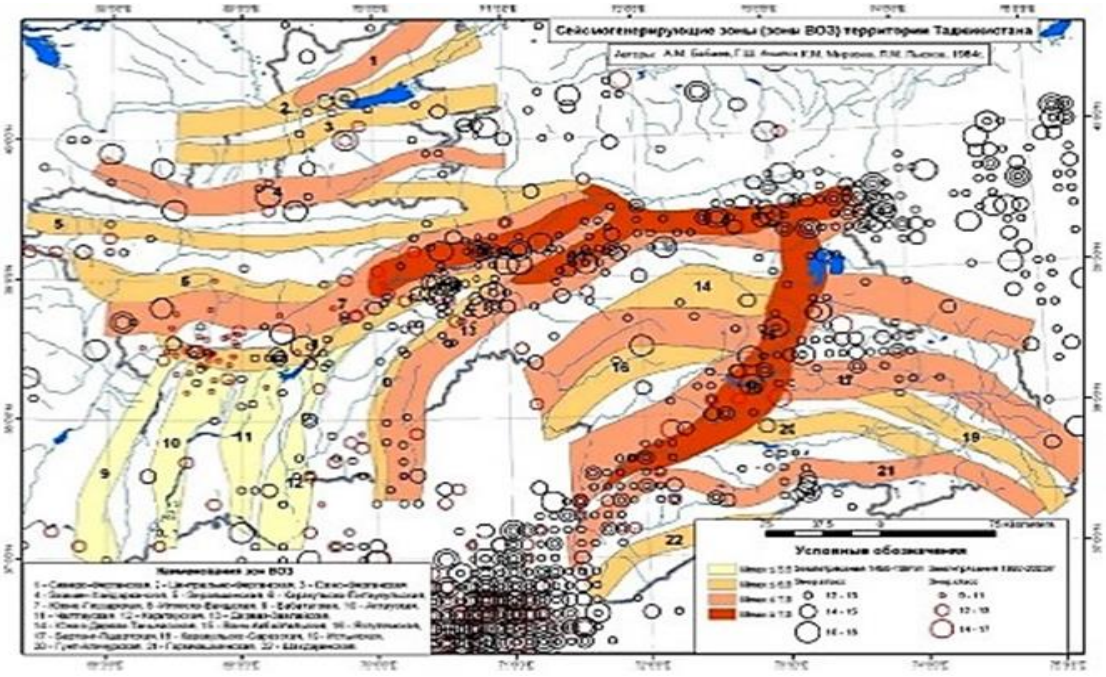

Figure 2 Seismic zones of Tajikistan (Source: Institute of Seismology and Seismic Engineering)

4.3 Soils

The project area soils consist mainly of material deposited in the process of erosion and demolition of material of surrounding mountain massifs and represent the alternation of gravel, sandy clay and clay layers. As far as we approach the foot of mountains, coarse-grained material as pebbles and gravel predominates in soil transferred from hilslopes affected by surface water flow and gravity. As we move away from the mountains, we see the finer components like silt, sand and loam/ According to Tajikistan's classification agricultural soils in the project region belong to two principle types:

1. Mid-altitude mountainous typical brown soils
2. Mountainous light brown soils

The first type evolves in the areas covered by trees and bush vegetation with relatively high precipitation up to 800 mm and widespread within the bed Vanj valley at altitudes from 1600 to 2600m. This type is characteristic with high soil fertility compared to other brown

soils. The soil profile includes humus layer in thick of about 40 cm with humus content of 5-10%.

The mountainous light brown carbonate soils are found at the agricultural lands of Yezgulem and Pyanj valleys with the lower levels of precipitation and less density of vegetation cover. The humus is strata is about 30-35cm with humus content of 3-5%. This type of soil normally contains many of rocky particles. Increase in the proportion of finer sediments in the form of silt, sand, and loam.

4.4 Climate

The climate of Tajikistan belongs to the continental, subtropical, semi-arid type, but the climatic conditions in the regions are diverse depending on the altitude and the influence of other geographic factors. The project sites are located in the 2 principle climatic zones of Tajikistan;

a) Mediterranean dry Western Pamirs zone with maximum precipitation in the cold season with warm summer and moderately warm winters- Bridges 1,2, 3,4,5,6,7,8,9, 16, 17, and 18.
b) Mediterranean insufficiently wet climate with maximum precipitation in the cold season of Darvaz region with very warm summers and soft winters- Bridges 14 and 15
c) Central Asian dry Eastern Pamir zone with negligible amount of precipitation, most of which fall in warm season with moderately warm summer and severely cold winters with little of snow- Bridges 10,11,12 and 13

Most precipitation in the valleys falls in the form of rain or snow during the autumn-winter period. The amount of annual rainfall in the Vanj valley depends on the altitude and varies from 800-1200 mm in the region of the Medvezhy glacier to 180-200 mm per year in the vicinity of the Khamrogi meteorological station in the lower part of the valley near the confluence of the Vanch River in the river Pyanj. In the area of project bridges within the Vanj valley, annual precipitation amounts to 450-500 mm. At an altitude of more than 2000 m above sea level, the snow cover remains on the ground up to 90 days a year. Minimum winter temperatures can reach -30°C, while maximum summer temperatures reach + 40°C. For 12 years of observations from 2005 to 2017, the maximum temperature at the Rushan + 36.6°C meteorological station was registered in July 2013, and the minimum -20.5°C in January 2012.

The surrounding highlands of the Western Pamirs are a dry climate zone, with moderately warm summer and moderately severe winters.

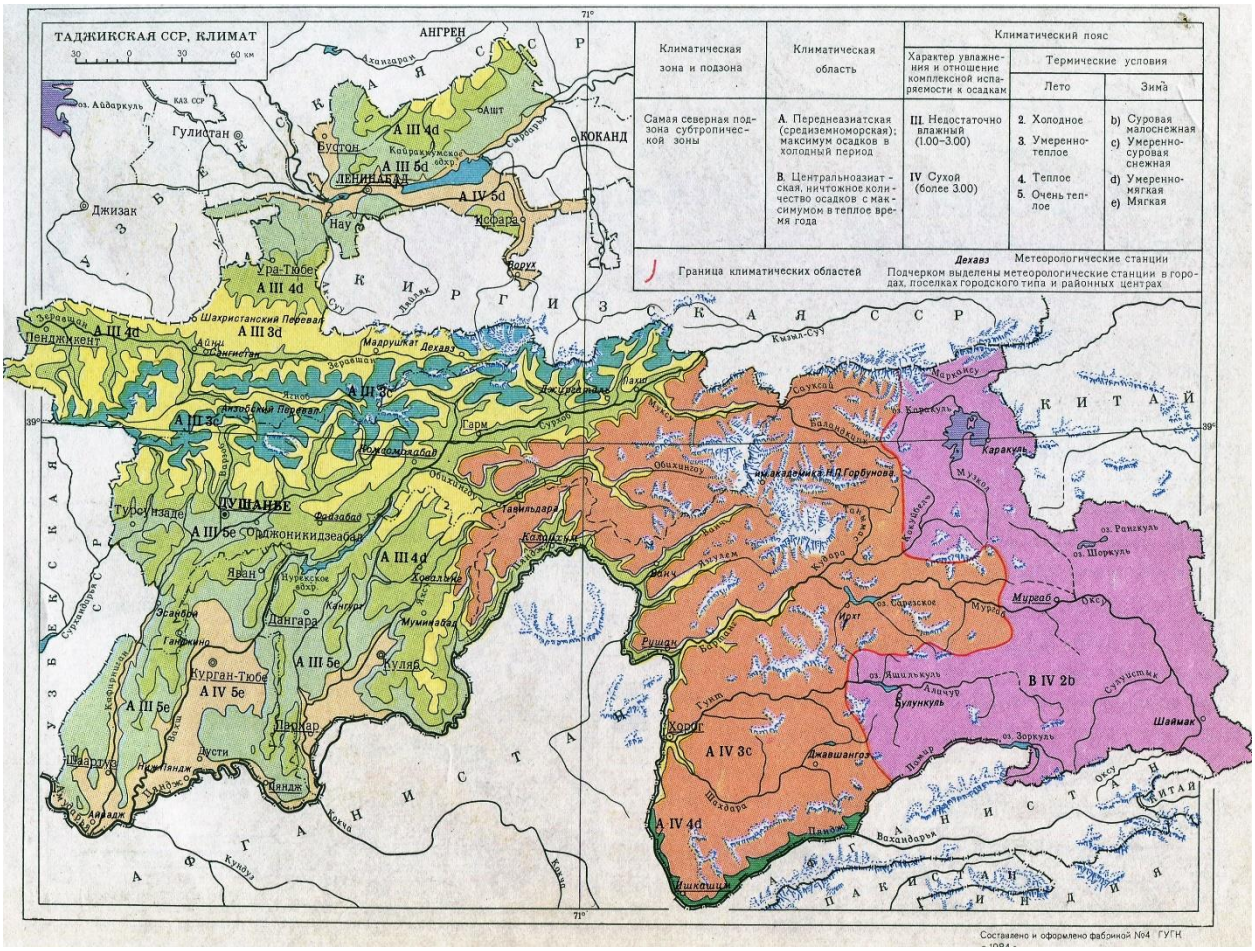

Figure 3 Map of Climatic zones of Tajikistan

The climate of Darwaz with insufficient moisture, with warm summers and moderately mild winters. The average annual temperature is 14.1°. The average temperature of the coldest month January is 0.4° frost. The average minimum air temperature is -3.4°C, but for incursions of large cold air masses, it can be lowered up to -20-23°C. The average temperature of the warmest month - August is 28.2°C. In the hottest months, in daytime, air warms up to 35-40°, and the absolute maximum is 42°C. The annual precipitation is 468 mm. In the most moisture-proof years, the amount of precipitation is 600-900 mm, and in dry years - 200-250mm. The annual course of precipitation is characterized by maximum in March-April and almost its complete absence in August-September. The snow cover is set in mid-December and is kept until mid-March. The average maximum height is 27 cm. The maximum height of the snow cover was 76 cm. The winds prevail in the northern, southeastern and northwestern directions. The average monthly speed varies from 0.8 m/s in November to 2.0 m/s in August.

The climate of Murgab is dry, with cold summers and severe little snowy winter. The average annual temperature is 1.4° frost.

The coldest month is January, the average temperature of which is 16.9° frost. The average minimum air temperature is -24.6°C, but with the shocks of large cold masses, it can drop up to 30-35° frost at night. The absolute minimum is -39°C.

The warmest month is July, the average temperature of which is 12.6° heat. In the daytime, the air warms up to 15-20°C and the absolute maximum is 33°C.

The average annual precipitation is 75 mm. In the driest years, the annual amount of precipitation decreased to 12 mm, while in wet conditions it did not exceed 181 mm. The maximum amount of precipitation falls in warm period and is only 85 m.
The snow cover lies from December to mid-March; its average is 1-2 cm. The maximum height of snow cover over the winter does not exceed 17 cm.
The winds of the southwestern direction (26%) prevail in Murgab. The average monthly speed fluctuates during the year from 1.2 to 3.2 m / s. The highest wind speeds are recorded in April-June.

In Rushan region, the most precipitation in valleys falls as a rain or snow during autumn-winter period. For 12 years of observations from 2005 to 2017, the maximum temperature at weather station of Rushan + 36.6 ° C was registered in July 2013, and the minimum temperature was -20.5 ° C in January 2012. In Bartang Valley in winter period 2016-2017 the maximum amount of snow fell. In some high-mountainous settlements, the height of snow cover reached 2.8 m.

4.5 Hydrology and Water Resources

The project region is part of the Amu Darya river basin, which in the past was one of the main suppliers of fresh water until now almost disappeared Aral Sea (lake). The bridges locations belong to the largest river basin of Pyanj River in Tajikistan, occupying an area of more than 100 square kilometers with a population of about 1.3 million people. The Pyanj River is the main water artery of GBAO and constitutes a natural state border between Tajikistan and Afghanistan.

Table 4 Parameters of the main watershed spaces of project sites

Guage	**Area of basin, km^2**	**Date**		**Total surface flow, km^3**	**Duration of flood, days**	**Peak discharges, m^3/sec**
		Flood beginning	**Flood end**			
Yazgulem-Motravn	1970	21.04	13.10	924	177	167
Vanj-Bichkharv	2070	01.04	19.10	1400	188	268
r.Alichur	1200	**05.05**	**01.09**	320		63

v.Alichur						
r.Kobrigen r.Boztere in Murghob district	In the spring times and early summer the river contains mainly rain water					
r.Oqbaital in Murghob district	In the spring times and early summer the river contains mainly rain water					
r.Eastern Pshart in Murghob district	In the spring times and early summer the river contains mainly rain water					
r.Bartang v.Darjomch v.Basid v.Gurkhum	2050	21.04	01.10	1640		275
r.Yahchipun v.Zigar	860	05.04	01.10	970		93
r.Guldara v.Zigar	In the spring times and early summer the river contains mainly rain water					

Glaciers and perennial snow are the main sources of food for rivers. In the upper reaches of Vanch, Yazgulem and Rushan valleys, located on the slopes ridge of the Academy of Sciences, there are 139 glaciers with a total area of 1134 km²

• Fedchenko Glacier with a length of 77 km with a total area of 696 km²

• Garmo Glacier is 30.4 km long with a total area of 114 km²

• Glacier of the Geographical Society with a length of 24.2 km with a total area of 64.4 km²

• Glum-Grzhimailo Glacier, 37 km long, with a total area of 142.9 km²

• Ragzob Glacier with a length of 17.4 km with an area of 47.29 km²

Many other smaller glaciers are also located in the Vanj and Rushan regions. Because of its mobility, the Medvejy glacier with a length of 15.8 km with a total area of 25.3 km2 became famous. Periodically, the glacier moves overlap the valley and form a lake in the lower reaches of the Abdukagor River. Stagnated melted water can lead to a break in the snow bridge and cause catastrophic consequences in the Vanj valley.

On the territory of Darvaz, Rushan and Murghab Districts, there are also many glaciers of a smaller size. Because of its mobility, the glacier Medvezhiy was known for its 15.8 km length, with a total area of 25.3 km².
In Rushan region in the upper valley of Bartang valley in 1911, because of earthquake, Sarez Lake was formed. Currently, the lake condition and the water level in the lake is under full-time surveillance.

There are many lakes in Murghab district and the largest of them: Karakul Lake, Yashikul Lake, Sarsykul Lake, Shorkul Lake, etc.

4.6 Air Quality

According to annual statistical reports on Environmental Protection published by the CEP the territory of GBAO has no or very low levels of harmful pollutant emissions into the atmosphere. On the project sections, there is no information on conducting instrumental monitoring of air quality.

The air pressure is decreasing with altitude the same as oxygen available for breathing.

The noise level in the project area is mostly insignificant, especially in mountain valleys, where the traffic intensity is very low.

4.7 Biological Diversity

GBAO is known with biodiversity and hosts the largest in country Tajik National Park which is going to be very important component of the development of tourism industry.

4.7.1 Flora

The Western Pamirs valleys have a long history of human activity and agricultural development. In view of the insufficient number of lands suitable for agricultural activities, most of the forests were cut down for using land for agriculture.

The preserved natural vegetation cover belongs to the sub-Alpine type (up to 3500 m above sea level). Tugai forests, consisting mainly of shrubs are the main plant growing along the coasts, rivers and around springs at altitudes up to 3500 m above sea level. Currently, only fragments of tugai forests are preserved in the flood plain of Darvaz and Rushan plains. The dominant tree species are the Pamir birch (Betula Pamirica) and the Pamir poplar (Populus Pamirica). In the floodplain part of Bartang River, there are preserved thickets of sea buckthorn (Hipophae rhamnoides) and barberry (Beberis integerrima). On the steep, stony slopes of Darvaz and Rushan ridges grow single trees or small groups of juniper (Juniper).

Photo 3 Fruits of sea-buckthorn in Bartang valley

Most of the remaining natural forests were cut down by local population in the 1990s, when firewood was the only source of energy for winter heating and cooking, as the power supply system was operating with significant interruptions.

Near the project bridges, small groups of willow trees and shrubs (Sa-lix turanica, Salix shunganica) and sea-buckthorn (Hipophae rhamnoides) grow. Seabuckthorn has a certain commercial value, so picking berries from sea buckthorn is an additional source of income. The local population collects berries and sells them for the production of sea buckthorn oil to a local private enterprise.

There are no forest tracts in East Pamir in Murghab district. In the project area (bridge No10,11, 12, 13) grows crackle, the main food for yaks. In the floodplains of Alichur River and East Pshart, vegetation grows, which local people are harvested for fattening cattle in winter.

4.7.2 **Fauna**

Tajikistan is characterized by a diversity of fauna and Western and Eastern Pamirs are the habitat of many of its representatives, including a number of rare and endangered species. **Mammals:** The most significant mammal species in Ovis Orientals, the snow leopard (Uncia uncia), the Tien Shan brown bear (Ursus arctos), and the Eurasian otter (Lutra lutra) are included both in IUCN list and in the International Red Book of Tajikistan. According to Nazarshoev and others, the Red wolf (Cuon alpinus), Turkestan lynx (Felix lynx isabellinus), weasel (Mstela altai) live in Tajik National Park and are also on IUCN list.

Birds: The bearded hawk (Gypaetus barbatus) inhabiting in Pamir is included in the Red Book of Tajikistan and in IUCN list, while the Himalayan vulture (Gyps himalayensis) is listed as IUCN in the category close to threat of destruction and the Common vulture (Neophron percnopterus) and the Falcon (Falco cherrug milvipes) in the category of threatened destruction.

The species of reptiles in the Pamirs are not so numerous and include lizards (Asymblepharus alaicus), and Turanian giurzu (Macrovipera lebetina turanica).
Habitats of the above-described animal species are located outside of immediate project impact zone. During the interviews, the locals mentioned occasional encounters with bears and wolves and even complained about the damage caused by wild animals to livestock and orchards. However, these cases occurred at considerable distances from the location of project bridges, mainly in the upper reaches of Bartang and Vanj valleys.

In Bartang valley of Rushan District there is a mountain goat, which is of particular interest to hunters. In winter of 2016-2017 due to heavy snowfall, many wild animals of this region died of starvation.

In Darvaz region, in project impact zone in Specially Protected Area, there is a scythed goat (Markhor). Markhor inhabits only in this area and is protected by the State. According to the Committee of Environmental Protection of Tajikistan, the number of these animals in 2016 is 10 000 heads.
There are many ground squirrels in Murghab district, which live in close proximity to the destroyed bridges. According to the Committee for Environmental Protection of the Republic of Tajikistan, the sheep of Mark Polo inhabit in Murghab district, the number of which is 24,000 heads according to the census of 2016. Sheep of Mark Polo lives far from the project bridges on the territory of National Park of the Republic of Tajikistan.

4.7.3 Fish resources and other river fauna:

It should be noted that the fishery industry still does not make a significant contribution to the economic development of the region. The commercial fishing exista only on Bulunkul and Yashilkul lakes, locals produce fish for sale in Khorog and other settlements of GBAO. By the words of people there is only armature fishing is possible in Vanj and Alichur rivers.

4.8 Specially Protected Natural Territories

All projected bridges are located outside the boundaries of Specially Protected Natural Territories (SPNT) of Tajikistan. The nearest protected area is the Tajik National Nature Park, which covers an area of more than 26,000 km2 and is located on the territory of GBAO and Jirgital and Sangvor districts of the Republican Subordination (DRS) of Tajikistan. In the vicinity of the projected bridges Park Territory passes through watershed spaces of Darvaz, Rushan and Murghab distrcts.

It is expected that project implementation cannot have a direct impact on the natural habitat or any biological species that live in the National Park.

4.9 Socio-Economic and Cultural Resources

4.9.1 General information

Darvaz, Vanj, Rushan and Murghab Districts are rural administrative units. In the regions, there are very few active industrial and processing enterprises. As per location in action planning, the Project area can be conditionally divided into the following sections:

1) Bridges 1,2,3 - located in the valley of the Yazgulem River
2) Bridges 4,5,6,7,8- Upper part of the Vanj valley Bridge 9 - The valley of the river Pyanj
3) Bridges No 10, 11, 12, 13 - are located in Alichur River valley and Murgab District
4) Bridges No 14.15-Zigar village of Darvaz Region
5) Bridge No 16, 17, 18 - Bartang River Valley

Economic activity: People grow potatoes, tomatoes, beets, pumpkin, as well as legumes and grains, including wheat and barley. In the valleys, there are many orchards, where apple and pear trees predominate. All families contain a limited number of cattle, which during the vegetative season, grazed by shepherds, jointly hired by the community. Due to a lack of fodder base and severe winter conditions, the possibilities of livestock development are limited. Under the agreements with the forestry, people gather berries of sea-buckthorn, walnuts, herbal plants and firewood.

Photo 4 Collection of bushes as fire-wood at mountain slopes

In Murghab District, population is engaged only in livestock breeding, because of the severe climatic conditions in this area, fruit and ornamental trees do not grow.

4.9.2 Land Use

Land use in project implementation areas can be divided into a number of categories: land of housing stock (1), including the territories of settlements, agricultural land (2), pasture (3) and forest land (4). Relatively flat, usable land is reserved mainly for agriculture, a large part of which is occupied by gardens.

Table 5 Number of population in Project Impact Zone

The nearby Bridge No	District	Jamoat	Name of settlement	No of hoseholds	Population
8	Vanj	Jovidon	Bunai	222	2021
8			Ardobak	13	152
7		Tekharv	Sed		378
4,5,6,7			Shabru		233
4,5,6,7			Udob		977
5,6			Tekharv		747
5,6			Chikhoh		639
5,6			Ravgada		250
2,3		Yazgulem	Vishkharv	98	735
2,3			Andarbak	128	1052
1,2,3			Jamak	155	1258
9	Rushan	N.Dodkhudoev	Barrushan	458	2541
16		Bartang	Darjoms		2268
17,18		Basid	Basid		1360
14,15	Darvaz	Nulvand			4289
10	Murgab	Alichur			1751
11,12,13		Berdobaev			1406

Languages: Tajik language is state and official language in Tajikistan and the mother tongue of all residents of Darvaz, Vanj, Rushan and Murghab districts. The entire population of Project Impact Zone is fluent in Tajik language. The language of residents of Murghab district is also Kigriz.

Religion: All residents of Project Impact Zone are Muslims. Residents of Darvaz, Vanj and Murgab regions are Sunni Muslims, while the population of Rushan district is mostly Shi'a-Ismaili.

5 Project Impacts and Measures for Mitigation

This section discusses the potential environmental and social consequences that may arise due to the Project implementation, and suggests measures to mitigate them. Ultimately, all proposed measures to prevent or mitigate possible adverse effects related to construction will be included in bid or contract documentation, thus becoming mandatory elements of construction contracts and construction supervision.

5.1 Control of Environmental Impacts

The Environmental Consequences of Project Implementation in general can be classified as those that take place during the design, construction and further activities.
Short-term consequences, such as noise and gas emissions, are associated with the use of heavy equipment during road construction and, as a rule; do not have a long-term effect. Long-term consequences, on the other hand, can affect regional patterns of land use and development and even mobility and migration.

It is recommended that the consequences be mitigated through strategic avoidance combined with monitoring. Site Specific Environmental Action Plans (SSEAPs) will be required for each specific site to be prepared by Contractor and coordinated with Project Supervision Consultant (PSC). Detailed requirements to the content of SSEAP are outlined in paragraph in Appendix I.

5.2 Impacts before Construction Commencement

The potential impact on environment due to design work will be related to topographic, geotechnical, geological and prospecting studies. It is assumed that the consequences for environment will be negligible due to small-scale field works.

Mitigation of consequences:
1. Minimizing of productive land use;
2. Development of appropriate technical solutions for implementation of drainage work;
3. Slope stabilization as per geological conditions;
4. Development of appropriate technical projects of bank protection structures and river crossings;
5. Identification and development of safety measures suitable for mountainous terrains.
6. Facing and fastening channels in downstream of river due to rockfills or other protective works;

As a rule, the consequences for environment during the design phase at construction site are insignificant, temporary and reversible.

5.3 Construction impacts and measures to mitigate them

The consequences arising from construction activities and related measures to mitigate these impacts are discussed at the level of the following environmental sectors:

• Landscape Impact

• Temporary land use and production area loss

•Water pollution

• Erosion and sedimentation

• Air pollution and dust

• Impact of geological work

• Solid Waste Pollution

• Biological diversity

• Noise and vibration

• Habitat destruction

•Resource usage

• Cultural resources

• Disruption of public utilities work

•Security

5.4 Impacts for the natural landscape

The existing bridges and access roads are in poor condition and, as a rule; do not contribute to landscape improvement. However, new bridges, access roads construction, and old bridges demolition can to some extent negatively affect the existing landscape. The natural appearance can be disturbed by cleaning the site, removing vegetation, performing earthworks, creating embankments of excavated surplus material, redirecting the riverbed and improper waste management. Erosion, caused by inappropriate excavation and changing the watercourse.

New bridges design will improve terrains landscape. Planting trees and shrubs along the access roads will be an adequate measure for mitigating the consequences. Contractor should avoid disposal of surplus materials near cleared access roads to protect the local landscape and nature.

5.5 Land use practices impacts

Preliminary land assessment, which will be purchased for various purposes.

Table 6 Approximate land area used for project implementation

No bridge	Closest populated area	Land area, taken in permanent use, ha				Land area, taken in temporary use, ha		
		Bridge	Access roads	Bank protection structure	Total	Construction site	Camps & strcutures	Total
1	Andarbak	0,04	0,48	0,05	0,57	0,06		0.56
2	Andarbak	0,02	0,36	0,05	0,43	0,06	0.05	0,06
3	Vishkharv	0,04	0,36	0,06	0,46	0,06		0,06
4	Udob	0,03	0,24	0,16	0,43	0,06		1,06
5	Chikhoh	0,02	0,12	0,16	0,30	0,06		0,06
6	Tekharv	0,05	0,3	0,3	0,65	0,06	1.0	0,06
7	Sed	0,04	0,25	0,1	0,39	0,06		0,06
8	Andarbak	0,02	0,24	0,12	0,38	0,06		0,06
9	Barrushan	0,02	0,72	0,2	0,94	0,06	0.5	0.56
10	Alichur	0,04	0,48	0,05	0,57	0,06	0,50	0,56
11	Berdibaev	0,02	0,36	0,05	0,43	0,06		0,06
12	Beshgumbez	0,04	0,36	0,06	0,46	0,06		0,06
13	Kuhnakurgan	0,03	0,24	0,16	0,43	0,06		1,06
14	Yachipun	0,02	0,12	0,16	0,30	0,06		0,06
15	Zigar	0,05	0,3	0,3	0,65	0,06		0,06
16	Darjomj	0,04	0,25	0,1	0,39	0,06		0,06
17	Basid	0,02	0,24	0,12	0,38	0,06	1,00	0,06
18	Chadud	0,01	0,2	0,1	0,3	0,03	0,50	0,5

Lands, which are necessary for bridges construction will be identified and presented in design documentation as a drawings. Consequences for potential and current land use practices will be caused by the following activities:

• Cleaning and uprooting of site;

• Searching for natural materials sources for construction, i.e. earthworks and quarrying;

• Creation of base camp and camps for builders;

• Construction debris utilization; and construction works, i.e. movement of construction machinery and equipment;

• Soil compaction due to movement of construction machinery and equipment;

• Soil pollution in location of construction camps and loss of fertile soils.

Land areas needed to implement supporting activities, as mentioned above, will be rather small. Thus, direct impact scale will be insignificant. The lands affected by Project are not sensitive from ecological point of view. In general, the Project will have little impact on potential and current land use practices.

5.5.1 Impacts for surface water and hydrology

The project is capable of creating some short-term and minor adverse effects on water quality, including (i) increasing the amount of sludge deposition in the bridging zones; (ii) building materials such as gravel, peat and mound will be washed into local waterways and rivers during rains; (iii) hydrocarbon leaks and / or spills in storage and accommodation areas of mixing plants; and (iv) discharge of sewage and sewerage from the location of construction camps into local waterways and rivers, or leakage through leaks and contamination of the water surface.
The main probable types and sources of water pollution are:

- Fuel and oil leaks from vehicles, storage tanks and machinery;
- Temporary sediments deposited during excavation in water-collecting basins;
- Wash water from the use of crushing plants;
- Human wastes from construction camps and non-compliance with sanitation rules and regulations;
- Indiscriminate discharge of household and construction waste;
- Chemical waste from the use and storage of chemicals during construction, or flushing of solvents used for equipment (asphalt mixing plant);
- Wash water containing oil or detergents used to clean equipment.

Contractor will not discharge any materials and substances except with the permission of the CSPI and regulators.

Contractor will ensure that all existing watercourses and drains are not threatened with the dumping of construction debris and materials as a result of the work, and will protect waterways, waterways, canals, channels, drains, etc. from pollution, silting, flooding or erosion as a result of the project work.

In the event of a flood or other damage caused by the activities of contractors, the contractor will have to take corrective measures to restore the affected area to its previous or better condition

It is necessary to monitor the condition of rivers, tributaries, temporary drainages, especially during and after heavy rainfall to avoid sudden changes or floods..

5.6 Erosion and sedimentation

The Project can contribute to soils erosion and increase the sedimentation level. Erosion can accelerate (1) instability of soil reserves, (2) slope overload and resulting collapse; (3) change in the structure of drainage. However, soil erosion and sedimentation will be limited to activities directly on and near the sites of bridges.

Suggested mitigation measures: In sections where there may be a direct or indirect threat to productive land, Contractor will implement measures on erosion protection, especially on vulnerable soils, as soon as practicable after the disruption of land integrity. Measures on erosion protection may include silt fences, bales of hay, temporary drainage channels, and temporary measures related to energy dissipation, etc.

5.7 Air Pollution and Dust

The impact on air quality will be short-term in certain places (sections). Conditions in these sections should be such that dust is not spread over long distances, and that it quickly settles, thereby exerting impact exclusively in localized zones.
During construction, trucks and heavy equipment can disrupt topsoil layer, which can contribute to generation of dust-related problems for workers and residents of nearby settlements.

Proposed mitigation measures:

Contractor shall ensure that material resources are kept in confined spaces and covered with tarpaulins or other suitable cover to prevent material from being transported through air. In addition, effective control of fugitive dust emissions should be carried out during the delivery of materials and waste collection.

The stationary sources location of dust will be away from sensitive areas (preferably from wind side) so that dust does not adversely affect the sensitive areas. All trucks used to transport materials to / from construction site will be covered with tarpaulin canvas. Contractor will be liable for any damage in connection with dust generated as a result of his activities.

5.8 Impacts to biodiversity

Construction works will directly cause an insignificant degradation of local ecology due to clearing of small areas from vegetation (soil cover) in main and auxiliary work sections.

5.8.1 Fauna

Potential negative consequences of construction camps placement is destruction of animals and edible birds, despite the prohibitions.
Contractor's specialist on environmental health and safety will be responsible for providing adequate knowledge to workers on the need of fauna protection. The worker's labor contract will include provisions prohibiting poaching, as well as imposing penalties for any incident that violates the requirements of this treaty.

5.8.2 Flora

Contractor should take all reasonable measures to minimize or otherwise compensate any damage to vegetation cover in the project impact area.

5.8.3 Noise and vibration

The construction of bridges and roads will lead to noise and vibration of earth due to work of construction equipment, especially heavy equipment, and rock explosion. Explosive work will not have a strong impact, as it is rarely carried out and is of a very short duration. The noise emanating from running construction equipment usually causes more problems.
The most sensitive areas within the project area are schools, medical centers and residential areas.

All reasonable measures should be taken in order to limit noise to limits permissible for Tajikistan and the World Bank Group. The construction machinery should be equipped with silencers and other noise monitoring devices. Similarly, it is expected that all equipment will be maintained in a state that minimizes noise generation under normal operating conditions.

5.7.4. Geological consequences

In some cases, activities such as blasting, compacting, excavating, cutting and creating embankments can lead to negative consequences, including rockfalls and landslides. Landslides and other slope collapse are expensive and can lead to the roads closure for long periods of time and cause significant damage and drainage problems beyond the site boundaries. In most cases, slope collapse is the result of poor design and improper construction practices.

- Removal of loose materials and, if necessary, removal of materials with broken structure and their replacement with a protective coating made of rock;
- Removal of unstable rock masses;
- Use of safe gabions or bitumen jute nets with planted grass to protect the slopes if necessary and where possible;

The various types of proposed stabilization measures for the slopes include:

- Bolted fastening and anchoring of rock
- Mounting the rock with nails
- Grating with galvanized mesh
- Galvanized mesh and gunning
- Reinforcement and replacement with sprayed concrete or cyclopic concrete

5.9 Use of Resources

There are a number of resources that will be required for the construction of bridges and access roads:

- Rock and inert material will be mined in the project area;

- Cement and bitumen. It is assumed that cement and bitumen will be imported into the region and transported to the construction site on vehicles with heavy load capacity. Therefore, adverse effects will mainly be related to transportation. Steel and other parts of the bridge construction, as well as other components, will also be imported to the construction site from outside the region;
- Water: It is assumed that Contractor will receive water from Side Rivers or from Bartang Rivers. Alichur, Kobrigen, East Pshart, Yakhchipun and Pyanj. The use of water should be coordinated with the relevant local authorities;
- Food: Supplies of food to the project area are already inadequate. Additional food requirements to support construction crews can exacerbate winter food shortages in villages. Obviously, this situation is unacceptable, and Contractor will need to import enough food to the construction site to supply the workers hired by him.

Mitigation measures: Contractor shall prepare and submit for consideration to the PSC Environmental Action Plans, including provisions on quarries, crushing of rocks, production of small fillers, concrete mixing plants and washing facilities, etc.

5.10 Impact to Cultural Resources

Mitigation measures: If undocumented burial grounds or cemeteries are found, contact religious authorities immediately. If any archaeological or valuable cultural resources are found during the survey, archaeological inspector (s) will be present at the construction stage to ensure compliance with the procedure for finding unexpected finds or other restrictions. This will probably require the presence of a qualified specialist and the availability of professional equipment, transport and driver during the construction period; it is also necessary the participation of the communities habitants.

5.11 Operation phase

After completion of main construction works, Contractor will be provided Defect Rectification Period on site, during which road technical maintenance will be very important. During this period, PIG representative at site and responsible person from PSC will be responsible for implementing EMP. It is assumed that routine maintenance may include the following activities:

- Maintenance of road surface, road signs, painted lines and other road equipment;
- Cleaning bridges and canals from debris and other solid waste;
- Conservation of excavations and embankments, including earthworks implementation;
- Preservation of planted vegetation and other work for slopes protection;

•Solid waste generation (solid waste generated from any type of activity should be properly disposed).

5.12 **Public Consultations**

Work with the communities as part of the EIA process began at the earliest stages of the Project and involved engaging stakeholders in the process to assist IA in ensuring that communities perceives the Project's objectives and its support by communities.

Table 7 Demographics of the selected jamoats in the project zone

Jamoat	**No of people**	**Mainly**			**Number**	
		Male	**Female**	**Children**	**schools**	**hospitals**
Teharv	6541	3421	2891	451	2	1
Jovidon	7854	3861	341	394	2	1
Yazgulom	3560	187	1456	289	2	
Alichur	1751	603	672	476	4	1
Berdibaev	1406	510	505	391	2	1
Nulvand	4289	2189	2100	746	9	3
Bartang	2268	914	867	264	1	1
Basid	1360	505	499	356	6	1

Issues related to identification of important natural resources and degree of their vulnerability were included in questionnaires. These issues included: (1) sources of drinking water used by population; (2) energy sources for heating homes; (3) relationship with fauna and flora and its economic value for local population.

Photo 5 Discussion of Project Environmental Aspects with population of Darchomch village (bridge No. 16).

Parallel with Socio-Economic Status of People Assessment, survey participants were informed in detail about the proposed Project, including the expected environmental impacts. During the meetings, an open discussion was held of possible negative consequences of the Project, including increased noise levels, vibration, impacts of construction camps, temporary water deterioration and air quality. Participants firmly supported the Project, and at the same time, openly shared the existing problems of environmental condition and its impact on public health. Wishes and recommendations of the stakeholders were taken into account on preparation of EMP, which is an integral part of this Document. The detailed matrix of the Public Consultations undertaken provided in the Appendix II.

6 Environmental Management Plan (EMP)

EMP sets out the framework for managing the environment. In order to ensure full implementation of all requirements (especially during construction) EMP is directly linked to several more safeguards:

1. Environmental Management Framework Document for the Project;
2. Site -Specific Environmental Management Plans (SSEMP) for individual sites;
3. Environmental Protection requirements in bid documents, including Specifications and,
4. Contractual documents.

6.1 Site-specific EMP (SSEMP)

SSEMP is a document that the Contractor prepares and describes how he will implement EMP in construction phase and ensure compliance with mitigation and monitoring requirements under the EMP. This is important, because at this stage of Project, there are still unclear aspects, such as who will dispose waste, generated in construction camps, the exact location of quarries, etc. The SSEMP should contain sections dealing with the following aspects:

- Management of Physical Environment (Soils, Water, Air)
- Environmental Management (Flora, Fauna)
- Management of Economic Parameters (Infrastructure, Transport, Land Use)
- Management of Social and Cultural Resources (Communities, Education and Health facilities, Historic and Cultural sites, Noise).

In each section, mitigation and monitoring measures, timing and reporting should be accurately described.
In addition, SSEMP should contain specific Management Plans (in form of Annexes) concerning the following aspects:

- Quarry Management
- Actions in Emergency Event
- Air Quality
- Water Quality
- Noise Levels.
- Waste Management
- Dust Levels
- Construction Camps
- Health and Safety
- Traffic Safety
- Grievance Examination

The mitigation of these issues is shortly discussed in the following sub-paragraphs and further summarized in Environmental Management tables. The Appendix 1 provides detailed guidelines for preparation of SSEMP.

6.2 Quarries (excavations)

Contractors should prepare an Borrow Pit Management Plan for identifying sources of materials for construction. Plan will be coordinated with the PSC and submitted to PIG for review, which will ensure the implementation plan. Materials and action plan should reflect the location of all quarries that will be used and measures that will be taken to restore these areas after the Project completion. PIG will approve and monitor the implementation plan. Prior to construction commencement, Contractor must also include provisions for quarry exploitation with indication of its location, access and exit roads, the proposed zone for extraction of material and geological profile (section).

The following good practices are recommended for extraction, storage and transportation of materials:

- Topsoil layer should be stored separately under cover and used to restore vegetation layer on production site or slopes on construction site;
- Materials extraction should be carried out only in specially designated areas in coordination with PSC;
- Extracted material should be stored in specially designated places in coordination with PSC;
- Extracted material should not be stored near surface water for preventing silting or blockage of waterways;
- Contractor should humidify ground roads passing near populated areas to suppress dust and prevent contamination when transporting materials from quarry areas;
- Fine-grained material (sand) must be covered with tarpaulins to prevent dust generation and transport roads contamination;
- Transported materials should be humidified by Contractor to reduce potential dust emissions; Trucks must not be overloaded to avoid road accidents;
- Safe quarry inclination should not exceed 45 ° at a height to base ratio of 1: 1.

In addition, Contractors should ensure that quarries and crushing plants are located:

- At a distance of at least 300 meters from residential areas to prevent noise and dust effects;
- Outside agricultural land location; and
- As far as possible, on land plots that are not currently in use.

Supervision work at site by PSC will be necessary until the final acceptance and payment under the terms of the contracts; topsoil layer taken in quarry area will be retained and reused to restore the vegetation cover in this section to meet the requirements of PSC.

Avoid mining of building material from the riverbed to prevent erosion and destruction of river banks, including nearby infrastructure (roads, settlements).

6.3 Storage and handling of fuel and chemicals

The project implementation may require the use of various chemicals that can affect the quality of water and air.
Transportation, storage and handling of fuel will be carried out in accordance with national or international standards.
At a minimum, the following security measures will be taken:

- Impermeable dams enclosing fuel storage tanks, with a capacity of more than 110% of the reservoir volume;
- Properly maintained tanks and vehicles running on fuel, with regular inspection and maintenance, as required;
- Daily checks and reconciliation of volumes on a daily basis;
- Equipment for containment and restoration in the event of an emergency fuel spill;
- Training and practical exercises on containment and recovery in the event of a fuel spill;
- Fuel storage tanks should be located away from rivers and streams. Refueling should be done away from streams and rivers.
- Chemical storage sites will be surrounded by a dam, far from streams and rivers, and will be located in the relevant building;
- Suitable extinguishing media will be provided for each chemical stored;
- Material safety data sheets should be kept in the storage and office of the building site;
- Containers must be clearly marked.

6.4 Waste management

The project implementation will lead to the formation of a certain number of different types of waste. Improper waste management can contribute to air, water and soil pollution, acceleration of erosion and disturbance of the natural habitat. Waste generated as a result of the project can be divided into the following categories:

a. Inert building materials;
b. Household waste;
c. Hazardous and toxic waste.

Contractor shall ensure the placement, storage and disposal of all types of waste, according to the requirements of the laws of the Republic of Tajikistan and international standards.
Transportation of hazardous chemicals / fuels must be in accordance with national or international standards. At a minimum, the following security measures should be taken:

- Properly maintained vehicles;

- Availability of equipment for containment and recovery in the event of emergency fuel spills on board vehicles;
- Regular inspections and maintenance as required
- Daily inspections of vehicles and their tanks and reconciliation of volumes on a daily basis;
- Notification of spills within a reasonable time.

6.4.1 Inert Constructional Materials

Inert construction materials include surplus soil (tips) and aggregate and other materials stockpiles. Surplus and construction material stockpiles will be susceptible to erosion, particularly during the rains and re-suspension of dust during the dry seasons.

Inert natural materials may (e.g. soil, rocks) be disposed of in the project area at the discretion of the PSC, and with due regard to all protection measures relating to solid waste, In such cases the materials disposed of should match the existing material, and should not cause any adverse environmental impacts.
Disposal or storage of solid materials is not permitted in or close to the following areas:

- Villages and residential areas;
- Cemeteries;
- River/stream beds, banks or slopes directly above river/stream beds;
- Cultivated lands;
- Pastures;
- Native fauna, including trees, shrubs and grasslands.

Topsoil and fill stockpiles shall be located in areas identified as suitable by the Engineer. Stockpiles shall be made with stable side slopes to prevent excessive erosion of material during heavy rains. Stockpile surfaces shall be compacted to prevent erosion during heavy rains. The Engineer may require the construction of compacted earth bunds around stockpiles to contain eroded materials.
Surplus material originating from earth works has to be disposed properly without adverse impact on landscape and nature. Basically, this material could be used for noise protection walls and stabilization of slopes or as embankment material if suitable. It is also suggested to use surplus material as fill material for re-cultivation of mine galleries or open pit mines. Reuse for the access road construction should also be taken into consideration if the material is suitable.
Disposal sites and haul routes will be identified and coordinated with local officials. Disposal on existing landfills would not be recommended if the volume of the excavated material will exceed existing capacities

6.4.2 Disposal of domestic waste from construction camp and other project location

Operation of construction camps and other facilities may generate significant quantities of liquid and solid domestic wastes. Improper handling and disposal of domestic waste may cause health problems, odor, air and water pollution.

The Contractor should provide adequate numbers of clearly labeled bins or skips for collection of wastes in the construction camps, and construction yards. Domestic and construction wastes shall be removed from the site and disposed of to a licensed sanitary landfill, or a similar landfill approved by the PSC.

6.4.3 Disposal and Transportation of Hazardous Waste

It is not expected that project implementation will generate significant quantities of hazardous or toxic waste. However, construction staff will be trained and informed of the hazards of the chemicals stored, as well as trained and drilled in the handling of emergency spills, fires, and incidents.

Reactive or hazardous materials (if any) shall be disposed of by the Contractor in accordance with the laws, regulations and guidelines currently in force in Tajikistan. If no such laws are available, the Contractor will dispose of these materials in accordance with international standards (ISO) or as directed by the Engineer.

Transport of hazardous chemicals / fuel shall be in accordance with the National or International Standards. At minimum, the following safety measures should be adapted:

- Well maintained transport vehicles
- Emergency fuel spill containment and recovery equipment on board vehicles;
- Regular inspections and maintenance as required;
- Daily inspections of transport vehicles and their tankers, and reconciliation of on a daily basis;
- Reporting of spills, within a reasonable time frame

6.5 Erosion Control

Soil erosion and landslides are significant problems in Tajikistan. Erosion is a widespread natural phenomenon due to the relief and climate of the country accelerated by poor land management practices, such as the cultivation of land on steep slopes; excessive cuttings of forests, shrubs and bushes including wind shelters; overgrazing; and improper irrigation.

The project may have potential for soil erosion and increased sedimentation. During construction there are a number of potential sources of erosion and sedimentation and activities that may result in increased run-off and could lead the loss of soil. Those include:

6.5.1 Site clearance and work on unprotected surfaces;

This will include removal of old bridges structures, boulders and rocks and in some cases vegetation, soils and surplus cut material. Site clearance not only exposes bare soils in the cleared area to erosion but also prompts the formation of new erosive channels and gullies that will have the capacity to cause damage (by erosion and possibly land movement) to lands outside of the cleared area. Excessive steepness of cut slopes and modification of water flows can result in landslides. Whereas side tipping of spoil material from road cuttings can kill vegetation and add to erosion and slope stability problems. Erosion might result in pollution and sedimentation of the river.

6.5.2 River diversion

It may be necessary in a number of cases for temporary stream diversions with modification of water flows to be put in place during the construction activities. Such temporary redirection of flows, or changes to drainage, can result in flooding of adjacent lands, and destruction of property, crops, and the natural environment if badly engineered.

The erosion may accelerate (i); instability of spoil stockpiles (ii) slope overloading and resultant failure; (iii) alteration of drainage pattern. However, soil erosion and sedimentation will be limited to carrying out activities at and near bridge locations.

Proposed mitigation: In areas where productive lands may be directly or indirectly threatened, the Contractor shall implement erosion protection measures, particularly on vulnerable soils, as soon as is practically possible following disturbance of the earth. Erosion protection measures may include silt fences, hay bundles, temporary drainage channels, temporary energy dissipation measures etc.

Where temporary stream diversions for the construction of new bridges are required they shall be carried out so that no additional erosion takes place. It is necessary to ensure that the designs prepared are efficient and appropriate to local conditions. Measures proposed include;

- Lining of downstream channels with rip rap, or other protective works.
- Protection of bridges and stream channels for as far downstream as is necessary to ensure their safety;
- Placing of drain outlets to avoid the cascade effect;

The Contractor shall repair any damage occurring as a result of erosion an sedimentation that is related to the construction of the project. The Contractor shall minimize damage to existing vegetation, particularly in steep areas, or on vulnerable soils.

Stockpiles of erodible materials shall be built and maintained to prevent erosion during heavy rains. This may include covering, low slopes on the sides of the stockpiles, and compacting of the surface of the stockpiles. Sediment control devices such as silt fences, earth bunds, lined drainage channels, hay bales etc shall be employed to control runoff, erosion and sedimentation.

Environmentally sound disposal of cut material and reuse. Any trees removed as part of the construction of the bridges and access road will be replaced. Additional trees may be planted as part of the business development along the road such as a nursery or fruit tree farm to provide additional food for the communities or as a commercial product for sale to other communities.

With care taken for sediment and erosion control, topsoil should be minimally affected.

The Contractor shall repair any damage occurring as a result of erosion and sedimentation that is related to the construction of the project. The Contractor shall minimize damage to existing vegetation, particularly in steep areas, or on vulnerable soils.

Stockpiles of erodible materials shall be built and maintained to prevent erosion during heavy rains. This may include covering, low slopes on the sides of the stockpiles, and compacting of the surface of the stockpiles. Sediment control devices such as silt fences, earth bunds, lined drainage channels, hay bales etc shall be employed to control runoff, erosion and sedimentation.

6.6 Chance find procedure

In the event of the unexpected discovery of archaeological object during construction operations the contractor shall immediately inform the residential engineer who will notify the Institute of Archaeology / Ministry of Culture and the PIU for further instructions. In this case the construction works at the localized site would be stopped until Institute of Archaeology give clearance for the continuation of the operations.

Works will resume only after appropriate measures have been taken as requested by the Institute of Ministry of Culture and confirmation has been received that works may continue.

6.7 The Safety and Personal Hygiene

Construction sites are potentially dangerous, so there are often happened serious accidents, especially if security measures are not provided. The bridges construction will include a number of activities that carry a particularly high risk, for example, blasting; use of heavy machinery; excavation on steep, potentially unstable slopes and construction equipment movement. This is a particular concern due to some construction sites remoteness from Darvaz district hospital – about 5 hours drive, in Rushan district - about 3-6 hours drive, in Murghab district - about 2 hours drive. The construction phase can lead to a number of adverse consequences for health and people's safety.

The main negative effects on health and safety are related to (1) risks in performing construction work (noise, risk of injury), (2) transmission of infectious diseases; (3) contamination of local water supplies; and (4) road safety issues.

Contractor should comply with the requirements of the laws of the Republic of Tajikistan on Health and Safety and/or the Contract must include specifications and conditions of Health & Safety, based on International Standards. Contractor is responsible for any

security risk for public and will be required to compensate for any damage caused because of his negligent attitude towards the health and safety of any member of society.

Contractor must hire trained personnel to provide first aid. Number of such employees and level of their training will be described in detail in their Contracts. Contractor shall ensure and will be responsible for the proper training of all staff in the safe use of equipment and machinery.

Contractor must provide all safety materials, protective clothing (including providing protective masks for workers in all areas where significant emissions are possible), ambulances, etc. for the Project.

6.8 Health and Safety Plan

A Health and Safety Plan shall be prepared by the Contractor to manage worker safety. The Plan shall include the following items:

6.8.1 Safety Training Program

A Safety Training Program is required and shall consist of (i) Initial Safety Induction Course. All workmen shall be required to attend a safety induction course within their first week on Site.

6.8.2 Periodic Safety Training Courses

Period safety course shall be conducted not less than once every six months. All Subcontractor employees will be required to participate in relevant training courses appropriate to the nature, scale and duration of the contract works. Training courses for all workmen on the Site and at all levels of supervision and management.

6.8.3 Safety Meetings

Regular safety meetings will be conducted on a monthly basis and shall require attendance by the safety representatives of subcontractors unless otherwise agreed by the PSC. The Engineer will be notified of all safety meetings in advance. The Engineer may attend in person or by representative at his discretion. The minutes of all safety meetings will be taken and sent to the Engineer within seven (7) days of the meeting.

6.8.4 Safety Inspections

The Contractor shall regularly inspect, test and maintain all safety equipment, scaffolds, guardrails, working platforms ,hoists, ladders and other means of access, lifting, lighting, signing and guarding equipment. Lights and signs shall be kept clear of obstructions and legible to read. Equipment, which is damaged, dirty, incorrectly positioned or not in

working order, shall be repaired or replaced immediately.

6.8.5 Safety Equipment and Clothing

Safety equipment and protective clothing are required to be available on the sites at all material times and measures for the effective enforcement of proper utilization and necessary replacement of such equipment and clothing, and all construction plant and equipment used on or around the Site shall be fitted with appropriate safety devices. These shall include but not be limited to:

1) Effective safety catches for crane hooks and other lifting devices, and
2) Functioning automatic warning devices and, where applicable, and
3) Valid test certificate, for cranes and hoists.

To avoid health and safety impacts the Contractor shall conform to the following:

Due precautions shall be taken by the Contractor to ensure the safety and security of his staff and labor to ensure that medical staff, first aid equipment and stores, sick bay and suitable ambulance service are available at the camps, housing, and on the Site at all times throughout the period of the Contract and that suitable arrangements are made for the prevention of epidemics and for all necessary welfare and hygiene requirements

The Contractor shall report to the PSC details of any accident or incident pertaining to the security of its personnel, equipment, the site, its camp or the completed Works as soon as possible after its occurrence. The report shall be based on a detailed investigation by the Contractor of the event and provide particulars of what occurred (with explanatory sketch as necessary), who was involved (including names, and affiliations of such persons), what caused the incident, when the incident occurred (time and date), where the incident occurred and why the incident occurred. In addition, the report shall fully describe what means and measures the Contractor shall take to prevent the future occurrence of such incidents.

In the case of any fatality or serious injury, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means.

The Contractor shall at all times take the necessary precautions to protect all staff and labor employed on the Site from insect nuisance, rats, and other pests and reduce the dangers to health and the general nuisance caused by the same. The Contractor shall provide his staff and labor with suitable prophylactics for the prevention of malaria and shall take steps to prevent the formation of stagnant pools of water. He shall comply with all the regulations of the local health authorities in these respects and shall in particular arrange to spray thoroughly with approved insecticide all buildings erected on the Site.

Such treatment shall be carried out at least once a year or as instructed by the Engineer. The Contractor shall warn his staff and labor of the dangers of bilharzia and wild animals In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders, and requirements as may be made by the government or

the local medical or sanitary authorities for the purpose of dealing with and overcoming the same.

The Contractor shall also be responsible, to the extent required by the local regulations, for making any arrangements with regard to burial of any of his local employees who may die while engaged upon the Works. The Contractor shall, so far as is reasonably practicable, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of his staff and labor. Save insofar as the Contract other-wise provides, the Contractor shall provide and maintain such accommodation and amenities as he may consider necessary for all his staff and labor, employed for the purposes of or, in connection with the Contract, including all fencing, water supply (both for drinking and other purposes), electricity supply, sanitation, cookhouses, fire prevention and fire-fighting equipment, air conditioning, cookers, refrigerators, furniture and other requirements in connection with such accommodation or amenities. On completion of the Contract, unless otherwise agreed with the Employer, the temporary camps/housing provided by the Contractor shall be removed and the site reinstated to its original condition, all to the approval of the Engineer

The Contractor shall supply all safety materials, protective clothing (including provision of protective masks to workforce in all areas where fugitive emissions are potentially significant), and emergency vehicles etc for the project.

The contractor will ensure that proper temporary road signs and markings will be employed when required, e.g. during road diversions. Footpaths and roads will kept free of debris, spoil and other material at all times.

6.8.6 Grievance Redress for Contractor's Employees

A grievance is a complaint of one or more workers with respect to the organization. The Contractor's employees may have grievances relating to work safety, unhygienic working conditions, law salaries, inadequate management, violation of rules, regulations, established traditions and accepted practices and other causes.
The procedure for individual grievance redress is regulated by the Labor code of Tajikistan No 1329 from 23 July, 2016 (Section 14)

The Contractor's operation of the grievance procedure may contain the following steps:

The aggrieved employee verbally explains his grievance to his immediate supervisor. The employee seeks satisfaction from his supervisor. The grievance can be settled if the supervisor has been properly trained for the purpose, and if he adheres strictly to a basic problem solving method.

The second step begins when the grievance is not settled by the supervisor. In this case it should be sent to a higher level manager with a note in which are mentioned the time, place and nature of the action to which the employee objects. The higher level manager is generally a Company Manager or Deputy Site Manager.

If the decisions of the supervisor and of the higher level manager have not solved the problem, the written Complaint should be submitted to Grievance Redress Commission. The Commission should have equal amount of representatives of employer and employees and may include representatives of Engineer and PIG and can invite the witnesses and specialists for consulting.

The complaint forwarded to the Grievance Redress Commission is subject to mandatory registration. The Commission is obliged to consider the grievance within 7 calendar days after submittal. If grievant is still unsatisfied with the decisions he can go to arbitrary court. The court decision is final and binding on both the parties

6.9 Road safety

Road safety on bridges and roads constructed within the Project will be observed. Shoulders widening and improving of indication system at intersections and bridges will reduce conflicts between different types of transport.
Mitigation measures: Injuries or deaths have serious social and economic consequences for affected families and communities. Therefore, it is necessary to take all practicable measures to minimize the incidence of deaths and injuries from road accidents.
Proposed measures include:

- Speed control and traffic volume reduction, for example, speed bumps availability in villages;
- Speed control and signs, fencing, etc. on hazardous road sections, for example, bends/curves, bridges, etc;
- Safety barriers and shoulders widening on some road sections;
- Required measures for minimizing road accidents victims, including, livestock (and local animal species);
- Suggested speed limits in areas where animals are grazing;
- Warning signs for cattle crossing;

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6.10 Grievance Mechanism and Proposals

The Project implementation may lead to the appearance of complaints or the manifestation of dissatisfaction of individual citizens or groups of persons – cumulatively referred to as grievances. Grievances may arise from members of communities who are dissatisfied with community planning and the environmental mitigation of the project impacts

In this connection, a mechanism for handling grievances has been developed. Grievance procedures require ensuring that affected people are able to lodge complaints or concerns, without cost, and with the assurance of a timely and satisfactory resolution of the issue. The procedures also ensure that the entitlements are effectively transferred to the intended beneficiaries. Stakeholders will be informed of the intention to implement the grievance mechanism, and the procedure will be communicated at the time that the EMP are finalized.

Grievance and proposals from residents, who are caught in Project Impact Zone will be directly sent to the parties, responsible for management aspects related to environmental issues at construction site, through local authorities or other representatives of stakeholders. All complaints will be carefully documented and submitted to PIG for review. Complaints on minor issues requiring immediate resolution at place will be considered and decided by representatives of PIG on site.

Complaints on significant issues will be forwarded to PIG for study and decision-making. All complaints and related issues will be included in quarterly and annual reports prepared for PIG. Information on grievance process will be circulated in public consultations.

Overall Process:

a) The process of grievance redress will start with registration of the grievances to be addressed for reference, and to enable progress updates of the cases.
b) All services should be provided to grievant free of charge
c) The project will use a local mechanism, which includes peers and local leaders of the affected people. These will ensure equity across cases, eliminate nuisance claims and satisfy legitimate claimants at low cost.
d) The response time will depend on the issue to be addressed but it should be addressed with efficiency.

Procedure:

a) As a first step the grievant or local representative of mahalla should contact the Social and Environmental Expert of the Project and share their problem. The grievance should be registered and reported to the Engineer immediately. Then the local representative will contact PIG either by phone, SMS (a cell phone number will be provided or letter at sites with limited phone service.). The complaint must be logged by PIG MT in the complaints register.
b) .If the problem cannot be resolved to the satisfaction of the affected person within 5 days, then the problem is moved to the next level. A record of the resolution or decision to take it to the next level must be recorded in the complaints register.
c) For grievance cases that cannot be resolved by the PIG Environmental Expert within 5 days: The affected person should file his/ her grievance, relating to any issue associated with the environmental impact, in writing to the PIG MT (Appendix III). The grievance note should be signed and dated by the aggrieved person. The PIG Expert will be the direct liaison with affected party and investigate the case to determine validity of claim. . If valid, the PIG will notify the complainant and s/he will be assisted. A response will be given within 14 days during which time any meetings and discussions to be held with the aggrieved and others person will be conducted. Environmental Expert will provide assistance at all stages to the aggrieved person to facilitate resolution of their complaint and ensure that the matter is addressed in the optimal way possible.

d) If the grievance is not solved by PIG within 14 days the Grievance Redress Commission to address the case will be created. Commission will include at least 5 person, including 2 are PIG employees and 3 other are representatives of the NGOs or authorities with perfect reputation. They should issue written decision registered by the local authority.
e) If grievant is still not satisfied with result he can apply for the court.

6.11 SSEMP timing

SSEMP is submitted within 45 days after the Contract is signed, and design work cannot start without SSEMP approval by the MT and by Supervision Engineer of SSEMP can be changed after pre-design and design work, but construction cannot commence without SSEMP approval by the Ministry of Transport and Supervision Engineer.

6.12 Tender documents

Tender documents of the potential Contractor contain sections dealing with environmental issues including: provisions indicating that the Contractor will be responsible for the implementation of the requirements of the EMP and that it will prepare its own project SSEMP. This EMP is included into the bidding documents in order to make Contractor aware of the requirements for environmental protection within the Project, and help to indicate the environmental cost of its proposals (for example, the cost of noise monitoring). The Project Technical Specification which also part of bidding documents also include "Environmental Protection" section (109) with description of the activities and Obligation of Contractor. Many sections of Specifications provide technical details for environmental mitigation activities included into the EMP such as tree planting section 1003- ("Planting trees, shrubs and ground cover") or section 1001 ("Erosion Control").

6.13 Contract Documents

Contract documents, in general, will repeat the bidding documents. There is no need to repeat the mitigation measure, but contract states that the Contractor is responsible for implementing EMP through its SSEMP. The EMP should be presented in form of an Annex to the Contract, which will impose obligations to him in implementation of EMP and EIA.

6.14 Roles and Responsibilities in Environmental Management

Responsibility for environmental management will rest on mainly;

(i) Project Implementation Group (GRP) of the Ministry of Transport

(ii) Supervision Company

(iii) Contractor

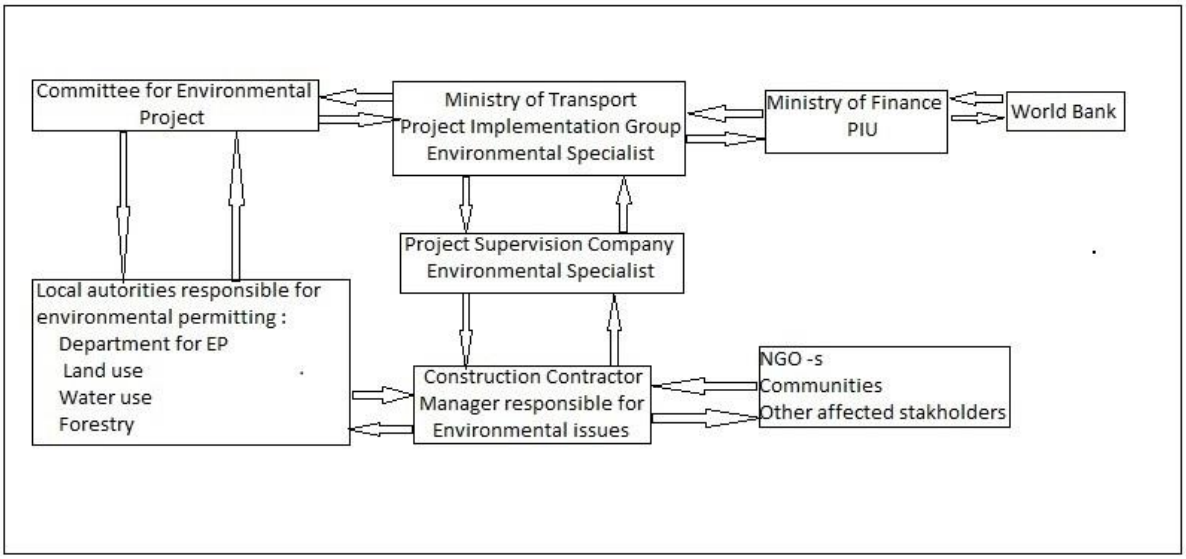


Figure 4 Environmental Management Communication Chart

6.15 Requirements for Contractors

The role of construction Contractor and Supervision Contractor in Environmental Management shown in the table below:

Table 8 The role of Construction Contractor and PSC in Environmental Management

Participant	Activity	Supporting Documentation
Construction Contractor, site specific	• Allocates adequate budget for environmental mitigation during the bidding process based on the EMP. • Assigns person responsible for environment health and safety at every site • Ensures the preparation and implementation of the SSEMP • Obtains clearance from authorized body or local executive authority if required • Obtains required permits/licenses • Reports regularly (once a month) to supervision contractor and PIG environmental specialists on the implementation of the mitigation measures and immediately in case of incidents. • Ensures that complains by the public are recorded and taken care of following the grievance redress mechanism (GRM)	• Inclusion of the EMP into the tender documents • Copies of the regular reports • Copies of permits, licenses • Clearance statements from the supervision contractor and the PIU environmental specialists • Periodic reports and sub-project completion report • EMPs/ EMP Checklists • Decision on the need for EIA from the authorized body or local executive authority (if applicable) • GRM instructions and log on-site.

Supervision contractor	• Ensures the implementation of the SSEMP by regular (weekly) supervision visits to the construction site • Ensures that Construction Contractor reports regularly on mitigation measures and monitoring • Checks the quality of the environmental reports • Ensures that Contractor obtains all required permits/licenses • Ensures that Contractor implements the GRM • Organize training for Construction Contractor staff on environmental safeguards requirements	• Clearance statements from the supervision contractor • Copies of regular reports • Copies of permits/ licenses

As mentioned above, the Contractor is responsible for the preparation of the SSEMP. This will require the participation of qualified environmental specialist, since this work must fully comply with EMP that needs to be prepared within 45 days of receiving Contract and updated upon completion of pre-design work. During the design and construction work period, the Contractor should keep the participation of environmental specialist to update SEAP, monitor progress of work and prepare reports throughout the contract period.
The Contractor is also responsible for attracting external consultants to monitor air, water and noise, as well as for preparing monthly reports on environment, which are submitted to the Engineer. Such monthly reports should contain the following sections:

1. Current Project Status
2. Cases of fuel pouring,
3. Recording environmental monitoring, visual and instrumental
4. Conclusions and recommendations.

The Contractor also prepares a number of training activities on environment for workers. These events will be prepared by responsible person and should include trainings on:
• Waste Management
• Health and Safety
• Dangerous liquids pouring

Supervision Engineer approves these training programs. The detailed guidelines for preparation of Contractor's SSEMP is provided in the Attachment.

6.16 Environmental Management Plan for the Construction Phase

Table below provides mitigation measures planned for Project Implementation:

Table 9 EMP Mitigation Measures during Construction and Operation

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
Pre-construction (mobilization) - Phase				
1. Establishment of Environmental Management System for Construction phase	The inadequate implementation of EMP can lead to incompliance and failure of the Project	Contractor shall prepare the SSEMP on the basis of this EMP. SSEMP should contain sections: - Management of the physical environment (Soils, Water, Air) -Management of Biological Environment (Flora, Fauna) - Management of economic parameters (Infrastructure, Transport, Land use - Management of social and cultural resources (Communities, education and health facilities, Historical and cultural sites, noise) In addition, the SSEMP should contain specific Management Plans (in the form of attachments) concerning: • Quarry Management • Actions in the event of an emergency • Air quality • Water quality • Noise levels • Waste management • Dust levels • Construction camps • Health and safety Each section accurately describes the location of the monitoring and mitigation	Contractor	PIG

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
		measures, responsible persons, the schedule for conducting and reporting. SSEMP are submitted within 45 days after the award of the contract, and the construction work can not start without the approval of the SSEMP by the Ministry of Transport and the Engineer.		
2. Selection of sites for borrow pits and facilities	Improper selection of sites for main construction facilities can cause significant environmental and social impacts, including air, water, soil pollution and tensions with the local communities and other stakeholders.	All facilities considered as stationary sources of air pollution including careers should not be located closer than 300m from any settlements, protected areas or sensitive recipients . To prevent pollution of the ambient air, the Contractor shall prepare an Air Quality Plan (AQP) and submit it to the Engineer as part of its SSEMP. The borrow pits locations should be agreed with local environmental authorities. The already operational pits are preferable. In this case environmental impacts concerning potential disfigurement of landscape, vegetation losses and damage to access roads are kept to a minimum. Careful site selection of aggregate crusher in order not to interfere with any sensitive receptor. Distance to next settlement and residential houses at least 1000 m downwind. Site selection for aggregate crusher has to be approved by the PIG. Asphalt plants shall be 1000 m downwind from any settlements and residential houses.	Contractor	CSC, PIG relevant authorities at the site area/
3. Selection of location for camp	Camp operation may cause environmental impacts and social tensions if its location is not selected properly	The contractor shall submit documents for approval (short statement and site plan in appropriate scale) which indicate: •Site location, surface area required and layout of the work camp. The layout plan shall a •Sewage management plan for provision of sanitary latrines and proper sewage collectio •Waste management plan covering provision of garbage tons, regular collection and disp •Description and layout of equipment maintenance areas and lubricant and fuel storage fa Prior to the commencement of works the site installations shall be inspected for approval.	Contractor	PIG

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
		The selected site will not be on top of ground water area or near surface waters.		
4. Selection of disposal areas for stockpiling demolished pieces of structures, surplus soil, pieces of asphalt pavements etc.	Loss of valuable ecological structures if the selected disposal sites are not carefully selected.	No agricultural area or river floodplain shall be selected as disposal site. Minimum distance to any watercourses must be at least 100 m. Disposal sites shall be preferably on barren land without any wooden vegetation.	Contractor	PIG
5.Environmental permitting	The failure to obtain necessary environmental permits and licenses will lead to project incompliance and suspension.	Contractor should communicate with all relevant authorities in order to obtain all necessary permits and licenses in the shortest time possible.	Contractor	PIG, MT
6. Establishment of Safe & Health Management System	The construction activities are potentially risky. Breach of Health & Safety rules can impact the human health and even threat to life.	Contractor shall prepare Health and Work Safety plan to manage Safety issues. The plan should include: (i) Safety training Program; (ii) Safety meeting; (iii) Safety inspections; (iv) Safety clothing and equipment; (v) First aid facilities. A contingency plan or emergency response plan is a set of procedures to be followed to minimize the effects of an abnormal event on the Project roads, such as a spill of oil, fuel or other substances that may harm drinking water resources or have adverse effects on the natural balance of sensitive areas. Additional measures to mitigate risk of	Contractor	PIG, PSC.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
		accidents and spill of harmful substances are speed control and weight stations.		
CONSTRUCTION PHASE				
7.Clearing of site	Loss of top soil.	Removing of top soil occurring within site clearing corridor. Topsoil shall be removed and stored for reuse. Long-term stockpiles of topsoil will immediately be protected to prevent erosion or loss of fertility. For erosion protection it will be sawn with a fast growing vegetation, e. g. grass	Contractor	Construction supervision Consultant (PCS)
8.Disposal of cut material	Potential wind and water erosion	The contractor is advised to compact end evenly distribute the surplus material by layers where possible, to minimize piling and impacts to landscape. During dry and windy periods, water should be spread on the disposed material to avoid dusting.	Contractor	Residential Engineer
	Bottom of embankment of designed road lying very close to tree rows. Potential damaging of trees during construction activities	Implementation of a temporary vegetation protection fence during construction activities. The measure is recommended for the bridges No 1, 2,4, 5,6 ,7 ,9,14,15,16	Contractor	Construction supervision (PSC)
9.Bridges construction activities nearby valuable surface waters	Possible alteration of surface water hydrology resulting in increased sediment by increased soil erosion at construction site	The main watercourses in the Project Impact Zone are the river of Panj and its tributary Barrrushon, river of Vanj and its tributaries(Udob, Chihoh, Ardobag, Sed), river of Yazgulem and its tributary of Camochdara, river of Bartang, river of Alichur Implementation of settlement ponds at locations where construction site comes close to natural watercourses to retain sediments and mitigate possible impacts on water hydrology. To prevent water pollution, the Contractor shall prepare a Water Quality Plan (WQP) and submit it to the Engineer as part of its SEMP. This plan will detail the actions to prevent water pollution, as well as provide information on the type, age and standards	Contractor	Construction supervision (CS)

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
		of the equipment used, together with a detailed monitoring program to ensure water quality.		
	Possible impact to aqua-fauna and fisheries	The Contractor shall consult the local environmental authority to determine the spawning period for the construction of bridges. The Contractor must ensure safety for the aqua-fauna during the works. In addition, the Contractor provides the diversion of flows at the bridge supports	Contractor	PIG, Local Environmental Authority
10.Construction activities in vicinity to wildlife habitat or possible migrating routes of animals	Poaching, Disturbance to fauna. Threat to safety in the case of chance encounter	Due to possible encounter with wild fauna (including endangered species) Contractor shall take all precautionary measures to prevent poaching. Contractor should train people about the ban for hunting and prohibition of unauthorized use of weapon. In addition staff should be trained to safe behavior in the case of unexpected encounter with the wild animals. The food and leftovers left unattached may attract the wild animals. No food or food remains should left unattached for night time.	Contractor	CSC, PIG
11. Operation of borrow areas and quarries	Potential disfigurement of landscape, vegetation losses and damage to access roads Increased dust emission Siltation and obstruction of surface waters	Wet aggregates and/or provide cover on haul trucks to minimize dust emission and material spillage. In addition watering of unpaved access roads for reduction of dust emission. The hauling traffic should be carried out only between 6.00 am and 9.00 pm. Locate stockpiles away from surface waters. Prior to start material extraction the contractor submit his SSEMP through the CSC to the Executing agency of the PIU indicating the location of the proposed extraction site as well as rehabilitation measures and implementation schedule for the borrow areas and access roads. Rehabilitation measures may not be necessary for borrow areas still in operation after road works have finished. The SSEMP needs to address the sensitive issues of avoidance of transportation through residential areas as far as technically feasible and closure rehabilitation.	Contractor	Construction supervision (CSC), PIU

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
12. Operation of aggregate crusher	Increased dust emission and noise emission	Locate the facility at least in 300m from the sensitive receivers. Spray water during the windy and dry weather.	Contractor	Construction supervision (CSC), PIU.
13.Operation of asphalt plant	Odor emission and safety risks	Provide spill and fire protection equipment and submit an emergency response plan (in case of spills, accidents, fires and the like) to the authority in responsibility prior to operation of the plant. Secure official approval for installation and operation of asphalt plants from MT.	Contractor	Construction supervision (CS), Executing agency of PIG.
	Water and soil pollution due to spills.	Bitumen storage and mixing areas must be protected against spills and all contaminated soil must be properly handled according to legal environmental requirements. Such storage areas must be contained so that any spills can be immediately contained and cleaned up.	Contractor	Engineer, PIG
14. fuel –station and filling operations	The soil and water pollution	On site there must be equipment for eliminating fuel dispensing. The following conditions must be observed in order to avoid fuel and fuel reagent bottling: - Refueling is performed only in certain places. - All fuel and chemical repositories (if any) should be on a watertight basis and fenced. Such places are located far from water sources and wetlands. The very foundation and walls of the embankments must withstand the load in 110% of the storage tanks. - Fueling is strictly controlled and regulated by formal procedures and is carried out in places surrounded by embankments to avoid bottling of petroleum products and potentially hazardous liquids. - All valves and pistols must be protected from unauthorized intervention and vandalism, disconnected and locked, if not used.	Contractor	Construction supervision (CS); Safeguard Department in of MT

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
		- The containers or drums are clearly marked with the contents. It is necessary to avoid getting into the water sources of any pollutants. - Disposal of fuels and other potentially hazardous liquids in the ground or water sources is prohibited. - In case of accidental filling of fuel, they must be immediately eliminated; such materials are stored in a safe place intended for the storage of hazardous materials..Қ		
	Competition for water resources	Prior to establishment of the work camps, conduct consultations with local authorities to identify sources of water that will not compete with the local population.	Contractor	Construction supervision (PCS)
15. Health and safety at the working sites and camp operation	Health and safety risks to workers and adjacent communities	For health and safety protection of workers and adjacent communities the following shall be provided: • adequate health care facilities (including first aid facilities) within construction sites; • training of all construction workers in basic sanitation and health care issues, general health and safety matters, and on the specific hazards of their work; • personal protection equipment for workers, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection in accordance with legal legislation; • clean drinking water to all workers; • adequate protection to the general public, including safety barriers and marking of hazardous areas; • safe access across the construction site to people whose settlements and access are temporarily severed by road construction;	Contractor	Construction supervision (CS); PIU

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
		• adequate drainage throughout the camps so that stagnant water bodies and puddles do not form; • sanitary latrines and garbage bins in construction site, which will be periodically cleared by the contractors to prevent outbreak of diseases. Where feasible the contractor will arrange the temporary integration of waste collection from work sites into existing waste collection systems and disposal facilities of nearby communities;		
16. Work site operation / Operation of equipment maintenance and fuel storage areas	Worker's health and air pollution	The contractor shall hire a qualified health and safety expert who will provide safety training to the staff according to the requirements of the individual work place. Prior to the commencement of works, the work site personnel shall be instructed about safety rules for the handling and storage of hazardous substances (fuel, oil, lubricants, bitumen, paint etc.) and also the cleaning of the equipment. In preparation of this the contractor shall establish a short list of materials to be used (by quality and quantity) and provide a rough concept explaining the training / briefing that shall be provided for the construction personnel. The Contractor shall monitor the maintenance of the construction equipment and keep it in good technical condition, meeting the emission control requirements. This equipment (including control devices) is regularly checked by the Engineer, and such checks are recorded by the Engineer as part of the monitoring activity. The Contractor will: • Avoid running machinery idling; • Prohibit the use of equipment and technics on sites emitting visible smoke; The stockpiles of the materials are covered with tarpaulins or other material to prevent the dust from blowing off. Locate storage facilities for fuels and chemicals away from watercourses. Such facilities will be bounded and provided with impermeable lining to contain spillage and prevent soil and water contamination.	Contractor	Construction supervision (CS); EA of PIU.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
		Store and dispose waste/used oil consistent with environmental legal requirements.		
17. Informal connections with outsiders	Potential risk to affect local communities and the health and well-being of those that live in or near to the temporary work camps by supporting the spread of STD and HIV/AIDS.	Providing information to workers, encouraging changes in individual's personal behavior and encouraging the use of preventive measures. The goal of the information is to reduce the risk of HIV / STD transmission among construction workers, camp support staff and local communities.	Contractor	Construction supervision (CS), Ministry of Health
18. Operation of camp and facilities	Air pollution due open burning of waste	The Contractor shall not incinerate garbage or other materials without the permission of the Engineer. The Contractor does not install without the written approval of the Engineer the burners, boilers and similar installations or equipment using any type of fuel that can generate pollutants.	Contractor	PIG, PSC
	Water and soil pollution	Wastewater must be collected and discharged from the site by a sewage system and placed in a place and in a manner that does not allow contamination and troubles. Direct drainage of sanitary and waste water to the ground is not allowed. Disposal of materials such as fuels and lubricants in open fields or water is prohibited. The places of collection of liquid wastes should not have leaks into the ground. Fuel dispensers must be immediately disposed of, and the means for their removal and cleaning should be stored in the camps. Construction and work sites should be equipped with toilets that do not have leaks into surface waters. Do not dispose of alluvial and waste water in surface water sources. It should be collected in ponds-settling tanks or containers before it is exported.	Contractor	PSC, PIG

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
		On site there must be equipment for eliminating fuel dispensing. The following conditions must be observed in order to avoid fuel and reagent bottling: Refueling is performed only in certain places. All fuel and chemical repositories (if any) should be located on a watertight basis and fenced. Such places are located far from water sources and wetlands. The very foundation and walls of the embankments must withstand the load in 110% of the storage tanks. -Fueling is strictly controlled and regulated by formal procedures and is carried out in places surrounded by embankments to avoid bottling of petroleum products and potentially hazardous liquids. All valves and pistols must be protected from unauthorized intervention and vandalism, disconnected and locked, if not used The containers or drums are clearly marked with the contents. It is necessary to avoid getting into the water sources of any pollutants. Disposal of fuels and other potentially hazardous liquids in the ground or water sources is prohibited. In case of accidental filling of fuel, they must be immediately eliminated; such materials are stored in a safe place intended for the storage of hazardous materials. According to the Engineer's instruction, the Contractor arranges a washing ditch, or a place for cleaning cars away from construction sites. The contractor ensures the washing of cars (body and wheels from sand and dirt) before their departure. Do not take dirty		
19. Earth works and various	Siltation of surface waters and/or impact on	Mostly all excavated material will be reused. In addition the reclaimed asphalt pavement will be recycled for the construction of new pavement. Thus potential	Contractor	Construction supervision

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
construction activities including quarry operation	soils due to improper disposal of excess materials	impacts due to the need for disposal of excess material will be kept to a minimum.		(CS)
	Competition for water resources	Conduct consultation with local authorities to identify sources of water (for spraying and other construction requirements) that will not compete with the local population.	Contractor	Construction supervision (CS)
	Air pollution due to exhaust emission from the operation of construction machinery	The contractor will maintain construction equipment to good standard and avoid, as much as possible, idling of engines. Banning of the use of machinery or equipment that cause excessive pollution (e.g., visible smoke). The Contractor has conveyor belts in front of the windshield boards (in quarries), and the hopper dispenser hatches should be sheltered to avoid blowing dust. All conveyor material from which dust can be blown must be completely covered and combined with a belt cleaning device.	Contractor	Construction supervision (CS)
	Disturbance of adjacent settlements due to elevated noise levels. Relates to the bridges No 1,2, 4.5, 9,16	Restrict work between 06.00 am to 9.00 pm within 500m of the settlements. In addition, a limit of 70 dBA will be set in the vicinity of the construction site and strictly followed. In addition the following measures need to be implemented: Noise control at source (using less noisier equipment, mufflers, dampeners, enclosures, proper maintenance of equipment, providing training to operators, etc), noise control at path (using natural structures with screening properties and acoustic barriers).	Contractor	PSC (PSC)
	Dust generation	The Contractor shall ensure measures to prevent dust generation: All trucks carrying material are covered with tarpaulins or other material (fixed) to prevent the falling of materials from the body; Waste burial places should be rammed as soon as possible to avoid dust formation and blowing. .In places where vehicles are constantly moving, roads must have a hard	Contractor	PSC, PIG

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
		surface, and Spraying of water (on the roads of construction sites watered at least twice a day or more, if necessary at the discretion of the Engineer).		
	Soil compaction due to operation of heavy equipment	Confine operation of heavy equipment within the corridor that is absolutely necessary for the approach road construction to avoid soil compaction and encroachment into agricultural used land close to the road.	Contractor	Construction supervision (CS)
20. Various construction activities (continuation)	Traffic impairment	Submit a traffic management plan to local traffic authorities prior to mobilization. Provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions Allow for adequate traffic flow around construction areas. Provide adequate signalization, appropriate lighting, well - designed traffic safety signs, barriers and flag persons for traffic control.	Contractor	Construction supervision (CS), PIG.
21. Construction activities nearby the cemeteries and other places of cultural and religious significance	Disturbance to the places of cultural and religious significance of the communities, may damage these site, and worsen relationships to the local residents.	The only documented cemetery in the close vicinity to the project site is an old cemetery near approach road of the bridge No3. Although the designed road doesn't disturb the visual borders of the cemetery Contractor should be very careful and immediately contact the elders in the case of unexpected find. The procedure of chance find should be strictly observed at all sites.	Contractor	Supervision Consultant, PIG
22.Archaeological chance finds	Potential damage to archaeological artefacts due to construction activities, particularly earthworks	In the event of the unexpected discovery of archaeological objects during construction operations the contractor shall immediately inform the residential engineer who will notify the Institute of Archaeology / Ministry of Culture and the PIU for further instructions. In this case the construction works at the localized site would be stopped until Institute of Archaeology give clearance for the continuation of the operations.	PIU, Residential Engineer and Contractor	PIU and Institute of Archaeology

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
		Works will resume only after appropriate measures have been taken as requested by the Institute of Ministry of Culture and confirmation has been received that works may continue.		
23. Construction activities at high altitudes (above 3,500m) .	The work at high altitudes can cause adverse Health & Safety impacts due to lower atmospheric pressure and severe climate conditions	The bridge sites 10,11,12,13 are located at the high-mountainous severe environment(over 3,500m above msl) featured with: (i) reduced natural air pressure which results to less amount of oxygen available for breathing; extreme low temperatures at the winter period(below (-40°C)) with strong winds. Accordingly, Contractor should ensure a sufficient adaptation period for workforce (especially hired from other regions) and adjust work schedule if it necessary. In order to protect people in the condition of extreme low temperatures to provide adequate uniform and personal protective equipment for the work in severe conditions at sufficient quantities and arrange protect accommodation for rest. All machinery should be provided with sufficient amount of lubricant, fuel and antifreeze agent designed for the work in conditions of extreme low temperatures/	Contractor	PIG,MT
24.Construction activities in close vicinity to business asset	Disturbance to business, people, activities and socio-cultural resources due to construction work Loss of businesses and income of people operating their business within the existing RoW	Inform all residents and businesses about the nature and duration of work well in advance so that they can make necessary preparations. Limit dust by removing waste soil quickly; by covering and watering stockpiles, and covering soil with tarpaulins when carried on trucks. Increasing workforce and use appropriate equipment to complete the work in minimum time in the important areas Avoid construction work in sensitive times like festivals near religious places	Contractor	Engineer, PIG, MT
25. Construction activities in close vicinity to existing infrastructure etc.	Damage to infrastructure, supply cuts of infrastructure services, such as water supply pipes and other facilities,	Measures will be ensured in engineering designing to avoid any disturbance to the existing infrastructure. Prior to construction start the respective service agencies shall be informed about the	Contractor	Construction supervision (CS); PIU

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
	waste water discharge facilities, electricity lines etc	construction work. Coordinate with respective agencies and provide prior information to the public in case of any required disruption in services during construction		
26.Construction activities within villages, settlements such as of Teharv, Udob, Chihoh , Barrushon	Noise levels exceeding applicable noise standards. Vibrations may result in damage to local infrastructure, including private property and local (haulage) roads.	For sensitive receptors of public interest such as schools and hospitals and also for residential houses alongside the Project road applicable noise standards shall be complied with as far as technically feasible by means of noise measurements. In case of exceed of standards, ascribe of time restrictions for construction activities between 7 am and 6 pm. For potential damages to local infrastructure, including private property and local (haulage) roads, compensation procedures will have to be established prior to the beginning of construction and approved by the engineer. In addition grievance redress procedures shall be put in place to facilitate communication between the contractor and potentially affected people. In addition haul routes and construction site access roads should be discussed and jointly approved between the contractor and local officials to minimize the risk of conflicts. Within the settlements of Teharv, Udob, Chihoh, Barrushan Darjoms there will be noise monitoring according to the stipulations in the monitoring program.	Contractor	Construction supervision (CS); PIU.
27 As above	Construction noise	To avoid excessive noise levels near sensitive receptors inclusive residential buildings as a mitigation measure no dynamic compaction is applied in the immediate vicinity of such structures and there will be no use of vibratory-head, that is, the compaction roller will operate without vibration. Construction noise barriers should be implemented if effective and practicable. This would be decided on a case-by-case basis.	Contractor	CS

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
28. Aggregate extraction. Haulage of aggregates and construction equipment through the villages	Potential Impact on Community Health and Safety	The community members will be advised on road safety with the key messages reinforced with communities throughout construction. Clear signs will be placed at construction sites including borrow pits, in view of the public, warning people of potential dangers such as moving vehicles, hazardous materials and excavation and raising awareness on safety issues. Heavy machinery will not be used after day light and all such equipment will be returned to its overnight storage area/position before night. All sites including storage areas will be made secure, prohibiting access by members of the public by fencing when appropriate. Install barriers to keep pedestrians away from hazardous areas such as constructions sites and excavation sites. Install signage at the periphery of the construction site advising road users that construction is in progress. g. Strictly impose speed limits on construction vehicles along residential areas and where other sensitive receptors such as schools, medical places and other populated areas located. Provide security personnel in hazardous areas to restrict public access. If necessary, provide safe passageways for pedestrians crossing the construction site and for people whose access has been disrupted due to construction woks.	Contractor	Engineer ; PIG.
	Dust generation	The Contractor shall ensure measures to prevent dust generation: All trucks carrying material are covered with tarpaulins or other material (fixed) to prevent the falling of materials from the body; Waste burial places should be rammed as soon as possible to avoid dust formation and blowing. In places where vehicles are constantly moving, roads must have a hard surface, and Spraying of water (on the roads of construction sites watered at least twice a day or more, if necessary at the discretion of the Engineer).	Contractor	Engineer

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
29. Utilities Provision All sites where utilities will be interrupted	Potential impact on community health and safety	The affected people will be consulted during project implementation and will make the project contractors aware of any significant issues resulting from loss of electricity. People will be informed in advance of any power cuts and the duration of the cut will be made clear in order that they can plan around the lack of power.	Contractor	Construction supervision (CS); PIU.
30. All construction sites	Traffic interruption	a. Implement a traffic management plan that will set out how access along the project road will be maintained safely during construction. b. Provide clear signs to guide road users and advise them on changes to road priorities in order to make their journey as smooth as possible and to ensure road safety as unanticipated changes e.g. change of lane, will be avoided. c. Ensure access in areas to be closed temporarily by providing temporary/alternative access.	Contractor	Construction supervision (CS); PIU.
31. Possible damage to properties and community facilities. Construction sites.	Community Health and Safety impacts	a. Immediately repair and/or compensate for any damage caused by construction works and activities to existing communities and their property and facilities b. Maintain access roads used for transport of construction materials and other construction related activities are maintained to ensure that they remain in at least in their pre-project condition for the duration of the project.	Contractor	Construction supervision (CS); PIU.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility	
			Implement	Monitor
32. Landscaping/ trees planting.	In some cases, such as bridge sites 2,4,5,6, 9,16 tree losses that cannot be prevented. Trees may be planted at the locations where they were not available before.	Any tree losses are compensated by new plantations in the ratio of 1:2. Plantations shall be conducted after technical works have been completed. Planting time shall be restricted to spring (March till April) and/or autumn (September till October). Locations for tree plantings are within the existing Right of Way (RoW) at the locations where tree losses occur. Trees to be planted shall have the following parameters: 1.5 – 2 m height, age 5 – 6 years. Distance in between individual trees shall be 6 – 8 m. Species: pines, cypresses, elms, poplars, willows, walnuts.		
33. Work site restoration:	Worsening of environmental health compared to original state	After completion of construction works the contractor shall execute all works necessary to restore the sites to their original state. Removal and proper disposal of all materials, wastes, installations, surface modeling if necessary, spreading and leveling of stored top soil	Contractor	CSC, PIG, local authority
OPERATION PHASE				
34. Maintenance during 1-year liability period	Damaged drainage structures or uncontrolled erosion during liability period	The Contract provides that the Contractor is responsible for the warranty period of 1 year. During this period Contractor should conduct visual monitoring of the project road the state of vegetation which is an important factor in erosion prevention. If any problems are found, they are notified to the Ministry of Transport, which attracts the contractor to account for the improvement. The final payment is not paid until the problems are eliminated.	Contractor.	PIG MT,

6.17 Environmental monitoring plan for the construction phase

Table below shows the actions for environmental monitoring during the construction and operation phases of the project

Table 10 Monitoring Schedule for Construction and operational phases

Parameter	Location	Monitoring	Frequency	Responsibility	Cost
Construction phase					
Landscape	Quarry site	Visual inspection to ensure quarry rehabilitation is conducted per EMP	Monthly	Contractor, PSC	Part of supervision cost
Material Storage Sites	Bridge sites	Visual inspection ensure vegetation clearance has been minimized	monthly	Contractor / PIU / PSC	Part of Construction and supervising costs
Erosion and sedimentation	Access road	Visual inspection of prevention measures per EMP and occurrence of erosion	monthly	Contractor / PIU / PSC	Part of Construction and supervising costs
Rock fall	Active rock fall sections	Visual inspection	monthly	Contractor / PIU / PSC	Part of Construction and supervising costs
Soil spill		Visual inspection, soil sampling	During and after remediation	Contractor / PIU / PSC	Part of Construction and supervision cost
Storage of Hazardous substances	Construction camp	Visual Inspection of storage facilities as per EMP and emergency	Monthly	Contractor /PIU / PSC	Part of construction and supervising

Parameter	Location	Monitoring	Frequency	Responsibility	Cost
		response plan			costs
		Containment of hazardous materials, oil spills, and work-site accidents	monthly	Contractor /PIU / PSC	Part of construction and supervising costs
Waste management	Construction camp	Visual inspection that solid waste is disposed properly	monthly	Contractor / PIG / PSC	Part of construction and supervising costs
Surface Water Quality	Bridge sites	Visual inspection of water management per EMP	Ongoing	Contractor/ PIG/PSC	Part of Construction and supervising cost
	Directly downstream of pollution event	Sampling and laboratory analysis -DO, COD, SS, fecal coliform, conductivity, turbidity, pH, temperature; additional parameters to be defined	Every six months or after pollution case	Contractor / PIG / PSC	Estimate cost shown in the table 11 Originator of spill will pay for post-accident m
Air quality	Sensitive areas (densely settled areas, schools, hospitals)	Measurements of Particulate matter NO_x, SO_x, CO as per EMP	Twice/year	Contractor can get third party involved by approval of Engineer	Estimate cost shown in the table 11
dust	Sensitive areas	Visual inspection to ensure dust	monthly	Contractor / PIU /	Part of construction

Parameter	Location	Monitoring	Frequency	Responsibility	Cost
		suppression measures being implemented as per EMP		Engineer	or supervision costs
Noise	Sensitive areas	dBA at sensitive areas as per EMP	monthly	Contractor / PIG/ Engineer	Part of construction costs. Estimated cost shown at the table 11
Vibration	Sensitive receptors	Ensure mitigation measures are being implemented as per EMP	monthly	Contractor / PIG/ Engineer	Part of construction or supervision costs
Re-vegetation	Bridges location	Monitoring of progress of revegetation activities as per EMP	Ongoing	PIG, Engineer	Part of Construction and supervision cost
Impacts to Community	Access road and sites surroundings	Consult with Local authorities and community Groups along the alignment monitor environmental concerns	ongoing	Contractor / PIG/ Engineer	Part of construction and supervision costs
Operating Phase during 1 year liability period					
Noise	Sensitive areas (densely settled areas, schools, hospitals)	dB at sensitive areas as per EMP	Twice/year	Contractor, MT, WB	Part of maintenance cost

Parameter	**Location**	**Monitoring**	**Frequency**	**Responsibility**	**Cost**
Air quality	Selected Sensitive receptors	Standard selection of components	Twice/year for	Contractor	Part of maintenance cost
Erosion	Bridges and road surroundings	Visual assessment of erosion resulting from project	Ongoing	PIG / World Bank, MoT and regional road departments	Part of maintenance cost
Water quality	Road corridor	Visual assessment of increased suspended solids from areas of erosion	Twice/year for 3 years or after complaint. Midterm monitoring	PIU /World Bank, MoT and regional road departments	Part of maintenance cost
Road safety	Road corridor	Collect road accident data	Ongoing	Contractor, PIG, MT and relevant Departments	Part of maintenance cost
Re-vegetation	Road corridor	Ongoing monitoring of revegetation asper EMP	ongoing	Contractor	Part of maintenance cost

6.18 Cost of implementation of EMP

The proposed BOQ contains a special item line for Environmental Protection measures. The amount of proposed Environmental Protection budget for 18 bridges makes up $199,000. However, most of the costs associated with implementation of EMP recommendations are part of the cost of other items included in the Tender Contract documents to ensure the implementation of environmental requirements. For example, the installation of septic tanks in construction camps is an environmental necessity, but not always considering as "environmental costs" (Table 14). The Tender proposals indicate the costs of recommended actions for standard monitoring. Standard and periodic monitoring during the construction period is usually considered as part of normal engineering practice and included in the project budget. Supervision and monitoring of the activities of the Contractor and reporting are the Engineer's usual responsibility, and is not an additional expense item.

However, the most obvious mitigating actions may require expenditures. These include training costs in accordance with the requirements of EMP, basic monitoring of key environmental parameters and periodic monitoring and reporting during the construction period .

Table 11 The proposed mitigation measures under EMP with cost included into appropriate items of BOQ

Activity/article	Frequency	Source of payment
1. selection of paces for quarries	Once	Included in the project budget
2. selection of places for borrow pits	Once	Included in the project budget
3. selection of places for asphalt concrete mixing plant	Once	Included in the project budget
4. selection of places for construction camp	Once	Included in the project budget
5. Enterprise resource planning	Once, part of the EMPC	EMPC budget
6. Anti-erosion measures	Once	Included in the project budget
7. Stabilization of slopes	Once	Included in the project budget
8. Hydrology	Once	Included in the project budget
9. Safety training	Every month; Contractor and Safety Specialist	Part of the construction cost
10. Protective clothing for	Once	Part of the Construction

workers		cost
11. First aid	Once	Part of the Health &Safety budget
18. Trash cans		Part of the mobilization budget
19. Waste removal	Construction period	Part of Construction cost
20. Cleaning of construction sites	Once	Part of the construction project
21. Environmental permitting	Once	Part of the budget of the construction work
22. The embankments landscaping	Construction period	Part of the budget of the construction work
23. Removing fuel spills	At each place of storage of hazardous liquids (about 10)	Part of the budget of the construction work
24. Septic	Once in one place.	Part of the budget of the construction work
25. Temporary drainage / Irrigation	Construction period	Included in the budget of the construction project
26. Watertight pallets (for mechanical yards, storage of bitumen, etc.))	In each construction camp	Included in the budget of the construction
28. Tarpaulin	Once	Included in the budget of the construction project

The following tables show the estimated Environmental protection expenses which should funded from the lump sum from Environmental Protection item:

Description	Unit	Quantity	Rate	USD
Planting of trees maintenance and watering	Piece	1,200	25	30,000
Protection of trees during construction period	L.S			3, 000
Preparation of Contractor's SSEMPs	piece		1,000	18, 000
Dust suppression measures, during dry period (three months)	Month	3	10,000	30,000
Contractor's Environmental Specialist	Man-month	72	1,000	72,000
Environmental @Safety trainings	event	6	1,000	6,000

Unexpected and emergency mitigation measures				40,000

Table 12 Estimate for basic monitoring

1. Water quality	Once at designated locations before construction (the number of sections will be installed)	Once	1,800.0$
2. Air quality	Once at designated locations before construction (the number of sections will be installed)	Once	1,800,0$
1. Noise quality	Once at designated locations before construction (the number of sections will be installed)	Once	540,0$.
Construction Phase			
2. Monitoring of water quality	One time in six months(totally 4 times)		1,800$ x 4 = 7,200
3. Air Quality Monitoring	One time in six months(totally 4 times))		1,800$ x4 = 7,200$
3. Noise Monitoring	One time in six months(totally 4 times)		540,0$ x 4 = 2,160.00$
Total			20,700$*

*This is an approximate estimate. The actual need in instrumental monitoring for the individual bridges will be determined in communication with the Construction Supervision Company and Client and will depend on situation. For example water quality monitoring schedule will depend on availability of water at the working site.

Table 13 Estimated Cost of mitigation measures under EMP in the US dollars for individual bridges (including approach road)

Действие	**B-1**	**B-2**	**B-3**	**B-4**	**B-5**	**B-6**	**B-7**	**B-8**	**B-9**	**B-10**	**B-11**	**B-12**	**B-13**	**B-14**	**B-15**	**B-16**	**B-17**	**B-18**	**Total Cost, $**
1. Preparation of SSEMP	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	**800.0**	14,400.0
1.Local environmentalist Instrumental monitoring aim at gathering basal data	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	**500.0**	9,000.0
TOTAL	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**1,300.0**	**23,400.00**

Table 14 Estimated base-line monitoring cost within EMP

Activity/item	B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-10	B-11	B-12	B-13	B-14	B-15	B-16	B-17	B-18	Total Cost. $
1. Water quality	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	1,800
2. Air quality	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.00	100.0	100.0	100.0	100.0	100.00	100.00	100.00	**1,800.00**
4. Noise level	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	540
SUB-TOTAL	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	230.0	4,140
Monitoring during construction on bi-annual basis (totally 4 times for each bridge)																			
Monitoring of water quality. once in six months totally 4 times for each bridge	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	7,200

1. Monitoring of air quality. once in six month	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	7,200
2. Monitoring of noise level, once in three months	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	2,160
SUB -TOTAL																			16,560
TOTAL																			20,700

Appendix I Guidelines to Preparation of Site-Specific Environmental Management Plan

General Requirements to SSEMP

The World Bank Operational Policy OP.4.01 requires preparation of Environmental Management Plan (EMP) for the projects supported by the Bank. This Document provides recommendations to assist Contractor in preparation of site specific EMPs (SSEMP) based on the Annex C OP. 4.01 Environmental Management Plan. The sample of EMP also provided in the Environmental Management Framework (EMF) document prepared for the Project (available at the website) at the design stage. The project EMF contains the detailed description of the site-specific Environmental Monitoring Plan (EMP) content.

Contractor shall prepare Site-Specific Environmental Management Plan (SSEMP) for Construction period within 45 days after Contract award. SSEMP should describe how the general EMP prepared as part of Environmental Management Framework (EMF) will be implemented in the conditions of particular construction site. A project's SSEMP should consist of the set of mitigation, monitoring, and institutional measures to be taken during implementation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The Supervision Consultant should review the Contractor's SSEMP and submit it to PIG/PIU for further review and approval by Environmental Protection Authority in the area (district level) of project implementation.

The SSEMP shall include the following parts:

A) General Project and Site Information

B) Environmental Safeguards Information

C) Management Arrangements

D) Mitigation Measures

E) Monitoring Plan

The content of SSEMP sections at least include as follows:

A) General Project and Site Information.

This SSEMP section should include information about the Contractor, brief description of project goals, objectives and environmental policy adopted by Contractor. The section should provide:

- A brief description of the project activities and a map showing location of the main project features and auxiliary facilities (borrow pits, construction camp, crashing and batch plants);

- The short specifications of main features of the sub-project including (bridge, access road, bank protection structures) with the design features and specifications of structural components, such as width, length;
- The main types of works to be undertaken (earthworks, demolition of old structures, concrete work, precast concrete etc.);
- Construction schedule with the intended start and completion dates provided;
- Basic information on the environment at these locations should be included as this helps provide the environmental context to which the environmental management plan applies;
- At least several representative photos of the environment existing near the site.

B) Safeguards Information

This section should provide the information on regulatory, legal and administrative network, which serves as a basis for environmental compliance. Accordingly, this section should provide:

- List of applicable laws, standards and policies relating to the project Environmental issues;
- List of necessary licenses and permits required for the project implementation and explaining environmental requirements for the project. Copies of extraction licenses (if applicable), environmental permits (if applicable) and waste disposal permits should be attached to this CCEMP once obtained.

C) Environmental Mitigation (Protection) Plan

The SSEMP should identify feasible and cost effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels. The section should contain description of environmental concerns (issues) and measures to address these concerns. The mitigation measures should be described with the technical details, and relate to following components:

a) Quarry and borrow pit Management including:

- A plan indicating the location of the proposed material extraction;
- Description of good practices for excavation, material storage and transportation;
- Rehabilitation measures to be implemented for the borrow areas and access roads upon project completion;

b) Protection of water quality

This section should provide:

- The description anticipated sources of water pollution and water bodies nearby the project;
- The measures to prevent or otherwise reduce pollution of water sources;

- Procedures and plans for safeguarding aquatic habitats and fish during in-river work (rivers of Vanj, Yazgulem, Bartang and smaller rivers);

c) Noise levels

While it is unlikely that noise and vibration will be an issue due to the large distances between the activities and the communities the Contractor should provide:

- List the main sources of construction noise and nearby receptors;
- Schedule will confine all noise generating work to daylight hours (recommended as 07:00hrs – 19:00hrs) should the community find that any night time operations become a nuisance
- Proof that all equipment is licensed and approved in accordance with National or/and (WHO) standards. This applies to all machinery, vehicles and construction sites where noise and vibration may affect susceptible receptors.

d) Air Pollution Management and Dust Suppression

Air pollution management and dust suppression section should address site –specific air quality control and dust reduction measures, including:

- The sources of air pollution and dust generation;
- Schedule for water spraying on access road and other sources of dust generation at the project facilities;
- Methods of emission control during the work of construction equipment

e) Construction camp

- Layout of the work camp and details of the proposed measures to address adverse environmental impacts resulting from its installation;
- Description and layout of equipment maintenance areas and lubricant and fuel storage facilities including distance from water sources/bodies;
- Description of sewage and septic management plan for provision of sanitary latrines and proper sewage collection and disposal system to prevent pollution of watercourses;
- Procedures for establishing and operating construction camps in order to safeguard nearby communities and environmental resources;

f) Handling complaints

A plan (mechanism and organizational structure) detailing the means by which local people and other project affected persons (PAP) can raise grievances arising from the rehabilitation process and how these will be addressed (e.g., through dialogues, consultations, etc.)

g) Storage of liquid, toxic and dust creating materials

Oil and fuel storage section should include:

- Terms and conditions for safe storage, transportation and usage of oils and fuels, re-filling of equipment and machinery;
- Procedures for minimizing the risk of soil and water contamination and prevention of spillages, including precautionary measures at the filling stations;
- The measures for cleaning of spillages.

h) Waste control and management

- This section should cover all aspects of waste management include but not limited to:
- Sources, types and approximate quantities of anticipated waste generated during project implementation;
- Details of temporary waste storage, waste transfer and pre-treatment prior to final disposal or recycling
- Plan of the locations of for collection of waste and landfills for disposal
- Description of reduce, re-use and recycling methods
- The methods for handling of hazardous and toxic waste

i) Erosion Control Plan

Soil Management Plan detailing measures to be undertaken to minimize effects of wind and water erosion on stockpiles, measures to minimize loss of fertility of topsoil, timeframes, haul routes and disposal site;

j) Responding to the occurrence of disaster

The Contractor's SSEMP should contain procedures for emergency response in the event of accidents or major incidents, in order to safeguard people, property and environmental resources including:

- The list of responsible staff with contact information;
- Details of the spill response;
- Description of emergency equipment available on the site.

k) Biological Environmental

- List the main components of the wild flora and fauna to be affected by the constructional activities;
- The measures to be taken for protection of vulnerable species (if applicable)

l) Rehabilitation Plan

It is the contractor the Contractor‘s responsibility to address site clean-up. All construction sites and work areas should be rehabilitated so that these can be returned as close as possible to their previous uses;

Contractor’s rehabilitation plan should include:

- Procedure for handover, sale or removal of all plants, vehicles and machinery to ensure that no unserviceable items are left on the construction and auxiliary sites;
- Description of the methods of clearance and rehabilitation of construction sites and removal of contractor‘s facilities;
- Removal of waste;
- Stabilization and landscaping of all of the construction sites.

D) Management Arrangement

The section should provide:

- Organizational structure of Environmental management staff, which should identify the personnel engaged into the environmental protection and specific roles and responsibilities of the participants;
- The powers vested in the environmental management staff which would enable them to take urgent, appropriate and direct action to prevent and/or correct disruption to the environment.;
- Frequency, coverage and intent of environmental management meetings together with the rational for attendance;
- The means by which environmental management matters and requirements will be communicated to subcontractors of all tiers;
- Methods of promoting an awareness of environmental protection amongst all persons directly or indirectly associated with the Works
- The methods of stakeholders capacity building;
- Recording system for communication procedures and feedback mechanism

E) Environment Monitoring Plan

This section should;

- Describe the means by which environmental management systems will be supervised, monitored and audited to ensure due compliance with the principles and objectives of the environmental management Plan at all levels of construction;
- Stipulate the period and frequency of monitoring required

- All locations (including but not limited, construction areas, sites areas, plant and equipment areas and Contractor staff office and accommodations) that are directly or indirectly associated with the Contract shall be regularly inspected for compliance with environmental requirements;
- The samples of check-lists

a) Reporting requirements

- Frequency, coverage and intent of regular environmental reports;
- Schedule for preparation and submitting of Environmental Monitoring Reports;
- The brief content of reports;
- Mechanisms of review and approval

Appendix II Public Consultations Matrix

Stage and content of Public Consultation	**Date**	**Location**		Participants*		The main environmental issues discussed
		Town/District	Jamoat	Males	Females	
Initial assessment of social and environmental situation in the project area and preparation of safeguard documentation . Public hearings including open discussion of the issues of concern. Collection of information about environmental concern through the questionnaires and free style interviews with stakeholders	Nov. 24, 2016	Vanj	Teharv	30	15	The environmental questions relating to availability of natural resources, including water, medicine grasses, fire-wood as a source of energy, interaction with wild fauna were included in questionnaire
	Nov. 25,2016		Jovidon	22	18	
	Nov. 26.2016		Yazgulem	25	13	
	Nov.29.2016	Rushan	Dodhudoev	11	15	
Presentation of the draft safeguards documents to local communities (Minutes of meetings No3,4)	Mar. 23, 2017	Vanj	Abdulloev	17	9	PIU Environmental Specialist presented issues included to EMF on the basis of the earlier discussion with communities
	Mar. 24, 2017	Rushan	N. Dodhudoev	48	23	
Official presentation of Environmental Framework Document to the principle stakeholders	April 25, 2017	Dushanbe	MF Building in Dushanbe	19	5	After discussion Environmental Management Framework document was published at website of MF RT.

Meetings of Design Company Environmental Specialists with stakeholders and local communities	July 10-15 2017	Rushan, Murgab	Basid, Alichur	18	7	Re-planting of trees, loss of land, employment of local work force for the project implementation
Meeting with local population and authorities in Rushan district, Basid Jamoat during joint mission of WB with PIU	September 12, 2017	Rushan, Murgab	Basid, Alichur	20	8	Discussion of the site-specific Environmental problems
Public Consultation with affected people and other stakeholders after completion of detailed design with preliminary assessment of loss to affected people. In addition to representative of affected communities 13 of the major stakeholders participated/	April 2018	Vanj	Teharv, Yazgulem	20	15	PIU Environmental Consultant jointly with District's environmental authorities participated in the process/
		Rushan	Dodhudoev	25	14	
Final Public hearing before bidding for construction Contractor	August 23-28 2018	Vanj, Rushan	Teharv, Yazgulem, Dodhudoev	-	-	Planned to finalize outstanding issues

*These figures relates to representatives of nearby communities. Each interviewed represented a household from 2 to 10 people. In addition the other stakeholders including district's and Jamoat's levels environmental and Forestry authorities participated.

Appendix III Application sample for Grievance Redress Mechanism

Sample of Complaint /Request/Proposal of the Project Beneficiaries

To _____

(Chief of Establishment)

Dear _____

(Name of responsible person)

From_____

(Name of applicant)

Living_____

(Address of Applicant)

Application

Me,_____

(Personal detailed information, including home address and occupation)

_____

_____

Purpose of application_____

(Information about the problems and reason)

_____

_____

_____

_____

_____

The methods of solution of problem_____

_____

(ask……, about this or other actions/lack of action…,.propose)

Signature of applicant _____ _____

(Name of Applicant)

_____

(Date)

Telephone_____

E-mail (if available)_____

Location: Project Implementation Unit , 3 Ac.Rajabovs street, Dushanbe

Project Implementation Unit for Access to Green and Rural Development Finance

Contact telephone (992 37) 221 02 34

Fax : (992 37) 221 03 39

Address of representatives of the Project in region _____(filled after determination)

Appendix IV Sample of Construction phase Environmental Monitoring Check-list

Location	Bridge No	Contractor	Date of inspection	Name of Inspector	Reporting Period

Environmental Impact: Check the appropriate column with X or √. If answer *Yes,* please provide explanation and mitigation measures

Type of impact	Yes	No	Location	Proposed mitigation	Mitigated	
					Yes	No
1) **Soil and water pollution (oil spills, chemicals, sediments etc).**						
2) Damage to property or water quality caused by earthworks during construction.						
3) Improper waste management (open rubbish heaps, garbage scattered on the ground and in the water, no proper containers, improper location or lack of toilets).						
4) Open burning at the construction site or facilities						
5) **Excessive emissions from machinery (Visual).**						

6) Excessive dust generation as result of project activities:						
7) Floods, sedimentation and disturbance to irrigation as result of construction activities.						
8) Cutting of the trees and high shrubs						
9) Endangered species reported in vicinity to the project:						
10) Archeological or historical findings:						
11) Disturbance to cultural places and cemeteries:						
12)Usage of pesticides for suppression of mosquitoes/flies;						
13)Damages outside of ROW as result of blasting;						
14) Other impacts noticed:						

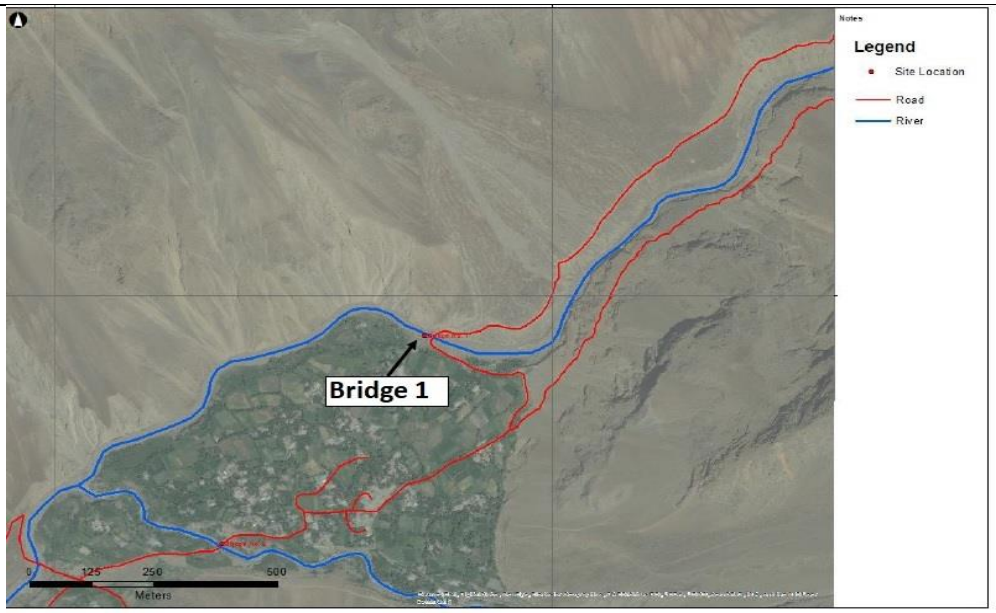
Issues below relate to complaints from the local communities about:						
a) Water quality.						
b)Land acquisition						
c) Air Pollution						
d) Noise.						
e) Odor						
f) Blockage of traffic						
g)Demolition of property						

Appendix V Site specific Environmental Management Profiles for individual bridge sites

Site-Specific Environmental Management Profile

for bridge# 1 over Yazgulom river at Km 28 of road

Dashti Yazgolom-Matravn-Jamaq



Bridge location plan (Source ARUP, 2017)

View from right bank, upstream from the bridge

Basic location and environmental information:

Bridge location	Jamoat Yazgulem, Vanch Disritct
The crossed water body	River of Yezgulem, tributary of Pyanj
The closest villages	Andarbag in about 200 from the bridge , Jamak about 3 km from the bridge
The current state of structure	14m long bridge structure with metal I-beams and wood flooring. The exposed concrete supports foundations are eroded and partly washed out by floods. Dimensions are insufficient for floods causing the further scour of foundations. Access to bridge is complicated due to small turning radius. The bridge does not meet requirements for carrying capacity, peak flood capacity and width.
The designed structure under the project	New bridge 34.1m in length with increased clearance dimensions and improved load capacity with width of road of 8.0m. The bridge will be built about 20-30m upstream from the existent bridge. Totally, 288(125+163)m of approach road from will be built according to national standards and paved with cold asphalt-concrete mixture.
Socio-economic Significance	The bridge is a part of road and the only link connecting the villages in the upper part of Yazgulem valley including village of Jamak with the middle/lower parts of valley and Dushanbe-Khorog road. No alternative access road exist. This is the most upper bridge in valley rehabilitated under the Project.
Topography	The topography at site area is exclusively irregular, rugged terrain with alternation of rocky steep mountainous and deep narrow valley with prominent differences in true altitudes. The Yazgulem valley is limited by Yaszulem and Vanj ranges with true altitudes above 4000 m. The difference between true altitude of ranges and bed of valley is over 2000m. The width of valley ranges from 100 to 500 m. The site is located at altitude of 1891 m above msl. The Andarbag village is situated om the elevated, relatively flat area mainly formed by alluvial fan. Upstream of Bridge 1 the Yazgulom valley is V-shaped in form beingvery narrow. At the bridge location slopes are very steep on the right bank side of the valley. On the left bank is an alluvial fan of approximately 0.3 km² on which Andarbag village is sited, with more moderate slopes, but with a steep step adjacent to the river where the river has incised into the alluvial fan.

Geology	The bridge surrounding composed by Cambrian and Ordovician metamorphic and sedimentary rocks including schists, marble, limestones and sandstones. Nearby the bridge location there are quaternary sediments consisting of a mixture of glacial, talus and alluvial deposits.
Sensitive area	The closest residential settlement- village of Argandab is located outside of direct visibility from the site. Therefore direct interaction with sensitive areas such as residential houses, schools, hospitals, etc. is not anticipated However the straight distance to the closest houses is less than 200m, therefore the closest houses should be considered as sensitive points.
Flora and Fauna	The environmental survey confirmed that no habitat for rare and endangered species exists in the bridge area. On the left bank of river upstream from the bridge there are some willow, wild cherry trees and shrubberies. According to local people the encounter with wild animals including bears and wolves is also possible although unlikely. (photo below)
Land Use	The bridge surroundings are mainly barren, and used occasionally for grazing. Total estimated land take for the construction purposes is 0.56 ha

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	Proposed mitigation
Water pollution	The river of Yesgulem is the major water body with permanent and relatively stable water flow which may be used downstream for domestic and drinking purposes. Therefore the special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m) and apply protection measures provided by EMP. (EMP 6.3, 6.4, 6.5) Technical Specifications (Section 109).
Noise	Due to natural geomorphological barrier noise is not anticipated to be a major problem. However, as direct distance to the closest residential houses is less than 200 m the work schedule should be discussed with residents. The noisy activities should be avoided at night time. EMP table 9 (28).
Dust abatement	Contractor should strictly follow the regulations relating to dust control and appropriate measure described in EMP to ensure observations of work health and safety standards. The water should be sprayed at the approach road and bridge site during dry and windy weather. Contractor should regularly communicate to communities about this issue. (EMP table 9 (28,30)
Safety	The special precaution measures should be taken during the work in vicinity to

	the river and in vicinity to the steep slopes. The falling to water may be very dangerous especially in the peak flood time. The steep rocky slopes on the right bank are not sufficiently stable and may generate collapses, rockfalls and landslides. The slopes should be cleaned from the outstanding and unstable stones before excavation. Special care is needed during the excavation and blasting due to high and unstable slopes
Property encroaching	The fenced area occupied by the garden with rare trees adjoins the construction site at the left bank. Before commencement of work confirm the land limits acquired for the construction work.
Loss of trees and shrubs	Shrubbery and immature trees along the approach road upstream the bridge which can be impacted by the construction activities shown in red oval. This vegetation is not only may have commercial value for residents, but also play important role in bank protection. Contractor should minimize impact by the proper planning of earth and slope protection work. The construction of approach road may also require cutting of few shrubs and trees. Before cutting jointly with residents designate the trees to be cut. Treat the remained trees and shrubs according to Specification 401.03 Construction requirements. Planting of trees and shrubs should be undertaken according to Specification 1003.01. For trees maintenance follow the provision of Specification set forth in Section 108 " Contractor's Responsibility for Work"
Protection of wildlife	Contractor should train people about the ban for hunting and prohibition of unauthorized use of weapon. Contractor should train people to safe behavior in the case of unexpected encounter with the wild animals. Unattached left food may attract the wild animals.
Interruption of traffic	As an existent bridge is the only connection link for the villages located upstream it should be preserved until the new bridge will be operational. The Contractor shall minimize and discuss with local resident any interruptions of traffic which may happen during the construction of access road. Wherever possible the temporary bypass access way should be provided.
Contractor's SSEMP	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract.

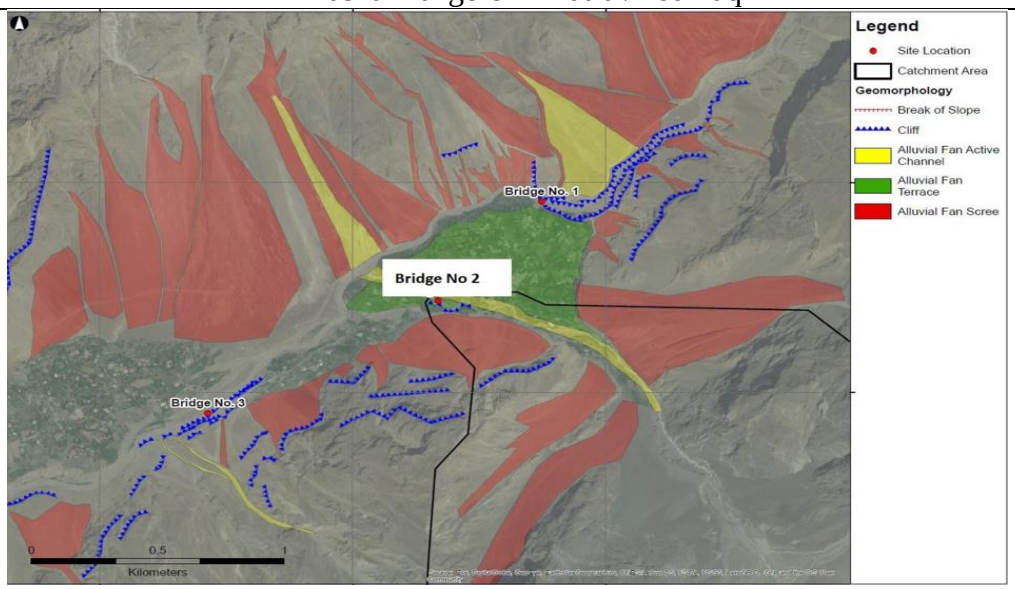
Photo illustrating the environmental issues of the site:

Shrubbery and immature trees along the approach road upstream the bridge which can be impacted by the construction activities shown in red oval..

Steep instable slopes may cause landslides, fall of stones and snow avalanches in the winter time. All precautionary measures should be taken during a work under slope in the conditions of the limited space/

Site-Specific Environmental Management Profile for

bridge 2 over Camochdara river at km 26 28 of road
Dashti Yazgolom-Matravn-Jamaq



Geomorphological Plan of bridge location

View from the left bank of Camochdara

Basic and environmental information:

Bridge location	Bridge connects the villages Andarbag and Lyangr in Jamoat Yazgulem, Vanch Disritct
The crossed water body	River of Camochdara, left tributary of Yezgulem. The river flows at the western part of alluvial fan where Andarbag village is located.
Socio-economic Significance	The bridge is located on the only road connecting the villages in the upper part of Yazgulem valley with the middle/lower parts of valley and Dushanbe-Khorog road. No alternative access road exist.
The closest villages	Bridge connects Andarbag and Lyangar villages located at opposite banks of Camochdara river. The approach road passes through the residential area.
The current state of structure	10m in length simple beam-type bridge with span built from two steel I beams and wood flooring. The bridge structure with eroded and partly washed out foundations has insufficient dimensions for floods.
The structure designed under the project	The 19,1 m bridge in total width of 6.9m will ensure the sufficient dimensions and better load capacity to allow heavy trucks. The site design includes 210(120+90) m of approach road in width of 8,0 from both sides will be built according to national standards and paved with cold asphalt-concrete mixture. The bank protection will provided from both sides. The bridge will provided with railings for pedestrians safety.
Topography	The area terrain is irregular and mountainous with peaks at altitudes of about 4000 and valley bed about 2000m (above msl) The surroundings in the vicinity of the bridge site and approach road are mainly rolling. The elevated alluvial fans formed by the numerous mud-stones streams originated from Camochdara valley, as well as by rockfalls and landslides. The true altitude at the bridge location is 1,891m.
Geology	The bridge surrounding composed by Cambrian and Ordovician metamorphic and sedimentary rocks including schists, marble, limestones and sandstones. The bridge is located at the alluvial fan originated from Camochdara river. The giant boulders scattered around indicate the glacial nature of deposits.
Sensitive area	The closest residential settlements- villages of Argandab and Lyangar. The several residential houses located on the both sides are primary potential sensitive receptors, of the project activities. Other sensitive areas such as school, clinic are located at the significant distance.

Flora and Fauna	The environmental survey confirmed that no habitat for rare and endangered species exists in the bridge area. The bridge located within the village and an encounter with wild animals is unlikely. The several private trees grow within construction limits.
Cultural and Historical Heritage	The cemetery is available at the left side of approach road from the Lyangar side. It is fenced and outside of site limits however sufficiently close. Contractor should treat this location with respect and take special care to avoid disturbance.
Land Use	The part of lands acquired for construction is used for gardening and grazing. The three families claimed the property including 6 trees and semi-destroyed mill within construction limits.

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	Description and proposed mitigation
Water pollution	The river of Camochdara is a left tributary of Yesgulem with significant seasonal variations of water flows. At the certain periods of year the river may serve as a source of water for daily needs and even for drinking. Therefore the special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m). (EMP 6.3, 6.4, 6.5) Technical Specifications (Section 109).
Noise	As the direct distance to the closest residential houses is less than 100 m the work schedule should be discussed with residents. The noisy activities should be avoided at night time. The Contractor should comply with noise limits set for residential areas according to EMP. Table 9 (26,27)
Dust generating	Contractor should strictly follow the regulations relating to dust control and appropriate measure described in EMP to ensure observations of work health and safety standards especially taken into account that the work will be undertaken within the village . The water should be sprayed at the approach road and bridge site during dry and windy weather. The water should be also sprayed on roads inside the village which are used by the Contractor. Contractor should regularly communicate to communities about this issue. EMP. Table 9 (28,30)
Safety	The special precaution measures should be taken during the work in vicinity to the river. The falling to water may be very dangerous especially in the peak flood time. The steep rocky slopes on the right bank are not sufficiently stable and may generate collapses, rockfalls and landslides
Property encroaching	The property taken for construction needs should be fully compensated before Contract award. However, before commencement of work Contractor should confirm the land limits acquired for the construction work. It is recommended to plant new trees instead of removed in cooperation with local communities.

Protection of wildlife	The bridge is located in the middle of residential area. The encounter with wild animals is unlikely.
Loss of trees and shrubs	The upgrade of the road will require removal of trees within the designed "right of way". The Contractor should strictly observe the designed limits. The damaged property should be fully compensated before commencement of work, however Contractor should assist in re-planting of trees where it is possible or undertake compensatory planting of new trees. Before cutting jointly with residents designate the trees to be cut. Treat the remained trees and shrubs Specification 401.03 Construction requirements. Planting of trees and shrubs should be undertaken according to Specification 1003.01. For trees maintenance follow the provision of Specification set forth in Section 108 " Contractor's Responsibility for Work" The planting of new trees should be conducted strictly in accordance with Project specifications section 1003 Planting trees, shrubs and ground cover.
Interruption of traffic	As an existent bridge is the only connection link for the villages located upstream it should be preserved until the new bridge will be operational. The Contractor shall minimize and discuss with local resident any interruptions of traffic which may happen during the construction of access road. Wherever possible the access way should be provided.
Contractor's SSEMP	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract.

Photos illustrating Environmental issues

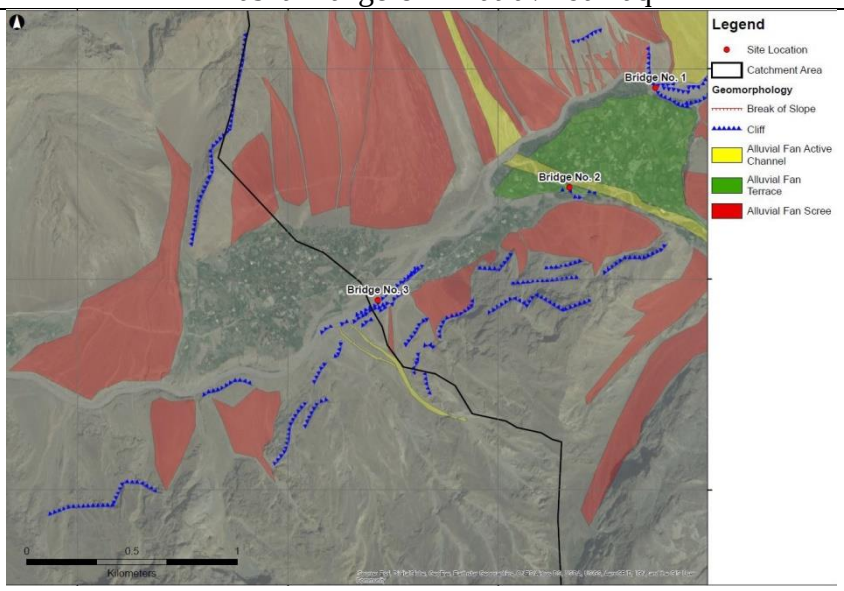
The fruit trees and fenced area along the approach road.

View from the existent bridge to semi-destroyed water mill and power-line pole. The water mill nearby the bridge was destroyed by mud-stream. In planning of work and allocation of utilities Contractor should avoid storage of any materials and equipment nearby the river.

Relocation of power line should be conducted in close cooperation with community, competent electricity authority and other stakeholders and completed in short time.

Site-Specific Environmental Management Profile

for bridge# 3 over Yazgulom river at Km 24 of road
Dashti Yazgolom-Matravn-Jamaq



Bridge location geomorphologic map (ARUP, 2017)

View from the left bank, downstream from the bridge

Basic site and environmental information:

Bridge location	Jamoat Yazgulem, Vanch Disritct
The crossed water body	River of Yezgulem, tributary of Pyanj
The closest project bridge	Bridge No 1 and 2
The closest villages	Vishkharv, Andarbag
The current state of structure	Cable strayed 26m bridge with the width across the pylons axes of 4.05m. The bearing cable is worn. The bridge dimensions are insufficient with the supports foundations eroded by floods.
Socio-economic Significance	The bridge is the only link connecting the villages in the upper part of Yazgulem valley including Jamak, Andorbak and Lyangar with the middle/lower parts of valley and Dushanbe-Khorog road. No alternative access road exist. This is the most downstream bridge in valley rehabilitated under the Project.
The new structure designed under the project	The new designed 31.1 m bridge will be located 10-20 m upstream from the existent bridge. The new bridge will have better dimensions and improved carrying capacity. The design includes 254(127+127) m access road improved and bank protection from both sides.
Topography	The topography of the site is exclusively irregular, the steep rocky cliff limits the access road at the left bank, while the right bank is a relatively flat fragment of ancient alluvial fan, covered by numerous boulders falling from the side slopes or brought by the seasonal streams. The true altitude of the bridge site is about 1825m (above msl).
Geology	The bridge surrounding composed by Cambrian and Ordovician metamorphic and sedimentary rocks including schists, marble, limestones and sandstones. Nearby the bridge location there are some quaternary deposits consisting of a mixture of glacial, talus and alluvial deposits.
Sensitive receptors	The closest residential settlement- village of Vishkharv is located at the significant distance from the bridge (over 200m). Therefore direct impact to sensitive areas such as residential houses, schools, hospitals, etc. is anticipated to be minor.
Flora and Fauna	The environmental survey confirmed that no habitat for rare and endangered species exists in the bridge area. The vegetation cover is practically absent at the bridge area. According to local people the encounter with wild animals including bears and wolves is possible although unlikely.

Land Use	The bridge surroundings are mainly barren, and used occasionally for grazing. The adjoining area at the right bank of the river occupied by old graveyard.

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	**Explanation and proposed mitigation**
Cultural Heritage(old cemetery)	Initially It was expected that the project would disturb old cemetery located at left bank of the river along the approach road and require re-location of the several graves. However, the optimization of design allowed the selection of alternative avoiding the disturbance of graves. Non-the less Contractor shall take into consideration that the graveyard is not fenced and locations of graves are not always marked clearly (photo below). In addition the residents said that some remains may be under existent access road. Therefore, Contractor shall take a special care while working in this area, keep permanent communication with community about this issue and strictly observe the chance find procedure forth set in EMP. (EMP 6.6 "Chance Find Procedure")
Water protection and erosion control	The river of Yesgulem is the major water body with permanent and relatively stable flow and may be used for drinking purposes downstream. Therefore the special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m). (EMP sub-section 6.6)
Noise	The direct distance to the closest residential houses is over than 200 m. However, the section of approach road designed to be rehabilitated ends nearby the residential houses. Therefore the noisy activities for the rehabilitation of access road should be avoided at night time (EMP Table 9 (26,27).
Dust Suppression	Contractor should strictly follow the regulations relating to dust control and take appropriate measures described in EMP to ensure observations of work health and safety standards. The water should be sprayed at the approach road and bridge site during dry and windy weather. Contractor should regularly communicate to communities about this issue.
Safety	The special precaution measures should be taken during the work in vicinity to the river and under the steep slopes. The falling to water may be very dangerous especially in the peak flood time. The steep rocky slopes on the right bank are not sufficiently stable and may generate collapses, rockfalls and landslides. The landslides regularly occur near left abutment. Special care is needed during the excavation and blasting.
Property encroaching	There are not property issues for this bridge, except the old graveyard discussed above
Protection	Contractor should train people about the ban for hunting and prohibition of

of wildlife	unauthorized use of weapon. Contractor should train people to safe behavior in the case of unexpected encounter with the wild animals. Unattached left food may attract the wild animals.
Interruption of traffic	As an existent bridge is the only connection link for the villages located upstream it should be preserved until the new bridge will be operational. The Contractor shall minimize and discuss with local resident any interruptions of traffic which may happen during the construction of access road. Wherever possible the by-pass access road should be provided.
Contractor's SSEMP	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract.

Photo illustrating environmental & Safety issues:

Old graveyard along the approach road is not fenced and marked clearly. Contractor should be extremely careful working at this section. The local religious authorities and representatives of community should be invited to mark the borders of graveyard where possible. Strictly follow the chance find procedure.

The steep rocky slope on opposite side causes localized landslides and fall of rock making work nearby potentially dangerous. Contractor should be extremely careful while working in dangerous zone. The best personal protective equipment should be used. Only necessary people

and equipment should be at the dangerous zone during the work.

Site-Specific Environmental Management Profile

For bridge# 4 over Udob river at Km 31
of Vanj-Dursher road

Bridge location plan(source ARUP, 2017)

View from the left bank, downstream from the bridge

Basic site and Environmental Information:

Bridge location	**Jamoat Teharv, Vanch Disritct**
The crossed water body	River of Udob, right tributary of Vanch river
The closest villages	Udob, Teharv
The current state of structure	The mudflow washed out the permanent bridge and nearby structures. Currently the temporary 5m bridge with concrete supports serves for crossing. During the peak flow season the river channel is overwhelmed. The foundations of 5m bridge are eroded and dimensions are insufficient for floods. The bridge is unsafe for crossing, especially by heavy trucks.
Socio-economic Significance	The bridge connects the villages in the upper part of Vanch valley. No alternative access road exist. This is the most upper bridge in Vanch valley rehabilitated under the Project.
The bridge designed under the project	The new 25m bridge in width of 6.9m, with 4.5 in width carriageway and sidewalks from both sides will be located 10-15m downstream from the existent bridge. The design includes access roads 321(152+169)m of access road improvement to meet V-category standards and bank protection.
Topography	The watershed area include the steep mountainous ranges with peaks of up to 5,963m and wide bed of Vanj Valley at altitude of about 2,000m. The altitude of site is 2,065m. The topography of the site is rolling to flat. The width of Vanj valley in this section is about 1.5 km.
Geology	The bridge surrounding composed by quaternary deposits consisting of a mixture of glacial, talus and alluvial deposits.
Sensitive receptors	Two settlements- villages of Udob and Teharv located nearby the project site on the opposite banks of the river. The distance to the closest of sensitive receivers (residential houses) is less than 200m. There are several commercial buildings nearby which are currently non fully operational.
Flora and Fauna	According to local communities the encounter with wild animals is unlikely. However, The spots of natural vegetation including the trees and high brushes grow at the bridge surroundings.
Land Use	The adjoining area at the right bank of the river occupied by commercial buildings, houses, shrubberies and planted trees.

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	Description and proposed mitigation
Water quality and erosion	The river of Udob is the side tributary of Vanj river with significant and abrupt variations of the flow and risk of mud-flows. The special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m)
Noise	The direct distance to the closest residential houses is less than 200 m. Therefore, the noisy activities during construction should be avoided at night time. The work schedule should be agreed with the local communities. EMP table 9 (28)
Dust generation	Contractor should strictly follow the regulations relating to dust control and appropriate measure described in EMP to ensure observations of work health and safety standards as the work will be undertaken within the village . The water should be sprayed at the approach road and bridge site during dry and windy weather. Contractor should regularly communicate to communities about this issue.
Property encroachment	Four households claimed the property within the construction limits of the site, including the trees and stone wall. All property will be fully compensated before the work commencement. However, Contractor should follow this issue and keep communication with communities to avoid unauthorized encroachment
Loss of trees and bushes	In addition to private planted trees to be removed under the project there are several wild trees within the construction limits. These are small immature bush associations of willow (Salix turanica, Salix shunganica) and common sea buckthorn (Hipophae rhamnoides). The removal of these stands was agreed with the local Department of Environmental protection, however Contractor should take measures to minimize the cuttings. Before cutting jointly with residents designate the trees to be cut. Treat the remained trees and shrubs according to Specification 401.03 Construction requirements. Planting of trees and shrubs should be undertaken according to Specification 1003.01(planting trees, shrubs and ground cover). For trees maintenance follow the provision of Specification set forth in Section 108 " Contractor's Responsibility for Work"
Interruption of traffic	The existent bridge should be preserved until the new bridge will be operational. The Contractor shall minimize and discuss with local resident any interruptions of traffic which may happen during the construction of access road. Wherever possible the by-pass access road should be provided.
Loss of cultural Heritage	The cemetery is available at the left side of approach road from the Teharv side. It is fenced and outside of site limits however sufficiently close. Contractor should treat this location with respect and take special care to avoid disturbance.
Site-specific Health and safety issues	The river hydrological regime indicates very significant increase in water flow during flood periods. Such flood in 2015 destroyed significant quantity of property on the banks including gas- filling station. Contractor should be very careful even with temporary allocation of facilities nearby the river channel
Contractor's	The Contractor shall review attached EMP and prepare its own SSEMP for the site in

SSEMP	accordance with prepared instruction with 45 days after award of Contract.

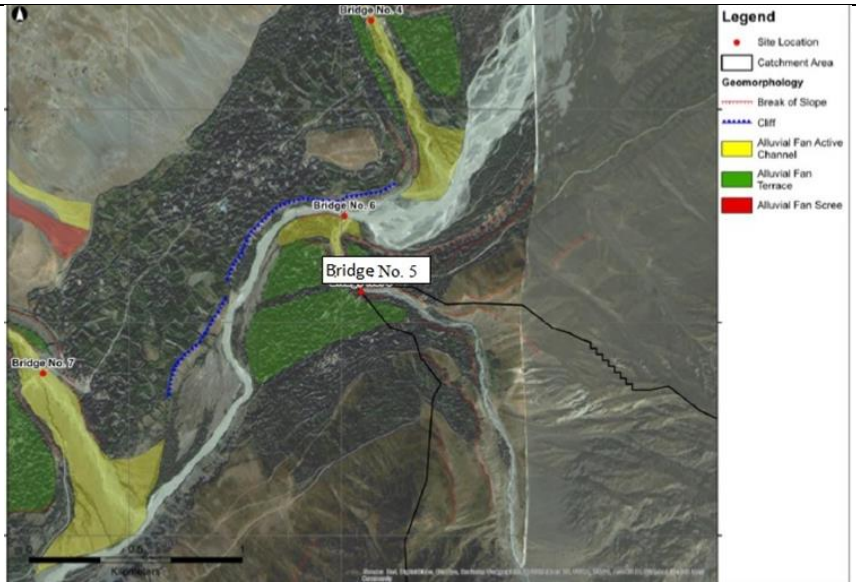
The photo illustrating the site environmental issues

Riparian shrubbery at the location of new designed bridge. The shrubbery is under subordination of forestry and environmental authority. The cutting of shrubs and trees to clear place for construction of approach road was agreed with the local environmental authority and forestry, The Contractor should clarify and strictly observe permitted limits and agree the use of obtained wood with stakeholders.

The commercial and residential buildings nearby the bridge. On the right there are remains of the filling station destroyed by the mud & stone stream in 2015. The station was at significant distance from the channel of river. In the planning of work the risk of sudden flood should be taken into account. Contractor should avoid placement of facilities, storage areas, containers for collecting of waste nearby the river.

Site-Specific Environmental Management Profile

For bridge# 5 over Chihoh river at Km 4
Teharv-Chihoh-Poimazar road



Geomorphological map of the bridge location (source ARUP, 2017)

View from the left bank, downstream from the bridge. The residential house on the right from the bridge.

Basic Site Information:

Bridge location	**Jamoat Teharv, Vanch Disritct**
The crossed water body	River of Chihoh, left tributary of Vanch river
The closest villages	The site located within village of Chihoh
The current state of structure	The simple 4.1m long beam bridge with width of 5.5m. The span is made from two steel I-beams with concrete support foundations of 2.7m in height. The foundations are eroded by floods and exposed due to insufficient dimensions of the bridge.
Socio-economic Significance	The bridge connects the villages in the upper part of Vanch valley and very important for the development of this remote rural area. Now bridge is not passable for heavy trucks.
New structure designed under the Project	The construction of new 13.1 beam bridge in total width of 6.9m, including 0.75m sidewalks from both sides. The new bridge will be built at the location of old bridge. The design includes 127(74+53)m of access road improvement and bank protection.
Topography	The watershed area includes the steep mountainous ranges with peaks of up to 5,963m and wide bed of Vanj Valley at altitude of about 2,000m. The altitude of site is about 2,060m. The topography of the site is rolling to flat. The width of Vanj valley in this section is about 1.5 km.
Geology	The geology of area includes a series of sedimentary, volcanic and magmatic rocks of various composition and age. The bridge surrounding composed by the Quaternary deposits consisting of a mixture of glacial, talus and alluvial deposits.
Sensitive receptors	The project site location is inside the village of Chihoh. Several residence houses located nearby the project. The school in Chihoh is located in about 250m from the bridge.
Flora and Fauna	The site surroundings is a densely built residential area and wild fauna except small birds is absent.
Land Use	The part of designated Construction site is occupied by the planted trees and stone walls fencing the private gardens and houses

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	**Proposed mitigation**
Cultural	No information about cultural heritage sites within the construction limits is available

Heritage	however Contractor should strictly observe "the chance find procedure"
Water quality and erosion control	The river Chihoh of is the left tributary of Vanch river with significant and often unexpected seasonal variations of the flow. The special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m). (EMP 6.3, 6.4, 6.5) Technical Specifications (Section 109).
Noise	The construction work will be undertaken within the village in close vicinity to the residential houses. Therefore, the noisy activities during construction should be avoided at night time. The work schedule should be agreed with the local communities
Dust suppression	Contractor should strictly follow the regulations relating to dust control and take appropriate measure described in EMP to ensure observations of work health and safety standards especially taken into account that the work will be undertaken within the village . The water should be sprayed at the approach road and bridge site during dry and windy weather. The water should be also sprayed on roads inside the village which are used by the Contractor. Contractor should regularly communicate to communities about this issue. EMP. Table 9 (28,30).
Property encroaching	Four households claimed the property within the construction limits of the site, including the trees and stone wall. The domestic animals are freely roam around the bridge, All property will be fully compensated before the work commencement. However, Contractor should follow up this issue and keep communication with communities to avoid unauthorized encroachment
Loss of trees and bushes	All trees to be removed at the site are private and planted for fruits, timber and fire-wood. Contractor should closely communicate with local communities during the preparatory work to avoid any damage outside the construction limits. Before cutting jointly with residents designate the trees to be cut. Treat the remained trees and shrubs according to Specification 401.03 Construction requirements. Planting of trees and shrubs should be undertaken according to Specification 1003.01(planting trees, shrubs and ground cover). For trees maintenance follow the provision of Specification set forth in Section 108 " Contractor's Responsibility for Work"
Disturbance to local communities	Due to closeness of the site to the dwelling houses and lack of free space Contractor should minimize the disturbance to the communities. It is strongly recommended to set a work camp and other facilities outside the villages. The containers for collecting of waste should be provided at the site and waste should be brought out from the site on the regular basis.
Interruption of traffic	The location of existent bridge is the only option for construction of new one. Therefore the old bridge structure should be dismantled before the commencement of construction of new bridge. Before the commencement of construction activities Contractor shall prepare by-pass and maintain it during the whole construction period. It is suggested that the frames of existent bridge may be used construction of temporary driveway. The Contractor shall minimize and discuss with local resident any interruptions of traffic which may happen during the construction of access road.
Contractor's SSEMP	The Contractor shall review generic EMP prepared as part of design and prepare its own SSEMP for the site in accordance with instruction included in EMP

	within 45 days after award of Contract (EMP Table 9.(1).)

The photos illustrating environmental issues at the site

Several of willow*(salix)* trees planted by the local communities should be removed for construction of new structure and bypass road. Contractor should minimize the impact to trees by the proper planning of work and assist in re-planting to local communities if it is possible.

The site is within a densely populated area and even domestic animals freely roaming along the bridge and approaches. Contractor should be in permanent communication with community through the meetings with stakeholders and Grievance Redress Mechanism

Site-Specific Environmental Management Profile

for bridge# 6 over Vanj river at km 2+
on the Tekarv-Chihoh-Poimazor road

Bridge Location Plan

View from the left bank, downstream from the bridge

Basic site and environmental information:

Bridge location	Jamoat Tekharv , Vanch Disritct
The crossed water body	River of Vanj, tributary of Pyanj river
The closest villages	Teharv, Chihoh
Socio-economic Significance	The bridge is the only link connecting the villages in the upper part of Vanch valley with the middle/lower parts of valley and Dushanbe-Khorog road. No alternative access road exist.
The current state of structure	Cable strayed 36m bridge with 5.0m in width supports. The left tributary river of Chikhoh joins river of Vanj about 150m up from the bridge location and during floods washes out the existent approach road. The bridge pylons skewed, probably because of collision with heavy vehicle, and not subject to rehabilitation. Supports foundations are eroded and bridge dimensions insufficient for floods. Access road improvement and riverbank protection is required
The structure designed under the project	The new structure designed under the project comprises 61.1 m cable strayed bridge with suspension system consisting of two carrying cables(d76mm) and improvement of 301(161+140)m of approach road with retaining walls. The design also includes construction of bank protection. The new bridge structure will ensure the sufficient dimensions, higher load capacity and stability of the bridge. The bridge will be built at the location of existent bridge however, the crossing of river channel will be undertaken under different angle.
Topography	The width of Vanch valley is about 1.5 km in the site area. The topography of the site is irregular and mainly rolling. The right bank of Vanj river is a steep wall elevated by about 50 m in height compared to the modern channel of river and composed by glacial deposits including large boulders the current channel of the Vanch river. The left t bank is relatively flat fragment of ancient alluvial fan, covered by numerous boulders falling from the side slopes or brought by the seasonal streams. The bridge location altitude is about 2000 above msl.
Geology	The geological composition of area includes a set of sedimentary, volcanic and magmatic rocks of various age. The bridge surrounding composed by Quaternary deposits consisting of a mixture of glacial, talus and alluvial deposits.
Sensitive receptors	The closest residential settlements- villages of Tekharv and Chihoh are located at the significant distance from the bridge (over 200m). Therefore, direct impacts to sensitive areas such as residential houses,

	schools, hospitals, etc during construction is not anticipated.
Flora and Fauna	The environmental survey confirmed that no habitat for rare and endangered species exists in the bridge area. Stands of immature trees and bushes grow at the banks of river, near the bridge location. However, according to local people the encounter with wild animals including bears and wolves is also possible although unlikely.
Land Use	The banks of river covered by shrubbery the surroundings are mainly barren, and used occasionally for grazing.

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	Proposed mitigation
Water pollution	The river of Vanch is a major water body with permanent and relatively stable water flow and may be used by the downstream communities for drinking. Therefore the special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m) (EMP 6.5)
Noise	Due to significant distance to sensitive points noise is not anticipated to be a major problem. The direct distance to the closest residential houses is over than 200 m. (EMP Table 9(26)).
Special Health and Work SafetyIssues	The special precaution measures should be taken during the work in vicinity to the river. The falling to water may be very dangerous especially in the peak flood time. The steep high slopes on the right bank are not sufficiently stable and may generate collapses, rockfalls and landslides. The landslides regularly occur near left abutment. Therefore, the safety measures for work in vicinity to unstable slopes should be strictly observed (Sub-section 6.7) .
Property encroaching	There are not property acquisition issues for this bridge.
Cultural Heritage	No information about cultural heritage sites within the construction limits is available however Contractor should strictly observe “the chance find procedure”(EMP 6.6)
Protection of wildlife	Contractor should train people about the ban for hunting and prohibition of unauthorized use of weapon. Contractor should train people to safe behavior in the case of unexpected encounter with the wild animals. The left food may attract the wild animals. (EMP Table 9(10).
Protection	There are riverbank shrubs and immature trees growing from both sides of river.

of vegetation	The selected alternative reduces significantly the needs in cutting of vegetation for clearance of the site. However, Contractor should take all precautionary measures to avoid unnecessary cutting of vegetation and minimize the damage to vegetation during construction of new bridge and dismantling of old structure. Before cutting jointly with forestry representatives designate the trees to be cut. Treat the remained trees and shrubs according to Specification 401.03 Construction requirements. Planting of new trees should be agreed with forestry. Planting of trees and shrubs should be undertaken according to Specification 1003.01(planting trees, shrubs and ground cover). For trees maintenance follow the provision of Specification set forth in Section 108 " Contractor's Responsibility for Work"
Interruption of traffic	As an existent bridge is the only connection link for the villages located upstream and relocation is not feasible, Contractor should build temporary 18m bridge with by-pass road before commencement of the construction at the site. The Contractor shall minimize and discuss with local resident any interruptions of traffic which may happen during the construction of access road. Wherever possible the by-pass access road should be provided.
Contractor's SSEMP	The Contractor shall review generic EMP prepared as part of design and prepare its own SSEMP for the site in accordance with instruction included in EMP within 45 days after award of Contract. EMP .Table 9 (1)

The photo illustrating environmental issues:

Riparian shrubberies at the opposite side of the river,. The approach road from the right passes

along the steep slope composed by unstable material containing many of large boulders. Contractor should strictly follow to safety regulations relating to the risk of landslides and rockfalls.

Site-Specific Environmental Management Profile

for bridge # 7 over Obi-Sed river at Km 27
of the road Vanj-Dursher

Bridge location plan

View from the left bank, downstream from the bridge(the designed location of new bridge).

Basic and Environmental Information:

Bridge location	Jamoat Teharv, Vanch Disritct
The crossed water body	River of Obi-Sed, right tributary of Vanch river
The closest villages	Tekharv and Sed
Socio-economic Significance	The bridge connects the villages in the middle part of Vanch valley and very important for the development of this remote rural area.
The current state of structure	Two-span bridge is in length of 24m. The main spans made of two steel I beams with the carriageway paved by orthotropic material. Pavement is fractured and deeply deformed. Left bank support is inclined along the flow because of intense scouring. The support foundations rotated and bared by erosion. Currently, they are in critical state requiring urgent protection.
The Structure designed under the project	The project envisages construction of new 25.1m bridge with 4.9 m carriageway and 0.75m sidewalks from both sides. The design also comprises rehabilitation of 584m of approach road(160m from Sed site and 324m from Tekharv side) and 150m of bank protection(76 m on the left bank+74m on the right bank).
Topography	The topography of the site is rolling to flat. The width of Vanj valley in this section is about 1.5km.
Geology	The bridge surrounding composed by quaternary deposits mainly formed by alluvial fan and movement of glacier).
Sensitive receptors	The closest residential settlement- village of Sed is located at the significant distance from the bridge (over 200m). However, the end of approach road are sufficiently close to several residential houses. Therefore these houses are define as sensitive points in term of direct short-terms impacts from construction activities.
Flora and Fauna	Several riverside stands of the trees and bushes (Hippóphaë, Salix), grow in vicinity to the bridge, within the flood channel of the river, however outside of construction limits. Few bushes grow at the location of designed new bridge and subject to removal. The encounter with the wild fauna is unlikely,
Land Use	The lands are mainly barren and used by locals for occasional grazing

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	**Proposed mitigation**
Cultural	Sites of cultural or/and historical significance were not revealed at the bridge surroundings during the survey. Due to rich historical background of the area

Heritage	Contractor shall strictly observe the " Chance find procedure"(EMP 6.7)
Water quality and erosion	The river of Obi-Sed is a left tributary of Vanch river with significant and abrupt seasonal variations of the flow. The special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m) (EMP 6.5).
Noise	Contractor should strictly follow the regulations relating to noise control and appropriate measure described in EMP to ensure observations of work health and safety standards. The work schedule for rehabilitation of approach road should be agreed with the local communities. Contractor should avoid noisy activities at night time. (EMP Table 9(26)
Dust suppression	The dust control measures should ensure the compliance with work health and safety standards. During the dry weather the dust should be mandatory controlled by the spray of water. Outside receptors sensitive to dust and air pollution are not present nearby the site
Property encroaching	The abandoned semi-destructed building of former filling station with two semi-buried rusty containers is located nearby the construction site. While building is outside of construction limits, the containers may obstacle construction. During investigation the owner of container was not identified. It was agreed during communication with stakeholders that Contractor should remove these containers and put it to the safe location.
Loss of trees and bushes	Very few bushes are subject to removal during clearing of construction site. The limits of clearing were agreed with district environmental authority. Contractor should strictly comply with these limits and avoid any unnecessary damage to vegetation. Before cutting jointly with forestry designate the trees to be cut. Treat the remained trees and shrubs according to Specification 401.03 Construction requirements. Planting should be undertaken in accordance with Technical Specifications 1003
Interruption of traffic	The Contractor shall minimize and discuss with local residents any interruptions of traffic which may happen during the construction of access road. The temporary bypass road should be provided.
Contractor's SSEMP	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract.(EMP Table 9(1).

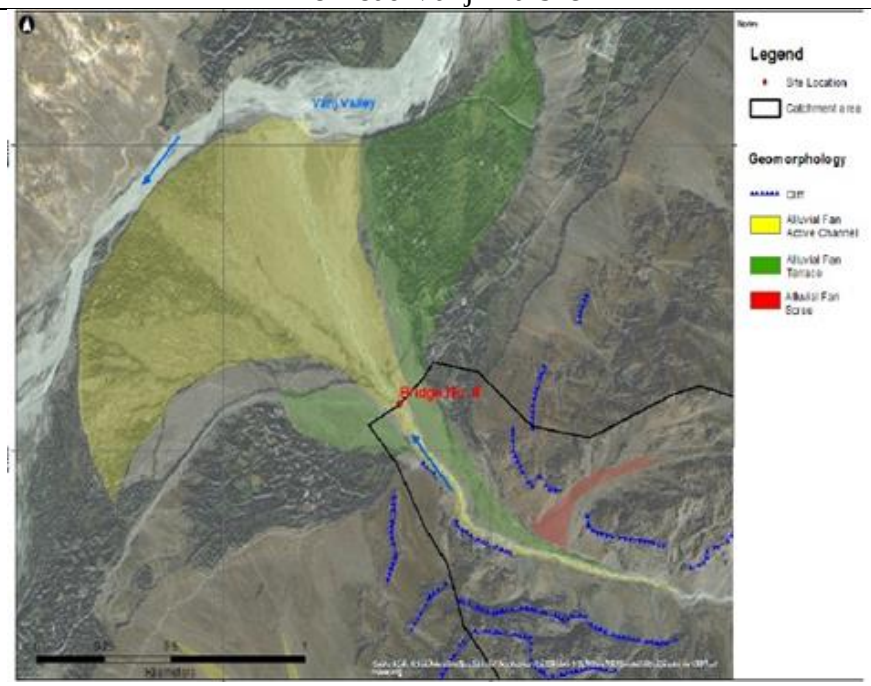
Photo illustrating the Environmental issues at the site

The abandoned fuel station building and rusty tanks nearby the bridge location. The tanks will obstacle the construction and should be moved by the Contractor to the place agreed with local communities

The fragment of riparian forest upstream the bridge is located outside of construction limits. Contractor should avoid any damage to the vegetation in construction of bypass road or placement of equipment.

Site-Specific Environmental Management Profile

for bridge# 8 over Ardabak river at Km 17+
of road Vanj–Dursher



Bridge location on geomorphologic map (Source: ARUP, 2017)

View from the left bank, downstream from the bridge

Basic environmental information:

Bridge location	Jamoat Jovidon, Vanch Disritct
The crossed water body	River of Ardobak, right tributary of Vanch river
The closest villages	Ardobak, Jovidon
The current state of structure	The simple beam 7.0m bridge in width of 4.50m. The span structure consists of two I beams and covered by reinforced concrete slab in thick of 0.25m. During the peak flood season water covers the whole channel area and flow partly bypasses the bridge due insufficient bridge dimensions.
Socio-economic Significance	Bridge is the only access between Vanj, Sitvarg village and the villages and settlements located further upstream.
The new structure designed under the project	The project envisages construction of new approximately 20m bridge with 4.5 m carriageway and 0.75m sidewalks from both sides proposed under the project. The design also includes 60m of bank protection from both sides and 260(130+130) m of access road.
Topography	The topography of the site is rolling to flat. The bridge is located at the middle part of Vanj valley within alluvial fan formed by the deposits of Ardobak river. The true altitude of the bridge site is 1,882m above msl.
Geology	The area bedrock comprising principally Proterozoic, Carboniferous and Permian aged bedrock of limestones, marble, sandstones and slates. Quaternary aged superficial deposits are mapped in the tributary valleys and main Vanj valley The bridge surrounding composed by quaternary deposits formed mainly by alluvial fans.
Sensitive receptors	The closest residential settlement- village of Ardobak is located at the significant distance from the bridge (over 200m). Therefore direct impacts to sensitive areas such as residential houses, schools, hospitals, etc. are anticipated to be insignificant.
Flora and Fauna	The small fragments of riparian shrubberies grow upstream from the bridge outside of construction site. One silverberry (Elaeágnus) tree and several bushes (Hippóphaë, Salix,), grow in vicinity to the bridge and may be removed for site clearing (The encounter with the wild fauna is unlikely as bridge located between the villages.
Land Use	The lands around bridge mainly occupied by shrubberies and used for occasional grazing.

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	Proposed mitigation
Water quality and erosion	The river of Ardabak is the left tributary of Vanch river with significant and abrupt seasonal variations of the flow. The special care shall be taken to erosion control and prevention of contamination during construction work as set in EMP and Project Specification. Avoid the storage of the waste in vicinity to the river (at least 20m) (EMP 6.5)
Noise	Contractor should strictly follow the regulations relating to noise control and appropriate measure described in EMP to ensure observations of work health and safety standards. The work schedule for rehabilitation of approach road should be agreed with the local communities. Contractor should avoid noisy activities at night time. (EMP Table 9(26).
Dust suppression	The dust control measures should ensure the compliance with work health and safety standards. During the dry weather the dust should be mandatory controlled by the spray of water as per EMP.
Property encroaching	The private property is absent within construction limits. The closest shop is located in about 100m from the bridge and aside from the approach road and will not be disturbed by the construction works.
Cut of trees and bushes	Very few immature trees and bushes are subject to removal during cleaning of construction site. The limits of removal were agreed with District environmental authority. Contractor should take special care to observe these limits any avoid any damage to vegetation outside, including riparian shrubbery. It is recommended to re-plant silverberry (Elaeágnus) tree growing near the bridge to new location in cooperation with local communities if it necessary. Proper planning of bypass road and dismantling of existent structure can help preserving of the tree. The planting of new trees should be undertaken in accordance with Specification 1003.
Interruption of traffic	The existent bridge shall be dismantled only after completion of new bridge. The Contractor shall minimize and discuss with local residents any interruptions of traffic which may happen during the construction of access road.
Disturbance to Cultural Heritage	The historical/archaeological heritage sites or places of cultural value are not known in the site surroundings. However, due to rich history of region Contractor should strictly observe “Chance Find Procedure” described in EMP 6.6
Health and Safety	Contractor should strictly follow to relevant Health and Safety regulations and prepare its Health and Safety Management Plan.
Contractor’s	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract.

SSEMP	(EMP Table 9(1).

The photo illustrating environmental issues at the site

The bridge is located at the middle part of large alluvial fan with little of vegetation. The lack of vegetation indicates the frequency and scale of floods. Contractor should take precautionary measures in order to protect people and property in the case of unexpected flow. No equipment, storage area or accommodation should be placed within the flood channel.

The closest property to the bridge is a shop located at the significant distance from the bridge. The shop and fragments of forest are located at significant distance from the bridge and shouldn't be affected by the project. Contract should avoid encroachment.

Site-Specific Environmental Management Profile

for bridge# 9 over Barrushan river at km 538
of Dushanbe-Kulab-Khorog-Kulma road

Bridge No 9 location Plan (source ARUP, 2017)

Current view of bridge from downstream

Basic Environmental Information:

Bridge location	**Jamoat N.Dodhudoe, Rushan Disritct**
The crossed water body	River of Barrushsn, right tributary of Pyanj river
The closest villages	The site located at the edge village of Barrushan
The current state of structure	The permanent bridge structure was destroyed by stone& mudflow on 21 July 2015 when the flow completely blocked the river. The destructed bridge had a length of 10.0m with width of 7.0m. The span structure consisted of 7 precast concrete slabs. The current bridge was built by local community using traditional technics
Socio-economic Significance	The bridge is located at the strategically important national highway (M41) connecting country and GBAO to China. Current bridge is unsuitable to the status and tasks of this highway and doesn't have sufficient dimensions to pass peak flood.
The structure designed under the project	The project proposes construction of new 21.4m bridge with 4.5 in width carriageway and 1,5m sidewalk from both sides. The design comprises rehabilitation of total 414 m of approach road to appropriate road Category III standards. The total width of the road will be 12m, including carriageway of 7m and 2.5m of shoulders from both sides. The length of bank protection will be 150m. .
Topography	The topography of the site surroundings is rolling to flat. The bridge located at the bed of Pyanj valley within the imposed alluvial fan formed by Barrushon river. The steep mountains limiting the Pyanj valley from the right side located in 600m. The true altitude of the site is about 1,950m.
Geology	The regional bedrock geology is dominated by metamorphic bedrock of the Yazgulomsky Complex (unit 'Pl3? jz'), composed of schists and gneiss together with Jurassic aged limestones of the Damamatskaya Suite (unit ' J2-3 dm') Superficial The bridge surrounding composed quaternary deposits consisting of a mixture of glacial, talus and alluvial deposits formed by mud floods.
Sensitive receptors	The project site location is on the edge of the village. Several residence houses and commercial shops located nearby the project. At least seven houses located nearby are considered be sensitive receptors.
Flora and Fauna	The site surroundings is a densely built residential and agricultural area and wildlife except small birds and several low roadside shrubs is unknown.

Land Use	The site is surrounded by residential and commercial houses from 3 sides and agricultural lands form the south.

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	Description and Proposed mitigation
Cultural Heritage	The sites of historical and cultural significance were not revealed during the studies, however Contractor should strictly observe "chance find procedure".
Water quality and Erosion	The river Barrushan is a right tributary of Panj river with significant and abrupt seasonal variations of the flow. The water of river is being used by the local communities for irrigation and domestic use, in some cases for food, The special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m). (EMP 6.5. Erosion Control).
Water supply network	The water supply channel diverted from Barrushan river upstream from the bridge runs along the approach road. Contractor should preserve the existing water supply and drainage during construction. When it is not possible Contractor should provide alternative water supply lines. (EMP Table 9(9).
Noise	The construction work will be undertaken within the village in close vicinity to the residential houses. Therefore, the noisy activities during construction should be avoided at night time. The work schedule should be agreed with the local communities. EMP Table 9 (26-27)
Air Quality	Burning of trash and open fire is strictly prohibited as the site is located at the populated area. Contractor should properly maintain machinery and control emission to comply with health standards for residential areas.
Dust suppression	Contractor should strictly follow the regulations relating to dust control and take appropriate measure described in EMP to ensure observations of work health and safety standards especially taken into account that the work will be undertaken within the village . The water should be sprayed at the approach road and bridge site during dry and windy weather. The water should be also sprayed on roads inside the village which are used by the Contractor. Contractor should regularly communicate to communities about this issue. EMP. Table 9 (26, 28,30).
Property encroaching	Four households claimed the property within the construction limits of the site, including the commercial buildings (shop), trees and stone wall. All property will be fully compensated before the work commencement. However, Contractor should follow up this issue and keep communication with communities to avoid any unauthorized encroachment during construction activities.
Loss of trees and bushes	All trees are to be removed at the site are private and planted for fruits, timber, fire-wood or with decorative purposes. The several low shrubs fall within the designed right of way and subject to removal. The removal of shrubs was

	discussed and agreed with the district environmental authority. Contractor should closely communicate with local communities during the preparatory work to avoid any damage outside the Very few bushes are subject to removal during clearing of construction site. The limits of clearing were agreed with district environmental authority. Contractor should strictly comply with these limits and avoid any unnecessary damage to vegetation. Before cutting jointly with residents designate the trees to be cut. Treat the remained trees and shrubs according to Specification 401.03 Construction requirements. It is recommended to consider the re-planting program. Planting should be undertaken in accordance with Specification 1003-Planting of trees.
Interruption of traffic	The location of existent structure is the only option for construction of new bridge. Therefore the old bridge structure should be dismantled before the commencement of construction. Before dismantling of existent structure Contractor shall prepare by-pass road temporary bridge downstream and maintain it during the whole construction period due to significant traffic at the highway. The work should be schedule so that to avoid any work in the channel of river during peak flood season. Due to importance of the road the Contractor shall minimize and discuss with local residents and road authorities any interruptions of traffic which may happen during the construction.
Contractor's SSEMP	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract.

The photos illustrating environmental issues:

The water supply channel diverted from Barrushan river upstream from the bridge turned to right and runs along the turn and approach road.

Contractor should preserve the existent water supply network or provide alterative waterline. Interruption in water supply should be agreed with the local communities.

The discussion about the property within the "right of way" on the bridge and approaches. In undertaking of work Contractor should strictly observe the limits of the site.

Site-Specific Environmental Management Profile

for bridge# 10 over Alichur river at Km 828
of Khorog-Murgab-Kulma Highway

Bridge location plan (Source: ARUP, 2017)

View from the left bank, downstream from the bridge

Basic environmental information

Bridge location	Jamoat Alichur, Murgab Disritct

The crossed water body	River of Alichur, tributary of Yashilkul lake
The closest villages	Village of Alichur in 500m from the bridge site.
The current state of structure	The Bridge is 48.2 m long structure consisting of two I beams and covered by reinforced concrete slabs in thick of 0.25m. The handrails are partially damaged and do not ensure proper protection for pedestrians.
Socio-economic Significance	The bridge is located on the important National Highway(M41) connecting GBAO and the whole country with Karakorum highway in China.
The structure designed under the project	The new 58,2 m bridge with 10 m in width carriageway and 1.0m sidewalks from both sides designed under the project. The design also comprises rehabilitation of total 538 (224+314) m approach road to Category (III) standards (width of carriageway of 8m with 2 m shoulders from both sides and building of bank protection
Topography	The topography of the site is rolling to flat bed of Alichur Valley. The width of Alichur valley in this section about 1,5 km. The catchment area includes mountain peaks between 4,000m and 6,000m, with the highest elevation in the upper catchment being 5,537m. The approximate altitude of the site is about 3,950 above msl
Geology	The solid geology comprises a mix of sedimentary, igneous and metamorphic bedrock principally of Jurassic and Cretaceous age. Bedrock closest to the site are Jurassic aged sediments comprising limestone, sandstone and conglomerate, with dip direction mapped to be towards the north. Quaternary aged superficial deposits of alluvial, fluvio-glacial, proluvial and glacial origins are mapped in the Alichur valley and within the tributary valleys.
Sensitive areas	The closest residential settlement- village of Alichur is located at the significant distance from the bridge (over 200m). Therefore direct interaction with sensitive areas such as residential houses, schools, hospitals, etc. is anticipated to be negligible.
Flora and Fauna	The vegetation cover is very scarce and limited by the low grass at the wet part of the river channel and rare shrubs. The encounter with the wild fauna is possible. Few types of fish inhabit in Alichur river, however no information about economic resources of fish available.
Land Use	The land around bridge mostly used for seasonal grazing.

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated	**Proposed mitigation**

issue	
Loss of Cultural Heritage	The historical/archaeological heritage sites or places of cultural value are not known in the site surroundings. However, due to rich history of region Contractor should strictly observe "Chance Find Procedure" described in EMP. 6.6.
Water quality and erosion	The river of Alichur with permanent and relatively stable seasonal variations of the flow is the left tributary of Yashilkul lake. The special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m)(EMP 6.5 and relevant Specifications).
Noise	Contractor should strictly follow the regulations relating to noise control and appropriate measure described in EMP to ensure observations of work health and safety standards. The work schedule for rehabilitation of approach road should be agreed with the local communities. Contractor should avoid noisy activities at night time. (EMP Table 9(26).
Dust suppression and air quality	The dust control measures should ensure the compliance with work health and safety standards. During the dry weather the dust should be mandatory controlled by the spray of water. Outside receptors sensitive to dust and air pollution are not present nearby the site.
Property encroaching	The survey and public communication confirmed that the private property is absent within construction limits.
Cut of bushes and grass	Several low brushes growing within construction site area will rooted out for site and approach roads clearing. Contractor should observe the right of way limits to avoid any unnecessary cutting.
Poaching of animals	Due to possible encounter with wild animals (including endangered species) Contractor shall take all precautionary measures to prevent poaching. Contractor should train people about the ban for hunting and prohibition of unauthorized use of weapon. In addition staff should be trained to safe behavior in the case of unexpected encounter with the wild animals. The food and leftovers left unattached may attract the wild animals. No food or food remains should be left unattached for night time. Any fishing with the use of illegal methods (including but limited by explosives, electric shock, nets) is prohibited. Individual fishing permits should be obtained from the relevant authority). EMP Table 9 (10).
Interruption of traffic	The new bridge will be built about 10-15m upstream from the existent bridge structure. Therefore, the existent bridge will be preserved for the whole period of construction and shall be dismantled only after completion of new bridge and approach roads. The Contractor shall minimize and discuss with local residents any interruptions of traffic which may happen during the construction of access road.

Health and safety issues for conditions of high altitude	The site is located at the high-mountainous severe environment(over 3,500m above msl) featured with: (i) reduced natural air pressure which results to less amount of oxygen available for breathing; extreme low temperatures at the winter period(below(-40°C) with strong winds. Accordingly, Contractor should ensure a sufficient adaptation period for workforce (especially hired from other regions) and adjust work schedule if it necessary. In order to protect people in the condition of extreme low temperatures Contractor should provide adequate uniform and personal protective equipment for the work in severe conditions at sufficient quantities and accommodation for rest. All machinery should be provided with sufficient amount of lubricant, fuel and antifreeze designated for the work in conditions of extreme low temperatures/(EMP Table 9(23).
Contractor's SSEMP	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract.

The photos illustrating environmental issues

On the photo: (i) the riparian and aqua vegetation of Alichur river,(ii) hydrological gage at river of Alichur; (iii) cemetery at slope of hill. Contractor should minimize the damage to riparian and aqua ecosystem of the river of Alichur from the construction. The water quality control measures described in EMP should be strictly followed. No disturbance to the cemetery is allowed.

Alichur village on the opposite side of river. Contractor should establish the communication system about environmental issues.

Site-Specific Environmental Management Profile

for bridge# 11 over Kobrigen river at Km 861
of Khorog-Murgab-Kulma Highway

Bridge location plan (Source: ARUP, 2017)

Bridge view from downstream

Basic environmental information:

Bridge location	Jamoat Alichur, Murgab District

The crossed water body	River of Kobrigen, tributary of Alichur river
Features of the river	The water flow is intermittent and available only in spring-summer period or during the raining.
The closest villages	The village Beshkambez at a distance of 6 km from the bridge outside of sight
The current state of structure	The simple one-span 4m. in length bridge. The carriageway is elevated over riverbed by 1.5m. The bridge dimensions capacity is not sufficient to pass peak flood flow and load bearing does not meet the requirements for this road category.
Socio-economic Significance	The bridge is located on the important National Highway connecting GBAO and Country with Karakorum highway in China.
The structure designed under the project	The new 16.1 m bridge with 10 m carriageway and 1.0m sidewalks from both sides designed under the project. The design also comprises rehabilitation of total 381 (193+188) m approach road to Category (III) standards (width of carriageway of 8m with 2 m shoulders from both sides and building of bank protection.
Topography	Bridge located at the high mountain environment in middle part of Alichur valley and characteristic by active geomorphic process. The topography of the site surroundings is mainly flat, rocky mountainous slopes located in several hundred meters north from the bridge. The elevation at the site is approximately 3,900m above msl,
Geology	The site is underlain by Quaternary superficial deposits of glacial, fluvio-glacial and fluvial origin. The solid geology comprises Jurassic-Cretaceous aged igneous and metamorphic rocks including granite, granodiorite and gneiss and Jurassic aged sedimentary rocks of limestones, sandstones and conglomerates, generally dipping to the north.
Sensitive receptors	The bridge surrounding are very sparsely populated steppes. The closest residential settlement- village of Beshkambez is located in 5 km from the project bridge outside of the direct visibility. Therefore, no sensitive points are available at the construction site.
Flora	The vegetation cover is very scarce and limited by the grass and low shrubs.
Fauna	The site is remote area and the encounter with the migrating wild animals is possible.
Land Use	The surrounding lands are used for seasonal grazing.

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	Proposed mitigation
Cultural Heritage	The historical/archaeological heritage sites or places of cultural value are not known in the site surroundings. However, due to rich history of region Contractor should strictly observe "Chance Find Procedure" described in EMP 6.6.
Water quality and erosion	The river of Kobrigen is the left tributary of Alicher river and significant part of an year lacks water. Due to unexpected floods the special care shall be taken to erosion control during construction work. Avoid the storage of the waste in vicinity to the river channel (at least 20m). (EMP 6.5 Erosion Control, Specifications 109-Environmental Protection).
Noise	Contractor should strictly follow the regulations relating to noise control and appropriate measure described in EMP to ensure observations of work health and safety standards. The outside noise receptors are not available at the site.
Dust suppression	The dust control measures should ensure the compliance with work health and safety standards. Outside receptors sensitive to dust and air pollution are not present nearby the site.
Property encroaching	The private property is absent at the construction area and in vicinity.
Loss of vegetation	The clearing of the site and construction of by-pass will require the cutting of low shrubs of *Eurotia ceratoides* which is an important and widespread species of the steppes of Eastern Pamir. This is the main food for Yaks. Contractor should avoid any unnecessary cutting.
Poaching	Due to possible encounter with wild fauna (including endangered species) Contractor shall take all precautionary measures to prevent poaching. Contractor should train people about the ban for hunting and prohibition of unauthorized use of weapon. In addition staff should be trained to safe behavior in the case of unexpected encounter with the wild animals. The food and leftovers left unattached may attract the wild animals. No food or food remains should left unattached for night time.
Interruption of traffic	Temporary bypass road of sufficient capacity to pass the traffic should be provided and maintained until the completion of new bridge and approaches. The Contractor shall minimize and discuss with local residents any interruptions of traffic which may happen during the construction of access road.
Health and Safety issues relating to high altitude and severe	The site is located at the high-mountainous severe environment(over 3,500m above msl) featured with: (i) reduced natural air pressure which results to less amount of oxygen available for breathing; extreme low temperatures at the winter period(down to -60°C) with strong winds.

climate	Accordingly, Contractor should ensure a sufficient adaptation period for workforce (especially hired from other regions) and accordingly adjust work schedule. In order to protect people in the condition of extreme low temperatures to provide adequate uniform and personal protective equipment for the work in severe conditions at sufficient quantities and arrange protected accommodation for the rest. All machinery should be provided with sufficient amount of lubricant, fuel and antifreeze agent specially manufactured for the work in conditions of the extreme low temperatures. (EMP Table 9(23)
Contractor's SSEMP	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract. (EMP Table 9 (1)).

The photo illustrating environmental issues

The vegetation in the bridge surroundings is scarce (mainly *Eurotia ceratoides)* but ecologically valuable. The damage to vegetation should be minimized.

View upstream from the bridge. The borders of channel indistinct and water lacks most of time. However the flood may occur unexpectedly and damage property and equipment

Site-Specific Environmental Management Profile

For bridge# 12 over Ak-baital river at Km 940
of Khorog-Murgab-Kulma Highway

Bridge location plan (Source: ARUP, 2017)

Bridge view from upstream

Basic environmental information:

Bridge location	Murgab Disritct, GBAO
The crossed water body	River of Ak-baital, tributary of Murgab river
Features of the river	The water flow is intermittent and available only in spring-summer time or in heavy raining.
The closest villages	Konakurgan in 500m from the site, 8km north of Murgab town
The current state of structure	The bridge is one span 11.2 m long structure. Neither proper safety bridge furniture nor an adequate dewatering system have been provided.
Socio-economic Significance	The bridge is located on the M41 highway leading from Murghab to the Kulma pass crossing with China
The structure designed under the project	The new 16.1m bridge with 10 m in width carriageway and 1.0m sidewalks from both sides designed under the project. The design also comprises rehabilitation of total 352(174+178) m approach road to Category (III) standards (width of carriageway of 8m with 2 m shoulders from both sides.
Topography	Bridge located at the high mountain environment and characteristic by active geomorphic process. The topography of the site surroundings is mainly rolling to flat. The elevation at the site is approximately 3,630m above msl,
Geology	The bridge surroundings composed by quaternary deposits comprising a mix of glacial deposits (tills and fluvio-glacial terraces) and alluvial river terrace deposits.
Sensitive receptors	The closest residential settlement- village of Kuhnakurgan is located in 500 m from the project bridge Therefore, no sensitive receptors which may be directly affected by the construction activities are available at the site.
Flora and Fauna	The vegetation cover is very scarce and limited by the low grass and rare shrubs (mainly *Eurotia ceratoides).* The site is remote area and the encounter with the migrating wild animals is possible,
Land Use	The surrounding lands mainly barren and used for occasional grazing

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	**Proposed mitigation**
Cultural Heritage	The historical/archaeological heritage sites or places of cultural value are not known in the site surroundings. However, due to rich history of region Contractor

	should strictly observe "Chance Find Procedure" described in EMP 6.6
Erosion prevention	The river of Akbaital is a tributary of Murgab river and significant part of an year lacks water. Due to unexpected floods the special care shall be taken to erosion control during construction work when the channel is overwhelmed. Avoid the storage of the waste in vicinity to the river (at least 20m). EMP 6.5
Noise	Contractor should strictly follow the regulations relating to noise control and appropriate measure described in EMP to ensure observations of work health and safety standards. The outside noise receptors are not available at the site.
Dust suppression	Contractor should strictly follow the regulations relating to dust control and appropriate measure described in EMP to ensure observations of work health and safety standards. The outside sensitive dust receptors are not available in vicinity to the site.
Property encroaching	The private property is absent within construction limits.
Loss of vegetation	There are not any trees in surroundings of the bridge. The clearing of the site and construction of by-pass will require the cutting of small amount of low shrubs of *Eurotia ceratoides* which is an ecologically important and widespread species of the steppes of Eastern Pamir. This is the main food for Yaks. Contractor should avoid any unnecessary cutting.
Poaching	Due to possible encounter with wild animals (including endangered species) Contractor shall take all precautionary measures to prevent poaching from the side of staff. Contractor also should train people about the ban for hunting and prohibition of unauthorized use of weapon. Contractor should train people to safe behavior in the case of unexpected encounter with the wild animals. Unattached left food may attract the wild animals. No food or food remains should left unattached at night time to avoid attracting of wild animals EMP Table 9 (10)
Health and Safety issues relating to high altitude and severe climate	The site is located at the high-mountainous severe environment(over 3,500m above msl) featured with: (i) reduced natural air pressure which results to less amount of oxygen available for breathing;(ii) extreme low temperatures at the winter period(below (-40°C)) with strong winds. Accordingly, Contractor should ensure a sufficient adaptation period for workforce (especially hired from other regions) and adjust work schedule if it is necessary. In order to protect people in the condition of extreme low temperatures to provide adequate uniform and personal protective equipment for the work in severe conditions at sufficient quantities and arrange protect accommodation for rest. All machinery should be provided with sufficient amount of lubricant, fuel and antifreeze agent designed for the work in conditions of extreme low temperatures. (EMP, Table 9, 23)
Interruption	Temporary bypass road of sufficient capacity to pass the traffic including temporary culvert should be provided and maintained until the completion of new

of traffic	bridge and approaches. The Contractor shall minimize and discuss with stakeholders any interruptions of traffic which may happen during the construction of access road.
Contractor's SSEMP	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract. (EMP Table 9(1)).

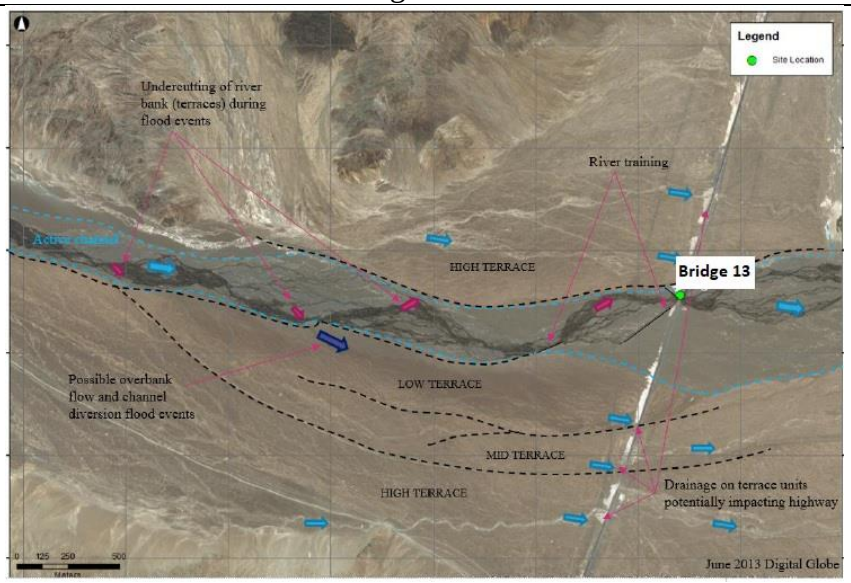
Photo illustrating the environmental issues of the site

The vegetation cover is very scarce and represented by very rare shrubs of *Eurotia ceratoides and Oxytropis* cushion plants. Contractor should preserve the vegetation wherever possible, avoiding any unnecessary damage.

The water presence is intermittent and during floods the water flows do not form distinct channel. Due to abrupt nature of floods the Contractor should be careful with placement of equipment, storage areas and accommodation. These should be placed at the elevated places.

Site-Specific Environmental Management Profile

for bridge# 13 over East Pshart river at Km12
of Murgab-Osh- road



Bridge location plan (Source: ARUP, 2017)

View of location of former bridge washed out by the flood

Basic environmental information:

Bridge location	Murgab Disritct, GBAO
The crossed water body	River of East Pshart, tributary of Ak-Baital river
Features of the river	The water flow is intermittent and available only in spring-summer time or during heavy raining.
The closest villages	In 7km north east of Murgab town
The current state of structure	The bridge was completely washed out by mud-stream
Socio-economic Significance	The bridge is located on the road leading from Murghab to the Kyrgizstan border
The Structure designed under the Project	The new 16,1 m bridge with 10 m in width carriageway and 1.0m sidewalks from both sides designed under the project. The design also comprises rehabilitation of total 517(285+232) m approach road to Category (III) standards (width of carriageway of 8m with 2 m shoulders from both sides and bank protection.
Topography	Bridge located at the high mountain environment and characteristic by active geomorphic process. The topography of the site surroundings is mainly rolling to flat. The elevation at the site is approximately 3,640m above msl,
Geology	The solid geology comprises a mix of sedimentary and metamorphic rocks of Permian, Triassic and Jurassic age, including limestone, marl and slate. The bridge surroundings composed by quaternary deposits comprising a mix of glacial deposits (tills and fluvio-glacial terraces) and alluvial river terrace deposits.
Sensitive receptors	The closest residential settlement- town of Murghab, the center of Murghab District is located in 5 km from the project bridge outside of the direct visibility. Therefore, no sensitive receptors are available at the construction site.
Flora and Fauna	The vegetation cover is very scarce and limited by the low shrubs, cushion plants and grass. The site is remote, unpopulated area and an encounter with the migrating wild animals is possible,
Land Use	The land around the bridge are used for occasional grazing

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	**Proposed mitigation**
Cultural	The historical/archaeological heritage sites or places of cultural value are not

Heritage	known in the site surroundings. However, due to rich history of region Contractor should strictly observe "Chance Find Procedure" described in EMP, sub-section 6.6.
Erosion prevention	The river of Eastern Pshart is a tributary of Akbaital river and significant part of an year lacks water. Due to unexpected floods the special care shall be taken to erosion control during construction work when the channel is overwhelmed. Avoid the storage of the waste in vicinity to the river (at least 20m). Avoid the storage of placement of equipment, storage areas and accommodations within the possible route of flow. Follow the EMP 6.5 and Specification 109.
Noise	Contractor should strictly follow the regulations relating to noise control and appropriate measure described in EMP to ensure observations of work health and safety standards. The outside noise receptors are not available in site surroundings. EMP Table 9 (26,27)
Dust suppression	Contractor should strictly follow the regulations relaying to dust control and appropriate measure described in EMP to ensure observations of work health and safety standards. The outside sensitive dust receptors are not available in vicinity to the site.
Property encroachment	The private property is absent within construction limits, therefore there are not any complaints.
Loss of vegetation	The clearing of the site and construction of by-pass will require the cutting of low shrubs of *Eurotia ceratoides* which is an ecologically important and widespread species of the steppes of Eastern Pamir. Contractor should minimize the area of cutting.
Poaching	Due to possible encounter with wild animals (including endangered species) Contractor shall take all precautionary measures to avoid poaching. Contractor should train people about the ban for hunting and prohibition of unauthorized use of weapon. Contractor should train people to safe behavior in the case of unexpected encounter with the wild animals. Unattached left food may attract the wild animals. No food or food remains should left unattached at night time to avoid attracting of wild animals. (EMP Table 9(10)
Interruption of traffic	By-pass road should be provided and maintained throughout the whole construction period. . The Contractor shall minimize and discuss with road authorities and local communities any interruptions of traffic which may happen during the construction of access road in accordance with EMP
Health and Safety Issues relating to work at high altitudes and severe	The site is located at the high-mountainous severe environment(over 3,500m above msl) featured with: (i) reduced natural air pressure which results to less amount of oxygen available for breathing; (ii) extreme low temperatures at the winter period(below (-40°C)) with strong winds. Accordingly, Contractor should ensure a sufficient adaptation period for

weather conditions	workforce (especially hired from other regions) and adjust work schedule if it necessary. In order to protect people in the condition of extreme low temperatures to provide adequate uniform and personal protective equipment for the work in severe conditions at sufficient quantities and arrange protect accommodation for rest. All machinery should be provided with sufficient amount of lubricant, fuel and antifreeze agent designed for the work in conditions of extreme low temperatures/ EMP table 9(23)
Contractor's SSEMP	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract. EMP table 9(1)

Photo illustrating the environmental issues of the site

The vegetation cove is very scarce and represented by very rare shrubs of *Eurotia ceratoides and Oxytropis* cushion plants. Contractor should preserve the vegetation wherever possible, avoiding any unnecessary damage.

The water presence is intermittent and during floods the water flows do not form distinct channel. Due to abrupt nature of floods the Contractor should be careful with placement of equipment, storage areas and accommodation. These should be placed at the elevated places.

Site-Specific Environmental Management Profile

For bridge# 14 over Yahchipun river at km 267
on the Dushanbe-Kulyab- Khorog -Kulma road

Bridge location plan with the main geomorphological features

Bridge view from downstream

Baseline site Information:

Bridge location	Shurobod district. The bridge has been removed from the subordination of Maintenance Unit of Darvaz Region and transferred to the balance of Maintenance Unit of Sh. Shokhin by the Resolution of the Government of RT
The crossed water body	River of Yahchipun, right tributary of Pyanj
The closest villages	Yahchisor in 10km from the bridge; Yahchimiena in 3 km from the road.
The current state of structure	The Bridge is 32.6 m in length with total width of 12.9 m. The bridge carriageway is located in distance of approximately 5.0 to 6.5 m from the river's edge. The mud & stone flow in spring 2016 damaged the beam and span structure, The curbs and metallic handrails from upstream side are also partially destroyed.
Socio-economic Significance	The bridge is located on the important road within the only section around year section connecting Hatlon region with GBAO
The structure designed under the project	The project new 32,6 m bridge with total width of 12,9m, including carriageway of 10,0 m and 1.0 sidewalks from both sides. The design includes rehabilitation of 377(196+181) m of approach road and bank protection.
Topography	The bridge and approach road are located at the right bank of Pyanj valley, which serves as a natural border between Tajikistan and Afghanistan. The topography of the site is irregular, the steep rocky cliff limits the access road from the left side, while the right side is lies on the top of steep and deep bank of Pyanj river. The channel of Yahchipun covered by numerous boulders falling from the side slopes or brought by the seasonal streams.
Geology	The solid geology in the catchment area comprises Carboniferous to Permian igneous and sedimentary rocks, Nearby the bridge location there are some quaternary deposits consisting of a mixture of alluvial and talus deposits.
Sensitive receptors	The closest residential settlements- villages of Yachchisor is located at the significant distance from the bridge. There is a governmental office in about 300m from the bridge. Therefore direct environmental impacts to sensitive areas such as residential houses, schools, hospitals, etc during construction is not anticipated.
Flora and Fauna	The environmental survey confirmed that no habitat for rare and endangered species exists in the bridge area. The vegetation cover is present on the bank slopes and represented by shrubberies and immature trees (including wild pomegranate). The encounter with wild migrating animals is possible.
Land Use	The buildings and fenced area of governmental facilities located on the right bank of Yakchpun about 300m from the bridge, The land around the bridge

	are used for occasional grazing

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	Proposed mitigation
Erosion control and water pollution	The river of Yahchipun is a right tributary of Pyanj river with significant and abrupt seasonal variations of the flow. The special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m). (EMP 6.5 and relevant Specifications)
Noise	Due to significant distance to sensitive receptors noise is not anticipated to be a major problem. The direct distance to the closest governmental buildings is over than 200 m. Contractor should strictly follow the regulations relating to noise control and appropriate measure described in EMP to ensure observations of work health and safety standards. EMP (Table 9 (26-27)
Dust suppression	Contractor should strictly follow the regulations relating to dust control and appropriate measure described in EMP to ensure observations of work health and safety standards. The outside sensitive dust receptors are not available in vicinity to the site.
Health Safety issues	The special precaution measures should be taken during the work in vicinity to the river. The falling to water may be very dangerous especially in the peak flood time. The weather in the summer can be hot. Contractor should provide sufficient amount of drinking water and shelter. The location also known for mosquito which could be malaria vector. Contractor should use only appropriate, approved measures to fight mosquito.
Property encroaching	There are not property issues for this bridge, the cutting of trees should be agreed with forestry. For planting of trees follow Specification 1003- Planting of trees.
The loss wildlife	Contractor should train people about the ban for hunting and prohibition of unauthorized use of weapon. Contractor should train people to safe behavior in the case of unexpected encounter with the wild animals. Unattached left food may attract the wild animals.
Interruption of traffic	The Contractor should provide temporary bypass road with adequate drainage structure. The Contractor shall minimize and discuss with stakeholders any interruptions of traffic which may happen during the construction of access road.
Historical and Cultural Heritage	The historical/archaeological heritage sites or places of cultural value are not known in the site surroundings. However, due to rich history of region Contractor should strictly observe "Chance Find Procedure" described in EMP 6.6
Contractor's	The Contractor shall review attached EMP and prepare its own SSEMP for the

SSEMP	site in accordance with prepared instruction within 45 days after award of Contract. EMP Table 9 (1).

Photo illustrating the environmental issues of the site

The immature trees and shrubbery in the area of the proposed temporary bypass route. Contractor should minimize the damage to vegetation by the proper work planning

Site-Specific Environmental Management Profile

for drainage structure # 15 over Guldara river at km 272
on the Dushanbe-Kulyab-Khorog-Kulma road

Bridge location map(source ARUP, 2017)

The view of the washed out section of the road

Baseline site Information:

Bridge location	Darvaz District
The crossed water body	River of Guldara, tributary of Pyanj
The closest villages	Yachchisor, Zigar
The current state of structure	The section of the road on the steep rocky bank of Panj completely washed out by the mud-flow from the narrow gorge (Guldara)n and restored without adequate engineering and drainage consideration.
Socio-economic Significance	The bridge is located on the important road within the only section around year section connecting Hatlon region with GBAO
The structure designed under the project	The project proposes construction of new 36 m culvert like structure with total width of 12,5m, including carriageway of 7,0 m and 2,5m shoulders from both sides. The design includes rehabilitation of 555m of approach road and construction of engineering embankment.
Topography	The topography of the site is exclusively irregular, the steep rocky cliff limits the structure and access road from the left bank, while the right side is a rocky steep slope of Pyanj river.
Geology	The bridge surrounding composed by Cambrian and Ordovician metamorphic and sedimentary rocks including schists, marble, limestones and sandstones. Nearby the bridge location there are some quaternary deposits consisting of a mixture of talus and alluvial deposits.
Sensitive receptors	Villages are not available in close vicinity to the site, Therefore direct impacts to sensitive areas such as residential houses, schools, hospitals, etc during construction is not anticipated.
Flora and Fauna	The environmental survey confirmed that no habitat for rare and endangered species exists directly in the bridge area. The vegetation cover is practically absent. However habitat of the encounter with migrating wild animals including endangered species i possible.
Land Use	The bridge surroundings are mainly barren, and rocky.

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	**Proposed mitigation**
Cultural Heritage(old	The historical/archaeological heritage sites or places of cultural value are not known in the site surroundings. However, due to rich history of region Contractor

cemetery)	should strictly observe "Chance Find Procedure" described in EMP 6.6
Noise	Due to significant distance to sensitive points noise is not anticipated to be a major problem. The direct distance to the closest residential houses is over than 200 m.
Safety	The special precaution measures should be taken during the work in vicinity to the river. The falling to water may be very dangerous especially in the peak flood time. The location also known for mosquito which could be malaria vector. Contractor should use only appropriate, approved measures to struggle mosquito.
Geological hazards	The steep rocky slopes near the road are not sufficiently stable and may generate collapses, rockfalls and landslides.. Special care is needed during the excavation and blasting.
Property encroachment	There are not property issues for this bridge
Protection of wildlife	Contractor should train people about the ban for hunting and prohibition of unauthorized use of weapon. Contractor should train people to safe behavior in the case of unexpected encounter with the wild animals. (EMP Table 9 (10)
Interruption of traffic	The Contractor should provide temporary bypass road with adequate drainage and capacity and maintain it during the whole construction period. The Contractor shall minimize and discuss with road authorities any interruptions of traffic which may happen during the construction of access road.
Contractor's SSEMP	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract.

The photos illustrating environmental issues at the site

Agama turkestanica in the area of designed structure. Contractor should take care about local fauna and make sure that animals left dangerous zone before undertaking of blasting, excavation and other invasive activities.

The site area is exclusively steep and unstable terrain The special care and safety measures should be observed both under the rocky cliffs and next to the edge of road from the side of

bank.

Site-Specific Environmental Management Profile

For bridge# 16 over Bartang river at km 53.8
of Rushan-Gudara-Muskul road

Bridge location plan (Source: ARUP, 2017)

View from the left bank, downstream from the bridge

Basic environmental information

Bridge location	Rushan Disritct
The crossed water body	River of Bartang, right tributary of Panj river
The closest villages	Villige of Darjoms is located about 100m from the existent bridge
The current state of structure	The cable-strayed system consists of a metal pier with a height of 1.44 m with four cables 30 mm in diameter; the ends of cables are fixed to anchors on bridge approaches. The cables are fixed to the main beam using transverse I-beams under the main span. The bridge carriageway consists of transverse bars of different cross-sections and floor covering of boards 5 cm thickness with track of the same boards is laid on top. As a curb, bar of 20-25 cm high is installed. Handrails are absent. Bridge piers from in situ reinforced concrete with foundations on natural basis. Behind the piers are built retaining walls of masonry, partially destroyed.
Socio-economic Significance	The bridge is the connection for the villages in the middle and upper part of Bartang river valley and very important for the development of this remote rural area.
The structure designed under the project	The project designed new 62.1m cable stray with suspended system bridge in total width of 5.3 m. The design also includes rehabilitation of 433(209+224) m of approach road. The bank protection dams will be built on both banks. On the right bank a length of the dam will make up 180m on the right bank 170 m.
Topography	The site is located in a mountainous environment on the bed of deeply incised Bartang valley with peaks between 4,000m and 7,000 . The elevation of the location of Bridge No.16 is approximately 2,180m above msl.
Geology	The solid rock on the right bank of the valley comprise Triassic to Jurassic aged sedimentary rocks, with much of the lower portion of the valley side comprising Jurassic aged limestones (unit J2-3). Quaternary superficial deposits are mapped in the valley bottom and at the alluvial fan area of Darjomj village.
Sensitive receptors	The closest residential settlement- village of Darjoms is located in about 100 m from the bridge. Therefore, the closest houses located along the approach road considered to be the sensitive receptors of the direct impact from construction activities under the project
Flora and Fauna	The shrubbery (Hippóphaë, Salix,), grow along the bank in vicinity to the bridge. Few shrubs and recently planted trees grow at the location of designed new bridge and subject to removal. The encounter with the wild fauna is unlikely as bridge located nearby the

	village.
Land Use	The small pieces of land nearby the bridge are occupied by shrubberies. The land are used for grazing and partially for farming.

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	**Description of Impacts/Proposed mitigation**
Cultural Heritage	The historical/archaeological heritage sites or places of cultural significance are not known in the site surroundings. However, due to rich historical background of region Contractor should strictly observe "Chance Find Procedure" described in EMP Section 6.6
Impact to Water quality and erosion	The river of Bartang is the right tributary of Panj river and originates from the Sarez lake. The river is a major water body with permanent and relatively stable flow and may be used for drinking purposes downstream. Therefore the special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m) and follow EMP (EMP 6.3, 6.4, 6.5). Specification (Section 109)
Noise	The construction work will be undertaken nearby the village in close vicinity to the residential houses. Therefore, the noisy activities during construction should be avoided at night time. The work schedule should be agreed with the local communities. EMP (Table 9. 26-27)
Dust suppression	Contractor should strictly follow the regulations relating to dust control and take appropriate measure described in EMP to ensure observations of work health and safety standards especially taken into account that the work will be undertaken nearby the village. The water should be sprayed at the approach road and bridge site during dry and windy weather. The water should be also sprayed on roads inside the village which are used by the Contractor. Contractor should regularly communicate to communities about this issue. EMP. Table 9 (26, 28,30).
Property encroaching	There are several trees and possibly small spots of agricultural land which will be taken for construction needs. All property should be fully compensated by the GRT before commencement of construction. However, the Contractor should prevent any further disturbance and discuss all issues with stakeholders at the meetings or through Grievance Redress Mechanism provided by EMP.
Loss of trees and bushes	Several immature trees and bushes are subject to removal during cleaning of construction site. The limits of removal were agreed with District's Environmental authority. Contractor should take special care to observe these limits any avoid any damage to vegetation outside. It is recommended to re-plant trees newly planted growing near the bridge to new locations jointly with local communities. Before cutting jointly with forestry designate the trees to be cut. Treat the

	remained trees and shrubs according to Specification 401.03 Construction requirements. The tree planting undertake according to Specifications 1003
Interruption of traffic	The new bridge will be constructed 27m downstream of the existent bridge. The existent bridge is the only alternative for crossing of river. It should be used as temporary during the construction and shall be dismantled only after completion of new bridge. The Contractor shall minimize and discuss with local residents and other stakeholders any interruptions of traffic which may happen during the construction .
Contractor's SSEMP	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract. (EMP Table 9(1).

The photos illustrating the site environmental issues :

The recently planted by local communities trees (mainly willow) on the left bank of Bartang river. Part of trees will be removed for construction of bridge and approach road. Contractor should assist in re-planting of trees and avoid any unnecessary damage to vegetation.

The residential house in Darjoms village nearby the bridge, one of the sensitive receptor of the direct impact from construction activities

Site-Specific Environmental Management Profile

For bridge# 17 over Bartang river at Km 80.1
of Rushan-Gudara-Muskul road

Bridge location plan (Source: ARUP, 2017)

View from the left bank, upstream from the bridge

Basic environmental information

Bridge location	Rushan Disritct, Jamoat Basid
The crossed water body	River of Bartang, right tributary of Panj river
The closest villages	Basid
The current state of structure	The existent cable-stray bridge is 35.8 m in length with a total width of 4.1 m without sidewalks. The bridge carriageway is located at a height of approximately 3.65 m from river's edge. Load-carrying capacity of the bridge is no more than 10 tons.
Socio-economic Significance	The bridge connects the villages in the middle and upper part of Bartang valley and very important for the development of this remote rural area.
The structure designed under the project	The project designed new 62.1m cable stray with suspended system bridge in total width of 5.3 m. The design also includes rehabilitation of 557(278+279)m of approach road according to Category V standards. The bank protection dams will be built on both banks. On the right bank a length of the dam will make up 186m on the right bank 208m.
Topography	The site is located in a mountainous environment with peaks between 4,000m and 7,000m. The highest elevation in the upper catchment is 6,940m (Independence Peak), whereas the elevation in the Bartang valley at the location of Bridge No. 17 is approximately 2,350m
Geology	The rocks on the right bank comprise Permian age sedimentary and metamorphic rocks including limestone, schist and dolerite. Quaternary Holocene superficial deposits on the valley floor (unit QIV), and on a terrace unit at high elevation (unit QII zp) consist of mixed alluvial, lacustrine and pluvial origin.
Sensitive receptors	The closest residential settlement- village of Basid is located at the significant distance from the bridge (over 500m). Therefore, no sensitive receptors which may be directly affected by the construction activities are available around the site.
Flora and Fauna	Only few low shrubs grow in vicinity to the bridge. Few bushes grow at the location of designed new bridge and subject to removal. The encounter with the wild fauna is possible due to remoteness to area and closeness to the Tajik National Park,
Land Use	There is water take structure upstream from the bridge built on the funds of International water diverting water from Bartang river to the small irrigation channel for the villages located downstream. . The land is in vicinity to site is rocky and mainly barren and probably used for occasional grazing.

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	Impact Description/Proposed mitigation
Cultural Heritage	The historical/archaeological heritage sites or places of cultural significance are not known in the site surroundings. However, due to rich historical background of region Contractor should strictly observe "Chance Find Procedure" described in EMP (6.6)
Water quality and erosion	The river of Bartang is the right tributary of Panj river and originates from the Sarez lake. The river is a major water body with permanent and relatively stable flow and may be used for drinking purposes downstream. Therefore the special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m) and follow EMP (EMP 6.3, 6.4, 6.5). Specification (Section 109).
Noise	Contractor should strictly follow the regulations relating to noise control and appropriate measure described in EMP to ensure observations of work health and safety standards. The outside noise receptors are not available at the site. EMP Table 9 (26-27).
Dust suppression	Contractor should strictly follow the regulations relating to dust control and appropriate measure described in EMP to ensure observations of work health and safety standards. The outside sensitive dust receptors are not available in vicinity to the site.
Property encroaching	There is water take structure upstream from the bridge diverting water from Bartang river to the small irrigation channel. Contractor should prevent any damage to structure and channel during construction.
Cut of trees and bushes	Very few bushes are subject to removal during cleaning of construction site. The limits of removal was agreed with District environmental authority. Contractor should take special care to observe these limits any avoid any damage to vegetation outside.
Poaching of wild animals	Due to possible encounter with wild animals (including endangered species) Contractor shall take all precautionary measures to prevent poaching among the staff. Contractor should train people about the ban for hunting and prohibition of unauthorized use of weapon. Contractor should train people to safe behavior in the case of unexpected encounter with the wild animals. Unattached left food may attract the wild animals. No food or food remains should left unattached at night time to avoid attracting of wild animals (EMP Table 10(9)).
Interruption of traffic	The new bridge will be constructed 150m upstream of existent bridge. During construction, the existing structure will be used as a temporary bridge. After the construction is completed, the temporary bridge will be dismantled and the remains of the supports will be removed. The Contractor shall minimize and

	discuss with local residents any interruptions of traffic which may happen during the construction of access road.
Contractor's SSEMP	The Contractor shall review attached EMP and prepare its own SSEMP for the site in accordance with prepared instruction with 45 days after award of Contract.(EMP Table 9(1).

Photo illustrating the environmental issues of the site

The irrigation channel passes nearby the bridge. Contractor should preserve and maintain the channel throughout the construction period. Contractor should avoid pollution of water during construction work. Any interruptions in water supply should be agreed with affected community

Site-Specific Environmental Management Profile

For bridge# 18 over Bartang river at Km 91
of Rushan-Gudara-Muskul road

Bridge location plan (Source: ARUP, 2017)

View from the left bank, downstream of the bridge

Site basic and environmental information:

Bridge location	Rushan Disritct, GBAO
The crossed water body	River of Bartang, right tributary of Panj river
The closest villages	Gurkhum village in about 1 km
The current state of structure	The cable strayed bridge is 41.0 m long, with a total width of 3.9 m without sidewalks. The bridge carriageway is located at an altitude of approximately 4.0 m from the river's edge. Load-carrying capacity of the bridge is not more than 20 tons.
Socio-economic Significance	The bridge is the connection for the villages in the middle and upper part of Bartang valley and very important for the development of this remote rural area.
The structure designed under the project	The project designed new 62.2m cable stray with suspended system bridge in total width of 5.3 m. The design also includes rehabilitation of 433(162+271) m of approach road by the standards of V Category road. The bank protection dams will be built on both banks. On the right bank a length of the dam will make up 176m on the right bank 221 m
Topography	The site located at the bed of deeply incised valley The topography of the site surroundings is highly irregular mountainous terrain. The true altitude of the bridge site is about 2,400m.
Geology	The bridge is located within the Triassic bedrock comprising sandstone, schist, siltstone and conglomerates. Quaternary aged superficial deposits of glacial, fluvioglacial and alluvial deposits are fragmentary.
Sensitive receptors	The closest residential settlement- village of Gurkhum is located at the significant distance from the construction site. Therefore direct interaction with sensitive areas such as residential houses, schools, hospitals, etc. is not anticipated .
Flora and Fauna	Only several of low shrubs grow in vicinity to the bridge. Few bushes grow at the location of designed new bridge and subject to removal. The encounter with the wild fauna is possible,
Land Use	The surrounding lands are mainly barren.

Anticipated Site-Specific Environmental issues and Proposed Mitigation

Anticipated issue	**Proposed mitigation**

Water quality and erosion	The river of Bartang is the right tributary of Panj river and originates from the Sarez lake. The river is a major water body with permanent and relatively stable flow and may be used for drinking purposes downstream. Therefore the special care shall be taken to erosion control and prevention of contamination during construction work. Avoid the storage of the waste in vicinity to the river (at least 20m) and follow EMP (EMP 6.3, 6.4, 6.5). Specification (Section 109).
Noise	Contractor should strictly follow the regulations relating to noise control and appropriate measure described in EMP to ensure observations of work health and safety standards. The outside noise receptors are not available at the site. (EMP. Table 9(28-30)
Dust suppression	Contractor should strictly follow the regulations relating to dust control and take appropriate measures described in EMP to ensure compliance with work health and safety standards.
Specific Health and Safety Issues	The special care should be taken during the works near/over the river and under unstable slopes.
Property encroaching	The private property is absent within construction limits, therefore no resettlement issue is anticipated.
Cut of trees and bushes	Very few low shrubs are subject to removal during cleaning of construction site. The limits of removal were agreed with district's environmental authority. Contractor should take special care to observe these limits any avoid any unnecessary damage to vegetation.
Poaching	Due to possible encounter with wild animals (including endangered species) Contractor shall take all precautionary measures to prevent poaching among the staff. Contractor should train people about the ban for hunting and prohibition of unauthorized use of weapon. Contractor should train people to safe behavior in the case of unexpected encounter with the wild animals. Unattached left food may attract the wild animals. No food or food remains should left unattached at night time to avoid attracting of wild animals (EMP Table 10(9)).
Interruption of traffic	New bridge will be constructed 30m downstream of the existent bridge structure. During construction the existing structure will be used as a temporary bridge. After the construction is completed, the temporary bridge will be dismantled and the remains of the supports will be removed. The Contractor shall minimize and discuss with local residents any interruptions of traffic which may happen during the construction of access road.
Damage to Cultural or Historic Heritage	There are no documented cultural or historical heritage sites in close vicinity to the site, however due to rich history of area Contractor should strictly follow " The Chance Find Procedure" described in attached EMP. EMP sub-section 6.5
Contractor's	The Contractor shall review attached EMP and prepare its own SSEMP for the

SSEMP	site in accordance with prepared instruction with 45 days after award of Contract(EMP Table 9(1).

Photo illustrating the environmental issues at the site

The shrubs of *Rosa (rosaceae)* growing nearby the locations of the designed bridge.

SOCIAL ASSESSMENT

7 INTRODUCTION

Extreme climatic events in Tajikistan (such as floods, droughts, avalanches, landslides) periodically destroy land, crops, infrastructures and adversely affect sources of income. Annual losses from climate change and extreme climate events are estimated at $ 600 million, or 4.8% of Tajikistan's gross domestic product (GDP). Natural disasters and cataclysm threaten not only the life of the population, but also the resources and sources of their existence. Severe consequences of natural disasters can lead to the fact that recent advances in the economic and social development of countries can be reversed.

Based on the above, the proposed project plans to contribute to the creation of a framework for a long-term disaster risk management program for the Government of Tajikistan. A project of this type in the country will be implemented for the first time and includes the following components: (1) capacity building for disaster risk management (DRM) in the Republic of Tajikistan (II) ensuring the sustainability of critical infrastructure against natural hazards (III) conditional subcomponent for emergency response situation and (iv) project management.

The second component consists of two subcomponents:

- Transportation subcomponent: the project will provide support in the rehabilitation of bridges, which includes 18 bridges in four districts of GBAO: 5 bridges in the Vanj valley, 3 bridges in the Yazguliam valley (Vanj district); 1 bridge on the M41 highway (Dushanbe-Khorog, 538km), 3 bridges in the Bartang valley (Rushan district); 4 bridges in Murgab district and 2 bridges in Darvoz district.

Flood risk management subcomponent: the project will consider the possibility of supporting the rehabilitation of shore protection structures in the Khatlon region.

The transport subcomponent of the project plans to direct resources to the Gorno-Badakhshan Autonomous Region, which suffered the most from floods and mudflows in July 2015. The project plans to finance the reconstruction of infrastructure (bridges) in order to reduce the risk of exposure to natural disasters, reduce potential damage in the long term, taking into account the vulnerability of this region in case of emergency situations..

8 PURPOSE AND SCOPE:

The purpose of the social assessment was to study the socio-economic conditions of the project areas in terms of types and frequency of natural disasters, the amount of damage, the early warning system, emergency resettlement plans, the existing system of compensation for damage, the willingness of institutional organizations and the community to participate in the project and risks construction impact on the population.

Based on the objectives of the study, the main social research purposes were:

- Collection and analysis of data related to the socio - economic situation, living standards and food insecurity, income sources, taking into account gender issues in areas where the project will be implemented.
- Identify the level of labor migration and the use of labor to restore the infrastructure to protect against natural disasters;

- Identify the types, frequencies and amounts of damage resulting from natural disasters, both at the institutional and community levels;
- Identify segments of the population most vulnerable to the effects of natural disasters;
- Measures taken in emergency situations, both at institutional organizations and community levels;
- Identify the existing early warning system for natural disasters, both at the institutional and community levels;
- Identify public access to the main sources of information about natural disasters;
- Availability of resettlement plans and community willingness to relocate to new places of residence;
- Analysis of public access to the state compensation system in emergency situations;
- Identify the availability and types of international organizations assistance in emergency situations;
- Identify how, and if community members, apply new technologies in the construction of residential buildings, repair of bridges, roads and irrigation systems to reduce the impact of natural disasters;
- Consider the procedure for registration and consideration of complaints at the local level, including those related to the impact of natural disasters;
- Identify the willingness of the parties to participate in the project, in terms of human resources, community mobilization;
- Identify the impact of disaster recovery and construction of disaster resilient infrastructure on the standard of living of the population;
- To determine the population attitude to the location of temporary construction camps in terms of relationships, health and road safety;
- Identify the risk extent associated with drift of labor during the project implementation.

9 METHODOLOGY

To achieve these goals, there was used qualitative research methods: semi-structured interviews with key informants and focus groups.
These research methods have improved the reliability and validity of the data obtained when compared with data obtained from various other sources.
Semi-structural interviews were conducted with the following key informants:

1. Deputy chairmen of the Khukumats in charge of agriculture and water management, as well as natural disasters;
2. The heads of regional agencies of land reclamation and irrigation;
3. Representatives of the regional headquarters of the Committee of emergency management and civil defense (CEM and CD);
4. Heads of regional departments of education;
5. Health system representatives;
6. Representatives of environmental protection departments;
7. The chairmen of jamoats and mahalla committees;

The focus groups were held in jamoats, and included both men and women.

Site selection

The selection of areas for rapid social assessment was carried out taking into account the natural disasters (earthquakes, floods and mudflows) that occurred in June 2015 in GBAO and agreed with the world Bank.

Table 15 Name of project pilot zones in GBAO, where the social assessment was conducted

n/n	The name of the pilot areas	Name of jamoats	Name of villages
	Vanj	Jovid	Ardobak, Bunai
		Tekharv	Udob, Sed, Chikhokh, Ravgada, Tekharv, Shabru
		Yazgulom	Abdarbak, Jamak, Vishkharv
1	Murgab	Alichur	Alichur
		Berdybaev G	Kuna Kurgan
	Rushan	N. Dodkhudoev	Barrushon
2		Bartang	Darjomch
		Basid	Basid
3	Darvoz	Nulvand	Sangevn

In total, the survey was conducted 28 semi-structured interviews with key informants: including Vice-chairs Hukumat–3; heads of staff of CEM and CD–3; the heads of reclamation & irrigation departments – 3; the heads of education departments -3; representatives of the health care system to 3; the heads of departments of environmental protection -3; the chairmen of rural Communities – 5; chairmen of mahalla committees (community) -5. There were 5 focus groups, with the participation of both men and women. A total of 134 people were interviewed during the study.

Geographical location of the studied areas

Murgab district: the Murgab district occupies the Eastern part of GBAO and is the largest district in Tajikistan. The district shares borders with Kyrgyzstan to the North, China on the East, Afghanistan to the South, with Roshtkala Ishkashim, Shugnon and Vanj districts of GBAO from the South-West and Sangvorsk and Lyahsh districts of Republican subordination from the North-West. The distance from the center of the district to the center of the region-the city of Khorog is 300 kilometers, the capital of Dushanbe is 930 kilometers.

Vanj district: Vanch district is located between the Darvaz and Yazgulem ranges. With the Sangvor district, in the east with the Murghab district, from the south with the Rushan region, and in the east with the Darvaz region of Tajikistan and the province of Badakhshan of Afghanistan. From the north east to the southwest, the Vanch district is crossed by the Vanch and Yazgulem rivers.

Rushan. The Rushan district is located in the eastern part of Tajikistan and administratively is a part of the Gorno-Badakhshan Autonomous Region of Tajikistan. In the north-west it borders with the Vanj district, in the east with the Shugnan region and in the southeast with the Islamic Republic of Afghanistan. The distance from the district center to the capital of the country Dushanbe is 532 kilometers.

Darvaz district. The Darvaz district is located on both sides of the Darvaz mountain mange, which stretches 200 km between the Vanj and Hingou valleys. The Darvaz range borders the Sangvor region from the north, Vanj district from the east, Khatlon region from the west and Pyanj river from the south with the Badakhshan province of Afghanistan. Darvaz is known for its rugged terrain with high and steep mountains, narrow gorges with fast rivers and the lack of an internal road network. The international road M41 is the only transport artery passing through the district. The distance from the capital of the Republic of Dushanbe to Darvoz is 384 km.

10 SOCIO-ECONOMIC SITUATION OF PROJECT ZONES

General socio-economic characteristics of project areas.

In order to assess the main sources of household income, the level of employment and labor migration, it is necessary to give a general socio-economic characteristic of the studied areas. Indicators such as the total number and population density, the number of employees, the average annual wage, the official unemployment rate can give a general picture of the social standard of living.

Table 16 Socio - economic indicators of project areas[1]

	Vanj	**Murgab**	**Rushan**	**Darvoz**
The total area of thousands of square km	4,4	37,2	5,9	2,8
Population - total (thousands)	32,4	15, 5	25,3	23,3
Including%: men	5,8	49,7	51,6	51,7
women	49,2	50,3	48,4	48,3

[1]Official information was obtained on the basis of the statistical information received from the departments of the district statistics, as well as official information of the Agency of Statistics under the President of the Republic of Tajikistan, presented during the study by local authorities, the so-called district passports.

Population density km^2.	3,4	0,3	4,2	8,0
% of urban sector	0	0	0	0
% of rural sector	100	100	100	100
Ethnic composition:%: Tajiks	100	23,0	100	100
Kyrgyz	-	76,8	-	3
Other nations	-	0,1	-	-
Number of Jamoats	6	6	7	4
Number of villages	57	23	43	55
Number of able-bodied part of the population, thousand people	17600	9895	10700	13600
The average annual number of employees thousand people	2,5	3,03	7,8	10 730
Average monthly nominal wage (somoni)	500	500	550	570

Statistics show that the largest area in terms of occupied area is the surveyed Murghab district. Rushan and Vanj are also large areas. Darvoz is the smallest among the surveyed areas. In the Murghab and Rushan areas, the population density is the lowest. This indicator is 3,4 persons per km2 in VAnj, 0.3 persons per km2 in Murghab, and 4.2 persons per km2 in Rushan. In Darvaz, this figure is 8.0 people. per km2.

Employment rate and labor migration

According to official statistics obtained from local authorities and regional departments of the Statistics Agency, it is very difficult to obtain real information about the level of employment and unemployment. Thus, according to official data, the level of employment relative to the average annual number employed by the number of the working-age part of the population in the Murgab district is 25%. The unemployment rate in this area is over 60%. Then, as the official unemployment rate (2.5-3%)[2], does not give a real picture of unemployment at the district level. Due to the low level of unemployment benefits, the main part of the able-bodied part of the population is not registered at the Employment Centers of the districts.

Information obtained from local authorities suggests that although in recent years the number of labor migrants has decreased due to the tightening of immigration legislation in the Russian Federation, however, despite this, the level of labor migration remains high, as young people do not have another way

[2]Regions of the Republic of Tajikistan, 2015. Agency for Statistics under the President of the Republic of Tajikistan

out. A relatively high level of labor migration is observed in all the studied areas. So, in Murgab, this indicator is 21.3, in Vanj district, the number of labor migrants is 5.4, in the Rushan district, the number of labor migrants is 25.7% of the total population and 54% of its able-bodied part, in the Darvaz district, respectively, 12% of the total population and 28.1% of its able-bodied part.

Table 17 The level of labor migration in the studied areas

	Vanj	**Murgab**	**Rushan**	**Darvoz**
Number of labor migrants (thousand people)	5,4	3,3	6,4	2,08
In% of total population	16,6	21,3	25,7	12,0
In% of the working population	33	30	54	28,1

Main sources of income

According to official statistics, more than 50% of household incomes are earned income and only 10% of income from the sale of agricultural products [3].

[3]Food Security and Poverty №1 -2015. Agency on Statistics under the President of the Republic of Tajikistan

According to the statistics received from the district departments, the level of nominal wages in all the studied areas is almost the same and ranges from 500 somoni in the Murgab district to 570 somoni in the Darvaz district, in Vanj district, the minimum wage is 500 TJS somoni and in Rushan district, 600 TJS somoni.

Numerous studies conducted in Tajikistan indicate that wages, especially in rural areas, are not the main source of household income.

Conducted interviews in the focus groups of N. Dodkhudoev, Vanj, Murgab, Rushan and Darvaz districts revealed that migrant worker remittances are the main source of income for the majority of households.

The focus group participants of Jovidon and Yazgulom jamoats of Vanj district and N. Dodkhudoev jamoat of Rushan district noted that despite the decline in labor migration associated with the deportation of labor migrants from the Russian Federation in recent years, for most families, the main sources of their income are money transfers of labor migrants. Focus group participants in the Murgab district said that only thanks to labor migrants they can live more normally in this high mountain region. In these areas, the interlocutors noted that, on average, one person in each family, and in some families, two able-bodied men are in labor migration.

> *Our guys in Russia mainly work in the construction industry. Their work is considered seasonal, since spring - autumn is considered the height of construction work in Russia. In winter, there no job to do, so we return to our homeland and go back to Russia in early spring. Some young people who do not have the opportunity to go to Russia or have been deported work as a "mardikor" - employee" in the neighboring districts of the region. Afrosiyob, 27 years old, Udob village, Teharv jamoat, Vanj*

> *In the past three years, as they often began to deport us from Russia, the number of unemployed in the villages has increased several times. We returned to our land, and do not know what to do. Our land is rocky. We have so much strength, and we do not know where to put and use them, so we go from one mahalla to another. In the summer, deported migrants work as "mardicors" (employees) in the capital. Iskhok, 28 years old, Andarbak village, Yazgulyam. Vanj*

> *Our land can feed only 30% of the population of the area. Each member of the household has enough for 4 hectares of land, and those are stony. Homestead lands are distributed on 3-10 acres to each household. Therefore, labor migration is considered the main source of income. The grain stock, they say, is enough for 2 or 3 months of winter, and winter here begins very early and ends late. Focus group Barrushon village, Ruson*

One of the main sources of income for many families is agricultural production. It should be noted that rural settlements of Darvoz and Rushan districts have their own specific agri-ecological features in the production of agricultural products. Thus, the population of Nulvand jamoat of Darvaz district is engaged in gardening mainly in the production of apples and mulberry trees, and they also practice beekeeping, which has been developing in recent years. The participants of the focus groups of this jamoat noted that one of the main problems for their village is the lack of irrigation water. Due to the destruction of the canal more than 150 hectares remain unused. There is a problem of drinking water as well. The population uses irrigation cabal water as drinking water, which leads to the spread of infectious diseases related to the quality of drinking water. Grown products, mainly apples, are sold to middlemen at relatively low prices.

In Basid and Bartang jamoats of Rushan district, the population is mainly engaged in animal husbandry, the production of vegetables, fruits and the drying of mulberry trees. But, they noted that the products produced are used only for the needs of the family. They buy flour and butter.

But the main problem for the studied areas of Rushan and Darvoz is the lack of agricultural land. The stony highlands do not allow for the expansion of agricultural land.

Women in all studied areas are mainly engaged in agricultural production and housework. The employment of women in the Rushan district is somewhat different from the Murgab and Darvoz districts. The majority of women in Rushan district are educated, and more than 60% of the teaching staff of secondary schools are women. For a long time, women in the area have been engaged in knitting socks like "pamir jurabs", which are in great demand not only among locals, but also abroad, since "jurabs" are made from pure wool and have great value as an artistic craft, made from organic materials. In Murgab district, women are engaged only in animal husbandry. Due to the fact that it is very cold and highlands, it is not possible to engage in the production of vegetables and or gardening. This is the most significant difference of the area from other studied areas.

Our land can feed only 30% population of this area. Each member of the household has 4 hectares of land, and those are stony. Garden plots are distributed per 3-10 acres to each household. Therefore, labor migration is considered the main source of income. The grain stock, they say, is enough for 2 or 3 months of winter and winter itself starts here very early and ends late. Focus group village Barrushon, Rushan

11 NATURAL HAZARDS DAMAGE ASSESSMENT OF PROJECT AREAS

Propagation dynamics analysis of the most dangerous natural phenomena and damage assessment in the studied project areas

Extreme climatic events (such as earthquakes, floods, droughts, avalanches, landslides) periodically destroy land, crops, infrastructure and negatively affect sources of income. Climate change is a major concern for Tajikistan, as the country is highly susceptible to this and has a relatively low adaptive capacity. Among 182 countries ranked by the global adaptation index of the University of Notre Dame, Tajikistan ranks 115th. Tajikistan ranks 45th among the most vulnerable countries and 118th among the less developed countries. Compared to other countries in the index, its current state of vulnerability is manageable. However, improvement in readiness is necessary, if it is done, in order to become better adapted to future climate change and climate-related difficulties[4]. TheGermanwatch, Tajikistan, ranks 29th[5] in the Long-Term Climate Index. World Bank identifies Tajikistan as the most vulnerable country in Central Asia[6].

According to the Committee of Emergencies Management and Civil Defense under the Government of Tajikistan, over the past eighteen years, there are 2,750 emergencies of a natural hazard have occurred in the country (Figure 1).

[4] NotreDameGlobalAdaptationIndex. http://index.gain.org/country/tajikistan

[5] Craft S., Eckstein D., Dorsch L., and Fisher L., 2015 Global Climate Risk Index 2016: Who suffers the most from extreme weather events? Losses due to weather in 2014, a comparison of 1995. by 2014.

[6] Gelbert R., Reva A., and Zaidi S., 2012, Tajikistan: Economic and Distributive Impact of Climate Change (No. 10047). The World Bank.

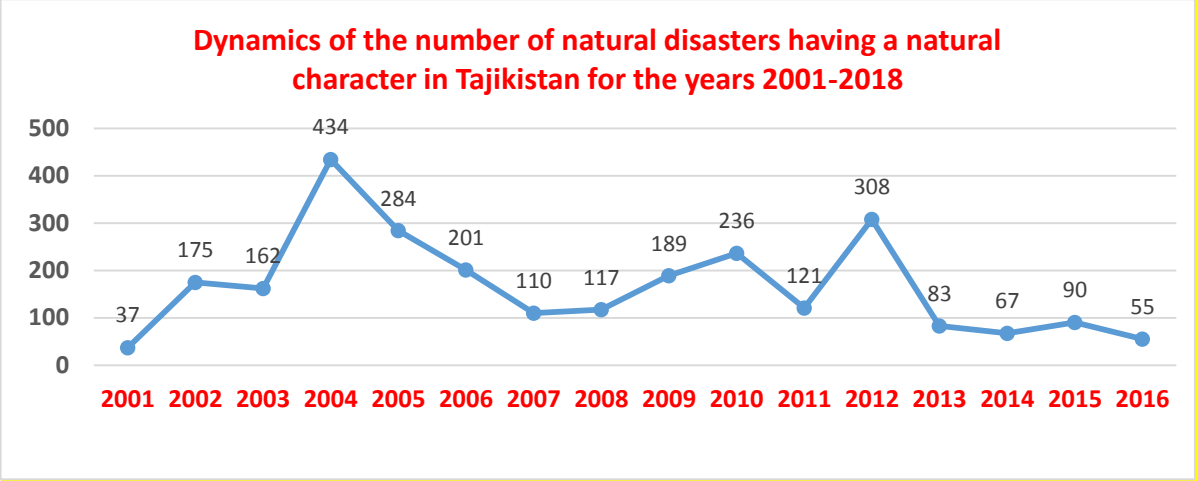


Figure 5 Dynamic of the number of natural disasters having a natural character in Tajikistan for the years 2001-2018

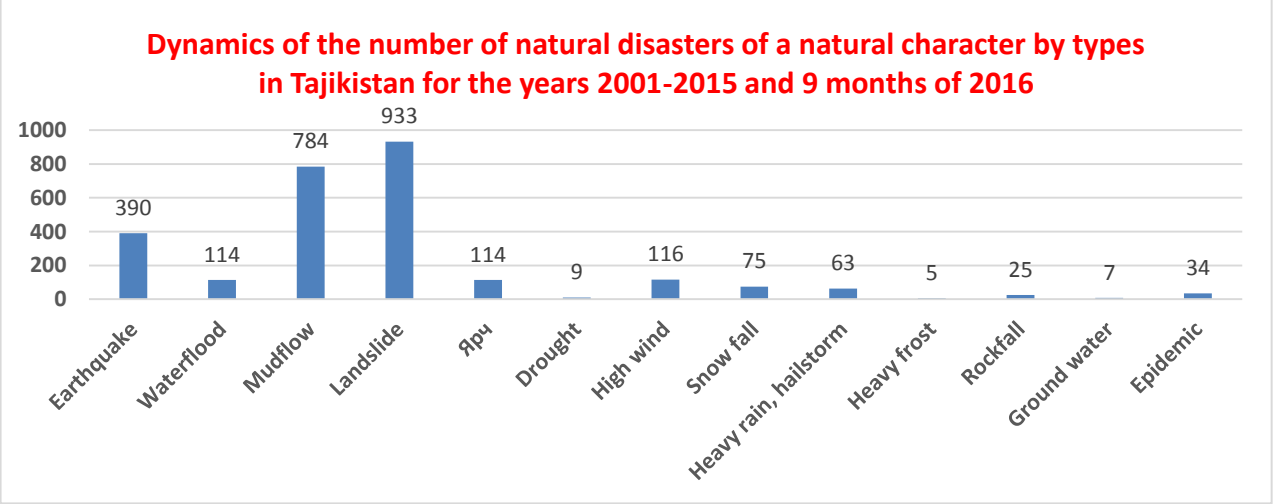


Figure 6 Dynamics of the number of natural disasters by types in Tajikistam for the years 2001-2015 and 9 months of 2016

Based on the fact that over 93% of Tajikistan territory is made up of mountains, the number of natural disasters associated with avalanches and mudflows[7] is observed most of all, especially during the period of warming weather. Thus, over the past 16 years, 933 natural disasters have occurred in the country, associated with the avalanche and 784 cases of mudflows. Tajikistan, as a mountainous country, is also prone to earthquakes (390 cases), floods in particular in the Pyanj River basin (114 cases) and landslides (114 cases).

As noted above, the implementation of Component 2 of the project to strengthen critical infrastructure to ensure the resistance against natural hazards consists of 2 subcomponents. The first

[7]The mudflow is a flood with a very high concentration of mineral particles, stones and rock fragments

subcomponent is implemented in GBAO (bridges reconstruction) and the second in Khatlon districts (bank protection works).

The results of the interviews at the level of institutional organizations (Hukumat, headquarters CEM&CD), and the community of jamoats, mahalla committees, and focus groups showed that in natural areas of GBAO (Murgab, Darvoz and Rushan) such natural disasters like earthquakes, avalanches, rock falls and floods are mostly observed. Respondents noted that in recent years, natural disasters such as mudflows, avalanches and earthquakes are repeated almost every year. These disasters mainly occur in the spring, when the temperature rises. According to the respondents, the most devastating natural disaster occurred in July 2015.

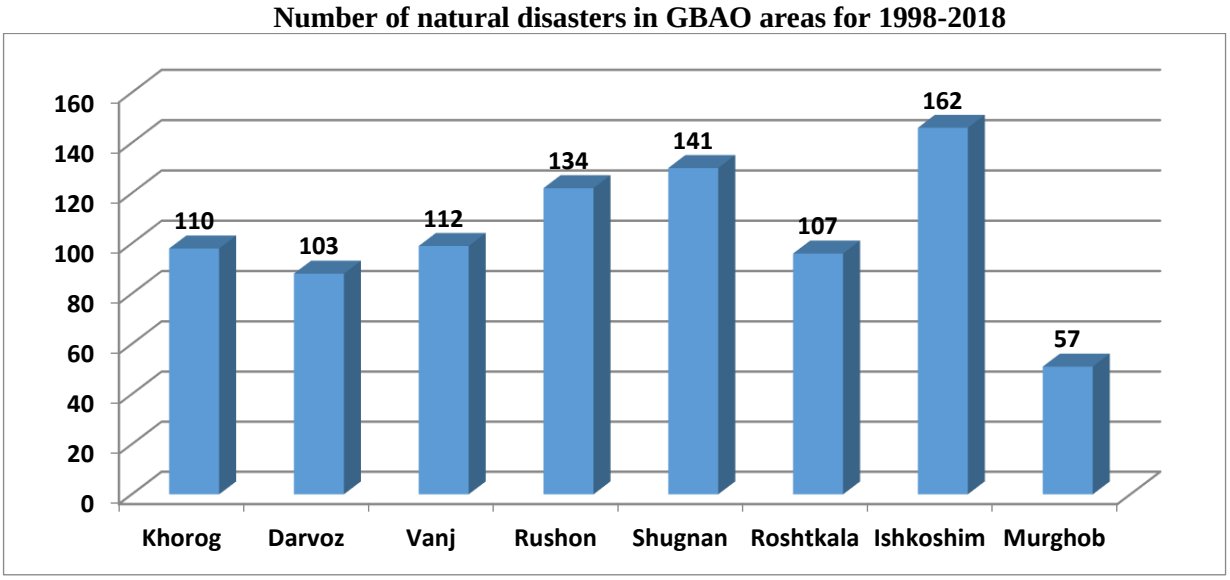


Figure 7 Number of natural disasters in GBAO areas for 1998-2018

According to information received from the CEM&CD of the republic, for the years 1998-2018, GBAO recorded 926 cases of emergency situations having a natural character, which makes up 31% of all natural emergency situations of Tajikistan. During this period of time, emergencies claimed the lives of 66 people. Most of all human victims were observed in Roshtkala district - 30 people, Shugnan - 17 and Ishkoshim-10 people. On average, over the past 20 years in GBAO there have been 44 natural disasters.

The most destructive natural disasters in the project areas of Rushan and Darvoz were events that took place July 19-24, 2015. In the Rushan region as a result of rising temperatures, mudflows and rising water levels in the Bartang and Pyanj rivers, the total damage caused by natural disasters was 16,148.6 thousand TJS somoni (more than 1,714 thousand US dollars).

Table 18 The number and amount of damage as a result of natural disasters that took place on July 19-24, 2015 in Vanj, Murgab, Darvoz and Rushan districts of GBAO

		Unit	Quantity				Amount of damage (thousands of somoni)		
			Vanj	Murgab	Darvoz	Rushan	Murgab	Darvoz	Rushan
1	Number of affected dwellings including: completely destroyed partially destroyed	nos.	19 7 12	34 12 22	15 9	9 6 3	2198,0 350,0 52,3	969,7	225
2	Highways	km	1,62	7,5	27,4	29,5	117,1	78,1	280
3	Bridges	nos.	10	10	-	4	274,9	-	140
4	Transmission lines and communications	km	2,0	-	9,5	2	-	324,6	22,8
5	Irrigation canals, pumps	km	0,4	-	-	4,66	-	-	138,3
6	Acreage	hectare	7,18	-	9,0	79,4	-	476,3	855,9
7	The gardens	hectare	2,12	-	3	12,78	-	273,7	24,3
8	Shore protection lines	km	4,36	0,104	-	5	170,0	-	150
9	Subsistence and dekhkan farms	hectare	-	-	-	2,77	-	-	124,6
10	Health facilities	nos.	1	-	-	-	-	-	-
11	Drinking water transmission lines	km	1,5	-	-	-	-	-	-
12	Agricultural works	nos.	7	17	-	-	58,5	-	-
	Total	x	x	x		x	1022,8	2296,5	1712,0

According to participants and focus groups, the main reason for the increase in the number of natural disasters in recent years is climate change. Respondents noted that in recent years, with a sharp rise in temperature, glaciers began to thaw strongly, leading to an increase in natural disasters such as mudflows,

avalanches and floods. Respondents noted that before such natural disasters occurred, but they were not so devastating.

The most vulnerable population to natural hazards

The results of surveys in focus groups revealed that natural disasters have tangible impacts on all segments of the population. But at the same time, respondents attributed the most vulnerable groups of the population to the effects of natural disasters: the family where the heads of the household are women (mostly widows), the family where the adult members of the household are mostly men in labor migration, the family has no adult sons, large family, family where members of the household are disabled.

> *In July 2015, due to excessive warming of the weather and large mudflows, mudflows occurred, which caused great damage to the economy of the Vanj region. As a result, roads, bridges, pipelines, living quarters, gardens and fields remained under the mudflow. Including, the bridge of Udob village, which is of great strategic importance, has become unsuitable. The bridge connects the lower part of the Vanj district with the upper part of Vanj. Nearly 10 thousand people live on the other side of the bridge. Focus group Vanj*
>
> *Of course, it was noticeable that my husband was not among us that day, but thanks to the neighbors, my family was able to quickly reach a safe place. After some time, we were with relatives. Among the victims there were families with disabled people, but fortunately, these people with disabilities could walk, and do without any help. Gulhonim, 35 years old, Basid, Rushan.*
>
> *Women fall into panic in an emergency situations, as there are no men or adult children near them to get to a safe place. It is pity most of all for disabled children and old men. Therefore, we try first of all to help them. Focus group, village Sangevn, Nulvand jamoat, Darvoz.*

12 ANALYSIS OF THE EXISTING MANAGEMENT SYSTEM OF NATURAL DISASTERS IN THE PROJECT ZONES

Assessment of the level of community awareness of natural disasters at all activity levels

Decree of the Government of the Republic of Tajikistan dated March 30, 2010 No. 164 adopted the National Strategy for Disaster Risk Management for 2010-2015. This strategy notes that the current level of community awareness of the Republic of Tajikistan on the possibilities and methods of disaster risk reduction are not sufficient to reduce their consequences. Knowledge of disaster risk at the institutional and community level is necessary for the rational use of limited resources to prevent consequences or to avoid disasters. Based on this, this Strategy has set the task of conducting continuous work to increase the level community awareness of natural disasters at all levels of life, starting from secondary schools and ending with communities and government.

Conducted conversations with representatives of the education system of Vanj and Rushan districts showed that during the school year, two practical classes and theoretical lessons on behavioral skills are conducted for students in emergency situations. During the year secondary school teachers twice participate in student training and seminars organized by district headquarters of CEM&CD and international organizations. Representatives of medical institutions also noted that they annually participate in workshops related to the actions of medical workers in emergency situations.

Representatives of district Hukumats and district headquarters for emergency situations noted that they had planned twice-yearly exercises in the districts with the involvement of representatives of all government agencies and the community. When conducting planned exercises, issues such as the availability of contingency plans, the distribution of responsibilities, availability of safe places for population evacuation are considered. Voluntary-support groups are organized in each jamoat.

Focus group participants (Vanj, Murgab, Rushan and Darvoz) noted that representatives of their communities participate in workshops and round tables related to the impact of the population during natural disasters. Such seminars are usually held in the center of districts, several people are invited from each jamoat. The organizers of such events are usually the Hukumats of the regions, the headquarters of the CEM&CD with the support of international organizations. In GBAO, such events are usually organized by Focus international organizations. Focus group participants noted that informational work on emergency situations should be carried out, not only for individuals, but also for all members of the community.

> *The seminars were held in the center of the region, and representatives were invited from each village, with the purpose that they, in turn, could hold such seminars with the population. The meetings showed that explanatory work was conducted among the population and people understand the natural danger well. Focus group Basid, Rushan*

An important means of raising public awareness is the mass media and above all television, radio, newspapers and magazines. Most of the participants in focus groups noted that television is the most effective means of raising public awareness. At the same time, respondents noted that they do not always receive reliable information about natural disasters on television. Thus, representatives of the focus groups of the surveyed regions noted that they received TV information only after natural disasters that occurred in their regions. Respondents noted that there are very few programs on television related to the actions of the population in emergency situations.

Effectiveness analysis of the existing early warning system and rapid response teams

In accordance with Article 6 of the Law of the Republic of Tajikistan "On the Protection of the Population and Territories from Natural and Man-Made Emergencies" dated 08.08.2004. №7 unified state system of prevention and elimination of emergencies combines the authorities, whose authority is to address issues of protecting the population and territories from emergencies. The main tasks of the unified state warning system in emergency situations are: the development and implementation of legal and economic standards, the implementation of targeted and scientific-technical programs, preparedness for action by management bodies, the collection, processing, exchange and issuance of information, training the population to act in emergency situations. In accordance with this law, an early warning system, authorized ministries and departments on a single state system provide projected information on emergencies to the Committee for Emergencies Management and Civil Defense. The Committee in its time provides information to regional headquarters of emergency situations and civil defense, and they provide to district headquarters of emergency situations and civil defense. The district headquarters of the emergency and civil defense alert local authorities and jamoats. In accordance with Article 10 of this law, local authorities are obliged to collect and exchange information in the established order in the field of population and territories protection from emergency situations, to ensure timely notification of the population about the threat of emergency situations.

However, the impossibility of due notice of population evacuation can adversely affect the evacuation management. In other words, the effectiveness of the evacuation depends on how the alert system is well-adjusted. It can be significantly improved if the population is aware of the danger, and

understands the circumstances under which evacuation is unavoidable, how it will be carried out, and how to prepare for it.

The warning system for natural disasters is largely dependent on public access to information sources. As the results of the study showed, the main source of information about natural disasters for many residents of the studied areas is telephone communications. According to the Statistics Agency under the President of the Republic of Tajikistan, at present, the number of mobile subscribers in nine million Tajikistan is more than 11.2 million people, among them about 6.5 million people are active subscribers. Despite this, in some GBAO localities, public access to mobile communications is limited. For example, the participants of the focus groups of Basid jamoat of Rushan district noted that they do not have a mobile connection. And in the Alichur jamoat of the Murgab district, not everyone has access to mobile communications due to the fact that electricity is often cut off. Based on this, many residents of these jamoats, only the next day will learn about past natural disasters on television in their areas.

Interviews with representatives of the institutional organizations of Murgab, Rushan and Darvoz districts represented by Hukumats and emergency headquarters, and jamoats, who are directly responsible for the early warning system in emergency situations, have shown that the main means of warning about natural disasters are radio, mobile phones. At the community level, portable speakers are also accepted. Representatives of Hukumats, emergency headquarters, local departments of internal affairs and representatives are mostly provided with walkie-talkies, more dangerous to natural disasters jamoats (Tekharv, Jovid of Vanj district, N.Dodkhudoev, Basid and Bartang of Rushan district, Nulvand and Alichur of Darvoz district and Berdybaev of Murgab district).

> *In the village and in the area there is an early warning system in emergency situations. Public alerts occur via mobile phones. This is where the rapid response team is actively involved. They help people get to safe places. A safe place for the population is considered to be a school, as it is, as a rule, on a hill, in a safe place. Before the arrival of assistance, this group can feed and water the victims. Focus group, Rushan*

> *In the village and in the area there is an early warning system in emergency situations. Public alerts occur via mobile phones. We also have a special signal from Lake Sarez. This is where the rapid response team is actively involved. They help people get to safe places. A safe place for the population is considered to be a school, as it is, as a rule, on a hill, in a safe place. Before the arrival of assistance, this group can feed and water the victims. Focus group, Basid, Rushan*

The participants of the GBAO focus groups (Vanj, Rushan) noted that representatives of their communities participate in workshops and round tables related to the impact of the population during natural disasters. Such seminars are usually held in the center of districts from each jamoat are invited for several people. The organizers of such events are usually the Khukumats of the regions, the headquarters of the ES and CD with the support of international organizations. In GBAO, such events are usually organized by international organizations Focus. Focus group participants noted that information work on emergency situations should be carried out, not only for individuals, but also for all members of the community.

> *The seminars were held in the center of the region, and representatives were invited from each village, with the goal that they, in turn, could hold such seminars with the population. But, unfortunately, conversations have shown that explanatory work was not conducted among the population as a whole. Focus group Vanj*

> *Of course, they don't have to invite all of us to the seminars, but there are other methods of disseminating information to the public, such as brochures, booklets, and posters. Focus group Vishkharv, Yazgulyam, Vanj*

Representatives of the district headquarters of emergency situations and civil defense noted that they feel great difficulties in technical equipment of their organizations. They mainly use their own mobile phones as the main means of notification, they need such notification tools as sirens and circular call stands for more effective work. Practically all the heads of emergency situations and civil defense staffs noted that they lack special equipment to assist the population during natural disasters, the necessary equipment, shelter tents, cars.

Rapid response teams. The world experience shows that one of the most effective methods to quickly respond to the effects of natural disasters and reduce damage and, above all, human lives is the creation of committees or rapid response teams. The main task of the rapid response teams is to: coordinate the activities of the group members, eliminate natural disasters consequences at the site of natural disasters, carry out prompt assistance to victims at the site of natural disasters. The activity of the Rapid Response Group is based on the Standard Methods of Work for the assessment of damage and needs, detailed terms of reference for the rapid response teams. In accordance with the legislation of the Republic of Tajikistan, members of the rapid response team must complete special courses on providing emergency assistance to the population and have a corresponding certificate.

Conversations, both at institutional organizations and community levels, revealed that at the community level in the studied areas of GBAO (Vanj, Murgab, Rushan and Darvoz) there are rapid response teams in emergency situations. Thus, representatives of Darjomch village, Rushan district, noted that four years ago, a rapid response group of 30 people was created in the village. Three years ago, the group members underwent training and received the appropriate certificate. Periodically, they conduct trainings among the population on action in emergency situations. The rapid response team includes medical workers, teachers, specialists of various professions, mostly young strong men. On their hand, the rapid response team has primary rescue equipment, including shovels, cables, ropes, stretchers, tents and loudspeakers.

Representatives of Berdybaev jamoats, Alichur of Murgab district, also noted that there is a rapid response team in emergency situations in their jamoats. At the same time, representatives of the community noted that the rapid response team in their village did not have enough basic equipment to provide emergency assistance, for example, the group did not have a loudspeaker to alert the population and coordinate activities. The community representatives noted that with the support of the international organization, a quick-response workshop was held for group, and this organization promised to provide the group with all the necessary equipment and supplies.

Assessment of existing disaster resettlement plans at institutional and community levels

Disaster recovery often includes the relocation of disaster victims from dangerous places to new places. Resettlement in Tajikistan is allowed in accordance with Instruction No. 221 on the Approval of Orders on the Implementation of Ecology, Migration in the Republic of Tajikistan, dated May 3, 2010.

In general, resettlement is carried out on land owned by the state, or land on which the state acquired control through purchase or by other means. The Ministry of Labor, Migration and Employment, together with the Committee for Emergency Situations and Civil Defense, the General Directorate of Geology, the Agency for Land Use, Geodesy and Cartography should coordinate resettlement issues.

The legislation of the Republic of Tajikistan provides for the following conditions of resettlement, including those related to natural disasters: resettlement cannot be enforced; relocated persons must be notified of the relocation; relocated persons should receive free of charge the right to land ownership, the

relocation process includes support to relocated persons in the form of monetary compensation, construction materials[8].

In accordance with the Law of the Republic of Tajikistan "On population and territory protection from natural and man-made emergencies", an evacuation commission should operate at the district level, which in the event of natural disasters should arrange population evacuation to safe places. Based on this, in each district there should be an evacuation plan.

Conversations, both at the institutional organizations and at community levels revealed that respondents do not always clearly understand the concept of a resettlement plan and a plan to evacuate the population.

Conducted conversations with representatives of the Hukumats of Vanj, Murgab, Rushan and Darvoz districts revealed that at the level of these areas there are plans to resettle the population and plans to evacuate the population to safer places when natural disasters occur. So representatives of the Rushan district noted that, until the present, 133 families had been relocated to safer places, they had been assisted in building houses. In Darvaz district, 21 families were also relocated, and the government built houses with all conveniences to them.

Representatives of Hhukumats noted that the process of population resettlement is carried out on a voluntary basis, and representatives of these villages themselves participate in choosing places for resettlement. On the part of the Government and local authorities, immigrants receive material assistance in the form of construction materials, fuel and lubricants, labor, and monetary compensation. Representatives of the district headquarters of the CEM&CD noted that in their areas there are plans for resettlement and evacuation in emergency situations. At the same time, representatives of CEM&CD Headquarters noted that they are most responsible for the implementation of plans for the temporary evacuation of the population to safer places. Evacuation commissions have been established in these areas. In accordance with the evacuation plan, trainings, seminars and planned exercises are conducted on average once a year in these areas. Representatives of local authorities in the face of jamoats noted that in their jamoats there are plans for resettlement and evacuation of the population in emergency situations. For example, the chairman of Nulvand jamoat of Darvoz district noted that there are 18 families from Khostav village and 3 families from Shirgovad village were resettled to safe places, the resettlement process was voluntary. Representatives of these families directly participated in the choice of place of residence. According to information obtained from the socio-economic development programs for 2015-2020, in the Rushan district, among 47 villages, 31 villages (72.1%) of them are in the zones of natural disasters origin, in Darvoz district, among 55 villages, 36 of them are in hazardous areas.

In accordance with the evacuation plan, trainings and seminars are held in these districts. The Hukumat of the Vanj District noted that this process involved the resettlement of the population from the villages of Vahdat and Dashti Bovid. Representatives of the Hukumats noted that the process of resettlement of the population is carried out on a voluntary basis, and the representatives of these villages themselves participate in the selection of places for resettlement. On the part of the Government and local authorities, immigrants receive material assistance in the form of building materials, fuel and lubricants, labor, and monetary compensation. Representatives of the district headquarters of ES and CD noted that in their districts there are plans for resettlement and evacuation during emergency situations and planned exercises on average once a year. Representatives of local authorities in the face of jamoats noted that in their jamoats there are plans for resettlement and evacuation of the population in emergency situations. For example, the chairman of Jamoat Teharv, Vanj district noted that 14 families were resettled from the village of Khaspo to safe places, the resettlement process was voluntary. Representatives of these families directly

[8]The law does not describe the exact amount of monetary compensation, the monetary compensation depends on the amount of damage.

participated in the choice of residence. Representatives of Hukumats and jamoats noted that the family of immigrants received monetary compensation from the Ministry of Labor, Migration and Employment in the amount of 3,000 TJS somoni and the insurance company "Tochiksugurta" in the amount of 5,000 TJS somoni of one-time assistance. According to information obtained from the socio-economic development programs for 2015-2020, in the Rushan district among 47 villages there are 31 villages (72.1%) are in the zones of natural disasters orogin, in Vanj district among 67 villages there are 23 are in hazardous areas

Conversations with the heads of the education and health care systems in the studied areas showed that there were approved emergency evacuation plans in their organizations.

Interviews in focus groups showed that respondents were mostly aware of emergency evacuation plans. Focus group participants noted that there are safe places in their villages, where people usually temporarily relocate in emergency situations, and according to respondents, schools that were built in safe places according to the plan. Part of the population temporarily live with relatives whose homes are in safe places.

> *Our village threatens the fall of avalanches every winter and at the beginning of spring. These homes include 19 households of Basid village and there are such households in other villages of the jamoat. In such situations, only women and children are temporarily resettled by relatives who live in the safe places of this village or another village. Men stay at home looking after the household and livestock. Focus group, Basid, Rushan.*

Representatives of Jovidon jamoat, Vanj district, also noted that there is an emergency response team in their jamoat. At the same time, representatives of the community noted that the rapid response team in their village did not have enough basic equipment to provide emergency assistance, for example, the group did not have a loudspeaker to alert the population and coordinate activities. Representatives of the community noted that with the support of the international organization Focus, a quick workshop was held for a workshop, and this organization promised to provide this group with all the necessary equipment and gear.

> *On the day of the onset of mudflows, three of our fellow villagers were on top of a mountain and were examining the village from the top and they had a loudspeaker. It was with the help of a loudspeaker that they notified the population and as a result almost 150 people survived. The population of the village quickly climbed to the high-altitude place of the village, then temporarily housed with relatives. Focus group, Udob village, Vanj*

The use of new technologies by local communities to reduce the impact of disaster risks

The results of the studies showed that the impact of natural disasters was most confirmed those households, social facilities, irrigation bridges and other structures in the construction of which did not take into account the impact of natural disasters and did not use new technologies, that is, they are usually old buildings.

Interviews at the level of representatives of Hukumats, CEM and Civil Defense, the education system, health care and irrigation system workers showed that at present, the construction of new structures takes into account the impact of natural disasters. So representatives of the education system noted that at the present time, schools and preschool institutions are being built in places safe from natural disasters. The construction of schools uses modern technologies that are resistant to natural disasters. Seismic belts, plastic doors and windows, cement and modern brick blocks are used as new technologies. Acceptance of school and preschool institutions is carried out by a specially established commission that takes into account the resilience of objects to natural disasters using the latest technologies. According to respondents, the safest place in case of natural disasters are school and preschool institutions, and in terms of evacuation, these

objects are considered the most reliable. Representatives of the health care system also noted that the building of medical institutions at the present time is mainly built taking into account the impact of natural disasters. So representatives of Vanj, Murgab, Rushan and Darvoz districts noted that medical facilities are being built primarily taking into account such natural disasters as earthquakes and floods. Usually medical facilities are built in places where the impact of natural disasters is minimal. Representatives of the irrigation system noted that the use of new technologies in restoring the irrigation system and carrying out bank protection work requires large financial resources, new technology, on the basis of which they mainly use traditional methods of reducing natural disasters. To reduce the impact of natural disasters, they mainly use such methods as terracing the slopes and planting trees, cleaning irrigation canals, erecting gabions in hazardous areas.

Conversations with representatives of jamoats and mahalla committees revealed that traditional methods of disaster reduction are mainly used to reduce the impact of natural disasters in their communities. To reduce the impact of natural disasters, "hashar" public works are organized annually, mainly in spring, for planting trees, cleaning canals and ditches, mudflow zones, erecting gabions, and repairing farm roads. Due to the lack of technology, all work is done manually.

> *In addition to passenger cars, the population has no other equipment. The population has to order trucks for transportation of building materials for the repair or construction of houses. Focus group. Darjomch village, Bartang jamoat, Rushan.*
>
> *It seems to us that, whenever possible, equipment should be in every village, especially in our villages, where natural disasters occur every year. The population is doing all the recovery work manually. Even women have to carry or lift stones, sand, sticks ... Nosirsho, Shirgovad village, Nulvand jamoat, Darvoz.*

During the interviews in focus groups, issues related to the use of new technologies in the construction of residential buildings were also considered, taking into account the impact of natural disasters. Most respondents noted that the use of new technologies in the construction of residential buildings depends on the financial situation of the household. The poorest segments of the population mainly use traditional building materials in the construction of residential premises, which do not fully take into account the effects of natural disasters (earthquake, avalanches, mudflows and floods). When building houses, poor households mainly use clay as a building material (especially in Darvaz). Respondents noted that the returned migrant workers have extensive experience in the use of new technologies in the construction of residential buildings in the light of emergency situations. When building new houses, they build houses in safer places, use in construction as local building materials, for example, sand and stones, as well as cement, block bricks, fittings, plastic windows. In general, respondents noted that they have a lot of experience in the use of new technologies in the construction of new residential buildings, but given the lack of financial resources, they are not fully able to use them.

13 ASSESSMENT OF THESTATE AND INTERNATIONAL SUPPORT SYSTEM FOR NATURAL DISASTERS

Public access to the state emergency support system

In accordance with Article 24 of the Law of the Republic of Tajikistan "On Protection of the Population and Territories from Natural and Man-Made Emergencies", emergency response measures are financed by organizations in emergency zones, funds from local government bodies, relevant budgets, insurance funds and other sources. In the absence or inadequacy of these funds for emergency response, funds are allocated from the reserve fund of the Republic of Tajikistan in the manner established by the Government of the Republic of Tajikistan.

The results of interviews with representatives of institutional organizations, local authorities (jamoats), communities (mahalla committees) and focus groups showed that the role of local and central authorities, international and public organizations in reducing the impact of natural disasters is significant.

Thus, representatives of Hukumats of Vanj, Darvoz and Rushan districts noted that the Central Authorities provided great assistance in the aftermath of natural disasters that occurred July 19-24, 2015 and in 2016. For the trying households of the Rushan district, free construction materials were allocated, 8 households were relocated to new places of permanent residence. Assistance in the aftermath of natural disasters has provided all regions of the republic. By order of the Government of the Republic of Tajikistan, the houses of those households that were destroyed were completely given one-time assistance in the amount of 10 thousand somoni, houses that were partially destroyed in the amount of 6 thousand somoni. In the Rushan district, more than 133 households received material assistance in the form of constructive materials. Affected families were also assisted in the form of food. Representatives of the health care system noted that, on the part of government bodies, medical organizations had been allocated medicines, which were distributed free of charge among the population.

In Darvoz District, there are 21 affected families from Khostav and Shirgovad villages built new houses with all conveniences at the expense of the country's budget in a new safe place.

In almost all the focus groups in Darvoz and Rushan districts, respondents noted that they received help from state bodies in the form of building materials and food products, and some heavily struggling households received monetary compensation and even presented ready-made houses to them.

The contribution of international organizations to reducing the impact of natural disasters

The assistance of international organizations in reducing the impact of natural disasters in Tajikistan is very great. And to describe in this report the contribution of all international organizations including international financial institutions, donors, international non-governmental organizations, humanitarian aid is almost impossible. This question requires a separate study. Based on this, this report presents the opinion of institutional organizations and the community on the contribution of international organizations, specifically in their area, jamoat or village associated with reducing the impact of natural disasters. It should be noted that due to the low level of public awareness about the contribution of international organizations, they often do not know which international organization rendered assistance to them.

Interviewing at the level of institutional organizations of Vanj, Murgab, Darvoz and Rushan districts revealed that international organizations such as the Focus Program, the Aga Khan Foundation, the Global Partnership, the United Nations Program, climate change in the Pyanj river basins (ADB). Thus, representatives of the Hukumats noted that the Focus Program, the UN and the Aga Khan Foundation, each affected family, as a result of the 2015 floods, provided one-time assistance in the amount of 3000 somoni. The Aga Khan Foundation also helped restore the drinking water line and helped with food. ADB assisted in shore protection works.

Representatives of the CEM&CD headquarters noted that the Focus program helped them in the form of fuel and lubricants. Representatives of medical institutions noted from the side of the Aga Khan Foundation, 10 outpatient clinics were repaired and medical equipment was provided. Representatives of the studied jamoats also noted assistance from the Focus and Aga Khan Foundation programs. Representatives of environmental protection departments noted that they did not receive any assistance in reducing the impact of natural disasters from international organizations.

The interviews conducted in focus groups showed that most of the respondents either do not have or have very little information about the assistance of international organizations, the assistance provided is

mainly distributed among the affected households, representatives of local authorities. Only respondents of the focus groups of the Darvoz district, noted that they were provided with material, assistance, such international organizations as the Aga Khan Foundation, Focus and ADB.

Based on the study, it can be concluded that international organizations do not coordinate their activities, do not conduct informational work among the population, there is no communication between the community and project implementation units.

Registration procedure and consideration of grievances

Conducted interviews in focus groups showed that the procedures for handling, consideration and registration of complaints of the population, are the same in almost all the studied areas. The initial instance of complaints about domestic complaints (quarrels in the family, with neighbors) are mahalla committees, if the solution to this complaint is not found at this level, then the population turns to jamoats (local authorities). At the level of mahalla committees, complaints are usually not registered, and appeal complaints are oral in nature. At the jamoat level, complaints are usually registered and considered in accordance with the authority of the jamoat. In Jamoats, the population usually lodges complaints, both of a domestic nature and related to the unfair distribution of land, and compensation for damages. If it is impossible to solve their problems at the level of jamoats, the population most often complains to the Hukumats of the districts. In the Hukumat of the district, all complaints are registered and sent to their respective organizations for resolution (for example, the district education department, the district water management department). There are special days in Hukumat district for receiving complaints from citizens.

In the course of the study, special attention was paid to complaints concerning the issues of resettlement of people to safer places, distribution of land in new places of residence, compensation repayment in case of natural disasters. Representatives of Hukumats and other government agencies noted that a special commission of representatives of all government agencies was established for complaints from the population on issues of resettlement, compensation for damage caused by natural disasters at the level of Hukumats, which consider complaints and take appropriate decisions.

> *After devastating natural disasters, the number of complaints and statements increased several times. The Hukumat first of all decided to help heavily destroyed households, but the population did not always understand this. Focus group Darjomch village, Bartang, Rushon.*

14 READINESS, INFLUENCE AND RISKS OF PROJECTS IMPLEMENTATION IN STUDIED AREAS

Opinion of stakeholders on the impact of project results on raising the living standard

In determining the impact of the results of the proposed project on improving the living standards of the studied areas, the restoration of bridges in the project areas of GBAO (Vanj, Murgab, Rushan, Darvoz) was taken into account.

Representatives of the Hukumats, education and health care systems, staffs of CEM&CD, irrigation and other organizations in the Vanj, Rushan, Darvoz and Murgab districts noted that, in general, the construction of bridges will have a positive effect on population living standards, but also on other districts. Thus, representatives of Hukumats noted that the construction of bridges would improve transport links between the settlements, reduce transport costs, and allow dekhkans and households to sell their products outside the district. Restoration of bridges will affect the decline in prices for food products and other industrial products. Due to the lack of bridges and high transportation costs, the price of food products such

as flour, oil and other industrial products is slightly higher compared to other villages. In the Murgab district, respondents noted that they bring almost all products, except meat and dairy products. Therefore, the restoration of bridges is very important for them. Representatives of the education system of the Rushan district noted that the construction of bridges will improve the attendance of schoolchildren in school. For example, representatives of the education system noted that due to the lack of bridges, some students have to walk to school at a distance of 10-15 kilometers, and when building bridges, this distance can be as low as 2 kilometers. Representatives of the health care system noted that from an emergency condition and lack of bridges, not everyone can receive the necessary medical care in time.

Interviews in focus groups of the studied areas also confirmed the positive impact of building bridges on the standard of living of the population. So the focus group participants noted that the construction of bridges can affect the decline in food prices. The majority of respondents noted that the construction of bridges is of great importance for the sale of agricultural products. Respondents noted that due to the lack of bridges, they are not able to sell products and receive additional income. The women's group of respondents most of all focused on issues related to access to health care and education. The women noted that due to the absence of bridges, their children have to travel 10-15 kilometers to school, which adversely affects their health and level of knowledge. Due to the lack of bridges, not all women, especially large family and pregnant women, can receive the necessary medical care in a timely manner.

> *The bridge is of great importance for the development of the social life of the population, especially in mountainous areas. We have no bypass roads in the mountainous areas. Transportation of food and everything you need for life passes through the bridge. Sometimes, when roads become impassable, we wait for days for food. Rustam, 35 years old, Vishkharv village, Yazgulyam, Vanj*

> *If we have bridges, then each person can, without any difficulty, bring his product up for sale and sell them at a normal price, and not give it to the businessmen or resellers. Farrukh, 34 years old, Chikhokh village, Tekharv Jamoat, Vanj*

> *The bridge is of great importance for the development of the social life of the population, especially in mountainous areas. We have no bypass roads in the mountainous areas. Transportation of food and everything you need for life passes through the bridge. Sometimes, when roads become impassable, we wait for days for food. Askhob, 45 years old, village Basid, Rushan.*

Willingness of institutional organizations and community to participate in project implementation

As shown by the results of the research, the circle of stakeholders in the project implementation is the strengthening of the most important infrastructure facilities from natural disasters is extensive. Since the majority of the population of these areas live in locations vulnerable to natural disasters, then practically the entire population is interested in its successful implementation.

The results of the interviews with representatives of the Hukumats showed that local authorities can assist in project implementation in recruiting workers, organizing public works using the “hashar” method, and conducting explanatory work among the population. Representatives of district irrigation and melioration departments, Emergency Situations and Civil Defense, and Environmental Protection Headquarters noted that they can assist in project implementation only through the provision of advisory services. Representatives of jamoats and mahalla committees also noted that they will be able to assist in the implementation of the project in providing labor force, mobilizing the population for public works "hashar", conducting awareness campaigns among the population about the project. The participants of the focus groups expressed more willing to assist in the implementation of the project. So representatives of the focus groups of the Rushan and Darvoz districts noted that they have extensive experience in the implementation of projects, including their own capabilities. In the Murgab district, participants expressed hope that they

would be recruited as well. Considering that the construction of bridges for the studied areas is of great importance for life, they are ready to assist in its implementation in every way. Focus group participants noted that there are a lot of young professionals in villages who are ready to participate in the project implementation.

> *First, we really want the World Bank to build bridges for us. If God hears our prayers and you start working with us, we will not stay on the side either. In almost all villages, professional people live precisely in this field, they will need to be attracted, and they will be able to participate in the construction of the bridge with great pleasure. Focus group Yazgulom, Vanj*
>
> *First, we really want the World Bank to build bridges for us. If you start working with us, we will not stay on the side either. In almost all villages, professional people live precisely in this industry, they will need to be attracted, and they will be able to participate in the construction of the bridge with great pleasure. Focus group Nulwand, Darvoz.*
>
> *We, women will not stay on the side. Our women will be able to cook hot meals and bake cakes. For cooking, we will be able to isolate agricultural crops, like potatoes, onions, carrots, and more. Focus group: Jamoat Bartang, Rushan.*
>
> *Every year we use the hashar method to do something for our village. People do it voluntarily. Could provide builders with fresh meat and we can work ourselves. Among us there are builders, road engineers. Erkin, 51, Alichur village, Murgab.*

Identify the risks of construction impacts on the local population in the project areas

In the course of the research conducted, issues related to potential risks and impacts associated with construction works, including in connection with the creation of construction camps, were also raised. How construction works can affect the health and safety of local people, including men and women. This is primarily due to the movement of the population, the introduction of construction works, sanitary conditions, water pollution, and the release of harmful substances. What are the risks for local residents with the influx of labor for the rehabilitation and construction of infrastructure from natural disasters. These issues were addressed, both at the institutional and community levels.

Based on the fact that project implementation in the project areas consists of a component related to the restoration and construction of bridges (Murgab, Darvoz and Rushan), the opinion of the respondents was also associated with the impact on the population of construction works.

Representatives of the Hukumats and Emergency Situations and Civil Defense Headquarters of the Murgab, Rushan and Darvoz Districts noted that, in general, the location of temporary construction camps for the construction of bridges will not affect the lives of local residents, including their health conditions, water pollution, emission of harmful substances. Respondents noted that during construction it is necessary to build temporary transitions for both vehicles and pedestrians. Representatives of the education system noted that for the safety of schoolchildren, it is necessary to install appropriate barriers, pedestrian walkways, signs during the construction of bridges. On the part of construction organizations there should be responsible people for the safety of local residents during construction work. Representatives of the health care system noted that builders should be provided with all sanitary conditions, including common areas. The negative impact of labor inflow can be avoided if permanent contacts are organized between builders and the local community represented by representatives of jamoats and mahalla committees. Representatives of local authorities noted that it was necessary to conduct explanatory work among the

population related to the impact of construction work on the safety and health of the population, including women, men and children. Similar explanatory work is necessary to be carried out among bridge builders.

Representatives of the districts of environmental protection departments noted that in general, in their opinion, the construction of bridges and the location of temporary construction camps will not affect the environment. But at the same time, it is necessary to carry out explanatory work, among builders about reducing the impact of construction work on the environment and, above all, fauna and flora.

According to participants, the focus of Vanj, Murgab, Rushan and Darvoz rayon groups on the impact of construction works and the location of temporary construction camps will not have a tangible impact on the safety and health of the population, including men and women. According to respondents, reducing the negative impact of labor inflows for construction can be reduced by involving local residents in construction work. In their opinion, it is the participation of local residents in construction works that can create an atmosphere of trust between builders and local residents. Most of the participants in the focus groups noted that the bridges that are planned to be restored are mainly located far from their place of residence, they will hardly hear the noise of construction work. Regarding the issues of traffic safety and the impact on public health, respondents supported the opinion of local authorities on the construction of temporary bypass routes,

> *Temporary accommodation of construction camps will not affect our health and the safety of the local population. All the studied villages are far from the place of construction of bridges. In cases of bridge construction, you must first build temporary passages. There will be no other problems; not a single household will suffer as a result of the construction of bridges. Focus group, Kuna Kurgan, Jamoat, Berdiboev, Murgab.*

> *Temporary accommodation of construction camps will not affect our health and the safety of the local population. All the studied villages are far from the place of construction of bridges. In cases of bridges, you must first build temporary bridges. There will be no other problems; not a single household will suffer as a result of the construction of bridges. To improve the relationship between the influx of labor, it is necessary that the residents of our villages, mainly returning migrant workers, be involved in construction work. In this way, you can create an atmosphere of trust between the locals and the builders. Focus group. Rushan*

> *To improve the relationship between the influx of labor, it is necessary that the residents of our villages, mainly returning migrant workers, be involved in construction work. In this way, you can create an atmosphere of trust between the locals and the builders. Focus group, Bartang, Rushan*

According to the majority of interview participants, it is necessary to create a mechanism to reduce the risk of the impact of construction works and construction camps on the safety and health of the population, including both women and men. Mutual control can reduce risks and increase confidence in construction. Participants noted that the feedback mechanism in most cases should be a helpline. The respondents explained this opinion by the fact that there are mobile phones in almost every household. You can also use boxes, but they must be installed in each jamoat or in the nearby village to the bridge.

15 CONCLUSIONS

- Despite the difficulties of recent years, labor migration in the studied areas remains fairly high. For the studied areas of GBAO, remittances of migrant workers remain the main source of household income;
- Women's employment is mainly related to the production of agricultural products in dekhkan and household farms, national crafts in households;

- In the studied areas (Murgab, Darvoz and Rushan), natural disasters, such as earthquakes, avalanches, rockfalls, floods and strong winds are mostly observed (in Murgab);
- In the surveyed areas, according to respondents, the main reason for the increase in the number of natural disasters in recent years is climate change;
- Respondents attributed the most vulnerable groups of the population to the effects of natural disasters: the family, where the heads of the household are women, the family, where adult members of the household are in labor migration, the family without adult sons, large families, the family where there are disabled;
- In the studied areas, training exercises are held annually related to the actions of the population in emergency situations involving representatives of all government agencies and the community;
- In order to raise public awareness, representatives of the community and government organizations participate in workshops and round tables related to the population's actions during natural disasters, but these events are held in a narrow circle and the information is not disseminated to other members of the community;
- The main means of disaster warning are walkie-talkie, mobile phones. At the community level, mobile speakers are also accepted;
- At the community level, there are emergency response teams. The equipment of the rapid response teams remains at a rather low level; At the district level, there are plans to relocate the evacuation of the population to safer places in the event of natural disasters. The process of resettlement of the population is carried out on a voluntary basis, and representatives of villages participate in the selection of places for resettlement, commissions for resettlement and evacuation are created. At the community level, the population does not always clearly understand the concept of a resettlement plan and evacuation plan;
- The Government and local authorities provide immigrants with material assistance in the form of building materials, fuel and lubricants, labor and monetary compensation. When building new social infrastructure facilities (education, health, irrigation systems), the impact of natural disasters is taken into account. mainly depend on the financial situation of the household. The poorest segments of the population use traditional building materials in the construction of residential premises, which do not fully take into account the effects of natural disasters (earthquake, avalanches, mudflows and floods);
- Representatives of regional hukumats noted that the central authorities provided great assistance in the aftermath of natural disasters last July 19-24, 2015;
- In the studied areas of the GBAO, international organizations such as the Focus Program, the Aga Khan Foundation, the Global Partnership, the United Nations Program, ADB provided assistance to reduce the impact of natural disasters;
- Public awareness of international assistance, including those related to disaster reduction, remains at a rather low level;
- For consideration of complaints of the population concerning questions of resettlement, compensation for damage in case of natural disasters at the level of Hukumats, a special commission of representatives of all state structures was created;
- The restoration of bridges will improve transport links between settlements, reduce transport costs, allow dehkan farms and households to sell their products outside the district, improve the attendance and safety of schoolchildren and public access to the health care system;
- Local authorities can assist in project implementation in the recruitment of labor, the organization of public works using the "hashar" method, and carrying out explanatory work among the population. Representatives of the community can help builders in providing a place of residence, women in preparing food, to participate in public works on a free basis using the hashar method;

- To reduce the negative impact of construction work, it is necessary to create workarounds, barriers, conduct outreach work among the population;
- According to representatives of institutional organizations and the community, the location of temporary construction camps will not affect the lives of local residents, including their health, including men and women;
- The negative impact of labor influx can be avoided if permanent contact groups are established between builders and the local community represented by representatives of jamoats and mahalla committees.

16 RECOMMENDATIONS

- The local population is the most important resource in emergency management. The quality and effectiveness of this resource can be significantly improved by improving local knowledge and skills, taking into account the identification of risk areas;
- It is necessary in the community to conduct work on the observance by the population of home safety measures and daily work activities, to study the basic methods of protecting the population and territories, methods of providing first aid to victims and, if necessary, assist in carrying out rescue and other urgent work;
- For timely notification, in addition to mobile phones, it is necessary to use television, radio, newspapers, and sound signals. It is necessary to provide all communities with modern means of notification;
- It is necessary to conduct explanatory work among the population about the emergency evacuation plan. It is necessary to determine in advance the safe evacuation routes, gathering places and evacuation zones. People with disabilities, the sick and the weak need special attention;
- It is necessary to raise the level of public awareness about the legal and regulatory documents related to the rights and duties of the population in emergency situations, including voluntary relocation and reparation;
- Information, education and training activities for the population can reduce the latter's vulnerability to specific hazards. In particular, knowledge of the alert and evacuation procedures can greatly assist in carrying out evacuations smoothly and efficiently, as a result of which you can save more lives and reduce the number of losses and damage;
- To reduce the impact of natural disasters, it is necessary to conduct explanatory work among the population on the use of the latest technologies in housing construction. For these purposes, you can use the experience of migrant workers;
- In educational institutions it is necessary to organize seminars on the actions of students in emergency situations with the involvement of parents' committees, the organization of children's posters and drawings;
- To reduce the impact of natural disasters, it is necessary to provide rapid response teams with modern rescue equipment. World experience shows that the timely action of a rapid response team from among local residents can reduce casualties by an average of 90%;
- The negative impact of the inflow of labor for construction can be reduced by involving local residents in construction work;
- It is necessary to create a mechanism to reduce the risk of the impact of construction works and construction camps on the safety and health of the population, including both women and men;
- In most cases, the feedback mechanism should be a helpline, each household has mobile phones. You can also use boxes, but they must be installed in each jamoat;

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18 PERSONS HELD MEETINGS AND CONSULTATIONS WITH:

№ п/п	Name	Position occupied	Phone numbers
1.	Mardov O.	Deputy Chairman of Vanj d.	935414514 901417097
2.	Abdusamadov Sh.	Chairman of A. Abdulloev jamoat of Vanj d.	935139849

3.	Davlatov Sh.	Chairman of Teharv jamoat of Vanj d.	934423088
4.	Surkhov A.	Headmaster of Gushhun village, Vanj d.	915366887
5.	Noyobov F.	Head of RCCA, Vanj d.	935140594
6.	Gayurov Tabrez	Chairman of "Gandzh" farm of Vanj d.	931540378
7.	Dodkhudoev F.	Chairman of the Rushan district	935809944
8.	Dustalizoda G.	Deputy Chairman of the Rushan d.	935410886
9.	Davlatmamadov Kh.D.	Head of RCCA in the Bartang valley of Rushan d.	934208038
10.	Niyozbekov N.	Chairman of Basid jamoat Rushan d.	550156034
11.	Tolibshoev M.	Chairman of Bartang jamoat Rushan d.	937310448
12.	Abdulkayomov A.	Secretary general of Murgab district	934409383
13.	Mirzozoda Zarrina	Deputy Chairman of Darvaz d.	935377040
14.	Avgonov A.	Chairman of Nulwand jamoat, Darvaz d.	988553066