

# Initial Environmental Examination

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January 2024

## CENTRAL ASIA REGIONAL ECONOMIC COOPERATION (CAREC): CORRIDORS 2, 5, AND 6 (DUSHANBE - KURGONTEPPA ROAD PROJECT - ADDITIONAL FINANCING

### Baljuvon – Sari Khosor Road Rehabilitation

Prepared by Project Implementation Unit for Roads Rehabilitation under the Ministry of Transport of the Republic of Tajikistan

## ABBREVIATIONS

AADT	-	Annual Average Daily Traffic
ADB	-	Asian Development Bank
Aids	-	Acquired immune deficiency syndrome
CAC	-	Center for Analytical Control
CAREC	-	Central Asia Regional Economic Cooperation
CSC	-	Construction Supervision Consultant
CEP	-	Committee for Environmental Protection under the Government of Tajikistan
EMP	-	Environmental Management Plan
GoT	-	Government of Tajikistan
GRM	-	Grievance Redressal Mechanism
GRC	-	Grievance Redress Committee
HIV	-	Human Immune Deficiency Virus
IBAT	-	Integrated Biodiversity Assessment Tool
IEE	-	Initial Environmental Examination
IBA	-	Important Bird Area
IBAT	-	Integrated Biodiversity Assessment Tool
IUCN	-	International Union for Conservation
KBA	-	Key Biodiversity Area
LAR	-	Land Acquisition and Resettlement
LARP	-	Land Acquisition and Resettlement Plan
MAC	-	Maximum Allowable Concentrations
MoT	-	Ministry of Transport
PAP	-	Project-Affected Person
PIURR	-	Project Implementation Unit for Road Rehabilitation (of MoT)
PIURR-SE	-	PIURR Safeguards Expert
PRC	-	People's Republic of China
RAMS	-	Road Asset Management Unit
RAP	-	Resettlement Action Plan
RoW	-	Right-of-Way
SEE	-	State Ecological Expertise
SES	-	Socioeconomic Survey
SSEMP	-	Site Specific Environmental Management Plan
TOR	-	Terms of Reference

## WEIGHTS AND MEASURES

°C (degree Celsius)	–	Measurement unit for temperature
dB (decibel)		Measurement unit for noise. The decibel is a relative unit of noise measurement. It is equal to one tenth of a bel (B).
h		hour
l		litre
m		metre
m <sup>2</sup>		square metre
m <sup>3</sup>		cubic metre
min		minute
mg (milligramme)		thousandth of one gramme
mSV (micro sievert)		

km millionth of a sievert. Sievert is a unit for measuring radioactivity  
kilometre

### GLOSSARY

GOST	–	National Standards and Regulations
Hukumat		Administrative Unit of Tajikistan
Jamoat	–	Administrative Unit of Tajikistan
San PIN		Sanitary Protection Rules and Norms
SNiP		Technical Standards (Tajiki: СНИП) - a building code, a set of rules that specify the minimum standards for constructed objects such as buildings and nonbuilding structures
Raisi		Head of the Village
Mahala-		

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## II. INTRODUCTION

### A. Project Background and Purpose of the Report

1. The road network has a particular importance for the Republic of Tajikistan (herein referred to as Tajikistan). Due to its geographical location, specific mountainous conditions of the relief in the complete absence of sea and river routes, insufficient development of railways and airlines network, roads and motor transportations are the main type of transport services for the Republic.

2. The current level of condition of most roads (mainly regional and local roads) in Tajikistan has a low traffic capacity, not meeting the requirements of acting norms in the Republic. Most of the road network does not allow ensuring the safety of road users in accordance with modern requirements. In view of the unsatisfactory technical condition of many existing roads, the efficient operation of transportation is at a low level. Therefore, improving Tajikistan's road network system remains a national priority and will remain so, as the main task of the MoT is to connect all regions of the country with a reliable network of relevant roads.

3. The Ministry of Transport (MOT) of Tajikistan and the Asian Development Bank (ADB) agreed to enhance income and reduce poverty in Republic of Tajikistan by improving road infrastructure and thereby support the creation of productive employment opportunities. Under the Road Network Sustainability Project, the rehabilitation of an additional road section from Baljuvon to Sari Khosor is envisaged.

4. The project road will start at 28 km of Kangurt – Baljuvon road, which was rehabilitated with financial assistance of ADB, 100m from the bridge across Shurabdarya River. The Project Road ends at the Sari Khosor waterfall, which is considered as the entrance to the tourist area, which is currently under development. The length of the project road is about 56 km. Overall direction of the project road is north-east. Most of the project road is located on the right bank of Shurabdarya Mountain River.

5. The road is running through mountainous terrain with difficult relief and extreme weather conditions. It is located in the Baljuvon region in the catchment of Vakhsh river. The project area borders on the Faizabad, Rogun, Nurabad and Sangvor regions, and in the east and south, on the Khovaling, Temurmalik and Nurek regions of the Khatlon region.

6. Baljuvon – Sari Khosor road is linking the villages along the road with Dushanbe and other re-gions of Tajikistan. Baljuvon – Sari Khosor road runs through highland areas with the steep slopes and strong atmospheric temperature drops. Huge volume of snow is experienced in winter periods. Mudflow and landslides are destroying some sections of the road and rock falls are creating road safety hazards, leading periodically to closure of the road.

7. Therefore, the Project is urgently needed and consequently the Ministry of Transport of the Republic of Tajikistan (MoT) has requested additional consultancy services for the ‘Baljuvon – Sari Khosor Road Rehabilitation’ to create an all weather, all year-round access between Baljuvon and Sari Khosor. This will transform the lives of existing residents by providing access to: (i) markets, (ii) schools; and (iii) medical facilities. The project will be implemented as supplementary task to the presently ongoing Central Asia Economic Cooperation Corridors 2, 5, and 6 (Dushanbe –Kurgonteppa) Road Project – Additional Financing.

8. The map in the following figure 1 shows the Project road's location within Tajikistan.

Figure 1 - Location of the Project road within Tajikistan



9. Seventeen settlements have been identified along the alignment. The number of settlements excludes isolated settlements of less than ten buildings. The alignment generally passes by settlements, it only (potentially) passes through Shalidon (Km31), which may be bypassed, and Mullokoni (Km54). The representation as a village marker in Figure 4 and Figure 5 indicates if a settlement is passed by or through. Observations suggest that the village developments have adapted to the presence of the alignment and have not come close to it. The following table 1 shows the villages along the alignment.

**Table 1 – Districts, Jamoats and Villages traversed by the Project road<sup>1</sup>**

	Km	Rayon / District (Hokoumat)	Sub Rayon / District (Jamoat)	Village (Mahala) <sup>See Note 1</sup>	Other Notes
1	0	Baljuvan district	The Baljuvan district is administrably divided into the following five jamoats:  Tojikiston Sayf Rahim Sarikhosor Safar Amirshoev Baljuvon	Baljuvon	Outside alignment
2	7			Komolakdara	On side road off alignment
3	7			Dulonamaidon	On side road off alignment
4	11			Un-named	
5	18			Doshmandy	
6	26.5			Boghizoghn	Opposite (east) side of river valley
7	27.5			Un-named	
8	31			<b>Shalidon</b>	Administration centre for the area (hospital & school), surfaced road through settlement. Alignment may pass through settlement
9	36			Dashtaro (Chinar tree)	
10	40.5			Nusai	
11	41			Aspiringon	Opposite (east) side of river valley
12	44			Surkhudara	
13	45			Kulkhucha	Opposite (east) side of river valley
14	46			Peshtroba	School ?
15	49			Rezgam	
16	54			Mullokoni	Alignment may pass through settlement
17	56			Sari Hosor Hotel	

## 1. Study Area and Project Categorization

10. Regarding the Project Area of Influence, it needs to be distinguished between the core impact area which is subject to direct physical encroachment and interferences such as noise and air emissions and the wider zone of Project influence that is mostly subject to indirect and positive impacts such as better road connectivity. In addition, road development often encourages induced growth and related environmental impacts. These include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems. Induced impacts are indirect effects occurring during construction and also operation phase of the Project road. Possible induced impacts associated with the road construction entail the spread of uncontrolled development activities and threat to natural resources in previously undisturbed area. These potential long-term impacts are indirectly connected to the road construction Project and can only be managed and handled by means of future sustainable land use planning and wildlife protection measures.

11. The area of direct physical encroachment is the construction corridor which is 15 m to both sides of the designed Project road edge. Considering that the width of the designed road is 10 meters, then the corridor of direct physical encroachment covers a width of 40 m (construction

<sup>1</sup> Information Taken from Project alignment drawings, Google earth and Gaia GPS (June 2023)

corridor). In addition, the area of influence covers an area outside the immediate construction corridor. It is up to 200 m on both sides of the road. Within this area there is no direct physical encroachment but there may be negative interferences such as noise and air emissions. Outside this 200 m corridor negative impacts only occur at ancillary facilities, such as borrow areas and transport routes. Therefore, an envelope of potentially 200 m wide on each side of the Project road over its entire length is identified as the core impact area. This core impact area is subject to direct physical encroachment which usually results in the physical loss of structures, such as human properties (kiosks, fences, crops etc.) or natural structures such as topsoil, trees, shrubs and biotopes. Other impacts refer to negative interferences which do not cause the loss of structures but nevertheless cause the reduction of environmental quality. Examples are the negative effects of noise emissions, the effects of emissions of pollutants or the occurrence of increased erosion due to malfunctioning of culverts, lack of retention basins or other.

12. A detailed description of the impacts is given in the chapter on impacts and mitigation measures. Within road sections where sensitive receptors are present, such as schools, hospitals or other places where people congregate particular attention will be given so that ample mitigation is formulated.

13. For road sections that cross rivers, the impact assessment may be expanded to cover the identified continuous extent of any ecologically important habitats / features along the Project Corridor. In addition, the core impact area needs to be widened at certain locations to consider all ancillary facilities occurring outside the 200 m corridor such as borrow pits and quarries.

14. In contrast the wider zone of influence includes the wider geographical area that is influenced by the project due to better access and more efficient transport connections. This wider zone of influence is subject to indirect impacts and must be managed by future sustainable land use planning and wild life protection.

15. The road will be reconstructed along the existing alignment. The existing road Baljuvon – Sari Khosor road exists only as earth/gravel track with no pavement and is only passable with a 4-wheel drive vehicle. The width of the earth bed varies between 3.7 m and 7 m. Very limited culverts or bridges exist for crossing of water streams. From the beginning of the road to km 8, some artificial drainage structures exist, including 1.0 m and 1.5 m pipe culverts and rectangular box culverts of 1.0x1.0m, 1.5x1.5m, 2.0x2.0 m and 2.5x2.5 m sizes. After Sari Khosor, the old road exists only in fragments and the current track goes through the flood plains of Shurabdaryo River.

16. The Baljuvon-Sari Khosor Road section is designed according to Category IV (two-lane road, according to the State Road Construction Code 32-02-12 and in populated areas according to the State Road Construction Code 30-01-2007). The design speed for Category IV Road will be 60 km/h for flat terrain. On the hilly and mountainous section, the design speed will be reduced to 40 km/h, depending on the terrain conditions.

17.

## **B. Purpose of the Initial Environmental Examination**

18. **Screening and assessment of potential impacts.** ADB requires consideration of environmental issues in all aspects of the Bank's operations, and the requirements for Environmental Assessment are described in ADB SPS. The potential environmental impacts of the Baljuvon-Sari Khosor subproject has been assessed using ADB rapid environmental assessment (REA) checklist. The potential negative impacts were identified in relation to preconstruction, construction, and operation phases.

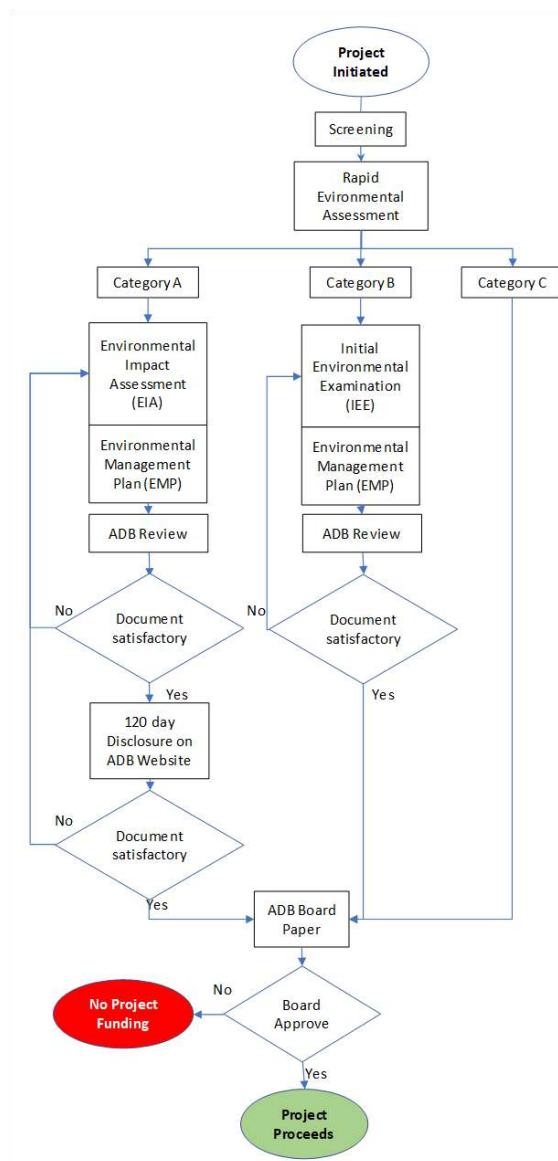
19. **Categorization.** ADB uses a classification system to reflect the significance of a project's potential environmental impacts. A project's category is determined by the category of its most

environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence.<sup>2</sup> .

20. Category A projects. A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required. Category A projects require a 120-day disclosure period before ADB Board consideration.

21. Category B projects. A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required. The categorization is summarized in the following figure.

**Figure 2 - Summary flow chart of the ADB environmental process**



22. **Rapid Environmental Assessment.** ADB has prepared a set of Rapid Environmental Checklists to assist in the categorization of projects. In reaching a decision for this project the REA

<sup>2</sup> Extracted from the ADB Safeguard Policy Statement (ADB 19 para 50)

for roads and highways has been consulted – Rapid Environmental Assessment (REA) for Road and Highway projects.

23. The southern section of the project will be constructed on an existing alignment. There are minimal bulk earthworks proposed confined to the southern half (up to Shalidon Km30) to remediate embankments and cut back slopes to stable angles. These works are not as extensive as full reconstruction. The northern section will be constructed on the western side of the river flood plain and will not require cutting and filling. Subsequent works are the forming of the engineered layers and bitumen running surface. These works will require engineered stone (most likely taken from the 1Km wide riverbed), crushing and grading operation and operation of a bitumen plant. There is potential for adverse noise and air quality (dust) impacts from these activities, but these can be mitigated by standard construction mitigation and included as requirements in the EMP and the contractor generated Construction EMP (CEMP). In addition, the alignment passes through sparsely populated areas where there are minimal sensitive receivers.

24. The alignment passes close to seventeen villages. Of these it only bisects one (assuming Shalidon is bypassed) most existing settlements are bypassed to the east. With care in siting processing facilities and construction camps, impacts on existing villages will be minimal.

25. The hot summers and fine clay material on the southern sections of the alignment could result in severe dust pollution from vehicle movements on dry, dusty surfaces. Management of dust will be a key environmental pollution issue but can be managed through standard construction mitigation such as watering and load coverage.

26. The southern section of the alignment passes through a highly modified landscape. There was no permanent native woodland identified during field trips that would be impacted by construction and operation of the proposed road. Rivers used for potable water, bathing and washing are generally upstream from the alignment and therefore would not be affected by construction activities. An ecological survey along the riverbed will be conducted to determine if there are any fauna species that need protection. The Sari Khosor Nature Park is located 4km from the alignment up a side catchment at Km 54. Upland flora and fauna are protected within the park. Construction and operation of the alignment is within a riverine habitat and are therefore unlikely to affect species within the Sari Khosor Nature Park.

27. For these reasons, the environmental team proposes that the project should be classified as Category B (Environmental) requiring the production of an Initial Environmental Examination and Environmental Management Plan rather than a full Environmental Impact Assessment.<sup>3</sup>

28. This IEE report covers the Baljuvon-Sari Khosor road section, based on the detailed design documents and field-based data gathering and consultations which were carried out during preparation of the IEE. The EMoP developed as part of the EMP will require the contractor/s to (i) together with PIURR and the CSC, conduct consultations with communities adjacent to sites, if any; and (iii) prepare SSEMP prior to commencement of civil works. The CSC is required to establish the baseline site-specific environmental conditions. The baseline results and consultation records will be reported as part of the SAEMRs and will be the basis to ensure no environmental degradation will happen and views/feedback of the communities near or adjacent to project sites are considered during project implementation.

29. This IEE identifies and analyses all potential impacts; describes their extent, duration, and severity; formulates the required mitigation and monitoring measures and presents it all in the form of an EMP and EMoP. The IEE also provides a detailed description of the direct and indirect environmental impacts associated with the Project during key periods of work, namely the design, pre-construction, construction, and operational phase.

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<sup>3</sup> The project team await confirmation from ADB on the project classification

30. Various design related measures are already included in the project design. During construction, the EMP includes mitigation measures such as (i) proper planning of works to minimize the public inconvenience; (ii) barricading, dust suppression and control measures; (iii) traffic management measures for works along the roads and for hauling activities; (iv) analysis of existing materials on-site to assess potential health and safety risks; and (v) finding beneficial use of excavated materials to the extent possible to reduce the disposal quantity. EMP will guide the environmentally sound construction of the subproject. EMP includes an EMoP to measure the effectiveness of EMP implementation and include observations on- and off-site, document checks, and interviews with workers and beneficiaries.

31. This IEE will be further updated if unanticipated environmental impacts become apparent. The updated IEE will supersede the earlier version of IEE and will be contractually applicable to the contractor.

32. The implementation of the project will be governed by Government of Tajikistan applicable environmental acts, rules, regulations, and standards. Environmental safeguards will be followed in accordance with ADB SPS. During construction and operation of the project, the borrower/client will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as EHS Guidelines.

33. **Report Organization.** Work on the IEE started in May 2023 with the arrival of the Environmental Specialist in Tajikistan. Field works for the IEE were conducted in summer 2023. In compliance with ADB SPS requirements, this IEE has been structured and consists of 11 chapters including executive summary:

- (i). **Error! Reference source not found.**
- (ii). INTRODUCTION
- (iii). Policy, Legal, and Administrative Framework
- (iv). DESCRIPTION OF THE PROJECT
- (v). Analysis of ALTERNATIVES
- (vi). Description of the Environment
- (vii). ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES
- (viii). ENVIRONMENTAL MANAGEMENT PLAN
- (ix). INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION
- (x). Grievance Redress Mechanism
- (xi). Conclusions and Recommendations

34. The report is supported by 3 annexes.

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## 1. Project Proponent and Main Institutional Responsibilities

35. The executing agency for the project is the MoT. The implementing agency is PIURR. Project office facilities are provided on the fourth floor of the MoT offices, 14 Aini Street, Dushanbe.

36. PIURR has appointed a PIURR-SE who is responsible for coordinating and bringing forward all due diligence and safeguard documents required for the environmental and social permitting process on the national level and according to ADB SPS.

37. The preparation of the IEE was supported by Kocks Consult GmbH who is continuously supported and advised by PIURR and ADB. The National Design Consultant is the Design Institute.

## 2. Methodology

38. The methodology used for the preparation of the IEE followed ADB SPS and the existing national Tajikistan environmental and social legislation.

39. The first methodological step according to ADB SPS is the carrying out of the Rapid Environmental Assessment Checklist (REA). This needs to be done in order to establish and confirm the Project category. Based on the resulting categorization, relevant environmental assessment (i.e. Environmental Impact Assessment (EIA) for category A or Initial Environmental Examination (IEE) for category B) will need to be carried out according to ADB SPS.

40. The project road is following the existing road. The Project Road will be implemented as category IV. Hence a strip of approximately 15 m to both sides of the designed Project Road will be physically impacted and natural and human structures within this strip will be lost. During the surveys carried out, no valuable ecological structures or habitats were identified within this strip which cannot be restored.

41. Remaining impacts are generic and site specific and of such kind which occur in all construction Projects. Therefore, the Project has been classified as B in terms of its environmental impacts.

42. Surveys, field verification and data gathering are conducted for the purpose of collecting baseline information of the Project site and for identification of sensitive receptors.

43. The required field surveys were carried out by Kocks Consult GmbH international and national environmental experts. The field works consisted of walk over of the entire alignment of the road to describe the physical environment, including condition of the road base, vegetation along the road corridor, land use types along the corridor, existing infrastructure within and nearby the road corridor, parameters of the river crossings and environmental sensitive points (proximity of national parks or protected areas).

44. For obtaining baseline information of air quality, water quality and noise, a qualified laboratory has been assigned for sampling and analysis. The identification of measurement points and sensitive receptors was carried out and coordinated by the Kocks Consult GmbH national and international environmental experts. Measurements on air quality, noise and water quality were conducted in July 2023.

45. Project stakeholders and regulatory agencies that need to be involved have been identified and consulted in the course of IEE preparation. Follow up measures and responsibilities that need to be considered during Project implementation are incorporated in the EMP.

46. All statutory requirements are identified within scope of the legal framework description and duly considered in the IEE and EMP preparation.

47. The Project is categorized as B in terms of its environmental impacts and requires stakeholder engagement and consultation as a continuous process. In total seventeen (17) settlements have been identified along the alignment. Based on the detailed design by Design Institute, SES has been carried out to obtain the views, attitude and feedback of villagers alongside the Project Road. The villagers in the Project affected community were also informed about potential environmental impacts.

48. In total, six public consultation and meetings were conducted which were attended by 100 attendees. Many passers-by and others came into the meetings for shorter periods. The first round of consultations were initiated on 26 August 2023. A site visit was conducted along with the International Safeguards Specialist to consult the Baljuvon and Jamoati Sari Khosor community.

49. Additional informal consultations were carried out with stakeholder groups were conducted during the team’s visit. A summary of the consultations (including the main issues raised) is set out in the following table.

Table 2 – Informal Meetings and Consultations on Environment in May and June 2023

Date & time	Organisation(s)	Venue	Attending	Presentation Medium	Observations, Notes & Outcomes
30 May 2023 at 11:45	Sari Khosor Hotel	Sari Khosor Hotel	Manager Salim Kahmonor, Consultants	Round table discussion	Season for hotel (all year). Provision of hotel. Access issues.
14 June 23 at 8:40	Ministry of Transport	3/f MoT	Chief Engineer Holboy, Consultants	Round table discussion	Environmental – Sari Khosor Nature Park.
8 June 2023 at 07:00	Sari Khosor Hotel	Sari Khosor Hotel	Manager Salim Kahmonor, Consultants	Round table discussion	Provisioning of hotel. Access issues, opportunities for future. Species in area.
8 June 2023 at 08:15	Householder	Qiozuno settlement <sup>4</sup>	Householder, Vahdat Shaipov (SUE DITI), Consultants	Round table discussion	Decline in village population (50 > 4). Access to schools and medical services. Over wintering population (2 of 4).
8 Jun 2023 at 11:20	State Entity for Protected Natural Areas	Shalidon Office	Manager of Sari Khosor Protected Areas, Vahdat Shaipov (SUE DITI), Consultants	Discussion on the location of Sari Khosor Natural Park	A definitive map of the park was not tabled. Passport for Sari Khosor Nature Park was handed over together with a document identifying land use and inhabitants within the Park
15 June 2023 at 9:00	MoT DITI	MoT, Dushanbe	MoT DITI Egamberdi Rustamov, Consultants	Round table discussion	Baseline monitoring program - air, noise, water, ecology
16 June 2023 at 13:45	State Entity for Protected Natural Areas	Dushanbe	Director and Deputy Director, MoT – Miraliev & MoT DITI - Egembirdi, Consultants	Discussion on the location of Sari Khosor Natural Park	Discussion and a (i) passport (ii) species list (advised not updated and (iii) a map showing the location of Sari Khosor Nature Park handed over.
END					

50. Views and feedback from villagers alongside the Project Road were considered and incorporated in this IEE, particularly the Project EMP and EMoP as far as technically feasible. After finalization, the IEE will become part of the bid documents.

### III. Policy, Legal, and Administrative Framework

51. This section presents an overview of the policy/legislative framework as well as the environmental assessment guidelines of the Republic of Tajikistan that apply to the proposed project. The section also identifies relevant requirement under ADB SPS that will be applied in the project.

<sup>4</sup> Location: 38° 38' 55.47" N. 70° 3' 21" E. Approx. 3.5Km (30minutes driving) upriver valley from hotel

## A. Environmental Clearance Requirements

52. According to ADB's Guidelines and Environmental Assessment Requirements of Infrastructure Projects, an IEE will be presented to both the Government of Republic of Tajikistan and ADB. According to initial environmental assessment, the Project has been classified as category "B".

### 1. Government Environmental Laws, Regulations and Guidelines

#### 1. Legislation

53. Tajikistan has a well-developed environmental legal and regulatory framework. Current environmental legislation in Tajikistan includes statutory acts and laws on the following topics: (i) Protection of the environment; (ii) ecological audit and monitoring; (iii) protection of flora and fauna; (iv) environmental information and education; (v) soil, water and air quality; (vi) biological safety; (vii) human health and safety; and (viii) waste and chemicals management. These laws, along with the regulations approved by the Government of Tajikistan (GoT) create a favorable legal framework for environmental protection and for the use and protection of the country's natural resources. They also enforce the rights of any citizen for environmental safety, organic products, eco-friendly environment, access to environmental information, possibility of investing (moral, material and financial) to improve the ecological situation in the country.

54. Environmental legislation in the Tajik Republic includes the Constitution, codes and laws on air quality, noise, mineral resources, land management, forests, health and safety, waste and chemicals management. The Tajikistan Framework Environment Law was adopted in 1993, enacted in 1994 and amended sequentially in 1996, 1997, 2002, 2004 and 2007. Then in 2011, it was replaced by new law. The Water Code was adopted in 2000 (amended in 2008, 2009, 2011 and 2012), the Land Code in 1996 (amended in 1999, 2001, 2004, 2006 and 2011, twice in 2008 and 2012) and the Forest Code in 1993 (amended twice in 1997 and 2008).

55. Environmental impact assessment (EIA) is the subject of the Law on Environmental Protection (2011), the Law on Ecological Expertise (2012), and the Law on Environmental Impact Assessment (updated in 2018). An environmental licensing system applies to hazardous waste management and mining. Environmental permitting systems regulate the use of natural resources, especially hunting or collecting certain species.

56. In Tajikistan, the organizations responsible for monitoring environmental and health and safety protection and their management are the Committee for Environmental Protection under the Government of Tajikistan (CEP), the Sanitary Inspectorate under the Ministry of Health (SES), the Industrial Safety Inspectorate; and the Field Development Inspectorate.

57. The Law on Environmental Protection (2011) contains articles that relate to the protection of the subsoil and the efficient use of land resources. The main environmental laws relevant to the Project are indicated in the following table.

**Table 3 - Environmental, Labour and Health & Safety Laws of the Republic of Tajikistan**

No	Name of the documents	When the document was approved
<b>In the field of environmental protection</b>		
1.	Law of RT <sup>1)</sup> "On Environmental Protection"	2 August 2011 as amended on 18 July 2017
2.	Law of RT "On Ecological Expertise"	16 April 2012
3.	Law of RT "On Environmental Impact Assessment"	1 November 2018
4.	Law of RT "On the protection of atmospheric air"	28 December 2012
5.	Law of RT "On production and consumption waste"	10 May 2002, amended in 2011
6.	Law of RT "On Environmental Audit"	26 December 2011
7.	Law of RT "On Specially Protected Natural Territories"	26 December 2011
8.	Law of RT "On Environmental Monitoring"	25 March 2011

<b>№</b>	<b>Name of the documents</b>	<b>When the document was approved</b>
9.	Law of RT "On Radiation Safety"	1 August 2003
10.	Law of RT "On the protection and use of flora"	17 May 2004
11.	Law of RT "On Biological Security"	1 March 2005
12.	Law of RT "On fauna"	5 January 2008
13.	Law of RT "On Soil Protection"	16 October 2009
14.	Law of RT "On hydrometeorological activity"	2 December 2002
15.	Law of RT "On the collection, conservation and rational use of genetic resources of cultivated plants"	1 August 2012
<b>In the field of health, social protection and emergency situations</b>		
1.	Law of RT "On protection of population and territories from emergency situations of natural and man-made character"	15 July 2004
2.	Law of RT "On Fire Safety"	29 December 2010
3	Law of Republic of Tajikistan on Appeals of Individuals and Legal Entities	2016
4	Health Care code	2017
<b>In the field of energy, industry and minerals</b>		
1.	Law of RT "On Energy Saving"	10 May 2002
2.	Law of RT "On mineral resources"	20 July 1994
3.	Law of RT "On precious metals and precious stones"	12 May 2001
4.	Law of RT "On industrial safety of hazardous production facilities"	28 February 2004
<b>In the field of water and land relationship, agriculture</b>		
1.	Law of RT "On drinking water and drinking water supply"	29 December 2010
2.	Law of RT "On Land Reform"	5 March 1992
3.	Law of RT "On Land Valuation"	12 May 2001
4.	Law of RT "On Land Management"	5 January 2008, amended 2016
5.	Law of RT "On the production and safe handling of pesticides and agrochemicals"	22 April 2003
<b>Codes</b>		
1.	Land Code of the Republic of Tajikistan	13 December 1996, amended in 2016
2.	Water Code of the Republic of Tajikistan	20 October 2000
3.	Forest Code of the Republic of Tajikistan	2 August 2011
4.	Labour Code of the Republic of Tajikistan	2016

RT = Republic of Tajikistan

## 2. Environmental Assessment

58. There are three laws in the country that stipulate all aspects of the Environmental Assessment: (a) Law on Environment Protection (2011); (b) Law on Ecological Expertise (2012) and the Law on Environmental Impact Assessment (2018). The Chapter V, Articles 35-39 of the Law on Environment Protection (2011) introduces the concept of state ecological review (literally, state ecological expertise<sup>5</sup> – SEE) that seeks to examine the compliance of proposed activities and projects with the requirements of environmental legislation and standards and ecological security of the society. The mentioned laws stipulate the mandatory cross-sectoral nature of SEE, which shall be scientifically justified, comprehensive, and objective and which shall lead to conclusions in accordance with the law. SEE precedes decision-making about activities that may have a negative impact on the environment. Financing of programs and projects is allowed only after a positive SEE finding, or conclusion, has been issued.

59. The following activities and projects are subject to state ecological review:

- draft state programs, pre-planning, pre-project, and design documentation for economic development;
- regional and sectoral development programs;
- spatial and urban planning, development, and design;

<sup>5</sup> State Ecological Expertise means both the department (institution) within the Committee for Environmental Protection and the process of review as well.

- environmental programs and projects;
- construction and reconstruction of various types of facilities irrespective of their ownership;
- draft environmental quality standards and other normative, technology, and methodological documentation that regulates economic activities;
- existing enterprises and economic entities.

60. The laws stipulate that all types of economic and other activities shall be implemented in accordance with existing environmental standards and norms and shall have sufficient environmental protection and mitigation measures to prevent and avoid pollution and enhance environmental quality. The Environmental Assessment studies analyzing the short- and long-term environmental, genetic, economic, and demographic impacts and consequences shall be evaluated prior to making decisions on the allocation, construction, or reconstruction of facilities, irrespective of their ownership. If these requirements are violated, construction will be terminated until necessary improvements are made, as prescribed by the GoT and/or other duly authorized control bodies, such as sanitary, geological, and public safety agencies.

61. An Environmental Impact Assessment (EIA) is a component of the SEE. Its procedure includes: General guidelines, terms of reference, coordination and approval of design estimates, development of the EIA text, state approval, and feasibility documents. The EIA should follow the categorization of the proposed activities, which contains 180 types of activities, grouped according to four environmental impact categories: from A (in Cyrillic sounds A) "high risk" to Г (in Cyrillic sounds G, "local impact"). If the activity is not included in the list, then it is not required to pass either an EIA or a SEE. The EIA is the responsibility of the project proponent. The "Procedure on Environmental Impact Assessment" (2013) establishes general requirements for the contents of the EIA documentation. The SEE for all investment projects is the responsibility of the CEP and its regional offices. Furthermore, according to the Law on the SEE, all civil works, including rehabilitation, should be assessed for their environmental impacts and the proposed mitigation measures reviewed and monitored by the CEP. A detailed project description and the EIA study are the basis to go for the environmental permit and have to be submitted to the CEP. As a rule, the CEP prepares its conclusion within one month. The CEP provides three options of the conclusion: allowed, not allowed, and allowed on conditions (usually some additional requirements) to be followed by the company during the activity. If the CEP concludes that an environmental permit cannot be provided due to different circumstances, the company can change its design and resubmit the documents once again. It is not allowed to change the approved project to the detriment of environmental safety requirements.

### **3. Administrative Basis and Approval Procedure Specifically for the Project**

62. The Law on Environment Protection (2011) determines that the state environmental review is conducted by an authorised state body of Tajikistan in the field of environmental protection, i.e. Committee on Environmental Protection (CEP). The CEP has a significant mandate, which includes environmental policy and inspection duties. The CEP has units at the regional, city and district levels, in the form of environmental protection departments.

63. A special unit under the CEP is charged with leading and managing the approval process of EIA and for issuing the SEE which is the official environmental approval on the National level.

64. This IEE report must be submitted to the CEP for obtaining the SEE for the Project.

### **4. Public Participation**

65. Article 12 of the Law on Environment Protection (2011) proclaims the right of citizens to live in a favorable environment and to be protected from negative environmental impacts. Citizens also have the right to environmental information (Article 13), as well as to participate in developing, adopting, and implementing decisions related to environmental impacts (Article 13). The latter is assured by public discussion of drafts of environmentally important decisions and public ecological

reviews. Public representative bodies have an obligation to take into consideration citizen's comments and suggestions.

66. According to the law, for any project subject to the EIA, the public has the right to initiate a public environmental assessment prior to or concurrently with the state environmental assessment. The outcome of the public assessment is of an advisory nature and has to be reviewed during the state environmental assessment. The EIA is carried out by an expert or an expert committee, as set out in the legislation. According to the EIA law, depending on the significance of environmental impacts, a project can be assigned a category "A", "B", "V" and "G". Review of the documents can take up to 60 days depending on the category of the project. As a result of the review, a positive or a negative conclusion is issued by the state institution. A positive conclusion is often supplemented by recommendations, for example, obtaining additional permits (emissions to air, wastewater discharge and waste) and activities to improve the surrounding environment. The conclusion is valid for the duration of the life cycle of the technology. If changes are made to the work processes or technologies which result in greater/smaller impact on the environment, a new assessment will have to be carried out.

67. The public has the right to request public hearings to be carried out. For category "A" and "B" projects, the authorized state body should develop a stakeholder engagement plan with the possibility of conducting consultations and taking into account the opinions of citizens.

68. In Tajikistan, disagreements are resolved through Jamoats' (Hukumats') grievance mechanism or appeal to court. A GRM capable of receiving and facilitating the resolution of affected persons' concerns and grievances related to the project is required as a formalised way for PIURR to identify and resolve concerns and grievances.

## 5. Environmental Permits and Licenses

69. The Law on Environmental Protection (2011) set the legal, organizational and economic basis for the permits system: the list of activities that require a permit, the permitting procedure, and the types of permits and the competent state bodies authorised to issue them. The Law was one of the elements of the country's permit system reform that reduced the total number of types of permits (more than 600) to only 88. Eight types are issued by the CEP.

70. An indicative list of the permit types which may be required for the Project is provided in the following table.

**Table 4 - Indicative List of Permits and Licenses Applicable to the Project**

Description of Authorisation Document	Due Date of Issue	Issuing Authority and requirements for follow up.	Remark
<b>Design Stage: Project Feasibility Study and Environmental Impact Assessment</b>			
Conclusion of the SEE on the project to be issued by the CEP <sup>1)</sup> . Current Status as per May 2022: IEE needs to be translated to Russian and submitted by PIURR <sup>3)</sup> to the CEP (State Committee for Environmental Protection of Tajikistan) for obtaining the the National Environmental Permit (SEE)	IEE needs to be submitted to CEP for obtaing environmental clearance (SEE)	Committee for Environmental Protection under the Government of Tajikistan (CEP RT).  IEE needs to be submitted to CEP.	Currently in process.

Description of Authorisation Document	Due Date of Issue	Issuing Authority and requirements for follow up.	Remark
<b>At the Construction Stage: Permits and Licences</b>			
License to conduct the type of activity	Prior to construction	Ministry of Industry and New Technologies of Tajikistan	
Permission for land use for the construction of the camp, asphalt and concrete plants and the development of quarries for the extraction of soil for the preparation of building materials (gravel, sand, crushed stone) and excavation for road pavement.	Prior to construction	Local authorities (Hukumats)	
Permission for special water use	Before and during construction	(CEP RT), Tajikgeology (technical water), Ministry of Health and social defence of the population of Tajikistan (drinking water)	
Permission to cut down trees and shrubs	At the construction stage	(CEP RT)	
Permission for emissions of harmful substances into the atmosphere (MPE <sup>4</sup> ) from stationary and mobile sources	At the construction stage	(CEP RT)	
Permission for discharge of hazardous substances into water bodies (MPD <sup>5</sup> )	At the construction stage	(CEP RT)	
Permission for land acquisition for temporary storage of construction waste (substandard soil, old asphalt, dismantled concrete products, etc.)	At the construction stage	(CEP RT), Local authorities (Hukumats)	
Permission to remove construction and household waste for storage in specially designated areas (disposal areas)	As required	Local authorities (Hukumats)	

- 1) CEP Committee for Environmental Protection  
2) IEE Initial Environmental Examination  
3) PIURR Project Implementation Unit for Road Rehabilitation (of MoT)  
4) MPE Maximum permissible emission  
5) MPD Maximum permissible discharge  
6) SEE State Ecological Expertise

## 6. Occupational Health and Safety (OHS) Legislation

71. There are several documents playing crucial role in labour health and safety decision-making process.

72. Under the Constitution of Tajikistan, everyone has the right to safe labour and health protection, which requires the state measures to improve the environment (Article 38)

73. *Labour Code of Tajikistan* contains main OHS principles including: a working environment that meets safety and health requirements; the responsibility of the employer for violation of OHS

requirements; restrictions on work in harmful or hazardous labour condition; training and instruction of employees on OHS matters; development and introduction of instructions on OHS that are mandatory for the employees.

74. *The Law of Tajikistan on Occupational Safety (2007)* lays down the main provisions on ensuring the constitutional rights of citizens to occupational safety and guarantees the right to safe labour, sets down the main principles of occupational safety in the workplace and envisages economic mechanisms of ensuring occupational safety. The law applies to all the ministries, agencies, concerns, associations, enterprises, organizations, institutions, cooperatives, lease and other organizations regardless of the form of ownership and business activities.

75. *The Law of Tajikistan on inspections of business assets (2006)* sets an order of inspections, rights and obligations of business assets and officials of inspecting authorities and aims protection of this activity from unwarranted intervention. Inspection of business assets are performed by authorized state agencies, in particular: on protection of environment and forestry - by an authorized agency on protection of environment and forestry; on protection of labor during production process - by an authorized agency on labour protection; on compliance with sanitary norms and rules - by an authorized agency, performing Sanitary and Epidemiological Surveillance.

76. *Health Care Code of Tajikistan, the Law No. 1413 as of May 30, 2017* replaced Laws “On protection of public health (1997), “On ensuring sanitary-epidemiological safety of the population” (2003, amended in 2011) and “On counteraction to HIV/AIDs (2005).

## **7. State Environmental Program 2009-2019**

77. The Program, approved in 2009, obligates ministries and offices, heads of administrations and mayors of cities to improve environmental conditions and ensure sustainable development of the country during the period of economic transition. It calls for adoption of modern environmental standards for water, air, soil, solid waste, toxic wastes, and noise control, based on maximum permissible amounts. Standards are to be supplemented by discharge permits. The Program is accompanied by broad ecological zoning, dividing the country into ten zones (Syr-Darya, Northern Turkestan, Zeravshan, Gissar, Vaksh, Dangarin, Khulbak-Kulyak-Tchube, Karategin-Baldzhuan - Shurobad, Garm-Muksu-Balandkiik, and Badakshan).

### **2. ADB Safeguards**

78. The environmental and social assessment needs to comply with ADB SPS. Based on ADB SPS, a project is classified as one of the following four environmental categories:

- Category A: Projects with potential for significant adverse environmental impacts. An environmental impact assessment and a summary EIA (SEIA) are required to address significant impacts.
- Category B: Projects judged to have some adverse environmental impacts, but of lesser degree and/or significance than those for category A projects. An initial environmental examination and a summary IEE are required to determine whether or not significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
- Category C: Projects unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are still reviewed.
- Category FI: Projects are classified as category FI if they involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all subprojects will result in insignificant impacts.

79. As noted previously, the Baljuvon – Sari Khosor road has been classified as category “B” for Environment. The categorization was carried out based on ADB SPS by means of screening and scoping of the main Project related issues and impacts. The categorization is based on the Rapid

Environmental Assessment (REA) checklist and was conducted by the consultant. The confirmation by the financing institution is still outstanding.

80. ADB SPS in addition to the required environmental assessment process emphasizes the requirements for public consultation and information disclosure. Consultation must be carried out in a manner commensurate with the Project impacts. The consultation process and its results are to be documented and reflected in the environmental assessment report.

### **3. International Treaties and Legal Commitments**

81. Tajikistan is party to a number of international environmental treaties including:

- Vienna Convention for the Protection of the Ozone Layer, 1996 and updated by:
  - Protocol on Substances that Deplete the Ozone Layer (Montreal), 1998;
  - London Amendments to Montreal Protocol on Ozone Depleting Substances, 1998;
  - Copenhagen Amendments to Montreal Protocol on Ozone Depleting Substances, 2009;
  - Montreal Amendments to Montreal Protocol on Ozone Depleting Substances, 2009;
  - Beijing Amendments to Montreal Protocol on Ozone Depleting Substances, 2009.
- UN Convention to Combat Desertification (CCD), 1997.
- UN Convention on Biological Diversity (CBD), 1997; Related updates to CBD are:
  - Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 2004.
  - Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity, signed in 2011 and ratified in 2013.
- Ramsar Convention (joined 2000);
- Bonn Convention on the Conservation of Migratory Species of Wild Animals (joined 2001); A related update is:
  - Bukhara Deer Memorandum, 2002.
- UN Framework Convention on Climate Change, 1998; A related update is:
  - Kyoto Protocol, accessed on December 29, 2008, and entered into force on March 29, 2009.
- Stockholm Convention on Persistent Organic Pollutants (ratified 2007); Related updates:
  - 2009 amendments listing 9 new POPs, August 26, 2010;
  - 2011 amendment listing endosulfan, October 27, 2012; and
  - 2013 amendment listing HBCD, November 26, 2014.
- Aarhus Convention (joined 2001); A related update is:
  - Kiev Protocol on Pollutant Release and Transfer Registers to the Convention on Access to Information, on May 21, 2003.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 2016.
- UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (joined 1992).

## B. Environmental Standards

82. Environmental quality standards in Tajikistan are based on GOST, SNiP and SanPiN. GOST (Tajiki: ГОСТ) refers to a set of technical standards maintained by the Euro-Asian Council for Standardization, Metrology and Certification (EASC), a regional standards organization operating under the auspices of the Commonwealth of Independent States (CIS). SNiP mean Technical Standards (Tajiki: СНИП) - a building code, a set of rules that specify the minimum standards for constructed objects such as buildings and nonbuilding structures. SanPiN (Tajiki: Коидахо ва меъёрҳои санитарӣ) are sanitary rules and norms (standards).

83. Environmental quality standards in Tajikistan ensure both maximum permissible concentration (MPC) (Tajiki: ПДК) and maximum permissible (or allowable) emissions (MPE) (Tajiki: ПДВ). The MPC is approved by law hygienic standard. Under MPC refers to a concentration of chemical elements and their compounds in the environment, which in everyday impact for a long time on the human body does not lead to pathological changes or diseases established modern research methods in any time of life of present and future generations. The MPE is standard of maximum permissible emissions of harmful substances (pollutants) into the air, which is set for a stationary source of air pollution in accordance with technical standards for emissions and background air pollution. It provides non-exceeding of the hygiene and environmental air quality standards, limits (critical) loads on ecological systems and other environmental regulations requirements.

84. The following table gives an overview of the National Standards and regulations that are applicable to the Project.

**Table 5 - National standards and regulations applicable to the Project**

#	Title - National Standards - GOSTs
	31431—2011. Protection of nature. Air. Set of Maximum Permissible Emissions (MPE <sup>1</sup> ). 29 November 2011
	31434—2011 Protection of nature. Air. Determination of parameters of efficiency of dust collection systems. 29 November 2011
	IEC 61241-0—2011 Electrical equipment used at areas containing flammable dust. Part 0. General requirements. 29 November 2011
	GOST 17.0.0.01-76 (ST SEV 1364-78) (in edition of 1987) System of standards for environmental protection and improvement of natural resources usage. General provisions
	General provisions GOST 17.0.0.04-80 (1998) Protection of nature. Environmental passport (certificate) of industrial facility. General provisions
	GOST R ISO14001-98 Environmental management systems. Requirements and guidelines.
	GOST 17.0.0.02-79 (1980) Protection of nature. Provision of metrological control of air, surface water and soils pollution.
	GOST 17.1.1.01-77 (ST SEV 3544-82) Usage and protection of water. General terms and definitions.
	GOST 17.2.1.01- 76 Classification of emissions (content).
	GOST 12.1.014-84 (1996) SSBT. Air at workplace. Methodology of measuring of pollutants concentration using indication tubes.
	GOST 12.1.005-88 (1991) SSBT. General sanitary and hygiene requirements to air at workplace.
	GOST 17.2.2.05-97 Norms and methods of emissions measuring containing spent diesel gases, tractors and self-propelled agricultural machines.
	GOST 21393-75 Diesel motorcars. Exhaust gas opacity. Norms and methods of measurement.
	GOST 17.2.2.03-77 Concentration of carbon monoxide at exhaust gases of motorcars with gasoline engines. Norms and measurements methodology.

#	Title - National Standards - GOSTs
	GOST 17.2.2.03-87 Norms and methods of measurements of carbon monoxide at exhaust gases of motorcars with gasoline engines.
	GOST 17.4.2.01-81 Nomenclature of sanitary condition parameters
	GOST 17.4.1.02-83 Classification of chemical substances for monitoring of contamination.
	GOST 12.1.003-83 (1991) SSBT. Noise. General safety requirements
	GOST 12.1.023-80 (1996) SSBT. Noise. Methods of threshold noise levels for stationary machinery.
	GOST 12.1.029-80 (1996) SSBT. Means and methods of noise protection. Classification.
	GOST 12.1.036-81 (1996) SSBT. Noise. Allowable levels of noise within residential and public buildings.
	GOST 12.1.007-76 (1999) SSBT. Harmful substances. Classification and general safety requirements.
	GOST 12.4.119-82 SSBT. Means of respiratory PPE. Methods of protective features assessment for aerosols.
	GOST 12.4.125-83 (1985) SSBT. Means of collective protective equipment from mechanical factors. Classification.
<b>Sanitary norms and regulations (SanPins)</b>	
	SanPiN 2.1.4.559-96 Drinking water. Hygienic requirements to the quality of water from centralised systems of drinking water supply. Quality control
	CH 2.2.4/2.1.8.562-96 Noise at working places, indoors of residential and public buildings and the territories of residential areas

<sup>1)</sup> MPE Maximum permissible emission

85. In the following tables, a synopsis is given on the specific standards for air quality, water, waste and noise emissions in Tajikistan. In addition, the standards are compared with international guidelines and standards. In general, it can be concluded that the Tajik system of environmental standards is well developed and for the purpose of the present Project, it is in line with the requirements of international guidelines and standards. It was therefore decided to use the Tajik standards as the reference in the present Project.

**Table 6 - Environmental Standards for Emissions to the Atmosphere**

Topic	National Standards / Requirements	EHS Guidelines (footnote Error! Bookmark not defined.) (or IFC PS)	Adopted Project Standard	Rationale
<b>Emissions of Ozone Depleting Substances</b>	No relevant numeric standard	No relevant numeric standard ( <i>Although 'no new systems or processes should be installed using CFCs, halons, 1,1,1-trichloroethane, carbon tetrachloride, methyl bromide or HBFCs'</i> ).	Consistent with applicable international conventions apply the principle that there will be no utilisation of ozone depleting substances (halons, PCBs, CFCs, HCFCs) and IFC	Good practice

Topic	National Standards / Requirements	EHS Guidelines (footnote Error! Bookmark not defined.) (or IFC PS)	Adopted Project Standard	Rationale
<b>GHG emissions</b>	No relevant numeric standard		Numeric standards do not apply. GHG will be quantified and reported annually if >25,000 tonnes CO <sub>2</sub> equivalent per year are expected (as per IFC PS3, 2012)	Most relevant

**Table 7 - Environmental Standards for Ambient Air**

	<b>National Standards / Requirements</b> Tajikistan standards <sup>6</sup> ,	<b>EHS Guidelines (footnote Error! Bookmark not defined.)</b>	<b>Adopted Standard supplementary standards are marked blue</b>	<b>Project (mg/m<sup>3</sup>)/ standards are marked blue</b>	<b>Rationale</b>
<b>Air Quality - Human population protection (at receptors)</b>	mg/m <sup>3</sup> : PM 0.15 NO 0.06 NO <sub>2</sub> 0.04 SO <sub>2</sub> 0.05 Ammonia 0.06 Benzopyrene 0.1 Benzene 0.1 Acetone 0.35 Petrol 1.5 V <sub>2</sub> O <sub>5</sub> 0.002 Vinyl acetate 0.15 HCl 0.2 HF 0.005 Fe <sub>2</sub> O <sub>3</sub> 0.04 HNO <sub>3</sub> 0.4 H <sub>2</sub> SO <sub>4</sub> 0.1 Xylol 0.2 Manganese and its oxides 0.001 Copper oxides 0.002 Magnesia 0.05 Nickel oxide 0.001 Inorganic dust (SiO <sub>2</sub> 70 %) 0.05 SiO <sub>2</sub> = 70 % - 20 % 0.1 SiO <sub>2</sub> is less than 20 % 0.15 Lead and its compounds 0.0003 Lead sulfur 0.001 Hydrogen sulfide, H <sub>2</sub> S 0.008 Turpentine 1 Ethyl alcohol (ethanol) 5.0 Butyl alcohol (butanol) 0.1 Propane alcohol (propanol) 0.3 Methyl alcohol (methanol) 0.5 Styrene 0.003 Soot 0.05 CO 3.0 Phenol 0.01 Formaldehyde 0.003 Fluoride (HF, SiF <sub>4</sub> ) 0/05 Freon ( all brands ) 10 Chromium trioxide 0.0015 Chlorine 0.03 ZnO 0.05 Ethylene oxide 0.03	Where set, national air quality standards apply. If no national standards are set then apply WHO standards WHO guidelines, µg/m <sup>3</sup> : PM <sub>2.5</sub> 10 (1 yr) PM <sub>2.5</sub> 25 (24 h) PM <sub>10</sub> 20 (1 yr) PM <sub>10</sub> 50 (24 h) Ozone 100 (8 h) NO <sub>2</sub> 40 (1 yr) NO <sub>2</sub> 200 (1 hr) SO <sub>2</sub> 20 (24 h) SO <sub>2</sub> 500 (10 min)	mg/m <sup>3</sup> : PM 0.15 NO 0.06 NO <sub>2</sub> 0.04 SO <sub>2</sub> 0.05 CO 3.00 Ammonia 0.06 Benzopyrene 0.1 Benzene 0.1 Acetone 0.35 Petrol 1.5 V <sub>2</sub> O <sub>5</sub> 0.002 Vinyl acetate 0.15 HCl 0.2 HF 0.005 Fe <sub>2</sub> O <sub>3</sub> 0.04 HNO <sub>3</sub> 0.4 H <sub>2</sub> SO <sub>4</sub> 0.1 Xylol 0.2 Manganese and its oxides 0.001 Copper oxides 0.002 Magnesia 0.05 Nickel oxide 0.001 Inorganic dust (SiO <sub>2</sub> 70 %) 0.05 SiO <sub>2</sub> = 70 % - 20 % 0.1 SiO <sub>2</sub> is less than 20 % 0.15 Lead and its compounds 0.0003 Lead sulfur 0.001 Hydrogen sulfide, H <sub>2</sub> S 0.008 Turpentine 1 Ethyl alcohol (ethanol) 5.0 Butyl alcohol (butanol) 0.1 Propane alcohol (propanol) 0.3 Methyl alcohol (methanol) 0.5 Styrene 0.003 Soot 0.05 Phenol 0.01 Formaldehyde 0.003 Fluoride (HF, SiF <sub>4</sub> ) 0/05 Freon ( all brands ) 10 Chromium trioxide 0.0015 Chlorine 0.03 ZnO 0.05 Ethylene oxide 0.03	mg/m <sup>3</sup> : PM 0.15 NO 0.06 NO <sub>2</sub> 0.04 SO <sub>2</sub> 0.05 CO 3.00 Ammonia 0.06 Benzopyrene 0.1 Benzene 0.1 Acetone 0.35 Petrol 1.5 V <sub>2</sub> O <sub>5</sub> 0.002 Vinyl acetate 0.15 HCl 0.2 HF 0.005 Fe <sub>2</sub> O <sub>3</sub> 0.04 HNO <sub>3</sub> 0.4 H <sub>2</sub> SO <sub>4</sub> 0.1 Xylol 0.2 Manganese and its oxides 0.001 Copper oxides 0.002 Magnesia 0.05 Nickel oxide 0.001 Inorganic dust (SiO <sub>2</sub> 70 %) 0.05 SiO <sub>2</sub> = 70 % - 20 % 0.1 SiO <sub>2</sub> is less than 20 % 0.15 Lead and its compounds 0.0003 Lead sulfur 0.001 Hydrogen sulfide, H <sub>2</sub> S 0.008 Turpentine 1 Ethyl alcohol (ethanol) 5.0 Butyl alcohol (butanol) 0.1 Propane alcohol (propanol) 0.3 Methyl alcohol (methanol) 0.5 Styrene 0.003 Soot 0.05 Phenol 0.01 Formaldehyde 0.003 Fluoride (HF, SiF <sub>4</sub> ) 0/05 Freon ( all brands ) 10 Chromium trioxide 0.0015 Chlorine 0.03 ZnO 0.05 Ethylene oxide 0.03	Tajikistan and supplemented by WHO where necessary to achieve most comprehensive suite <sup>7</sup>

<sup>6</sup> Annex 3 to Procedure of Environmental Impact Assessment accepted by Resolution No 464 of the Government of the Republic of Tajikistan dated 3 October 2006

<sup>7</sup> The IFC cites WHO ambient air quality guidelines typically apply only in jurisdictions where there are no national standards in place.

**Table 8 - Environmental Standards for Surface Water Quality & Discharges to Water**

Topic	National Standards / Requirements	EHS Guidelines (footnote Error! Bookmark not defined.)	Adopted Project Standard	Rationale
<b>Discharge to surface water: Effluent water</b>	List of MPC (Maximum Permission Compact) quality of water at surface water bodies (Requirements to water quality in fishery water bodies) <sup>8</sup> pH 6.5-8.5 Aluminium (Al) 0.04 Iron (Fe) 0.1 Cadmium (Cd) 0.005 Copper (Cu) 0.001 Nickel (Ni) 0.01 Lead (Pb) 0.006 Zinc (Zn) 0.01 Chromium (Cr <sup>+6</sup> ) 0.02 Chromium (Cr <sup>3+</sup> ) 0.07 Oil and petrochemicals 0.05 Arsenic (As) 0.05 Calcium (Ca) 180 Silicon (SiO <sub>3</sub> <sup>2-</sup> ) 1.0	Temperature of wastewater prior to discharge does not result in an increase greater than 3°C of ambient temperature at the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use and assimilative capacity among other considerations. For treated sanitary wastewater: pH 6-9 BOD 30 COD 125 Total nitrogen 10 Total Phosphorus 2 Oil and grease 10 TSS 50 Total coliform bacteria 400/100ml	pH 6.5-8.5 BOD 30 COD 125 Total Nitrogen 10 Total Phosphorus 2 TSS 50 Total Coliform bacteria 400/100 ml Aluminium (Al) 0.04 Iron (Fe) 0.1 Cadmium (Cd) 0.005 Copper (Cu) 0.001 Nickel (Ni) 0.01 Lead (Pb) 0.006 Zinc (Zn) 0.01 Chromium (Cr <sup>+6</sup> ) 0.02 Chromium (Cr <sup>3+</sup> ) 0.07 Oil and petrochemicals 0.05 Arsenic (As) 0.05 Calcium (Ca) 180 Silicon (SiO <sub>3</sub> <sup>2-</sup> ) 1.0	Tajik MPC as most stringent standard supplemented by IFC where needed for comprehensive suite
<b>Water quality - freshwater</b>	List of MPC above (mg/l)	No numeric standards	Tajik MPC for surface water bodies	Tajik as only relevant

<sup>8</sup> Annex 3 to Procedure of Environmental Impact Assessment accepted by Resolution No 464 of the Government of the Republic of Tajikistan dated 3 October 2006 ..

**Table 9 - Environmental Standards for Noise**

Topic	National Standards / Requirements	EHS Guidelines (footnote Error! Bookmark not defined.)	Adopted Project Standard	Rationale
<b>Night time noise limits for human protection</b>	<p>Noise emissions at the night time (23:00-07:00) should not exceed the following levels (SanPin 2.2.4/2.1.8.562-96, п.5.3.1.):</p> <ul style="list-style-type: none"> <li>• In residential and public buildings:               <ul style="list-style-type: none"> <li>– Hospitals, health centres with recreation areas: 25 dB(A);</li> <li>– Residential rooms: 30 dB(A);</li> <li>– Rooms in hotels and hostels; Territory directly surrounding hospital buildings and health centres, with their recreation areas: 35 dB(A);</li> <li>– Territory directly surrounding residential, clinics, rest homes, homes for the elderly and disabled, educational institutions, libraries; Recreation areas within the territory of residential, rest homes, houses for the elderly and disabled, children's playgrounds, schools and other educational institutions: 45 dB(A);</li> <li>– Halls of cafes, restaurants, eating rooms: 55 dB(A);</li> <li>– Shops trade halls, passenger halls in airports and stations, consumer services centres: 60 dB(A);</li> </ul> </li> </ul> <p>Sound levels for the major types of work and workplaces are the same as for the daytime (see below).</p>	<p>Noise emissions should not exceed the following levels or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site:</p> <p>Residential; institutional, educational: Night time (22:00-07:00): 45 dB(A)</p> <p>Industrial, commercial. Night time (22:00-07:00): 70 dB(A)</p>	<p>Tajik standards apply with night time defined as 22:00 – 07:00 in line with IFC EHS General Guidelines.</p>	<p>Most stringent and provides more comprehensive measurement criteria</p>
<b>Day time noise limits for human protection</b>	<p>Noise emissions at the daytime (07:00-23:00) should not exceed in residential and public buildings: - 55 dB(A) and 45 dB(A) at night in office buildings – 60 dB(A), in production facilities – 80 dB(A) (Reference to Tajik standard should be given).</p>	<p>Noise emissions should not exceed the following levels or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site:</p> <p>Residential.; institutional., educational.: Daytime (07:00-22:00): 55 dB(A) Industrial, commercial: Night time (22:00-07:00): 70 dB(A).</p>	<p>Tajik standards with daytime defined as 07:00 – 22:00 in line with IFC EHS General guidelines.</p>	<p>Most stringent and provides more comprehensive measurement criteria</p>

### Vibration Standards

In Tajikistan, there are no state standards for vibration. The vibration standards used in Tajikistan are the "Sanitary rules and regulations. "SanPiN 1.2.3685-21. Hygienic norms and requirements to ensure safety and (or) harmlessness for humans of habitat factors." It is a Russian SanPIN dated 2021 and it is also used in several CIS countries, including Tajikistan.

According to this standard permissible values and levels of vibration in residential and public buildings are the following:

Geometric mean frequencies of octave bands, Hz	Equivalent values and levels of vibration acceleration for directions of action X, Y, Z	
	m/s <sup>2</sup> x 10 <sup>-3</sup>	dB
2	4.0	72.0
4	4.5	73.0
8	5.6	75.0
16	11.0	81.0
31,5	22.0	87.0
63	45.0	93.0
Corrected and equivalently corrected values and their levels, frequency correction Wm	4.0	72.0

The standard applied in the Project is the one in the last row in dB (72 dB).

For public buildings the following permissible values and levels of vibration are applied:

Vibration Type	Vibration Category	Direction of action	Equalization filter	Equivalent adjusted vibration acceleration levels	
				m/s <sup>2</sup>	dB
Local		X <sub>i</sub> , Y <sub>i</sub> , Z <sub>i</sub>	Wh	2.0	126
General	Transport vibration in workplaces and vehicles, self-propelled and trailed vehicles when moving	Z <sub>0</sub>	Wk	0.56	115
		X <sub>0</sub> , Y <sub>0</sub>	Wd	0,40	112
	Transport and technological vibration at workplaces in machines moving on prepared surfaces of production premises, industrial sites, and mine workings	Z <sub>0</sub>	Wk	0,28	109
		X <sub>0</sub> , Y <sub>0</sub>	Wd	0,2	106
	Technological vibration at the stationary workplaces	Z <sub>0</sub>	Wk	0.1	100
		X <sub>0</sub> , Y <sub>0</sub>	Wd	0.071	97

86. **ADB SPS International Best Practice Requirements.** ADB SPS requires that, during the design, construction, and operation of the project, the executing agency shall apply pollution prevention and control technologies and practices that are consistent with international good practice, as reflected in internationally recognized standards such as EHS

Guidelines (footnote **Error! Bookmark not defined.**). These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of Tajikistan regulations differ from these levels and measures, PIURR will apply the levels or measures whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, PIURR will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

## **IV. DESCRIPTION OF THE PROJECT**

### **B. Overview**

87. The project is located in the Baljuvon region in the valley of the Vakhsh river. The project area borders on the Faizabad, Rogun, Nurabad and Sangvor regions, and in the east and south, on the Khovaling, Temurmalik and Nurek regions of the Khatlon region.

88. The Baljuvon - Sari Khosor road was originally built in the 1960s of the last century and is of strategic importance for the country, as it provides transport links between the south eastern regions of the country and the capital and other regions of the Republic.

89. The population along the project road live in very difficult conditions, since it is impossible to get here in winter. During the Soviet Union, due to lack of roads, most of the people were relocated from this place to nearby valleys. After the collapse of the Soviet Union, people returned to their homes.

90. Implementation of the project will increase freight traffic between settlements of this region, as well as provide the possibility of year-round transport communication to the city of Bokhtar, the regional center of Khatlon region. Improvement of road infrastructure will contribute to the development of agriculture, increase industrial production. It is also important to note the fact that this region is rich in minerals and precious metals, and this road will be important in the future development of the mining industry.

91. The project road will start at 28 km of Kangurt – Baljuvon road, which was rehabilitated with financial assistance of ADB, 100m from the bridge across Shurabdaryo River. The Project Road ends at the Sari Khosor waterfall, which is considered as the entrance to the tourist area, which is currently under development. The length of the project road is about 56 km. Overall direction of the project road is north-east. The majority of the project road is located on the right bank of Shurabdaryo Mountain River.



**Figure 3 - Project Alignment Map of Project Road**

92. In the future it is envisaged to extend and connect the road to the Nurobad-Tavildara-Kalaikhumb Main Road RB 02 (former M41). The M41 forms part of the Pamir Highway and is of international importance. The M41 continues to Kyrgyz Republic and CAREC road network.

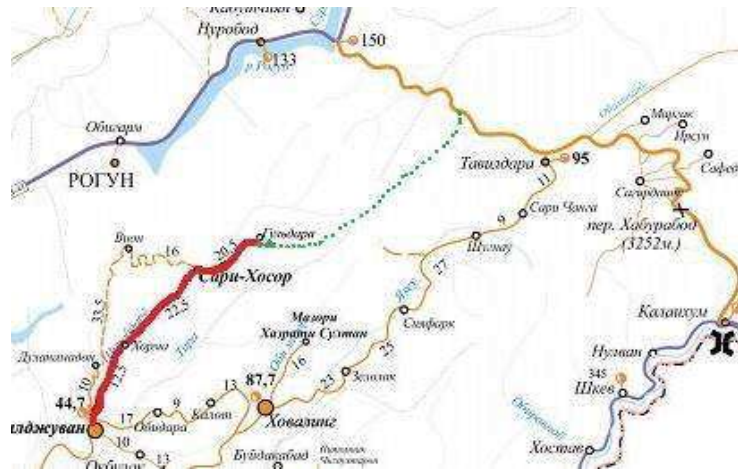


Figure 4 – Future Extension of the Road

## C. Type and Category of Project

### 1. Existing Road Characteristics

93.

94. The existing road Baljuvon – Sari Khosor road exists only as earth/gravel track with no pavement and is only passable with a 4-wheel drive vehicle. The width of the earth bed varies between 3.7 m and 7 m. The minimum horizontal curve radius is in some areas less than 30 m and the maximum longitudinal slope more than 12%. Very limited culverts or bridges exist for crossing of water streams. From the beginning of the road to km 8, some artificial drainage structures exist, including 1.0 m and 1.5 m pipe culverts and rectangular box culverts of 1.0x1.0m, 1.5x1.5m, 2.0x2.0 m and 2.5x2.5 m sizes. After Sari Khosor, the old road exists only in fragments and the current track goes through the flood plains of Shurabdaryo River.

95. In 1990-1996 from the Kangurt-Khovaling road adjoining about 3-4 km the track was built and in 2017 from the beginning of the highway to km 8-9 the road is built according to the parameters of V-technical category and in this section, there are no side ditches and signs, guardrails. In some places bank protection works have been constructed which do not correspond to the technologies.



**Figure 5 – Existing Road at km 2.88**



**Figure 6 – Village Doshmandi Passage**

From km 36 to km 54 there is no road, and vehicles drive along the left and right banks of the river, where there is no water.



**Figure 7 – Existing Road at km 47**

## **2. Designed Road Characteristics and Technical Parameters**

96. In order to meet the tight deadlines for the preparation of the detailed design and to speed up the survey and design work, the road has been divided into two sections, allowing different teams to work simultaneously on the project. Section 1 starts from km 0 (project number 0+000) to km 33 (project number 33+000), while Section 2 continues from km 33 to km 54.1 (project number 54+100), the end of the project road.

97. The design carefully takes into account a wide variety of factors that have a direct or indirect impact on the enterprise, as well as all changes in financial indicators. It must also include all possible calculated risks, the proposed solutions are just that, a project of bank protection pipes and bridges.

98. Baljuvon-Sari Khosor road starts from km 48 of RD-026 (Republic Road) Dangara-Kangurt-Khovaling 100 m from Shurobdaryo River Bridge. The design of the road was carried out on the basis of the technical assignment issued by the Client.

99. Section 1 is taken at the T-junction of the Dangara-Kangurt-Khovaling highway. Section 1 connects the settlements of Khorma, Doshmandi, Chiltori, Dashtikilko, Bogi Zogon and Toydara. From the beginning of the road to 3.2 km, the road runs along the Yoksu River. Basically up to 9 km of the existing road is reconstructed according to the parameters of IV- technical category. Basically the culverts are preserved and some of them, which were constructed in 2017 are reconstructed. In some places bank protection works, which were not performed according to the relevant technologies are designed and accounted for in the Feasibility Study stage anew. From the beginning to the end of the route of Section 1, where the road runs along slopes, the berm is adopted up to 3 m, because this it will create easy and convenient conditions for excavators during construction works and in case of stone fallout or inflow of soil from the foothills, it will fall on the berm and will not fill the side ditches.

100. Where structures such as culverts, bridges, guardrail signs, side ditches and BURs are not foreseen, they are taken into account in the Feasibility Study. The alignment of the route has been taken according to the Technical Assignment issued by the Client.

101. Sidewalks, lighting and prefabricated trays LK2-3 are provided in the settlement areas, and the shoulder is reinforced with asphalt concrete. This road is in extremely unsatisfactory condition along its entire length.

**Table 10 – Technical Attributes of Section 1**

No	Name of indicators and design solutions of Section 1	
1	Technical category of road	IV category
2	Length of the section, km	30.00
3	Driving speed, km/h	40-60
4	Width of roadway, m	6
5	Marginal pre-strip (shoulder), m	0,5
6	Number of lanes, pcs.	2
7	Earth bed width, m	10
8	Shoulder width, m	2
9	Transverse slope, ‰	20
10	Cross slope curb, ‰	40
11	Maximum longitudinal slope, ‰	90
12	Minimum radius in plan , m	40
13	Type of pavement	Asphalt concrete
14	Pavement area, m <sup>2</sup> (excluding exits and ramps)	229 244
15	Artificial structures, pcs.	84
16	Exits, pcs.	13
17	Retaining wall (downstream),m	134
18	Retaining wall (upstream),m	520
19	Gabion retaining wall	730
20	Bank protection structures, m	14153
21	Spurs, pcs	3
22	Drainage, m	730
23	Sidewalks, m <sup>2</sup>	593
	Boardstone100.20.8	398
24	Installation of reinforced concrete trays LK2-3, pcs.	1170
25	Installation of reinforced concrete trays L2-3, pcs.	9
26	Installation of curbstone 100.30.18, m	1556
27	Metal pipe Ø300mm, m	53
28	Polyethylene signal posts, pcs.	1327
29	Parapet guardrail type F (OBK), pcs.	2705
30	Monolithic parapet fence made of butcrete, pm	19038
31	Road signs, pcs.	308
32	Г-shaped sign,pcs	3
33	Road markings, km	
	Horizontal	89,8
	Vertical	23,3
34	Excavation, m <sup>3</sup> (1158137 m <sup>3</sup> rocky siltstone)	1 719 709
35	Embankment (taking into account compaction factor), m <sup>3</sup>	697643
36	Monolithic cuvette (damper). pcs.	76

No	Name of indicators and design solutions of Section 1	
37	Grass seeding of ditches, rm	730
38	Construction of ditches from monolithic concrete M200, slope from 30 to 50‰, m	2380
39	Arrangement of ditches from shotcrete M200, m.	4200
40	Construction of new bridges, pcs.	3
41	Restroom (Toilet), pcs.	1

102. Section 2 - starts from 450 m before reaching the right side of the Bulgori River. The right and left sides are connected by a new bridge. There is no road in Section 2. Section 2 starts from Jamoata Shahidon and passes directly next to a new settlement where there is a helicopter landing pad which is being demolished during the envisioned project in the feasibility study phase, the road then turns between the Honey Processing Plant and connects to a new bridge at Langar Cemetery.

103. As agreed, and submitted by APZ during the envisaged project, connecting roads in the center of Jamoat Shahidon were taken into account. The road passes through Langar Cemeteries and the right side of Langar Cemetery is demolished. Further, it is envisaged that the road runs up to 2 km along slopes and the rest along the floodplain of the right bank of the river, and where there is a possibility of departure from the floodplain, the route is envisaged according to the Customer's request. (see Plan and longitudinal profile). The road passes through the villages of Dashtaro (km 35) and Nusai (km 40). Opposite Nusai village there is a secondary school in Aspiringon village and a pedestrian bridge is provided there. Further the road connects with the villages of Shomusha (km 43), Shipdara (km 44), Pestova (km 46), Dashti gaz (km 48), Tovgula (km 49), Shikeldara (km 50), Rezgai (km 51), Mulokoni (km 52) and the end of the road is the waterfall of Sari Khosor (natural park).

**Table 11 – Technical Attributes of Section 2**

No	Name of indicators and design solutions of Section 2	
1	Technical category of road	IV category
2	Length of the section, km	24,1
3	Driving speed, km/h (in mountainous conditions-40km/h)	40-60
4	Width of roadway, m	6
5	Marginal pre-strip (shoulder), m	0,5
6	Number of lanes, pcs.	2
7	Earth bed width, m	10
8	Shoulder width, m	2
9	Transverse slope, ‰	20
10	Cross slope curb, ‰	40
11	Maximum longitudinal slope, ‰	70
12	Minimum radius in plan, m	60
13	Type of pavement	Asphalt concrete
14	Pavement area, m <sup>2</sup> (excluding exit and exit ramps and excluding tunnel)	184 748

№	Name of indicators and design solutions of Section 2	
15	Artificial structures, pcs.	49
16	Exits, pcs.	30
17	Retaining wall (downstream)	154
18	Bank protection structures, m	16 340
19	Sidewalks, m <sup>2</sup>	2 319
	Curbstone 100.20.08, мм	1 546
20	Installation of reinforced concrete trays LK2-3, pcs.	864
21	Installation of reinforced concrete trays L2-3, pcs.	29
22	Installation of curbstone 100.30.18, m	1 484
23	Polyethylene signal bollards, pcs.	453
24	Parapet guardrail type F (OPK), pcs.	1 348
25	Monolithic parapet fence made of butcrete, m	32 089
26	Road signs, pcs.	321
27	Road markings, km	
	Horizontal Vertical	78,98 34,95
28	Excavation, m <sup>3</sup> (766281 m <sup>3</sup> rock BVR-7-29v)	960206
29	Embankment, (taking into account compaction coefficient) m <sup>3</sup>	1 357 051
30	Monolithic cuvette (damper). pcs.	30
31	Arrangement of ditches from shotcrete concrete M200, m	1407
32	Construction of new bridge, pcs	8
33	Restroom (Toilet), pcs.	2
34	Camping, pcs	1

**Table 12 – List of restrooms and campsites located along the Baljuvon-Sari Khosor road (km 0+000 to km 54+100)**

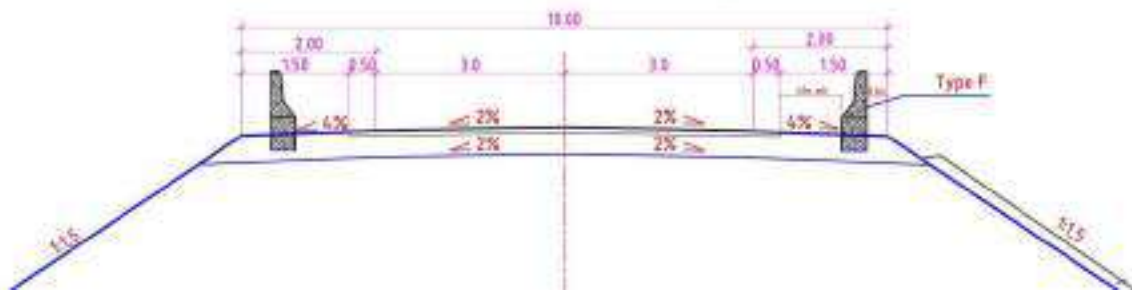
№ п/п	Location, PC	Name	Area, м <sup>2</sup>
1	PC 136+31	Restroom	144,55
2	PC 316+10 (on the left)	Camping, mother and baby room, and restrooms	308,01
3	PC 334+53	Restroom	144,55

104. Typical construction drawings are shown in the book Road Service Drawings of the technical design documents.

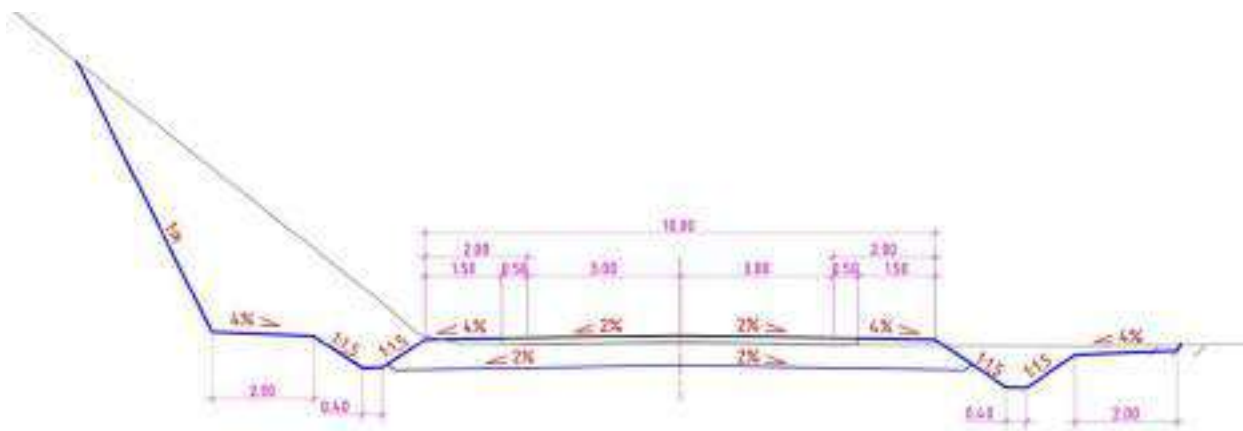
105. The designed cross section of the road includes 2 lanes. The following table shows the main parameters of the Project road's cross profile.

**Table 13 – Main parameters of the road cross profile**

Name of road elements	Road parameters IV -category
Number of lanes	2
Lane width, m	3,0
Width of roadway, m	6.0
Width of shoulders, m	2.0
Smallest width of reinforced shoulder lane, m	0,5
Roadbed width, m	10.0



**Figure 8 - Typical cross section in Embankments**



**Figure 9 - Typical cross section outside settlements (4-lanes. Category I)**

106. In settled areas, the implementation of sidewalks, street lightening and green strips for improvement of road safety are considered in the design.

107. Cross-section parameters are related to traffic flows and will vary with the requirements of vehicular traffic. The cross section in combination with the alignment will determine the earthwork quantities. Lane and shoulder width greatly impact traffic operations and safety therefore the road width should be kept to a minimum so as to reduce the costs of construction and maintenance whilst being sufficient to carry traffic loading efficiently and safely.

108. According to the intended classification of the road, the design speed is 40 to 60 km /h, in mountainous conditions 40 km/h.

#### **D. Need for Project**

109. Baljuvon – Sari Khosor road is linking the villages along the road with Dushanbe and other regions of Tajikistan. Baljuvon – Sari Khosor road runs through highland areas with the steep slopes and strong atmospheric temperature drops. Huge volume of snow is experienced in winter periods. Mudflow and landslides are destroying some sections of the road and rock falls are creating road safety hazards, leading periodically to closure of the road.

110. Therefore, the population along the project road live in very difficult conditions, since it is impossible to get here in winter. During the Soviet Union, due to lack of roads, most of the people were relocated from this place to nearby valleys. After the collapse of the Soviet Union, people returned to their homes.
111. Due to its currently bad conditions the rehabilitation of the Baljuvon – Sari Khosor road is a critical requirement for allowing the future development of the communities along the Project road.
112. Implementation of the project will increase freight traffic between settlements of this region, as well as provide the possibility of year-round transport communication to the city of Bokhtar, the regional center of Khatlon region. Improvement of road infrastructure will contribute to the development of agriculture, increase industrial production. It is also important to note the fact that this region is rich in minerals and precious metals, and this road will be important in the future development of the mining industry.
113. In summary the need for the rehabilitation of the Project road is caused by the inconsistency of the existing technical category and the many safety risks caused by the existing bad conditions. Therefore, the rehabilitation of the Baljuvon – Sari Khosor road is urgently needed. The below photo (Figure 10) exemplifies the deficient situation of the existing Project road at km 9.3 which is within a section located along the foot of the mountain.
114. The width of the earth bed is 4 – 6 m and the road surface is unpaved. Earths from excavation are stored on the roadside and ditches are not provided. Due to the lack of a side drainage, water on the slopes runs along the roadway and leading to erosion, which formed potholes. On this section the terrain is very difficult, the soil is aleuralite and during rain slope is prone to landslides and mudflows. Steep turns are existing, and visibility is not provided. Turning radius is partly less than 6m. Winter maintenance is very difficult and could be hardly provided. Hence the need of the Project becomes obvious.



**Figure 10 – Existing road at km 9.3 with serious safety deficiencies**

## **E. Size or Magnitude of Operation**

115. The existing conditions of the project road do not meet any design criteria for road construction.

116. The Baljuvon-Sari Khosor Road section is designed according to Category IV (two-lane road, according to the State Road Construction Code 32-02-12 and in populated areas according to the State Road Construction Code 30-01-2007).

117. The design speed for Category IV Road will be 60 km/h for flat terrain. On the hilly and mountainous section, the design speed will be reduced to 40 km/h, depending on the terrain conditions.

118. The design alignment is mostly based on the existing alignment with minor adjustments made to improve geometric characteristics, wherever practical. No spatial alternatives or bypasses are foreseen under this Project. The Project will involve several associated activities such as utilization of borrow areas, operation of asphalt plants and aggregate crusher, establishment of contractor's worker camps and storage sites, etc.

119. The anticipated works for reconstruction of the Dangara-Guliston Project Road comprise:

- Reconstruction and widening of road pavement
- Replacement of bridges
- Replacement of culverts and improvement of drainage system
- Installation of road lighting in settled areas
- Improvement of traffic safety due to proper road signing and marking and installation of guardrails
- Construction of retaining walls.

120. The works will be procured in accordance with ADB procurement rules and guidelines for Open Competitive Bidding (OCB) and based on detailed design drawings.

## **F. Traffic Volume**

121. Present traffic volumes are low, about 100 vehicles per day, although observed traffic growth is about 10% every year. Due to the very poor existing road condition, travel time from Baljuvon to Sari Khosor, the largest village along the project road, is more than 2 hours for 31.2 km. From Sari Khosor, the road continues to the waterfall of Sari-Khosor (Guldara), which is considered as the main access point to the tourist area. The length of the road section from Sari Khosor to the waterfall is about 27 km. There is virtually no road to the waterfall and a 4-wheel vehicle can only drive with walking speed.

122. Considering the difficult terrain and the anticipated low traffic volumes, a road design in accordance with the parameter for road category IV is envisaged with a design speed of 40km/h in mountainous terrain.

## G. Proposed Schedule for Implementation

123. The implementation schedule needs to be determined in cooperation with the Project's financier which still needs to be determined.

## H. Bridges

124. The Project involves the construction of eleven bridges as shown in the below table.

**Table 14 – Bridges and its Technical Parameters**

### Feasibility Study and Detailed Design of Bridges on Baljuwon-Sari Khosor Road

No. of Sites	section length, Km +	No. of structures	Location of the structure, PK	Nearest village	Name of obstacles	Parameters of designed bridges			
						Bridge length, m	Bridge scheme, m	Bridge dimension, m	Bridge width, m
1	2		3	4	5	6	7	8	9
1	0 to 30	1	148+ 00.0 0	Horm		19,2	1x18,0	8+2x1.0	10,9
		2	270+ 25.0 0	Toidara		19,20	1x18,0	8+2x1.0	10,9
		3	292+ 38.5 0	Toidara		19,20	1x18,0	10+2x1.0	12,9
		<b>Total on site 1</b>					38,40		
2	30 to 54.1	4	305+ 36.7 0	Shaydon	Bulgori River	133,50	4x33.0	8+2x1.0	10,9
		5	322+ 30.0 0	Shaydon		82,40	24+33+ 24	8+2x1.0	10,9
		6	367+ 20.0 0	Nusai		19,20	1x18.0	8+2x1.0	10,9
		7	417+ 60.0 0	Shipdara		19,20	1x18.0	8+2x1.0	10,9
		8	430+ 80.0 0	Pestova		82,40	24+33+ 24	8+2x1.0	10,9
		9	456+ 30.0 0	Tovgula		82,40	24+33+ 25	8+2x1.0	11,9
		10	488+ 00.0 0	Shikeldara	Daraa Gugird		82,40	24+33+ 26	8+2x1.0

## Feasibility Study and Detailed Design of Bridges on Baljuwon-Sari Khosor Road

No. of Sites	section length, Km +	No. of structures	Location of the structure, PK	Nearest village	Name of obstacles	Parameters of designed bridges			
						Bridge length, m	Bridge scheme, m	Bridge dimension, m	Bridge width, m
		11	518. +20.00	Mulokoni	Hackodara	19,2	1x18,0	8+2x1.0	10,9
<b>Total on site 2</b>						<b>254,30</b>			
<b>Total from km 480+00 to 715+00</b>						<b>292,70</b>			

125. The design of the bridge considers the risks of flooding. The construction of adequate number and size of culverts, as well as the sufficient height of bridges is considered in the construction cost estimates.

### I. Quantities

126. The quantities of aggregates required are spread over the construction period and will only be sourced from local quarries and/or suppliers.

127. The volumes of excavation works were calculated by cross-sectional profiles of the roadbed in Topomatic and AutoCAD program. The total profile volume in the Feasibility Study of earth works for the construction of the roadbed, according to road sections 1 and 2 amounted to:

128. Section 1: Embankment including compaction factor – 697,643m<sup>3</sup>. Excavation – 1,719,709m<sup>3</sup> (of this 1158137m<sup>3</sup> BWR siltstone and sandy clay with cement).

129. Section 2: Bulk fill including compaction factor – 1,357,051m<sup>3</sup>, Excavations – 960,206m<sup>3</sup> (of this 766,281m<sup>3</sup> BVR-7(29B)).<sup>9</sup>

130. The required fill material needs to be sourced from suitable borrow areas. The surplus soil resulting from cut sections needs to be transported to suitable disposal sites. The proposed disposal sites are shown in Annex 2 - IDENTIFIED AREAS FOR SURPLUS MATERIAL DISPOSAL. Currently the selected locations for disposal of excess soil have not yet been agreed with the local authorities, but the most suitable locations have been selected and as a rule before the start of construction works the Contractor will necessarily agree these locations with the local authorities.

<sup>9</sup> Source: Draft Final FS Report. Chapter 6.2 Cross Section Parameters.

## J. Borrow Areas

131. For the construction works, particularly for the embankment works, the production of asphalt concrete and concrete mixtures, construction aggregates are required which need to be extracted from suitable borrow areas.

132. The Surkhob River gravel deposits can serve as a soil reservoir of construction material for embankment or gravel-sand mixture. Access to the quarry is available where the project road runs along the floodplain. During floods the floodplain of the river is flooded with water. The material can be used for embankment and lower layers (up to the bottom of the working layer) of the earth bed if particles larger than 400mm are removed.

133. The proposed river deposits can only be used after a detailed study of the quality of the material. Currently, the soil reserve material is used by private entrepreneurs.

134. **Material quality control:** After selecting one or another of the proposed soil reserves, the contractor is recommended to conduct material quality studies by laying the pits in places that are typical for quarry area. The number of pits should be 6 or more. The depth of the pits should reach the depth of the proposed soil reserve to be excavated. It is necessary to take soil samples from all marked layers and test them in the laboratory. Laboratory tests should include all tests specified in the Specifications. It is necessary to keep a protocol for laying pits and laboratory tests in accordance with the Specification.

## **V. Analysis of ALTERNATIVES**

135. No spatial alternatives or bypasses are foreseen for the Baljuvon - Sari Khosor road rehabilitation. The general objective of the design was to follow the existing alignment with respect to minimizing the impact on properties, the environment and land. In order to minimize impacts, the road centreline will be adjusted as far as it is technically feasible. There will however be no departures from the standards.

136. There are minor design adjustments due to compliance requirements with technical design parameters and for improving traffic flow.

137. The “no Project” option is not really an alternative. It would imply that the existing connection between Baljuvon and Sari Khosor would be left in its present state as characterized by serious safety hazards such as mudflow, landslides and rock falls. In addition the communities along the Project road would be cut off from markets and services during winter time.

138. It is therefore obvious that the reconstruction of the Project road is urgently needed and that the “do nothing” option is not a real alternative.

## **VI. Description of the Environment**

139. In the following background information on Tajikistan, the Project and the environmental baseline conditions within the Project's area of influence are given.

140. Tajikistan is a landlocked, mountainous country with formidable geographic barriers that seriously constrain its ability to effectively participate in international trade. Its development efforts are further hampered by inadequate physical infrastructure, which is in need of investment and regular maintenance. Tajikistan is surrounded by the People's Republic of China, the Kyrgyz Republic, Uzbekistan and Afghanistan. The population of Tajikistan is 9.1 million (2019)<sup>10</sup>. Population density is 57.2 persons / km<sup>2</sup>.

141. The Project road is entirely located within the Vaksh River basin. The length of the project road is about 56 km. Overall direction of the project road is north-east. The majority of the project road is located on the right bank of Shurabdarya Mountain River which is a tributary to Vaksh River.

### **A. Physical Resources in Project Area**

142. Administratively, the Project is located in the Baljuvon district of the Kathlon region in the valley of the Vakhsh river. The project area borders on the Faizabad, Rogun, Nurabad and Sangvor districts, and in the east and south, on the Khovaling and Temurmaliq districts.

143. In orographic terms, the route of the projected road is located at the south-eastern end of the Vakhsh Range and is confined to its adyr part (foothill zone). The relief of the area is highly dissected which is caused by a variety of factors: a well-developed hydrographic network, the presence of tectonic zones and the development of physical and geological processes. The slopes of varying steepness are easily eroded by water and collapse onto the existing roadway.

#### **1. Geology**

144. The geological section of the site is represented mainly by gravel deposits of the Surkhob River and its tributaries, rocks (interbedded layers of siltstones and sandstones on clay cement) of the Upper Neogene and Quaternary age. Outcrops of semiscale rocks, which include sandstones and siltstones overlain by deluvium (fractures of sandstones and siltstones). The thickness of the deluvial deposits is up to 6.0m. The conditions of occurrence of lithological and genetic types of soils along the highway route are presented on the longitudinal profile.

145. The slopes of the excavations are composed of interlayered siltstones and sandstones for most of their length.

146. To following figure shows the geological map of the Project area.

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<sup>10</sup> World Bank, 2020. Country Context. Available at: <https://www.worldbank.org/en/country/tajikistan/overview> (accessed on 28 July 2020).



**Figure 11 - Geology of the Project Area**

147. The legend of the above map of Geology of the road corridor uses the following abbreviations.



**Figure 12 – Symbols for the Geological Map of the Project Area**

148. Of the modern geological processes and phenomena that can affect the roadbed, the following should be highlighted: seismicity, mudflows, bank scour, widespread slope erosion, gully formation and landslides.

149. Areas of hazardous geological processes identified alongside the Project route are shown in the following table (source: Draft Final FS Report). The recommended actions have been incorporated into the Project design.

**Table 15 List of sites affected by exogenous geological processes and phenomena on the Project road**

№№ п/п	Kilometerage from km 0+000		Type of exogenous geological process	Recommended activities
	From	To		
1	0+250	0+500	Slope erosion, possible rockfalls	Slope terracing, construction of rock retaining walls
2	0+600	0+670	Slope erosion, possible rockfalls	Slope terracing, construction of rock retaining walls
3	0+731		Sai	Construction of a mudflow outlet, mudflow retention dam

№№ пп	Kilometerage from km 0+000		Type of exogenous geological process	Recommended activities
	From	To		
4	0-930		Sai	Construction of a mudflow outlet, mudflow retention dam
5	1+147		Sai	Construction of a mudflow outlet, mudflow retention dam
6	1+298		Sai	Construction of a mudflow outlet, mudflow retention dam
7	1+637		Sai	Construction of a mudflow outlet, mudflow retention dam
8	1+852		Sai	Construction of a mudflow outlet, mudflow retention dam
9	2+180	2+230	Slope erosion, possible rockfalls	Terracing of the slope, construction of stone retaining walls
10	2+280	2+410	Slope erosion, possible rockfalls	Terracing of the slope, construction of stone retaining walls
11	2+840	2+910	Slope erosion, possible rockfalls	Terracing of the slope, construction of stone retaining walls
12	3+080	3+600	Landslide-prone slopes, Slope erosion, possible rockfalls	Terracing of the slope, construction of stone retaining walls, строительство подпорной стенки
13	3+614		Sai	Construction of a mudflow outlet, mudflow retention dam
14	3+420	7+280	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
15	4+180	4+420	Slope erosion, possible rockfalls	Terracing of the slope, construction of stone retaining walls
16	4+550	4+820	Landslide-prone slopes, Slope erosion, possible rockfalls	Террасирование склона, строительство подпорной стенки
17	6+480	6+910	Slope erosion, possible rockfalls	Terracing of the slope, construction of stone retaining walls
18	6+950	7+140	Slope erosion, possible rockfalls	Terracing of the slope, construction of stone retaining walls
19	7+600	8+410	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
20	9+120	10+460	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
21	9+170	9+840	Slope erosion, possible rockfalls	Terracing of the slope, construction of stone retaining walls
22	10+200	10+300	Slope erosion, possible rockfalls	Terracing of the slope, construction of stone retaining walls
23	10+740	10+820	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
24	10+920	11+520	River side erosion	Bank protection works (gabions, concrete slabs, etc.)

№№ пп	Kilometerage from km 0+000		Type of exogenous geological process	Recommended activities
	From	To		
25	11+630		Sai	Construction of a mudflow outlet, mudflow retention dam
26	13+460	16+640	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
27	14+770	14+820	Sai	Construction of a mudflow outlet, mudflow retention dam
28	16+720	17+110	Slope erosion, possible rockfalls	Terracing of the slope, construction of stone retaining walls
29	17+210	17+580	Slope erosion, possible rockfalls	Terracing of the slope, construction of stone retaining walls
30	17+760	18+310	Slope erosion, possible rockfalls	Terracing of the slope, construction of stone retaining walls
31	18+620	20+670	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
32	21+980	23+060	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
33	23+460	24+580	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
34	24+695		Sai	Construction of a mudflow outlet, mudflow retention dam
35	25+280	25+570	Landslide-prone slopes	Террасирование склона, строительство подпорной стенки
36	26+080	26+720	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
37	30+460	30+700	Sai Bulgori	Bridge construction, mudflow protection dams near bridge piers
38	32+180	32+300	Sai	Bridge construction, mudflow protection dams near bridge piers
39	32+620	33+240	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
40	32+620	33+340	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
41	34+050	35+220	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
42	38+000	38+460	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
43	39+580	39+860	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
44	40+920	40+945	Sai	Construction of a mudflow outlet, mudflow retention dam
45	41+160		Sai	Construction of a mudflow outlet, mudflow retention dam
46	41+160	41+360	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
47	41+206		Sai	Construction of a mudflow outlet, mudflow retention dam
48	43+090	43+440	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
49	43+810	46+100	River side erosion	Bank protection works (gabions, concrete slabs, etc.)

№№ пп	Kilometerage from km 0+000		Type of exogenous geological process	Recommended activities
	From	To		
50	46+480	52+110	River side erosion	Bank protection works (gabions, concrete slabs, etc.)
51	48+730	48+800	Рeкa Shkeldara	Bridge construction, mudflow protection dams near bridge piers
52	51+800	51+900	Sai Khovakdara	Bridge construction, mudflow protection dams near bridge piers
53	52+420	54+100	River side erosion	Bank protection works (gabions, concrete slabs, etc.)

150. As a protective measure against rockslides and slumps it is necessary to provide for the device between the route and the upper slope or slope catching trench, the dimensions of which should be determined taking into account the possible volume of collapsing soils, widened berms retaining walls.

151. The flood zone in the river floodplain can be protected by the construction of dykes. Protect the dyke from the wave surf of riverbed waters with gabions. For better bonding of stone material used in gabions use angular stone fragments.

## 2. Seismicity

152. The most dangerous and unpredictable phenomenon for the route of the Baljuvon-Sari Khosor road is seismicity. According to the map of seismic zoning of the Republic of Tajikistan, the route of the projected highway is located in the 8-point zone. Category of soils on seismic properties II. Estimated seismicity along the highway route 8 points.

153. The design seismicity for artificial structures on roads of IV, IIIp and IVp categories, as well as for embankments, excavations, on roads of all categories is assumed to be one point lower than the seismicity of construction sites.

154. The design seismicity for artificial structures on highways of categories I-III is assumed to be equal to the seismicity of construction sites.

155. Tracing of roads in areas with seismicity of 8 points on non-rocky slopes with slope steepness more than 1:1.5 is allowed only on the basis of the results of special engineering and geological surveys. Tracing of roads on non-rocky slopes with slope steepness of 1:1 and more is not allowed GNiP RT 22-07-2018.

## 3. Soils

156. Soil erosion is a major environmental concern throughout Tajikistan due to steep slopes, the fragility of the soils and human activities such as inappropriate livestock management, the removal of protective vegetative cover and poor water management practices.

157. Soil types of the study area mainly consist of dark gray soils that overlap upper quaternary deposits, light gray soils and gray-meadow soils on the terraces of the valley of the Shurabdarya river. The soils in the Project area are mainly used for pastures.

## 4. Climate

158. Tajikistan's location in the middle of Eurasia, its remoteness from oceans and seas and vicinity to deserts predefine its climate which can be characterized as continental, with considerable seasonal and daily fluctuations in temperature and humidity. The country's very complicated relief structure, with huge variations in elevation, creates unique local climates with great temperature differences.

159. In climatic terms, the location of the Project road belongs to the Central Asian region. This is a dry climate zone with very warm summers, mild winters and moderately mild autumns Climate data

are given for two meteorological stations - Khovaling station and Kangurt station. **Khovaling weather station** right bank (altitude 1463m) Summer is very warm and mild winter.

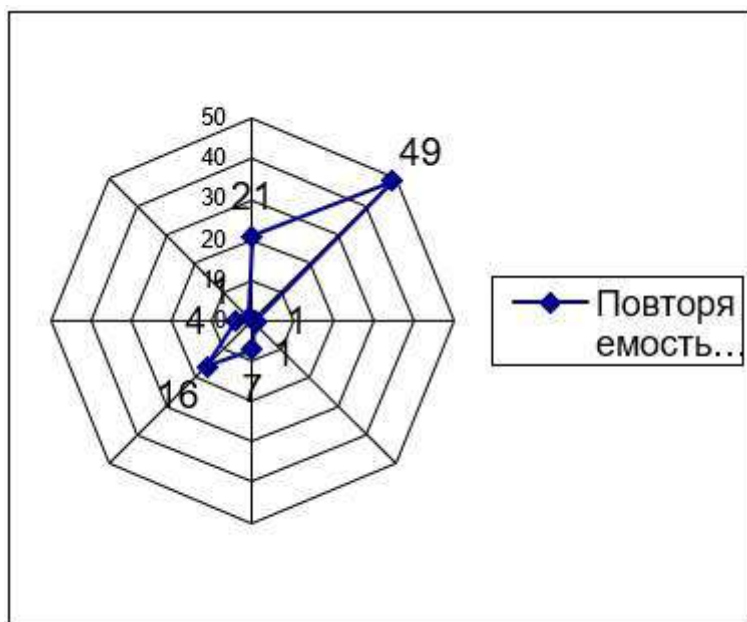
160. The mean annual air temperature +10.8 °C, maximum temperature is 39 °C and minimum temperature is -30 °C. The average monthly air temperatures are summarized in the table below:

Month	1	2	3	4	5	6	7	8	9	10	11	12
Temperature	-3,2	-0,9	4,9	10,9	15,8	19,8	23,6	22,7	17,7	11,5	5,9	1,3

161. The average annual precipitation is 842mm. The month with the most intensive precipitation is March.

162. Soil frost depth is 15 cm (Climatic characteristics of the survey area. Kangurt - Baljuvon - Khovaling highway).

163. Winds prevail in the north and north-east and south-west directions with an average annual speed of 2.8 m/sec. The wind rose based on the wind frequency of different wind directions in % per year is shown below.



**Figure 13 – Wind Rose**

164. The maximum wind speeds of different recurrence probabilities are summarized in the table below:

weather station	Wind speed (m/sec) possible once per				
	1 year	5 years	10 years	15 years	20 years
Khovaling	16	19	20	21	22

165. Relative air humidity varies from 73% in March to 36% in August. The average highest snow cover height is 32 cm and the maximum is 60cm (Climatic Characterization of the survey area. Kangurt - Baljuvon - Khovaling road).

166. **Meteorological station Kangurt** left bank. Summers are warm and winters are moderately mild with mean annual air temperature +14.3 °C, absolute maximum +45 °C and absolute minimum -25 °C.

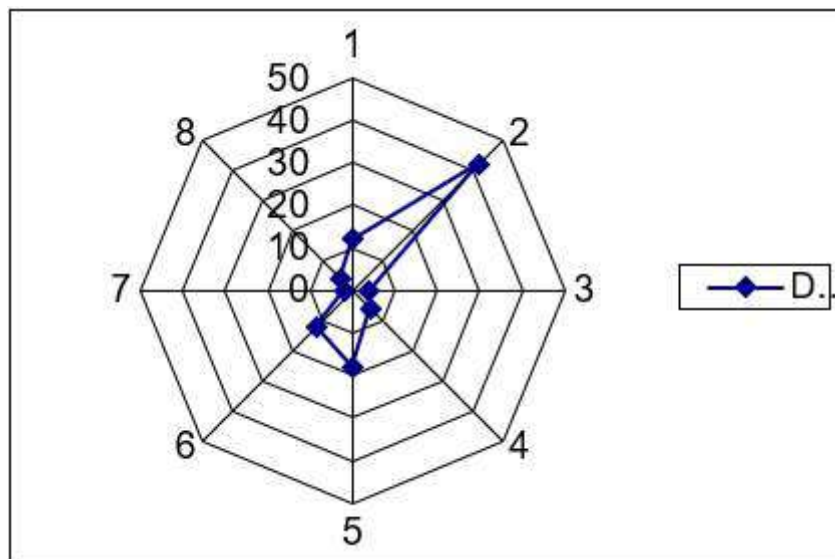
167. Average monthly air temperatures are summarized in the table below:

Month	1	2	3	4	5	6	7	8	9	10	11	12
Temperature	0	3,1	8,4	14,3	18,9	23,9	27,6	26,4	21,5	14,6	8,6	3,8

168. The average annual precipitation is 693mm. The month with the most intensive precipitation is March. Soil frost depth is 10 cm (Climatic characteristics of the survey area. Kangurt - Baljuvon - Khovaling road).

169. Winds prevail in northeastern and southern directions with an average annual speed of 1.4 m/sec.

170. The wind rose is based on the wind frequency of different wind directions in % per year.



171. The maximum wind speeds of different recurrence probabilities are summarized in the table below:

weather station	Wind speed (m/sec) possible once per				
	1 year	5 years	10 years	15 years	20 years
Kangurt left	13	17	19	20	21

172. Relative humidity ranges from 74% in January to 33% in August. The average maximum height of snow cover is 21cm and the maximum height is 34cm (Climatic characterization of the survey area of Kangurt-Baljuvon-Khovaling Road).

## 5. Climate Change

173. A stand-alone document was prepared which assesses the effects of climate change with regard to the Project Road.

## 6. Surface Water Resources

174. The hydrographic network belongs to the Surkhob River basin. The rivers and branches are fed from atmospheric precipitation and groundwater. They are most full flowing in spring and summer period. The relief along the route of the projected technogenic-altered, namely private development, land development for pastures, gardens and orchards.

175. The highly dissected relief is due to the presence of various factors: a well-developed hydrographic network, the presence of tectonic zones and the development of physical and geological processes.



**Figure 14 – Surkhob River**

176. Due to the relatively low altitude of the catchment area, the duration of floods in such rivers is not long, approximately 110-160 days. The low-water condition can occur as early as June.

177. The largest annual discharges occur mainly in April-May (less often in March, June). As a rule, they are of rainfall origin, so cases of short-term destructive mudflow floods are very frequent. The power of debris flows primarily depends on the amount and intensity of liquid precipitation, as well as on the presence in the basin of easily movable and easily erodible loose clastic material involved in the flow.

178. The runoff period of small watercourses is limited to the period of snowmelt and rainfall (March - June). Mudflows and streams saturated with sandy-clay-rubby fine-grained gravel with pebble inclusion are formed during heavy rainfall or prolonged rainfall and acquire a mudflow character.

179. The period of the greatest mudflow activity is April-May, rarely June.

180. Hydrological justification of the road reconstruction project consisted in determining the maximum water discharge of the watercourses to be crossed in order to justify the correct choice of the type and size of artificial structures. In addition, water levels corresponding to the calculated discharges were calculated in the alignments of the bridges.

181. The hydrological calculations were preceded by cartographic surveys on 1:25,000 scale maps, which consisted in determining the hydrographic characteristics of the watercourses to be crossed.

182. The road under study is assigned to the IV technical category, so the calculated probability of exceeding the maximum water discharge is assumed 3% for culverts and 2% for bridges.

183. Hydrological calculations have been performed to justify the type and size of artificial culverts across watercourses crossed by the Baljuvon - Sari Khosor road.

**184.** The average height of catchments in the study area, with few exceptions, exceeds 2 km, which provides the rivers with snow-rain feeding, while the period of action of small area logs and cuts is limited to the period of snowmelt and liquid precipitation.

185. On rivers of this type of feeding, the flood begins on average in February and its duration is short: on permanently operating watercourses, the low-water state begins in June-August and lasts until the next flood. the flood hydrograph consists of individual snow-rain flood peaks observed against the background of a general increase in water availability. On other small watercourses and incisions their period of action is limited by the period of snowmelt and rainfall.



**Figure 15 – Road to Sari Khosor Waterfall**

186. The highest annual water discharges occur in April-May and are usually of rainfall origin, with rainfall runoff maxima far exceeding snow maximums, and due to easily washed away bedrock, flows acquire mudflow character when intense rains occur.

187. The rationale was to determine design maximum water discharges of 3% of ER for pipes and 2% of ER for bridges according to the IV category of the road.

188. Hydrological study of the study area is completely absent, so the calculation of maximum water discharges was made according to the normative and technical literature in force on the territory of RT.

189. The methods developed for debris flows were used in the calculations.

190. The calculations were preceded by cartographic surveys using 1:25000 scale maps.

191. Baljuvon is one of the unique places in Tajikistan, a gift of nature - it is the Sari Khosor Reserve; Sari Khosor Waterfall has a delightful beauty and mythical origin, which attracts masses of international and local tourists every year in the summer season.



**Figure 16 –Sari Khosor Waterfall**

The distance from the capital of Tajikistan to Sari Khosor reaches about 200-205 km. Also, the road to the Waterfall is not smooth and in the rainy season it is almost impossible to get there by car. Many people go there on foot or on a donkey, as the road is not flat and in the rainy season the paths are flooded with mud and mudflows.

#### **7. Ground Water**

192. Groundwater has been uncovered on road sections where the road alignment runs along the river floodplain and is uncovered by excavations.

No. of workout	Depth of groundwater table (m)
ш-20	3,00
ш-29	2,70
ш-34	2,60
ш-35	2,70
ш-36	3,00
ш-37	2,50
ш-38	2,90

193. The remaining excavations have not uncovered groundwater to a depth of 3.0m as of April 2023. It should be noted that the part of the projected roadway that runs along the Surkhob River floodplain may be under water during floods. To protect the roadbed from erosion by channel waters during floods, it is recommended to construct dams and high embankments.

#### **B. Ecological Resources in the Project Area**

194. Natural ecosystems are the single reliable source of environmental stability in the world. At the same time, the impact of anthropogenic activity on ecosystems is becoming the main reason for climate change, loss of biodiversity, and desertification/land degradation. Control of environmental risks requires a strong environmental policy, improved coordination of government structures, civil and business society representatives.

195. Changeable mountain climatic conditions and hard natural historical processes promoted formation of a unique biological diversity in Tajikistan. The annual average sunshine level varies from 2,090 to 3,160 hours, the average air temperature varying from +17°C and higher in the south of the country to -7°C and lower in the Pamirs. The highest temperature is in July, while the lowest is in January. The most severe climate is observed in the Eastern Pamirs, where the annual average temperature is from -1 to -6°C. The absolute minimum is at the Bulunkul Lake -63°C. In hot deserts of southern Tajikistan and in cold high-mountain deserts of the Eastern Pamirs, the annual average precipitation level varies from 70 to 160 mm, the maximum being in Central Tajikistan, sometimes exceeding 2000 mm a year. The mountain landscapes of Tajikistan contain 0.66% of the animal world and 1.8% – plant diversity, including wild relatives of domestic animals and cultivated plants.

**Table 16 - Main Components of Biodiversity in Tajikistan**

<b>Component</b>	<b>Importance</b>
Ecosystems	12 types
Types of vegetation	20 types
Flora	9,771 species
Wild relatives of cultivated plants	1,000 species
Endemic plants	1,132 species
Plants, listed in the Red Data Book of Tajikistan	226 species
Agricultural crops	500 varieties
Fauna	13,531 species
Endemic animals	800 species
Animals, listed in the Red Data Book of Tajikistan	162 species
Domestic animals	30 breeds

196. Forests only take up 3% (412,000 ha) of the land area of the country, however they still play an important role in the conservation of biodiversity and genetic resources as well as in atmospheric carbon absorption. In addition, the forests are a natural protection for human settlements against floods, avalanches, and soil erosion. They also regulate the water balance and microclimate.

197. Almost all forests in Tajikistan belong to the state and are considered to be Group 1 forests. Forest management activities are directed at conservation and the improvement of forest conditions. Primarily, there is an open juniper forest prevailing at 1,500-3,200 m. above sea level. Pistachio trees, well accustomed to the hot dry climate, are mostly found in southern Tajikistan at an elevation of 600-1,400 m. Walnut forests are characteristic of Central Tajikistan at 1,000-1,200 m. above sea level and are known by their specific requirements for soil and climatic conditions. Part of the forest belt consists in maple forests with fragmentary poplars, willows, birch trees, buckthorn, saxaul and various shrubs.

198. Field surveys in connection with the study of pertinent literature and consultation of institutes (e.g., forest department) are the methodological pillars that allow the description of the ecological baseline. Most of the vegetation alongside the Project Road has been converted to agricultural use in historical times. Information obtained on the flora and vegetation during the conducted site surveys in 2023 and study of pertinent literature are described in the following.

### **1. Flora and Fauna**

199. The area is rich in vegetation. It is represented by woody and shrubby (broad-leaved forests, tugai, shiblyak, juniper), semi-bushy, semi-grassy and herbaceous types. Among the plants of the district there are many vitamin-bearing and medicinal, such as walnut, apple, pear, pistachio, hawthorn, barberry, rosehip, onion anzur, rhubarb, millennia, burdock, wormwood, licorice, etc. Almost the entire area is suitable for cattle grazing.



200. The flora of modern Tajikistan has for thousands of years been considered the cradle of the most important economic plant products. This fact was common knowledge among ancient traders traveling along the Great Silk Road. However, at present few people realize the influence that the flora of Central Asia has had on the development of mankind. Many plant species that are now cultivated around the world originated in the territory of Tajikistan. Moreover, many of the plant products are still used by the Tajik people as they were hundreds of years ago.

201. Soil and climatic conditions, as well as the complex geography of Baljuvon region led to the creation of a unique and one of the richest collections of food, medicinal, decorative and pasture plants in Tajikistan. The most common plants found in the area are:

- Yarrow (*Achillea filipendulina*) is a perennial herbaceous plant.;
- *Astragalus sieversianus* (lat. *Astragalus sieversianus*) is a species of perennial plants of the genus *Astragalus* in the Legume family;
- *Berberis integerrima* (lat. *Berberis integerrima*) is a shrub, a species of the genus *Berberis*;
- Spiny capers (lat. *Capparis spinosa*) is an herbaceous plant and much more
- *Crambe* is a genus of perennial or annual plants in the cabbage family
- Chinese needles (lat. *Ephedra sinica*) is a species of shrub in the genus *Coniferous*
- *Ficus* (lat. *Ficus*, figs) is a genus of plants in the Mulberry family.
- Liquorice, or *Glycyrrhiza glábra* (lat. *Glycyrrhiza glábra*) is a perennial herbaceous plant
- Sea buckthorn (lat. *Hippóphaë*) is a genus of plants in the Loch family
- *Hypericum* (Latin *Hypericum*) is a genus of flowering plants in the *Hypericaceae* family.
- English spearmint (lat. *Méntha piperíta*), is an herbaceous plant

202. The Government of the Republic of Tajikistan declared Baljuvon district as a zone of international tourism. Implementation of the project will allow safe access of tourists to Sari Khosor, contribute to the development of international tourism and the popularization of the republic, as well as replenish the budget of Baljuvon district. By attracting tourists and services appear different types of services, which will lead to new jobs and enable the local population to earn a living in their place of residence.

203. The animal world is diverse. Wild boar, wolf, bear, fox, porcupine and some others are common in the area. Marinka is found in the rivers. Some of the fauna of the area are truly rare and therefore included in the Red Book of the Republic: porcupine, white bears.

204. Baljuvon district with its rich flora and fauna is one of the most beautiful places in Tajikistan. The Sari Khosor National Nature Park is located on the territory of the district. It was organized by the Decree of the Government of the Republic of Tajikistan on October 25, 2003 on the territory of Baljuvon district. The area of the park is 3,805 hectares.

205. Due to the abundance of fodder during the ripening of fruits, valuable commercial animal species such as wild boar (*Sus scropha nigrepus*) and bear (*Ursus arctos isabellinus*) are concentrated in the fall. Also inhabited by Siberian ibex (*Capra sibirica*), urial (*Ovis vignei boharensis*), stone marten (*Martes foina*), otter (*Lutra lutra*), common lynx (*Felis lynx*), snow leopard (*Uncia uncia*). The Siberian Ptarmigan (*Alectoris kakelik*), the finch (*Columbus polombus*), the great turtle-dove (*Streptopelia orientalis*) and other birds are found in large numbers.

206. The diversity of fauna and flora of the reserve, located in a mountainous area, allows its use for the organization and development of various types of tourism.

207. This unique natural park is a state-protected natural area. The Sari Khosor Nature Park is managed by the Committee on Environmental Protection under the Government of the Republic of Tajikistan.

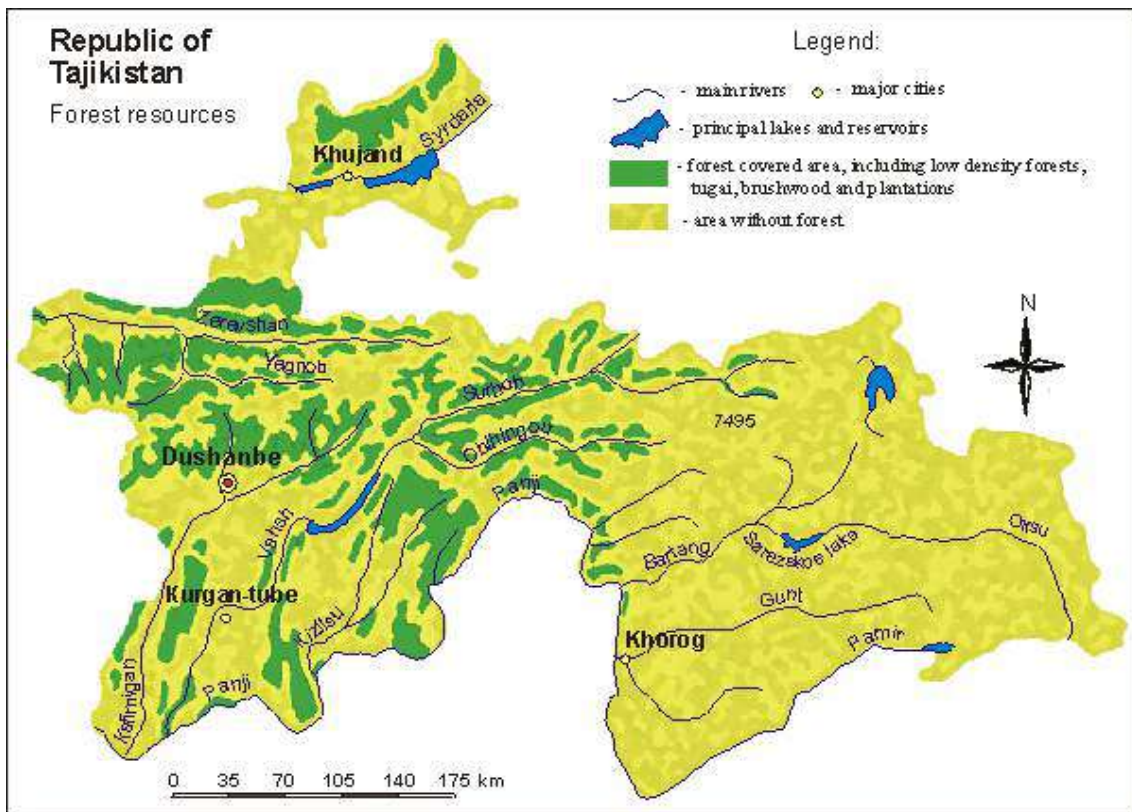


Herbivores within the wider vicinity of Project area



**Figure 17 –Bear, potentially occurring in Sari Khosor Parc**

208. Figure 18 provides an overview of the forest areas in Tajikistan.



**Figure 18 - Forest Resources in Tajikistan**

### 1. Protected Areas and Biodiversity

209. A crucial element for environmental safeguards assessment is potential for impact on the Sari Khosor Nature Park a second tier<sup>11</sup> of Tajikistan protected area system. Sari Khosor nature Park was designated in 2005. During the May / June visit in 2023 the extent of the park and its precise location was determined through discussions with relevant authorities. The Park is located at the northern end of the alignment (up a side valley at Km 52) in an enclosed upland catchment more than 4 Km from the proposed alignment (See Figure 20).

<sup>11</sup> There are 8 tiers of natural area protection in Tajikistan under the Law "On Natural Territories and Specially Protected Objects": (1) State Nature Reserves (4No.); (2) State Nature Parks (3 No. including Sari Khosor); (3) Nature Preserves (13 No.); (4) State Zoological Parks; (5) State Monuments of Nature; (6) Ecological ethnographic zones; (7) Dendro parks (zone of an arboretum, intended for public recreation) and botanic gardens (5 No.); and (8) Natural Zones of Health Resorts, therapeutic and recreational zones (3 No.)



**Figure 19 – Sari Khosor Nature Park in relation to the alignment**

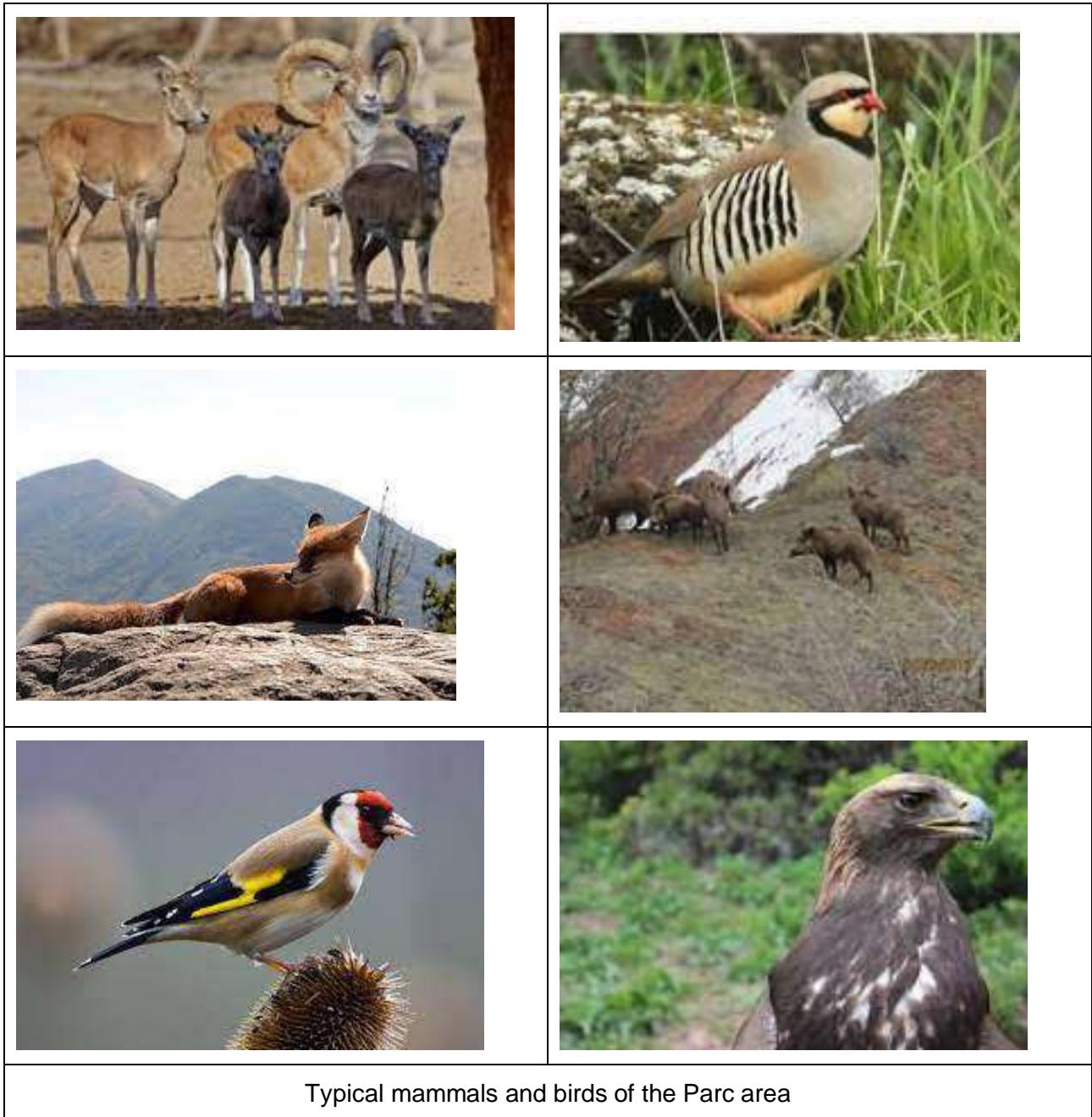
210. This unique natural park is a state-protected natural area. The Sari Khosor Nature Park is managed by the Committee on Environmental Protection under the Government of the Republic of Tajikistan.

211. Sari Khosor Nature Park is located in southern Tajikistan and is distinguished by its unique natural riches and mountainous mesophilic broadleaved forests that have been preserved in Tajikistan. The Sari-Khosor Nature Park is truly unique, with a special wealth of mountain forests consisting of walnut (*Juglans regia*), several species of wild fruit trees and shrubs.



**Figure 20 – Sari Khosor Nature Park**

212. Due to the abundance of food in this reserve, wild boars, bears, Siberian ibex, urial, stone marten, otter, common lynx and snow leopard live there. The Siberian Mountain goat, ibex, stone marten, otter, common lynx, and snow leopard occur in great numbers.



213. The region's avifauna is diverse and includes many species of rare and exotic birds, such as the kaklik, bearded vulture, gray vulture, golden eagle, hummingbird, sharp-winged hawk, Eurasian owl, and the endangered Egyptian vulture.

214. There are many vertebrate wildlife in the reserve, including nine species of prey, including lynx, wildcat, snow leopard, bear, wolf, red fox, sable, chipmunk, datar, three species of partridges: Bukhara sheep, Siberian mountain goat and wild boar, and other mammals such as lizards and bats, which are important for the health of the ecosystem.

215. According to the Environmental Committee Head Office, there is a government rare-deer-raising farm along the road. The new road is at least 5-15m outside its southern (river side) fence boundary, on almost barren river bank/bed (apart from some small trees) – and does not impact it.



Deer Raising Farm at km 34+500 lhs. Dark green area in aerial photograph

## 2. Land use

216. According to socio-economic surveys the main land-use types in the Project area are pasture and wheat growing. The below table (table 17) provides an overview of the overall usage of land in the Project area.<sup>12</sup> agricultural land use pattern of the Project area.

<sup>12</sup> Source: LARP Table 8 (April 2024)

**Table 17 – Affected Land Use Types**

Type of Land Impacted	No. of Parcels	Total Area (Ha)	Affected Area (Ha)	No. AH
Collective Dekhan Farm (CDF) for Pasture	3	894.00	16.22	3
Forestry (land) for Garden	6	15.42	0.59	6
Forestry (land) for Pasture	1	2.00	0.48	1
Forestry (land) for Wheat	19	14.11	0.82	19
Forestry (rent) for Pasture	3	8.00	0.31	3
Forestry (rent) for Vineyard	1	0.20	0.05	1
Forestry (rent) for Wheat	5	2.68	0.22	5
Government for Wheat	1	20.00	0.29	1
Homestead for Pasture	3	0.94	0.15	3
Homestead for Wheat	18	2.20	0.41	18
Individual Dekhan Farm (IDF) for Garden	10.	21.00	0.10	1
Individual Dekhan Farm (IDF) for Pasture	9	2495.10	34.71	9
Individual Dekhan Farm (IDF) for Wheat	1	49.00	0.75	1
<b>TOTAL</b>	<b>71</b>	<b>3524.65</b>	<b>55.1</b>	<b>71</b>

217. In 2005, under the Government’s land reform, around 23,300 state agricultural enterprises from the Soviet era were reorganized into privately-owned dehkan farms in three categories: individual, family or collective dehkan associations. However, private ownership of land is still not permitted. Indeed, the Constitution states that all land “is in exclusive ownership of the state which guarantees its effective use in the interests of the people”. Nevertheless, the dehkan farms have a land-use right in the form of lifelong inheritable holdings.<sup>13</sup>

### C. Socioeconomic Environment

218. Baljuvon district is located in the Vakhsh river valley. In the north and west it borders with Faizabad, Rogun, Nurabad and Sangvor districts, and in the east and south - with Khovaling, Temurmalik and Nurek districts of Khatlon region. Baljuvon district covers an area of 1,326.62 km<sup>2</sup>. Baljuvon district is the northernmost in Khatlon region. The relief is dominated by the Vakhsh mountain range, which is just over 3,000 m high. The administrative center is the village Baljuvon, located in the valley of the river Kyzylsu.



<sup>13</sup> FAO, 2020. Gender and Land Rights Database. Tajikistan. Available at: [http://www.fao.org/gender-landrights-database/country-profiles/countries-list/general-introduction/en/?country\\_iso3=TJK](http://www.fao.org/gender-landrights-database/country-profiles/countries-list/general-introduction/en/?country_iso3=TJK) (accessed on 31 July 2020).

## **Figure 21 – Location of Baljuvon district on Tajikistan map**

219. In the near future in Baljuvon district of Khatlon region it is envisaged to build a mining - enrichment enterprise, oil production, construction of a recreation area for tourists. The World Tourism Organization (WTO) and UNESCO in cooperation with the national tourist administrations of the republic, taking into account the rich cultural and historical heritage of the peoples living along the road, declared Baljuvon district as a tourism and recreation zone. Tajikistan is a land of the highest peaks, powerful glaciers, rushing turbulent rivers, lakes unique in their beauty, unique vegetation and rare animals. It is the mountainous, mountainous landscape that determines the originality and uniqueness of Tajikistan's nature, the richness of its forms brought to life by the diversity of climatic zones. The unique ecology, landscapes and natural monuments have been preserved in pristine condition in the national parks, as well as the national parks. Rare endangered species of plants and animals listed in the Red Book are also preserved.

### **1. Profile of the Project Area**

220. The Poverty Social and Gender Assessment Report (PSGA) surveyed eight villages in the Project area covering profile of almost more than half of the population in the project road area.

221. The detailed socioeconomic profile of the Project area is described in this report which is a stand alone document.

### **2. Results of Socio-economic Assessment**

222. Potential adverse Social and LARP impacts are addressed through mitigation measures prescribed in the LARP.

### **3. Cultural and Historical Sites**

223. There are cemeteries alongside the Project road which are described in the LARP.

## **D. BASELINE MEASUREMENTS Measurements**

224. Instrumental baseline measurements have been carried out at identified sensitive receptors on air quality, water quality and noise during July 2023. In addition, scientific field investigations were conducted on the aquatic fauna of the Shurobdaryo river. The results of the baseline measurements and the investigation on the aquatic fauna are described in the following chapters.

225. Based on the results of instrumental measurements and chemical analyses of air, water and noise samples in the project impact area, the following conclusion is made by the environmental impact monitoring specialists: •No significant anthropogenic impacts have been recorded in the Project footprint at the time of the instrumental environmental surveys and there have been no environmental impacts during construction, as evidenced by the absence of exceedances of water quality, air quality and noise regulations.

### **1. Air Quality**

226. Atmospheric air protection is one of the main tasks of nature protection. The Law on Environmental Protection precisely sets out the problem of anthropogenic air pollution and establishes the priorities of atmospheric air protection. The Law on Atmospheric Air Protection establishes the basic principles of atmospheric air protection and rational use in the country, economic mechanisms and responsibilities, as well as the directions of activity of state bodies. Tajikistan's regulations are more stringent than international ones, but more general. For example, Western countries have different size standards for particulate matter (PM-10, PM-2.5), whereas Tajikistan uses the concept of dust, which is similar to total suspended particulate matter (TSP). Also, many international standards for air

pollutants differ in the time of external exposure, whereas Tajikistan's standards are based on annual averages.

227. In the present instrumental monitoring, air quality is tested for seven (7) indicators, MACs, which are summarised in Table 3 below.

**Table 18 – Maximum allowable concentration (MAC)**

Polluter	Standards, mg/m <sup>3</sup>
PM <sub>10</sub> / PM <sub>2.5</sub>	0,3 / 0,16
Amount of nitrogen oxides(NO <sub>x</sub> )	0,04
Carbon monoxide (CO)	3,0
Sulphur dioxide(SO <sub>2</sub> )	0,50
Nitrogen oxide	0,06
Dust	0,15
Carbon dioxide	3900

Users of natural resources exercise internal control over the protection of atmospheric air, including compliance with maximum permissible emissions of pollutants into the atmospheric air and unfavourable physical impacts on it. In this case carried out by the Contractor.

Instrumental measurements were carried out from 22.07.2023 to 23.07.2023, during day and night time from 04:00 am to 23:00 pm.

**Table 19 – Parameters of the measuring range of survey instruments**

№	Substances	Ингредиент ы	Норматив мг/м <sup>3</sup>	Исходные результаты мг/м <sup>3</sup>
1	Dust (RSP)		0,150	0,05 – 1,0
2	Nitrogen dioxides	NO <sub>2</sub>	0,04	0,03-2,5
3	Sulphur dioxide	SO <sub>2</sub>	0,50	0,025-5
4	Carbon monoxide	CO	3,0	1,5-10
5	Nitrous oxide	NO	0,06	0,03-2,5
6	Carbon dioxide	CO	3900	20- 4500

Instrumental measurements were taken at one (1) point three (3) times at the following sites:

**Table 20 – Determination of GPS coordinates for 7 air sampling points**

№	Place	Latitude	Longitude
1	Km 0+ 00.Start of the track	38°18'35.36"N	69°41'1.03"E
2	Km 2+ 00. Section of unpaved road	38°23'38.99"N	69°41'29.09"E
3	Km 18 + 00. Dashtiturko	38°26'58.62"N	69°44'25.46"E
4	Km 31 + 00. Shahidon	38°31'56.45"N	69°50'2.63"E
5	Km 47 + 00. Peshtoba	38°36'25.81"N	69°56'32.69"E
6	Km 54 + 00. Mullokoni	38°37'59.48"N	70° 0'26.22"E
7	Км 54 + 00. Гостиница Сари Хосор	38°37'49.17"N	70° 1'37.82"E

Note: Instrumental measurement of atmospheric air and noise was carried out at pressure 679 - 680 mm.Hg, wind speed from 1 - 7 m/sec, humid - 25 - 35 % and temperature - 27 – 35 °C.

Table 21 – Place 1. Km- 0 + 00 Home Road Balchuvon

№	Types of particles	MPC for RT	Measuring time							Average values
			04: 00	07:00	10:00	13:00	17:00	20:00	23:00	
	Option	Standard mg/m <sup>3</sup>	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6	№ 7	
1	PM <sub>10</sub> и PM <sub>2.5</sub>	0,3и0,16	0,0190	0,0199	0,0958	0,090	0,091	0,087	0,0165	0,060
			0,011	0,014	0,016	0,019	0,021	0,020	0,014	0,0164
2	NO <sub>2</sub>	0,04	0,00161	0,00169	0,0041	0,00806	0,0080	0,0081	0,0010	0,00465
3	SO <sub>2</sub>	0,50	0,00134	0,00142	0,00163	0,00721	0,00732	0,0070	0,0013	0,00389
4	CO	3,0	0,242	0,251	0,267	2,03	1,85	1,80	1,98	1,20
5	NO	0,06	0,0012	0,0015	0,00197	0,00451	0,00543	0,00478	0,001	0,00291
6	CO	3900	234	248	349	351	465	412	189	321,1
7	Dust	0,15	0,013	0,015	0,019	0,021	0,032	0,020	0,0124	0,0122

Table 22 – Location Km 2+ 00.Dirt road section

№	Types of particles	MPC for RT	Measuring time							Average scores
			04: 00	07:00	10:00	13:00	17:00	20:00	23:00	
	Option	Standard mg/m <sup>3</sup>	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6	№ 7	
1	PM <sub>10</sub> и PM <sub>2.5</sub>	0,3и0,16	0,0170	0,0180	0,0945	0,070	0,071	0,079	0,0152	0,0521
			0,012	0,016	0,013	0,029	0,028	0,022	0,018	0,0197
2	NO <sub>2</sub>	0,04	0,0010	0,00109	0,0021	0,00626	0,0060	0,0061	0,0010	0,00336
3	SO <sub>2</sub>	0,50	0,00	0,0003	0,0005	0,0002	0,00032	0,00010	0,00	0,000202
4	CO	3,0	0,142	0,143	0,147	1,13	1,25	1,20	1,48	0,968
5	NO	0,06	0,0011	0,00	0,0010	0,0015	0,00143	0,00128	0,000	0,000901
6	CO	3900	134	178	159	171	173	172	121	158,2
7	Пыль	0,15	0,013	0,014	0,017	0,013	0,012	0,030	0,0151	0,0163

Table 23 – Location Km 18 + 00. Dashtiturko

№	Types of particles	Maximum permissible concentrations according to RT	Measuring time							Average scores
			04: 00	07:00	10:00	13:00	17:00	20:00	23:00	
	Option	Normative mg/m <sup>3</sup>	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6	№ 7	

1	PM <sub>10</sub> и PM <sub>2.5</sub>	0,3и0,16	0,0206	0,0204	0,0545	0,070	0,071	0,078	0,0261	0,0486
			0,020	0,018	0,026	0,029	0,028	0,025	0,019	0,0235
2	NO <sub>2</sub>	0,04	0,008	0,009	0,0058	0,00526	0,0060	0,0071	0,0016	0,00609
3	SO <sub>2</sub>	0,50	0,0006	0,0008	0,0009	0,0008	0,00044	0,0009	0,0005	0,000634
4	CO	3,0	0,207	0,243	0,347	1,15	1,30	1,41	1,53	0,884
5	NO	0,06	0,005	0,0007	0,007	0,009	0,00443	0,0070	0,0007	0,00383
6	CO	3900	573	582	459	571	675	741	231	547,4
7	Пыль	0,15	0,09	0,07	0,08	0,07	0,09	0,080	0,09	0,0814

Table 24 – Location Km 31 + 00. Shahidon

	Types of particles	Maximum permissible concentrations according to RT	Measuring time							Average scores
			04: 00	07:00	10:00	13:00	17:00	20:00	23:00	
№	Option	Standard mg/m <sup>3</sup>	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6	№ 7	
1	PM <sub>10</sub> и PM <sub>2.5</sub>	0,3и0,16	0,0715	0,0734	0,0825	0,080	0,081	0,076	0,0371	0,0716
			0,030	0,048	0,056	0,069	0,068	0,065	0,042	0,054
2	NO <sub>2</sub>	0,04	0,0075	0,0089	0,00898	0,00896	0,0060	0,0071	0,0041	0,00736
3	SO <sub>2</sub>	0,50	0,0012	0,0013	0,0015	0,0018	0,00144	0,0011	0,0005	0,00126
4	CO	3,0	0,526	0,543	0,647	1,36	1,46	1,45	1,42	1,058
5	NO	0,06	0,005	0,007	0,008	0,009	0,0063	0,0060	0,004	0,00647
6	CO	3900	905	875	891	902	856	749	431	801,2
7	Пыль	0,15	0,08	0,09	0,10	0,10	0,09	0,070	0,06	0,0842

Table 25 Location Km 47 + 00. Peshtoba

	Types of particles	Maximum permissible concentrations according to RT	Measuring time							Average scores
			04: 00	07:00	10:00	13:00	17:00	20:00	23:00	
№	Option	Standard mg/m <sup>3</sup>	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6	№ 7	
1	PM <sub>10</sub> и PM <sub>2.5</sub>	0,3и0,16	0,0709	0,0724	0,0815	0,0810	0,0785	0,0754	0,0365	0,0709
			0,020	0,037	0,049	0,058	0,060	0,057	0,037	0,0454
2	NO <sub>2</sub>	0,04	0,0063	0,0072	0,0076	0,0071	0,0070	0,0068	0,0037	0,00652
3	SO <sub>2</sub>	0,50	0,0010	0,0012	0,0015	0,0016	0,0018	0,0015	0,0008	0,00134
4	CO	3,0	0,376	0,487	0,521	1,23	1,26	1,24	1,19	0,900
5	NO	0,06	0,0034	0,0037	0,0036	0,0039	0,0073	0,0050	0,002	0,00413
6	CO	3900	796	845	862	871	888	759	341	766
7	Пыль	0,15	0,06	0,08	0,09	0,09	0,09	0,080	0,04	0,0628

Table 26 - Location Km 54 + 00. Mullokon

			Measuring time							
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	Types of particles	Maximum permissible concentrations according to RT	04: 00	07:00	10:00	13:00	17:00	20:00	23:00	Average scores
№	Option	Standard mg/m <sup>3</sup>	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6	№ 7	
1	PM <sub>10</sub> и PM <sub>2.5</sub>	0,3и0,16	0,0609	0,0614	0,0756	0,0763	0,0685	0,0614	0,0245	0,0612
			0,021	0,027	0,029	0,033	0,0350	0,034	0,027	0,0294
2	NO <sub>2</sub>	0,04	0,0058	0,0060	0,0072	0,0074	0,0068	0,0066	0,0028	0,00608
3	SO <sub>2</sub>	0,50	0,000	0,000	0,0010	0,0001	0,0004	0,0002	0,000	0,000242
4	CO	3,0	0,123	0,129	0,131	0,167	0,176	0,124	0,119	0,138
5	NO	0,06	0,000	0,001	0,0013	0,0016	0,00173	0,00150	0,003	0,00145
6	CO	3900	286	385	374	376	371	356	287	347,8
7	Пыль	0,15	0,04	0,05	0,07	0,08	0,08	0,060	0,02	0,0571

Table 27 - Location Km 54 + 00. Hotel Sari - Khosor

	Types of particles	Maximum permissible concentrations according to RT	Measuring time							Average scores
			04: 00	07:00	10:00	13:00	17:00	20:00	23:00	
№	Option	Standard mg/m <sup>3</sup>	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6	№ 7	
1	PM <sub>10</sub> и PM <sub>2.5</sub>	0,3и0,16	0,048	0,046	0,0576	0,0579	0,0585	0,0514	0,0145	0,0477
			0,014	0,016	0,019	0,020	0,0321	0,018	0,017	0,0178
2	NO <sub>2</sub>	0,04	0,00349	0,00350	0,00353	0,00374	0,00368	0,00365	0,0021	0,00338
3	SO <sub>2</sub>	0,50	0,000	0,0001	0,0002	0,0001	0,0002	0,0002	0,0001	0,00013
4	CO	3,0	0,120	0,121	0,130	0,147	0,146	0,144	0,117	0,132
5	NO	0,06	0,000	0,001	0,0016	0,0018	0,0020	0,00160	0,000	0,00114
6	CO	3900	256	374	367	372	370	349	267	336,4
7	Пыль	0,15	0,03	0,06	0,08	0,07	0,05	0,053	0,015	0,0511

Table 28 - Arithmetic mean values.

	Types of particles	Maximum permissible concentrations according to RT	Location of instrumental measurements							Average values
			№ 1	№ 2	№ 3	№ 4	№ 5	№ 6	№ 7	
№	Option	Standard mg/m <sup>3</sup>	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6	№ 7	
1	PM <sub>10</sub> и PM <sub>2.5</sub>	0,3 / 0,16	0,060	0,0521	0,0486	0,0716	0,0709	0,0612	0,0477	0,0458
			0,0164	0,0197	0,0235	0,054	0,0454	0,0294	0,0178	0,0295
2	NO <sub>2</sub>	0,04	0,00465	0,00336	0,00609	0,00736	0,00652	0,00608	0,00338	0,00535

3	SO <sub>2</sub>	0,50	0,00389	0,000202	0,000634	0,00126	0,00134	0,00024	0,00013	0,0012
4	CO	3,0	1,20	0,968	0,884	1,058	0,900	0,138	0,132	0,754
5	NO	0,06	0,00291	0,000901	0,00383	0,00647	0,00413	0,00145	0,00114	0,00413
6	CO	3900	321,1	158,2	547,4	801,2	766	347,8	336,4	468,3
7	Пыль	0,15	0,0122	0,0163	0,0814	0,0842	0,0628	0,0571	0,0511	0,0521

Note: According to the results of the analysis of instrumental air sampling, reflected in Tables No. 5 ÷ No. 12, no exceedance of MPC norms was detected anywhere.



**Figure 22 – Photos documenting the air quality measurements**

228.

**2. Water Quality Measurements**

229. Eleven water samples were collected for chemical analysis of water quality at the following locations:

**Table 29 – Locations of water sampling**

1. KM 1 + 00.	Surkhob River.
2. KM 20 + 00.	Bogisogon
3. KM 26 + 00	Bogisogon
4. KM 27 + 00.	Bogisogon
5. KM 31 + 00.	Shahidon
6. KM 36 + 00.	Dashti Turco.
7. KM 44 + 00.	Surkhdar.
8. KM 46 + 00.	Peshtoba.
9. KM 51 + 00.	
10. KM 54 + 00.	Mulloconi.
11. KM 56 + 00	Hotel Sari - Hosor



Water sampling. Km 20 + 00, 22.07.2023



Water sampling. Km 2 + 00, 23. 07. 2023.



Water sampling. Km 27+00



Water sampling. Km 46+00, 22.07. 2023.



Laboratory for chemical analysis of water



Water analysis

**Figure 23 – Photos showing the water sampling and the laboratory**

Table 30 – Results of water analysis<sup>14</sup>

	Place	GPS coordinates of water sampling points		Name of ingredients			Base indicators given
		Latitude	Longitude		Domestic use	Fishery designation	
1	2	3	4	5	6	7	8
1	Km 1+00 r. Surkhob	38°19'6.33"N	69°41'11.56"E	Suspended solids, mg/l	25,0	75,0	64,4
				Dry residue, mg/litre	1000	1000	176
				pH	6,5 – 8,5	6,5 – 8,5	8,2
				Mineralisation, mg/l	unavailability	unavailability	196,0
				BOD5, mg/l	3,0	3,0	2,4
				COD mg/l	30,0	30,0	21,4
				The Dissolved Oxygen, mg/litre	Not less than 4.0	Not less than 4.0	4,3
				Electrical conductivity	-	-	140,00
				Petroleum products, mg/litre	unavailability	unavailability	0,009
				Coli-index, units/litre	1000	1000	155,0
2	Km 20 + 00.	38°27'32.22" N	69°45'8.29"E	Suspended solids, mg/litre	25,0	75,0	59,1
				Dry residue, mg/litre	1000	1000	394
				pH	6,5 – 8,5	6,5 – 8,5	8,3
				Mineralisation, mg/l	отс	отс	180,0
				BOD5, mg/l	3,0	3,0	2,5
				COD mg/litre	30,0	30,0	22,1

<sup>14</sup> Sampling date: 22.07.2023. Date of continuation of analyses: 22.07.2021-27.07.2023.

	Place	GPS coordinates of water sampling points		Name of ingredients			Base indicators given
		Latitude	Longitude		Domestic use	Fishery designation	
				Dissolved oxygen, mg/litre	Not less than 4.0	Not less than 4.0	4,5
				Electrical conductivity	-	-	140,00
				Petroleum products, mg/litre	unavailability	otc	0,007
				Coli-index, pcs/litre	1000	1000	146,0
3	Km 26 + 00 Bogisogon (S)	38°29'37.03" N	69°47'48.96"E	Suspended solids, mg/litre	25,0	75,0	23,1
				Dry residue, mg/l	1000	1000	123,0
				pH	6,5-8,5	6,5-8,5	7,1
				Mineralisation, mg/l	unavailability	unavailability	118,0
				BOD5, mg/litre	3,0	3,0	1,3
				COD mg/l	30,0	30,0	5,1
				Dissolved oxygen, mg/l	Not less than 4.0	Not less than 4.0	6,5
				Electrical conductivity	unavailability	unavailability	135,00
				Petroleum products, mg/litre	0,05	0,05	unavailability
				Coli-index, pcs/litre	1000	1000	45,0
		38°30'3.06"N	69°48'26.54"E	Suspended solids, mg/litre	25,0	75,0	45,5
				Dry residue, mg/l	1000	1000	195,6
				pH	6,5-8,5	6,5-8,5	6,9
				Mineralisation, mg/l	unavailability	unavailability	135,0

4	Place	GPS coordinates of water sampling points		Name of ingredients	Domestic use	Fishery designation	Base indicators given
		Latitude	Longitude				
4	KM 27 + 00 Bogisogon (N)			BOD5, mg/litre	3,0	3,0	1,2
				COD mg/l	30,0	30,0	6,6
				Dissolved oxygen, mg/l	Not less than 4.0	Not less than 4.0	6,8
				Electrical conductivity	unavailabilit y	unavailabilit y	136,00
				Petroleum products, mg/litre	0,05	0,05	0,003
				Coli-index, pcs/l	1000	1000	35,0
5	KM 31 + 00 Shahidon (W)	38°32'2.95"N	69°49'41.35"E	Suspended solids, mg/litre	25,0	75,0	41,2
				Dry residue, mg/l	1000	1000	175,7
				pH	6,5-8,5	6,5-8,5	6,8
				Mineralisation, mg/l	unavailabilit y	unavailabilit y	140,0
				BOD5, mg/litre	3,0	3,0	1,6
				COD mg/l	30,0	30,0	4,9
				Dissolved oxygen, mg/l	Not less than 4.0	Not less than 4.0	6,0
				Electrical conductivity	unavailabilit y	unavailabilit y	134,00
				Petroleum products, mg/litre	0,05	0,05	0,008
				Coli-index, pcs/l	1000	1000	50,0
6	KM 36 + 00 Dashtiturko	38°33'6.67"N	69°53'13.53"E	Suspended solids, mg/litre	25,0	75,0	141,3
				Dry residue, mg/litre	1000	1000	7,0
				pH	6,5-8,5	6,5-8,5	140,0
				Mineralisation, mg/litre	unavailabilit y	unavailabilit y	1,5
				BOD5, mg/litre	3,0	3,0	3,6

	Place	GPS coordinates of water sampling points		Name of ingredients			Base indicators given
		Latitude	Longitude		Domestic use	Fishery designation	
				COD mg/l	30,0	30,0	6,9
				Dissolved oxygen, mg/l	Not less than 4.0	Not less than 4.0	140,00
				Electrical conductivity	unavailabilit y	unavailabilit y	0.005
				Petroleum products, mg/litre	0,05	0,05	0,003
				Coli-index, pcs/l	1000	1000	54,3
7	Km 44 + 00 Surkh dara	38°35'31.37" N	69°55'49.10"E	Suspended solids, mg/litre	25,0	75,0	67,5
				Dry residue, mg/litre	1000	1000	173
				pH	6,5-8,5	6,5-8,5	7,8
				Mineralisation, mg/litre	unavailabilit y	unavailabilit y	130,0
				BOD5, mg/litre	3,0	3,0	2,8
				COD mg/l	30,0	30,0	23,6
				Dissolved oxygen, mg/l	Not less than 4.0	Not less than 4.0	4,3
				Electrical conductivity	unavailabilit y	unavailabilit y	180,00
				Petroleum products, mg/litre	0,05	0,05	0,005
				Coli-index, pcs/l	1000	1000	48,0
8	Km 46 + 00 Peshtoba	38°36'43.52" N	69°56'48.00"E	Suspended solids, mg/litre	25,0	75,0	61,2
				Dry residue, mg/litre	1000	1000	174
				pH	6,5-8,5	6,5-8,5	7,0
				Mineralisation, mg/litre	unavailabilit y	unavailabilit y	152,0
				BOD5, mg/litre	3,0	3,0	2,7
				COD mg/l	30,0	30,0	22,1
				Dissolved oxygen, mg/l	Not less than 4.0	Not less than 4.0	4,4

	Place	GPS coordinates of water sampling points		Name of ingredients			Base indicators given				
		Latitude	Longitude		Domestic use	Fishery designation					
				Electrical conductivity	unavailability	unavailability	180,0				
				Petroleum products, mg/litre	0,05	0,05	0,002				
				Coli-index, pcs/l	1000	1000	49,0				
9	KM 51 + 00	38°38'9.90"N	69°58'30.94"E	Suspended solids, mg/litre	25,0	75,0	45,2				
				Dry residue, mg/litre	1000	1000	234				
				pH	6,5-8,5	6,5-8,5	7,1				
				Mineralisation, mg/litre	unavailability	unavailability	200,0				
				BOD5, mg/litre	3,0	3,0	2,7				
				COD mg/l	30,0	30,0	22,1				
				Dissolved oxygen, mg/l	Not less than 4.0	Not less than 4.0	4,4				
				Electrical conductivity	unavailability	unavailability	150,0				
				Petroleum products, mg/litre	0,05	0,05	0,002				
				Coli-index, pcs/l	1000	1000	40,0				
				10	KM 54 + 00 Mulloconi	38°38'4.00"N	70° 0'6.64"E	Suspended solids, mg/litre	25,0	75,0	56,2
								Dry residue, mg/litre	1000	1000	194
pH	6,5-8,5	6,5-8,5	7,2								
Mineralisation, mg/litre	unavailability	unavailability	200,0								
BOD5, mg/litre	3,0	3,0	2,7								
COD mg/l	30,0	30,0	22,1								
Dissolved oxygen, mg/l	Not less than 4.0	Not less than 4.0	4,4								
Electrical conductivity	unavailability	unavailability	180,0								

	Place	GPS coordinates of water sampling points		Name of ingredients			Base indicators given
		Latitude	Longitude		Domestic use	Fishery designation	
				Petroleum products, mg/litre	0,05	0,05	0,002
				Coli-index, pcs/l	1000	1000	19,0
11	Km 56 + 00 Hotel Sari - Hozor	38°37'48.72" N	70° 1'28.27"E	Suspended solids, mg/litre	25,0	75,0	26,7
				Dry residue, mg/litre	1000	1000	138,1
				pH	6,5-8,5	6,5-8,5	6,9
				Mineralisation, mg/litre	unavailability	unavailability	120,0
				BOD5, mg/litre	3,0	3,0	1,6
				COD mg/l	30,0	30,0	4,2
				Dissolved oxygen, mg/l	Not less than 4.0	Not less than 4.0	6,3
				Electrical conductivity	unavailability	unavailability	169,00
				Petroleum products, mg/litre	0,05	0,05	0,004
				Coli-index, pcs/l	1000	1000	16,0

230. The purpose of the measurements is the establishment of baseline conditions on water quality prior to construction start.

231. The results of analyses show that the actual concentration of pollutants does not exceed the normative indicators - regulated MPC in the Republic of Tajikistan.

### **3. Noise Measurements**

232. Instrumental baseline measurements of noise were conducted at 6 locations, 8 times, day and night during the period from 22 to 23 July 2023:

233. Tajikistan's standards in accordance with the sanitary norms SN 2.2.4/2.1.8.562-96 (provided by the Sanitary and Epidemiological Surveillance Service of the Health Ministry of the Republic of Tajikistan) are as follows: 55-45 дБ (max) - Жилая зона. 75-75 dB (max) - Commercial zone, 80 dB (max) – industrial zone, 40 – 50 dB (hospitals) and 50-55 dB (max) – schools, libraries.

Table 31 – Results of noise measurements

№	Measurement location	GPS coordinates of water sampling points		Noise standards, dB (max.)		Metering time, dB (max)							
		Latitude	Longitude	07.00–23.00	23.00-07.00	07:00	10:00	13:00	16:00	19:00	23:00	02:00	07:00
1M	Km 0 + 00. Baljuvon	38°18'35.36" N	69°41'1.03"E	55	45	41,7	45,2	42,1	44,0	40,1	42,0	37,6	41,8
2M	Km 18 + 00.Dashtiturko	38°26'58.62" N	69°44'25.46" E	55	45	42,5	43,7	44,0	43,2	38,9	40,7	37,2	41,2
3M	Km 31 + 00. Shahidon	38°31'56.45" N	69°50'2.63"E	55	45	41,1	42,8	44,2	43,6	40,4	39,5	38,0	40,6
4M	Km 47 +00.Pestoba.	38°36'25.81" N	69°56'32.69" E	55	45	41,4	41,8	43,9	42,5	37,9	39,0	36,7	40,8
5M	Km 54 + 00. Mullokoni	38°37'59.48" N	70° 0'26.22"E	55	45	42,2	42,0	43,7	42,3	40,0	39,1	38,8	40,9
6M	Km 54+ 00. Hotel Sari Khosor	38°37'49.17" N	70° 1'37.82"E	55	45	43,5	42,8	43,9	42,6	40,0	39,2	38,9	41,0

Note: The observed average results of daytime and nighttime noise measurements are below the permissible sanitary norms.

Conclusion: Noise levels at the project sites in July 2023 did not exceed the permissible standards, with the exception of the sixth point, where there is a slight exceedance of the standard at night.

#### **4. Aquatic Fauna**

A field investigation of the Current State of the Hydrophauna of the Shurobdaryo River under “Rehabilitation of Baljuvan – Sari Khosor Road Project”.<sup>15</sup> The results show that the construction of the Baljuvan-Sari Khosor road in the area of Baljuvan tributaries will not harm the biology and hydrofauna of the Surkhob River in any way. The report is a stand alone document and attached in annex 3.

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<sup>15</sup> AQUATIC BIOLOGY REPORT of the Scientific Research Study of the Current State of the Hydrophauna of the Shurobdaryo River under “Rehabilitation of Baljuvan – Sari Khosor Road Project”.  
Author: Shamsiddinov Farrukh Abdukodyrovych, head of the fishery department of the Institute of Animal Husbandry and Pasture of the Academy of Agricultural Sciences of Tajikistan



## ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

234. Based on the results of the conducted field surveys, desk top study and analysis of Project documents, the project's environmental impacts were identified and described and suitable mitigation measures prepared.
235. The Project involves the rehabilitation of the Baljuvon-Sari Khosor road along its existing track.
236. Project Road will be rehabilitated according to technical category IV. A strip of approximately 15 m to both sides of the Project Road will be physically impacted and natural and human structures within this strip will be lost. During the carried-out surveys, no valuable ecological structures or habitats were identified within this strip which cannot be restored.
237. For managing impacts on human assets, a LARP has been prepared under this Project as a stand-alone document. After construction, during operation phase, there will remain only low negative impacts as compared to the existing situation. This is because the road reconstruction scheme follows the existing alignment over most of its length. No valuable or protected natural habitats or other valuable environmental structures are significantly impacted after finalization of construction period, neither in their structure nor function. Structures impacted by the Project can be physically restored within reasonable time. There will be many beneficial impacts.
238. For impact assessment, a corridor of maximum 200 m on each side of the project road over its entire length is identified as the core impact area. The Project Road passes alongside 17 settlements. Sections where sensitive receptors are present, such as schools, hospitals or other places where people congregate are given particular attention so that adequate mitigation and monitoring measures are formulated. In addition, the core impact area needs to be widened at certain locations to consider all ancillary facilities occurring outside the 200 m corridor such as borrow pits and quarries.
239. Most interferences are due to noise emissions, emissions of pollutants and vibrations during construction phase because of the current bad road conditions.
240. In summary, main impact categories arise from the following activities: (i) construction works within or close to settlements result in demolition of roadside structures and physical assets, loss of trees, noise impacts, emission of pollutants to air and vibration which is especially of concern when the Project Road comes close to sensitive receptors, (ii) site clearance activities result in loss of top soil and vegetation structures, (ii) aggregate sourcing, crushing of aggregates and asphalt plant operation may have severe impacts in case of unsuitable site selection or management. Additional impacts include (iii) impacts from bridge rehabilitation, (v) potential impacts on surface waters and potential impacts on natural habitats and biodiversity.
241. The assessment of impact follows a risk matrix approach where the likelihood of an environmental, safety or social impact occurring is matched with the consequence (severity) of the impact occurring. The matrix ranks potential risks as low, medium, high or extreme. The assessment is provided for the post mitigation risk level to support the findings that the impacts are not-significant, short in duration, temporary and site-specific. All risks classified as medium or higher are considered significant, and require mitigation. Figure 24 sets out the general risk matrix and assessment criteria.



Within this area there is no direct physical encroachment but there may be negative interferences such as noise and air emissions. Outside this 200m corridor negative impacts only occur at ancillary facilities, such as borrow areas and transport routes.

## 2. Road alignment in areas of tree plantations

### Impacts

245. There is a considerable number of tree losses involved. Based on the counting in the BoQ in total 5405 trees need to be removed (2968 pieces with a stem diameter larger 16 cm and 2968 with a stem diameter at 1m height of smaller than 16 cm).
246. Main species alongside the Project road are poplars, willows, birch trees, pistachio trees, walnut trees, buckthorn, and saxaul.

### Mitigation Measures

247. Tree losses that cannot be prevented will be compensated by new tree plantings at the respective locations alongside the Project Road.
248. The compensation ratio for tree replanting is 1:2. This means that 10,810 trees are to be newly planted for compensation. The actual number and details of trees to be cut will be reported in the contractor's SSEMP and the first SAEMR.
249. Plantations will be executed after technical works have been completed. Plantations will be restricted to spring (March - April) and/or autumn (October). Locations for planting are within the new RoW at the locations where tree losses occurred. Therefore, no additional land acquisition for tree planting is required. However, the design will avoid tree losses as far as technically feasible by adjusting the roads center line. Tree losses on private land are compensated as set out in the LARP. Suitable species for roadside planting are pines (*Pinus spec.*), cypresses (*Juniperus spec.*), mulberry (*Morus nigra*), pistachio (*Pistacia vera*), walnuts (*Juglans regia*) and planes (*Platanus orientalis*). Based on additional consultation results for the Green Corridor Demonstration Project additional suitable species are Chestnut (*Aesculum hippocastanum*), the Spanish broom (*Spartium junceum*) and the Sada (*Ulmus minor umbraculifera*). At locations where an irrigation channel is running alongside the road the planting of species that require more moisture such as poplar (*Populus alba*), willow (*Salix alba*), maple (*Acer spec.*) and ash (*Fraxinus spec.*) can be carried out. Only native species will be planted from local genetic stocks.
250. Under the dry conditions and the summer heat at the Project road, outside settlements cypresses, pines and the yellow flowering Spanish broom shall be planted. At irrigation channels and along settlements additional species shall be planted. These are poplar, platane, chestnut and elms (*Ulmus minor umbraculifera*).
251. The planting quality is 2 year old saplings. The planting scheme is in rows (one at each side of the road) at a quantity/density of 4 meters (every 4 meters planting of a sapling). This is according to the stipulations in the meeting on 08<sup>th</sup> of May at the environmental department in Dangara (MoM in Annex 8). Planting more than one row is not recommendable because additional land acquisition would be needed.
252. Additional mitigation of impacts to trees will be done through refraining from storing construction material and other heavy equipment which could compact the soil near the roots, using only organic material at the tree stem zone for potential fill up, or fencing the area around the trees during construction works near the trees.

## Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>16</sup>
Potential impact on trees and tree rows alongside the road. Risk of permanent tree losses if not compensated by new plantings.	Moderate	Probable	LOW	LOW

### 3. Embankment filling of the tree stem area

#### Impacts

253. Road alignment in areas of tree plantations bears the risk of embankment filling of the tree stem area. This may cause the loss of the respective tree because of compaction of soil above the roots of the tree, fill up of ground level at base of tree stem, covering the soil around the tree with impervious material, release of materials that are toxic to the trees or physical severance of the root system. The critical impact of the filling up is the weight and the density of the filled-up material. These factors cause the reduction of the pore volumina and reduction of the oxygen amount in the soil.

#### Mitigation Measures

254. In order to protect the trees any fill up of the tree stem area must be avoided. At locations where the bottom of the designed embankment comes close (less than 2 m) to trees or tree rows a vegetation protection fence during construction activities must be implemented.

## Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE
Potential impact on trees and tree rows alongside the road embankment. Risk of permanent tree losses if not protected by suitable measures.	Moderate	Probable	LOW	LOW

### 4. Road alignment traversing cattle crossings

255. Alongside the project road, field cultivation is a prominent land use. Hence an important income source is from livestock breeding (mostly cattle and sheep).

256. Possibility for road crossing are given by the bridges. In total, the project provides for 11 bridges which can be used for cattle/lifestock passes.

### 5. Road alignment traversing towns and villages

#### Impacts

257. The Project Road is traversing alongside 17 settlements. The reconstructed Project Road will have higher traffic load in the future. Also, the reconstructed road due to its higher road category will allow higher speed. Potential impacts arising from this refer to potentially increased disruption of the traversed villages.

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

258. In addition, there will be loss of building structures and assets (buildings, tree losses, masonry retaining wall and private yards). This is because the design needs to comply with the applicable national standards. These are:

- GNiP RT 32-02-2012 "Highways";
- GNiP RT 30-01-2018 "Urban planning. Planning and development of settlements";
- SNiP 3.06.03-85 Highways;
- SNiP 2.05.03-84\* "Bridges and pipes";
- SNiP 12-04-2002 "Labor safety in construction";
- SNiP 12-01-2004 "Organization of construction";
- SNiP 3.02.01-87 Earthworks;
- SNiP 3.06.07–86 "Bridges and pipes. Rules for inspections and tests";
- Recommendations for the design of streets and roads of cities and rural settlements. Moscow 1984.
- GOST 33150-2014 "Design of pedestrian and bicycle paths"
- TP 503-0-47.86 Cross profiles of roads passing through settlements. Album 1.

### Mitigation Measures

259. Suitable safety features and mitigation measures have been developed and integrated into the engineering design which will avoid or substantially minimize the impacts on settlements alongside the road. These design safety features consist of speed control signs, pedestrian crossings, livestock crossings, proper road markings, streetlights, and other visual means.

260. The chosen alignment and cross section will aim on reducing the loss of building structures as far as technically feasible. Loss of structures that cannot be prevented will be compensated according to the LARP.

### Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>17</sup>
Potential impact on road safety within traversed villages	Minor because road safety will improve through the Project	Improbable	LOW	LOW

## 6. Bridge/Culvert Rehabilitation

### Impacts

261. The bridge works will have potential environmental impacts that need mitigation but the impacts of culvert works can be considered as minimal.

262. Culvert replacement will contribute to sustainable functioning of the irrigation systems alongside the project road sections. Without replacement of the culverts the local irrigation system might be damaged. No asbestos containing materials (ACM) will

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

be used in the implementation of the Project, but it cannot apriori be excluded that no asbestos is contained in the old culverts which need to be removed. Management of asbestos waste must be done according to ADB's Good Practice Guidance Note for the Management and Control of Asbestos. This is a requirement of the Waste Management Plan.

263. There will be new construction of 11 bridges. The new bridges may trigger water erosion processes at bridge and river embankments. This was considered in the pre-construction-/design-phase of the project.

### Mitigation Measures

264. The lower parts of the bridge embankments have to be protected against erosion. Erosion protection is achieved by using natural stones which can in addition be embedded in concrete. The required protection measures were designed based on the hydraulic calculations.

265. In addition, in order to minimize impacts to the ecologically valuable surface waters, a solid drainage system will be designed. In principle, the infiltration of surface run-off water into the slopes and in grass ditches is aimed at. Surplus water is evacuated to the nearest natural waterway. Drainage installations are designed in a way to allow for easy maintenance and operation.

### Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>18</sup>
Potential impacts due to bridge/culvert rehabilitation	Minor	Improbable	LOW	LOW

## B. Construction Phase

### 1. Impacts due to site clearance activities

#### Impact

266. Site preparation and clearance includes stripping and temporary storage of topsoil. If topsoil is not effectively managed, it can lead to erosion, siltation, obstruction of water courses and drainage, and loss of topsoil fertility. The associated impacts to site preparation and clearance activities are expected to be spatially limited to small strips alongside the already existing road. It includes the removal of vegetation within the construction corridor.

#### Mitigation Measures

267. The removed topsoil will be stored for re-use and long-term stockpiles of topsoil will be protected against erosion. This will be done for example through sowing fast growing vegetation such as grass on the stockpiles.

268. To ensure proper soil management, the contractor will prepare a spoils management plan as part of the SSEMP. This plan will include measures for minimizing water and wind erosion, measures to minimize loss of fertility in topsoil, timeframes, haul routes, final disposal sites and a re-cultivation plan. It will describe the mitigation measures to be taken from the beginning of the project until final disposal of spoils.

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

materials. Upon completion of the project, the contractor will provide spoils stockpiles with grass cover.

### Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>19</sup>
Potential impacts due to site clearance activities	Moderate	Probable	LOW	LOW

## 2. Break up of old pavement layers and asphalt

### Impact

269. The breaking up of the old pavement and asphalt layer by excavator or milling machine will cause noise emissions, air emissions and vibrations. In addition, a significant amount of spoil will be generated which will be reused as much as possible for the subbase for the new pavement.
270. Air quality impacts, noise and vibration will mostly be temporary. Sources include construction machinery, dust generated from construction works, haul roads, exposed soils, and material stockpiles. Noise is temporary and results from operating construction machines. Vibration is caused by operating of construction machinery and hauling of materials.
271. In the traversed villages, several residential buildings are stretching alongside the road. During construction phase there will be noise and vibration monitoring.

### Mitigation Measures

272. Within the traversed settlements, site- and work-specific timebound environmental monitoring program will be established for the construction phase. The parameters to be monitored are indicated in the EMoP (Table 34).
273. For the preservation of evidence, the contractor will document the condition of houses close to the road. Photographs of all building structures within a 50 m corridor, 25 m to both sides of the road axes, will be taken as a protection for possible complaints regarding damages in house walls etc. This is part of the contract.
274. The 50 m corridor was chosen based by consideration of the stipulations in the "Transportation and Construction Vibration, Guidance Manual, CALTRANS, September 2013".
275. In addition to avoid damages due to vibration, special construction techniques will be applied in areas where buildings and structures are located directly near the road. Such actions may include, alternative construction methods such as: (i) decrease of vibration emission from the particular equipment item; (ii) substitution of the particular equipment item at such location by other equipment capable of variable vibration control; (iii) use of smaller equipment; (iv) compaction without vibration rollers; (v) decreasing the thickness of material layers below the maximum thickness permissible under the specification; (vi) building wave barriers (trench or ditch) where appropriate; (vii) change the pavement type for example from flexible to rigid pavement, (viii) any other method of Contractor's choice that may be used while ensuring compliance with the specification for the material that is being compacted.

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

276. For purpose of spoil reduction, construction materials will be recycled. Recycled material from the existing pavement and special recycling techniques will be used in the reconstruction of the new pavement layers. The cost effectiveness of reconstruction measures could be enhanced greatly by the application of recycled pavement materials. Recycling options include hot mix recycling (HMR) with/without new materials and cold mixing recycling with/without new materials.
277. Recycled material will be used to the largest extent feasible to reduce the volume of spoils that needs to be disposed of.
278. Prior to commencing the activities, the contractor will prepare a waste management plan as part of the SSEMP, indicating detailed management of the waste produced in the project, including proper waste disposal sites, respectively government licenced waste disposal sites.

### Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>20</sup>
Potential impacts due to break up of old pavement layers and asphalt	Moderate	Possible	LOW	LOW

### 3. Impacts due to Earthworks

#### Impact

279. The cut and fill balance for the Project is as follows: Section 1: Embankment including compaction factor – 697,643m<sup>3</sup>. Excavation – 1,719,709m<sup>3</sup> (of this 1158137m<sup>3</sup> BWR siltstone and sandy clay with cement). Section 2: Bulk fill including compaction factor – 1,357,051m<sup>3</sup>, Excavations – 960,206m<sup>3</sup> (of this 766,281m<sup>3</sup> BVR-7(29B)).
280. The required fill material needs to be sourced from suitable borrow areas. The proposed borrow areas are described in annex 1. The surplus soil resulting from cut sections will be transported to the identified disposal sites (annex 2)

#### Mitigation Measures

281. Temporary storage of surplus spoil will be close to the excavation area preferably on barren land without any wooden vegetation.
282. For final and temporary disposal of surplus spoil suitable sites have been identified which are shown in Annex 2 - IDENTIFIED AREAS FOR SURPLUS MATERIAL DISPOSAL. The identified sites need to be agreed upon with the respective authorities.
283. The contractor will dispose the surplus material within the identified sites by adhering to the following measures for impact mitigation and erosion protection: (i) Any stockpile of disposed surplus material will be allocated at least 100 m distance from any water course and no woody vegetation will be filled up or cut. Height of stockpiles will not exceed 3 m. For purpose of erosion protection fast growing vegetation, e.g. grass species, will be sown for stabilizing the disposed material. (ii) The selected disposal sites are not expected to be a source of erosion as unsuitable material will fill up the existent gullies and depressions. However, the contractor is advised to compact and evenly distribute the surplus material by layers where possible, to minimize piling and impacts to landscape. The stockpiles will be sown with fast growing grass to avoid

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

erosion by the root system. During dry and windy periods, water should be spread on the disposed material to avoid dusting.

### Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>21</sup>
Potential impacts due to disposal of surplus material	Moderate	Possible	LOW	LOW

#### 4. Reconstruction of pavement inclusive widening of existing road

##### Impact

284. The settlements traversed by the Project Road will be exposed to some degree to noise, air emissions and vibration during construction phase. Therefore, monitoring needs to be conducted during construction phase as stipulated in the EMoP.
285. The reconstruction activities cause air quality impacts, noise and vibration. The impacts are temporarily restricted to the construction phase. Impact sources include construction machinery, dust generated from construction works, haul roads, exposed soils, and material stockpiles. Noise is temporary and results from operating construction machines. Vibration is caused by operating of construction machinery and hauling of materials.
286. The impacts on soil originate from the surface sealing due to the road widening, compaction of soil, site preparation and clearance, and improper storage of spoil material.
287. Compaction of soil on especially agricultural land can lead to degradation of its fertility. Agricultural lands are common along the whole length of the Project Road.

##### Mitigation Measures

288. To prevent soil compaction the contractor will limit the use of heavy machinery to the existing RoW especially in the vicinity of agricultural land.
289. The following mitigation measures will be implemented by the contractor to reduce emission levels of construction equipment: (i) maintenance of construction equipment in good condition and avoiding, as much as possible, idling of engines; (ii) banning of the use of machinery or equipment that cause excessive pollution (e.g., visible smoke); (iii) utilize construction machinery with low emission levels.
290. Negative effects of noise are mitigated by limiting construction work to 07:00 am - 22:00 pm within 200 m of settlements, and by limiting hauling traffic through settlements. The time frame 07:00 am to 22:00 pm was chosen because it applies with the night-time definition of the EHS Guidelines (night-time definition according to Tajikistan standards is 23:00 pm to 07:00 am). 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).
291. Construction phase monitoring is conducted for air quality, noise level and vibration.

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

## Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>22</sup>
Potential impacts due to reconstruction of pavement inclusive widening of existing road	Moderate	Probable	LOW	LOW

### 5. Operation of borrow areas and quarries

#### Impact

292. The impacts related to establishment of borrow pits are largely dependent on the need for opening new pits.
293. Three soil reserves are proposed to be used in the Project. They are all located in the floodplain of Surkhob River and described in chapter 1.

#### Mitigation Measures

294. The contractor will refrain from storing material near surface waters to prevent siltation or obstruction of water ways.
295. The contractor will wet the unpaved routes which go next to settlements to suppress dust pollution when hauling material from borrow pits and provide covers for the load of all hauling vehicles to prevent dust pollution. Also wetting the aggregate load reduces potential dust emissions. The contractor will, as part of the SSEMP, prepare and implement air quality management plan, including transportation and post-closure rehabilitation of borrow sites. The access to the selected borrow areas is via the project road. The contractor must include mitigation measures for dust pollution by the settlements along the way.
296. The hauling traffic should be carried out only between 7:00 am and 22:00 pm.
297. In order to avoid any ground water pollution the used machinery needs to be in good technical condition and properly maintained, so that no leakages of oil or any other pollutants occur. In addition, before starting material extraction the contractor will obtain the environmental permit from the CEP which may also include provisions for landscaping measures after finalization of the extraction activities.
298. After completion of construction and rehabilitation works, and after the use of borrow pits, the landscape will be restored to a standard that is of equal quality to its original condition.

## Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>23</sup>
Potential impacts due aggregate extraction from borrow areas	Moderate	Probable	LOW	LOW

### 6. Operation of Asphalt Plant and Aggregate Crushers

#### Impact

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

299. Impacts from asphalt plants include pollutant and or emissions, possible water pollution from bitumen spills, and safety risks. The impacts can be minimized by acquiring the needed asphalt from an existing asphalt plant. In case a new asphalt plant must be set up, certain provision and mitigation measures have to be taken.
300. Air quality impacts are temporary. Impact sources include construction machinery, fugitive emissions from asphalt plants, aggregate crushers, and dust generated from construction works, haul roads, exposed soils, and material stockpiles. Noise is temporary and results from operating construction machines. Vibration is caused by operating of construction machinery and hauling of materials.
301. Aggregate crushers produce noise and dust emissions, and they require certain mitigation measures.
302. In road rehabilitation, the most severe possible water quality impact could come from spilled bitumen or any petroleum products used in asphalt production. Bitumen is stored in drums which may leak, or which are often punctured during handling after long periods (more than 6 months in the elements) of storage.

### Mitigation Measures

303. To ensure minimal impacts on settlements and productive land, the asphalt plants and aggregate crushers must be located downwind of settlements at a distance of 1,000 m or more.
304. Bitumen will not be allowed to enter either running or dry streambeds nor must it be disposed of in ditches or small waste disposal sites prepared by the contractor. Bitumen storage and mixing areas must be protected against spills and all contaminated soil must be properly handled. Storage areas should be lined with impermeable layer to mitigate impacts of potential spills. As a minimum, these areas must be designed so, that any spills can be immediately contained and cleaned up.
305. The contractor must have provisions for spill and fire protection equipment and will submit an emergency response plan (in case of spills, accidents, fires and the like) prior to operation of the plant, and asphalt plants will not be located close to plantations and productive land.
306. Bitumen storage and mixing areas will be protected against spills and all contaminated soil will be properly handled according to legal environmental requirements. Such storage areas will be contained so that any spills can be immediately contained and cleaned up.
307. Prior to commencing operation of the asphalt plant, the contractor must receive all relevant permissions and the site selection for the asphalt plant and aggregate crusher must be approved by CSC.
308. Both, asphalt plant and aggregate crusher are sources of emission of noise and air pollutants. Therefore, regular monitoring measurements will be conducted at these facilities as described in the monitoring table of the EMP.

### Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>24</sup>
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<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

Potential impacts due to operation of asphalt plant and aggregate crusher	Moderate	Probable	LOW	LOW
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## 7. Bridge and Culvert Reconstruction Works

### Impact

309. Potential impacts include the generation of turbidity and siltation including change of surface hydrology in the water body by increased sediment load, and pollution of these water ways.
310. The impacts of stockpiling of topsoil and material are mitigated by storing the material at a safe distance from nearby surface waters and by providing for long term stockpiles a grass cover. Storage must be outside the River floodplain There must be a distance of 20 m to any other small water course. These mitigation measures also prevent the impacts of increased sediment load on surface hydrology. Settlement ponds must be implemented to places where construction activities come near the natural water courses.
311. When construction activities are being carried out on or in the vicinity of watercourses improper handling and storage of materials (concrete, asphalt, lubricants, fuels, solvent) may pose the risk of water contamination. In addition, embankments and construction materials (fill, sand and gravel) are subject to wash out with rainwater. Oil and grease concentrations in surface waters will increase especially if oil leaks from engines are not properly controlled.

### Mitigation Measures

312. Any construction material storage must be outside the River floodplain (approximately 50 m to both sides of Tairsu river). There must be a distance of 20 m to any other small water course. The exact distance must be defined in the SSEMP.
313. Appropriate mitigation measures must be taken for ground and surface water protection, such as regular maintenance of the construction equipment to prevent oil leaks, in addition chemicals and oil will be stored in secure locations, impermeable, and bound area far away from surface waters.
314. Water quality monitoring will be conducted according to the EMoP.
315. Chemicals used for possible bridge corrosion treatment are especially hazardous for water ways and the treatment requires special provisions for preventing chemicals reaching the water. When carrying out corrosion treatment the contractor needs to present a method statement on this.
316. The bridge reconstruction debris will be removed in an environmentally safe manner and the costs of environmental measures have to be included in the unit costs of the contractor.
317. The contractor will submit a method statement or plan for the execution of bridge construction works including measures that will be undertaken to address adverse environmental impacts such as erosion of river embankment and siltation of watercourses that may result from such activities. The plan will be submitted to the Construction Supervision and PIURR.
318. Storage of any hazardous construction material will be on sealed surfaces only to prevent leakages into the groundwater.

## Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>25</sup>
Potential impacts due to bridge and culvert reconstruction works	Moderate	Probable	LOW	LOW

### 8. Establishment and operation of contractor's yard

#### Impact

319. To mitigate the construction camp related impacts, the contractor will arrange the facilities, services and water supply of the work camp so that it will not compete on the same resources with nearby communities. The contractor will also employ, to the largest extent feasible, people from the local communities to the workforce. Local communities will also be preferred, to largest extent feasible, when employing people for the tree planting works, drainage cleaning, and other suitable tasks.
320. Impacts produced by workers camps are manifold and include generation of solid and liquid waste, equipment maintenance related pollutants spills, potential spills from stored materials (chemicals, fuels, etc.), competition for water resources with local needs, and health and safety risks to workers and locals, including risk of HIV / AIDS and other STD's.
321. Construction worksites may place stresses on resources and infrastructure of nearby communities. This may lead to friction between local residents and the temporary workers.
322. In addition, construction camps are likely to have public health impacts. There will be a potential for diseases to be transmitted, exacerbated by inadequate health and safety practices. Therefore, the contractor will be required to recruit a qualified HSO to address such concerns in the work sites. The HSO will also liaise/work with the nearby communities when it is necessary for mitigation of health and safety concerns.

#### Mitigation Measures

323. The camp will not be set up on top of a ground water area, nor near any surface water areas.
324. Prior to commencing operation, the contractor will indicate proper sources of drinking and construction water which won't compete with local needs. This will be done together with local authorities.
325. For health and safety protection of workers and adjacent communities the following will be provided: (i) Adequate health care facilities (including first aid facilities) within construction sites; (ii) 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; (iii) Personal protective equipment (PPE) for workers, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection in accordance with legal legislation; (iv) Clean drinking water to all workers; (v) Adequate protection to the general public, including safety barriers and marking of hazardous areas; (vi) Safe access across the construction site to people whose settlements and access are temporarily severed by road construction; (vii) Adequate drainage throughout the camps so that stagnant water bodies and puddles do not form; (viii) Sanitary latrines and

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

garbage bins in construction site, which will be periodically cleared by the contractors to prevent outbreak of diseases.

326. 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. This will be taken into consideration when deciding the place for the camp.
327. The contractor will hire a qualified HSO who will provide safety training to the staff according to the requirements of the individual workplace. Prior to the commencement of works, the work site personnel will 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 will establish a short list of materials to be used (by quality and quantity) and provide a rough concept explaining the training / briefing that will be provided for the construction personnel.
328. The contractor will provide 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.
329. Contractors' conformity with contract procedures and specifications during construction will be carefully monitored. Contractors will be made to follow standard construction practices, monitored and supervised by CSC employed under the Project.

### Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>26</sup>
Potential impacts due to operation of working camps	Moderate	Probable	LOW	LOW

### 9. Traffic impairment

#### Impact

330. Traffic impacts of the road rehabilitation project will include disturbance of traffic along the road sections.
331. Transport of potentially hazardous or toxic materials on the road poses a risk to the local population. Impacts in case of an accident which causes a spill may include pollution of surface water or ground water through leaching.

#### Mitigation Measures

332. Prior to commencing operations, the contractor will submit a traffic management plan to local traffic authorities, and provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions.
333. During the construction work the contractor will arrange for adequate traffic flow around construction areas.
334. The contractor will enhance traffic safety by providing adequate signalization, lighting, traffic safety signs, barriers, and flag persons for traffic control. Adequate training will be provided to the workers on traffic control prior to commencing operations.

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

335. The contractor will include action plan to mitigate impacts from transport of hazardous and toxic materials to the traffic emergency response plan for the operation phase of the road.

**Risk Assessment**

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>27</sup>
Potential traffic impacts during road construction	Moderate	Probable	LOW	LOW

**10. Archaeological chance finds**

**Impact**

336. Potential damage to archaeological artefacts due to construction activities, particularly earthworks.

**Mitigation Measures**

337. In the event of the unexpected discovery of archaeological objects during construction operations, the contractor will immediately inform the CSC who will notify the Institute of Archaeology / Ministry of Culture and PIURR 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.

338. 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.

**Risk Assessment**

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>28</sup>
Extended time line of construction schedule in case of construction site closure due to archaeological chance finds.	low	low	LOW	LOW

**11. Closure of construction sites**

**Impact**

339. Potential impacts to landscape aesthetics occur if the camp site and construction associated facilities such as borrow areas are not properly cleaned and restored in the course of construction closure. Possible impacts which may arise are the disfigurement of landscape due to improper disposal of surplus material, spoils of waste (construction debris, metallic scrap etc.) if not properly disposed of.

**Mitigation Measures**

340. After completion of construction works the contractor will 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 topsoil).

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

341. After completion of construction and rehabilitation works, and after the use of borrow pits, the landscape will be restored to a standard that is of equal quality to its original condition. Rehabilitation measures may not be necessary for borrow areas still in operation after road works have finished.

### Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>29</sup>
Landscape degradation due to not executing restoration works.	Low	Low	LOW	LOW

## C. Operational Phase

### 1. Impact on communities

#### Potential Impacts

342. Settlement patterns. No significant changes in settlement patterns are anticipated because of proposed road upgrading.

343. Community impacts. Potential community-level impacts can include economic enhancement, split communities, bypassed loss of roadside community business and social activities, impacts on current mode of transportation, impacts related to culture shock, and conversion to higher value land users.

#### Mitigation Measures

344. As the Project Road rehabilitation will be carried out within the existing road corridor no barriers or obstacles are created which could split communities. Any Project affected people will be compensated for their loss by implementing the LARP.

### Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>30</sup>
Potential impacts on population and communities in settlements alongside Project Road	Moderate	Possible	LOW	LOW

### 2. Increased risk of accidents with possible spills of harmful substances

#### Impact

345. Possible threats to people and communities living along the Project may occur in case of accidents and possible spills of harmful substances. However, due to the implemented safety features of the new road these risks are mitigated as compared to the status quo.

#### Mitigation Measures

346. PIURR will prepare and implement spill-contingency plan or emergency response plan which 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

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

areas. Additional measures to mitigate risk of accidents and spill of harmful substances are speed control and weight stations.

### Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>31</sup>
Spill of harmful substances due to accidents	Moderate	Low	LOW	LOW

### 3. Damaged drainage or uncontrolled erosion

347. Damaged drainage can result in damage to local irrigation systems, and erosion can have adverse effect on the road.

### Mitigation Measures

348. Erosion damages will be mitigated by conducting routine monitoring of drainage and erosion at least twice a year. In case there are any damages identified these have to be repaired. Defects liability period from the side of the contractor is for 2 year. After this year maintenance and repair, if required have to be done by MoT.

### Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE <sup>32</sup>
Potential damages due to erosion	Moderate	Improbable because issue is considered in the design	LOW	LOW

### 4. Positive Impacts

349. The proposed project will result in better road condition. The rehabilitation of the road which currently is in bad condition will, in combination with the implemented road safety features, allow safer driving in the future and better connecting the small villages along the Project Road to medical and educational facilities, state institutions, banks and markets.

350. The Project will bring mostly positive impacts to the people living in the villages alongside the Project Road and beyond. The currently existing unacceptable bad road conditions which hinders economic development and access to essential infrastructure facilities like education, medical treatment and markets will significantly improve. This will bring great benefits to the people living in the villages alongside the Project corridor.

351. In addition, there will be better road safety conditions and smoother traffic flow which enhances driving comfort on the Project Road and also brings safety benefits to the people living alongside the Project Road.

352.

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

## VII. ENVIRONMENTAL MANAGEMENT PLAN

### A. Implementation Arrangements

353. The overall responsibility for implementation of the Project lies at the GoT. The relevant organizational entity for the project implementation is PIURR, as Project implementation authority.
354. PIURR will be responsible for the overall implementation of the environmental mitigation, management and monitoring measures and requirements specified in this IEE. They will be required to oversee implementation of the SSEMP developed by the contractor to ensure it fulfils all identified environmental, health, safety and social requirements under the loan agreement for the Project. PIURR is responsible for ensuring roles and responsibilities are clearly identified and allocated for environmental, health, safety and social, gender, both within PIURR itself, within the contractors' arrangements and for the handover to operations.
355. MoF (Ministry of Finance) is the responsible government body for coordination with ADB and other donors for foreign assistance.
356. The State Ecological Review Committee and its regional offices are responsible for environmental permitting and monitoring of Project implementation. Furthermore, according to the 2012 Law on SEE, all civil works, including rehabilitation ones, should be assessed for their environmental impacts and the proposed mitigation measures should be reviewed and monitored by the CEP (Committee for Environmental Protection under the Government of Tajikistan).
357. The CSC will take over the responsibilities for the implementation of the environmental mitigation measures and monitoring measures during construction phase. The CSC will report to PIURR on a regular basis.
358. The Contractor will provide environmental monitoring reports as part of his monthly reporting obligations. The tender and contract documents will clearly set out the contractor's obligations to undertake environmental mitigation measures set out in the EMP.
359. PIURR will monitor and measure the progress of implementation of the EMP. In this regard SAEMRs during construction phase will be prepared by PIURR with the CSC's support and submitted to ADB and MOT within 1 month after the reporting period.
360. The executing agency is MoT of Tajikistan and the implementing agency is the Project Implementation Unit for Roads Rehabilitation (PIURR), wholly responsible for the implementation of ADB-financed projects, as agreed jointly between the borrower and ADB, and in accordance with the policies and procedures of the government and ADB. ADB staff is responsible for supporting implementation including compliance by MOT and PIURR of their obligations and responsibilities for project implementation in accordance with ADB SPS.
361. The MOT will (i) provide overall project oversight; (ii) ensure compliance with all covenants of the financing agreement and ADB's policies, procedures, and guidelines; (iii) coordinate with all ministries and agencies involved in the project as appropriate; (iv) ensure that PIURR is adequately staffed and functional during the entire period of project implementation; (v) approve bidding documents, bid evaluation reports, contract variations, and suspension and termination of contracts; (vi) sign and act as the

Employer for the contracts with consultants and contractors; (vii) timely resolve issues that would compromise quality, costs, or completion time of the project; (viii) conduct timely financial audits as per agreed timeframe and take recommended actions; (ix) collect and retain all supporting and reporting documents, including annual audit reports and financial statements; (x) involve beneficiaries and civil society representatives in all stages of project design and implementation as appropriate; (xi) regularly post on PIURR/MOT website (footnote **Error! Bookmark not defined.**), in consultation with ADB, the updated project information documents for public disclosure, including safeguards documents (IEE and the SAEMRs); and (xii) ensure project's post-implementation sustainability and report to ADB on the project impacts. The MOT will engage international and national consultants for the construction supervision.

362. The MOT will ensure that the preparation, design, construction, implementation, operation and decommissioning of the project and all project facilities comply with (a) all applicable national laws and regulations relating to environment, health and safety; (b) the Environmental Safeguards; and (c) all measures and requirements set forth in the IEE, and any corrective or preventive actions set forth in a Safeguards Monitoring Report.

363. PIURR will (i) coordinate the day-to-day project implementation activities; (ii) act as focal point for communication with ADB on project-related matters; (iii) procure works and goods and administer works and goods contracts; (iv) recruit consultants and administer consulting services contracts; (v) carry out environmental monitoring and public consultation during implementation to ensure the proper implementation of the project's SSEMPs and LARP; (vi) monitor and promptly address complaints, and ensure their effective and adequate resolution; (vii) establish adequate financial management system and submit timely withdrawal applications to ADB; (viii) prepare periodic progress reports identifying issues and action plans, and ensure their timely submission to ADB; (ix) monitor and evaluate project activities and outputs, including periodic review and preparation of project completion report; (x) assist ADB's project review missions, as appropriate. PIURR will be assisted during project implementation by relevant departments of the MOT, the CSC, and relevant government agencies. PIURR-SE with the support of CSC-NES and CSC-IES will have responsibility for regular (weekly at least) supervision of the EMP implementation, and provision of required reports. The specific responsibilities of the EMS include: (i) liaise with the Works Contractor, CSC, and MOT to ensure adherence to the IEE and EMP and adequate implementation of related activities; (ii) undertake internal supervision of the EMP implementation and report regularly to PIURR on progress made and envisaged action plans; and (iii) conduct consultation meetings with local stakeholders as required, informing them of imminent construction works, updating them on the latest project development activities, GRM, etc.

364. The CSC is tasked with specific responsibility to ensure environmental safeguards compliance of civil works, with particular emphasis on the monitoring of implementation of the EMP through the works contractor's SSEMP and related aspects of the project. The CSC will include CSC-NES and CSC-IES who will be responsible for supervising the contractor's environmental performance, coordinating the public consultations and project GRM, and reporting to PIURR management for submission to MOT and ADB through the periodic project progress reports and SAEMRs.

365. The Works Contractor is required to appoint an ESO and HSO. The Works Contractor is responsible for preparing a SSEMP that reflects its understanding and commitment to address environmental issues. The works contractor is also responsible

for the day-to-day implementation of the EMP and compliance at all times with the requirements of both the IEE and EMP.

366. The EMP included in this IEE together with the SSEMP that need to be prepared by the contractor provide the overall Project environmental management framework.
367. The SSEMP must be submitted within 30 days of the contract award and Preconstruction and Construction cannot commence until the SSEMP is approved by the MoT/PIURR and the CSC.
368. The Bid Documents for the potential Contractor(s) will contain two sections relating to environmental issues, firstly a basic clause indicating that the Contractor will be responsible for following the requirements of this IEE including the EMP and that he should prepare his own SSEMP for the Project. Secondly, EMP of the IEE will be repeated in its entirety as an Annex to the Bid Documents so as the bidder is aware of his environmental requirements under the Project (both Pre-construction, Detailed Design, Construction and operation during the liability period) and help him put costs to his proposal (such as costs for noise monitoring, etc).
369. The Contract Documents should follow a broadly similar pattern to the Bid Documents. It is not considered necessary to repeat the mitigation measures. The Contract should specify that the Contractor(s) is responsible for implementation of the EMP via his SSEMP. Again, the EMP should be included at an Annex to the Contract so the Contractor(s) is liable for any non-conformance with the EMP, and thereby this IEE.
370. The Contractor(s) will be responsible for the preparation of the Construction EMP/ SSEMP. The preparation of the Construction EMP/SSEMP requires a qualified environmental person. The work will need to be fully compliant with the EMP and will need to be prepared within 30 days of Contract award.
371. During the Construction phase, the Contractor must retain the expertise of an ESO and an HSO to prepare and update SSEMP and to oversee and report on the operation throughout the contract period. The ESO and HSO should be full-time member of contractor's staff over the 18 months construction time.
372. The CSC team will include CSC-NES and CSC-IES to ensure that the Contractor is compliant with his environmental obligations. The CSC-NES will be engaged on a full-time basis to undertake day to day monitoring of the contractor's activities. The CSC-NES will be assisted by the CSC-IES who will provide intermittent inputs.
373. The following table provides a synopsis.

**Table 32 – Implementation Arrangements (Synopsis)**

No	Entity	Role and Responsibility
1	GoT	Overall responsibility for implementation of the Project.
2	ADB	Financier. Financing and Supervising the Project Implementation.
3	MoF (Ministry of Finance)	Responsible government body for coordination with ADB and other donors for foreign assistance.
4	MoT (Ministry of Transport)	Executing Agency

<b>5</b>	<b>PIURR</b>	Implementation Agency. Responsible for the overall implementation of the environmental mitigation, management and monitoring measures and requirements specified in this IEE.
<b>6</b>	<b>State Ecological Review Committee</b>	Permitting Agency. Responsible for the issue of Environmental Permits.
<b>7</b>	<b>CSC (Construction Supervision Consultant)</b>	Assigned Supervision Consultant. Construction Supervision and Monitoring.
<b>8</b>	<b>Contractor</b>	Assigned Contractor. Construction of Project.

## **B. Environmental Management Plan**

374. The EMP describes the various measures proposed under this Project, which were designed to avoid, mitigate, or compensate the adverse environmental impacts that may result from the Project. As such the EMP considers all phases of the Project cycle, namely the detailed design, construction and operational phases of the Project.

375. To ensure that the proposed mitigation measures will be carried out by the contractors during the construction stage, the design consultant will clearly set out in the tender and contract documents the contractor's obligation to undertake the respective environmental mitigation measures.

376. Table 33 summarizes the environmental mitigation measures, and Table 34 describes the environmental monitoring requirements.

**Table 33 - Summary of Environmental Mitigation Measures**

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
<b>DETAILED DESIGN PHASE – PRE-CONSTRUCTION PHASE</b>					
Preparation of SSEMP	Environmental impacts due to lack of SSEMP	1. Contractors to prepare and submit SSEMPs based on the Project EMP to reflect relevant conditions and requirements for any given contracts package. SSEMP to be approved by CSC and EA for submission to the ADB prior to start of construction	Contractor	CSC, PIURR	SSEMP submitted and approved by CSC, PIURR and ADB
Permitting Requirements	Illegal construction activities because of lack of Permit	2. Obtain all required consents, permits, clearances, no objection certificate (NOC), etc. 3. Time target: Ensure they have been acquired or authorized before works commencement.	Contractor	CSC, PIURR	All required permits obtained and officially approved.
		4.			
		5.	Contractor	CSC, PIURR	
Road alignment in areas of tree plantations.	Felling of trees.	6. Required tree felling and site clearance activities which involves the remove of vegetation will be outside bird's nesting season (preferably between October and February). 7. Any tree losses are to be compensated by new plantations at a ratio of 1:3. 8. Species to be planted are: outside settlements: pines, cypresses and the yellow flowering Spanish broom. Alongsite settlements:	Contractor	PIURR	Counting of trees felled and of trees planted. Monitoring and check that tree felling is outside nesting period. Outcome documented in 1st SAEMR. Outcome documented in 1 <sup>st</sup> SAEMR.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>chestnuts, elms, mulberry, pistachio, walnuts and planes.</p> <p>9. At locations outside settlements with good moisture conditions (for example alongside irrigation channels) the planting of species that require more moisture such as poplar (<i>Populus alba</i>), willow (<i>Salix alba</i>), maple (<i>Acer spec.</i>) and ash (<i>Fraxinus spec.</i>) is recommended. Only native species will be planted from local genetic stocks.</p> <p>10. Plantings will be conducted after technical works have been completed. Planting time will be restricted to spring (March till April) and/or autumn (September till October). Planting quality is 2 years old saplings.</p> <p>11. Locations for tree plantings are within the acquired RoW at the locations where tree losses occur. one row of sapling is planted to each side of the road.</p> <p>12. Distance in between individual saplings will be 4 m.</p> <p>13.</p>			
Embankment filling of the tree stem area	Potential tree losses due to embankment fill.	14. In order to protect the trees any fill up of the tree stem area must be avoided. At locations where the bottom of the designed embankment comes close (less than 2 m) to trees or tree rows	Contractor	PIURR with support of CSC	Measurement of depth of fill material at tree stands. Regular monitoring and documentation

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		a vegetation protection fence during construction activities must be implemented.			of results in SAEMR.
	Potential damaging of trees lying very close to the road (less than 2m).	15.All trees not felled must either be fenced off, demarcated or numbered in some way. These trees should be photographed, recorded and GPS locations recorded for each. This information can then be shared with those responsible for tree felling to avoid unnecessary impacts.	Contractor	PIURRwith support of CSC	Regular check of vitality of trees near construction site. Photo evidence and documentation of monitoring result in SAEMR.
Road alignment traversing towns and villages	Loss of building structures and assets. (buildings, tree losses, masonry retaining wall, private yards and other structures).	16.Compensation payment according to the LARP.	EA thru PIURR	PIURR	Continuous monitoring of LARP implementation.  Documentation in SASMR.
Bridge/Culvert Reconstruction	Potential damage to local irrigation system or to drainage if new culverts should not be sufficiently dimensioned or in case that not all existing culverts should be rehabilitated in the course of the road rehabilitation.	17.The design of the bridges considers the 1 in 100 years flood event. This is warranted by the diemensioning of the bridge and the solid building structure and used materials. The piers are designed on a natural foundation with solid monolithic vertical walls. The riverbed and part of the slopes are strengthened with large-sized stones 1.0 m in size, in the area under the bridge, voids are filled with B20 class monolithic concrete.	Design Consultant	PIURR	Photo evidence. Monitoring and documentation in SAEMR

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	Potential water erosion processes at bridge and river embankments.	18.Design of erosion protection measures at lower parts of bridge embankments. Erosion protection is achieved by using natural stones which are embedded in concrete.	Design Consultant	PIURR	Photo evidence. Monitoring and documentation in SAEMR
Complaints/grievances	Compensation claims	19.Establishment of grievance redress mechanism (GRM) as a channel for complaints and issues relating to the construction period of the Project. The GRM for this Project is in detail described in the chapter “Grievance Redress Mechanism” of the IEE.	EA thru PIURR	PIURR	Grievance boxes in place. Grievance Log in place. Documentation in SASMR.
Within settlements disproportionate encroachment on poor people's assets.	Loss of wealth and property of poor people. Poor and vulnerable households might be affected.	20.Resettlement Specialist will issue LARP covering assessment of loss and compensation procedure.	EA thru PIURR	PIURR with support of CSC	Continuous monitoring of LARP implementation. Documentation in SASMR.
Use of water for dust suppression and other construction activities	Competition for water resources	21. Conduct consultation with local authorities to identify sources of water (for spraying and other construction requirements) that will not compete with the local population. 22.Because for dust suppression and other construction activities only water from natural river and irrigation channel will be used there is no competition to local communities expected.	Contractor	PIURR with Support of CSC	No complaints on competition for water resources. Evidence in Grievance log.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
<b>CONSTRUCTION PHASE</b>					
Impacts due to site clearance activities	Loss of topsoil.	<p>23. Implement the spoils management plan prepared as part of the SSEMP.</p> <p>24. Removing of topsoil occurring within site clearing corridor. Topsoil will be removed and stored for reuse.</p> <p>25. Long-term stockpiles of topsoil will immediately be protected to prevent erosion or loss of fertility.</p> <p>26. For erosion protection it will be sown with a fast-growing vegetation, e. g. grass</p>	Contractor	PIURR with support of CSC	Regular monitoring of site clearing activities. Photo-evidence in case of non compliances. Documentation of non compliances and remediation measures in SAEMR.
Construction activities / Project road and ancillary facilities (e.g. borrow areas, asphalt plant, haulage routes)	Dust emission. Deterioration of air quality.	<p>27. Prepare a detailed Dust Management Plan (DMP) as part of the SEMP, which at the minimum should include the control measures listed below.</p> <p>28.- Regular dust suppression (watering) along roads and the earthwork sites and ensure that adequate water supply for dust suppression is available.</p> <p>29. Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. Crusher site and mixing plants should be located at least 1km downwind of sensitive receptors and settlement areas.</p> <p>30. Avoid (or suspend) dust-generating activities during</p>	Contractor	PIURR with support of CSC	Regular monitoring of site clearing activities. Photo-evidence in case of non compliances. Documentation of non compliances and remediation measures in SAEMR.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>windy periods such soil stripping/ earthworks.</p> <p>31.Minimize drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment, when appropriate.</p> <p>32.Limit the speed of all construction vehicles at &lt;20km/h.</p> <p>33.Cover earth material (e.g., sand) transporting trucks and ensure vehicles entering and leaving sites are covered to prevent escape of particulate materials during transport.</p> <p>34.Wet/spray with water stockpiles during loading operations in dry or windy conditions.</p> <p>35.Cover particulate materials stockpiles.</p> <p>36.Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and if possible, stored in silos with suitable systems to prevent escape of material and overfilling during delivery</p> <p>37.For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.</p> <p>38.Fully enclose or install dust screens or barriers on or around site or specific operations where there is a high</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>potential for dust production and the site is active for an extended period.</p> <p>39. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. Cover if they are being re-used on-site.</p> <p>40. Cover stockpiles of particulate construction materials.</p> <p>41. Regularly clean crusher site to remove fine dust. Keep site fencing, barriers and scaffolding clean using wet methods. Avoid dry sweeping of large areas.</p> <p>42. Avoid site runoff of water or mud from site compounds by providing appropriate temporary drainage.</p> <p>43. Ensure sand and other aggregates are stored in banded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate control measures are in place.</p> <p>44. Rehabilitate disturbed areas as soon as practicable. Re-vegetate earthworks and exposed areas/soil to stabilize surfaces as soon as practicable.</p> <p>45. Limit soil disturbance area, i.e., only remove soil cover in small areas during work. Demarcate</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>construction areas within which construction activities should be done.</p> <p>46.Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.</p>			
Impacts due to Earthworks	<p>Selected disposal sites for cut material. Potential disfigurement of landscape. Potential wind and water erosion.</p>	<p>47.Compact and evenly distribute the surplus material by layers where possible, to minimize piling and impacts to landscape.</p> <p>48.The stockpiles will be sown with fast growing grass to avoid erosion by the root system.</p> <p>49.During dry and windy periods, water will be spread on the disposed material to avoid dusting.</p>	Contractor	PIURR with support of CSC	<p>Regular monitoring.</p> <p>Provision of photo-evidence in case of non compliances. Documentation of non compliances and remediation measures in SAEMR.</p>
	<p>Loss of topsoil Water erosion</p>	<p>50.Implement the spoils management plan which provides detailing measures to be undertaken to minimize effects of wind and water erosion on stockpiles, measures to minimize loss of fertility of top soil, timeframes, haul routes and disposal sites.</p> <p>51.Topsoil will be removed and reused to cover areas where excess materials will be dumped and on road embankments.</p>	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		52.As erosion protection measure at riverbanks, natural stone fillings will be used as additional measures if required.			
	Siltation of surface waters and/or impact on soils due to improper disposal of excess materials	53.Excavated material will be reused as far as technically feasible. In addition, the reclaimed asphalt pavement will be recycled for the construction of new pavement as far as technically feasible. Thus potential impacts due to the need for disposal of excess material will be kept to a minimum. 54.Extracted soil material that can not be reused needs to be disposed at the areas shown in Annex 2. 55.Material storage sites must be kept away from water sources. No storage in the floodplain of the Tairsu River (50 m distance from shore line). For any other water courses storage sites must be at east 20 m distant. Spoil management practices must be specified in the SSEMP.	Contractor	PIURR with support of CSC	
	Air pollution due to exhaust emission from the operation of construction machinery	56.Maintain construction equipment to good standard and avoid, as much as possible, idling of engines. 57.Banning of the use of machinery or equipment that	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		cause excessive pollution (e.g., visible smoke).			
	Disturbance of adjacent settlements due to elevated noise levels	58.Restrict work between 7:00 am and 22:00 pm within 200 m of the settlements. 59.A limit of 70 dBA will be set in the vicinity of the construction site and strictly followed. 60.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	PIURR with support of CSC	
	Soil compaction due to operation of heavy equipment	61.Confine operation of heavy equipment within the corridor that is absolutely necessary for the road construction to avoid soil compaction and encroachment into agricultural used land close to the road.	Contractor	PIURR with support of CSC	
Reconstruction of pavement inclusive widening of existing road	Dislocation or involuntary resettlement of people (Within settlements, encroachment into private assets and residential houses and land).	62.Implement LARP covering assessment of loss and compensation procedure.	EA through PIURR	PIURR with support of CSC social safeguards team	Continuous monitoring of LARP implementation.  Documentation in SASMR.
	Loss of businesses and income of people	63.Implement LARP covering assessment of loss and compensation procedure.	EA through PIURR	PIURR with support of CSC social	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	operating their business within the existing RoW	<p>64. Inform all residents and businesses about the nature and duration of work well in advance so that they can make necessary preparations.</p> <p>65. Limit dust by removing waste and soil quickly; by covering and watering stockpiles, and covering soil with tarpaulins when carried on trucks</p> <p>66. Increase workforce and use appropriate equipment to complete the work in minimum time in the important areas.</p> <p>67. Avoid construction work in sensitive times like festivals near religious places.</p> <p>68. Contractors (and sub-contractors) need to be informed that they are not allowed to hunt/poach in the project area of influence.</p>		safeguards team	
	Damage to infrastructure, supply cuts of infrastructure services such as water supply pipes and other facilities, wastewater discharge facilities, electricity lines etc.	<p>69. Measures will be ensured in engineering designing to avoid any disturbance to the existing infrastructure.</p> <p>70. Prior to construction start the respective service agencies will be informed about the construction work.</p> <p>71. Coordinate with respective agencies and provide prior information to the public in case of any required disruption in services during construction</p>	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>72. Consult with the affected people during project implementation.</p> <p>73. Make the project contractors aware of any significant issues resulting from loss of electricity.</p> <p>74. Inform people 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.</p>	Contractor	PIURR with support of CSC	
	Possible damage to properties and community facilities. Construction sites.	<p>75. Immediately repair and/or compensate for any damage caused by construction works and activities to existing communities and their property and facilities</p> <p>76. 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.</p>	Contractor	PIURR with support of CSC	
	Noise exceeding applicable noise standards. Vibrations may result in damage to local infrastructure, including private property and local (haulage) roads.	<p>77. Limit the use of heavy machinery to the existing RoW especially in the vicinity of agricultural land.</p> <p>78. maintenance of construction equipment in good condition and avoiding, as much as possible, idling of engines.</p> <p>79. banning of the use of machinery or equipment that cause</p>	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>excessive pollution (e.g., visible smoke).</p> <p>80.Utilize construction machinery with low emission levels.</p> <p>81.limiting construction work to 7:00 am – 22:00 pm within 200 m of settlements, and by limiting hauling traffic through settlements.</p> <p>82.Within the traversed villages applicable noise standards will be complied with as far as technically feasible by means of noise measurements as indicated in the EMoP and in case of exceed of standards, ascribe of time restrictions for construction activities between 7:00 am and 22:00 pm.</p> <p>83.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).</p> <p>84.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 CSC.</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		85. Put in place grievance redress procedures 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.	PIURR with support of CSC	PIURR with support of CSC	
	Construction activities close to building structures, particularly within villages. Aggregate extraction. Haulage of aggregates and construction equipment.	86. Advise the community members on road safety with the key messages reinforced with communities throughout construction. 87. Place clear signs 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. 88. Heavy machinery will not be used after day light and all such equipment will be returned to its overnight storage area/position before night. 89. All sites including storage areas will be made secure, prohibiting access by members of the public by fencing when appropriate.	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>90. Install barriers to keep pedestrians away from hazardous areas such as construction sites and excavation sites.</p> <p>91. Install signage at the periphery of the construction site advising road users that construction is in progress.</p> <p>92. 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.</p> <p>93. Provide security personnel in hazardous areas to restrict public access.</p> <p>94. If necessary, provide safe passageways for pedestrians crossing the construction site and for people whose access has been disrupted due to construction works.</p>			
Operation of borrow areas and quarries	<p>Potential disfigurement of landscape, vegetation losses and damage to access roads</p> <p>Increased dust emission</p> <p>Siltation and obstruction of surface waters</p>	<p>95. Refrain from storing material near surface waters to prevent siltation or obstruction of water ways. This refers particularly to the floodplain of Shurabdaryo river.</p> <p>96. Wet the unpaved routes which go next to settlements to suppress dust pollution when hauling material from borrow pits and provide covers for the load of all hauling vehicles to</p>	Contractor	PIURR with support of CSC	<p>Regular monitoring.</p> <p>Provision of photo-evidence in case of non compliances.</p> <p>Documentation of non compliances and remediation measures in SAEMR.</p>

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>prevent dust pollution. Also wetting the aggregate load reduces potential dust emissions.</p> <p>97. Implement air quality management plan, including transportation and post-closure rehabilitation of borrow sites.</p> <p>98. The hauling traffic should be carried out only between 7:00 am and 22:00 pm.</p> <p>99. Used machinery needs to be in good technical condition and properly maintained, so that no leakages of oil or any other pollutants occur.</p> <p>100. Before starting material extraction the contractor will obtain the environmental permit from the CEP which may also include provisions for landscaping measures after finalization of the extraction activities.</p> <p>101. Before starting extraction activities it needs to be confirmed that there is a valid license for the quarrying activities issued by the responsible authorities/agencies.</p> <p>102. Implement material management plan which indicates the location of the proposed extraction site as well as rehabilitation measures and implementation schedule for</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		the borrow areas and access roads. The plan needs to address the sensitive issues of avoidance of transportation through residential areas as far as technically feasible and closure rehabilitation.			
	Loss of valuable ecological structures if the selected disposal sites are not carefully selected.	103. No agricultural area or river floodplain will be selected as disposal site. Minimum distance to any watercourses must be at least 100 m. This need to be added in the spoil management plan. 104. Disposal sites will be preferably on barren land without any wooden vegetation. This need to be added in the spoil management plan.	Contractor	PIURR with support of CSC	
Operation of Asphalt Plant and Aggregate Crushers	Increased dust emission and noise emission	105. Careful site selection of aggregate crusher in order not to interfere with any sensitive receptor. Distance to next settlement and residential houses at least 1,000 m downwind. Site selection for aggregate crusher has to be approved by PIURR.	Contractor	PIURR with support of CSC	Regular monitoring.  Provision of photo-evidence in case of non compliances. Documentation of non compliances and remediation measures in SAEMR.
	Odor emission and safety risks	106. Asphalt plants will be 1,000 m downwind from any settlements and residential houses.	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>107. 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.</p> <p>108. Secure official approval for installation and operation of asphalt plants from MoT.</p>			
	Water pollution due to spilled bitumen	<p>109. Receive all relevant permissions prior to commencing operation of the asphalt plant.</p> <p>110. Bitumen will not be allowed to enter either running or dry streambeds nor will it be disposed of in ditches or small waste disposal sites prepared by the contractor.</p> <p>111. Storage areas should be lined with impermeable layer to mitigate impacts of potential spills. As a minimum, these areas must be designed so, that any spills can be immediately contained and cleaned up.</p> <p>112. 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</p>	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>contained and cleaned. This is based on the Law on Environmental Protection of the Republic of Tajikistan (2. August 2011 as amended on 18. July 2027.</p> <p>113. Bitumen storage and mixing areas will be protected against spills.</p> <p>114.</p>			
Bridge and Culvert Reconstruction Works	Possible alteration of surface water hydrology resulting in increased sediment by increased soil erosion at construction site	<p>115. Store the material at a safe distance from nearby surface waters. The only river crossed by the Project road is Tairsu River. Any construction material storage must be outside the River floodplain (approximately 50 m to both sides of Shurabdaryo river). There must be a distance of 20 m to any other small water course. The exact distance must be defined in the SSEMP.</p> <p>116. For avoidance of reduction of water quality there will be instrumental monitoring as stipulated in the Environmental Monitoring Plan.</p> <p>117. If required sediment ponds must be implemented.</p> <p>118. No asbestos containing materials (ACM) will be used in the implementation of the Project, but it cannot apriori be excluded that no asbestos is</p>	Contractor	PIURR with support of CSC	<p>Regular monitoring.</p> <p>Provision of photo-evidence in case of non compliances. Documentation of non compliances and remediation measures in SAEMR.</p>

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>contained in the old culverts which need to be removed. Management of asbestos waste must be done according to ADB's Good Practice Guidance Note for the Management and Control of Asbestos. This is a requirement of the Waste Management Plan.</p> <p>119. Provide for long term stockpiles a grass cover.</p> <p>120. Implementation of settlement ponds at locations where construction site comes close to natural watercourses to retain sediments and mitigate possible impacts on water hydrology.</p> <p>121. Implement the waste management plan which considers sensitive receptors (rivers and their floodplains).</p> <p>122. Conduct regular maintenance of the construction equipment to prevent oil leaks.</p> <p>123. Chemicals and oil will be stored in secure locations, impermeable, and bound area far away from surface waters.</p> <p>124. When carrying out corrosion treatment, the contractor needs to present a method statement on this.</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>125. Bridge reconstruction debris will be removed in an environmentally safe manner.</p> <p>126. Prepare a method statement or plan for the execution of bridge construction works including measures that will be undertaken to address adverse environmental impacts such as erosion of river embankment and siltation of watercourses that may result from such activities.</p> <p>127. Storage of any hazardous construction material will be on sealed surfaces only to prevent leakages into the groundwater.</p> <p>128. With regard to spill kits, training and response the following measures must be adhered to:</p> <p>129. Ensure equipment is readily available on site to clean any spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.</p> <p>130. Develop and implement a Spill Prevention and Response Plan, which should include control measures listed below:</p> <p>131. Store hazardous chemical such as fuels, oils, lubricants</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>and chemicals as well as hazardous wastes in appropriate containers provided with proper labels and placed in an area with impermeable surface and provided with containment with volume that can accommodate 110% of the volume of the largest container.</p> <p>132. Locate fuel and chemical storage areas at least 500 m away from any surface water, including dry rivers.</p> <p>133. Make available Safety Data Sheet (SDS) of hazardous chemicals at storage areas and where they were used.</p> <p>134. Refuel vehicles in an area that is at least 100 m away from any surface water.</p> <p>135. Provide spill kits in accessible areas at all times.</p> <p>136. Train personnel handling fuel and chemicals in the use of spill response kits in accordance with the emergency preparedness and response plan.</p>			
Establishment and operation of contractor's yard	Potential soil and water pollution	137. Implement the Construction camp management plan prepared as part of the SSEMP in reference to World Bank Group's	Contractor	PIURR with support of CSC	Regular monitoring.  Provision of photo-evidence in case

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>Workers' Accommodation: Processes and Standards.<sup>33</sup> The plan will indicate:</p> <p>138. Site location, surface area required and layout of the work camp. The layout plan will also contain details of the proposed measures to address adverse environmental impacts resulting from its installation.</p> <p>139. Sewage management plan for provision of sanitary latrines and proper sewage collection and disposal system to prevent pollution of watercourses;</p> <p>140. Waste management plan covering provision of garbage tons, regular collection and disposal in a hygienic manner, as well as proposed disposal sites for various types of wastes (e.g., domestic waste, used tires, etc.) consistent with appropriate regulations;</p> <p>141. Description and layout of equipment maintenance areas and lubricant and fuel storage facilities including distance from water sources and irrigation facilities. Storage facilities for fuels and chemicals will be located away</p>			of non compliances. Documentation of non compliances and remediation measures in SAEMR.

<sup>33</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>from watercourses. Such facilities will be bounded and provided with impermeable lining to contain spillage and prevent soil and water contamination.</p> <p>142. Prior to the commencement of works the site installations will be inspected for approval.</p> <p>143. The selected site will not be on top of ground water area or near surface waters.</p>			
	Competition for water resources	<p>144. Prior to establishment of the work camps;</p> <p>145. Indicate proper sources of drinking and construction water which won't compete with local needs.</p> <p>146. Conduct consultations with local authorities to identify sources of water that will not compete with the local population.</p>	Contractor	PIURR with support of CSC	
	Health and safety risks to workers and adjacent communities	<p>147. Implement the waste management plan prepared as part of the SSEMP.</p> <p>148. Provide sanitary latrines and garbage bins at construction site.</p> <p>149. Periodically clear the sanitary latrines and garbage bins.</p>	Contractor/ HSO	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>150. Do not allow open burning of waste</p> <ul style="list-style-type: none"> <li>i. For health and safety protection of workers and adjacent communities, the following will be provided:</li> <li>ii. adequate health care facilities (including first aid facilities) within construction sites;</li> <li>iii. 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;</li> <li>iv. personal protective equipment for workers, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection in accordance with legal legislation;</li> <li>v. clean drinking water to all workers;</li> <li>vi. adequate protection to the general public, including safety barriers and marking of hazardous areas;</li> <li>vii. safe access across the construction site to people whose settlements and access are temporarily severed by road construction;</li> </ul>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>viii. adequate drainage throughout the camps so that stagnant water bodies and puddles do not form;</p> <p>ix. 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;</p>			
	Worker's health and soil / water pollution in and around equipment maintenance and fuel storage areas	<p>151. The contractor will hire a qualified HSO who will provide safety training to the staff according to the requirements of the individual workplace. Prior to the commencement of works, the work site personnel will 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 will establish a short list of materials to be used (by quality and quantity) and provide a rough concept</p>	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>explaining the training / briefing that will be provided for the construction personnel.</p> <p>152. Locate storage facilities for fuels and chemicals away from watercourses.</p> <p>153. Management and storage of fuel, waste oil, hazardous waste will be planned in accordance with the IFC EHS General Guidelines on Hazardous Materials Management. This includes the use of appropriate secondary containment structures capable of containing the larger of 110 percent of the largest tank or 25% percent of the combined tank volumes in areas with above-ground tanks with a total storage volume equal or greater than 1,000 liters.</p> <p>154. Store and dispose waste/used oil consistent with environmental legal requirements.</p>			
	Road construction projects bear a high 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	155. 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	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	STD and HIV/AIDS. In addition, the transport sector itself actually helps the epidemic, as infrastructure and associated transport services give people and infections mobility. Possible risks on construction sites also arise regarding the possible spread of the corona virus.	support staff and local communities. 156.			
	Social conflict between the workers and local people	157. Arrange the facilities, services, and water supply of the work camp so that it will not compete on the same resources with nearby communities. 158. Employ, to the largest extent feasible, people from the local communities to the workforce. Local communities will also be preferred, to largest extent feasible, when employing people for the tree planting works, drainage cleaning, and other suitable tasks.	Contractor	PIURR with support of CSC	
Traffic impairment	Traffic impairment	159. Submit the traffic management plan to local traffic authorities prior to mobilization. The plan will include action plan to mitigate impacts from transport of	Contractor	PIURR with support of CSC	Regular monitoring. Provision of photo-evidence in case

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>hazardous and toxic materials to the traffic emergency response plan for the operation phase of the road.</p> <p>160. Provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions</p> <p>161. Allow for adequate traffic flow around construction areas.</p> <p>162. Provide adequate signalization, appropriate lighting, well - designed traffic safety signs, barriers and flag persons for traffic control.</p>			of non compliances. Documentation of non compliances and remediation measures in SAEMR.
	Potential Impact on Community Health and Safety	<p>163. Implement a traffic management plan that will set out how access along the project road will be maintained safely during construction.</p> <p>164. 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.</p> <p>165. Ensure access in areas to be closed temporarily by</p>	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>providing temporary/alternative access.</p> <p>166. Provide adequate training to the workers on traffic control prior to commencing operations.</p>			
Archaeological chance finds	Potential damage to archaeological artefacts due to construction activities, particularly earthworks	<p>167. In the event of the unexpected discovery of archaeological objects during construction operations, the contractor will immediately inform the CSC who will notify the Institute of Archaeology / Ministry of Culture and PIURR 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.</p> <p>168. 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.</p>	PIURR, CSC and Contractor	PIURR with support of CSC and in coordination withy Institute of Archaeology / Ministry of Culture	<p>Regular monitoring.</p> <p>Provision of photo-evidence in case of non compliances. Documentation of non compliances and remediation measures in SAEMR.</p>
Closure of construction sites	Potential impacts to landscape aesthetics occur if the camp site and construction associated facilities such as borrow areas are not properly cleaned and restored in	<p>169. After completion of construction works the contractor will execute all works necessary to restore the sites to their original state (removal and proper disposal of all materials, wastes,</p>	Contractor	PIURR with support of CSC	<p>Regular monitoring.</p> <p>Provision of photo-evidence in case of non compliances.</p>

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	the course of construction closure. Possible impacts which may arise are the disfigurement of landscape due to improper disposal of surplus material, spoils of waste (construction debris, metallic scrap etc.) if not properly disposed of.	installations, surface modeling if necessary, spreading and leveling of stored topsoil). 170. After completion of construction and rehabilitation works, and after the use of borrow pits, the landscape will be restored to a standard that is of equal quality to its original condition. Rehabilitation measures may not be necessary for borrow areas still in operation after road works have finished.			Documentation of non compliances and remediation measures in SAEMR.
<b>OPERATION PHASE</b>					
Impact on communities	Economic enhancement, split communities, bypassed loss of roadside community business and social activities, impacts on current mode of transportation, impacts related to culture shock, and conversion to higher value land users.	171. Any Project affected people will be compensated for their loss by implementing the LARP.	PIURR	PIURR	LARP successfully implemented.
Increased risk of accidents with possible spills of harmful substances	Community safety risk	172. Prepare and implement spill-contingency plan or emergency response plan which 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	PIURR	PIURR	Documentation and count of accidents on the Project road.  Provision of additional safety features if required.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		drinking water resources or have adverse effects on the natural balance of sensitive areas. Additional measures to mitigate risk of accidents and spill of harmful substances are speed control and weight stations.			
Damaged drainage or uncontrolled erosion	Harmful environmental impacts resulting from damaged drainage or uncontrolled erosion.	173. Routine monitoring of drainage and erosion control at least twice a year. 174. In case there are any damages identified, these have to be repaired.	PIURR	PIURR	All drainage facilities functioning. Regular monitoring and check of drainage facilities and other road assets. Provision of corrective and/or repair measures if required.

CSC = Construction Supervision Consultant, EA = Executive Agency, EMP = Environmental Management Plan, PIURR = Project Implementation Unit for Road Rehabilitation (of MoT)

377. Prior to construction works, the contractor will provide a comprehensive SSEMP covering the following aspects:

- (i) Construction site standard operating procedures (SOP)
- (ii) Material management Plan detailing measures for construction material management and storage in order to avoid environmental pollution and any safety hazards to workers and nearby communities. Identification and designation of special storage sites, e.g., for bitumen barrels, prefabricated concrete elements (e.g. culverts) and metallic structures.
- (iii) Spoils Management Plan detailing measures to be undertaken to minimize effects of wind and water erosion on stockpiles of topsoil and excess materials, measures to minimize loss of fertility of topsoil, timeframes, haul routes and disposal sites for excess materials.
- (iv) Water quality management plan which must include site specific protection measures for ground and surface water inclusive water quality monitoring at rivers, creeks and irrigation channels crossed by the Project Road. Description and layout of equipment maintenance areas and lubricant and fuel storage facilities including distance from water sources and irrigation facilities. Storage facilities for fuels and chemicals will be located away from watercourses. Such facilities will be bounded and provided with impermeable lining to contain spillage and prevent soil and water contamination
- (v) Sewage management plan including provision of sanitary latrines and proper sewage collection and disposal system to prevent pollution of watercourses
- (vi) Waste management plan covering provision of garbage bins, regular collection and disposal in a hygienic manner, as well as proposed disposal sites for various types of wastes (e.g., domestic waste, used tires, etc.) consistent with appropriate regulations. Management of asbestos waste must be done according to ADB's Good Practice Guidance Note for the Management and Control of Asbestos.
- (vii) Hazardous waste management plan for ensuring that hazardous waste is properly stored, collected and safely disposed to an official landfill.
- (viii) Air quality management plan which must include air quality monitoring at sensitive receptors including asphalt plant, aggregate crusher and concrete plant. Monitoring results need to be incorporated in construction site environmental monitoring reports. Air quality management plan will include schedule for spraying on hauling and access roads to construction site and details of the equipment to be used
- (ix) Noise and vibration management plan which must include noise and vibration monitoring at sensitive receptors. Monitoring results need to be incorporated in construction site environmental monitoring reports
- (x) Asphalt Plant and Borrow pit/Quarry Management plan. In case a new borrow area is opened by the contractor the restoration of the area also needs to be incorporated.
- (xi) Traffic management plan for ensuring traffic safety and avoiding congestion to the degree technically possible during construction phase.
- (xii) Emergency response plan (in case of spills, accidents, fires and the like) prior to operation of the asphalt plant
- (xiii) Construction camp management plan in reference to World Bank Group's Workers' Accommodation: Processes and Standards.<sup>34</sup> The plan will include layout of the work camp and details of the proposed measures to address adverse environmental impacts resulting from its installation.
- (xiv) Health and Safety Management Plan
- (xv) COVID-19 health and safety management plan and emergency response plan prepared in accordance with the relevant government regulations and guidelines on COVID-19 prevention and control or, where relevant, with international good practice guidelines<sup>35</sup>

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<sup>34</sup> [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

<sup>35</sup> World Health Organization, Considerations for public health and social measures in the workplace in the context of COVID-19. Geneva. Available here: <https://www.who.int/publications-detail/considerations-for-public-health-and-social-measures-in-the-workplace-in-the-context-of-covid-19>

- (xvi) Chance find procedure needs to be in place for avoiding any damage to archaeological artefacts (if any) due to earthworks. The mitigation measures to be followed are described. In case of unexpected discovery of archaeological objects during construction operations contractor must immediately inform CSC.
- (xvii) Post-construction plan for ensuring that camp site and associated facilities such as borrow areas are left clean and without any landscape disformation and safety hazards (e.g. steep slopes).
- (xviii) As part of the SSEMP, the contractor is required to document pre-work conditions and include restoration as part of work.
- (xix) Method statement or plan for the execution of bridge construction works including measures that will be undertaken to address adverse environmental impacts such as erosion of river embankment and siltation of watercourses that may result from such activities.

378. The SSEMP will be submitted by the contractor for approval to the CSC and PIURR before the commencement of civil works. It will also be shared with ADB for no objection. Works will not be allowed to commence prior to approval of SSEMP.

379. Environmental Monitoring Plan

380. Environmental monitoring is an important aspect of environmental management during construction and operation phases of the project to safeguard the protection of environment. The parameters to be monitored are outlined in Table 34. PIURR will supervise the road project regularly, and submit quarterly reports based on the monitoring data and laboratory analysis report.

**Table 34 - Environmental Monitoring Plan**

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored? <sup>36</sup>	When is the parameter to be monitored? Frequency	Institutional responsibility
<b>Pre-Construction</b>					
A. Pre-works conditions and environmental baseline	Site conditions	This should be on project sites, alignments, and project area of influence as defined in this IEE.	Photo-documentation with GPS coordinates for all sites and and detailed report	During preparation of the SSEMP. If works will be conducted chainage/section-wise, the SSEMP should provide justification and detailed action plan on undertaking the pre-works documentation and baseline monitoring.	Contractor  To be confirmed by PIURR with support of CSC
<b>Construction stage</b>					
<b>B. Water quality</b> in surface waters crossed by and nearby Project road. <sup>37</sup>	pH, temperature, suspended solids (mg/l), oil products (mg/l), mineralization (mg/l), BOD 5 (mg O <sub>2</sub> /l), turbidity (mg/l) and electrical conductivity (Ohm/cm)	At surface waters traversed by the Project Road.	Measurement either directly in river water with a suitable measurement device or sample taking and measurement in a certified laboratory.	During construction activities water measurements will be carried out on a <u>quarterly</u> basis and results must be documented in the environmental monitoring reports.	CSC Measurements must be taken by a certified laboratory which needs to be assigned for this task.
<b>C. Noise</b>	Noise level.	At the 6 locations listed in the table 31 in chapter D baseline conditions and in addition at the asphalt plant, concrete batching plant and aggregate crushers.	By means of portable noise	Monitoring measurements <u>twice per Month</u> during construction phase. Monitoring results must be documented in the environmental monitoring reports,	CSC Measurements must be taken by a certified laboratory which needs to be assigned for this task.
<b>D. Vibration</b>	Vibration level	At the 6 locations listed in the table 31 in chapter D baseline conditions and in addition at the asphalt plant, concrete batching plant and aggregate crushers.	By using an assistant brand vibrometer	Monitoring measurements twice per Month during construction phase. Monitoring results must be documented in the environmental monitoring reports,	CSC Measurements must be taken by a certified laboratory which needs to be assigned for this task.

<sup>36</sup> For environmental parameters, follow requirements per local standards and EHS Guidelines, whichever is more stringent.

<sup>37</sup> Baseline measurements have been conducted. Results are shown in the water baseline measurement report (**Error! Reference source not found.**).

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored? <sup>36</sup>	When is the parameter to be monitored? Frequency	Institutional responsibility
<b>E. Air quality</b> deterioration due to road construction works	TSP, CO, NO, NO <sub>2</sub> ; SO <sub>2</sub> , PM 10 and PM 2.5	At the locations listed in Table 19 in chapter D Baseline Conditions and in addition at the asphalt plant, concrete batching plant and aggregate crushers.	By means of suitable measurement device	Monitoring measurements will be carried out on a quarterly basis during construction phase.	CSC Measurements must be taken by a certified laboratory which needs to be assigned for this task.
<b>F. Potential tree losses</b> because tree stem area is subject to embankment filling.	Trees located within the newly designed embankment.	At respective tree locations.	Inspections; observation. An embankment fill of up to 20 cm at the bottom of the tree stem area can be accepted. A filling up of more than 30 cm will damage the tree and cutting will be necessary. Decision is to be made by the CSC.	During construction phase.	PIURR with CSC's support
<b>G. Topsoil preservation</b>	Stockpiling and means of protection	Job site	Inspections; observation	Upon preparation of the construction site, after stockpiling and after completion of works on shoulders	PIURR with CSC's support
<b>H. Equipment servicing and fuelling</b>	Prevention of spilling of oil and fuel	Contractor's yard	Inspections; observations	Unannounced inspections during construction	PIURR with CSC's support
<b>I. Worker's safety and health</b>	Official approval for worker's camp; Availability of appropriate personal protective equipment; Organization of traffic on the construction site  Provision of safety training to the staff according to the requirements of the individual work place	Job site and worker's camp	Inspection; interviews; comparisons with the Contractor's method statement	Weekly site visits by the HSO. The assigned HSO must be independent of the contractor to avoid any conflict of interest.  Unannounced inspections during construction and upon complaint.	PIURR with CSC's support

<b>Issue</b>	<b>What parameter is to be monitored?</b>	<b>Where is the parameter to be monitored</b>	<b>How Is the parameter to be monitored?<sup>36</sup></b>	<b>When is the parameter to be monitored? Frequency</b>	<b>Institutional responsibility</b>
<b>J. Worker's education on AIDS and STD</b>	Has relevant education been provided?	To be determined by assigned Construction Supervision	To be determined by assigned Construction Supervision	After beginning of works and at appropriate intervals throughout construction	PIURR with CSC's support
<b>K. Material supply Asphalt plant</b>	Possession of official approval or valid operation license	Asphalt plant	Inspection	Before work begins	PIURR with CSC's support
<b>L. Borrow areas</b>	Possession of official approval or valid operation license	Sand and gravel borrow pit and / or quarry	Inspection	Before work begins	PIURR with CSC's support
<b>M. Material transport Asphalt</b>	Are the truck loads covered or wetted?; Compliance with the Contractor's method statement (restricted working hours; haul routes) dust suppression methods where required	Job site / haul routes	Supervision	Unannounced inspections during work	PIURR with CSC's support
<b>N. Stone</b>		Job site / haul routes	Supervision spot checks	Unannounced inspections during work	PIURR with CSC's support
<b>O. Sand and gravel</b>		Job site / haul routes	Supervision	Unannounced inspections during work	PIURR with CSC's support
<b>P. Surface water protection</b>	Contractor's compliance with his approved method statement	Bridges and Culverts	Inspection	Unannounced inspections during bridge and culvert works	PIURR with CSC's support
<b>Air pollution from improper maintenance of equipment</b> Q. Asphalt plant and Machinery	Exhaust fumes, dust	At site	Measurement at asphalt and crushing plants. Regular check certificate of vehicles and equipment	Unannounced inspections during construction works	PIURR with CSC's support
<b>R. Planting of new road side trees</b>	Regular monitoring and control of successful growth of new planted trees	At locations of new planted trees	Replanting of trees that have died	Monitoring to be conducted in autumn so as to allow for replacement of failures	Contractor for 3 years and according to the stipulations in the Tree management Plan. PIURR in the subsequent year(s)

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored? <sup>36</sup>	When is the parameter to be monitored? Frequency	Institutional responsibility
<b>Operational stage</b>					
<b>S. Increased road kills of animals due to higher traffic loads and vehicle speeds</b>	Road kills of animals	Along the new road	Keep records of accidents. In the case that accident hot spots with large mammals are identified, appropriate protective measures will be elaborated (e.g. reflectors / local fencing, warning signs, speed reductions etc.)	Throughout the Year	MoT
<b>T. Increased traffic volumes may increase possible spills of harmful substances</b>	Accidents that cause spills of harmful substances	Along the new road	Counting of accidents	Throughout the Year	MoT
<b>U. Damaged drainage or uncontrolled erosion</b>	Leakages in drainage system and damages due to erosion	Culverts and drainage facilities	Documentation	Throughout the Year	MoT <sup>6)</sup>

CSC = Construction Supervision Consultant, EHS = Environment, Health and Safety, IEE = Initial Environmental Examination, MoT = Ministry of Transport, PIURR = Project Implementation Unit for Road Rehabilitation (of MoT), SSEMP = Site Specific Environmental Management Plan

### **C. Capacity building and development**

381. Executing and implementing agencies need to have a sustained capacity to manage and monitor compliance with ADB SPS and government requirements. PIURR will be supported by the CSC-NES and CSC-IES. However, it is necessary to mainstream safeguards in day-to-day working thus PIURR require capacity building measures for (i) a better understanding of the project-related environmental issues; and (ii) to strengthen their role in preparation of IEE, implementation of mitigation measures, and subsequent monitoring. Trainings and awareness workshops are included in the project with the primary focus of enabling PIURR staff to understand impact assessments and carry out environmental monitoring and implement EMP. After participating in such activities, the participants will be able to review environmental assessments, conduct monitoring of EMPs/SSEMPs implementation, understand government and ADB requirements for environmental assessment, management, and monitoring (short- and long-term), and incorporate environmental features into future project designs, specifications, and tender documents and carry out necessary checks and balances during project implementation.
382. CSC-NES and CSC-IES will assess the capabilities of the target participants, customize the training modules accordingly and provide the detailed cost.
383. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The proposed training project, along with the frequency of sessions, is presented in Table below.

**Table 35 - Suggested Capacity Building Program on EMP Implementation**

	<b>Description</b>	<b>Target Participants and Venue</b>	<b>Timing</b>	<b>Resource person</b>	<b>Cost and Source of Funds</b>
1	Introduction and Sensitization to Environmental Issues (1 day) <ul style="list-style-type: none"> <li>• ADB Safeguard Policy Statement (2009)</li> <li>• Government of Tajikistan applicable safeguard laws, regulations and policies including but not limited to core labor standards, OH&amp;S, etc.</li> <li>• incorporation of EMP into the project design and contracts</li> <li>• monitoring, reporting and corrective action planning</li> </ul>	All staff and consultants involved in the project (at PIURR office)	Once prior to the commencement of civil works	Safeguard specialist of CSC (IES together with NES).	PIURR cost
2.	EMP implementation (2 days) <ul style="list-style-type: none"> <li>• Roles and responsibilities</li> <li>• OH&amp;S planning and implementation</li> <li>• Wastes management (water, hazardous, solid, excess construction materials, spoils, etc.)</li> <li>• Working in congested areas,</li> <li>• Public relations</li> <li>• Consultations</li> <li>• Grievance redress</li> <li>• Monitoring and corrective action planning</li> <li>• Reporting and disclosure</li> <li>• Post-construction planning</li> </ul>	All staff and consultants involved in the project  All contractors before start of construction works	Once prior to the commencement of civil works	Safeguard specialist of CSC (IES together with NES).	PIURR cost
3.	Plans and Protocols (2 days) SSEMP including <ul style="list-style-type: none"> <li>• Construction site standard operating procedures (SOP)</li> <li>• Material management plan</li> <li>• Spoils management plan</li> <li>• Water quality management plan</li> <li>• Sewage management plan</li> <li>• Waste management plan</li> <li>• Hazardous Waste Management Plan</li> <li>• Air quality management plan</li> <li>• Noise and vibration management plan</li> <li>• Asphalt Plant and Borrow pit/Quarry Management plan</li> <li>• Traffic management plan</li> <li>• Emergency response plan (in case of spills, accidents, fires and the like)</li> <li>• Construction camp management plan</li> <li>• Health and Safety Management Plan</li> <li>• COVID-19 health and safety management plan and emergency response plan)</li> </ul>	All staff and consultants involved in the project  All contractors before start of construction works or during mobilization stage.	Once prior to the commencement of civil works	Safeguard specialist of CSC (IES together with NES).	PIURR cost  Contractors cost as compliance to contract provisions on EMP implementation

	Description	Target Participants and Venue	Timing	Resource person	Cost and Source of Funds
	<ul style="list-style-type: none"> <li>• Chance find protocol</li> <li>• O&amp;M plans</li> <li>• Post-construction plan</li> </ul>				
4.	Experiences and best practices sharing <ul style="list-style-type: none"> <li>• Experiences on SSEMP implementation</li> <li>• Issues and challenges</li> <li>• Best practices followed</li> </ul>	All staff and consultants involved in the project	Quarterly (6 times during construction)	Safeguard specialist of CSC (IES together with NES).	PIURR cost
5.	Guidance and orientation to Workers on EMP implementation (OHS, core labor laws, hazardous waste management plan, spoils management, etc.)	All workers (including manual laborers) of the contractor prior to dispatch to worksite	Quarterly (6 times during construction)	Safeguard specialist of CSC (IES together with NES).	Contractors cost as compliance to contract provisions on EMP implementation

EMP = Environmental Management Plan, OHS = occupational health and safety, PIURR = Project Implementation Unit for Road Rehabilitation (of MoT)

## D. Monitoring and reporting

384. During construction, the ESO and the HSO of contractors are responsible for the preparation of weekly environmental checklists and environmental section of the contractor's monthly progress reports. The reports should comprehensively address all relevant aspects of environmental requirements and, in particular, all environmental audits undertaken during the period covered by the report. The monthly reports will be reviewed and endorsed by the contractor's project manager and then submitted to the CSC and PIURR for review. PIURR and the CSC will review and advise on corrective actions if necessary.
385. The CSC will prepare and submit to PIURR Quarterly Progress Reports which includes the information on the implementation and compliance with the EMP and the SSEMPs, including information on oil spills, accidents, grievance received, if any, and actions taken against them.
386. Based on the contractor's monthly environmental reports and the CSC's Quarterly Progress Reports, PIURR will, assisted by the CSC-NES and CSC-IES, prepare SAEMRs and submit to ADB for disclosure. The first SAEMR will include the photo-documentation, GPS coordinates, and strip map of nesting sites (para. **Error! Reference source not found.**) and actual number and details of trees to be cut (para. 247). ADB's monitoring and supervision activities are carried out on an ongoing basis until ADB's project completion report (PCR) is issued. Thus, SAEMR, which may cover O&M of completed packages, will be submitted to ADB until PCR is issued.
387. Within three months after completion of all civil works, a report on the project's environmental compliance performance (including lessons learned that may help MoT and PIURR in their environmental monitoring of future projects) will also be prepared. This report will be part of the input to the overall PCR.
388. During the operation phase, PIURR will be responsible for environmental management and will continue to prepare SAEMRs.
389. The SAEMRs will be disclosed on ADB website. The relevant information of the reports in Russian language will also be disclosed to the affected people by posting on PIURR/MOT website (footnote **Error! Bookmark not defined.**).
390. In addition to the above-mentioned reports, in case of any accident related to occupational and community health and safety, PIURR is expected to (i) report to ADB within 72 hours, and (ii) prepare and submit an incident report with action plan within 7 days of the occurrence.
391. CSC will support the PIURR in preparing such reports. In case the CSC's liability period ends before ADB's PCR issuance, PIURR-SE will prepare the SAEMRs without the CSC's support.
392. ADB will review project performance against the project commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system.

## VIII. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

### A. General approaches

393. The objective of public information is to involve public and other relevant stakeholders from the earliest stages with the aim to consider the concerns and suggestions of stakeholders regarding likely impacts of the project during the pre-, and construction phases. The main objectives of the public information are as follows:

- Familiarize possible affected people with proposed project;
- Ensure cooperation and participation of the public in Project planning and implementation phases; and
- Establish accessible and effective grievance redress procedures.

## **B. Identification of Main Stakeholders**

394. The primary stakeholders identified are as follows:

- Project Implementation Unit for Road Rehabilitation (PIURR) of the MoT
- Committee for Environmental Protection under the Government of Tajikistan (CEP)
- Hukumats, Jamoats and villages along the project road

## **C. Meaningful Consultations**

395. Meaningful consultation activities should include the following elements:

- **Begins early and is carried out on an ongoing basis throughout the project cycle.** Methods for consultation and participation, and response to comments received during project preparation should be documented in the EIA/IEE. Throughout the life of the project, the borrower/client is encouraged to build upon established channels of communication and engagement with affected communities to disclose information and receive feedback on the effectiveness of mitigation measures, and affected communities' ongoing interests and concerns about the project;
- **Provides timely disclosure of relevant information.** Affected people and stakeholders should have access to relevant project information prior to any decision-making that will affect them. Relevant information includes key aspects of the assessment such as project activities and locations, identified impacts, mitigation measures, compensatory methods and amounts, and consultation and grievance mechanisms. Information should be provided in a form and language that are understandable and readily accessible to affected people;
- **Is free of intimidation or coercion.** Consultation occurs freely and voluntarily, without any external manipulation, interference, or threat of retribution, and is conducted in an atmosphere of transparency;
- **Is gender-inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups.** Consultation should be inclusive of various segments of the affected community, including both women and men, and accessible to the disadvantaged and vulnerable groups within the community. In highly stratified communities or societies, lower ranking socioeconomic groups, ethnic groups, or castes may normally have little voice in public forums, community consultations, and formal meetings with project and/or borrower/client officials. Similarly, women in some communities are censored or shamed into silence in such forums and may be spoken for by their husbands or other male relatives. These barriers to participation need to be positively addressed in a culturally sensitive manner. Ensuring consultation with and participation of women may require a separate women's consultation process, and hiring female professionals to engage female stakeholders. For other excluded low ranking groups, separate consultations without the presence of higher ranked groups are usually needed to obtain a full picture of the needs of the poor and vulnerable, and specialists in the participation of the poor and vulnerable may be required; and
- **Requires the incorporation of relevant views of affected people and other stakeholders into project design and decision-making, including the development of mitigation and compensation measures.** It also involves communicating to affected people and other stakeholders the measures taken to address their concerns. It facilitates the sharing of development benefits and opportunities.

## D. Minimum topics required during consultation meetings

396. The types and level of consultation need to be commensurate with the impacts on affected communities. However, as minimum requirement, the following topics to be included in all consultation meetings:

- **Overview of the project** – Explain relevant info about the project, including information on associated project or previous phase/s of the project, if any; schedule of implementation; etc.
- **Specific design of the project such as capacity, number of beneficiary end users, exact locations, layouts, footprints that will be utilized, etc.** – Discuss the design and components of the project in a way that can be understood by non-technical people.
- **Construction methods and labor requirements** – Discuss the design preferring local labor, if required skills are available.
- **Operational processes during operation stage of the project** – Discuss how the project will operate once it is constructed.
- **Environmental impacts expected from the project and the mitigation measures to be implemented** – Discuss all environmental impacts expected from the construction phase and operation phase of the project and enumerate the measures to be undertaken to mitigate these impacts. The presentation on this topic should provide comfort to consultees that their issues are as relevant/important and could be solved through these measures.
- **Grievance redress mechanism** – Discuss and emphasize the grievance redress process that is available under the project to facilitate any issues or complaints about the implementation, including the availability of line of communication between affected persons and project implementers (the GRM chart could be used in this case). Discuss and emphasize the access of all affected persons to information about developments on the project (e.g. contact details of contractors, CSC, executing agency, implementing agency).

### 1. Consultation Process in the Baljuvon-Sari Khosor Road Section

397. Meaningful consultation according to the SPS Safeguard Policy Statement 2009 needs to comply with the following. It is a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

398. In total, six public consultation and meetings were conducted which were attended by 100 attendees (Table 39). Many passers-by and others came into the meetings for shorter periods. The first round of consultations were initiated on 26 August 2023. A site visit was conducted along with the International Safeguards Specialist to consult the Baljuvon and Jamoati Sari Khosor community.

399. Additional informal consultations with stakeholder groups were conducted during the team's visit. A summary of the consultations (including the main issues raised) is set out in the following table.

Table 36 – Informal Meetings and Consultations on Environment in May and June 2023

Date & time	Organisation(s)	Venue	Attending	Presentation Medium	Observations, Notes & Outcomes
30 May 2023 at 11:45	Sari Khosor Hotel	Sari Khosor Hotel	Manager Salim Kahmonor, Consultants	Round table discussion	Season for hotel (all year). Provision of hotel. Access issues.
14 June 23 at 8:40	Ministry of Transport	3/f MoT	Chief Engineer Holboy, Consultants	Round table discussion	Environmental – Sari Khosor Nature Park.
8 June 2023 at 07:00	Sari Khosor Hotel	Sari Khosor Hotel	Manager Salim Kahmonor, Consultants	Round table discussion	Provisioning of hotel. Access issues, opportunities for future. Species in area.
8 June 2023 at 08:15	Householder	Qiozuno settlement <sup>38</sup>	Householder, Vahdat Shaipov (SUE DITI), Consultants	Round table discussion	Decline in village population (50 > 4). Access to schools and medical services. Over wintering population (2 of 4).
8 Jun 2023 at 11:20	State Entity for Protected Natural Areas	Shalidon Office	Manager of Sari Khosor Protected Areas, Vahdat Shaipov (SUE DITI), Consultants	Discussion on the location of Sari Khosor Natural Park	A definitive map of the park was not tabled. Passport for Sari Khosor Nature Park was handed over together with a document identifying land use and inhabitants within the Park
15 June 2023 at 9:00	MoT DITI	MoT, Dushanbe	MoT DITI Egamberdi Rustamov, Consultants	Round table discussion	Baseline monitoring program - air, noise, water, ecology
16 June 2023 at 13:45	State Entity for Protected Natural Areas	Dushanbe	Director and Deputy Director, MoT – Miraliev & MoT DITI - Egembirdi, Consultants	Discussion on the location of Sari Khosor Natural Park	Discussion and a (i) passport (ii) species list (advised not updated and (iii) a map showing the location of Sari Khosor Nature Park handed over.
END					

400. Views and feedback from villagers alongside the Project Road were considered and incorporated in this IEE, particularly the Project EMP and EMoP as far as technically feasible. After finalization, the IEE will become part of the bid documents.

401. Based on the detailed design by Ronamo, socioeconomic surveys (SES) have been carried out to obtain the views, attitude and feedback of villagers alongside the Project Road. The villagers in the Project affected community were also informed about potential environmental impacts. The data collected during the SES consist of information on land use, income, household's assets, livestock, cropping pattern and other. For warranting objectivity and equal assessment of each affected person and household, a questionnaire format was used in the survey. The questionnaire will be annexed to the LARP. During the SES, face to face consultations were carried out.

402. The exercised face-to-face interaction has been proved to be a rather efficient instrument and source for sharing Project information with Affected Persons, for understanding their concerns and for answering their questions. This approach allows all Affected Persons/Affected Households to be fully informed on the project schedule, expected environmental, social and LAR impacts, benefits of GRM, eligibility to compensation and compensation entitlements. In addition, oral information was provided

<sup>38</sup> Location: 38° 38' 55.47" N. 70° 3' 21" E. Approx. 3.5Km (30minutes driving) upriver valley from hotel

to the consulted persons about the technical properties of the Project, its social and environmental impacts and foreseen mitigation and management measures. The below table provide an overview of concerns/questions raised and answers provided.

403. The main concern of Project Affected People aimed on reducing the social impacts (encroachment into private assets). The raised concerns have been taken into consideration and the design adjusted to further mitigate and avoid loss of private structures as far as technically feasible.

404.

## 2. Future Consultations

405. During the project implementation PIURR, in collaboration with the construction supervision consultant and the contractor, will conduct quarterly consultation meetings with stakeholders and local authorities. The locations and times of these public consultations will be announced in public places (village centers, community meeting places) prior to the scheduled consultation activities.

406.

## 3. Reporting on Consultations

407. The consultation process during the Project implementation and its results will be documented in the SAEMRs.

408. Key information that should be reported includes:

- relevant Tajikistan laws, rules and regulations;
- methodologies/means used to inform and involve the affected people and other stakeholders in the environmental assessment process;
- discussion of issues raised by various stakeholders;
- response to affected people on how the project will address concerns raised during consultation;
- continuous consultation measures to be and/or already established for the environmental management program; and
- documentation of public meetings and interviews, including dates, names, topics, summary details of discussion, and important outcomes.

## E. Information Disclosure

409. ADB SPS requires the borrower to provide relevant environmental information, including IEE, SAEMRs and corrective action plan, in a timely manner, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. MOT will make the environmental assessment and other environment-related documents available in accordance with Tajikistan's and ADB requirements for disclosure. All environmental safeguards documents are subject to public disclosure, and therefore will be made available to the public.

- PIURR is responsible for ensuring that all environmental assessment documentation, including the IEE and environmental monitoring reports, are properly and systematically kept as part of PIURR project specific record;
- all environmental documents (IEE and environmental monitoring reports) are subject to local public disclosure, and will therefore be made available to public through publication on PIURR/MOT website (footnote **Error! Bookmark not defined.**) and posting notices of availability of hard copy to be provided by PIURR on request in affected village communities;
- PIURR website at which the IEE and the SARMEs will be disclosed is <https://www.mintrans.tj/>. The IEE will be disclosed in Russian and in English Language. Translation of the IEE from English to Russian is done by the CSC. Hardcopies of the IEE will be made available in the respective villages alongside the Project Road if requested by the affected community.

- the IEE and SAEMRs have to be disclosed on ADB's website upon receipt, any update to the IEE during project implementation will be subject to ADB review and clearance before disclosure;
- PIURR will ensure that meaningful public consultations, particularly with project affected persons, are undertaken throughout preparation and implementation of the project
- PIURR will ensure relevant information and project reports are disclosed in language and form understandable by stakeholders, workers, and local communities

## **IX. Grievance Redress Mechanism**

### **A. General**

410. All grievances related to the Project will be addressed with the participation of PIURR, CSC and Contractor's representatives. In more complex cases, representatives of other authorized institutions are to be invited. The GRM covers issues related to social, environmental and other safeguard issues under ADB SPS and applicable laws of Tajikistan.
411. PIURR members of the Grievance Redress Committee (GRC) include:
- Chief Engineer
  - PIU Social safeguard specialist
  - PIU Environmental safeguard specialist
  - MOT lawyer
  - other specialists as necessary
412. The grievance redress committees is established on local level in compliance with the country legislation and under the the PIU letters No. 359-360, issued on 6 April 2020, to function for the entire project implementation cycle.
413. The GRC will be operating during the entire project cycle. A Focal Person appointed at each Project Jamoat will coordinate between affected prsons and GRC members at local and PIURR level. The PIURR has been involved in all consultations with project affected persons. The PIURR is in charge to provide the full contact details of GRC members to Jamoats within project influence area so that any aggrieved person can reach out the GRC in case of project related questions, concerns or complaints on social, environmental and LARP issues.
414. The GRC will function for the duration of the project implementation. Once the project implementation is launched the PIURR and the CSC will conduct training for members of district (local) level GRCs.

### **B. Grievance Resolution Process**

415. Grievances can be lodged with the Focal Person at the jamoat's GRC. The jamoat's Focal Person, in consultations with PIURR safeguard specialists, will screen the grievance for eligibility. If eligible, the jamoat's Focal Person will organize a meeting of the GRC. PIURR representatives will be informed and invited to the meeting.
416. The complaint registered with the GRM should be reviewed, addressed and a decision made on its relevancy to the Project within 14 calendar days of lodgement. If the case is complex or requires more detailed investigation (e.g., inspection by technical experts or legal opinion from the state or certified private entities), the complaint review period may be extended to 30 calendar days or more, if necessary. In such cases, written notification should be sent to the complainant explaining the reasons for extension, describing the process, and indicating the expected dates for the delivery of the results of the revision.
417. All supporting documents such as photographs, related certificates, and legal and technical expert opinions, if required, should be prepared, reviewed and assessed. Once the complaint is resolved, the GRC will organize a complaint closure meeting, where the complainant confirms the closure of the complaint. PIURR representative will oversee the resolution of the complaint.
418. All efforts will be made to settle issues at the Project level. All complaints and resolutions will be properly documented by PIURR and made available for review, monitoring and evaluation purposes. A PIURR-SE keeps in regular contact with the Focal Person of the GRCs and will have a database for the whole Project's grievances cases,

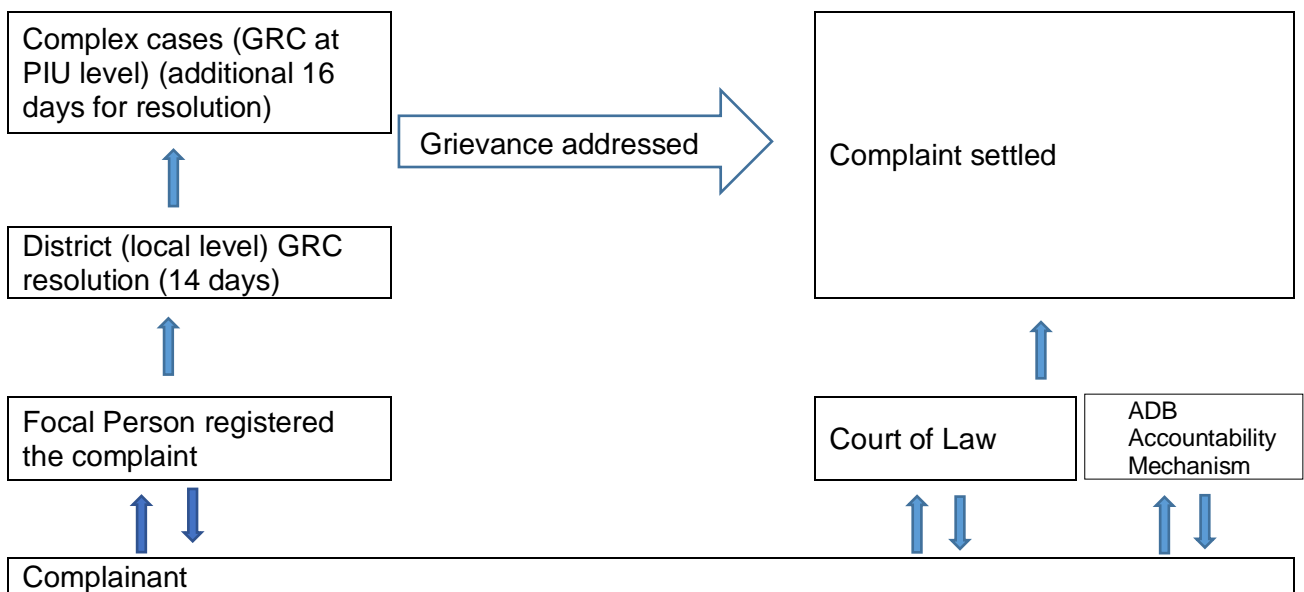
including the status of grievances. This report will be regularly included in monthly project progress reports.

419. Regardless of the set grievance mechanism and procedures, complainants will have the right to submit their cases to a court of law at any point in time of the grievance redress process. All efforts will be made to settle the issues at the Project level through community consultation with affected person. If not possible, attempts will be made to resolve the issues at PIURR level to avoid/minimize litigation as much as possible. All complaints and resolutions will be properly documented by PIURR and made available for review, monitoring and evaluation purposes.
420. Any aggrieved person is eligible to apply to the court at any phase of the grievance redress process.
421. If affected persons want to register a complaint with the ADB, the Focal Person will inform the complainants that they can refer their complaints through the ADB Tajikistan Resident Mission for proper coordination with the responsible project officer and relevant staff. Alternatively, the complainants may access the ADB Accountability Mechanism through its Complaint Receiving Officer (CRO) which will then forward it to either the Office of the Special Project Facilitator (OSPF) for facilitation of complaint resolution, or to the Office of the Compliance Review (OCRP) in case of allegation of ADB's violation to its operational policies and procedures. The Focal Person will provide the complainants the following contact information:

Resident Mission of Asian Development Bank in Republic of Tajikistan  
 45 Sovetskaya Street, Dushanbe, Tajikistan  
 Tel: 992 372 210558/271895/271897

Complaint Receiving Officer (CRO), Accountability Mechanism  
 Asian Development Bank  
 ADB Headquarters, 6 ADB Avenue, Mandaluyong City 1550, Metro Manila, Philippines  
 Tel. +63 2 4444 loc. 70309, Fax + 63 2 636 2086, E-mail: amcro@adb.org

**Figure 25 - Grievance Resolution Process**



### **C. District (Local) Level Grievance Redress Committee**

Under the Order<sup>39</sup> of the First Deputy of Mayor of town Levakant "On establishment of Grievance Redress Committee for consideration of grievances related to the implementation of Road Rehabilitation Project", district Level GRC will be established.

### **D. Complaints received by Contractor(s)**

422. Complaints received by contractor are dealt with as follows. Contractor must assign a Focal person to register all complaints (written /verbal) in the special log maintained by the Contractor. The Contractor is responsible to timely notify PIU and CSC about any complaints. At the same time Contractor studies the case and if feasible provides amicable solution to the satisfaction of the complainant and notifies PIU and CSC on the closure of complaint.
423. In case the amicable solution is not achieved, then the case and supporting materials are submitted to local level GRC. PIU and CSC are informed and updated accordingly.
424. Local level GRC reviews the case. Site observation visit is conducted together with the aggrieved person, social and/or environmental safeguards specialists of CSC, Construction Contractor and local government. The district level GRC is in position to reject or accept the complaint based on the results of conducted studies. Any decision of local level GRC communicated to complainant, CSC, CC and PIU. The notification on the closure of the complaint is provided to aggrieved person. Relevant notification is made to the attention of CSC, CC and PIU to update the Grievance Log.
425. All complaints and grievance not resolved on local level will be submitted to GRC at PIU level for further review and feasible and effective resolution by GRC at PIU level.
426. Any complaint lodged through the FP of the Contractor need to be communicated to the CSC and GRC at PIU level and recorded in the unified Grievance Log.
427. Contractor may receive complaints filed by workers and employees related to HSE issues. Such complaints also have to be treated in the described manner.

### **E. Technical Experts**

428. When requested by PIURR to provide technical expertise for the assessment of an impact claimed by the complainant, the relevant expert will:

- examine the case, perform relevant tests or an investigation
- prepare a short report based on the results of the examination completed
- recommend if further or additional legal opinion or expertise is needed to make a judgment on the substance of the case.

### **F. GRC Complaint Register, Records and Documentation**

429. PIURR of the MoT will maintain the complaint register. This will include a record of all complaints for regular monitoring of grievances and results of services performed by the GRC. The summary will be included in the SAEMRs to be submitted to ADB.

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<sup>39</sup> The Order was issued in accordance with the requirements of Articles 26 of the Law of the Republic of Tajikistan "On regulatory legal acts" and 19, 20 of the Constitutional Law of the Republic of Tajikistan "On local executive body of the government".

## **X. CONCLUSION AND RECOMMENDATIONS**

430. This is the Initial Environmental Examination (IEE) report for the reconstruction of the Baljuvon-Sari Khosor road rehabilitation Project.
431. In terms of its environmental impacts the Project is ranked as category B. It involves the rehabilitation along an existing road track.
432. The alignment passes close to seventeen villages. Of these it only bisects one (assuming Shalidon is bypassed) most existing settlements are bypassed to the east. With care in siting processing facilities and construction camps, impacts on existing villages will be minimal. The hot summers and fine clay material on the southern sections of the alignment could result in severe dust pollution from vehicle movements on dry, dusty surfaces. Management of dust will be a key environmental pollution issue but can be managed through standard construction mitigation such as watering and load coverage.
433. The alignment passes through a highly modified landscape. There was no permanent native woodland identified during field trips that would be impacted by construction and operation of the proposed road. Rivers used for potable water, bathing and washing are generally upstream from the alignment and therefore would not be affected by construction activities. An ecological survey along the riverbed was conducted to determine if there are any fauna species that need protection. The Sari Khosor Nature Park is located 4km from the alignment up a side catchment at Km 54. Upland flora and fauna are protected within the park. Construction and operation of the alignment is within a riverine habitat and are therefore unlikely to affect species within the Sari Khosor Nature Park.
434. For these reasons, the environmental team proposes that the project should be classified as Category B (Environmental) requiring the production of an Initial Environmental Examination and Environmental Management Plan rather than a full Environmental Impact Assessment.
435. No spatial alternatives are foreseen. There might be only minor alignment shifts due to need for compliance with design parameters such as gradient or radius.
436. After construction, during operation phase, there will remain only low negative impacts as compared to the existing situation. This is because the road reconstruction scheme follows the existing alignment over most of its length. No valuable or protected natural habitats or other valuable environmental structures are significantly impacted after finalization of construction period, neither in their structure nor function. There will be mostly beneficial impacts.
437. The positive impacts therefore by far outweigh the likely environmental and social risks as the Project will bring mostly positive impacts to the people living in the villages alongside the Project Road and beyond. The currently existing unacceptable bad road conditions which hinders economic development and access to essential infrastructure facilities like education, medical treatment and markets will significantly improve. This will bring great benefits to the people living in the villages alongside the Project corridor. In addition, there will be better road safety conditions and smoother traffic flow which enhances driving comfort on the Project Road and also brings safety benefits to the people living alongside the Project Road.
438. The IEE contains an EMP and an EMoP which need to be carried out during pre-construction, construction and operation phases. In addition, the contractor is required to prepare SSEMPs. In order to warrant duly implementation of the prescribed measures, a competent environmental and social supervision during the construction phase is strongly recommended.
439. SSEMPs need to be prepared by the contractor's ESO and HSO based on the stipulations of the EMP in this IEE. The CSC's team will be strengthened by CSC-NES, and CSC-IES, who will closely work together with PIURR to warrant implementation of

EMP and EMoP. For quality assurance, PIURR safeguard team need to be offered training and seminars as required. This is reflected in the cost estimate for the Project implementation.

## **A. Conclusion**

440. The project is unlikely to cause significant adverse impacts. The potential impacts that are associated with design, construction and operation can be mitigated to acceptable levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures. Based on the findings of the IEE, there are no significant impacts and the classification of the project as Category "B" is confirmed.

## **B. Recommendations**

441. The following are recommendations applicable to the project to ensure no significant impacts:

- (i). Obtain all statutory clearances at the earliest time possible and ensure conditions/provisions are incorporated in the detailed design;
- (ii). Include this IEE, or update thereof, with the EMP in bid and contract documents;
- (iii). Prepare SSEMP based on site-specific conditions, contractors working methodology;
- (iv). Update/revise the IEE/EMP if there are unanticipated impacts;
- (v). Ensure that the existing materials to be demolished/dismantled are tested for hazardous contents and Spoils management plan and Waste Management Plan for handling, storage, transport, and disposal of the wastes is prepared by contractors as part of the SSEMP, approved by PIURR and the CSC, and strictly monitored during project implementation.
- (vi). Ensure that wastes (solid and liquid) should be stored and disposed at designated site/facility (dumping on vacant lot is not allowed);
- (vii). Conduct safeguards induction to the contractor upon award of contract;
- (viii). Strictly supervise EMP implementation;
- (ix). Ensure contractor appointed qualified ESO and HSO prior to start of works;
- (x). Documentation and reporting on a regular basis as indicated in the IEE;
- (xi). Continuous consultations with stakeholders;
- (xii). Ensure consultations and focus group discussions are undertaken prior to start of works and incorporate measures to address relevant concerns in SSEMP;
- (xiii). Timely disclosure of information and establishment of GRM in language and form understandable by stakeholders;
- (xiv). Involvement of contractors, including subcontractors, in the first level GRM;
- (xv). Commitment from PIURR, MOT, CSC, and contractors to protect the environment and the people from any impact during project implementation.

## Annex 1 – Proposed Borrow Area Locations

### Appendix 3 Proposed Borrow Area Location

Following borrow areas are proposed to be used in the Project, subject to verification of the suitability by the Contractor:

**Soil Reserve Number 1:** is located from PK10+00 to PK 251+00 of the Surkhob River floodplain. The stockpile of materials is not limited. The material is represented by pebbles with boulders content up to 30%. Maximum grain size is up to 400mm.

Petrographic composition is represented by granites, quartzized limestones, strong sandstones and sand aggregate.

Approaches to the soil reservoir are available.

Soil group by difficulty of development 6(d) - E - 4 B- 4, P- 4

The groundwater level at the time of the survey is at the river's edge. During floods the river floodplain will be flooded.

The material can be used for embankment and lower layers (up to the bottom of the working layer) of the earth bed if particles larger than 500mm are removed.

**The soil reservoir No. 2** is located at PK 251+00 to PK303+00 of the outcrop cone in the floodplain of the Surkhob River. The material is represented by clayey soil up to 70%, maximum grain size > 700mm, sand and sandy loam.

Petrographic composition is represented by quartzized limestones and sandstones.

Approaches to the soil reservoir are available.

Group of soils on difficulty of development 6(e) - E - 5 B - 4, P - 5.

Groundwater level at the time of surveys to a depth of 3.0m has not been opened. During floods the river floodplain will be flooded with water.

The material can be used for embankment construction if particles larger than 400mm are removed. The material of the soil reserve No.2 can produce crushed stone of excellent quality as the crusher will be crushed with grains larger than 80mm.

**Soil reserves** for pebble material extraction can be organized in the Surkhob River floodplain from PK327+00 to 541+00

PK327+00 to PK 342+00 mining category 6(d) E,B,R -4

PK342+00 to PK 362+00 development category 6(c) E,B,R -3

PK362+00 to PK 385+00 development category 6(c) E,B,R -3

PK385+00 to PK 478+00 development category 6(c) E,B,R -3

PK378+00 to PK 516+00 development category 6(d) E,B,R -4

PK516+00 to PK 541+00 development category 6(c) E,B,R -3

The material is represented by pebble gravel of the Surkhob river floodplain, clumps up to 10% or up to 30%, maximum grain size up to 500mm in some places, sand filler.




Petrographic composition is represented by occluded limestones and sandstones.





Approaches are available.




The groundwater level at the time of the survey is at the river's edge. During floods the river floodplain will be flooded.




The material can be used for embankment construction if particles larger than 400mm are removed. The floodplain material can produce crushed stone of excellent quality


### Annex 2 - IDENTIFIED AREAS FOR SURPLUS MATERIAL DISPOSAL

Approximate sections of the excavation soli dump along the Baljuvan -Sari Khosor				
No. Dump Objects	Location walking,	For the section, km	Location map	Spoil, volume m3
1	Near Baljuvan	2 km		300-000
2	Degi kham	6 km		500-000
3	Khorma	9 km		1500-000

4	Khoram	10 km		100-000
5	Khoram	11 km		300-000
6	Bridge N.o 1	15 km		2500- 000
7	Between Bridge N.o 1 and Doshmandi	16 km		200-000

8	Between Doshmandi and Dashtikilko	20 km		150-000
9	Dashtikilko	21 km		300-200
10	Between Dashtikilko and Toydara	22 km		250-000

11	Toidar	24		700-000
12	Shahidon	30 km		40-000
13	Dashtaroh	32km		100-000

14	Sadaho	33 km		280-000
15	Bridge 5	35 km		163-700
16	Bridge 6	38 km		700-00

## Annex 3 – Report on the Survey of Aquatic Biology

### AQUATIC BIOLOGY REPORT

#### of the Scientific Research Study of the Current State of the Hydrophauna of the Shurobdaryo River under “Rehabilitation of Baljuvan – Sari Khosor Road Project”.

Baljuvan district is located at an altitude of 1400-1500 m above sea level. This district is located in the north-eastern part of Tajikistan, from the north with Nurobod district, from the west with the cities of Rogun and Norak and Faizobod district., It borders Khovalingu Kulob district from the east, and Temurmali Vose district from the south. According to the information, there are many sources of precious natural resources in this district, including 200 springs, streams of the Dashti Angora, Daroz Pitov, Shikildara, Shingidara, Gandara, Shibdara, Shurak, Safedak, Bulguri, Shurob, Khorma, Rui Ob, Surkhob Tira, Obi rivers. - Mazar, Talhak, Pushti Bogh waterfall, Kamoli waterfall, Safedov waterfall, Sultan Uvaisi match water healing spring, Qalanaq spring, Bulguri spring, Grave water spring, Shuluk water spring, Kasho spring, Hibil spring, Shing giant tree (Shingidara village), Chuvoz is Chinor (Dashtar village) and others.

The climate of district Baljuvon is medium continental: hot summer, mild winter. The average temperature in January is +3.1°C (from +0.8 to -12°C), in July - from 14.2 to 28.4°C. The average annual precipitation (in the valleys) is 767 mm.

The results of the conducted research revealed to us that the source of Shurobdaryo River is from the tributaries of Chagon village, Angora plain, Shikildara village, Khashab Guldera village, Safedsangob river, Shaydon river, Safedob and Bulguri rivers, Shurob village river and Doshmandi village. Surkhob flows and forms the Shurobdaryo River as a result.

To study the biology and hydrofauna of the Surkhob River, we studied 4 villages which construction road is near river. The results of the studies show that the organisms that live in this river are different from one villages to another. For example, in terms of weight, size, water temperature, type of fish, water transparency, etc.

#### Equipment and materials used for sampling

- Rubber bands
- Special clothes for holding aquatic organisms, including fish
- There are 3 types of nets for holding fish, depending on the size and hole.
- 10-liter bucket
- Metre
- Scales to know their weight
- Thermometer for determining water temperature
- A dipstick for testing the transparency of water
- Transparent laboratory glass for determining fish food under sunlight
- Pen and pencil
- Field notebook for data recording.



Fig 1



Fig 2



Fig 3

#### Organisms of the water bed of the Sorkhob River

№	Information about pictures
1	Figure 1 shows a bag, a tour for holding fish, a notebook for recording data and other tools
2	30/30 diameter black and white measuring cup for testing water clarity and depth of rivers and lakes.
3	A scale for determining the weight of fish and other aquatic animals, a meter for measuring their body size, is in the net of a standard fish scale with a weight of 56g, a length of 23cm, a width of 3cm.

#### Study areas

P/τ	Name of points	Distance km
1	Park of Sari Khosor	54,1
2	Village Sadaho	35
3	Village Doshmandi	20
4	Bridge of Sari Mazar	1



The first point of our study is near the waterfall of Sari Khosor, this rare monument of nature is located in Pushti Boghi village, Mulokoni village, Sari Khosor rural community. , transparency 65 cm, the development of water plants and macroelements was good, here from the world of fish, the most milkfish and trout were seen. The main food of milkfish and trout is detritus, insects that fall into the water, flies and crustaceans of low water level. Fig 1



Figure 1. Moments of sampling from the first research area

According to (Ahrorov, 1999) the amount of dissolved oxygen in water varies from 6.10 mg/l in September to 10.7 mg/l in other months. 12 types of underwater organisms (benthos) have been registered in the Surkhob River.

The biology of adult fish of the river, including trout, is that in the autumn they go upstream to the head of the river and lay eggs there. It is strictly forbidden to have fish during the spawning period.

During the research, we measured 20 pieces of fish from each area and determined their weight, then we showed their average weight. Figure 2



**Figure 2. Measurement of experimental fish**

№	Type	Length cm	Around the body cm	Weight	Width cm	Number of fish
1	Форель ручьевая/ golden trout	31	11	72	7	20
2	Маринка /Marinka.	19	8	51	5	20



The second research area is the village of Sadoho, the water temperature is 120C, and the water transparency is 52cm. The results of the research are our testimony shows that among the world of fish in this region there are the most abundant trout, milkfish, and bream. According to the information of experienced fishermen, in the first half of the summer, carp and eel are also found. Research has shown that in this region the average weight of trout is 600g, milkfish is 530g, and salmon is 400g.



Figure 3. Work situation in the second research area

№	Type	Length cm cm	Around the body cm	Weight	Width cm	Number of fish
1	Бычок/ Beechok	12	7	36	3	13
2	Сом / Catfish	11	6	32	2	19
3	Карась серебряный/ Silver carp	18	8	50	4	19
4	Mizide River /Река Мисиди	4	1,5	21	1	16



The results of the work in the third region, the village of Doshmandi showed that the water temperature was 140C, the transparency was 48cm, and the macroelements were good. On average, the average weight of trout was 400g, milkfish 390g, bream 350g, and bream 410g.



The 4th area for sampling is the bridge over the head of the mausoleum, the last point of the survey. The results of the scientific work showed us that the temperature of the water in this area is hot compared to other research points, it was 210C, the transparency of the water was 39 cm.

Tajik	Russian	English	Comments
Ширмоҳӣ муқарарӣ	Маринка	Marinka	
Гулмоҳӣ	Форель ручьевая	Brook trout	
Лаққамоҳӣ	Сом	Catfish	
Зағорамоҳӣ (сазан)	Сазан	Carp	
Подус	Подус	Podus	
Мормоҳӣ	Змеёголов	Snakehead	
Переси нукрагун	Карась серебряный	Silver carp	
Сағмоҳии аралӣ	Бычок	Bullhead	

In this region, we found podus fish. This type of fish belongs to the carp family. It is heat-loving. It weighs up to 1 kg.



Figure 4. Types of experimental fish

№	Намуд	Дарози см	Гирди бадан см	Вазн г	Паҳноӣ см	Шумора моҳӣ
1	Bullhead	12	7	36	3	13

2	Catfish	11	6	32	2	19
3	Silver carp	17	9	55	5	18
4a	Marinka	18	7	45	3	25
4б	Carp	27	12	67	6	23
4в	Подус	24	10	53	5	120

#### Hydrofauna of the Surkhab River

	Tajik	Russian	English	Types
<b>Р/г</b>	<b>организм</b>			
1	Фитопланктон	Фитопланктон	Phytoplankton	10
2	Коловратка	коловратки	rotifers	2
3	Бентос	бентос	benthos	15
4	гидробионтҳо	гидробионт	hydrobiont	13

The construction of the Baljuvan-Sari Khosor road in the area of Baljuvan tributaries will not harm the biology and hydrofauna of the Surkhab River in any way, but it will have a positive effect on the increase of aquatic organisms of the river.

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<b>р/г</b>	<b>Types of organisms</b>
1	Chironomidae sp
2	Oligochaeta sp.
3	Odonata sp.
4	Carinoqammans zoescbeli sp
5	Nais elinguis Muller
6	Cricotopus alex
7	Pristina bilobeta Bretscher
8	Zemnodrilis hottmeisteri typical

Attached pictures on the study of biology and hydrofauna of the Surkhob River

