

Initial Environmental Examination

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Tajikistan: Green Corridor Demonstration Project

Prepared by Project Implementation Unit for Roads Reconstruction, Ministry of Transport for the Asian Development Bank (ADB).

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CURRENCY EQUIVALENTS

(AS OF 06 JUNE 2022)

CURRENCY UNIT – SOMONI (TJS)

TJS 1.00 = \$ 0.09¹

\$1.00 = TJS 11.22

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

¹ [Foreign Exchange \(adb.org\)](http://www.adb.org)

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 ²		square metre
m ³		cubic metre
min		minute
mg (milligramme)		thousandth of one gramme
mSV (micro sievert)		millionth of a sievert. Sievert is a unit for measuring radioactivity
km		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-		

NOTE

In this report, "\$" refers to US dollars.

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CONTENTS

I.	EXECUTIVE SUMMARY	1
II.	INTRODUCTION	9
	A. Project Background and Purpose of the Report.....	9
	Study Area and Project Categorization	12
	B. Purpose of the Initial Environmental Examination	13
	Project Proponent and Main Institutional Responsibilities	16
	Methodology	16
III.	Policy, Legal, and Administrative Framework	17
	A. Environmental Clearance Requirements	18
	Government Environmental Laws, Regulations and Guidelines.....	18
	ADB Safeguards	24
	EBRD	25
	International Treaties and Legal Commitments	25
	B. Environmental Standards	26
IV.	DESCRIPTION OF THE PROJECT	36
	B. Overview	36
	C. Type and Category of Project.....	38
	D. Need for Project.....	41
	E. Size or Magnitude of Operation	42
	F. Traffic Volume	43
	G. Proposed Schedule for Implementation	45
	H. Bridges	45
	I. Quantities	46
	J. Borrow Areas.....	46
V.	Analysis of ALTERNATIVES.....	50
VI.	Description of the Environment.....	51
	A. Physical Resources in Project Area	51
	Geology	51
	Seismicity	57
	Geomorphology and Natural Hazards.....	57
	Soils	58
	Climate	59
	Climate Change	60
	Surface Water Resources	60
	Ground Water	61

B. Ecological Resources in the Project Area	62
Flora and vegetation	63
Fauna	66
C. Socioeconomic Environment	70
Profile of the Project Area	72
Results of Socio-economic Assessment	74
Cultural and Historical Sites	74
D. ALIGNMENT SHEETS	76
E. BASELINE MEASUREMENTS	93
Air Quality	94
Water Quality Measurements	97
Noise Measurements	97
Noise Modelling	98
Vibration	100
ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES	105
A. Pre-Construction (Design Phase)	107
Pre-works documentation and establishment of more recent baseline environmental conditions	107
Road alignment within ecologically sensitive areas	107
Road alignment in areas of tree plantations	108
Embankment filling of the tree stem area	109
Road alignment traversing cattle crossings	110
Road alignment traversing towns and villages	111
Bridge/Culvert Rehabilitation	113
B. Construction Phase	114
Impacts due to site clearance activities	114
Break up of old pavement layers and asphalt	114
Impacts due to Earthworks	116
Reconstruction of pavement inclusive widening of existing road	117
Operation of borrow areas and quarries	118
Operation of Asphalt Plant and Aggregate Crushers	119
Bridge and Culvert Reconstruction Works	120
Establishment and operation of contractor's yard	121
Traffic impairment	123
Archaeological chance finds	124
Closure of construction sites	125
C. Operational Phase	125
Impact on communities	125
Increased risk of accidents with possible spills of harmful substances	126
Damaged drainage or uncontrolled erosion	126
Positive Impacts	127
Cumulative and Induced Impacts	128
VII. ENVIRONMENTAL MANAGEMENT PLAN	129
A. Implementation Arrangements	129

B. Environmental Management Plan	132
C. Capacity building and development.....	194
D. Monitoring and reporting.....	197
E. Implementation cost	198
VIII. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION	199
A. General approaches	199
B. Identification of Main Stakeholders.....	200
C. Meaningful Consultations	200
D. Minimum topics required during consultation meetings	201
Consultation Process in the Dangara-Guliston Road Section.....	201
Future Consultations.....	203
Reporting on Consultations	203
E. Information Disclosure.....	203
IX. Grievance Redress Mechanism	205
A. General 205	
B. Grievance Resolution Process	205
C. District (Local) Level Grievance Redress Committee	207
D. Complaints received by Contractor(s)	208
E. Technical Experts	208
F. GRC Complaint Register, Records and Documentation.....	208
X. CONCLUSION AND RECOMMENDATIONS	209
A. Conclusion210	
B. Recommendations	210
Annex 1 - REPORT ON WATER QUALITY	211
A. INTRODUCTION.....	214
B. MONITORING OBJECTIVES.....	214
C. SCOPE OF THE STUDY AS PART OF THE INITIAL ENVIRONMENTAL MONITORING	214
D. ENVIRONMENTAL LAWS OF THE REPUBLIC OF TAJIKISTAN	215
E. ENVIRONMENTAL MONITORING	215
Water quality monitoring	215
Equipment 217	
Analysis methodology	218
F. Conclusion219	
Annex 2 - REPORT ON AIR QUALITY AND NOISE.....	226

A. MONITORING OF ATMOSPHERIC AIR QUALITY.....	228
B. CHARACTERISTICS OF THE MEASURING RANGE OF THE DEVICE	228
C. INSTRUMENTAL MEASUREMENTS WERE MADE AT 25 POINTS 3 TIMES IN THE FOLLOWING AREAS 229	
D. GPS TESTING AT 20 POINTS FOR ATMOSPHERIC AIR AND NOISE TESTING	229
E. NOTES / ATMOSPHERIC AIR.....	237
F. NOISE MEASUREMENT AT 25 POINTS IN THE DAYTIME.....	239
G. Notes / Noise.....	240
H. FINDINGS 240	
I. RECOMMENDATIONS	240
J. LIST OF REFERENCES AND REGULATORY DOCUMENTS.....	240
K. DETAILS OF INITIAL ENVIRONMENTAL MONITORING.....	241
L. NOISE MONITORING.....	243
Annex 3 - ALIGNMENT SHEETS	260
Annex 4 - BIODIVERSITY SURVEY	265
Annex 5 - MOM OF PUBLIC CONSULTATIONS	291
Annex 6 - IDENTIFIED AREAS FOR SURPLUS MATERIAL DISPOSAL	311
Annex 7 - BASELINE MEASUREMENTS ON VIBRATION AND AIR QUALITY INCLUSIVE PM 10 AND PM 2.5	312

TABLES

Table 1 – Districts, Jamoats and Villages traversed by the Project road	12
Table 2 - Environmental, Labour and Health & Safety Laws of the Republic of Tajikistan	18
Table 3 - Indicative List of Permits and Licenses Applicable to the Project	22
Table 4 - National standards and regulations applicable to the Project.....	26
Table 5 - Environmental Standards for Emissions to the Atmosphere	28
Table 6 - Environmental Standards for Ambient Air	29
Table 7 - Environmental Standards for Surface Water Quality & Discharges to Water	31
Table 8 - Environmental Standards for Noise	32
Table 9 – Counting Points and AADT	43
Table 10 – FORECAST AADT BY VEHICLE CLASS (INCLUDING GENERATED TRAFFIC) – SECTION 1 (DANGHARA-DZHARTEPPA)	44
Table 11 – FORECAST AADT BY VEHICLE CLASS (INCLUDING GENERATED TRAFFIC) - SECTION 2 (DZHARTEPPA -BULYEN).....	44
Table 12 – FORECAST AADT BY VEHICLE CLASS (INCLUDING GENERATED TRAFFIC) - SECTION 3 (BULYEN- GULISTON).....	45
Table 13 List of sites affected by exogenous geological processes and phenomena on the Dangara- Guliston highway.....	53
Table 14 Hydrological Characteristics of Tairsu and Kyzylsu River	60
Table 15 - Main Components of Biodiversity in Tajikistan.....	63
Table 16 - Socioeconomic Profile and Agricultural Land Use of the Project Area	69
Table 17 - Demographic data in Project impacted Villages	71
Table 18 - Economic profile of the rayons in the Project area.	73
Table 19 – Poverty Rate in the Project Area	73
Table 20 – Affected Assests alongside Cemetery	75
Table 21 - Selected Locations for Air Quality Measurements.....	94
Table 22 - Selected Locations for Noise Measurements.....	99
Table 23 - Data of instrumental measurements of vibration level	102
Table 24 - Selected Locations for Air Quality Measurements.....	110
Table 24 – Implementation Arrangements (Synopsis).....	132
Table 25 - Summary of Environmental Mitigation Measures	133
Table 26 - Environmental Monitoring Plan	187
Table 27 - Suggested Capacity Building Program on EMP Implementation	195
Table 28 - Cost Estimate for Contractor’s Environmental Management.....	198
Table 29 - Cost Estimate for CSC’s Environmental Management	199
Table 30 - Cost Estimate for Instrumental Monitoring (CSC).....	199
Table 31 – Composition of GRC at District (Local) level.....	207
Table 32 – Representatives of the GRC at PIU level composed of PIURR Safeguards Unit Specialists.....	207
Table 33 - ENVIRONMENTAL LAWS	215
Table 34 - The result of water quality analysis	220

459.	Table 35 - Maximum allowable concentration in air (MAC)	228
Table 36 - Range Characteristic.....		228
Table 37 - Atmospheric Air.....		229
Table 38 - Emissions of pollutants at road construction materials.....		238

FIGURES

Figure 1 - Location of the 3 Road Sections of the Road Network Sustainability Project within Tajikistan (Project Road Dangara-Guliston is shown in blue)	11
Figure 2 - Project Location Map of Dangara-Guliston Road	37
Figure 3 - Typical cross section in settlement with sidewalk and bicycle lane	40
Figure 4 - Typical cross section in settlement area with local road (4 lanes plus local road)	40
Figure 5 - Typical cross section outside settlements (4-lanes. Category I)	40
Figure 6 - Severely Damaged Road Pavement (November 2021. Km 17+600)	42
Figure 7 – Manual Traffic Counting done by Kocks Consult in November 2000	43
Figure 8 – Photo of Soil reserve Number 1	47
Figure 9 – Photo of Soil reserve Number 2	47
Figure 10 – Photo of Soil reserve Number 3	48
Figure 11 – Photo of Soil reserve Number 4	49
Figure 12 - Geology of the Dangara-Guliston road corridor	52
Figure 13 - Abbreviations	52
Figure 14 - Seismicity in the project road corridor and the wider vicinity	57
Figure 15 – Soil Zones traversed by Project Road	59
Figure 16 - Climate zones of Tajikistan and Project Road	60
Figure 17 - Surface waters in the Project Road corridor	61
Figure 18 - Ground water resources Project Road corridor	62
Figure 19 - Project Road and vegetation zones	64
Figure 20 - Conservation zones and National Protected Areas along the project road	65
Figure 21 - Forest Resources in Tajikistan	66
Figure 22 – IBA Dangara Massif in Relation to the Project Road	Error! Bookmark not defined.
Figure 23 - Map of administrative units of the Dangara-Guliston	72
Figure 24 – Location of Cemetery	75
Figure 25 - Map showing measurement locations for air quality and noise	96
Figure 26 - Map showing the vibration measurement locations along the Dangara-Guliston road	101
Figure 27 – Risk Matrix	106
Figure 28 – Life stock crossing at km 11:000	111
Figure 29 - Grievance Resolution Process	206
Figure 30 - basic laboratory of the CAC	212
Figure 31 - Selection of samples of water from the spring at km 33+800 and Dangara diversion canal. .	216
Figure 32 - Conducting a chemical analysis of water in a laboratory.	216
Figure 33 - Certificate of accreditation	217
Figure 34 - Conductivity meter, Bathometer, Titrometer, pH – meter, Spectrophotometer.	217
Figure 35- Air sampling	238
Figure 36 - Noise measurement	239

I. EXECUTIVE SUMMARY

Road Network Sustainability Project, approved by the Asian Development Bank (ADB) on 19 November 2020, initially aimed on improving two national arterial roads, namely (i) Dangara-Okmazor and (ii) Hulbuk-Kangurt. The Ministry of Transport (MoT) of Tajikistan requested ADB to provide additional financing for the improvement of road section Dangara - Gulsiton (km 0+000 to km 49+000).

The Dangara-Guliston Project Road section is 49 km long and forms one of the important roads of regional significance in the southern region of the republic. It provides important transport links, supply of agricultural products and industrial raw materials. The main purpose of this motor road is transport communication between the capital and some regions of the Khatlon region, as well as the Gorno-Badakhshan Autonomous region. It is possible to travel along it from the Republic of Uzbekistan and from the Islamic Republic of Afghanistan towards the Republic of Kyrgyzstan and the People's Republic of China.

Screening and categorization. ADB Safeguard Policy Statement (SPS) 2009 requires preparation of Initial Environmental Examination (IEE) for category B Projects. This IEE report covers Dangara-Guliston road section. ADB Rapid Environmental Assessment Checklist was used to screen potential impacts as a basis for the categorization and scope of the IEE.

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 the 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 the World Bank Group's *Environment, Health and Safety Guidelines* (hereafter referred to as the *EHS Guidelines*).²

IEE and EMP.

This IEE report covers Dangara-Guliston road section, based on the detailed design documents and field-based data gathering and consultations which were carried out during preparation of the IEE. In 2020, when the work on the IEE commenced the COVID-19 pandemic caused restrictions and limitations in visiting all locations, thus limited environmental field surveys and community consultations could be conducted initially. Therefore, additional detailed surveys and consultation meetings were conducted in 2023 and 2024 then, to offset any deficiencies due to Corona restrictions. During the SES, all affected persons met were handed out an information booklet which is describing the Project, its impacts and benefits. 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

² World Bank Group, *Environmental, Health, and Safety Guidelines*, Washington, USA. [Environmental, Health, and Safety Guidelines \(ifc.org\)](https://www.ifc.org/Environmental-Health-and-Safety-Guidelines).

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.

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.

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.

Project Description.

The Dangara-Guliston Project Road section is 49 km long and forms one of the important roads of regional significance in the southern region of the Republic. The Project Road is part of the Bokhtar-Okamzor-Dangara-Guliston road, which is an important trunk road of international significance in Tajikistan. It provides important transport links, supply of agricultural products and industrial raw materials. The road is running partly through hilly terrain and the road alignment consist of small curves and steep gradients. The Dangara-Guliston road traverses three districts (Dangara, Farkhor and A. Hamadoni Districts) by connecting the Jamoats of Korez, Ismat Sharif and Guliston to the cities of Dangara and Guliston.

The existing road falls into technical category III. The project road consists of one carriageway with two traffic lanes width of 3.50 m, in each lane. Traffic volumes indicates that the existing road category is not adequate for the anticipated future traffic volumes and improvement/upgrading of the road category to category I was therefore designed.

The Dangara-Guliston Project Road provides important transport links, supply of agricultural products and industrial raw materials. It forms part of a significant transport connection through the People's Republic of China, Afghanistan and further south to Pakistan. The project road section runs through arid country with steppe like vegetation. The relief is characterized by smooth low-lying mountains.

The beginning of the projected section - km 0 + 000, is taken as a T-shaped junction of the Bokhtar - Dangara - Guliston highway, on the border of the projected object "Reconstruction of st. Zebuniso in Dangara.

The end of the projected section is km 49+032, adopted at the border of the projected facility "Reconstruction of the Guliston-Kulyab Highway", financed by the World Bank.

Environmental Baseline

Administratively, the territory belongs to the Bokhtar, Vaksh, Levakand and Kushoniyon districts of Khatlon region.

The relief of the area is slightly dissected. Typical morphological structures are ridges and sediment fans which diverge towards the south, southwest and southeast. In the same direction, their absolute elevations decrease (from 1000-1500 to 400 m). The inter-montane valleys in the north are narrow V-shaped, to the south they expand significantly, occupying large spaces. In the following, the physical characteristics of the Project Road corridor are described.

There are no protected areas under national law within the Project Area of Influence.

In order to identify areas of international protection status including areas of key biodiversity, an online search was conducted by means of the Integrated Biodiversity Assessment Tool (IBAT). The search revealed that the Dangara-Guliston road is running alongside and marginally traversing the IBA Dangara Massif.

Therefore a biodiversity survey was conducted with focus on identification of habitats of the saker falcon (*Falco cherrug*). In addition, the study area was surveyed for identification of any other bird species that are potentially impacted by the Project Road construction.

In result, there is no risk identified for the saker falcon from the Project Road rehabilitation. There is however potential impact on bird species nesting in cliffs immediate abutting the Project Road. This refers to representatives of the roller family (Coraciidae) like the European roller (*Coracias garullus*), the family of bee-eater (Meropidae) (golden bee-eater), starlings (lane or Indian starling) and weaver family (Indian sparrow). In addition, these cliffs are habitats for wintering and sheltering of reptiles and amphibians.

In result the conducted biodiversity survey comes to the conclusion that the potential impact of the project road rehabilitation on biodiversity is only minor, but mitigation measures must be taken to address the identified impacts.

Potential environmental impacts and mitigation measures. The Dangara-Guliston Project involves the reconstruction and widening of an existing road. Cross section widening is from 2 to 4 lanes and involves the upgrade from a category III to a category I road (highway of city wide significance). Therefore the reconstruction Project will result in physical losses and encroachment into existing structures within a 10 to 15 m wide strip to both sides of the existing road. For managing these impacts, land acquisition will be carried out according to the LARP which will be cleared by ADB.

Construction activities will be confined to the selected sites and the interference with the general public and community around is minimal. In these works, the temporary negative impacts arise mainly from construction dust and noise, hauling of construction material, waste and equipment on local roads (traffic, dust, safety etc.), mining of construction material, occupational health and safety (OHS) aspects due to potential presence of hazardous materials such as fuels and oils.

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 are no archeologically sensitive areas identified within the project area. There will be mostly beneficial impacts.

Once the improved road section is operating, activities will only involve routine maintenance, which should not affect the environment.

Environmental management and monitoring. An EMP has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels, along with the delegation of responsibility to appropriate entities. 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 project. 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 local people.

The EMoP will require the contractor/s to (i) establish the baseline site-specific environmental conditions, (ii) together with PIURR and the Construction Supervision Consultant (CSC), conduct consultations with communities adjacent to sites, if any; and (iii) prepare site-specific EMP (SSEMP) prior to commencement of civil works. The baseline results and consultation records will be reported as part of the Semi-Annual Environmental Monitoring Reports (SAEMR) 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. The EMP will be binding for all contractors (including subcontractors) and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document will constitute a failure in compliance. A copy of the EMP and contractor's SSEMP will always be kept on-site during the construction period. The estimated cost for environmental management and monitoring measures is provided in Chapter VII.E.

This IEE, or update thereof, with the EMP will be included in the bid and contract documents to ensure compliance with the conditions set out in this document. The SSEMP will be submitted by the

contractor for approval to PIURR and the CSC before the commencement of civil works. The SSEMP will include information on, among others: (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; and (iii) site- and work-specific timebound environmental monitoring program. COVID-19 health and safety management plan and emergency response plan will also be prepared as part of the SSEMP. Works will not be allowed to commence prior to approval of SSEMP.

Safeguards implementation arrangements. The executing agency is the MOT, and the implementing agency is PIURR, wholly responsible for the implementation of ADB-financed projects, as agreed jointly between the borrower and ADB, and following 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's policies and procedures.

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,³ in consultation with ADB, the updated project information documents for public disclosure, including safeguards documents; 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 following services: (i) construction supervision, (ii) strengthening the Road Asset Management Unit (RAMS) Unit, and (iii) women empowerment. 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) ADB SPS; and (c) all measures and requirements set forth in the IEE, and any corrective or preventive actions set forth in a Safeguards Monitoring Report.

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

³ PIURR website at which the IEE and the SARMEs will be disclosed is <https://www.mintrans.tj/>.

proper implementation of the project's SSEMPs and land acquisition and resettlement plans; (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.

The CSC is tasked with specific responsibility to ensure environmental safeguards compliance of civil works, with 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 an international environmental specialist (CSC-IES) and a national environmental specialist (CSC-NES), who will be responsible for supervising the contractor's environmental performance, coordinating the public consultations and project grievance redress mechanism (GRM), and reporting to PIURR management for submission to MOT and ADB through the periodic project progress reports and SAEMRs. The CSC will also mobilize an ornithologist who conduct a fast-track ecological survey prior to construction.

The Works Contractor is required to appoint an Environment Safeguard Officer (ESO) and Health and Safety Officer (HSO). The Works Contractor is responsible for preparing SSEMP that reflects its understanding and commitment to address environmental issues. The works contractor is always also responsible for the day-to-day implementation of the EMP and compliance with the requirements of both the IEE and EMP.

Consultation, Disclosure

During the time of the pandemic public consultations were carried out in accordance with the newly adopted rules through applying the preventive measures elaborated regarding COVID-19 pandemic. Based on the detailed design by Ronamo, Kocks Consult GmbH (including an international and a national environment expert and social safeguards experts) and PIURR representatives carried out surveys within the villages alongside the Project Road. Villagers were informed about the social and environmental impacts of the Project. In addition, the communities were informed by distribution of an information brochure regarding potential impacts and measures to avoid and mitigate these impacts, project's mechanism to address complaints/grievances, and focal persons in the event villagers are interested to know more about the project.

In addition, two public consultation meetings were carried out on 17 November 2021. The public consultation meetings were organized by PIURR under strict adherence to corona pandemic restrictions. Views and feedback of villagers alongside the Project road were considered and incorporated in this IEE, particularly in the Project EMP and EMoP as far as technically feasible. A second round of public consultations was conducted on March 4, 7 and April 15, in 2023. The consultations were attended by 62 persons (37 men and 25 women). The minutes of public

consultation meetings, results of question-answer session, list of attendees and photo materials are presented in Annex 5.

The participants of the public meeting have been informed about the project's technical attributes, potential environmental impacts, design considerations and measures to avoid and mitigate impacts, project's GRM, implementation schedule, etc.

In addition the IEE will be made available at public locations and will be disclosed to a wider audience via the ADB and PIURR/MOT website (footnote 3). The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and can participate in its development, finalization, and implementation.

A grievance redress mechanism (GRM) is described within the IEE to ensure any grievances are addressed quickly.

Monitoring and Reporting. PIURR with the support of the CSC will be responsible for monitoring and reporting. During construction, results from internal monitoring by the contractor will be reflected in construction site environmental monitoring reports (monthly EMP implementation reports) to PIURR. The CSC team will monitor the compliance of contractor, prepare a quarterly progress report and submit to PIURR. PIURR will oversee the implementation and compliance and will prepare (with support of the CSC) SAEMR and submit to ADB. ADB will post the SAEMRs on its website. SAEMRs in Russian language⁴ will also be posted on PIURR/MOT website (footnote 3).

Conclusion. The project is unlikely to cause significant adverse impacts. The potential impacts that are associated with construction and operation can be mitigated to acceptable levels without difficulty through 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.

The successful implementation of the project will improve accessibility of 13 villages along the project road. Moreover, it will create short term employment opportunities.

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

- (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;

⁴ Russian language is regarded in Tajikistan as the language of inter-ethnic communication which is specifically referred to in Article 2 of the National Constitution and it is widely used as a second language among the population. It is generally accepted that most of the Tajik citizens are familiar with the Russian language, in both oral and written forms.

- (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.

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. It should also be noted that the section of the project road is part of the Bokhtar-Dangara-Guliston highway, one of the most significant international highways in Tajikistan. The Bokhtar-Dangara-Guliston highway is an international highway, from Levakant to Dangara RB-10 and from Dangara to Guliston AN-66. Roads are located on the territory of Khatlon region. The demand for road transport will increase rapidly and international traffic will increase as a result. The Bokhtar-Dangara-Guliston highway is the shortest route through China, Afghanistan and further south to Pakistan to the seaport of Karachi. The road also provides social, political and economic benefits for the entire country, providing greater mobility and accessibility for road users in the villages, supports agriculture, which in turn is an important basis for the sustainable economic development of the country.

4. **Output 1: Demonstration green corridor constructed.** The project will (i) upgrade the 49 km D–G road to four lanes using the Green Roads Toolkit; (ii) construct 48.8 kms of dedicated cycle way; (iii) construct two pilot electric vehicle (EV) charging stations ⁵, and; (iv) award grants for entrepreneurship to at least 12 women from the project site. The road will serve Tajikistan's international and transit trade by improving connectivity with CAREC countries through CAREC Corridors 3, 5 and 6.

5. **Output 2: Enabling transport sector capacity developed.** The project will develop capacity and transport sector policy. Road safety design practices will be improved through government approval of a procedure by which departures from national designs standards are approved upon demonstration of the road safety benefit.²⁸ Climate-resilient green road design practices will be enhanced through

⁵ At the time of IEE disclosure location and design information regarding the E.V pilot charging stations was not confirmed. Anticipated locations for pilot EV charging stations is expected to be within already operating petrol stations and thus potential environmental impacts are considered minor to negligible. If environmental concerns raised during the scoping stage of the proposed EV stations further studies may be required. Additional studies linked to EV stations will be disclosed on the ADB and EA website.

the approval of the Green Road Design Guidelines. Road maintenance planning capacity will be improved through the provision of data collection equipment.

6.

7. The Project Road (49 km of Dangara-Guliston section) is category III. The width of the existing carriage way is 9.0 to 11.0 m. The pavement of the carriageway is in parts heavily damaged by cracking and visibility is not ensured. The current road technical category is not adequate for the anticipated future traffic volume. Therefore the reconstruction and upgrade of the Project road to technical category I (four lane highway of city wide significance) is envisaged.

8. Road Network Sustainability Project,⁶ approved by the Asian Development Bank (ADB) on 19 November 2020, initially aimed on improving two national arterial roads, namely (i) Dangara-Okmazor and (ii) Hulbuk-Kangurt. The Ministry of Transport (MoT) of Tajikistan requested ADB to provide additional financing for the improvement of road section Dangara - Gulsiton (km 0+000 to km 49+000). The location of the 2 road sections (i) Dangara-Okmazor and (ii) Hulbuk-Kangurt, within Tajikistan is shown in Figure 1 below. The Project Road section Dangara-Guliston is shown in blue colour.

9. The Dangara-Guliston Project Road section is 49 km long and forms one of the important roads of regional significance in the southern region of the republic. It provides important transport links, supply of agricultural products and industrial raw materials. The main purpose of this motor road is transport communication between the capital and some regions of the Khatlon region, as well as the Gorno-Badakhshan Autonomous region. It is possible to travel along it from the Republic of Uzbekistan and from the Islamic Republic of Afghanistan towards the Republic of Kyrgyzstan and the People's Republic of China.

10. The road is running through mountainous terrain with difficult relief and extreme weather conditions (heavy rainfall, mudflows and snowfalls). Administratively it passes through Dangara and Vose Districts.

11. The designed cross-sections are in compliance with a four-lane category 1 road., The Project alignment is expected to follow the existing road alignment. There are only limited realignments to improve geometric characteristics, elimination of safety hazards and to avoid areas subject to severe soil erosion or unstable slopes. The Project Road consists of two carriageways, separated by a medium strip and providing four traffic lanes (two in each direction). The width of each traffic lane is 3,75 m, respectively 3,5m. There are no spatial alternatives or bypass options foreseen.

12. The Project is jointly financed by the Asian Development Bank (ADB) and the European Bank for Reconstruction and Development (EBRD). The project design and safeguard documents are prepared in accordance with ADB standards and requirements in consideration that the project has been categorized as 'B,' for environment.

⁶ [54005-001: Road Network Sustainability Project | Asian Development Bank \(adb.org\)](#)

Figure 1 - Location of the 3 Road Sections of the Road Network Sustainability Project within Tajikistan (Project Road Dangara-Guliston is shown in blue)



13. This road passes through the following village-type settlements: Kushoniyn, Shahbur, Shahbur 2, Khuramzamin, Bulyni poyn, Durakhshon and Bahoriston. In settlements, there are generally no sidewalks and street lighting, which contribute to a high level of traffic accidents in conditions of insufficient visibility at night.

Table 1 – Districts, Jamoats and Villages traversed by the Project road

Districts	Jamoats	Villages along the project road
Dangara	Korez	Kushoniyn
	Ismat Sharif	Shahbur
		Shahbur 2
		Khuramzamin
		Bulyni poyn
		Durakhshon
Vose	Guliston	Bahoriston

Study Area and Project Categorization

14. 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 encourage 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 on the Dangara Massiv entail the spread of uncontrolled development activities and threat to natural resources in previously undisturbed area. As the Project involves the reconstruction and widening of an already existing road no significant induced negative impacts are anticipated in this Project.

15. The area of direct physical encroachment is the construction corridor which is 15 m to both sides of the existing Project road. 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 Dangara-Guliston 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.

16. 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.

17. 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.

18. 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 and positive impacts.

19. The road will be reconstructed along the existing alignment. The existing road fall into technical road category III and consist of one carriageway with two traffic lanes width of 3.50 m, respectively 3.00 m, in each lane. The Project road will be upgraded to category I, a highway of citywide significance. It starts at km 0+000 in Dangara, at a T-shaped junction of the Bokhtar-Dangara-Guliston Highway and ends at km 49+032 by adjoining to the Guliston-Kulyab Highway which is under reconstruction, financed by World Bank. Potentially the upgrading of road Projects to a higher Category might cause separation to communities due to higher vehicle speeds or implementation of required roadside barriers which may create obstacles for farmers and villagers in accessing their fields, etc. However, proper design and other mitigation measures allow avoiding or minimizing those impacts and improve road safety.

B. Purpose of the Initial Environmental Examination

20. **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 subproject have been assessed using ADB rapid environmental assessment (REA) checklist. The potential negative impacts were identified in relation to preconstruction, construction, and operation phases.

21. **Categorization.** Environmental assessment has been conducted for the road section based on (i) detailed design, and (ii) most likely environmentally sensitive components. The results of the assessment show that the project entails physical encroachment which involves the loss of structures (e.g., trees, shrubs, soil, habitats) and transformation of topography due to embankment cut and fill. Impact magnitude is medium due to the upgrade to category I and widening of the cross section. The physical encroachment is confined to an approximately 15 m wide strip to both sides of the road. All impacts can be compensated by suitable mitigation measures and are therefore reversible. Hence the Project is not likely to have any significant adverse environmental impacts that are irreversible, diverse, or unprecedented. In addition to the loss of structures due to road widening additional potential impacts on environment result from construction dust and noise, hauling of construction material, waste and equipment on local roads (traffic, dust, safety etc.), mining of construction material, OHS aspects due to potential presence of hazardous materials such as fuels and oils. The potential impacts are site-specific, temporary in nature, short-duration, and can be mitigated to acceptable levels through proper engineering design and incorporation of recommended mitigation measures to be

provided in the EMP. In most cases, mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

22. Reasons for the determination of the Project as category B are the following.

- The Project Road will be upgraded to category I. Hence 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.
- The reconstruction will be carried out on the already existing alignment and confined to the existing Right of way (RoW) as far as technically feasible. 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. The anticipated environmental and social impacts are for the most generic and site specific and therefore such kind of impacts that occur in all types of road reconstruction Projects. They are mostly temporary limited to the construction phase.
- There are no protected areas under national law within the Project area of Influence.
- The Project is running alongside and marginally traversing the International IBA “Dangara Massif”. The area is of special importance for migratory birds. According to the information provided by bird life international, threats to the area are primarily from agriculture. There is no indication that there will be a risk to the area or its species by the road rehabilitation. The Dangara Massif has no national protection status.
- After Project implementation, during operational phase, there will be however only very low remaining impacts, mainly because the reconstruction follows the existing alignment and 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. Therefore, the Project is proposed to be classified as environmentally category B.

23. The classification as category B is based on the conducted screening as demonstrated in the REA checklist. It is in line with ADB SPS in which a category B Project is defined as follows: *“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.”*

24. This IEE report covers Dangara-Guliston 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 COVID-19 pandemic caused restrictions and limitations in visiting all locations thus limited environmental field surveys and community consultations were conducted. During the SES, all affected persons met were handed out an information booklet which is describing the Project, its impacts and benefits (The Project Information Pamphlet is provided in Annex 1 of the LARP). 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.

25. 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.

26. 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.

27. 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.

28. 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.

29. **Report Organization.** Work on the IEE started in March 2020. In a video call conference on 3 April 2020 joined by PIURR-SE, PIURR Project coordinator and Kocks Consult GmbH national and international environmental experts, the methodological approach and the required working steps were in detail discussed. In compliance with ADB SPS requirements, this IEE has been structured and consists of 11 chapters including executive summary:

- (i). EXECUTIVE SUMMARY
- (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

30. The report is supported by 7 annexes. Annex 7 - BASELINE MEASUREMENTS ON VIBRATION AND AIR QUALITY INCLUSIVE PM 10 AND PM 2.5 includes the additional measurements on vibration and air quality, inclusive PM 2.5 and PM 10, which were conducted in April 2024.

Annex 1 - REPORT ON WATER QUALITY.....	211
Annex 2 - REPORT ON AIR QUALITY AND NOISE.....	226
Annex 3 - ALIGNMENT SHEETS.....	243
Annex 4 - BIODIVERSITY SURVEY	265
Annex 5 - MOM OF PUBLIC CONSULTATIONS.....	291
Annex 6 - IDENTIFIED AREAS FOR SURPLUS MATERIAL DISPOSAL	311
Annex 7 - BASELINE MEASUREMENTS ON VIBRATION AND AIR QUALITY INCLUSIVE PM 10 AND PM 2.5.....	312

Project Proponent and Main Institutional Responsibilities

31. 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.

32. 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.

33. 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 Ronamo.

Methodology

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

35. In a video call conference on 3 April 2021 joined by PIURR-SE, PIURR Project coordinator and Kocks Consult GmbH national and international environmental experts, the methodological approach and the required working steps were in detail discussed.

36. 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.

37. The project road is following the existing road. The Project Road will be upgraded to category I. Hence 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.

38. 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.

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

40. The required field surveys were carried out by Kocks Consult GmbH national environmental expert. 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). All acquired field data were sent to the Kocks Consult GmbH international environmental expert for processing the data for IEE preparation in home office due to the travel restrictions due to COVID-19. During November 2021, the International Environmental Expert also could travel to Tajikistan and visit the Project site for consolidating the findings. The findings and recommendations of the IEE are presented to PIURR.

41. 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 is 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 2020. In March and April 2024 additional instrumental measurements for purpose of baseline establishment were conducted on vibration and air quality which also included the substances PM 2.5 and PM 10 which in 2020 had not been measured.

42. 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.

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

44. The Project is categorized as B in terms of its environmental impacts and requires stakeholder engagement and consultation as a continuous process. In total seven (7) villages are located alongside the Project Road. Based on the detailed design by Ronamo, 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. An information brochure which contains a Project description, its impacts and benefits was handed over to the villagers and affected persons met during the SES.

45. Two public consultation meetings were carried out on 17 November 2021, one in Ismat Sharif Jamoat at 10:00 am and one in Guliston Jamoat at 14:00 pm. The public consultation meetings were organized by PIURR under strict adherence to COVID-19 pandemic restrictions. On March 4, 7 and April 15, in 2023 an additional round on public consultations was conducted. The consultations were attended by 62 persons (37 men and 25 women). The minutes of public consultation meetings, results of question-answer session, list of attendees and photo materials are presented in Annex 5.

46. Views and feedback of 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

47. 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.

A. Environmental Clearance Requirements

48. 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".

Government Environmental Laws, Regulations and Guidelines

1. Legislation

49. 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.

50. 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).

51. 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.

52. 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.

53. 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 indicted in the following table.

Table 2 - Environmental, Labour and Health & Safety Laws of the Republic of Tajikistan

№	Name of the documents	When the document was approved
In the field of environmental protection		
1.	Law of RT ¹⁾ "On Environmental Protection"	2 August 2011 as amended on 18 July 2017

№	Name of the documents	When the document was approved
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
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
In the field of health, social protection and emergency situations		
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
In the field of energy, industry and minerals		
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
In the field of water and land relationship, agriculture		
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
Codes		
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

54. 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 expertise⁷ – 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.

55. 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;
- 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.

56. 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.

57. 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,

⁷ State Ecological Expertise means both the department (institution) within the Committee for Environmental Protection and the process of review as well.

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

58. 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.

59. 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.

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

4. Public Participation

61. 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.

62. 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.

63. 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.

64. 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

65. 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.

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

Table 3 - Indicative List of Permits and Licenses Applicable to the Project

Description of Authorisation Document	Date of Issue	Issuing Authority and requirements for follow up.
Design Stage: Project Feasibility Study and Environmental Impact Assessment		
Conclusion of the SEE on the project to be issued by the CEP ¹⁾ . Current Status as per May 2022: IEE needs to be translated to Russian and submitted by PIURR ³⁾ 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 obtaining environmental clearance (SEE)	Committee for Environmental Protection under the Government of Tajikistan (CEP RT). IEE needs to be submitted to CEP.
At the Construction Stage: Permits and Licences		
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)

Description of Authorisation Document	Date of Issue	Issuing Authority and requirements for follow up.
Permission to cut down trees and shrubs	At the construction stage	(CEP RT)
Permission for emissions of harmful substances into the atmosphere (MPE ⁴⁾) from stationary and mobile sources	At the construction stage	(CEP RT)
Permission for discharge of hazardous substances into water bodies (MPD ⁵⁾)	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

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

68. 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)

69. 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.

70. 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.

71. 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.

72. 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

73. 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).

ADB Safeguards

74. 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.

75. As noted previously, the Dangara-Guliston 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.

76. ADB SPS in addition to the required environmental assessment process emphasizes the requirements for public consultation and information disclosure. Consultation will 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.

EBRD

77. EBRD has categorised the Project as “A” in line with its Environmental and Social Policy (ESP) (2019) as the Project is a greenfield road. Category A projects are required to conduct a formalised and participatory environmental and social impact assessment (ESIA) of the proposed Project and associated infrastructure. Based on the existing ADB Environmental Safeguards Policy (2009), the Project is also Category “A” as it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, and that may affect an area larger than the sites or facilities subject to physical works.

International Treaties and Legal Commitments

78. 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

79. 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 санитари) are sanitary rules and norms (standards).

80. 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.

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

Table 4 - National standards and regulations applicable to the Project

#	Title - National Standards - GOSTs
1.	31431—2011. Protection of nature. Air. Set of Maximum Permissible Emissions (MPE ¹). 29 November 2011
2.	31434—2011 Protection of nature. Air. Determination of parameters of efficiency of dust collection systems. 29 November 2011
3.	IEC 61241-0—2011 Electrical equipment used at areas containing flammable dust. Part 0. General requirements. 29 November 2011
4.	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
5.	General provisions GOST 17.0.0.04-80 (1998) Protection of nature. Environmental passport (certificate) of industrial facility. General provisions

#	Title - National Standards - GOSTs
6.	GOST R ISO14001-98 Environmental management systems. Requirements and guidelines.
7.	GOST 17.0.0.02-79 (1980) Protection of nature. Provision of metrological control of air, surface water and soils pollution.
8.	GOST 17.1.1.01-77 (ST SEV 3544-82) Usage and protection of water. General terms and definitions.
9.	GOST 17.2.1.01- 76 Classification of emissions (content).
10.	GOST 12.1.014-84 (1996) SSBT. Air at workplace. Methodology of measuring of pollutants concentration using indication tubes.
11.	GOST 12.1.005-88 (1991) SSBT. General sanitary and hygiene requirements to air at workplace.
12.	GOST 17.2.2.05-97 Norms and methods of emissions measuring containing spent diesel gases, tractors and self-propelled agricultural machines.
13.	GOST 21393-75 Diesel motorcars. Exhaust gas opacity. Norms and methods of measurement.
14.	GOST 17.2.2.03-77 Concentration of carbon monoxide at exhaust gases of motorcars with gasoline engines. Norms and measurements methodology.
15.	GOST 17.2.2.03-87 Norms and methods of measurements of carbon monoxide at exhaust gases of motorcars with gasoline engines.
16.	GOST 17.4.2.01-81 Nomenclature of sanitary condition parameters
17.	GOST 17.4.1.02-83 Classification of chemical substances for monitoring of contamination.
18.	GOST 12.1.003-83 (1991) SSBT. Noise. General safety requirements
19.	GOST 12.1.023-80 (1996) SSBT. Noise. Methods of threshold noise levels for stationary machinery.
20.	GOST 12.1.029-80 (1996) SSBT. Means and methods of noise protection. Classification.
21.	GOST 12.1.036-81 (1996) SSBT. Noise. Allowable levels of noise within residential and public buildings.
22.	GOST 12.1.007-76 (1999) SSBT. Harmful substances. Classification and general safety requirements.
23.	GOST 12.4.119-82 SSBT. Means of respiratory PPE. Methods of protective features assessment for aerosols.
24.	GOST 12.4.125-83 (1985) SSBT. Means of collective protective equipment from mechanical factors. Classification.
Sanitary norms and regulations (SanPins)	
25.	SanPiN 2.1.4.559-96 Drinking water. Hygienic requirements to the quality of water from centralised systems of drinking water supply. Quality control

#	Title - National Standards - GOSTs
26.	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

¹⁾ MPE Maximum permissible emission

82. 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 5 - Environmental Standards for Emissions to the Atmosphere

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

Table 6 - Environmental Standards for Ambient Air

	National Standards / Requirements Tajikistan standards ⁸ ,	EHS Guidelines (footnote 2)	Adopted Project Standard (mg/m³)/ supplementary standards are marked blue	Rationale
Air Quality - Human population protection (at receptors)	mg/m ³ : PM 0.15 NO 0.06 NO ₂ 0.04 SO ₂ 0.05 Ammonia 0.06 Benzopyrene 0.1 Benzene 0.1 Acetone 0.35 Petrol 1.5 V ₂ O ₅ 0.002 Vinyl acetate 0.15 HCl 0.2 HF 0.005 Fe ₂ O ₃ 0.04 HNO ₃ 0.4 H ₂ SO ₄ 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 ₂ 70 %) 0.05 SiO ₂ = 70 % - 20 % 0.1 SiO ₂ is less than 20 % 0.15 Lead and its compounds 0.0003 Lead sulfur 0.001 Hydrogen sulfide, H ₂ S 0.008 Turpentine 1 Ethyl alcohol (ethanol) 5.0	Where set, national air quality standards apply. If no national standards are set then apply WHO standards WHO guidelines, µg/m ³ : PM _{2.5} 10 (1 yr) PM _{2.5} 25 (24 h) PM ₁₀ 20 (1 yr) PM ₁₀ 50 (24 h) Ozone 100 (8 h) NO ₂ 40 (1 yr) NO ₂ 200 (1 hr) SO ₂ 20 (24 h) SO ₂ 500 (10 min)	mg/m ³ : PM 0.15 NO 0.06 NO ₂ 0.04 SO ₂ 0.05 CO 3.00 Ammonia 0.06 Benzopyrene 0.1 Benzene 0.1 Acetone 0.35 Petrol 1.5 V ₂ O ₅ 0.002 Vinyl acetate 0.15 HCl 0.2 HF 0.005 Fe ₂ O ₃ 0.04 HNO ₃ 0.4 H ₂ SO ₄ 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 ₂ 70 %) 0.05 SiO ₂ = 70 % - 20 % 0.1 SiO ₂ is less than 20 % 0.15 Lead and its compounds 0.0003 Lead sulfur 0.001 Hydrogen sulfide, H ₂ S 0.008 Turpentine 1 Ethyl alcohol (ethanol) 5.0	Tajikistan and supplemented by WHO where necessary to achieve most comprehensive suite ⁹

⁸ 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

⁹ The IFC cites WHO ambient air quality guidelines typically apply only in jurisdictions where there are no national standards in place.

	National Standards / Requirements Tajikistan standards ⁸ ,	EHS Guidelines (footnote 2)	Adopted Standard (mg/m³)/ supplementary standards are marked blue	Project (mg/m³)/	Rationale
	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 ₄) 0/05 Freon (all brands) 10 Chromium trioxide 0.0015 Chlorine 0.03 ZnO 0.05 Ethylene oxide 0.03		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 ₄) 0/05 Freon (all brands) 10 Chromium trioxide 0.0015 Chlorine 0.03 ZnO 0.05 Ethylene oxide 0.03		

Table 7 - Environmental Standards for Surface Water Quality & Discharges to Water

Topic	National Standards / Requirements	EHS Guidelines (footnote 2)	Adopted Project Standard	Rationale
Discharge to surface water: Effluent water	List of MPC (Maximum Permission Compact) quality of water at surface water bodies (Requirements to water quality in fishery water bodies) ¹⁰ 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 ⁺⁶) 0.02 Chromium (Cr ³⁺) 0.07 Oil and petrochemicals 0.05 Arsenic (As) 0.05 Calcium (Ca) 180 Silicon (SiO ₃ ²⁻) 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 ⁺⁶) 0.02 Chromium (Cr ³⁺) 0.07 Oil and petrochemicals 0.05 Arsenic (As) 0.05 Calcium (Ca) 180 Silicon (SiO ₃ ²⁻) 1.0	Tajik MPC as most stringent standard supplemented by IFC where needed for comprehensive suite
Water quality - freshwater	List of MPC above (mg/l)	No numeric standards	Tajik MPC for surface water bodies	Tajik as only relevant

¹⁰ 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 8 - Environmental Standards for Noise

Topic	National Standards / Requirements	EHS Guidelines (footnote 2)	Adopted Project Standard	Rationale
Night time noise limits for human protection	<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, n.5.3.1.):</p> <ul style="list-style-type: none"> • In residential and public buildings: <ul style="list-style-type: none"> – Hospitals, health centres with recreation areas: 25 dB(A); – Residential rooms: 30 dB(A); – Rooms in hotels and hostels; Territory directly surrounding hospital buildings and health centres, with their recreation areas: 35 dB(A); – 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); – Halls of cafes, restaurants, eating rooms: 55 dB(A); – Shops trade halls, passenger halls in airports and stations, consumer services centres: 60 dB(A); <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>	Tajik standards apply with night time defined as 22:00 – 07:00 in line with IFC EHS General Guidelines.	Most stringent and provides more comprehensive measurement criteria

Topic	National Standards / Requirements	EHS Guidelines (footnote 2)	Adopted Project Standard	Rationale
Day time noise limits for human protection	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).	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: Residential.; institutional., educational.: Daytime (07:00-22:00): 55 dB(A) Industrial, commercial: Night time (22:00-07:00): 70 dB(A).	Tajik standards with daytime defined as 07:00 – 22:00 in line with IFC EHS General guidelines.	Most stringent and provides more comprehensive measurement criteria

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	
	$m/s^2 \times 10^{-3}$	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 W_m	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^2	dB
Local		X_l, Y_l, Z_l	W_h	2.0	126
General	Transport vibration in workplaces and vehicles, self-propelled and trailed vehicles when moving	Z_0	W_k	0.56	115
		X_0, Y_0	W_d	0,40	112
	Transport and technological vibration at workplaces in machines moving on prepared surfaces of production premises, industrial sites, and mine workings	Z_0	W_k	0,28	109
		X_0, Y_0	W_d	0,2	106
	Technological vibration at the stationary workplaces	Z_0	W_k	0.1	100
		X_0, Y_0	W_d	0.071	97

83. **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 2). 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

84. The Dangara-Guliston Project Road section is 49 km long and forms one of the important roads of regional significance in the southern region of the Republic. The Project Road is part of the Bokhtar-Okmazor-Dangara-Guliston road, which is an important trunk road of international significance in Tajikistan. It provides important transport links, supply of agricultural products and industrial raw materials. The road is running partly through hilly terrain and the road alignment consist of small curves and steep gradients. The Dangara-Guliston road traverses three districts (Dangara, Farkhor and A. Hamadoni Districts) by connecting the Jamoats of Korez, Ismat Sharif and Guliston to the cities of Dangara and Guliston.

85. The existing road falls into technical category III. The project road consists of one carriageway with two traffic lanes width of 3.50 m, in each lane. Traffic volumes indicates that the existing road category is not adequate for the anticipated future traffic volumes and improvement/upgrading of the road category to category I was therefore designed.

86. The Dangara-Guliston Project Road provides important transport links, supply of agricultural products and industrial raw materials. It forms part of a significant transport connection through the People's Republic of China, Afghanistan and further south to Pakistan. The project road section runs through arid country with steppe like vegetation. The relief is characterized by smooth low-lying mountains. Figure 2 below provides an overview of the Project Road.

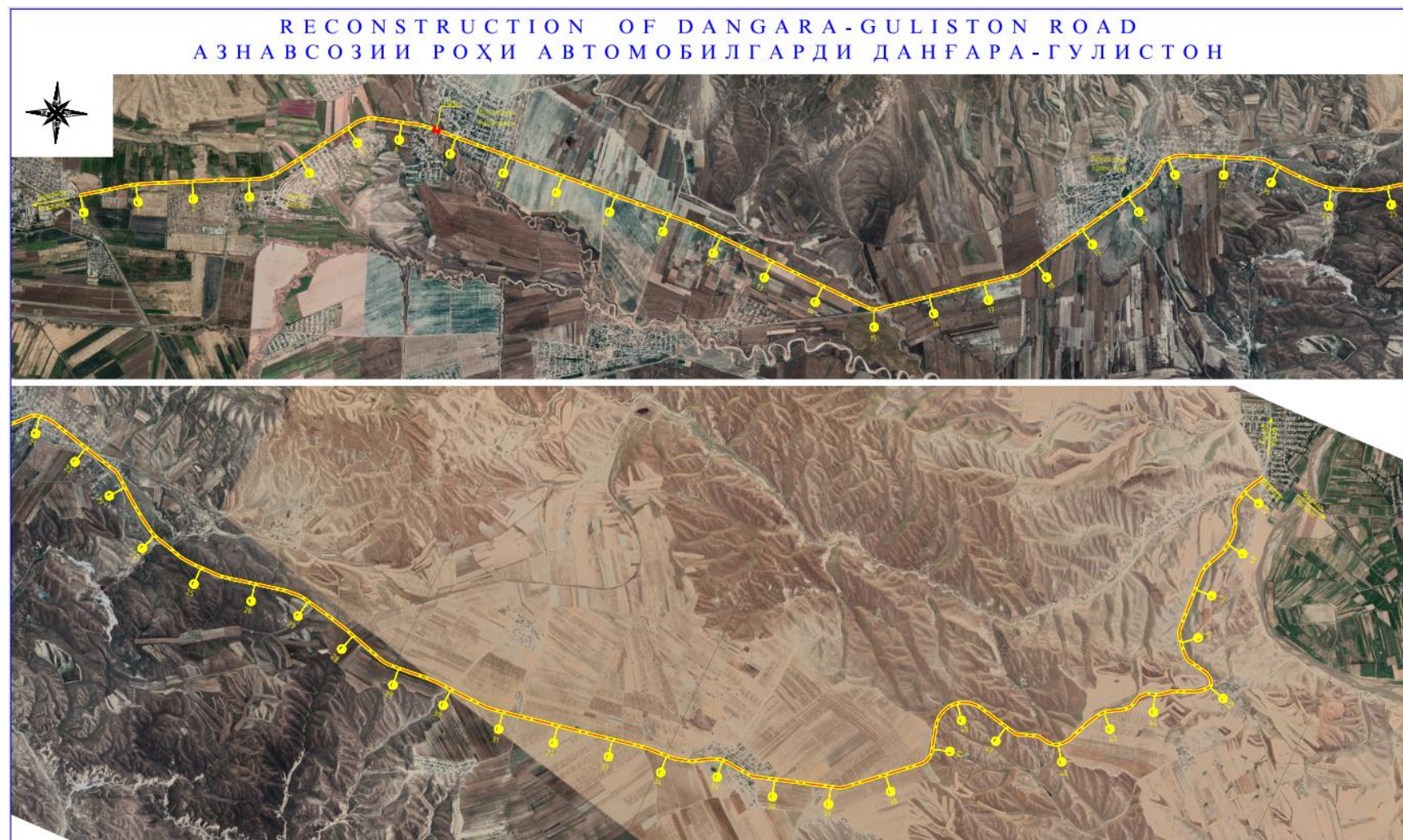


Figure 2 - Project Location Map of Dangara-Guliston Road

87. The Dangara-Guliston road reconstruction follows the existing alignment. No spatial alternatives are foreseen.

C. Type and Category of Project

1. Existing Road Characteristics

88. The Project Road length is 49+032 km and forms one of the important roads of regional significance in the Khatlon region of the Republic of Tajikistan.

89. The geometrical parameters of the existing motor road correspond to technical road category III according to SNIP. Intersections and junctions with secondary roads are carried out at the same level. The general direction of the road is from north to south.

90. The existing carriageway consists of two traffic lanes (one in each direction) of 3.5 meters. Roadsides strips of 2.5 - 4.0 m width are stretching alongside both sides and are reinforced with soil and gravel materials. The existing carriageway has an asphalt concrete pavement with an average thickness of 0.139 m on a base layer of coarse soils. According to the visual survey, the existing roadway surface and adjoining ramps are worn out, which is expressed in the presence of longitudinal and transverse cracks and a large number of areas where patching was carried out (figure 6). Drain systems are mostly absent, drainage from the roadway is unsafe.

91. This road passes through the following village-type settlements: Shakhbur, Khurramzamin, Buleni poyon, Bahoriston and Shukhtarar. In settlements, there are generally no sidewalks and street lighting, which contribute to a high level of traffic accidents in conditions of insufficient visibility at night.

92. Drainage is carried out by means of soil ditches, in some places by monolithic and prefabricated reinforced concrete trays.

93. The culvert system is made of prefabricated reinforced concrete, metal and asbestos-cement pipes of different diameters.

2. Designed Road Characteristics and Technical Parameters

94. The beginning of the projected section - km 0 + 000, is taken as a T-shaped junction of the Bokhtar - Dangara - Guliston highway, on the border of the projected object "Reconstruction of st. Zebuniso in Dangara.

95. The end of the projected section is km 49+032, adopted at the border of the projected facility "Reconstruction of the Guliston-Kulyab Highway", financed by the World Bank.

96. The main purpose of this motor road is transport communication between the capital and some regions of the Khatlon region, as well as the Gorno-Badakhshan Autonomous region. It is possible

to travel along it from the Republic of Uzbekistan and from the Islamic Republic of Afghanistan towards the Republic of Kyrgyzstan and the People's Republic of China.

97. According to the terms of reference for the design and based on the future anticipated traffic volumes, it was necessary to develop a project according to the norms of roads of the 1st category according to SNiP. Drawing the axis of the road in plan and profile was carried out in such a way as to maximize the use of the existing building line and minimize the impact of the project - the withdrawal of private land for permanent use. This will ensure the safety of all road users.

98. The road design is in accordance with SNiP 32-02-2012 "Automobile roads" and SNiP RT 30-01-2018 "Urban planning. Planning and development of settlements." The following main technical parameters were taken as a basis:

- Road category - I-b in rough terrain, with an estimated speed of 100 km / h.
- The lane width is 3.5-3.75 m.
- Number of traffic lanes - 4 pcs.
- The smallest width of the pedestrian part of the sidewalks is 1.5-3.0 m.
- The smallest radius of curves in the plan is 600 m.
- The smallest radius of curves in the longitudinal profile: convex - 10,000 m. concave - 3,000 m.
- The maximum longitudinal slope is 50 %.
- Type of road surface - asphalt concrete.
- Estimated load for pavement - 115kN per axle.

99. When developing the design solutions, the main task was to maximize the preservation of the existing boundaries of building lines in settlements and to minimize the volume of earthworks, taking into account compliance with the requirements of current regulatory documents on the territory of the Republic of Tajikistan.

100. The guiding main criteria for developing the design were:

- the maximum possible use of the open strip of land between the road edge and the adjacent building lines;
- minimization of and land acquisition to the degree possible under the given technical constraints (upgrade from technical category III to category I and cross section widening from 2 to 4 lanes);
- minimizing the demolition of existing building structures;
- requirements for ensuring traffic safety.

101. The designed cross section of the road includes four driving lanes, a central dividing strip, shoulders and sidewalks from the green zone in settlements. Sidewalks are located on both sides and in some places on one side of the road. According to the Terms of Reference for the design, a bicycle path is provided along the entire length of the road (on the right side). Depending on the terrain, twenty-four types of cross sections were adopted during the development of the project, which are

given in Book 1 of the technical Project documentation - Typical Drawings. The below figures show some typical cross sections.

Figure 3 - Typical cross section in settlement with sidewalk and bicycle lane

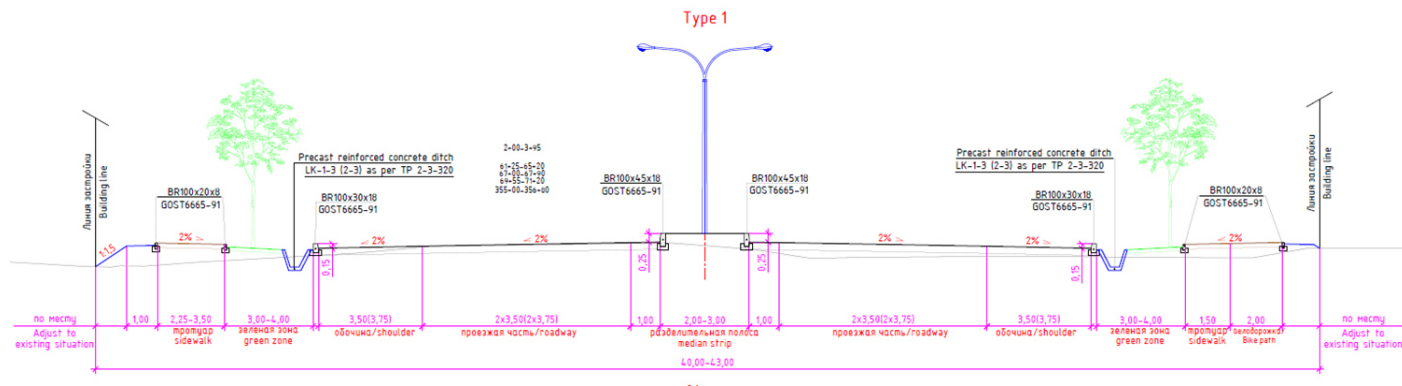


Figure 4 - Typical cross section in settlement area with local road (4 lanes plus local road)

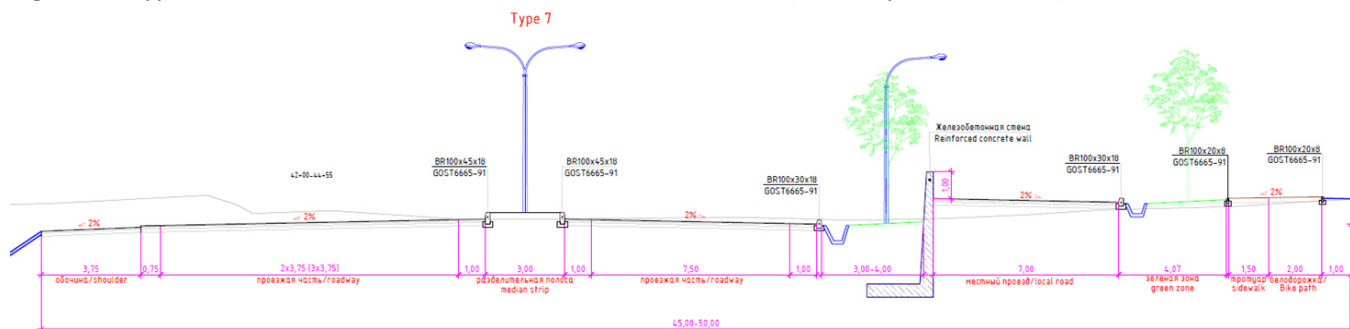
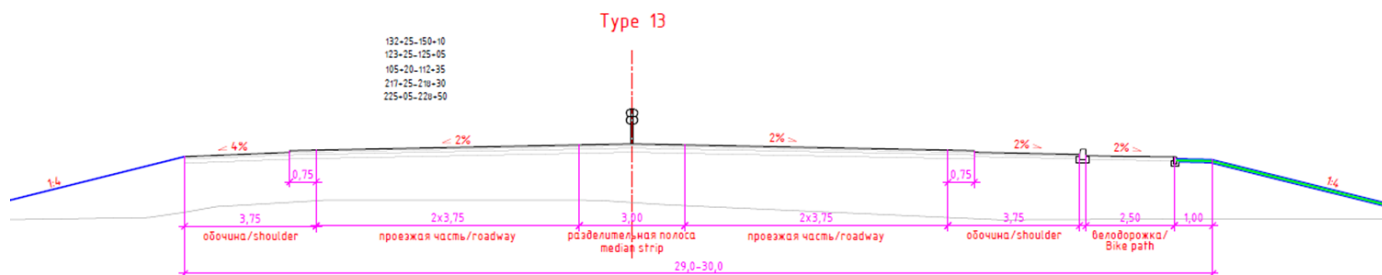


Figure 5 - Typical cross section outside settlements (4-lanes. Category I)



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

103. Cross-section parameters are related to traffic flows and will vary with the requirements of vehicular traffic. The road cross-section incorporates all elements between the road boundaries including carriageways, shoulders, verges, including cutting or embankment slopes. The cross-section elements serve several purposes and have a significant impact on construction costs, road operation and safety. 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.

104. According to the intended classification of the road, the design speed is 100 km /h.

D. Need for Project

105. The Project Road has deteriorated over the years and is in currently bad condition with numerous shortcomings and damages. Due to the existing poor technical condition of the road, transport is getting unreliable and expensive. The asphalt pavement is destroyed. The base, consisting of coarse soil, does not comply with GOST. The average thickness of the base is 0.20 m. There is no functioning drainage and numerous physical and geological processes are destroying the remaining intact roadbed. In many places stagnant water occur for more than 30 days over the year including flooding of the road embankment.

106. In summary the need for the reconstruction of the highway is caused by the inconsistency of the existing technical category and the deterioration of the existing route. Therefore the reconstruction of the Dangara-Guliston road is urgently needed. The below photo (Figure 6) exemplifies exemplifies the deficient situation of the existing Project road.



Figure 6 - Severely Damaged Road Pavement (November 2021. Km 17+600)

E. Size or Magnitude of Operation

107. The Project involves the reconstruction and upgrade from technical category III to category I of the existing Dangara-Guliston road over the length of 49 km. 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 a number of 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.

108. 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
- Construction of sidewalks and bicycle lane settled areas
- Installation of road lighting in settled areas
- Improvement of traffic safety due to proper road signing and marking and installation of guardrails
- Provision of bus stops with passenger shelters
- Construction of retaining walls.

109. 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

110. In order to determine the geometric and structural design and also to estimate the economic benefits a traffic growth forecast have been calculated based on the existing traffic volumes on the project road. To achieve the objectives of the traffic study following traffic surveys were used.



Figure 7 – Manual Traffic Counting done by Kocks Consult in November 2000

111. The following traffic was counted at the three locations.

Table 9 – Counting Points and AADT

Counting point	AADT 2020	Passenger cars %	Small bus %	Large bus %	2-axle %	3-axle %	4+axle %	Passenger cars	Small bus	Large bus	2-axle	3-axle	4+axle

1	10,954	95.7%	1.6%	0.0%	0.9%	1.5%	0.4%	10,484	171	5	95	160	39
2	6,590	94.4%	2.1%	0.1%	1.2%	1.6%	0.6%	6,223	136	8	80	105	38
3	7,459	94.6%	1.5%	0.1%	1.4%	2.0%	0.5%	7,056	113	7	102	146	35

112. The carried out traffic analysis distinguished three homogenous sections which are Dangara-Dzharteppa (1st section), Dzharteppa-Bulyen (2nd section) and Bulyen-Guliston (3rd section). The traffic forecast according to section is shown in the following three tables for the forecasted years 2022, 2027, 2032, 2037 and 2042.

Table 10 – FORECAST AADT BY VEHICLE CLASS (INCLUDING GENERATED TRAFFIC) – SECTION 1 (DANGHARA-DZHARTEPPA)

VEHICLE TYPE	2022	2027	2032	2037	2042
PASSENGER CARS	12,017	15,594	18,839	21,226	23,550
SMALL BUS (VAN)	196	254	307	346	384
LARGE BUS	6	7	9	10	11
MEDIUM 2-AXLE TRUCK	108	138	166	186	205
HEAVY 3-AXLE TRUCK	181	232	278	312	344
4+ AXLE TRUCKS	44	57	68	76	84
TOTAL	12,552	16,283	19,667	22,156	24,579

Table 11 – FORECAST AADT BY VEHICLE CLASS (INCLUDING GENERATED TRAFFIC) - SECTION 2 (DZHARTEPPA -BULYEN)

VEHICLE TYPE	2022	2027	2032	2037	2042
PASSENGER CARS	7,133	9,256	11,182	12,599	13,979
SMALL BUS (VAN)	156	202	244	275	305
LARGE BUS	9	12	14	16	18
MEDIUM 2-AXLE TRUCK	91	116	140	157	173
HEAVY 3-AXLE TRUCK	119	152	183	205	226
4+ AXLE TRUCKS	43	55	66	74	82
TOTAL	7,551	9,794	11,830	13,326	14,783

Table 12 – FORECAST AADT BY VEHICLE CLASS (INCLUDING GENERATED TRAFFIC) - SECTION 3 (BULYEN-GULISTON)

VEHICLE TYPE	2022	2027	2032	2037	2042
PASSENGER CARS	8,087	10,495	12,679	14,286	15,850
SMALL BUS (VAN)	130	168	203	229	254
LARGE BUS	8	10	13	14	16
MEDIUM 2-AXLE TRUCK	116	148	178	199	220
HEAVY 3-AXLE TRUCK	166	212	254	285	315
4+ AXLE TRUCKS	40	51	61	68	75
TOTAL	8,546	11,085	13,388	15,081	16,729

113. Based on the calculated traffic forecasts, the Project Road category was determined and designed.

G. Proposed Schedule for Implementation

114. The procurement of the Works is planned to commence in summer 2024. Considering 3 months for the procurement, the contract with the works contractor could be signed in late summer or autumn 2024. Commencement of works could start in October 2024. The overall construction time is estimated to be 18 months.

115. The SSEMP must be submitted within 30 days of the contract award and Preconstruction and Construction cannot commence until the SSEMP is approved by PIURR (MoT) and the CSC. Testing and commissioning is ongoing throughout construction period.

116. The construction duration of 18 months includes the winter season. A complete shut-down of the construction site in winter is not foreseen, despite the possibility that asphalt works might could not be carried out during winter season. The work schedule of the contractor should allow for limited works to be carried out during winter season.

H. Bridges

117. The Project involves the new construction of one bridge only, the bridge over the Tairsu river (River Obi Tohir in technical Project Documents) at km 6+614 (PK 66+14). No other natural water course is crossed by the Project Road. The planned bridge over Tairsu River at PK 66+14 is designed with a length of 100.40m, according to the scheme 33+33+33m, the bridge dimension is G-2x10+3.1+2x3.5m. The bridge is located in the plan on a straight section. In the profile on a slope of 5‰. The width of the

carriageway of the bridge is assumed to be 2x10.0m. The transverse slope of the bridge is assumed to be two-pitched with a slope value of 20‰.

118. The design of the bridge considers the 1 in 100 years flood event. This warranted by the dimensioning 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. In addition, the piers have 1200 mm diameter pile foundations with a length of 20 m and the abutments have 400x400 mm driven piles with a length of 9.2 m.

I. Quantities

119. The quantities of aggregates required are spread over the construction period of 18 months and will only be sourced from local quarries and/or suppliers.

120. The BoQ is currently still under preparation. According to the detailed design report prepared by company LLC Rohnamo, the volume of 3 504 815 m³ needs to be provided for embankment fill and the volume of 5 585 402 m³ is excavated cut material.

121. The required fill material needs to be sourced from quarries. The surplus soil resulting from cut sections needs to be transported to suitable disposal sites. The proposed disposal sites are shown in Annex 6 - 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.

J. Borrow Areas

122. 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.

123. There are no soil reserves of pebble material for the preparation of asphalt concrete, concrete mixtures, gravel-sand mixtures for the base of pavement closer than 20 km. It is possible to use deposits of pebble material from the Yakh-su River from the Gar-Gara quarry, deposits from the Surkhob River. When performing engineering and geological work at the sites "Reconstruction of the highway at the Guliston-Kulyab section", "Reconstruction and rehabilitation of the Khulbuk-Temurmalik-Kangurt highway", open pits were surveyed that can be used on the Dangara-Guliston highway project.

124. In result the following borrow areas are proposed to be used in the Project.

125. **Soil Reserve Number 1:** Soil reserve No. 1 is the deposits of pebbles of the floodplain of the Surkhob River. It is located 8.0 km from the end of the course. The river sediment material can be used downstream >1000 m, upstream >1000 m, width more than 700m. Ways of access: it is necessary to

organize a soil reserve in a flood, flooded from March to June. The useful thickness of deposits is up to 3m. There is a private crusher.



Figure 8 – Photo of Soil reserve Number 1

126. **Soil Reserve Number 2:** The proposed soil reserve is located 22 km from the end of the passageway of the projected route along the Guliston-Kulyab road and 2-3 km (from the bridge) to the north of the main road (upstream of the river) the riverbed and floodplain of the Yahsu River. The stock of material is not limited, since the excavation area can be expanded upstream of the river. The thickness of the pebble deposits is more than 3.0 m



Figure 9 – Photo of Soil reserve Number 2

127. **Soil reserve Number 3:** The proposed soil reserve is located along the Dangara-Kangurt road. From the beginning of the course to the Gar-Gara quarry is 15 km. During the construction of the

Vahdat-Dangara road by the Chinese company China Road, the deposits of the floodplain of the Tairsu River were used to obtain crushed stone and sand. It should be noted that the pebble deposits of the Tairsu River are saline. The increased content of chlorine makes it impossible to use the material as a filler for concrete. The extraction of pebbles from the Tairsu River can be used to obtain crushed stone, which is suitable for embankment and foundation, as well as for the preparation of asphalt concrete. The stock of material is not limited, since the excavation area can be expanded upstream of the river from the turn at the Gar-Gara village from the main road to Kangurt. The thickness of the pebble deposits is more than 3.0 m

128. The proposed quarries (soil reserves 1, 2 and 3) can only be used after a detailed study of the quality of the material. Currently, the soil reserve material is used by private entrepreneurs.

129. **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.



Figure 10 – Photo of Soil reserve Number 3

130. The following soil resources 4 to 8 are loamy type of soil as exemplified by the photos in figure 10. These extraction sites can only be used for embankment fill.

Soil reserve number 4: Soil reserve No. 4 on the left along the axis of the road, loam deposits on the PK 122 + 80 - 143 + 00 in the form of hills. The thickness of the deposits recommended for development is 20m. The quarry is approximately 500 m wide. Located from the axis of the road 500 meters.



Figure 11 – Photo of Soil reserve Number 4

131. **Soil reserve number 4a:** Soil reserve No. 4a (it is also the material of the excavation) on the left of the axis, there are more near-road deposits of loams on PK 233+00 - 235+60 in the form of hills. The thickness of the deposits recommended for development is the depth of the excavation. The quarry is approximately 500m wide. Adjacent to the axis of the road. It is possible to develop only to comply with a failure rate of 1: 1.5.

132. **Soil reserve number 5:** Soil reserve No. 5 to the right of the road axis there are loamy deposits along the road on PK 241+00 - 270+90 in the form of hills. The thickness of the deposits recommended for development is about 20m. The quarry is approximately 500m wide. Adjacent to the axis of the road.

133. On the left of the axis, there are near-road loam deposits on PK 242+80 - 277+20 in the form of hills. The thickness of the deposits recommended for development is about 20m. The quarry is approximately 500m wide. Adjacent to the axis of the road.

134. **Soil reserve number 6:** Soil reserve No. 6 (aka excavation soil) to the right and left of the road axis, loam deposits along the road on PK 392+00 - 401+00 in the form of hills. The thickness of the deposits recommended for development is about 20m. The width of the quarry is approximately 250m on the right and 50m on the left. It is possible to develop only for observance of a failure of 1: 1.5.

135. **Soil reserve number 7:** Soil reserve No. 7 (aka excavation soil) to the right and left of the road axis, there are loam deposits along the road on PK 417 + 00 - 455 + 00 in the form of hills. The thickness of the deposits recommended for development is the depth of the excavation. It is possible to develop only for observance of a failure of 1: 1.5.

136. **Soil reserve number 8:** Soil reserve No. 8 (aka excavation soil). Left side at PC 455+40 – 487+20. Right side at PC 455+40 – 482+20. The thickness of the deposits recommended for development is the depth of the excavation. It is possible to develop only for observance of a failure of 1: 1.5.

V. Analysis of ALTERNATIVES

137. No spatial alternatives or bypasses are foreseen for the Dangara- Guliston road reconstruction. 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.

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

139. Other adjustments refer to the required cross-section widenings, which is due to the upgrade from a 2 lane category III to a 4-lane category I highway. This will require land acquisition and also the demolishment of building structures. The compensation for Project affected People is managed according to the “Land Acquisition and Resettlement Plan” (LARP). All Project affected people will be compensated for their loss.

140. The “no Project” option would imply that the existing Dangara-Guliston road will not be improved and that the road would be left in its present state as characterized by advanced deterioration of the asphalt layer, insufficient and lacking drainage, silted and destroyed culverts, lacking footpaths and lacking road lightning. These deficiencies pose numerous safety hazards to the road users and to the residential people alongside the road.

141. 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

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

143. 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)¹¹. Population density is 57.2 persons / km².

144. Geologically the road project (re-construction project) is located with-in the Tajik Depression. Administratively, the territory belongs to the Dangara and Vose districts of the Khatlon region.

145. The route of the road crosses the Tairsu River which is a tributary of the Kyzylsu River. The climate of the region is continental. The average annual rainfall is from 500 to 650 mm (the maximum falls in winter and spring, the minimum in late summer and autumn). The average annual air temperature is from +16 to + 19.4 ° C, the average monthly temperature in January is from –18.7 to – 1.6 ° C, the average monthly temperature in July is from +21.5 to + 36,1 ° C.

A. Physical Resources in Project Area

146. Administratively, the territory belongs to the Bokhtar, Vaksh, Levakand and Kushoniyon districts of Khatlon region.

147. The relief of the area is slightly dissected. Typical morphological structures are ridges and sediment fans which diverge towards the south, southwest and southeast. In the same direction, their absolute elevations decrease (from 1000-1500 to 400 m). The inter-montane valleys in the north are narrow V-shaped, to the south they expand significantly, occupying large spaces. In the following, the physical characteristics of the Project Road corridor are described.

Geology

148. Geologically, the Dangara-Guliston road is located in a large geological structure - the Tajik Depression. The consolidated base in the Tajik Depression is largely blocked by a thick cover of Mesozoic-Cenozoic deposits.

149. To describe the geological characteristics of the Dangara-Guliston highway area, 1:200,000 scale geological maps were selected [1-3].¹² The geological information highlighted on these maps was somewhat generalized, i.e. a number of departments, formations and horizons were combined in order to prepare the below Geological map of the Project area (Figure 12). The main types of soil are loess-like loams, pebbles, loesses and sands.

¹¹ World Bank, 2020. Country Context. Available at: <https://www.worldbank.org/en/country/tajikistan/overview> (accessed on 28 July 2020).

¹² 1. Geological map of the USSR. The South Tajik series. J-42-XVI. Authors: A.I.Filonov, A.I.Korol.1964. 2. Geological map of the USSR. The South Tajik series. J-42-XXI. Author: A.P.Molchanov.1964. 3. Geological map of the USSR. The South Tajik series. J-42-XXII/XXVIII. Author: N.N.Kuznetsov. 1964.

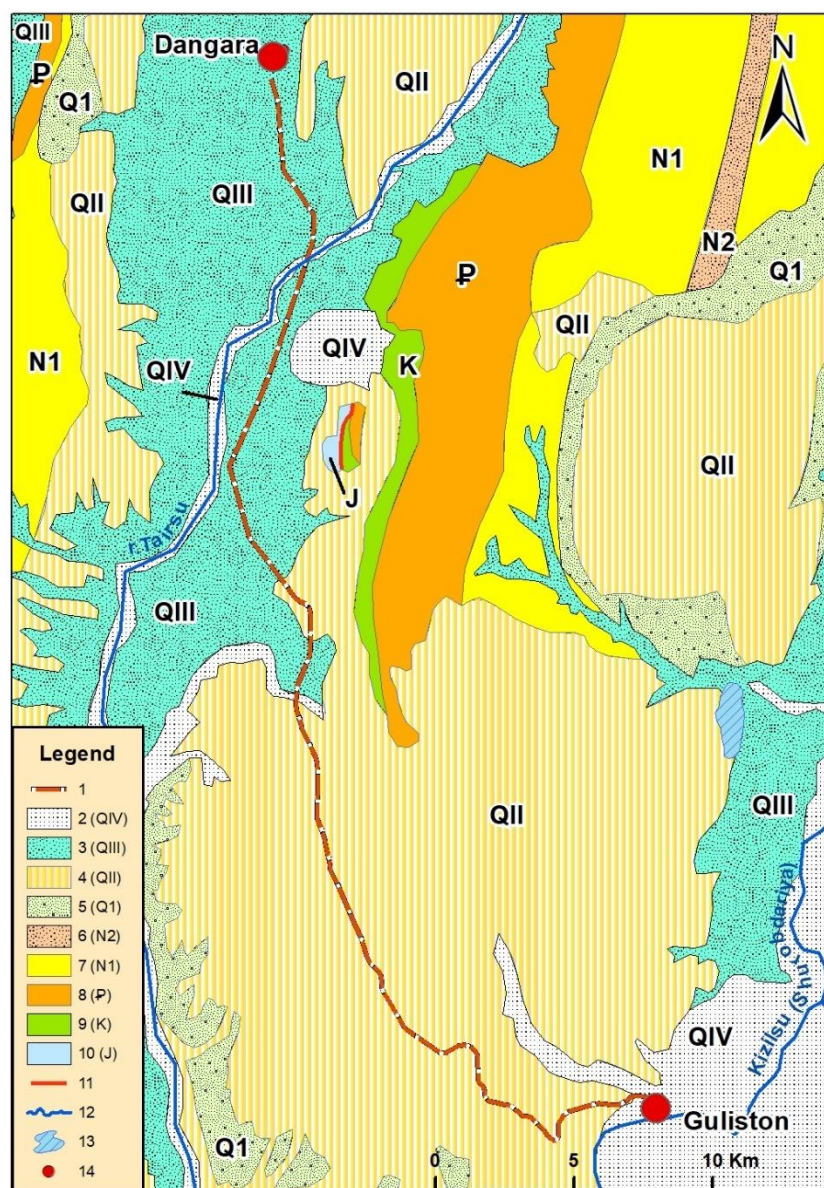


Figure 12 - Geology of the Dangara-Guliston road corridor

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

Figure 13 - Abbreviations

Signature	Description
1	Dangara – Guliston road
2 (QIV)	gravels, sands, loams, loamy sand
3 (QIII)	Sands, loams, pebbles
4 (QII)	Loess-like loams, pebbles, loesses
5 (QI)	Pebbles, conglomerates, sandstones, clays, loess-like loams
6 (N2)	Conglomerates, clays, siltstones, sandstones
7 (N1)	Sandstones, clays, siltstones
8 (P)	Clay, marl, limestone, gypsum, dolomite
9 (K)	Limestone, marls, clays, conglomerates
10 (J)	Sandstones, shales, gypsum, clay, rock, salt
11	Tectonic contact zone

12	River
13	Settlement

151. The entire Dangara-Gulistan highway runs in quaternary sediments of different ages. The beginning of the highway begins in the Upper Holocene sediments, represented by pebbles, sands, loams and sandy loams. Further south of the settlement of Kulbulion, the road passes through the Middle Holocene sediments represented by loess-like loams, pebbles, sands, loess. The highway route ends at the north-western end of the village of Guliston, located on an over-floodplain terrace composed of upper quaternary deposits represented by sands, pebbles and loams.

152. Of the modern geological processes and phenomena that can affect the roadbed, the following should be highlighted: seismicity, mudflow phenomena, subsidence phenomena, to a lesser extent landslides, landslides.

153. Areas of hazardous geological processes identified alongside the Project route are shown in the following table (source: Explanatory Note prepared by company Rohnamo). The recommended actions have been incorporated into the Project design.

Table 13 List of sites affected by exogenous geological processes and phenomena on the Dangara-Guliston highway

№ п.п.	Location			Type of geological process and phenomenon	Recommended activities
	Picketage		Side		
	от	до			
1	4+27	4+83	left	Stagnant water for more than 30 days	Drainage of water through land planning or through provision of a conduit network
2	27+00	29+63	To the right of the main axis of the road	Stagnant water for more than 30 days	Drainage of water through land planning or through provision of a conduit network
3	Bypass road Dushanbe- Guliston PK 4+00	7+60		Ravine erosion of the banks of the irrigation canal, depth on the cliff 8.0-1.5	Fortifying the banks with concrete casing
4	Bypass road Dushanbe- Guliston PK 0-30	0+80	left	Ravine erosion of the banks of the irrigation canal, depth on the cliff 8.0-1.5	Fortifying the banks with concrete casing
5	Bypass road Dushanbe- Guliston 2+10	2+60	left	Stagnant water for more than 30 days	Drainage of water through land planning or through provision of a conduit network
6	34+30	47+62	right	3 zones, according to the conditions of humidification of GW, lie at a depth of 0.5 m	Drainage of water through land planning or through provision of a conduit network

№ п.п.	Location		Side	Type of geological process and phenomenon	Recommended activities
	Picketage				
	от	до			
7	63+00	68+00	left	Tairsu River along the entire riverbed, washing away and collapse of the banks	Fortifying the banks with concrete casing
8	68+00	70+80	right	Ravine erosion of the banks of the irrigation Tairsu river, the depth of the cliff - 10.0	Fortifying the banks with concrete casing
9	76+20	81+00	left	Stagnant water for more than 30 days	Drainage of water through land planning or through provision of a conduit network
10	78+00	79+20	right	Stagnant water for more than 30 days	Drainage of water through land planning or through provision of a conduit network
11	122+00	123+60	right	Stagnant water for more than 30 days	Drainage of water through land planning or through provision of a conduit network
12	123+50	124+20	left	Stagnant water for more than 30 days	Drainage of water through land planning or through provision of a conduit network
13	151+00	151+80	left and right	Stagnant water for more than 30 days. Flooding by waters of the drainage channel	Drainage of water through land planning or through provision of a conduit network
14	159+20	159+80	left	Washouts in the embankment of the highway from the irrigation ditch	Repair of embankment
15	160+50	161+00	right	Washouts in the embankment of the highway from the irrigation ditch	Repair of embankment
16	193+00	194+60	left	Stagnant water for more than 30 days. Flooding by water of the drainage channel	Drainage of water through land planning or through provision of a conduit network
17	197+00	198+20	left and right	Irrigation ditch crosses the road. A swampy area forms around the road	Drainage of water through land planning or through provision of a conduit network

№ п.п.	Location			Type of geological process and phenomenon	Recommended activities
	Picketage		Side		
	от	до			
18	202+70	203+60	left and right	Flooding of the road embankment	Drainage of water through land planning or through provision of a conduit network
19	206+00			Spring No.1: The spring is located at the bottom of a ravine that crosses the road	Culvert
20	208+40	209+60	right	The lake is fed by spring No. 2	If the road passes through a cut near a lake, it is recommended to drain the waters of the lake down the terrain
21	209+30		left	Spring No.2	Captation of sping №1
22	216+40	224+40	right	Excessively saline soils	It is not recommended to leave such soils in the working layer
23	219+30	223+80	left	Excessively saline soils	It is not recommended to leave such soils in the working layer
24	221+90	224+40	left	Mudflows from the hills gather at the foot of the embankment of the highway	Draining the mudflows by culvert down the terrain
25	225+40	226+50	left and right	Suffusion processes. There is a crack in the roadbed.	Loosen the soil to a depth where suffusion bands are not visible and then re-compact well
26	225+60		left	Spring No. 3: The waters of the spring form a stream that intersects the roadbed of the projected road	Culvert
27	226+20	229+00	left and right	Suffusion processes. There is a crack in the roadbed.	To loosen the soil to a depth where suffusion bands are not visible and then to re-compact well
28	239+30	241+40	right	Rainwater is collected under the embankment of the highway	Drainage of water through land planning

№ п.п.	Location		Side	Type of geological process and phenomenon	Recommended activities
	Picketage				
	от	до			
					or through provision of a conduit network
29	240+60	242+40	left	Rainwater is collected under the embankment of the highway	Drainage of water through land planning or through provision of a conduit network
30	314+60		right	Stagnant water for more than 30 days	Drainage of water through land planning or through provision of a conduit network
31	348+00	348+60	right	Stagnant water for more than 30 days	Drainage of water through land planning or through provision of a conduit network
32	336+30	341+00	right	Rain water runoff not regulated	Provision of a conduit network along the highway route
33	395+60	396+80	left	Suffusion processes in the roadbed of the old highway. Currently, the new road runs in a different location	To fill suffusion funnels
34	409+60	410+40	left and right	Suffusion processes. In the upper and lower slopes	To fill suffusion funnels
35	419+00	448+20	crossing the road	Unregulated rainwater runoff.	Rainwater drainage by culverts or upland ditches
36	454+80	455+20	left	Gully erosion	Backfilling of ravines. Tree planting
37	455+00	457+60		The roadbed is in a state of waterlogging	Fixing of soils to a depth of 1.5 m with a large- sized stone
38	465+10	468+60	right	Stagnant waters for more than 30 days in the form of three lakes	Drainage of water through land planning
39	475+40	489+40	right	There is a deep ravine along the road.	The ravine should be filled up. Rain water should be diverted to the conduit network

Seismicity

154. The most dangerous and unpredictable phenomenon for the route of the Dangara-Gulistan highway is seismicity. The entire highway route passes in the zone of possible 7-point concussions (Figure 14 below)¹³. Most of the road falls into a zone capable of generating earthquakes with a magnitude of up to 5.5.

155.

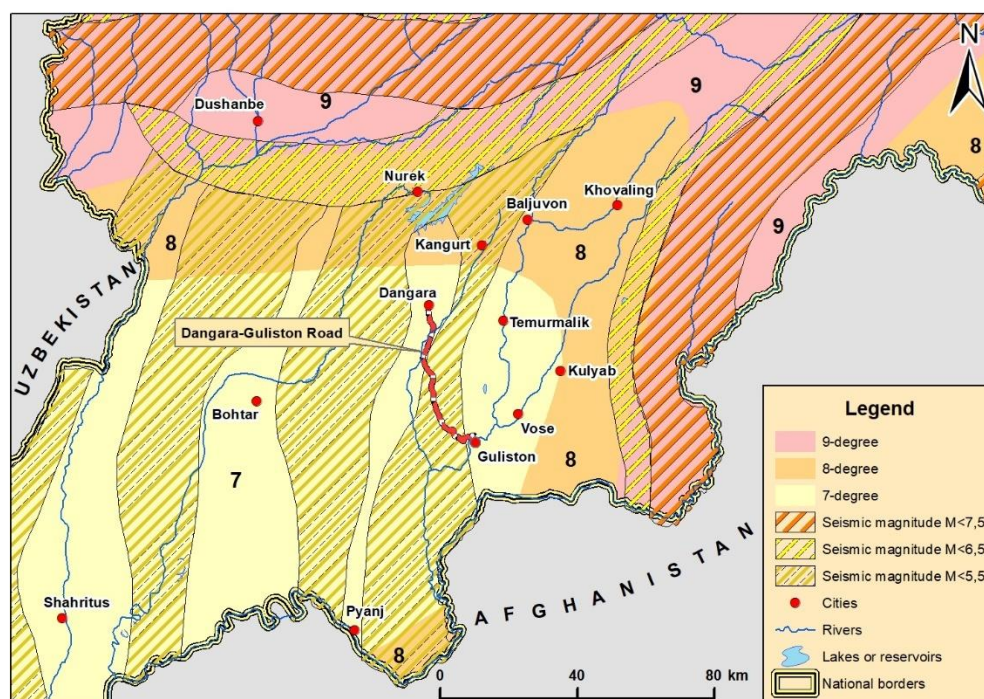


Figure 14 - Seismicity in the project road corridor and the wider vicinity

Geomorphology and Natural Hazards

156. The relief of the study area is formed by two leading exogenous factors, - denudation and accumulation – and can therefore be divided into two main geomorphological types of landforms: denudation- and accumulative forms. The first is localized in the areas of the newest uplifts, the second - in the areas of subsidence.

157. Among the denudation type of relief erosion is the main forming process. Morphologically, it is a hilly-ridge relief of watersheds with preserved fragments of erosional terraces on the slopes. The relative elevations of individual forms increase from west to east from 200-300 to 400-500 m. Fragments of erosional terraces preserved on the slopes of large ridges occupy small areas and are represented by perfectly flat areas with clearly expressed steep ledges. On separate sections of the Project road Dangara - Guliston, separate small-sized karst forms are observed: craters, sinkholes, karrs, etc.

¹³ Babaev A.M., Koshlakov G.V., Mirzoev K.M. Seismic zoning of Tajikistan (explanatory note). Dushanbe: Donish, 1978, 68c.

158. The accumulative relief is subdivided into two subtypes: the alluvial relief of the valleys of the foothill plains and the proluvial relief of the fans.

159. The alluvial relief of the valleys of the foothill plains is confined to the upper parts of the slopes of the Tairsu river valleys. Within this complex, there are three regional terraces, the deposits of which are sequentially nested into each other. The hypsometric position of these terraces varies from river mouths to their upper reaches as follows: the upper terrace is from 900-1000 to 1100-1200 m, the middle is from 680-720 to 760-800 m, and the lower is from 640-680 to 700-750 m.

160. The upper terrace, as a rule, is erosion-accumulative, the middle and lower, which are the most widespread, are accumulative. In the latter case, the basement of the bedrock reaches the surface only in the regions of the newest uplifts. In these cases, all the terraces have an elevated hypsometric position of 150-200 m. At present, there is a monotonous hilly relief, called by previous researchers "adyrny". The dissection depth of each terrace is no more than 70-100 m.

161. The accumulative forms of modern relief are represented by the second and first above-floodplain terraces and floodplains, usually leaning against the Upper Quaternary forms of erosional and accumulative reliefs. The first and second terraces have been preserved as separated narrow strips. The relative height of these terraces above the modern river beds decreases upstream: the second from 6 to 8 m and the first from 1.5 to 5 m. The floodplains and thalweg of modern valleys are located within the absolute heights from 500 to 1000-1500 m. The greatest areal development they are used in the valleys of the Yakhsu and Kyzylsu rivers, where they can be traced for several tens of kilometers with a width of 2 to 5 km.

162. In the proluvial topography of the lower tier, it seems possible to distinguish two age generations: weakly dissected soddy fan cones and proluvial trails of Upper Quaternary age; modern fan cones. They are composed of fragments, less often boulders of massive rocks, cemented with sandy-clay cement. From the surface, the cones are covered with loess-like loams. Their surface is mostly cut by dry ravines. In relief, they are fan-shaped. Modern cones are developed in all river and sai valleys with temporary streams.

163. Among the most active dangerous geological processes in the study area are: landslide processes in loess and loess-like loams (in a medium degree); mudflow processes in sediments of the Neogene and Lower Quaternary sediments (in an average degree); floods in the riverbed of the valley (often); processes of gully and river (lateral) erosion (often); rockfalls and talus (very rare); karst and suffusion processes (medium). Identified damages due to geomorphological and geological processes are shown in table 13.

Soils

164. Soil erosion is a major environmental concern throughout Tadjikistan 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.

165. The Dangara-Guliston road passes through three soil zones as shown in below figure. Most of the route passes through dark gray soils that overlap upper quaternary deposits.¹⁴ Then the road passes through light gray soils and ends in gray-meadow soils on the terrace of the valley of the Kyzylsu river.

¹⁴ Tajik Soviet Socialist Republic (encyclopedia). Editor-in-chief M.Asimov. Dushanbe, 1984, 504 p.

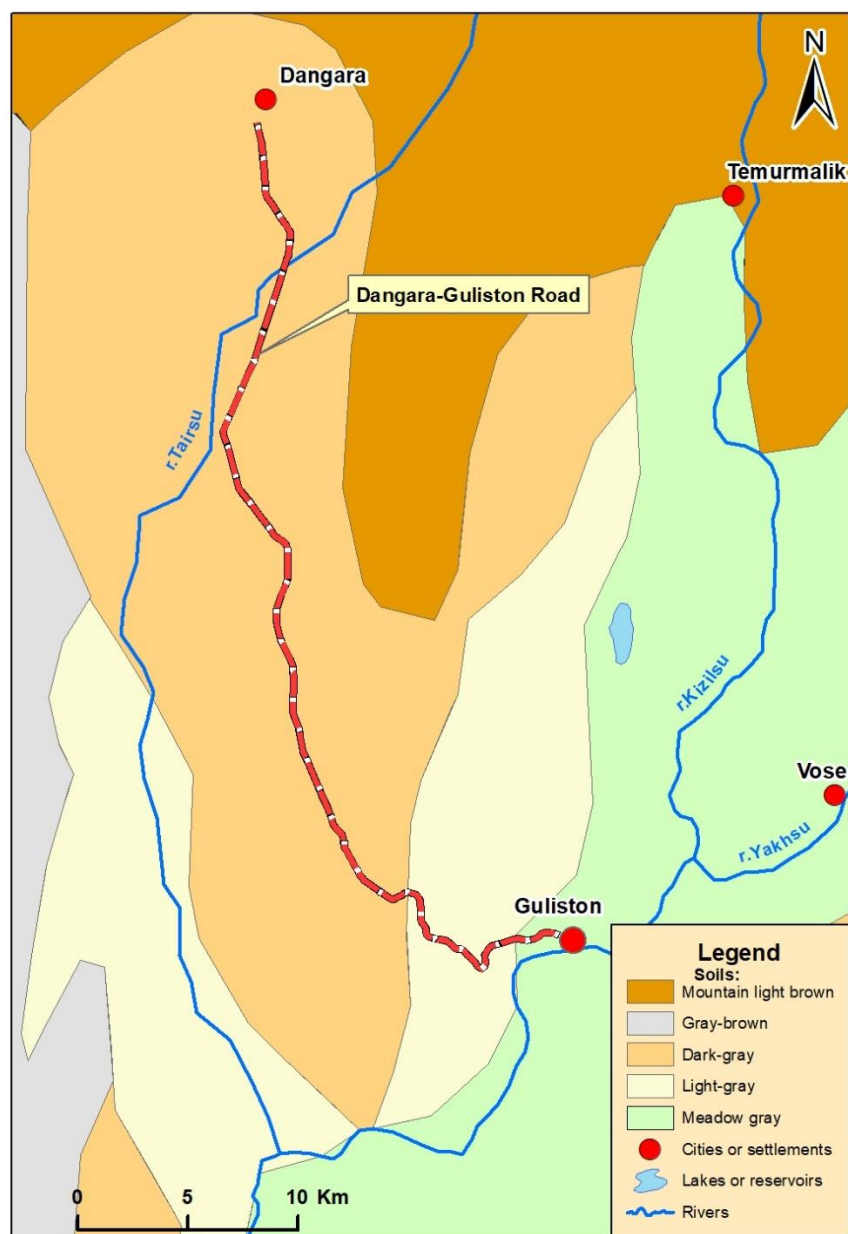


Figure 15 – Soil Zones traversed by Project Road

Climate

166. 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.

167. In climatic terms, the location of the Dangara-Guliston road belongs to the Central Asian region. This is a dry climate zone with very warm summers, mild winters and moderately mild autumns (Fig. 16). The end of the road is located in a drier zone, where the nature of moisture and the ratio of complex evaporation to precipitation is more than 3.0.¹⁵

¹⁵ The Tajik Soviet Socialist Republic. Chief editor: M.S.Asimov. Dushanbe, 1984. 504 p.

168. The average temperature of the hottest month - July exceeds 31 ° C, and the coldest - January - fluctuate between +2 and -2 ° C.
169. Figure 16 below shows the climatic zones of Tajikistan and the location of the Dangara-Guliston Project Road.

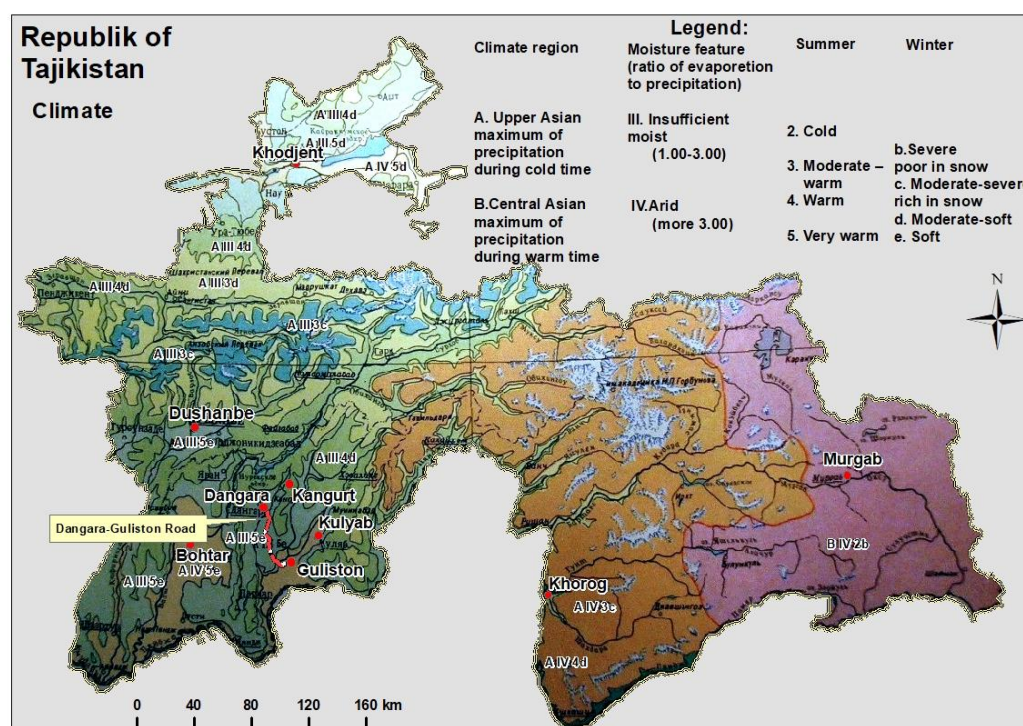


Figure 16 - Climate zones of Tajikistan and Project Road

Climate Change

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

Surface Water Resources

171. The Dangara-Gulistan road runs almost in a waterless zone (Figure 17) below.¹⁶ It crosses the valley of the Tairsu River by means of a sufficiently dimensioned bridge and ends in the valley of the Kyzylsu River to which the Tairsu River is a tributary. The main characteristics of these rivers are given in Table 14.¹⁷

Table 14 Hydrological Characteristics of Tairsu and Kyzylsu River

No	River	Catchment area, km ²	Length, km	Drop, m	Average annual flow rate, m ³ /sec
1	Tairsu	1830	104	1710	2,95
2	Kyzylsu	882	220	2370	64,3

¹⁶ Lobko V.Yu., Agapova V.G., Dilmuradov N. Natural resources of the Tajik SSR. Surface waters. Scale 1:500000. Edition of the GUGC of the USSR, 1984..

¹⁷ Hydropower resources of the Tajik SSR. Publishing house: Nedra, Leningrad branch. Leningrad, 1965, 659 p.

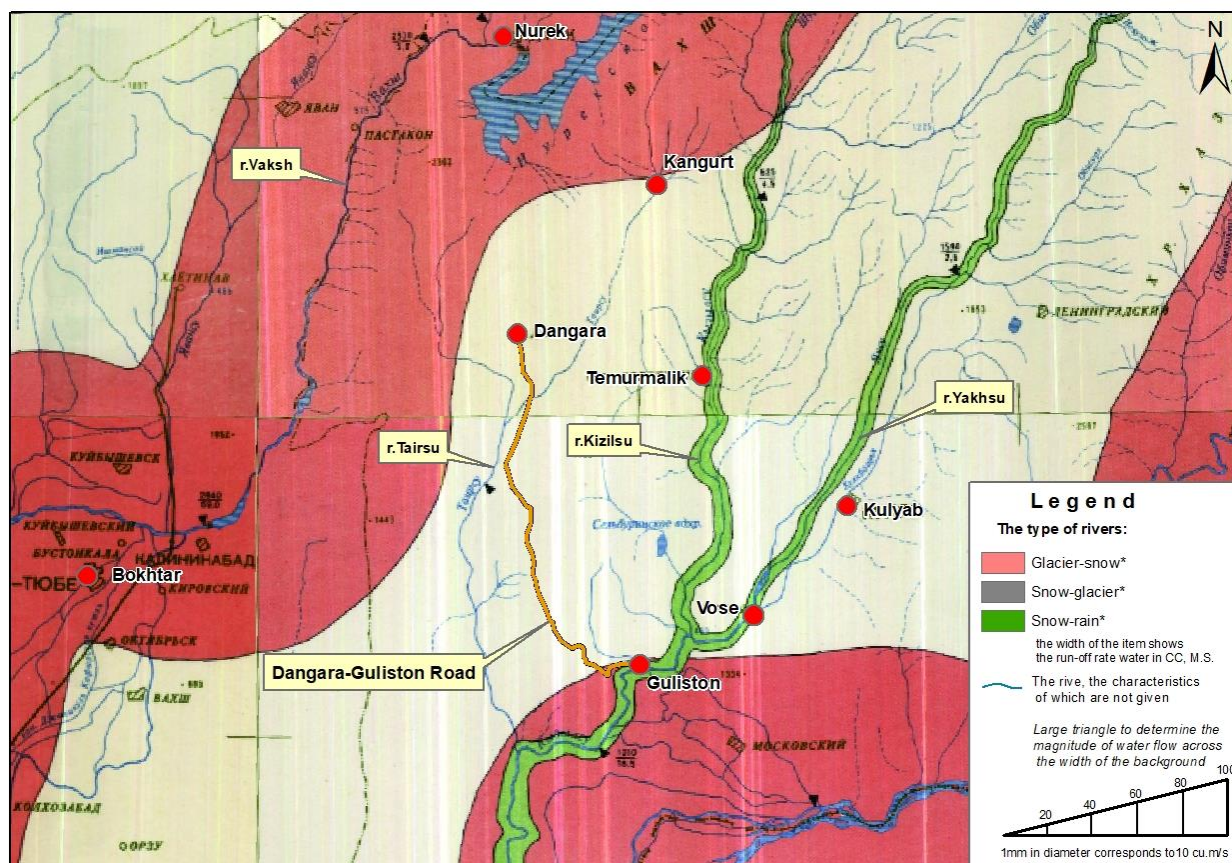


Figure 17 - Surface waters in the Project Road corridor

Ground Water

172. The Dangara-Guliston highway passes through various aquifer complexes of rocks.¹⁸ The northern beginning of the route falls on the above-floodplain terrace of the Tairsu River, represented by pebbles, sands, loams, sandy loams of upper Quaternary age (Figure 18 below).

173. The depth of groundwater here varies within 1-5 meters. Further to the village of Guliston, the route passes through almost anhydrous rock complexes of Neogene-Pleistocene and alluvial-proluvial Quaternary deposits.

¹⁸ Kostyuchenko A.P., Sulim T.V., Krasotin A.V., Sinyukov D.A., Merkulov D.M. Natural resources of the Tajik SSR. Underground water. Scale 1:500000. Edition of the GUGC of the USSR, 1984.

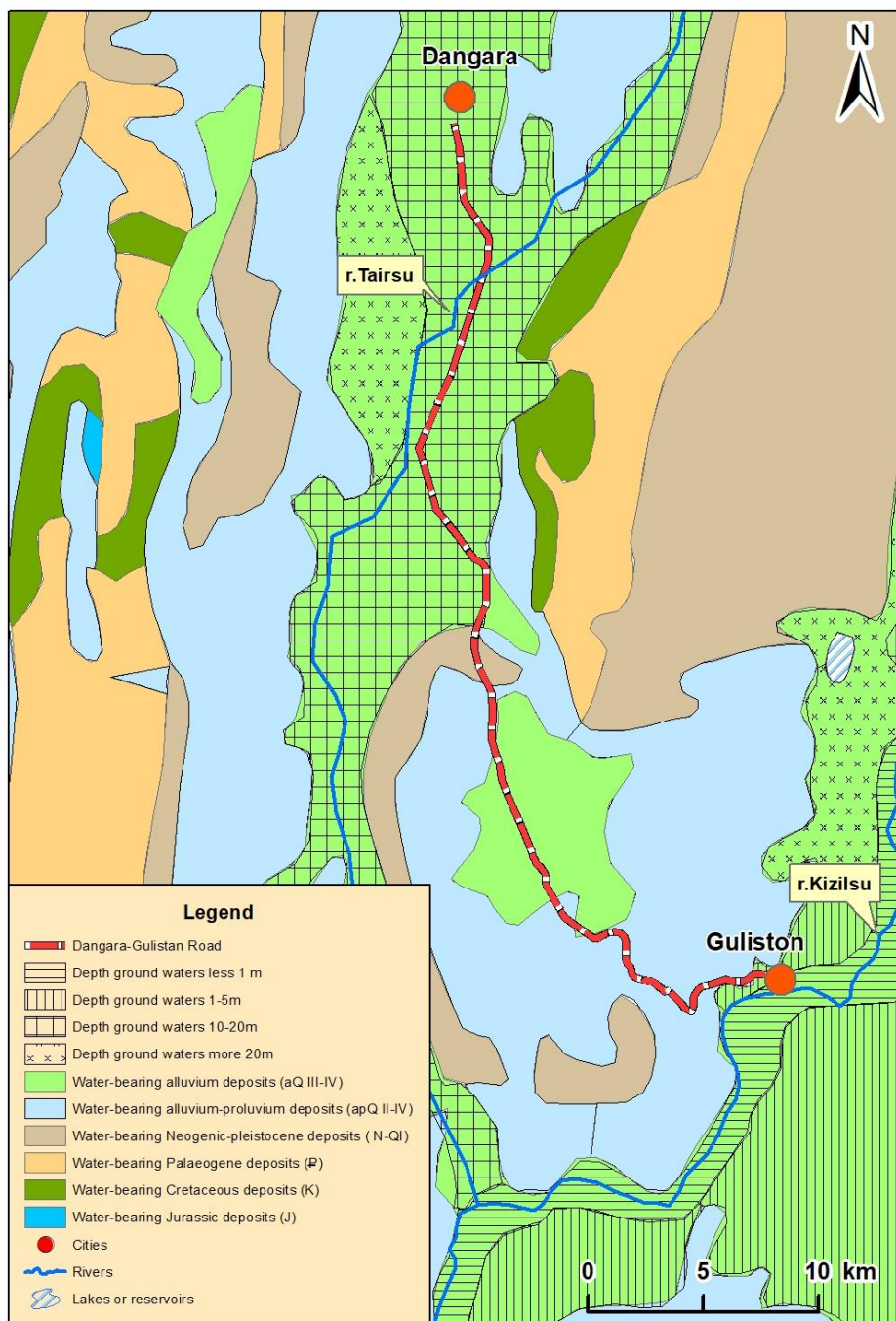


Figure 18 - Ground water resources Project Road corridor

B. Ecological Resources in the Project Area

174. 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.

175. 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 15 - Main Components of Biodiversity in Tajikistan

Component	Importance
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

176. 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.

177. 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.

178. 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 April – August 2020 and study of pertinent literature are described in the following.

Flora and vegetation

179. Most of the road, which runs mainly through hilly terrain, passes in a zone of high-grass vegetation, represented by meadows. When descending from a hilly area, the vegetation gradually turns into various types of ephemera. The final part of the road ends in a zone of low-grass vegetation (Figure 19).¹⁹

¹⁹ Kurbanbekov Z.K., Sidorenko G.T., Safarov N.M., Strizhova T.G. Natural resources of the Tajik SSR. Vegetation. Scale 1:500000. Edition of the GUGC of the USSR, 1984.

180. As can be seen from Figure 20, all nature protection zones are located far from the Dangara-Guliston - road, as a result of which road rehabilitation does not threaten these zones.

181. As the road rehabilitation will be spatially confined to the existing RoW, nearly all tree plantations will remain. In case tree felling is required at certain spots these will be compensated by new tree plantings.

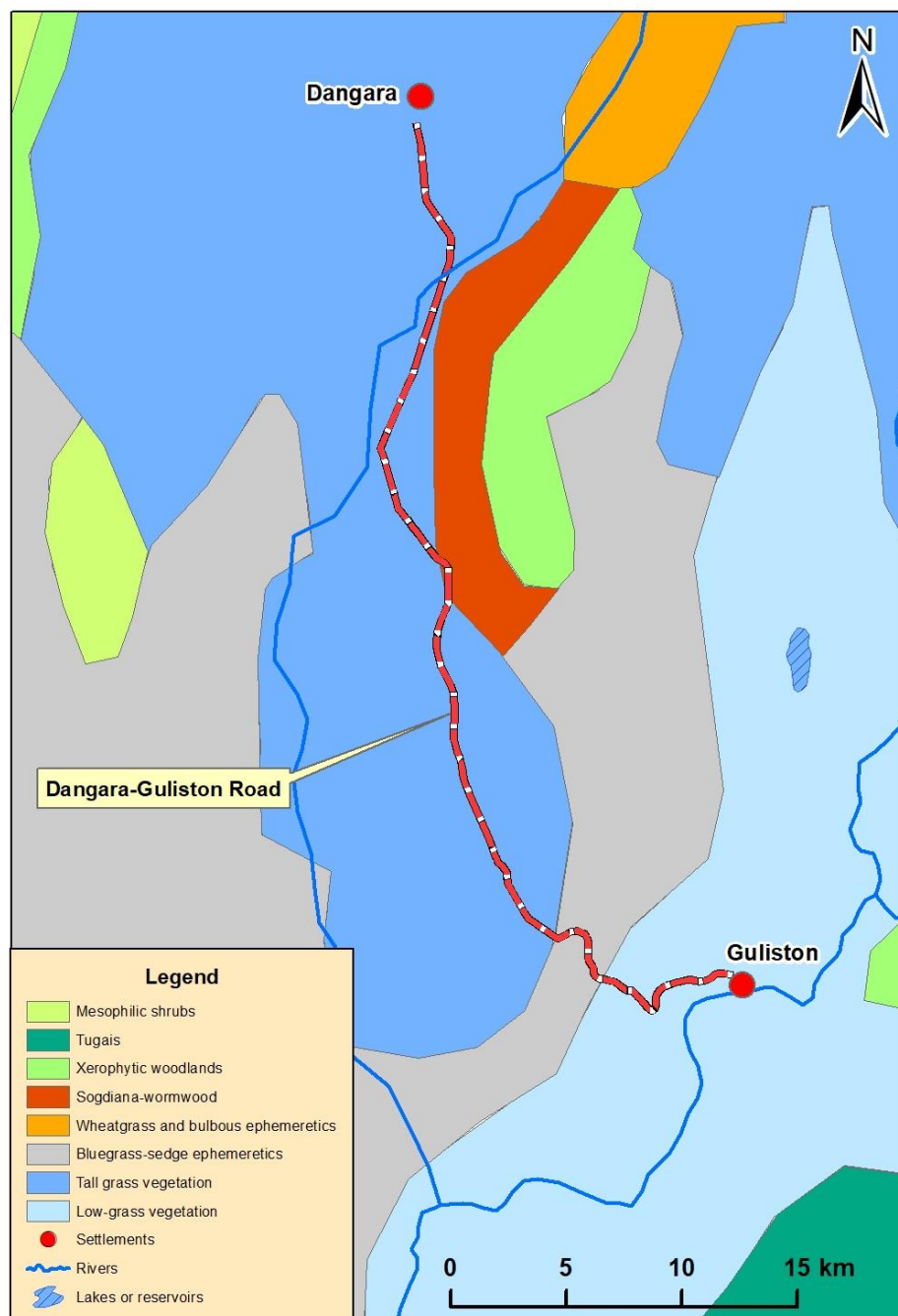


Figure 19 - Project Road and vegetation zones



Figure 20 - Conservation zones and National Protected Areas along the project road

182. Figure 21 provides an overview of the forest areas in Tajikistan.

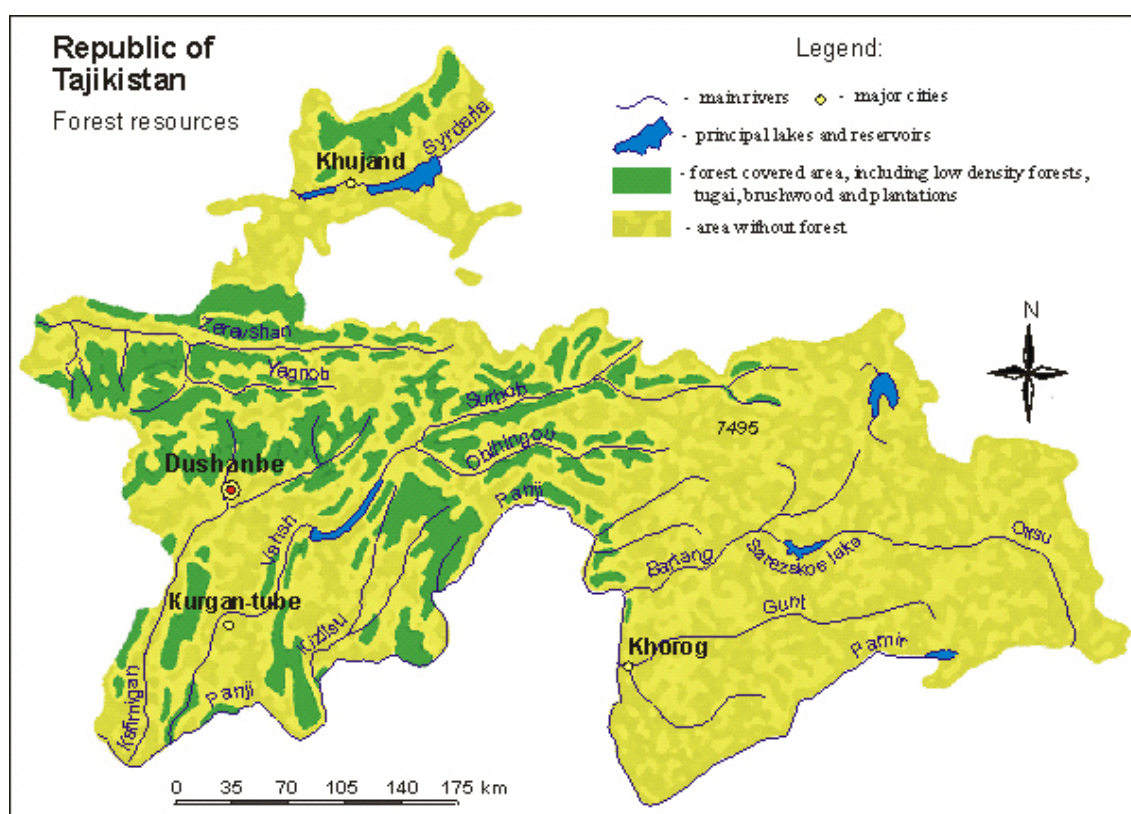


Figure 21 - Forest Resources in Tajikistan

Fauna

183. Tajik fauna is characterized by great genetic diversity. Mountain fauna is richer than that of the plain and contains a substantial number of European-Siberian and East-Asian elements. The fauna of the hot, lowland deserts contains plenty of Indo-Himalaya, Ethiopian, and Mediterranean species.

184. In terms of zoogeographic zoning, the entire length of the Project Road falls under the Tajik zoogeographical site. This site is characterized by an abundance of representatives of all classes of vertebrates. However, commonly the biodiversity alongside roads is reduced as compared to undisturbed areas. Project area is home to two species of amphibians, 40 species of reptiles, 186 species of birds and 45 species of mammals. The most common species here are:

Amphibians - Gray Toad (*Bufo bufo*) and Marsh Frog (*Rana ridibunda*);

Reptiles - Gecko, Turkestan and Steppe Agama, Viper, Cobra, East Boa (*Eryx miliaris*), Steppe Turtle, Glass-lizard (*Pseudopus apodus*) and Blindworm (*Anguis fragilis*); Rare and endangered species included in Red Data Book are cobra and steppe turtle.

Birds - Kestrel, Buzzard, Griffon Vulture, Rock Pigeon, Indian (*Acridotheres tristis*) and Pink (*Sturnus or Pastor roseus*) Starlings, Black-chest and Barn Sparrows, European Bee-eater, Roller, Crested Bird, Magpie, Black Check, Shrike, Long-tailed Shrike, and Barn Swallow; Rare birds such as Partridge, Shahin, Egyptian vulture, Golden Eagle, Saker and Pheasant are seen in this area. Due to their mobility they rarely fall into the car accidents.

Mammals - Wolf, Fox, Porcupine (*Hystrix*), Tolai Hare (*Lepus tolai*), Turkestan Rat, Wood Mouse, Vole (*Microtus*), Gerbils (*Gerbillus*), Long-eared Bat, Horseshoe Bat, Pipistrelle (*Pipistrellus pipistrellus*), Long-eared Hedgehog and other rare and endangered species such as Porcupine, *Vormela peregusna*, Wild cat and Striped hyena may occasionally cross the road.

Fish - There are 52 species of fish in Tajikistan, including acclimatized and accidentally imported, and about 85% of them are inhabitants of the Aral Sea basin. The greatest number of species of fish belong to the carp family - Cyprinidae (23), the second largest number of species is Cobitidae, also known as the True loaches (11), the third - Sturgeons - Acipenseridae (5), and the rest of the family are represented each by one or two species. The most typical fish species in Tajikistan are: Amudarya trout, Marina, Turkestan catfish, carp, Aral and Turkestan barbel, catfish and others; weeds (non-target) species - gudgeon, mosquito fish, and numerous loaches.

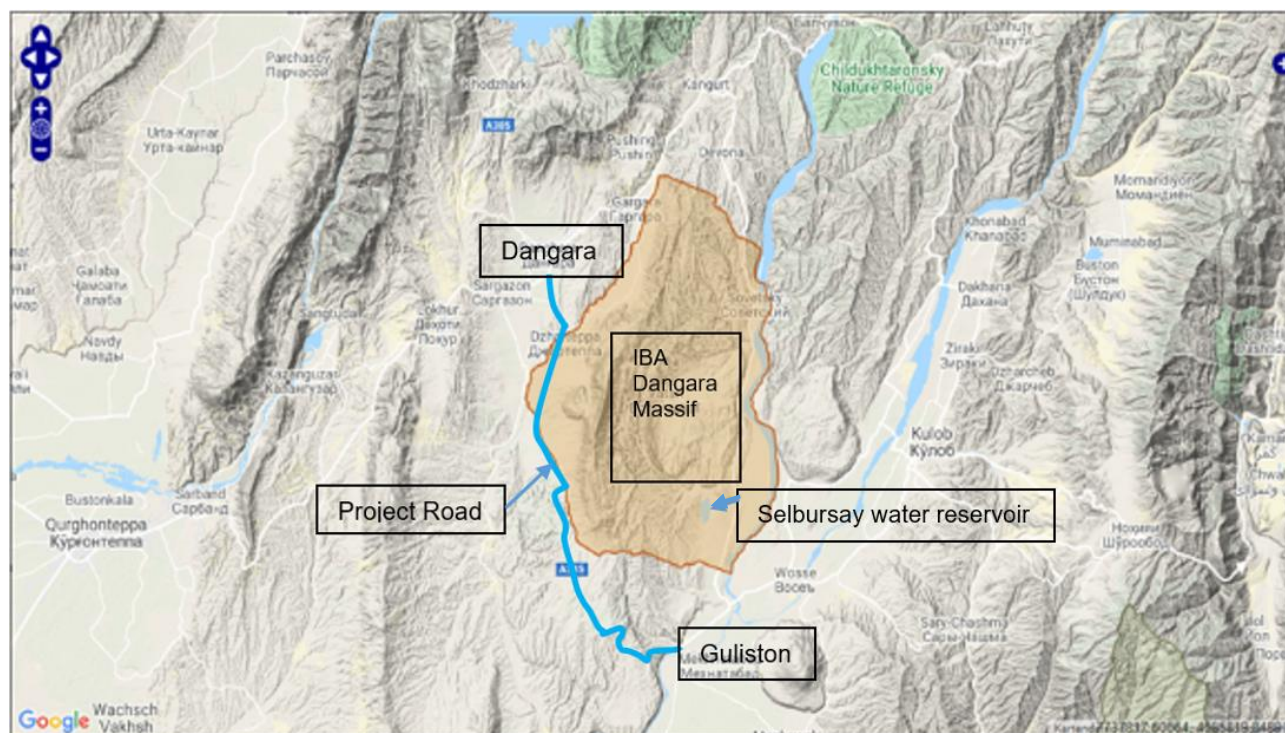
Insects - Among rare and endangered insects which could theoretically be found in the vicinity of the road are the following: the arboreal mantis *Empusa pennicornis* Pallas, the beetle *Carabus tadjikistanus* of the family Carabidae and *Nola elaeagni*, a deltoid moth of the family Noctuidae (Lepidoptera, Butterflies).

1. Protected Areas and Biodiversity

185. As can be seen in Figure 20, there are no protected areas under national law within the Project Area of Influence. Consequently, there is no measurable impact on any of these reserves due to the Project Road rehabilitation.

186. In order to identify areas of international protection status including areas of key biodiversity, an online search was conducted by means of the Integrated Biodiversity Assessment Tool (IBAT)²⁰. The search revealed that the Dangara-Guliston road is running alongside and marginally traversing the IBA Dangara Massif. The area of the IBA Dangara Massif in relation to the Project road is shown in fig. 22.

Figure 22 – IBA Dangara Massif in Relation to the Project Road



²⁰ IBAT is a multi-institutional programme of work involving Bird Life International, Conservation International, IUCN and UNEP-WCMC. IBAT provides a basic risk screening on biodiversity. It draws together information on globally recognized biodiversity information drawn from a number of IUCN's Knowledge Products: IUCN Red List of Threatened Species, Key Biodiversity Areas (priority sites for conservation) and Protected Planet/The World Database on Protected Areas (covering nationally and internationally recognized sites, including IUCN management categories I–VI, Ramsar Wetlands of International Importance and World Heritage sites).

187. According to the site information provided by IBAT, the Dangara massif covers an area of 69,441 ha. It lies between the Vakhsh and Pyandj rivers and is situated between the Vakhsh range and Kizilsu river valley at an altitude of 550-570 m above sea level. The IBA is centred on Dangara mountain. Landscape is characterized by gentle hills, richly vegetated in spring. The natural vegetation is grassland. There are no forest ecosystems. Before development, the massif has been used as autumn-winter pastures. Since construction of the Nurec hydroelectric power station and Nurec water reservoir (about 70 km long and from 800-900 m to 3-4 km wide), there has been the possibility of irrigating the massif and now 20-25% of virgin and long-fallow land has been developed and converted to agricultural land.

188. The transformation of dry steppe vegetation to irrigated agricultural land has also significantly influenced the composition of the area's avifauna. According to the information provided by IBAT, birds adapted to dry land such as the bustards *Otis tarda*, *Chlamydotis undulata* and *Tetrax tetrax*, the stone curlew *Burhinus oedicephalus* and fowl-like birds such as *Pterocles pterocles* and *Pterocles alchata* significantly decreased in their populations or are even extinct now.

189. On the other side, the irrigation which created large plots of cereals, legumes, wetlands and artificial water surfaces such as the Selbursay water reservoir favoured the increase of water birds in the area. Large numbers of *Anseriformes*, *Gruiformes*, *Charadriiformes* and *Lariformes* were found within the IBA and particularly near Selbursay water reservoir.

190. There were more than 18,000 birds (*Anser anser*, *Tadorna ferruginea*, *Anas penelope*, *Anas strepera*, *Anas platyrhynchos*, *Aythya ferina*, *Aythya fuligula*, *Mergus merganser*, *Grus grus* and others) observed on the IBA bird census on 14-15 January 2006. Selbursay water reservoir, situated in the south-east of the Dangara massif, is one of the important ecological factors playing a key role in the wintering, migration and nesting of several hundreds of thousands of waterbirds, cranes, gulls, diurnal raptors and passerines.

191. For the IBA Dangara Massif, 13 trigger species²¹ are identified. However, out of these 13 trigger species only the saker falcon (*Falco cherrug*) is classified as endangered (EN) according to the current IUCN Red List Category. All other species are categorized as least concern (LC).

192. Therefore a biodiversity survey was conducted with focus on identification of habitats of the saker falcon (*Falco cherrug*). In addition, the study area was surveyed for identification of any other bird species that are potentially impacted by the Project Road construction. Annex 4 - BIODIVERSITY SURVEY²²

193. In result, there is no risk identified for the saker falcon from the Project Road rehabilitation. There is however potential impact on bird species nesting in cliffs immediate abutting the Project Road. This refers to representatives of the roller family (*Coraciidae*) like the European roller (*Coracias garullus*), the family of bee-eater (*Meropidae*) (golden bee-eater), starlings (lane or Indian starling) and weaver family (Indian sparrow). In addition, these cliffs are habitats for wintering and sheltering of reptiles and amphibians.

²¹ Trigger (or qualifying) bird species are those for which a site has been recognised as an IBA under any of the global (or, where appropriate, regional or sub-regional) criteria.

²² Note, additional biodiversity studies will be conducted to comply with EBRD requirements. If such survey evidences impacts to endangered or critically endangered species, or if additional mitigation measures, management plans, or changes to biodiversity requirements are necessary, a supplementary document will be developed and disclosed by ADB to report and manage such changes.

194. In result the conducted biodiversity survey comes to the conclusion that the potential impact of the project road rehabilitation on biodiversity is only minor, but mitigation measures must be taken to achieve this. The proposed mitigation measures are incorporated in the EMP.

195. Induced impacts are indirect effects occurring during construction and also operation phase of the Project road. Possible induced impacts associated with the road construction on the Dangara Massiv entail the spread of uncontrolled development activities and threat to natural resources in previously undisturbed area. As the Project involves the reconstruction and widening of an already existing road no significant induced negative impacts are anticipated min this Project.

2. Land use

196. According to socio-economic surveys the main land-use types in the Project area are pasture and wheat growing. The below table (table 16) provides an overview of the agricultural land use pattern of the Project area.

Table 16 - Socioeconomic Profile and Agricultural Land Use of the Project Area

Economic profile of villages in the Project area

Джамо ат	Кишлаки под влияние проектов / Villages affected by Project	Пастби ша (га) / Pasture (ha)	Пшени ца (га) / Wheat (ha)	Орашаем ое земле (га) / Irrigated land (ha)	Не орашаем ое земле(га) / Non- irrigated land (ha)	Фруктов ый сад (га) / Orchard (ha)	Кол- во лошад и / Num,b er of Horses	Кол- во овцы / Numb er of Sheep	Кол- во коров / Numb er of Cows
Корез	Каёнуш	581	152	103	136	47	0	963	186
И.шари ф	Шахбури кухна	713	584	179	1493	31	43	2135	623
	Шахбур	346	273	94	791	8	20	1036	379
	Хурамзам ин	1017	632	192	1496	36	51	2238	728
	Булёни поён	674	534	176	1345	29	47	2085	581
	Дурахшо н	478	356	127	1039	14	32	1835	417
Гулист он	Бахорист он	296	97	152	94	7	29	984	382
3	7	4105	2628	1023	6394	172	222	11276	3296

197. 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

198. 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.²³

C. Socioeconomic Environment

199. This Chapter presents the findings on the major socio-economic characteristics of the affected Project communities.

200. The project is located in the Khatlon Region of Tajikistan. Khatlon Region is one of the most populated of the four regions of Tajikistan. It is situated in the southwest of the country, between the Hisor (Gissarr) Range in the north and the Panj River in the south and borders of Afganistan in the southeast and on Uzbekistan in the west. Khatlon has an area of 24,800 square kilometers and consists of 24 districts – 14 in Western Khatlon and 10 in Eastern Khatlon.²⁴ The total population of Khatlon in 2018 was 3,274,900²⁵. The population characteristics of the Project area is as follows

²³ 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 (accessed on 31 July 2020).

²⁴ World Bank. 2013b. Tajikistan - Reinvigorating growth in the Khatlon oblast (English). Washington DC; World Bank. Available at: <http://documents.worldbank.org/curated/en/728911468119949897/Tajikistan-Reinvigorating-growth-in-the-Khatlon-oblast> (accessed 28 June, 2020)

²⁵ Agency on Statistics under the President of the Republic of Tajikistan. Available at: <https://www.stat.tj/en/database-socio-demographic-sector> (accessed 28 June, 2020)

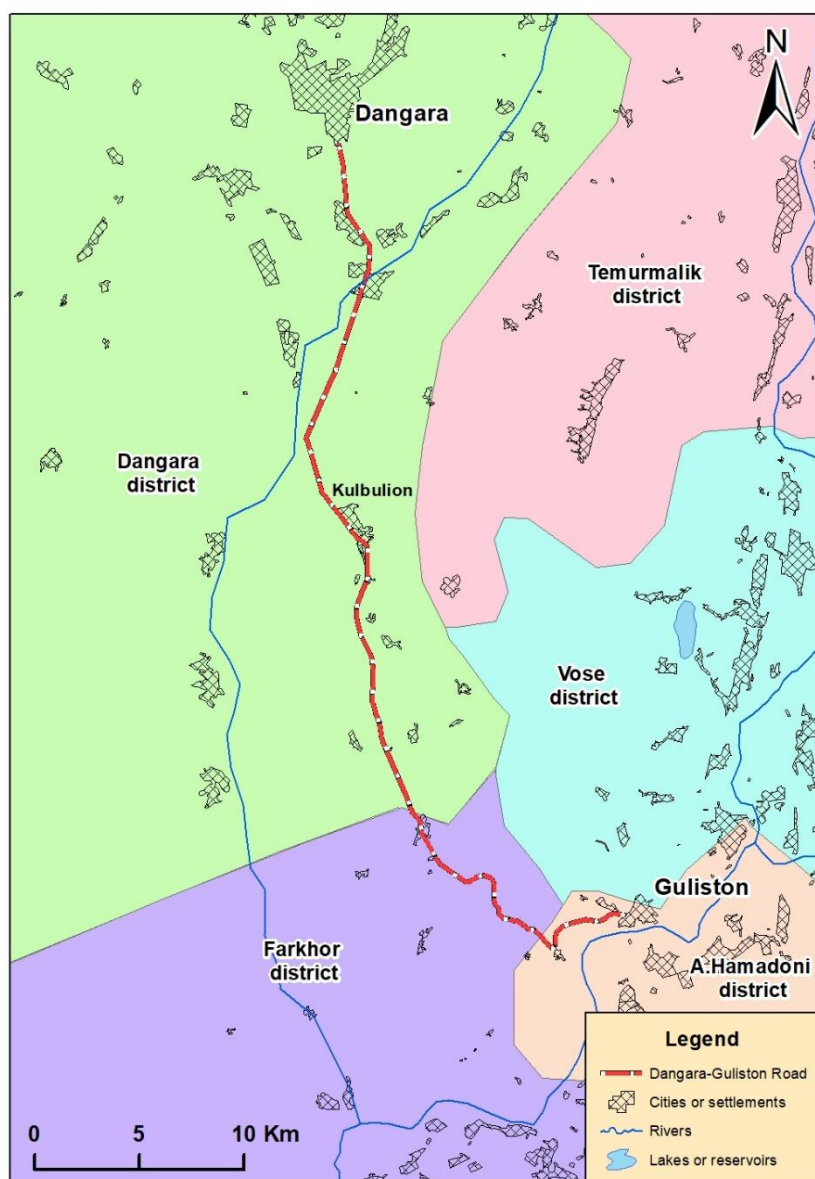
Table 17 - Demographic data in Project impacted Villages

Population in Project Impacted Villages

Район	Джамоат	Кишлаки под влиянием проекта / Villages affected by the Project	Население / Population	Мужчины / Men	Женщины / Women	кол-во домохозяйства / Number of Households	Средние количество члены домохозяйство / Average number of household members
Дангара	Корез	Каёнуш / Kayonush	2.072	1.061	1.011	437	4,7
	И.Шариф	Шахбури кухня / Shakhburi Cuisine	3.891	1.934	1.957	736	5,2
		Шахбур / Shabur	1.804	907	897	198	9,1
		Хурамзамин / Khuramzamin	5.786	2.892	2.894	826	7
		Булёни поён / Buleoni Roʻyon	4.520	2.261	2.259	600	7,5
		Дурахшон / Durakhshon	1.663	870	793	332	5
Восе	Гулистон	Бахористон / Bahoriston	1.097	511	586	134	8,1
Итог:	3	7	20.833	10.436	10.397	3.263	46,6

201. Administratively, the Dangara-Gulistan highway passes through three districts of the Khatlon region: Dangara, Farkhor and A.Hamadoni (fig. 23).²⁶

Figure 23 - Map of administrative units of the Dangara-Guliston



Profile of the Project Area

202. The proposed road project is located in Khatlon Region. The above figures shows the administrative units and settlements²⁷ alongside the Project Roads.

203. Khatlon Region is one of the most populated of the four regions of Tajikistan. It is situated in the southwest of the country, between the Hisor (Gissar) Range in the north and the Panj River in the south and borders on Afghanistan in the southeast and on Uzbekistan in the west.

²⁶ Map of administrative divisions of the Dangara-Guliston highway. (Settlements are plotted from satellite images of 2015-2018).

²⁷ The settlements are plotted from space images of 2015-2017

204. Khatlon has an area of 24,800 square kilometers and consists of 24 districts – 14 in Western Khatlon and 10 in Eastern Khatlon. The total population of Khatlon in 2019 was 3,274,900 up from 2,677,251 in the 2010 population census. The population in Khatlon is mainly engaged in Agriculture.

205. The following table presents the economic profile of the rayons in the Project area.

Table 18 - Economic profile of the rayons in the Project area.

Economic Profile of the Rayons of the Project Area

Район	Джамоат	Пшеница (га) / Wheat (ha)	Фруктовый сад (га) / Orchard (ha)	пастбища (га) / Pasture (ha)	Орошаемые земли (га) / Irrigated Land (ha)	Не орошаемые земли (га) / Non Irrigated Land (ha)	Кол-во лошадей / Number of Horses	Кол-во овец / Number of Sheep	Кол-во коров / Number of Cows
Дангара	Корез	1.707	544	6.398	1.119	1.625	442	12.827	2.473
	И.Шариф	7.363	222	11.271	2.591	20286	559	34.603	8.895
Восе	Гулистон	1.578	97	5.805	2005	1.478	483	19.164	7.692
Итого:	3	10648	863	23474	5715	23389	1484	66594	19060

206. The poverty rate of the Project area is shown in the following table.

Table 19 – Poverty Rate in the Project Area

Poverty Rate in Jamoats in the Project Area

Район	Джамоат	Кол-во домохозяйств / Number of Households	Кол-во бедных домохозяйств / Number of poor households	% бедных домохозяйств / Percentage of poor households	Женщина глава домохозяйства / Women headed household	Женщина глава бедных домохозяйств / Women headed poor households	% женщина глава бедных домохозяйств / Percentage of female headed poor households	Кол-во женщин в руководящей позиции / Number of females in management positions
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Traffic Noise Assessment

Данг	Корез	3.185	340	10,67	382	89	23,29	46
ара	И.Ша риф	4.064	805	19,8	369	96	26,01	12
Восе	Гулис тон	3.161	567	17,93	418	124	29,66	21
Итог :	3	10.410	1.712	48,400	1.169	309	78,96	79

Results of Socio-economic Assessment

207. Potential adverse Social and LARP impacts are addressed thorough mitigation measures prescribed in the LARP.

208. Main economic activities in the region are related to agriculture farming and horticulture. Some run small shops selling construction materials, consumer goods as well as local agricultural produce.

209. Rural and urban lifestyles differ in terms of main sources of income. In terms of job opportunities regional centres are in more advantageous position because there are more operating state institutions, such as education and health care facilities, as well as enterprises and private businesses.

210. Most households in the Project area keep some cattle and poultry. Some households also run private business or are employed locally and receive regular wages. Many households rely on pensions and earnings from selling surplus agricultural produce at the local market or to the wholesalers at the farm gate prices.

Cultural and Historical Sites

211. There is 1 cemetery that is affected at 2 locations by the Project road. The location of the cemetery is in Vose district, jamoat Abdi Avaz near village Guliston. Location is shown in the map in figure 24²⁸. In addition, a photo of the cemetery is shown under number 9 in the alignment sheets (annex 3).

²⁸ Map Source: Google Earth.



Figure 24 – Location of Cemetery

212. The cemetery is affected at 2 locations as shown in the below table that is an extract of table 57 of the LARP.

Table 20 – Affected Assets alongside Cemetery

No	Tenure status of affected assets ²⁹	Affected Asset	Land (m ²)	PCS	Sqm (m ²)	CBM (m ³)	Compensation (TJS)	Compensation (USD)
1	Public place (Cemetery) Guliston Jamoat #1 - from km 489+7,34 to 483+93,39_L #2 - from km 488+67,76 to 489+37,48_R	Fence	692.6	-	241.6	0.86	50,261	4,605.40
	TOTAL		692.6	-	241.6	0.86	50,261	4,605.40

213. The area of land take is the narrow strip of land along the edges of the cemetery territory attached with the fence, that is subject to cash compensation at replacement value calculated by SUE

²⁹ Extracted from table 57 of the LARP “Cost for reinstatement of public assets attached to State land”

valuators. There are no graveyards affected at all. The local government and commentary managements have been informed during the DMS, inventory of assets and valuation.

214. Since no graveyards or access to cemetery is to be affected by the road ROW there was no public consultation required to address impact to the fence of the cemetery.

D. ALIGNMENT SHEETS

215. Alignment Sheets for providing an overview of environmental hotspots and sensitive receptors alongside the Project Road are attached in NOISE MONITORING

216. TAJ: ROAD NETWORK SUSTAINABILITY PROJECT (DANGARA – GULISTION SECTION)

NOISE ASSESSMENT REPORT

1. Introduction

This noise impact assessment was prepared for the construction of the Dangara – Guliston road section. The noise study will be part of the overall impact assessment process and is part of the supplementary ESIA report.

Some of the most pervasive sources of noise in the environment come from transportation systems. Traffic noise is a dominant noise source in urban and rural environments accounting for about 80 % of total noise pollution.

Traffic noise has a variety of adverse impacts on human health. Community noise, including traffic noise, is already recognised as a serious public health problem by the World Health Organization, WHO.

An increase in traffic volumes, vehicle speeds, or the amount of heavy trucks will increase traffic noise levels. Therefore, an assessment has been undertaken to determine future traffic noise levels at sensitive receptors located adjacent to the project roads.

The purpose of the project noise assessment was to assess potential changes in noise levels due to the Project and to determine if the Project meets relevant noise regulations.

The approach for the Project noise assessment was to:

- determine the relevant assessment criteria for road traffic noise along project road corridor
- predict road traffic noise levels for the Year 2040 at sensitive receptor locations in the study area
- recommend practical noise attenuation strategies (if required).

2. Project Description

The Dangara-Guliston Project Road section spans 49 km and is a crucial route of regional significance in the southern region of the Republic. It is part of the Bokhtar-Okmazor-Dangara-Guliston road, a vital trunk road of international importance in Tajikistan. It facilitates key transport links and the supply of agricultural products and industrial raw materials. The road partly traverses hilly terrain, featuring small curves and steep gradients. The Dangara-Guliston road connects the districts of Dangara, Farkhor, and A. Hamadoni,

linking the Jamoats of Korez, Ismat Sharif, and Guliston to the cities of Dangara and Guliston. The map in the following Figure 1 provides an overview of the Project Road.

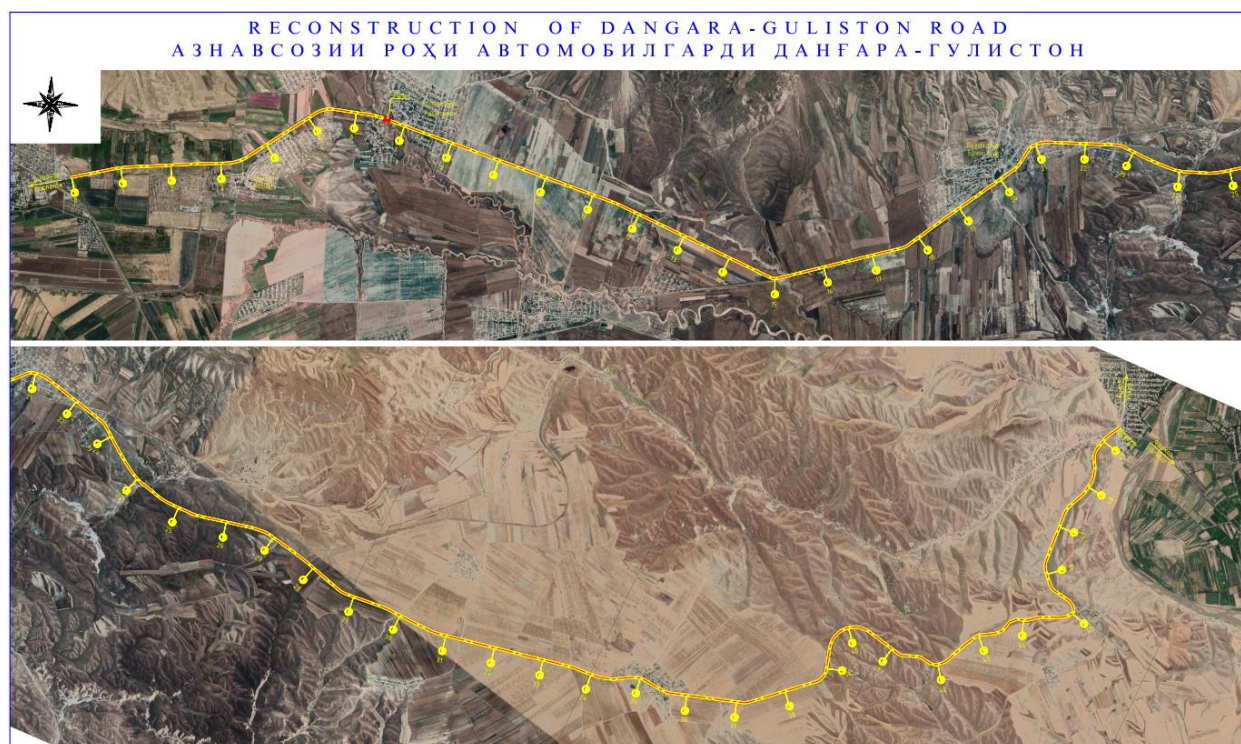


Figure 37 – Project Location Map of the Dangara-Guliston Road

The existing road is classified as technical category III and comprises one carriageway with two traffic lanes. Traffic volume assessments indicate that the current road category is insufficient for anticipated future traffic volumes. Therefore, an upgrade to two carriageways with four lanes is necessary.

The designed cross-section of the road includes four driving lanes, a central dividing strip, shoulders, and sidewalks within the green zones in settlements. Sidewalks are located on both sides and, in some areas, on one side of the road. According to the Terms of Reference for the design, a bicycle path is provided along the entire length of the road (on the right side). Depending on the terrain, twenty-four types of cross-sections were adopted during the project development, as detailed in Book 1 of the technical project documentation - Typical Drawings. The following figures illustrate the typical cross-sections outside settlements. The width of the cross-section including the bicycle lane and the shoulders is 29 to 30 meters as compared to the approximately 10 meters of the existing road (2 x 3,75 m driving lanes plus shoulders).

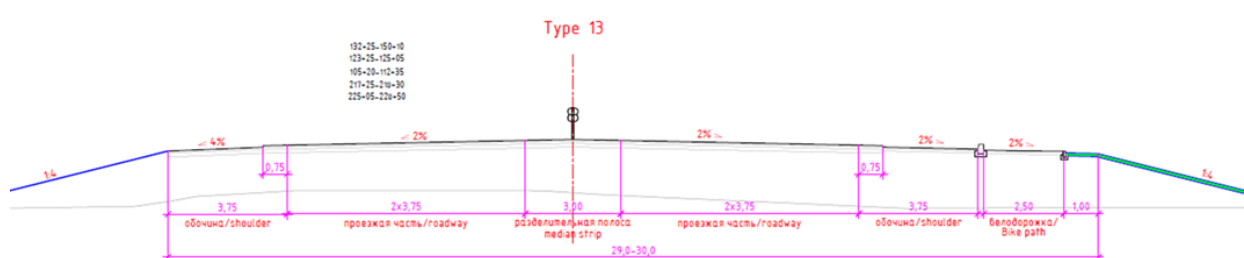


Figure 2 - Typical cross section outside settlements (4-lanes. Technical Category I)

The detailed design road was developed in accordance with the current regulatory documents of the Republic of Tajikistan.

- GNiP RT 32-02-2012 "Highways";
- GNiP RT 30-01-2018 "Urban planning. Planning and development of settlements";
- SNiP 3.06.03-85 Highways.

The design includes the widening of the road to 4-lane standard (technical road category Ib in rough design, construction of interchanges and the improvement of alignment, where necessary).

3. Fundamentals of Traffic Noise

Traffic noise is usually a composite of noises from engine exhaust and tire-road surface interaction. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired.

Noise levels near roads depend mainly on following main variables:

1. Traffic volume
2. Traffic speed
3. Amount of heavy trucks (as a percent of total trucks)
4. Distance from the roadway
5. Intervening topography

Generally, traffic noise increases with higher traffic volumes (more vehicles means more noise), higher speeds (faster vehicles makes more noise, and more heavy trucks (trucks makes more noise than passenger vehicles).

Sound is the sensation produced in the ear as a result of fluctuations in air pressure, superimposed on the steady atmospheric pressure. The ear responds to these much smaller fluctuations with great sensitivity.

The magnitude of noise is usually described by a ratio of its sound pressure to a reference sound pressure, which is usually twenty micro-Pascals (20 μ Pa). Since the range of sound pressure ratios varies greatly over many orders of magnitude, a base-10 logarithmic scale is used to express sound levels in dimensionless units of decibels (dB). The commonly accepted limits of detectable human hearing sound magnitudes is between the threshold of hearing at 0 decibels and the threshold of pain at 140 decibels.

Sound frequencies are represented in units of Hertz (Hz), which correspond to the number of vibrations per second of a given tone. A cumulative 'sound level' is equivalent to ten times the base-10 logarithm of the ratio of the sum of the sound pressures of all frequencies to the reference sound pressure. To simplify the mathematical process of determining sound levels, sound frequencies are grouped into ranges, or 'bands.' Sound levels are then calculated by adding the cumulative sound pressure levels within each band, which are typically defined as one 'octave' or '1/3 octave' of the sound frequency spectrum.

The commonly accepted limitation of human hearing to detect sound frequencies is between 20 Hz and 20,000 Hz, and human hearing is most sensitive to the frequencies between 1,000 Hz – 6,000 Hz. Although people are generally not as sensitive to lower-frequency sounds as they are to higher frequencies, most people lose the ability to hear high frequency sounds as they age. To accommodate varying receptor sensitivities, frequency sound levels are commonly adjusted, or 'filtered', before being logarithmically added and reported as a single 'sound level' magnitude of that filtering scale. The 'A-weighted' decibel filtering scale applies numerical adjustments to sound frequencies to emphasize the frequencies at which human hearing is sensitive, and to minimize the frequencies to which human hearing is not as sensitive. When people make judgments of the relative loudness or annoyance of a

sound, their judgments correlate well with the A-scale sound levels of those sounds. An A-weighted sound level is described as LA dB.

0 below describes typical A-weighted noise levels for various noise sources and shows levels of noise associated with common activities.

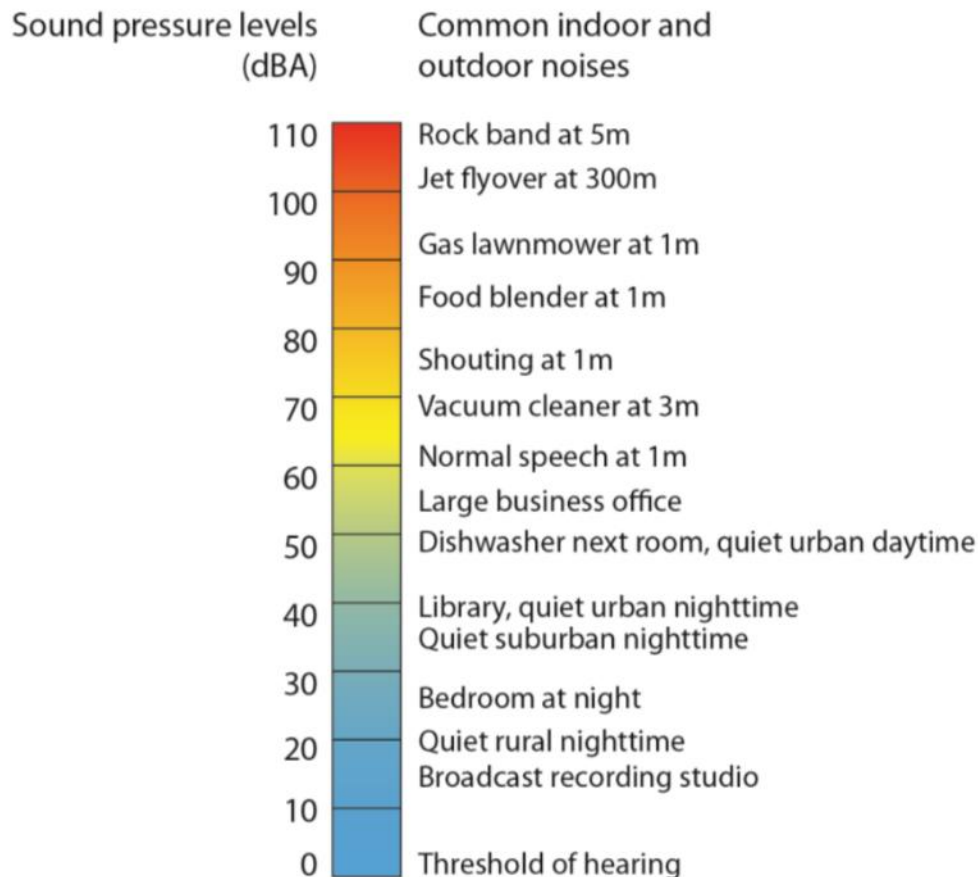


Figure 3 - Decibel levels of Common Noise Sources
 Source: A Guide to Noise Control in Minnesota

Decibel Addition

Because decibels are logarithmic units, sound pressure levels cannot be added arithmetically. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions.

Human Response to Changes in Noise Levels

Doubling sound energy results in a 3-dB increase in sound. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different than what is measured.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dB changes in sound levels. In typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dB in typical noisy environments.

Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound energy (e.g., doubling the volume of road traffic) that would result in a 3-dB increase in sound would generally be perceived as barely detectable.

Table 1 - Change in Decibel Level and Perceived Changes in Loudness

Change in dB(A)	Perceived Changes in Loudness
± 1 dB(A)	Not Noticeable
± 3 dB(A)	Threshold of Perception
± 5 dB(A)	Noticeable Change
± 10dB(A)	Twice (Half) as Loud
± 20 dB(A)	Four Time (One Fourth) as Loud

Source: A Guide to Noise Control in Minnesota

4. Traffic Noise Criteria

Tajikistans noise quality standards based on International Sanitary Norms adopted by CIS countries (SanPin 2.2.4/2.1.8.562-96) and in general equivalent to World Bank EHS / IFC standards.

Table 2 - Tajikistan Noise Standards

Area	Day time limits in dBA	Night time limits in dBA
Residential area	55	45
Commercial area	60	50
Hospitals	35	25
Schools, Library	45	45
Hotels, etc.	60	50

In Appendix 2 a synopsis is given on the specific standards for noise emissions in Tajikistan. In addition, the standards are compared with international guidelines and standards. In general, it can be concluded that the Tadjik system of environmental standards is well developed, but the IFC standard for noise is more stringent and therefore the guideline of the International Finance Corporation (IFC) is used for assessing the impacts of noise. This guideline provides criteria and guidance for noise control from a development beyond the property boundaries.

The criteria of the IFC guidelines specifies that noise levels measured at noise receptors must not be 3 dB(A) greater than the background noise levels or exceed 55 dB(A) during the day or 45 dB(A) during the night in residential areas and 70 dB(A) in commercial areas.

Table 3 - Noise Level Guidelines

Receptor	One Hour LAeq (dB(A))	
	Day time 07:00 – 22:00	Night time 22:00 – 07:00
Residential; institutional; educational	55	45
Industrial; commercial	70	70

Note: For acceptable indoor noise levels for residential, institutional, and educational settings refer to WHO, 1999



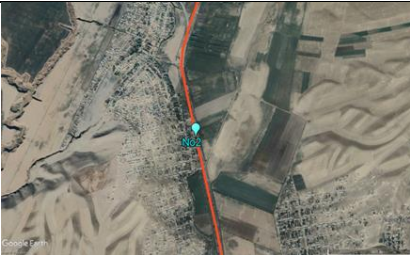

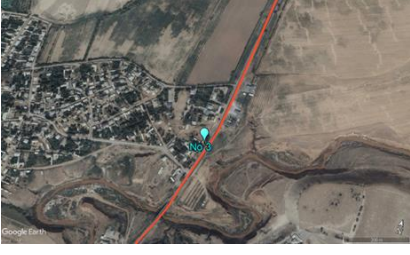



Source: IFC, EHS Guidelines, Noise Management











5. Receptor Selection

In the frame of the baseline measurements for air quality, several locations at sensitive/typical receptors were identified and baseline measurements for air quality were

carried out. These selected receptors are also used for the noise modelling. The location of the receptors for noise calculation are presented in the Table below.

Table 4 – Receptors for Noise Calculation

Nr.	Description	Google Image (Source: KMZ)	Road Chainage	Chainage location
1	Location of Monitoring Point 1st Km 0+000, "Aziz" dining room. Interchange of the Bokhtar-Dangara highway.		KM 0+500	
2	Monitoring Point No. 2. Village I. Sharipov. Near a residential building		KM 4 +200	
3	Monitoring Point No. 3. Khurramzamin village, near residential buildings		Km 6 + 400	
4	Monitoring Point No. 4. Khurramzamin village near school No. 8		Km 7 + 120	

Nr.	Description	Google Image (Source: KMZ)	Road Chainage	Chainage location
5	Monitoring point No. 5 (Residential buildings in the village of Bulyoni Poyon)		Km 20 + 900	
6	Monitoring Point No. 6 (Bulyoni Poyon, School No. 84)		Km 21 + 350	
7	Monitoring Point No. 7 (Bakhoriston village)		Km 35 + 500	
8	Monitoring point No. 8 (Shukhrater village, 300 m from the traffic police post)		KM 36 + 670	
9	Monitoring Point No. 9. Market square at the end of the project road (At the intersection with the Guliston-Farkhor road).		KM 49 + 100	

All receptors are assumed to be one story residential buildings.

6. Road Traffic Noise Calculation and Prediction Model

The noise modelling and planning software SoundPLAN essential, Version 5.1, was used for the development of predictive noise models for the project. SoundPLAN is a widely-used environmental noise modelling and prediction software developed by SoundPLAN GmbH, Germany. The road noise sources and sound propagation model included in the analysis follow German guideline RLS-19 for road traffic noise predictions.

RLS-19 is an effective calculation model, able to determine the noise rating level of road traffic. The RLS-19 model shows a good correlation between the measured and projected noise levels proving to be an adequate tool for road traffic noise prediction. The model requires an input of data regarding the average hourly traffic flow, separated into heavy and light vehicles, the average speed for each group, the dimension, geometry and type of the road and of any natural and artificial obstacles. This model also takes into account the main features which influence the propagation of noise, such as obstacles, vegetation, air absorption, reflections and diffraction. In particular it makes possible to verify the noise reduction produced by barriers and takes into account also the reflections produced by the opposite screens.

Terrain points from the design drawings are imported into SoundPLAN to create a Digital Terrain Model (DTM). The DGM is a digital representation of the ground surface and used in the calculation of the noise level at any receiver point.

The methodology adopted for the noise prediction is shown briefly summarized in the following Figure 4.

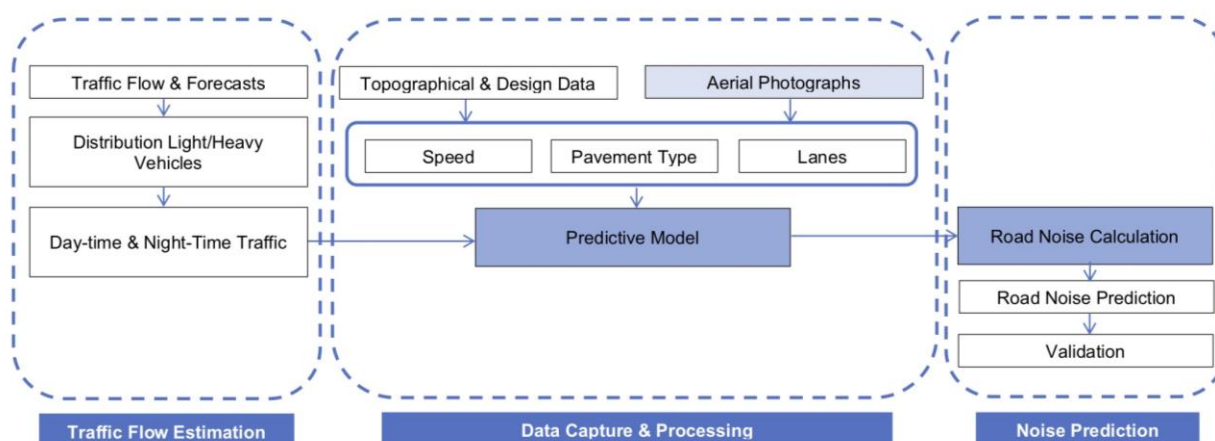


Figure 5 - Methodology Adopted for Traffic Noise Prediction

6.1 Road Traffic Data

Traffic noise increases with traffic volume and the proportion of heavy vehicles. Traffic forecasts for the base year 2024, and future year 2040 were provided for the project road by the Traffic Engineer/Transport Economist. To reduce Greenhouse Gas (GHG) emissions from the transport sector, Tajikistan is promoting the use of E-vehicles. Due to uncertain of the proportion of E-vehicles in the further vehicle fleet, in the noise calculation the traffic forecast of year 2040 has been used and no provisions for E-vehicles were considered.

The provided traffic data for the project road are shown in Table 5 below.

Table 5 – Traffic Forecast in AADT

Year	Motor-cycle	Car	Utility	Mini-bus	Bus	2-axle truck	3-axle truck	≥4-axle truck	AADT
2024	92	8,784	468	33	10	353	73	65	9,878
2040	143	13,670	728	51	16	549	114	101	15,373

Since the noise impacts are calculated during the one-hour period, the peak hour traffic volumes for day and night time have been deviated from the forecasted traffic volumes based on the hourly distribution of the traffic established during the traffic counts.

The vehicle classes are consolidated to the requirements of RLS-19< into following vehicle classes:

- Motorbikes/Motorcycles
- Cars and light vehicles u to 3.5 tons overall weight
- Truck group 1: trucks without trailer and busses with a total weight over 3.5 tons
- Truck group 2: trucks with trailer, articulated trucks with a total weight over 3.5 tons.

According to the IFC Guidelines daytime is defined between 07:00 and 22:00 and nighttime between 22:00 and 07:00. Existing traffic count data from manual classified traffic counts carried out in 2018 have been analyzed to identify the peak hour proportion of the AADT for daytime and nighttime traffic. The same proportion ratio has been used to determine the forecasted peak hour traffic in 2040 based on the predicted AADT. The hourly traffic data used for the noise modelling are shown in Tables 6 and 7.

Table 6 - Traffic Data 2024 per hour

Year: 2024	Day time	Night time
Motorcycles	5	1
Cars and Light Vehicles per hour	534	93
Trucks Group 1 per hour	21	4
Trucks Group 2 per hour	8	1
Total per hour	568	99

Table 7 - Traffic Data 2040 per hour

Year: 2040	Day time	Night time
Motorcycles	8	1
Cars and Light Vehicles per hour	831	145
Trucks Group 1 per hour	32	6
Trucks Group 2 per hour	12	2
Total per hour	884	154

6.2 Vehicle Speed

The lowest traffic noise for a typical traffic mix occurs at about 30 km/h. Increasing average vehicle speed above this increases traffic noise. Estimated operating speeds are used to predict road traffic noise levels and based on the road characteristic of the designed road. The vehicle speeds used in the noise modelling are shown in Table 8.

Table 8 - Vehicle speed

Vehicle speed (km/h)		Remarks
Cars	Trucks	
50	50	Receptors are located in settled areas and therefore a vehicle speed adjusted to build-up areas are considered

6.3 Road Surface

In the noise calculation, an asphalt concrete surface in accordance with ZTV Asphalt-StB 07/13 are considered for the existing (base year 2024) and project road section (year 2040).

6.4 Road Alignments and Terrain Elevation

The road alignment and terrain elevation are imported in SoundPLAN from the topographical survey and road design. Based on the imported terrain and design data a Digital Terrain Model (DTM) were created, which is a representation of the topographical reality. Roads are considered as line elements. For the noise calculation, the place of emission is in the middle of the outer lanes in accordance with RLS-19. The gradient of the project road (rate of climb/decent) is evaluated by SoundPLAN based on the set of coordinates from the road design. The slope of the road influences vehicle noise. As slope increases, engine noise increases because engines need to work harder.

6.5 Limitation

Traffic noise modelling procedures are not applicable in situations where the existing acoustical environment is not dominated by an existing road traffic noise source. Road traffic noise models are not capable of accurately determining existing noise levels where road traffic noise is not the dominant contributing acoustical characteristic. Generally, the procedures are intended for sites that are currently influenced by road traffic noise and will be similarly affected by the proposed road improvement project. In areas dominated by background (non-road) noise sources such as jet, monitored (rather than modelled) noise levels should be used to determine existing worst noise hour levels, thereby accurately representing the existing noise environment.

7. Results and Conclusion of Traffic Noise Predictions

The road noise prediction consists of the project road alignment and forecasted further traffic data. Noise levels for the base year 2024 and future years 2040 (after 16 years from the base year) were calculated and compared to the relevant criteria. The results of the noise prediction at the selected receptors are presented in the Table below. The location of the receptors, predicted noise levels and the corresponding noise contours for residential areas, are presented in Appendix 3 and 4.

Widening of the road for construction of U-turns, construction of interchanges and improvement of alignment leads to different levels of impacts at different receptors.

However, although the traffic noise levels at some receptors exceed the desirable level of 55 dB(A) in daytime and 45 dB(A) in nighttime in accordance to IFC standard, it should be noted that the increase of the noise levels between the base year 2024 and the reference year 2040 will be less than 3 dB(A) and therefore no additional noise abatement measures are required. The 3 dB(A) criteria is applicable as in settled areas the project road alignment will use mainly the right-of-way of the existing road. The area is pre-polluted due to existing traffic and the increase of the ambient noise level from the anticipated traffic increase is below the threshold of perception.

Table 9 - Results of Noise Modelling

Point No.	Location (Chainage)	Permissible Noise Level IFC Guidelines dB(A)		Measured Daily Ambient Noise Level in 2020 Maximum dB(A)	Predicted Noise Level 2024 in dB(A)		Predicted Noise Level 2040 in dB(A)		Difference Noise Level 2024 - 2040 in dB(A)		Requirement of additional noise protection measures based on the 3 dB(A) Rule between Base Year and Reference Year 2040
		LAeq day time	LAeq night time		LAeq day time	LAeq night time	LAeq day time	LAeq night time	day	night	
1	CH 0+500	55	45	52.6	52.6	44.9	54.7	47.1	2.1	2.2	no
2	CH 4+200	55	45	55.0*	52.7	45.0	53.1	45.5	0.4	0.5	no
3	CH 6+400	55	45	56.7	53.2	45.6	55.1	47.5	1.9	1.9	no
4	CH 7+120	55	45	57.5	51.1	43.4	53.0	45.4	1.9	2.0	no
5	CH 20+900	55	45	53.2	49.6	41.9	50.9	42.9	1.3	1.0	no
6	CH 21+350	55	45	54.8	50.7	43.0	52.8	44.8	2.1	1.8	no
7	CH 35+500	55	45	53.2	53.6	46.9	56.5	48.9	2.9	2.0	no
8	CH 36+670	55	45	51.4	51.2	43.6	52.7	45.2	1.5	1.6	no
9	CH 49+100	55	45	55.0	51.7	44.1	52.3	44.6	0.6	0.5	no

Note: * Entrance to I.Sharipov village: 48,4 dB, Exit from I.Sharipov village: 55.0 dB

Annex 1 Glossary

Ambient Noise: All-encompassing noise at a given place and time. This is usually a composite of sounds from all sources near and far, including any specific sources of interest.

Amplitude: The strength or magnitude of the pressure of a sound wave.

A-Weighted Sound Level: Expressed in dB(A). Frequency- weighted sound pressure level approximating the frequency response of the human ear. It is defined as the sound level in decibels measured with a sound level meter having the metering characteristics and a frequency weighting specified in the American National Standards Institute Specification for Sound Level Meters, ANSI S 1.4–1983. The A- weighting de-emphasizes lower frequency sound sounds below 1,000 Hz (1 kHz) and higher frequency sounds above 4 kHz. It emphasizes sounds between 1 and 4 kHz. A-weighting is the most commonly used measure for traffic and environmental noise throughout the world.

Best practice environmental management: The management of the activity to achieve a minimization of the activity's environmental harm through cost-effective measures assessed against the current international and national standards applicable to the activity.

dB Decibel, which is 10 times the logarithm (base 10) of the ratio of a given sound pressure to a reference pressure; used as a unit of sound.

dB(A) Unit used to measure 'A- weighted' sound pressure levels.

Emission Level: A measure of the noise output of a single vehicle. It is the maximum noise level, in dB(A), observed during a pass by of the vehicle at 25 m.

LAeq,T: Exposure to noise for the duration of a given time interval T (a 24-hour period, a night, a day, an evening) is expressed as an equivalent sound pressure level (measured in dB(A)) over the interval in question

Loudness: The judgment of intensity of a sound in terms of which sounds may be ranked on a scale from soft to loud. On this scale, a doubling of a reference sound energy is barely perceptible to the human ear, a tripling of the sound energy is readily perceptible, and 10 times the sound energy is about twice as loud. Decreasing the sound by the same factors has a reciprocal effect—reducing the reference sound energy to one-tenth of the original energy the sound is perceived as half as loud. Although loudness depends primarily on the intensity of the sound, it also depends on the sound's frequency and wave form.

Mitigation: Reduction in severity.

Noise: Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

Noise Barrier: A physical obstruction that is constructed between the highway noise source and the noise sensitive receptor(s) for the purpose of lowering the noise level, including stand-alone barrier structures, berms (earth or other materials), and combination berm/barrier structure systems

Noise Contour: An imaginary line shown on a plan along which all sound levels are equal.

Predicted Existing Traffic Noise Level: The traffic noise level that is determined through the use of the Traffic Noise Model for existing roadway conditions.

Predicted Future Traffic Noise Level: The traffic noise level that is determined through the use of the Traffic Noise Model for the future design year traffic and roadway geometry, including build and no-build alternatives.

Receptor: Most basically defined as any natural or artificial sensor that can perceive, register, or be affected by sound (e.g., human ear, microphone). In the context of a noise analysis a receptor is a single specific dwelling unit or the equivalent of a single dwelling unit.

RLS-19: Guidelines for Noise Protection on Roads (Richtlinien für den Lärmschutz an Straßen), 2019, German Calculation method for Noise Prediction

Sound: A vibratory disturbance created by a moving or vibrating source in the pressure and density of a gaseous, liquid medium or in the elastic strain of a solid that is capable of being detected by hearing organs. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to the ears. The medium of main concern is air.

Traffic noise: The total noise resulting from road traffic, including both light and heavy vehicles, steady and intermittent traffic flow and specific events such as the use of engine brakes.

WHO: World Health Organisation

Annex 2 Environmental Standards for Noise Emissions

Topic	National Standards / Requirements	International Guidelines / Standards	Adopted Project Standard	Rationale
	Tajikistan	IFC Environmental, Health, and Safety General Guidelines		
Night time noise limits for human protection	<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):</p> <ul style="list-style-type: none"> • Inside residential and public buildings: <ul style="list-style-type: none"> – Hospital and sanatorium's wards, and operating rooms: 25 dB(A); – Residential rooms in apartments, rest houses, boarding houses, houses for the elderly and disabled, sleeping rooms in kindergartens, and residential schools: 30 dB(A); – Rooms in hotels and hostels: 35 dB(A); • In residential and other areas: <ul style="list-style-type: none"> – Recreational areas immediately adjoining hospital buildings and health centres: 35 dB(A) – Areas immediately adjoining residential buildings, polyclinics, dispensary, rest houses, homes for the elderly and disabled, kindergartens, schools and other educational institutions, libraries; 45 dB(A); – Areas immediately adjoining hotel and dormitory's buildings: 50 dB (A) 	<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>Outdoor:</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>Exception 1: IFC standard will prevail from 22.00 to 23.00</p> <p>Exception 2: areas adjoining hotels and dorms where IFC standard is more stringent 45 dB (A)</p> <p>The 3 dB criteria in IFC Guideline for increase in background levels applies also to rehabilitation / upgrading projects.</p>	<p>Most stringent and provides more comprehensive measurement criteria</p>

Traffic Noise Assessment

Topic	National Standards / Requirements	International Guidelines / Standards	Adopted Project Standard	Rationale
	Tajikistan	IFC Environmental, Health, and Safety General Guidelines		
Day time noise limits for human protection	Noise emissions at the day time (07:00-23.00) should not exceed the following levels (SanPin 2.2.4/2.1.8.562-96): <ul style="list-style-type: none">• Inside residential and public buildings:<ul style="list-style-type: none">– Hospital and sanatorium's wards, and operating rooms: 35 dB(A);– Consultation rooms of polyclinics, ambulant clinics, dispensers, hospitals, and sanatoria 35 dB(A).– Classrooms, teachers' common room, school and other educational organization's auditoriums conference halls, and public reading rooms 40 dB(A).– Residential rooms in apartments, rest houses, boarding houses, houses for the elderly and disabled, sleeping rooms in kindergartens, and residential schools: 40 dB(A);– Rooms in hotels and hostels: 45 dB(A);– Halls of cafes, restaurants, eating rooms: 55 dB(A);– Shops trade halls, passenger halls in airports and stations, consumer services centres: 60 dB(A);• In residential and other areas:<ul style="list-style-type: none">– Recreational areas immediately adjoining hospital buildings and health centres: 45 dB(A)– Areas immediately adjoining residential buildings, polyclinics, dispensary, rest houses, homes for the elderly and disabled, kindergartens, schools and other educational institutions, libraries: 55 dB(A);– Areas immediately adjoining hotel and dormitory's buildings: 60 dB (A)– Rest areas at the territory of hospitals and sanatoria 35 dB (A)– Recreation areas at the territory of micro-districts, and residential areas, rest houses, houses for the elderly and disabled, children's playgrounds in kindergartens, schools and other educational institutions: 45 dB (A)	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: Outdoor Residential.; institutional, educational.: Daytime (07:00-22:00): 55 dB(A) Industrial, commercial: Night time (22:00-07:00): 70 dB(A).	Tajik standards with daytime defined as 07:00 – 22:00 in line with IFC EHS General guidelines. Exception: areas adjoining hotels and dorms where IFC standard is more stringent 55 dB (A) The 3 dB criteria in IFC Guideline for increase in background levels applies also to rehabilitation / upgrading projects.	Most stringent and provides more comprehensive measurement criteria

Annex 3 Receptor Location and Predicted Noise Levels for Year 2024

Annex 4 Receptor Location and Predicted Noise Levels for Year 2040

217. Annex 3 - ALIGNMENT SHEETS.

E. BASELINE MEASUREMENTS

218. Instrumental baseline measurements have been carried out at identified sensitive receptors on air quality, water quality and noise during August 2020. In addition, instrumental measurements were conducted in April 2024 for purpose of baseline establishment on vibration and air quality which also included the substances PM 2.5 and PM 10 which in 2020 had not been measured.

219.

220. Annex 1 - REPORT ON WATER QUALITY provides the report on water quality in the study area, Annex 2 - REPORT ON AIR QUALITY AND NOISE provides the report on air quality and noise in the study area. Annex 7 provides the report on vibration measurements and air quality measurement of the substances PM10 and PM2.5 which was conducted in April 2024. The original baseline measurements done in 2020 did not include measurements on vibration, PM2.5 and PM 10. The main findings are described in the following chapters. Further details are provided in the laboratory reports.

Air Quality

221. Instrumental air quality measurements have been conducted in August 2020 according to Tajikistan standards for TSP (Total Suspended Particulates), NO₂; SO₂; CO and NO. Measurements were carried out at 25 locations along the whole alignment sites. The measurements on water quality were carried out by Center for Analytical Control (CAC). PM 2.5 and PM 10 were not measured because no measurement device was available at the assigned laboratory. Only Total Suspended Particulates (TSP) were measured. The Tajikistan standards for air quality are presented in annex 2 (REPORT ON AIR QUALITY AND NOISE).

222. The selected measurement locations for air quality and noise are the following.

Table 21 - Selected Locations for Air Quality Measurements

No	Place	Width	Longitude
1	Km 0+00 junction in the road Dangara-Guliston	37° 57. 657 ¹	068° 40. 793 ¹
2	Entrance to I.Sharipov village	38° 03. 612 ¹	069° 20. 764 ¹
3	Exit from I.Sharipov village	37° 50. 627 ¹	068° 51. 210 ¹
4	Entrance to Shokhbur village.	38° 03. 000 ¹	069° 20. 797 ¹
5	Middle of Shokhbur village	37° 02. 285 ¹	069° 21. 279 ¹
6	Exit from Shokhbur village, km 5 +500	38° 01. 840 ¹	069° 21. 593 ¹
7	Entrance to Khuramzamin village	38° 01. 269 ¹	069° 21. 538 ¹
8	Khuramzamin village, near secondary school No.8	38° 00. 935 ¹	069° 21. 393 ¹
9	Exit from Khuramzamin village, km 7+600	38° 00. 640 ¹	069° 21. 253 ¹
10	Km 14+400, near a canteen.	37° 57. 109 ¹	069° 19. 545 ¹
11	Km 17+ 800, entrance to Bulyoni Poyon village.	37° 55. 315 ¹	069° 20. 239 ¹
12	Km 19+ 00, middle of Bulyoni Poyon village, near a first-aid post	37° 54. 789 ¹	069° 20. 747 ¹
13	Bulyoni Poyon fish farming reservoir	37° 54. 537 ¹	069° 20. 985 ¹
14	Km 20+ 600 Bulyoni Poyon village.	37° 54. 071 ¹	069° 21. 489 ¹
15	Km 21+300 Bulyoni Poyon village.	37° 53. 742 ¹	069° 21. 467 ¹
16	Km 22 +00. Project road.	37° 53. 369 ¹	069° 21. 460 ¹
17	Km 30 + 300 Kayumobod village	37° 48. 842 ¹	069° 22. 074 ¹
18	Km 32 +500. Project road	37° 47. 724 ¹	069° 22. 698 ¹
19	Exit from Dangara district	37° 47. 252 ¹	069° 22. 934 ¹
20	Entrance to Bahoriston village	37° 46. 838 ¹	069° 23. 187 ¹

Dangara – Guliston Road Section**Traffic Noise Assessment**

No	Place	Width	Longitude
21	Km 35+300 near Bahoriston Traffic Police Post.	37° 46.235 ¹	069° 23.551 ¹
22	Km 38+100 Entrance to Guliston.	37° 45.528 ¹	069° 24.850 ¹
23	Km 44+ 00 Junction at Gulrez village.	37° 43.788 ¹	069° 27.502 ¹
24	Km 46 +00. Project road.	37° 44.472 ¹	069° 28.996 ¹
25	Km 48 +200 junction at Guliston	37° 44.582 ¹	069° 29.791 ¹

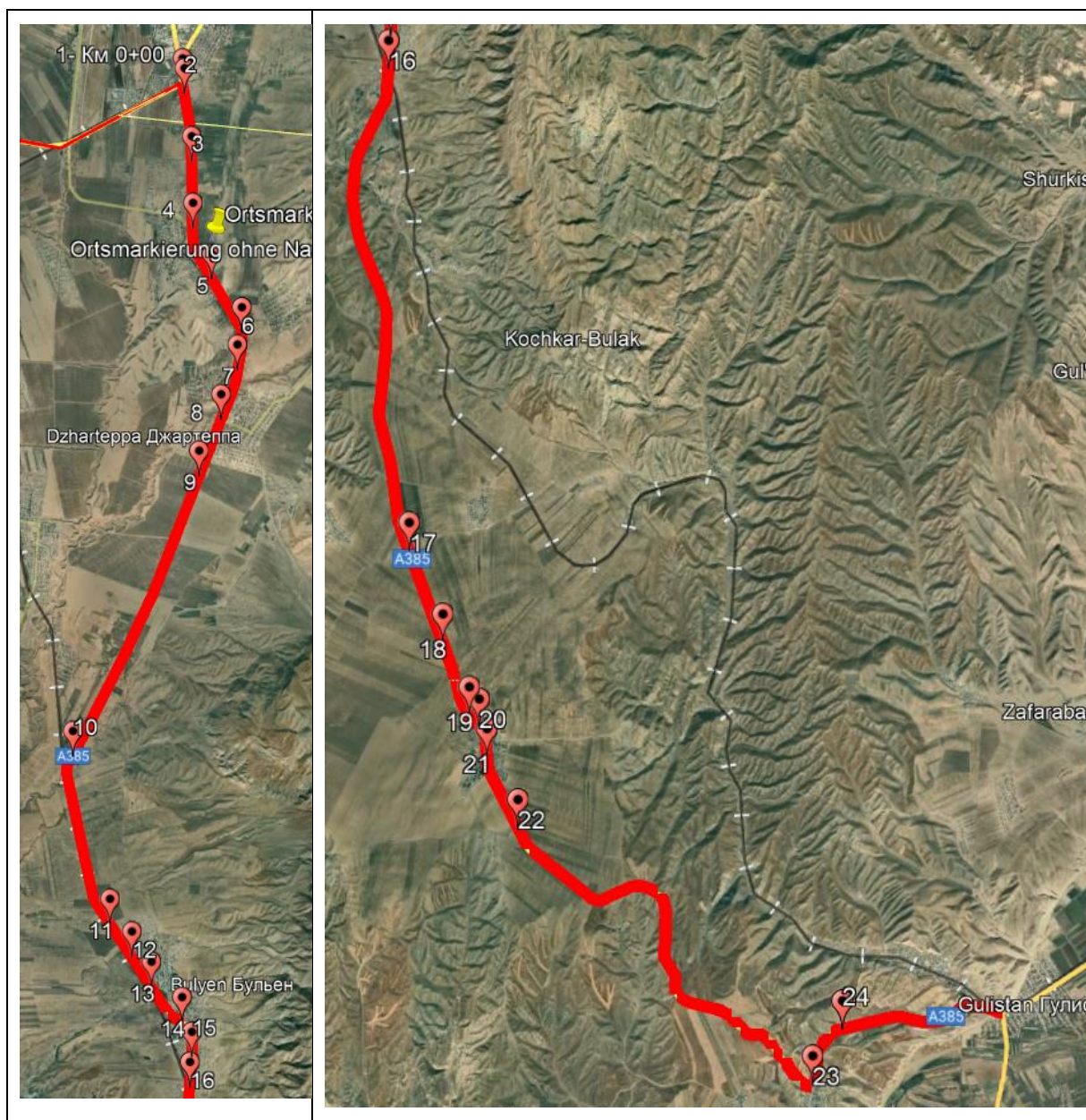


Figure 25 - Map showing measurement locations for air quality and noise

223. The underlying standards were the MAC of Tajikistan for pollutants in the atmosphere of populated areas. All standards were met. A detailed description of the conducted baseline measurement exercise is given in Annex 2 - REPORT ON AIR QUALITY AND NOISE. During construction phase regular monitoring measurements will be conducted as described in the EMoP.

224. In order to also establish a baseline for the substances PM 2.5 and PM 10 additional instrumental measurements on air quality were conducted in April 2024. The report is attached as Annex 7. No exceedences of PM 2.5 and PM 10 were measured.

Water Quality Measurements

225. Water quality measurements have been conducted on the parameters pH, temperature, suspended solids (mg/l), oil products (mg/l), mineralization (mg/l), BOD 5 (mg O₂/l), turbidity (mg/l) and electrical conductivity (Ohm/cm).

226. Water samples were taken for chemical analysis from the following identified 19 sensitive receptors in the study area.

1. Km 0+00 of the Dangara- Guliston project road. Irrigation ditch.
2. Km 0+600 of the project road. Left side. Water discharge canal.
3. Entrance to Ismat Sharipov village. Irrigation canal.
4. Km 2+0 Drinking water. Ismat Sharipov village.
5. End of Ismat Sharipov village. Right side of the road. Irrigation canal.
6. Water discharge canal. Left side of the road. End of Ismat Sharipov village.
7. Water discharge canal. Left side of the project road. Shokhbul village.
8. Irrigation ditch. Right side of the project road. Etalka village.
9. Irrigation canal. Entrance to Karomat village. Left side.
10. 50m above the bridge, a canal, Khuramzamin village. The project road.
11. 50m below the bridge, a canal, Khuramzamin village. The project road.
12. Km 9+600 Water discharge canal. Left side.
13. Km 9+600 Project Road. Ditch. Right side.
14. Km 14 + 800 Project Road. 50m above the diversion canal.
15. Km 14 + 800 Project Road. 50m below the diversion canal
16. Km 19 + 500 50m above, a ditch used as a discharge by fish reservoir
17. Km 19 + 500 50m below, a ditch used as a discharge by fish reservoir
18. Km 22+00 Project Road. Water spring.
19. Km 33 + 800 Water spring.

227. The purpose of the measurements is the establishment of baseline conditions on water quality prior to construction start. All details are described in the report i.

228. During construction phase of the Project, regular water quality measurements are foreseen as indicated in the EMoP. The measurement results will be presented in the SAEMRs.

Noise Measurements

229. Instrumental baseline measurements of noise were conducted in August 2020 by electronic sound level meter. The standards used are Tajikistan Standards (Sanitary Norms SN 2.2.4/2.1.8.562-96 – provided by Sanitary Epidemiological Surveillance Service of the Ministry of Health of Tajikistan).

230. The measurements were carried out within the villages traversed by the Project Road at the 25 locations shown in table below. The measurements provide a representative noise baseline for the

whole Project Road. The identified 25 measurement locations are the same as for the air quality measurement.

231. The noise measurements revealed that the measured noise levels does not exceed the acceptable noise levels indicated in the sanitary norms SN 2.2.4 / 2.1.8.562-96 (provided by the sanitary and epidemiological surveillance service of the Ministry of Health of Tajikistan). At the time of monitoring, no significant anthropogenic impacts in the project area of influence were recorded. All details are described in the report in Annex 2 - REPORT ON AIR QUALITY AND NOISE.

232. During construction phase, noise monitoring will be carried out as prescribed in the EMoP.

Noise Modelling

233. Beyond collecting baseline noise data at sensitive receptors, it is also fundamental to determine if the proposed project will affect noise levels throughout the projects lifespan. To assess this noise modelling is conducted. Anticipated noise levels are calculated at predetermined locations using predicted traffic volumes, speeds, composition (trucks and cars), and road alignment (horizontal and vertical) data. Selected receptors present a typical receptor category in the study area and the noise assessment of these receptors is assignable to adjacent buildings and areas with similar conditions. Noise measurements are used to quantify the existing noise levels and calibrate the noise model.

234. SoundPLAN Version 5 planning software, developed by SoundPLAN GmbH, was used to conduct noise modelling. This software is commonly used for environmental noise modelling for noise sources and sound propagation model and follows German guidelines (RLS-19) for road traffic noise predictions. RLS-19 is an effective calculation model, able to determine the noise rating level of road traffic. The RLS-19 model requires input of data including hourly traffic flows separated into heavy and light vehicles; average speeds for each group; the dimension, geometry and type of the road, and the inclusion of natural and artificial obstacles. This model also takes into account the main features which influence the propagation of noise, such as obstacles, vegetation, air absorption, reflections and diffraction, therefore making it possible to verify the possible noise reduction produced by noise barriers.

235. The purpose of the project noise modelling was to assess potential changes in noise levels to determine if the Project meets relevant noise regulations. The approach for the Project noise assessment was to:

- determine the relevant assessment criteria for road traffic noise along project road corridor
- predict road traffic noise levels for the Year 2040 at sensitive receptor locations in the study area

Dangara – Guliston Road Section

Traffic Noise Assessment

- recommend practical noise attenuation strategies (if required).

236. The road noise prediction consists of the project road alignment and forecasted further traffic data. Noise levels for the base year 2024 and future years 2040 (after 16 years from the base year) were calculated and compared to relevant criteria. The location of the receptors, predicted noise levels and the corresponding noise contours for residential areas

237. Baseline results ³⁰ showed that traffic noise levels exceeded 55 dB(A) in daytime and 45 dB(A) in nighttime (IFC standard) (see Table 22) at some receptors. However, noise levels between base year 2024 and the reference year 2040 will be an increase **less than 3 dB(A)**. Therefore, no additional noise abatement measures are required as the 3 dB(A) threshold has not been exceeded by the proposed project.

Table 22 - Selected Locations for Noise Measurements

No	Locations where measurement made	Noise standards in decibels, (max) 10.00 - 18.00	Baseline indicators, decibels (max)
1	Km 0+00 junction in the road Dangara-Guliston.	55 - 45	52.6
2	Entrance to I.Sharipov village.	55 - 45	48.4
3	Exit from I.Sharipov village	55 - 45	55.0
4	Entrance to Shokhbur village.	55 - 45	53.8
5	Middle of Shokhbur village	55 - 45	55.0
6	Exit from Shokhbur village, km 5 +500	55 - 45	54.4
7	Entrance to Khuramzamin village	55 - 45	56.7
8	Khuramzamin village, near secondary school No.8	55 - 45	57.5
9	Exit from Khuramzamin village, km 7+600	55 - 45	47.0
10	Km 14+400, near a canteen.	55 - 45	55.1
11	Km 17+ 800, entrance to Bulyoni Poyon village.	55 - 45	54.6
12	Km 19+ 00, middle of Bulyoni Poyon village, near a first-aid post	75 - 75	55.3
13	Bulyoni Poyon fish farming reservoir	55 - 45	42.5
14	Km 20+ 600 Bulyoni Poyon village.	55 - 45	53.2
15	Km 21+300 Bulyoni Poyon village.	55 - 45	54.8

³⁰ Full noise modelling study results can be found in the EBRD disclosed impact assessment

Dangara – Guliston Road Section

Traffic Noise Assessment

16	Km 22 +00. Project road	75 - 75	52.5
17	Km 30 + 300 Kayumobod village	55 - 45	52.7
18	Km 32 +500. Project road	75 - 75	55.0
19	Exit from Dangara district	75 - 75	53.6
20	Entrance to Bahoriston village	55 - 45	53.2
21	Km 35+300 near Bahoriston Traffic Police Post.	55 - 45	51.4
22	Km 38+100 Entrance to Guliston	55 - 45	50.9
23	Km 44+ 00 junction at Gulrez village.	55 - 45	52.1
24	Km 46 +00. Project road	75 - 75	49.7
25	Km 48 +200 junction at Guliston	55 - 45	55.0

Vibration

238. Vibration baseline measurements within the settlements traversed by the Project road have been measured in April 2024. Specialists of the Agency for Hydrometeorology of the Committee for Environmental Protection under the Government of the Republic of Tajikistan carried out instrumental measurements of vibration levels at 9 points on the Dangara-Guliston road (see Map in figure 26). Each measurement point was carried out three times within forty minutes using an Assistant brand vibrometer (photo1 in the laboratory report in Annex 7). The laboratory report is attached as Annex 7.

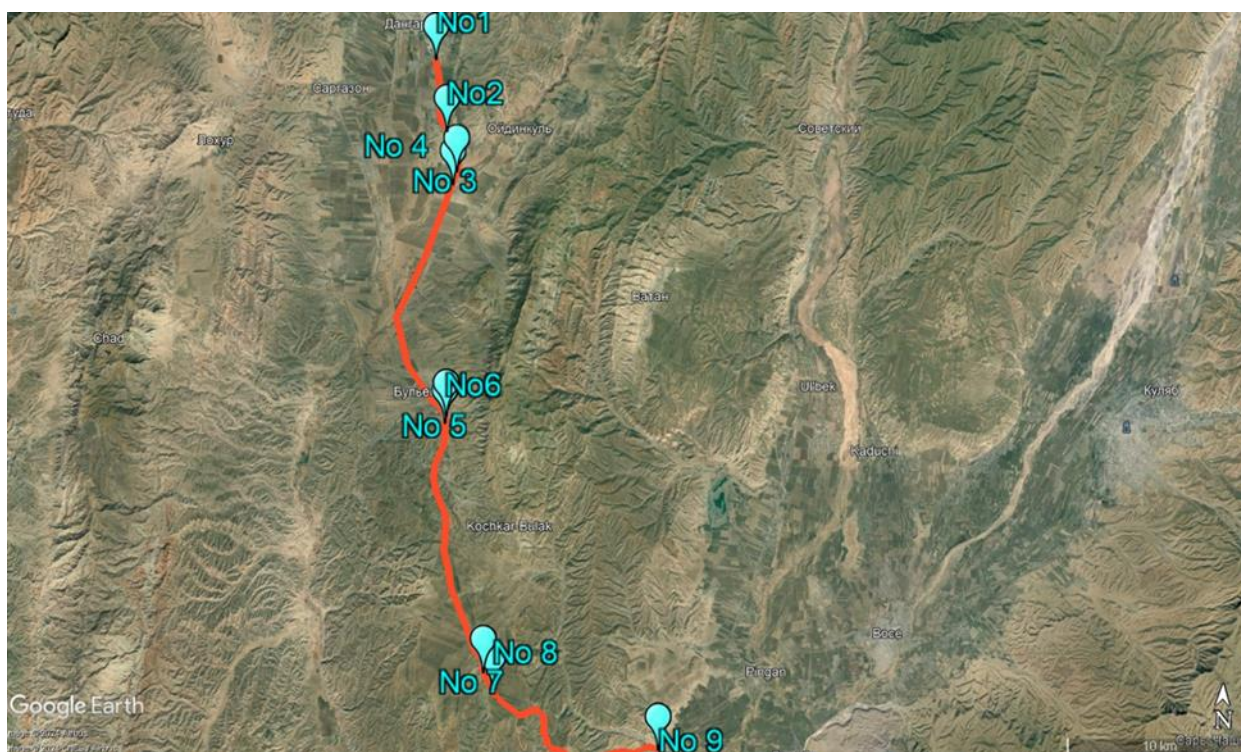


Figure 26 - Map showing the vibration measurement locations along the Dangara-Guliston road

Table 23 - Data of instrumental measurements of vibration level

№	Location.	Latitude/ longitude	Side of the road.	Distance from the edge of the road	Height.	Vib/mtr	MPL ³¹	Weather conditions				
								Wind speed	Direction	Tempe- rature	Pressure	Relative humidity (PH)
				m	m	d/b	d/b	m/s	Dtg	C°	hPa	%
1	Dining room “Aziz” km 0+000	38°04'132.97” 069°20'35.77	LS	20	625	45	72	2,9	343	11,4	713	74
2	Jamoat I. Sharipov km 4+000	38°02'121.94” 069°21'11.76”	RS	25	623	38	72	1,05	306	12,7	714	70
3	Danghara – Shobur km 6+300	38°01'118.75” 069°21'31.76”	RS	20	605	37	72	0,8	201	13,5	714	68
4	Danghara – Khurramzamin km 6+850	38°00'156.17” 069°21'25.23”	LS	50	623	38	72	1,5	326	14,3	715	65
5	Dangara – Bulyoni Poyon, km 20+000	38°00'155.94” 069°21'24.60”	LS	30	733	37	72	5,3	63	15,0	705	66
6	Durakhshon1 school No. 84 km 22+850	38°00'155.94” 069°21'24.60”	RS	40	728	36	72	5,1	229	15,0	706	63
7	Bakhoriston km 35- 300	37°46'140.87” 069°23'14.24”	RS	25	715	35	72	2,8	27	15,5	704	63
8	Shuhrater km 36+600	37°46'140.94” 069°23'13.91”	RS	15	741	35	72	2,0	31	14,4	701	67

³¹ The maximal permissible level of vibration for the public and residential buildings is taken based on the SanPin 1.2.3685-21 Standard from the year 2021 (Table 5.36) which is applied in several CIS countries, including Tajikistan.

Dangara – Guliston Road Section**Traffic Noise Assessment**

9	Dangara – Guliston km 48+200	37°46'40.94" 069°23'13.91"	RS	20	462	35	72	2,2	88	16,1	725	61
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Dangara – Guliston Road Section

Traffic Noise Assessment

Table No. 23 above shows that the vibration level in the area of influence of the Project does not exceed the permissible standards and ranges from 35 to 45 dB, which is even below the permissible standards for vulnerable receptors (school, hospital, childcare facilities, residential areas, etc.).

It is anticipated that during the construction phase, provided the contractor strictly adheres to regulations and construction technology, the population of the villages along the Dangara-Guliston road will not experience discomfort and harmful impacts on structures and social facilities (houses, schools, catering, and service outlets).

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

239. 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.

240. The Project involves the reconstruction and widening from 2 to 4 lanes of an existing road.

241. Project Road will be upgraded to category I. Hence 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.

242. For managing impacts on human assets, a LARPP 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.

243. 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 traverses 7 villages (names of villages see table 1). 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.

244. Main impacts refer to the human environment because the Project Road is widened from 2 to 4 lanes and therefore encroachment into physical structures and assets alongside the Project road cannot be avoided. Besides the periphery of Dangara and Guliston the Project road traverses seven villages. SES for assessing encroachment into human assets and building structures has been carried out and incorporated in the LARP which will be cleared by ADB.

245. Encroachment into private parcels and loss of other valuable assets such as private residential and commercial land parcels, farmland, commercial facilities, trees and other cannot be prevented to a certain degree because of required cross-section widening due to upgrades from category III to category I and higher comfort requirements of the future road which within settlements also requires some more space for pedestrian lanes, street lighting and other safety facilities.

246. Other interferences are due to noise emissions, emissions of pollutants and vibrations within the traversed settlements especially when the Project Road runs close to sensitive receptors such as schools, hospitals, mosques, bazars or other.

248. 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 27 sets out the general risk matrix and assessment criteria.

Figure 27 – Risk Matrix

RISK RATING		LOW 0 to 3 ACCEPTABLE OK TO PROCEED	MEDIUM 3 to 6 UNDESIRABLE TAKE MITIGATION EFFORTS (good site practice)	HIGH 7 to 10 UNACCEPTABLE CLEARLY IDENTIFIED MITIGATION WILL BE REQUIRED IN ESMF	EXTREME 11 to 12 INTOLERABLE PLACE EVENT ON HOLD
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		CONSEQUENCE / SEVERITY OF IMPACT			
		INSIGNIFICANT / MINOR <ul style="list-style-type: none"> Easily handled within the normal course of operations with no additional costs 	MODERATE <ul style="list-style-type: none"> Immediate time / resource reallocation will be necessary with a moderate estimated cost 	MAJOR <ul style="list-style-type: none"> Environmental conditions disrupted but can be reversed. Potential for serious injury / fatality Significant disruption to community Require significant resources to rectify 	CRITICAL <ul style="list-style-type: none"> Catastrophic environmental damage. Fines likely. Potential for multiple fatalities Significant irreversible disruption to community Significant resources needed to rectify.
		>>>>>>>>>> Environmental / safety / social impact increasing in severity <<<<<<<<<<<<			

RISK / LIKELIHOOD OF IMPACT		<<<<< Likelihood of impact increasing <<<<<<	LOW 1	MEDIUM 4	MEDIUM 6	HIGH 10
IMPROBABLE	• Environmental / safety / social impact is unlikely to occur (<20%)		LOW 2	MEDIUM 5	HIGH 8	EXTREME 11
POSSIBLE	• Environmental / safety / social impact is likely to occur (20% to 90%)		MEDIUM 3	HIGH 7	HIGH 9	EXTREME 13
PROBABLE	• Environmental / safety / social impact almost certain to occur (>90%)					

249. In the following chapters named “pre-construction phase”, “construction phase” and “operational phase”, the identified impacts and mitigation measures are described.

A. Pre-Construction (Design Phase)

Pre-works documentation and establishment of more recent baseline environmental conditions

Impacts

250. Possible obsolete information not capturing site-specific baseline and pre-works conditions. This is due to the span of time that passed between the establishment of the environmental baseline data and the actual construction start. During this time span certain baseline conditions may have changed.

Mitigation Measures

251. Within the Project area of influence, no significant land use changes occurred since the establishment of the environmental baseline in 2021. Therefore, the conducted biodiversity survey and the instrumental measurements on water quality, air quality and noise are considered still valid. No additional sampling is required in this regard. The project area of influence is described in the chapter “Introduction” in the paragraphs 10 to 14. There is the area of direct physical encroachment which is the construction corridor. This area is 15 m to both sides of the existing Project road. 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 200m corridor negative impacts only occur at ancillary facilities, such as borrow areas and transport routes.

Road alignment within ecologically sensitive areas

Impacts

252. At locations where the Project Road is traversing alongside or cutting cliffs, particularly loess cliffs which bear potential nesting sites for cavity nesters, there is the impact of possible destruction of bird nesting sites. This refers to bird species representatives of the roller family (Coraciidae), particularly the European roller (Coracias garrulus), the family of bee-eater (Meropidae) (golden bee-eater Merops apiaster), starlings (lane or Indian starling) and weaver family (Indian sparrow). In addition, these cliffs are often habitats for wintering or sheltering reptiles and amphibians.

Mitigation Measures

253. At sections where the Project Road rehabilitation is traversing alongside cliffs, mainly formed by loess sediments which are suitable nesting sites for various birds such as the European roller Coracias garrulus (assessed as Least Concern by IUCN), bee-eater (Merops apiaster) evaluated as Least Concern or the Indian starling (Common Myna Acridotheres tristis) evaluated as Least Concern the design investigated the possibility of widening the cross section to the opposite site and avoid any impacts.

254. In addition, prior to construction start, a fast-track ecological survey will be conducted by CSC’s ornithologist for purpose of identification of nesting sites at cliffs in the construction corridor. In

case nesting sites are identified, then construction schedule will consider nesting season in order to avoid bird losses.

255. Also required tree felling and site clearance activities which involves the removal of vegetation must be outside nesting season (preferably between October and February). The first SAEMR will include the photo-documentation, GPS coordinates, and strip map of nesting sites.

Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE ³²
Potential impact on ecologically sensitive sites, specifically loess cliffs with bird nesting sites and tree rows functioning as nesting sites for birds (all identified species are of IUCN conservation status Least Concern).	Moderate	Probable	LOW	LOW

Road alignment in areas of tree plantations

Impacts

256. There is a considerable number of tree losses involved. Based on the conducted surveys in total 3461 trees need to be felled (362 pieces with a stem diameter in one meter height of more than 32 cm, 1422 pieces with a diameter of 16-32 cm and 1677 pieces with a diameter of 16 cm). In addition 1688 trees will be transplanted (dugged out and planted at a new location).

257. Main species alongside the Project road are poplars, willows, birch trees, pistachio trees, walnut trees, buckthorn, and saxaul.

Mitigation Measures

258. Tree losses that cannot be prevented will be compensated by new tree plantings at the respective locations alongside the Project Road. The compensation ratio must be 1:2, meaning that for each felled tree 2 new trees must be planted. This means that $3,461 \times 2 = 6922$ trees are to be newly planted for compensation. A larger compensation ratio (1:3 or more) is not recommended because this would result in a too narrow space within the individual trees when they become older. The actual number and details of trees to be cut will be reported in the contractor's SEMP and the first SAEMR.

259. 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

³² The significance is low when the prescribed mitigation measures are adhered to. Timely restriction of site clearance activities outside the nesting season ensures that there are no bird losses due to construction activities. In addition, the cliff nesting sites will be naturally restored within reasonable time (5 to 6 years based on experience from other road Projects) because the habitat (loess cliff) doesn't disappear (it is only relocated backward from the road edge).

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*). 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.

260. 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 ³³
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

Embankment filling of the tree stem area

Impacts

261. 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 volume and reduction of the oxygen amount in the soil.

Mitigation Measures

262. 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.

³³ The significance is low because all tree losses are compensated by new plantings.

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

Road alignment traversing cattle crossings

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

264. Based on the requirement of representatives of the State Institution "Tresti charogohu meliorotivi" in the Kulyab region at km 11 + 000 (PK 109+99,5), at the junction with the village of Lolazor, the project provides for a facility for the passage of livestock which is dimensioned 6,0 m x 4,5 m (crossing number 1 in table 24. In total, the project provides for 11 cattle/livestock passes. The crossings number 2 to 11 in the below table 24 are all dimensioned 4 m x 3,0 m. Details of the location and design of the cattle passes are given in Volume 3, Book 8 of the drawing documents. The location of the underpass at km 11+000 is shown in the following figure 28.

Table 24 - Selected Locations for Air Quality Measurements

No.	Location, PC+	Dimension of culvert, m	Link to drawing
1	109+99,5	6,0x4,5	Book 8 BC-35
2	150+00,2	4,0x3,0	Book 8 BC-41.1
3	209+28,4	4,0x3,0	Book 18 UP2-02
4	241+06,7	4,0x3,0	Book 8 BC-66
5	279+50,9	4,0x3,0	Book 8 BC-75
6	299+60,9	4,0x3,0	Book 8 BC-82
7	346+59,9	4,0x3,0	Book 8 BC-94
8	369+41,3	4,0x3,0	Book 8 BC-102
9	446+98,4	4,0x3,0	Book 8 BC-111

265. On 20 and 21.03.2024, a survey was conducted together with PIU and Consultant. Local residents of two big villages - Khurramzamin and Bulyoni poyon were consulted regarding the cattle

Dangara – Guliston Road Section

Traffic Noise Assessment

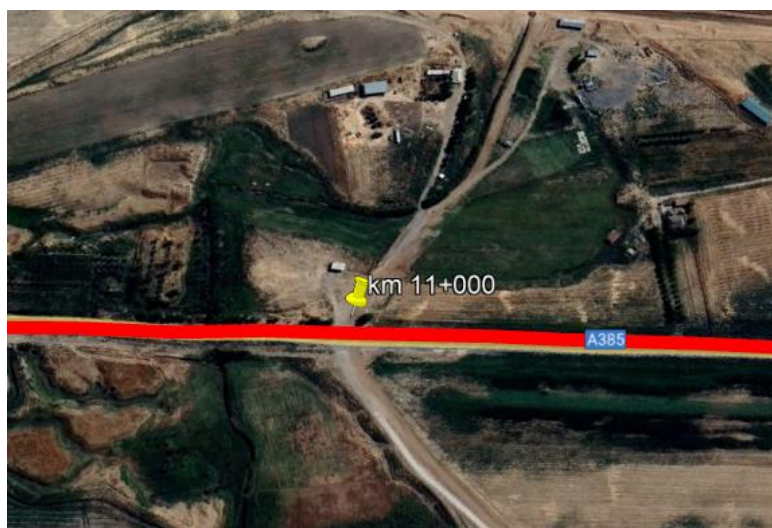
crossings. Resident people told that there are areas for pasture on both sides of Dangara-Guliston road and after implementation of the project, residents on the right side of the road can use the right pasture and residents on the left side of the road can use the left pasture.

266. Also all types of domestic animals can cross over the road at the following locations:

- under the bridge at PK65+64.4 and PK66+63.7 (before the bridge and after the bridge - Book 9, BRG-05);
- under the overpass at PK221+87 (Book 2, P-59).

267. In result on the average no farmer has to migrate more than 3 km to reach the next cattle crossing. In conjunction with the information obtained that residents on the right side of the road can use the right pasture and residents on the left side of the road can use the left pasture, no conflict remain regarding cattle crossin possibilities.

Figure 28 – Life stock crossing at km 11:000



268. The distances the cattle/farmers have to walk to cross the road are on the average less than 3 km. Location for life stock crossings were decided according to the responsible state representative "Tresti charogohu meliorotivi".

269. Speed reduction is installed by means of traffic signs. No speed bumps are foreseen because it is a 4-lane highway.

Road alignment traversing towns and villages

Impacts

270. The Project Road is traversing 7 villages from Dangara to Guliston. 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.

271. 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

272. 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.

273. 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	SIGNIFICANC E³⁴

³⁴ Significance is low because improved road safety measures and road signing will make the new road more safe as compared to the status quo.

Dangara – Guliston Road Section

Traffic Noise Assessment

Potential impact on road safety within traversed villages	Minor because road safety will improve through the Project	Improbable	LOW	LOW
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Bridge/Culvert Rehabilitation

Impacts

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

275. 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 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.

276. There will be new construction of the bridge over Tairsu River (River Obi Tohir in Technical project Documents) at km 6+614 (PK 66+14). the bridge is in such bad condition that replacement is required and construction of a new bridge (Chapter IV. H). The new bridge may trigger water erosion processes at bridge and river embankments. This was considered in the pre-construction-/design-phase of the project.

Mitigation Measures

277. 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.

278. 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	SIGNIFICANC E ³⁵
Potential impacts due to bridge/culvert rehabilitation	Minor	Improbable	LOW	LOW

³⁵ Significance is low when all mitigation measures are adhered to.

B. Construction Phase**Impacts due to site clearance activities****Impact**

279. 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 remove of vegetation within the construction corridor.

Mitigation Measures

280. 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.

281. 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 spoil 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	SIGNIFICANCE³⁶
Potential impacts due to site clearance activities	Moderate	Probable	LOW	LOW

Break up of old pavement layers and asphalt**Impact**

282. 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.

283. 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.

³⁶ Significance is low when all mitigation measures are adhered to.

284. In the traversed villages, several residential buildings are stretching alongside the road. During construction phase there will be noise and vibration monitoring.

Mitigation Measures

285. 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 27).

286. Vibration baseline measurements at identified sensitive structures within the villages alongside the Project road showed that no valid legal standards are exceeded (Annex 7).

287. 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.

288. The 50 m corridor was chosen based by consideration of the stipulations in the “Transportation and Construction Vibration, Guidance Manual, CALTRANS, September 2013”.

289. 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.

290. 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.

291. Recycled material will be used to the largest extent feasible to reduce the volume of spoils that needs to be disposed of.

292. 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 ³⁷
Potential impacts due to break up of old pavement layers and asphalt	Moderate	Possible	LOW	LOW

Impacts due to Earthworks

Impact

293. The cut and fill balance for the Project is as follows: the volume of 504 815 m³ needs to be provided for embankment fill and the volume of 5 585 402 m³ is excavated cut material. The proposed disposal sites are shown in Annex 6 - IDENTIFIED AREAS FOR SURPLUS MATERIAL DISPOSAL.

294. The required fill material needs to be sourced from quarries. The surplus soil resulting from cut sections will be transported to the identified disposal sites.

Mitigation Measures

295. Temporary storage of surplus spoil will be close to the excavation area preferably on barren land without any wooden vegetation.

296. For final and temporary disposal of surplus spoil suitable sites have been identified which are shown in Annex 6 - IDENTIFIED AREAS FOR SURPLUS MATERIAL DISPOSAL. The identified sites need to be agreed upon with the respective authorities.

297. 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 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 ³⁸
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³⁷ Significance is low when all mitigation measures are adhered to.

³⁸ Significance is low when all mitigation measures are adhered to.

Dangara – Guliston Road Section

Traffic Noise Assessment

Potential impacts due to disposal of surplus material	Moderate	Possible	LOW	LOW
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Reconstruction of pavement inclusive widening of existing road

Impact

298. The 7 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.

299. 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.

300. 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.

301. 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

302. To prevent soil compaction the contractor will limit the use of heavy machinery to the existing RoW especially in the vicinity of agricultural land.

303. 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.

304. 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).

305. Construction phase monitoring is conducted for air quality, noise level and vibration.

Risk Assessment

RISK	RISK SEVERITY	RISK LIKELIHOOD	POST MITIGATION RISK LEVEL	SIGNIFICANCE ³⁹
Potential impacts due to reconstruction of pavement inclusive widening of existing road	Moderate	Probable	LOW	LOW

Operation of borrow areas and quarries

Impact

306. The impacts related to establishment of borrow pits are largely dependent on the need for opening new pits.

307. There are no soil reserves of pebble material for the preparation of asphalt concrete, concrete mixtures, gravel-sand mixtures for the base of pavement closer than 20 km. It is possible to use deposits of pebble material from the Yakh-su River, from the Gar-Gara quarry and deposits from the Surkhob River.

308. The proposed quarries (soil reserves 1, 2 and 3) can only be used after a detailed study of the quality of the material. Currently, the soil reserve material is used by private entrepreneurs. All borrow areas are gravel pits. The identified borrow sites are described in Chapter IV. J. "Borrow Areas" above. In addition to the gravel sources suitable excavation sites for loam were identified (soil source number 4 to 8).

309. Impacts from river extraction activities refer to changes of riverbed morphology and increased erosion. Borrow Areas #1, #2, #3 are already operating and therefore environmental impacts concerning potential disfigurement of landscape, vegetation losses and damage to access roads are kept to a minimum because no new borrow site is opened.

Mitigation Measures

310. The contractor will refrain from storing material near surface waters to prevent siltation or obstruction of water ways. This refers particularly to the floodplains of Yakh-su River and Surkhob river (реки Сурхоб).

311. 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.

³⁹ Significance is low when all mitigation measures are adhered to.

Dangara – Guliston Road Section

Traffic Noise Assessment

312. The hauling traffic should be carried out only between 7:00 am and 22:00 pm.

313. 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.

314. 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 ⁴⁰
Potential impacts due aggregate extraction from borrow areas	Moderate	Probable	LOW	LOW

Operation of Asphalt Plant and Aggregate Crushers

Impact

315. 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.

316. 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.

317. Aggregate crushers produce noise and dust emissions, and they require certain mitigation measures.

318. 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

319. 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.

⁴⁰ Significance is low when all mitigation measures are adhered to.

320. 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.

321. 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.

322. 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.

323. 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.

324. 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	SIGNIFICANCE⁴¹
Potential impacts due to operation of asphalt plant and aggregate crusher	Moderate	Probable	LOW	LOW

Bridge and Culvert Reconstruction Works**Impact**

325. 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.

326. 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. The only river crossed by the Project road is the Tairsu River. 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. These mitigation measures also prevent the impacts of increased sediment load on

⁴¹ Significance is low when all mitigation measures are adhered to.

surface hydrology. Settlement ponds must be implemented to places where construction activities come near the natural water courses.

327. 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

328. 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 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.

329. 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.

330. Water quality monitoring will be conducted according to the EMoP.

331. 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.

332. The bridge reconstruction debris will be removed in an environmentally safe manor and the costs of environmental measures have to be included in the unit costs of the contractor.

333. 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.

334. 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	SIGNIFICANCE⁴²
Potential impacts due to bridge and culvert reconstruction works	Moderate	Probable	LOW	LOW

Establishment and operation of contractor's yard

Impact

⁴² Significance is low when all mitigation measures are adhered to.

335. 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.

336. 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.

337. Construction worksites may place stresses on resources and infrastructure of nearby communities. This may lead to friction between local residents and the temporary workers.

338. 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

339. The camp will not be set up on top of a ground water area, nor near any surface water areas.

340. 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.

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

342. 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.

343. 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.

344. 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.

345. 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	SIGNIFICANCE⁴³
Potential impacts due to operation of working camps	Moderate	Probable	LOW	LOW

Traffic impairment**Impact**

346. Traffic impacts of the road rehabilitation project will include disturbance of traffic along the road sections.

347. 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

348. 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.

349. During the construction work the contractor will arrange for adequate traffic flow around construction areas.

⁴³ Significance is low when all mitigation measures are adhered to.

Dangara – Guliston Road Section

Traffic Noise Assessment

350. 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.

351. 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 ⁴⁴
Potential traffic impacts during road construction	Moderate	Probable	LOW	LOW

Archaeological chance finds

Impact

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

Mitigation Measures

353. 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.

354. 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 ⁴⁵
Extended time line of construction schedule in case of construction site closure due to archaeological chance finds.	low	low	LOW	LOW

⁴⁴ Significance is low when the measures stipulated in the Traffic Management Plan is duly followed.

⁴⁵ The significance is low. Even in case there is a chance find, construction activities can be relocated and continue outside the chance find site.

Closure of construction sites**Impact**

355. 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

356. 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).

357. 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 ⁴⁶
Landscape degradation due to not executing restoration works.	Low	Low	LOW	LOW

C. Operational Phase**Impact on communities****Potential Impacts**

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

359. 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

360. As the Project Road rehabilitation will be carried out within the existing road corridor no barriers or obstacles are created which could split communities. There is however widening of RoW

⁴⁶ Significance is low because Construction Supervision will monitor and warrant site restoration measures.

Dangara – Guliston Road Section

Traffic Noise Assessment

required which entails encroachment into private assets within villages. 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 ⁴⁷
Potential impacts on population and communities in settlements alongside Project Road	Moderate	Possible	LOW	LOW

Increased risk of accidents with possible spills of harmful substances

Impact

361. 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

362. 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 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 ⁴⁸
Spill of harmful substances due to accidents	Moderate	Low	LOW	LOW

Damaged drainage or uncontrolled erosion

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

364. No particularly vulnerable areas regarding erosion were identified for Dangara – Guliston section.

Mitigation Measures

⁴⁷ Significance is low because there is a solid GRM in place.

⁴⁸ Significance is low because better road safety will be implemented for the new road as compared to the status quo.

Dangara – Guliston Road Section

Traffic Noise Assessment

365. 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 1 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 ⁴⁹
Potential damages due to erosion	Moderate	Improbable because issue is considered in the design	LOW	LOW

Positive Impacts

366. 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.

367. In order to assess the potential noise impacts during the operational phase, baseline noise measurements were carried out alongside the Project Road in August 2020. The measurement results were compared with the valid standards of Tajikistan according to the sanitary norms SN 2.2.4/2.1.8.562-96 (provided by the sanitary-epidemiological supervision service of the Ministry of Health of Tajikistan). No exceedences of the standards were detected. The detailed results are shown in the expertise in Annex 2.

368. The new road will allow smoother traffic flow which results in potentially lower noise levels. In addition, also the implemented safety and speed control measures will have positive impacts on noise emitted by the vehicles. In conclusion no noise exceedences during operation phase are anticipated. The new road will therefore bring only beneficial impacts for the future traffic.

369. 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.

⁴⁹ Significance is low because new drainage facilities are functioning better as compared to the status quo.

370. 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.

Cumulative and Induced Impacts

371. Cumulative impacts can be described as the combined changes of environment that are the result, not only of a single project, but of all human activities, past, present and future (as far as it is foreseeable) in the study area. Hence cumulative impact assessment requires the assessment of the combined effects resulting from implementation of all sections of the Road Network Sustainability Project namely the

372. Hulbuk – Temurmaliq - Kangurt, approximately 59 km in length; and

373. Bokhtar – Dangara - Guliston, approximately 125 km.

374. The cumulative impacts are mostly beneficial because the currently bad road network in the affected southern region of Tajikistan will be significantly improved allowing better transport links and access conditions for the population of Dangara, Baljuvan, Khovaling districts with Temurmaliq and Vose districts. Supply of agricultural products and industrial raw materials for the population and enterprises of the cities of Dushanbe, Kulyab, Bohtar, Khorog and other regions of the Republic will improve. Also, in perspective trade with neighbouring countries, and transport connection to the international road corridors “Dushanbe – Dangara - Kulob – Khorog – Kulma- PRC” and “Dushanbe- Dangara –Guliston- Farkhor - Afgan Border” will significantly improve and bring better economic perspectives to the people living in the Project area.

375. All road sections of the Road Network Sustainability Project will be rehabilitated and/or reconstructed within the existing road corridor. Therefore, no significant negative cumulative impacts are expected because for all three road sections the anticipated impacts are mostly site specific and generic and mostly confined to the construction phase.

376. Induced impacts are indirect effects occurring during construction and also operation phase of the Project road. There will be mostly positive induced impacts, such as the increase of spending capacity in the Project area, due to the influx of work force which will bring opportunities to local business. Negative induced impacts associated with road construction Projects usually entail the spread of uncontrolled development activities and threat to natural resources in previously undisturbed area. As the Project involves the reconstruction and widening of an already existing road no induced negative impacts are anticipated.

VII. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation Arrangements

377. 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.

378. 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.

379. MoF (Ministry of Finance) is the responsible government body for coordination with ADB and other donors for foreign assistance.

380. 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).

381. 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.

382. 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.

383. 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.

384. 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.

385. 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 3), 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 following services: (i) construction supervision, (ii) strengthening the RAMS Unit, and (iii) women empowerment. On 31 December 2020, the Road and Transport Digitization Unit was established. This is part of the RAMS. The purpose of the system is to develop data inventories of the country's arterial highway networks. At present, there is no comprehensive inventory in the MOT, making it difficult to estimate maintenance needs and plan the optimal use of available resources against the needs. For developing the RAMS database, the Road and Transport Digitization Unit will be supported by international consultancy firm.

386. 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.

387. 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.

388. 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 SEMP 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. The CSC will also mobilize an ornithologist who conducts a fast-track ecological survey prior to construction.

389. The Works Contractor is required to appoint an ESO and an HSO. The Works Contractor is responsible for preparing a SEMP 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.

390. The EMP included in this IEE together with the SEMP that need to be prepared by the contractor provide the overall Project environmental management framework.

391. The SEMP must be submitted within 30 days of the contract award and Preconstruction and Construction cannot commence until the SEMP is approved by the MoT/PIURR and the CSC.

392. 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 SEMP 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).

393. 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 SEMP. Again, the EMP should be included as an Annex to the Contract so the Contractor(s) is liable for any non-conformance with the EMP, and thereby this IEE.

394. The Contractor(s) will be responsible for the preparation of the Construction EMP/ SEMP. The preparation of the Construction EMP/SEMP 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.

395. During the Construction phase, the Contractor must retain the expertise of an ESO and an HSO to prepare and update SEMP 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.

396. The CSC team will include CSC-NES and CSC-IES, and a national ornithologist 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.

397. The following table provides a synopsis.

Table 25 – 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
5	PIURR	Implementation Agency. Responsible for the overall implementation of the environmental mitigation, management and monitoring measures and requirements specified in this IEE.
6	State Ecological Review Committee	Permitting Agency. Responsible for the issue of Environmental Permits.
7	CSC (Construction Supervision Consultant)	Assigned Supervision Consultant. Construction Supervision and Monitoring.
8	Contractor	Assigned Contractor. Construction of Project.

B. Environmental Management Plan

398. 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.

399. 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.

400. Table 26 summarizes the environmental mitigation measures, and Table 27 describes the environmental monitoring requirements.

Table 26 - Summary of Environmental Mitigation Measures

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
DETAILED DESIGN PHASE – PRE-CONSTRUCTION PHASE					
Preparation of SSEMP	Environmental impacts due to lackl 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
Preparation of a Tree Management Plan	Tree felling	2. A Tree Management Plan (TMP) will be developed to support the felling of 3,461 trees, either to be removed or relocated. A “Tree Management Plan” (TMP) enables necessary planning, managing and monitoring are achieved. At a minimum the TMP will include the following: <ul style="list-style-type: none"> • Surveys, mapping, planning. • Justification of species for suitability of soil type 	Contractor	CSC, PIURR	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<ul style="list-style-type: none"> • Justification of selection of native species • Water availability • Requirements of seedlings • Land preparation requirements • Planting method and density • Pest and disease control (if necessary) <p>Measures and capacity building for 'buy-in' from local communities</p> <p>Timeframes and budgets to ensure chosen species become established</p> <p>Confirmation of key stakeholders, roles and responsibilities; and</p> <p>Indicative budgets</p> <p>Additional attention may need to be given to the associated ecosystem services provided by tree species. The TMP shall be</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		submitted to PIURR/ADB for review and a no objection prior to any tree felling works.			
Permitting Requirements	Illegal construction activities because of lack of Permit	3. Obtain all required consents, permits, clearances, no objection certificate (NOC), etc. 4. Time target: Ensure they have been acquired or authorized before works commencement.	Contractor	CSC, PIURR	All required permits obtained and officially approved.
Road alignment within ecologically sensitive areas	Possible destruction of bird nesting sites and their offspring. Possibly affected bird species are the bee eater (<i>Merops apiaster</i>), the European roller (<i>Coracias garrulous</i>), starlings (lane or Indian starling) and birds of the weaver family, e.g., the Indian sparrow.	5. Prior to construction a control examination of the Project road will be conducted for purpose of verification of the identified nesting sites (nesting sites that were identified during the Biodiversity Survey, Annex 4). 6. During the bird nesting season which includes the time period from 01 st of March to 30 th of September no tree felling, and no cutting of the loess cliffs, identified as bird	CSC's Ornithologist	CSC, PIURR	Design review regarding consideration of nesting sites in roadside cliffs. Accomplishment of fast track ecological survey. Outcome documented in 1 st SAEMR.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>nesting sites in the biodiversity report in annex 4, is allowed.</p> <p>7. If this is not possible, then fencing of the nesting sites and raising of awareness for wildlife protection among the workers.</p> <p>8. Workforce awareness training program to avoid/prevent hunting / poaching and collecting of rare plants.</p>			
		9. Required tree felling and site clearance activities which involves the remove of vegetation will be outside nesting season (preferably between October and February).	Contractor	CSC, PIURR	Monitoring and check that tree felling is outside nesting period. Outcome documented in 1 st SAEMR.
Road alignment in areas of tree plantations.	Felling of trees.	10. Any tree losses are to be compensated by new plantations at a ratio of 1:2. This means that $3,461 \times 2 = 6,922$ trees are to be newly planted for compensation.	Contractor	PIURR	<p>Counting of trees felled and of trees planted.</p> <p>Outcome documented in 1st SAEMR.</p>

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>11. Species to be planted are pines, cypresses, mulberry, pistachio, walnuts and planes.</p> <p>12. At locations with goos 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>13. 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). Trees to be planted will have the following parameters: 1.5 – 2 m height, age 5 – 6 years.</p> <p>14. Locations for tree plantings are within the existing</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>RoW at the locations where tree losses occur.</p> <p>15. Distance in between individual trees will be 6 – 8 m.</p> <p>16. In addition 1,688 trees will be relocated.</p>			
Embankment filling of the tree stem area	Potential tree losses due to embankment fill.	17. 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.	Contractor	PIURR with support of CSC	Measurement of depth of fill material at tree stands. Regular monitoring and documentation of results in SAEMR.
	Potential damaging of trees lying very close to the road (less than 2m).	18. In association with the TMP, 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	Contractor	PIURRwith support of CSC	Regular check of vitality of trees near construction site. Photo evidence and documentation of monitoring result in SAEMR.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		responsible for tree felling to avoid unnecessary impacts.			
Road alignment traversing towns and villages	Loss of building structures and assets. (buildings, tree losses, masonry retaining wall, private yards and other structures).	19. 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 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.	20. The design of the bridge considers the 1 in 100 years flood event. This is warranted by the dimensioning 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.	21. 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	22. 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.	23. Resettlement Specialist will issue LARP covering assessment of loss and compensation procedure.	EA thru PIURR	PIURRwith 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	24. Conduct consultation with local authorities to identify sources of water (for spraying	Contractor	PIURR with Support of CSC	No complaints on competition for water resources.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		and other construction requirements) that will not compete with the local population. 25. 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.			Evidence in Grievance log.
CONSTRUCTION PHASE					
Impacts due to site clearance activities	Loss of topsoil.	26. Implement the spoils management plan prepared as part of the SSEMP. 27. Removing of topsoil occurring within site clearing corridor. Topsoil will be removed and stored for reuse. 28. Long-term stockpiles of topsoil will immediately be protected to prevent erosion or loss of fertility. 29. For erosion protection it will be sown with a fast-growing vegetation, e. g. grass	Contractor	PIURRwith 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	
Construction activities / Project road and ancillary facilities (e.g. borrow areas, asphalt plant, haulage routes)	Dust emission. Deterioration of air quality.	<p>30. 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>31. - Regular dust suppression (watering) along roads and the earthwork sites and ensure that adequate water supply for dust suppression is available.</p> <p>32. 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>33. Avoid (or suspend) dust-generating activities during windy periods such soil stripping/ earthworks.</p> <p>34. Minimize drop heights from conveyors, loading shovels, hoppers and other</p>	Contractor	PIURRwith 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>loading or handling equipment and use fine water sprays on such equipment, when appropriate.</p> <p>35. Limit the speed of all construction vehicles at <20km/h.</p> <p>36. 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>37. Wet/spray with water stockpiles during loading operations in dry or windy conditions.</p> <p>38. Cover particulate materials stockpiles.</p> <p>39. 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>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>40. For smaller supplies of fine power materials, ensure bags are sealed after use and stored appropriately to prevent dust.</p> <p>41. Fully enclose or install dust screens or barriers on or around site or specific operations where there is a high potential for dust production and the site is active for an extended period.</p> <p>42. 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>43. Cover stockpiles of particulate construction materials. .</p> <p>44. Regularly clean crusher site to remove fine dust. Keep site fencing, barriers and scaffolding clean using wet</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>methods. Avoid dry sweeping of large areas.</p> <p>45. Avoid site runoff of water or mud from site compounds by providing appropriate temporary drainage.</p> <p>46. Ensure sand and other aggregates are stored in bunded 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>47. Rehabilitate disturbed areas as soon as practicable. Re-vegetate earthworks and exposed areas/soil to stabilize surfaces as soon as practicable.</p> <p>48. Limit soil disturbance area, i.e., only remove soil cover in small areas during work. Demarcate construction areas within which construction activities should be done.</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		49. 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.			
Break up of old pavement layers and asphalt	Vibration impacts. 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	50. Vibration baseline measurements within the settlements traversed by the Project road have been conducted in April 2024. No exceedences of legal standards occurred. 51. 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.	Contractor	PIURRwith support of CSC	Regular monitoring. Provision of 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>52. The 50 m corridor was chosen based by consideration of the stipulations in the “Transportation and Construction Vibration, Guidance Manual, CALTRANS, September 2013”.</p> <p>53. For protection 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</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>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.</p> <p>54. Recycled material will be used to the largest extent feasible to reduce the volume of spoils that needs to be disposed of.</p> <p>55. Special recycling techniques will be used in the rehabilitation of the new pavement layers.</p> <p>56. Implement the waste management plan prepared as part of the SSEMP.</p>			
Impacts due to Earthworks	Selected disposal sites for cut material.	57. Compact and evenly distribute the surplus material	Contractor	PIURR with support of CSC	Regular monitoring.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	Potential disfigurement of landscape. Potential wind and water erosion.	by layers where possible, to minimize piling and impacts to landscape. 58. The stockpiles will be sawn with fast growing grass to avoid erosion by the root system. 59. During dry and windy periods, water will be spread on the disposed material to avoid dusting.			Provision of photo-evidence in case of non compliances. Documentation of non compliances and remediation measures in SAEMR.
	Loss of topsoil Water erosion	60. 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. 61. Topsoil will be removed and reused to cover areas where excess materials will be dumped and on road embankments.	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		62. 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	<p>63. 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.</p> <p>64. Extracted soil material that can not be reused needs to be disposed at the areas shown in Annex 6.</p> <p>65. 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 least 20</p>	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		m distant. Spoil management practices must be specified in the SSEMP.			
		66.			
	Air pollution due to exhaust emission from the operation of construction machinery	67. Maintain construction equipment to good standard and avoid, as much as possible, idling of engines. 68. Banning of the use of machinery or equipment that cause excessive pollution (e.g., visible smoke).	Contractor	PIURR with support of CSC	
	Disturbance of adjacent settlements due to elevated noise levels	69. Restrict work between 7:00 am and 22:00 pm within 200 m of the settlements. 70. A limit of 70 dBA will be set in the vicinity of the construction site and strictly followed. 71. Noise control at source (using less noisier equipment, mufflers, dampeners, enclosures, proper maintenance of equipment, providing training to operators,	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		etc.), noise control at path (using natural structures with screening properties and acoustic barriers).			
	Soil compaction due to operation of heavy equipment	72. 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).	73. 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 operating their business within the existing RoW	74. Implement LARP covering assessment of loss and compensation procedure. 75. Inform all residents and businesses about the nature	EA through PIURR	PIURR with support of CSC social safeguards team	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>and duration of work well in advance so that they can make necessary preparations.</p> <p>76. Limit dust by removing waste and soil quickly; by covering and watering stockpiles, and covering soil with tarpaulins when carried on trucks</p> <p>77. Increase workforce and use appropriate equipment to complete the work in minimum time in the important areas.</p> <p>78. Avoid construction work in sensitive times like festivals near religious places.</p> <p>79. Contractors (and sub-contractors) need to be informed that they are not allowed to hunt/poach in the project area of influence.</p>			
	Damage to infrastructure, supply cuts of infrastructure services such as water supply pipes and other	80. Measures will be ensured in engineering designing to avoid any disturbance to the existing infrastructure.	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	facilities, wastewater discharge facilities, electricity lines etc.	81. Prior to construction start the respective service agencies will be informed about the construction work. 82. Coordinate with respective agencies and provide prior information to the public in case of any required disruption in services during construction			
		83. Consult with the affected people uring project implementation. 84. Make the project contractors aware of any significant issues resulting from loss of electricity. 85. 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.	Contractor	PIURR with support of CSC	
	Possible damage to properties and	86. Immediately repair and/or compensate for any damage caused by construction	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	community facilities. Construction sites.	works and activities to existing communities and their property and facilities 87. 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.			
	Noise exceeding applicable noise standards. Vibrations may result in damage to local infrastructure, including private property and local (haulage) roads.	88. Limit the use of heavy machinery to the existing RoW especially in the vicinity of agricultural land. 89. maintenance of construction equipment in good condition and avoiding, as much as possible, idling of engines. 90. banning of the use of machinery or equipment that cause excessive pollution (e.g., visible smoke).	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>91. Utilize construction machinery with low emission levels.</p> <p>92. limiting construction work to 7:00 am – 22:00 pm within 200 m of settlements, and by limiting hauling traffic through settlements.</p> <p>93. Within the traversed 7 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>94. 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</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		screening properties and acoustic barriers). 95. 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.			
		96. 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.	97. Advise the community members on road safety with the key messages reinforced with communities throughout construction.	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	Haulage of aggregates and construction equipment.	<p>98. 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.</p> <p>99. Heavy machinery will not be used after day light and all such equipment will be returned to its overnight storage area/position before night.</p> <p>100. All sites including storage areas will be made secure, prohibiting access by members of the public by fencing when appropriate.</p> <p>101. Install barriers to keep pedestrians away from hazardous areas such as constructions sites and excavation sites.</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>102. Install signage at the periphery of the construction site advising road users that construction is in progress.</p> <p>103. 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>104. Provide security personnel in hazardous areas to restrict public access.</p> <p>105. 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	Potential disfigurement of landscape, vegetation losses and damage to access roads	106. Refrain from storing material near surface waters to prevent siltation or obstruction of water ways. This refers particularly to the floodplains of	Contractor	PIURRwith support of CSC	Regular monitoring.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	Increased dust emission Siltation and obstruction of surface waters	<p>Vakhsh river, Surkhob river (реки Сурхоб) and Tairsu river.</p> <p>107. 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.</p> <p>108. Implement air quality management plan, including transportation and post-closure rehabilitation of borrow sites.</p> <p>109. The hauling traffic should be carried out only between 7:00 am and 22:00 pm.</p> <p>110. 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>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>111. 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>112. 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>113. Implement material management plan which indicates the location of the proposed extraction site as well as rehabilitation measures and implementation schedule for the borrow areas and access roads. The plan needs to address the sensitive issues of avoidance of transportation through residential areas as far</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		as technically feasible and closure rehabilitation.			
	Loss of valuable ecological structures if the selected disposal sites are not carefully selected.	114. 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. 115. Disposal sites will be preferably on barren land without any wooden vegetation. This need to be added in the spoil management plan.	Contractor	PIURRwith support of CSC	
Operation of Asphalt Plant and Aggregate Crushers	Increased dust emission and noise emission	116. 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.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	Odor emission and safety risks	<p>117. Asphalt plants will be 1,000 m downwind from any settlements and residential houses.</p> <p>118. 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>119. Secure official approval for installation and operation of asphalt plants from MoT.</p>	Contractor	PIURR with support of CSC	
	Water pollution due to spilled bitumen	<p>120. Receive all relevant permissions prior to commencing operation of the asphalt plant.</p> <p>121. 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>122. Storage areas should be lined with impermeable layer to</p>	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>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>123. Bitumen storage and mixing areas must be protected against spills and all contaminated soil must be properly handled according to legal environmental requirements. Such storage areas must be contained so that any spills can be immediately contained and cleaned. 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>124. Bitumen storage and mixing areas will be protected against spills.</p> <p>125.</p>			
Bridge and Culvert Reconstruction Works	Possible alteration of surface water	126. Store the material at a safe distance from nearby	Contractor	PIURR with support of CSC	Regular monitoring.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	hydrology resulting in increased sediment by increased soil erosion at construction site	<p>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 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.</p> <p>127. For avoidance of reduction of water quality there will be instrumental monitoring as stipulated in the Environmental Monitoring Plan.</p> <p>128. If required sediment ponds must be implemented.</p> <p>129. No asbestos containing materials (ACM) will 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.</p>			Provision of 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>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>130. Provide for long term stockpiles a grass cover.</p> <p>131. 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>132. Implement the waste management plan which considers sensitive receptors (rivers and their floodplains).</p> <p>133. Conduct regular maintenance of the construction equipment to prevent oil leaks.</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>134. Chemicals and oil will be stored in secure locations, impermeable, and bound area far away from surface waters.</p> <p>135. When carrying out corrosion treatment, the contractor needs to present a method statement on this.</p> <p>136. The bridge reconstruction debris will be removed in an environmentally safe manner.</p> <p>137. 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>138. Storage of any hazardous construction</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>material will be on sealed surfaces only to prevent leakages into the groundwater.</p> <p>139. With regard to spill kits, training and response the following measures must be adhered to:</p> <p>140. 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>141. Develop and implement a Spill Prevention and Response Plan, which should include control measures listed below:</p> <p>142. Store hazardous chemical such as fuels, oils, lubricants and chemicals as well as hazardous wastes in appropriate containers provided with proper labels</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>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>143. Locate fuel and chemical storage areas at least 500 m away from any surface water, including dry rivers.</p> <p>144. Make available Safety Data Sheet (SDS) of hazardous chemicals at storage areas and where they were used.</p> <p>145. Refuel vehicles in an area that is at least 100 m away from any surface water.</p> <p>146. Provide spill kits in accessible areas at all times.</p> <p>147. Train personnel handling fuel and chemicals in the use of spill response kits in accordance with the</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		emergency preparedness and response plan.			
Establishment and operation of contractor's yard	Potential soil and water pollution	<p>148. Implement the Construction camp management plan prepared as part of the SSEMP in reference to World Bank Group's Workers' Accommodation: Processes and Standards.⁵⁰</p> <p>The plan will indicate:</p> <p>149. 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>150. Sewage management plan for provision of sanitary latrines and proper sewage collection and disposal system to prevent pollution of watercourses;</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>

⁵⁰ [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>151. 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>152. 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.</p> <p>153. Prior to the commencement of works the</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>site installations will be inspected for approval.</p> <p>154. The selected site will not be on top of ground water area or near surface waters.</p>			
	Competition for water resources	<p>155. Prior to establishment of the work camps;</p> <p>156. Indicate proper sources of drinking and construction water which won't compete with local needs.</p> <p>157. 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>158. Implement the waste management plan prepared as part of the SSEMP.</p> <p>159. Provide sanitary latrines and garbage bins at construction site.</p>	Contractor/ HSO	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>160. Periodically clear the sanitary latrines and garbage bins.</p> <p>161. Do not allow open burning of waste</p> <p>i. For health and safety protection of workers and adjacent communities, the following will be provided:</p> <p>i. adequate health care facilities (including first aid facilities) within construction sites;</p> <p>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;</p> <p>iii. personal protective equipment for workers, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection in accordance with legal legislation;</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		v.clean drinking water to all workers; i.adequate protection to the general public, including safety barriers and marking of hazardous areas; i.safe access across the construction site to people whose settlements and access are temporarily severed by road construction; i.adequate drainage throughout the camps so that stagnant water bodies and puddles do not form; x.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			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		disposal facilities of nearby communities;			
	Worker's health and soil / water pollution in and around equipment maintenance and fuel storage areas	162. 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.	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>163. Locate storage facilities for fuels and chemicals away from watercourses.</p> <p>164. 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>165. Store and dispose waste/used oil consistent with environmental legal requirements.</p>			
	Road construction projects bear a high	166. Providing information to workers, encouraging	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	<p>potential risk to affect local communities and the health and well-being of those that live in or near to the temporary work camps by supporting the spread of STD and HIV/AIDS. 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.</p>	<p>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.</p> <p>167. To avoid risk of spread of the corona virus the FIDIC guidance memorandum "FIDIC COVID-19: On-site working and project team organization" will be adhered to at construction site.</p> <p>168. Implement the 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</p>			

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>international good practice guidelines⁵¹</p> <p>169. If a suspected incidence of COVID-19 is reported of any member of the project team during implementation of the project-related activity (including consultation and public participation), the activity will stop immediately for a review of the adequacy of the safety system of work and a corrective action will be implemented to address any identified gaps in the safety system of work prior to recommencement of the activities. All such incidence will be reported to ADB immediately for review.</p>			

⁵¹ 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>

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
	Social conflict between the workers and local people	<p>170. Arrange the facilities, services, and water supply of the work camp so that it will not compete on the same resources with nearby communities.</p> <p>171. 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.</p>	Contractor	PIURR with support of CSC	
Traffic impairment	Traffic impairment	172. Submit the traffic management plan to local traffic authorities prior to mobilization. The plan will include action plan to mitigate impacts from transport of hazardous and toxic materials to the traffic emergency	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</p>

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>response plan for the operation phase of the road.</p> <p>173. Provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions</p> <p>174. Allow for adequate traffic flow around construction areas.</p> <p>175. Provide adequate signalization, appropriate lighting, well - designed traffic safety signs, barriers and flag persons for traffic control.</p>			measures in SAEMR.
	Potential Impact on Community Health and Safety	<p>176. Implement a traffic management plan that will set out how access along the project road will be maintained safely during construction.</p> <p>177. Provide clear signs to guide road users and advise them on changes to road priorities in order to make their</p>	Contractor	PIURR with support of CSC	

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		<p>journey as smooth as possible and to ensure road safety as unanticipated changes e.g. change of lane, will be avoided.</p> <p>178. Ensure access in areas to be closed temporarily by providing temporary/alternative access.</p> <p>179. 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	180. 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	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.</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>the continuation of the operations.</p> <p>181. 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>			
Closure of construction sites	<p>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</p>	<p>182. 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).</p> <p>183. 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</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	
	debfris, metallic scrap etc.) if not properly disposed of.	condition. Rehabilitation measures may not be necessary for borrow areas still in operation after road works have finished.			
OPERATION PHASE					
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.	184. 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	185. 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	PIURR	PIURR	Documentation and count of accidents on the Project road.

Activity / Location	Potential Impact	Mitigation measures	Institutional Responsibility		Performance Indicator
			Implement	Monitor	
		on the Project Roads, such as a spill of oil, fuel or other substances that may harm drinking water resources or have adverse effects on the natural balance of sensitive areas. Additional measures to mitigate risk of accidents and spill of harmful substances are speed control and weight stations.			Provision of additional safety features if required.
Damaged drainage or uncontrolled erosion	Harmful environmental impacts resulting from damaged drainage or uncontrolled erosion.	186. Routine monitoring of drainage and erosion control at least twice a year. 187. 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)

401. Prior to construction works, the contractor will provide a comprehensive SEMP 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) Tree Management Plan (TMP). In association with the TMP, all trees not felled should 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 felling to avoid unnecessary impacts.
- (ix) 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
- (x) 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
- (xi) 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.
- (xii) Traffic management plan for ensuring traffic safety and avoiding congestion to the degree technically possible during construction phase.

- (xiii) Emergency response plan (in case of spills, accidents, fires and the like) prior to operation of the asphalt plant
- (xiv) Construction camp management plan in reference to World Bank Group's Workers' Accommodation: Processes and Standards.⁵² The plan will include layout of the work camp and details of the proposed measures to address adverse environmental impacts resulting from its installation.
- (xv) Health and Safety Management Plan
- (xvi) 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 guidelines⁵³
- (xvii) 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.
- (xviii) 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).
- (xix) As part of the SSEMP, the contractor is required to document pre-work conditions and include restoration as part of work.
- (xx) 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.

402. 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.

403. Environmental Monitoring Plan

404. 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 27. PIURR will supervise the road project regularly, and submit quarterly reports based on the monitoring data and laboratory analysis report.

⁵² [A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards](#) (August 2009)

⁵³ 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>

Table 27 - Environmental Monitoring Plan

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored? ⁵⁴	When is the parameter to be monitored? Frequency	Institutional responsibility
Pre-Construction					
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 SEMP. If works will be conducted chainage/section-wise, the SEMP 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. Ecological baseline	Bird nesting sites.	fast-track ecological survey will be conducted for purpose of identification of nesting sites at cliffs in the construction corridor.	Photo documentation with geographical coordinates or alternatively specification of road chainage.	Once before construction starts.	CSC's ornithologist
Construction stage					

⁵⁴ For environmental parameters, follow requirements per local standards and EHS Guidelines, whichever is more stringent.

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored? ⁵⁴	When is the parameter to be monitored? Frequency	Institutional responsibility
C. Water quality in surface waters crossed by and nearby Project road. ⁵⁵	pH, temperature, suspended solids (mg/l), oil products (mg/l), mineralization (mg/l), BOD 5 (mg O ₂ /l), turbidity (mg/l) and electrical conductivity (Ohm/cm)	At surface waters traversed by the Project Road. (19 locations listed under para. 226 inclusive Tairsu River)	Measurement either directly in river water with a suitable measurement device or sample taking and measurement in a certified laboratory according to the methodology of the water baseline measurement report (Annex 1 - REPORT ON WATER QUALITY)	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.
D. Noise	Noise level.	25 locations listed in Table 22 ⁵⁶	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.

⁵⁵ Baseline measurements have been conducted. Results are shown in the water baseline measurement report (Annex 1 - REPORT ON WATER QUALITY).

⁵⁶ Rehabilitation works within the 13 villages that are traversed by the Project Road, particularly at locations where the Project Road runs close to sensitive receptors such as schools, hospitals, mosques, bazars or other sensitive socioeconomic infrastructure.

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored?⁵⁴	When is the parameter to be monitored? Frequency	Institutional responsibility
E. Vibration	Vibration level	At the 9 locations listed in the vibration measurement report in Annex 7, table 1.	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.
F. Air quality deterioration due to road construction works	TSP, CO, NO, NO ₂ ; SO ₂ , PM 10 and PM 2.5	At the 9 locations listed in the air quality measurement report in Annex 7, table 2	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.

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored? ⁵⁴	When is the parameter to be monitored? Frequency	Institutional responsibility
G. Potential tree losses 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
H. Topsoil preservation	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
I. Equipment servicing and fuelling	Prevention of spilling of oil and fuel	Contractor's yard	Inspections; observations	Unannounced inspections during construction	PIURR with CSC's support

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored?⁵⁴	When is the parameter to be monitored? Frequency	Institutional responsibility
J. Worker's safety and health	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
K. Worker's education on AIDS and STD	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
L. Material supply Asphalt plant	Possession of official approval or valid operation license	Asphalt plant	Inspection	Before work begins	PIURR with CSC's support
M. Borrow areas	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

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored? ⁵⁴	When is the parameter to be monitored? Frequency	Institutional responsibility
N. Material transport Asphalt	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
O. Stone		Job site / haul routes	Supervision spot checks	Unannounced inspections during work	PIURR with CSC's support
P. Sand and gravel		Job site / haul routes	Supervision	Unannounced inspections during work	PIURR with CSC's support
Q. Surface water protection	Contractor's compliance with his approved method statement	Bridges and Culverts	Inspection	Unannounced inspections during bridge and culvert works	PIURR with CSC's support
Air pollution from improper maintenance of equipment R. 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
S. Planting of new road side trees	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? ⁵⁴	When is the parameter to be monitored? Frequency	Institutional responsibility
Operational stage					
T. Increased road kills of animals due to higher traffic loads and vehicle speeds	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
U. Increased traffic volumes may increase possible spills of harmful substances	Accidents that cause spills of harmful substances	Along the new road	Counting of accidents	Throughout the Year	MoT
V. Damaged drainage or uncontrolled erosion	Leakages in drainage system and damages due to erosion	Culverts and drainage facilities	Documentation	Throughout the Year	MoT ⁶⁾

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

405. 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.

406. CSC-NES and CSC-IES will assess the capabilities of the target participants, customize the training modules accordingly and provide the detailed cost.

407. 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 28 - Suggested Capacity Building Program on EMP Implementation

	Description	Target Participants and Venue	Timing	Resource person	Cost and Source of Funds
1	<p>Introduction and Sensitization to Environmental Issues (1 day)</p> <ul style="list-style-type: none"> • ADB Safeguard Policy Statement (2009) • Government of Tajikistan applicable safeguard laws, regulations and policies including but not limited to core labor standards, OH&S, etc. • incorporation of EMP into the project design and contracts • monitoring, reporting and corrective action planning 	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.	<p>EMP implementation (2 days)</p> <ul style="list-style-type: none"> • Roles and responsibilities • OH&S planning and implementation • Wastes management (water, hazardous, solid, excess construction materials, spoils, etc.) • Working in congested areas, • Public relations • Consultations • Grievance redress • Monitoring and corrective action planning • Reporting and disclosure • Post-construction planning 	<p>All staff and consultants involved in the project</p> <p>All contractors before start of construction works</p>	Once prior to the commencement of civil works	Safeguard specialist of CSC (IES together with NES).	PIURR cost
3.	<p>Plans and Protocols (2 days)</p> <p>SSEMP including</p> <ul style="list-style-type: none"> • Construction site standard operating procedures (SOP) • Material management plan • Spoils management plan 	<p>All staff and consultants involved in the project</p> <p>All contractors before start of construction works or during mobilization stage.</p>	Once prior to the commencement of civil works	Safeguard specialist of CSC (IES together with NES).	<p>PIURR cost</p> <p>Contractors cost as compliance to contract provisions on EMP implementation</p>

	Description	Target Participants and Venue	Timing	Resource person	Cost and Source of Funds
	<ul style="list-style-type: none"> Water quality management plan Sewage management plan Waste management plan Hazardous Waste Management Plan Air quality management plan Noise and vibration management plan Asphalt Plant and Borrow pit/Quarry Management plan Traffic management plan Emergency response plan (in case of spills, accidents, fires and the like) Construction camp management plan Health and Safety Management Plan COVID-19 health and safety management plan and emergency response plan) Chance find protocol O&M plans Post-construction plan 				
4.	Experiences and best practices sharing <ul style="list-style-type: none"> Experiences on SSEMP implementation Issues and challenges Best practices followed 	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

408. 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.

409. 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.

410. 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. 253) and actual number and details of trees to be cut (para. 258). 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.

411. 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.

412. During the operation phase, PIURR will be responsible for environmental management and will continue to prepare SAEMRs.

413. 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 3).

414. 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.

415. 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.

416. 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.⁵⁷

⁵⁷ EBRDs additional monitoring requirements will be managed by the PMC, but importantly the proposed Project will be implemented according ADBs monitoring requirements as per SPS.

E. Implementation cost

417. Most of the mitigation measures require the contractors to adopt good site practice, which are part of their normal procedures. Mitigation that is the responsibility of PIURR will be provided as part of their management of the project. Cost for the capacity building program is included as part of the project. Cost of environmental management are given in Tables below.

Table 29 - Cost Estimate for Contractor's Environmental Management

Description	Unit	Quantity	Rate \$	Amount \$
Protection of Environment				
Planting, maintenance and watering (during construction stage) of trees on the road side as explained in the EMP ¹⁾ .	Pieces	6,922	30	207,660
Protection of trees during the construction activities.	lumpsum			5,000
Preparation of site-specific EMP ¹⁾	Lumpsum			10,000
Clearing of Construction Corridor.	lumpsum			Included in civil engineering works
Removal and Storage of Topsoil.	lumpsum			Same as above
Protection of Water Resources.	lumpsum			Same as above
Management of Solid Waste and Sewage Waste from the Construction Camp.	lumpsum			Same as above
Potential restoration of Work and Storage Sites, Quarries and Borrow Pits, Construction Site Roads.	lumpsum			Same as above
Securing of Storage and Equipment Maintenance Areas.	lumpsum			Same as above
Dust suppression measures during dry period (water spraying)	Lumpsum	Daily during dry summer periods (2 periods)	15,000	30,000
ESO	month	18	2,000	36,000
HSO	month	18	2,000	36,000
Medical seminar on worker's health protection covering protection against HIV / Aids and Covid-19	Quarterly	6	1,500	9,000
Subtotal				333,600
Contingencies 10%				33,360
Total				366,960

EMP = Environmental Management Plan

Table 30 - Cost Estimate for CSC's Environmental Management

Description	Unit	Quantity ⁵⁹	Rate (\$)	Amount (\$)
CSC-NES	month	18 (includes 1 month training)	3,000	54,000
CSC-IES	month	6	20,000	120,000
CSC national ornithologist ⁶⁰	month	1	3,000	3,000
Training of PIURR Safeguard Department	Lumpsum			15,000
Consultations in project affected villages	Lumpsum			16,000
Total				208,000

CSC = constructionconsultant, EMP = Environmental Management Plan, GRM = Grievance Redressal Mechanism, PIURR = Project Implementation Unit

Table 31 - Cost Estimate for Instrumental Monitoring (CSC)

Description	Unit	Quantity	Rate \$	Amount \$
Water Quality Monitoring (Quarterly)	Number of Measurements	120 (at 20 locations every 3 months during 18 months of construction phase)	200	24,000
Noise and Vibration Monitoring (Twice per month)	Number of Measurements	900 (25 locations twice per month during construction)	100	90,000
Air quality monitoring (Quarterly)	Number of Measurements	180 (at 25+5 locations every 3 months during 18 months of construction phase)	150	27,000
Subtotal Monitoring				141,000
Contingencies (10%)				14,100
Total Monitoring				155,100

VIII. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. General approaches

418. 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.

⁵⁹ Person-months of the CSC of ongoing original Project <[54005-001: Road Network Sustainability Project | Asian Development Bank \(adb.org\)](#)> will be increased. A national ornithologist will be mobilized under the CSC for this Additional Financing.

⁶⁰ The ornithologist will conduct survey for identification of bird nesting sites in cliffs which will be cut by Project Road.

B. Identification of Main Stakeholders

419. 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

420. 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

421. 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).

Consultation Process in the Dangara-Guliston Road Section

422. 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.

423. In the light of the Corvid-19 crisis, the consultation process needed to adapt to the required precautions and extra care in order to protect the consulted people, stakeholders and also the Project team against any potential spreading of the corona virus. This put a significant challenge to the consultation.

424. Although initially no large scale public gathering or traditional public consultation meetings could be organized for the sake of health safety reasons caused by the threat of pandemic, the final objective could be achieved and persons directly affected by road project as well as population within project influence area have been informed on the possible social and environmental impacts and benefits of the Dangara-Guliston road's reconstruction project.

425. 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.

426. During the carried out consultations, Kocks Consult GmbH national environmental expert together with PIURR and Designer's Engineer individually met with at least one mature member of each project affected household. Similarly, the owners and renters of business facilities and management of project affected legal entities, as well as other project stakeholders including Jamoat representatives, raisi mahalan (head of the village), and relevant local authorities. Public Information booklets were distributed to each and every consulted Affected Person. Instead of public gatherings, the preference was given to individual, face-to-face communication with project affected households and business owners, as well as renters and sub-renters.

427. All located Affected Persons including vulnerable and severely affected persons were individually consulted and provided with full information on project goals and objectives, expected benefits and environmental, social and LAR impacts to their land and assets. The Affected Persons learned about their rights and eligibility to compensation, compensation entitlements in accordance with ADB SPS and country legislation, GRM procedures and benefits, importance of PAPs participatory involvement if project planning and DMS, census, SES, inventory of affected assets.

428. 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 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.

429. In addition to the already conducted small scale consultations of affected people and households by means of face-to-face interviews, two official public consultation meetings were carried out on 17 November 2021, one in Ismat Sharif and one in Jamoat Guliston. During the meetings the participants were informed about the results of the IEE by means of a presentation. In the following question-answer session the participants had the opportunity to ask questions and raise their concerns.

430. 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.

The minutes of public consultations, photos, the list of attendees will be attached to LARP and IEE (Annex 5).

431. A second round of public consultations was conducted on March 4, 7 and April 15, of 2023. The consultations were attended by 62 persons (37 men and 25 women). The minutes of public consultation meetings, results of question-answer session, list of attendees and photo materials are presented in Annex 5.

432.

Future Consultations

433. 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.

434.

Reporting on Consultations

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

436. 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

437. 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 3) 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

438. 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.

439. 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

440. 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.

441. 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.

442. 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

443. 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.

444. 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.

445. 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.

446. 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.

447. 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.

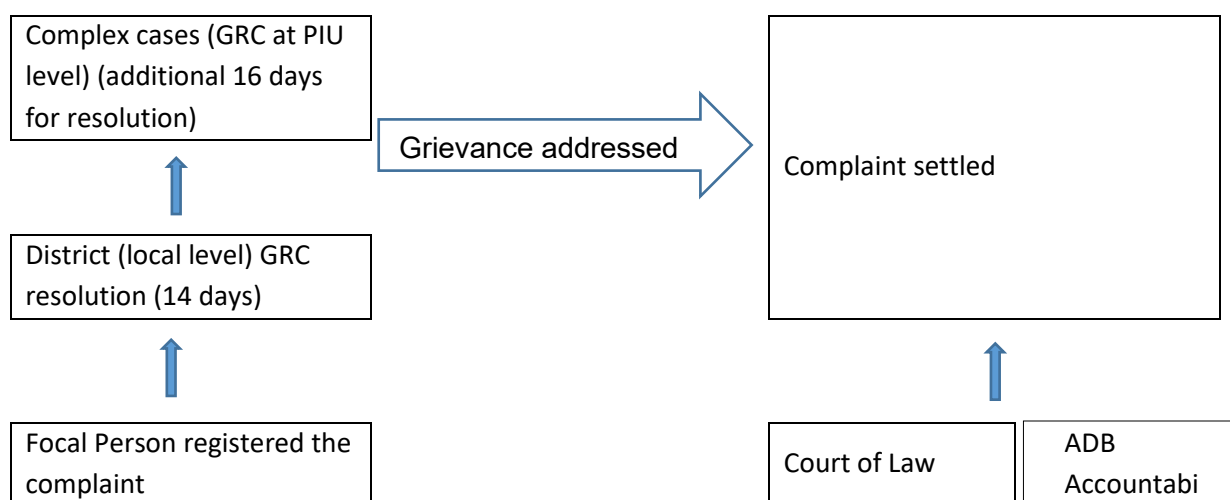
448. Any aggrieved person is eligible to apply to the court at any phase of the grievance redress process.

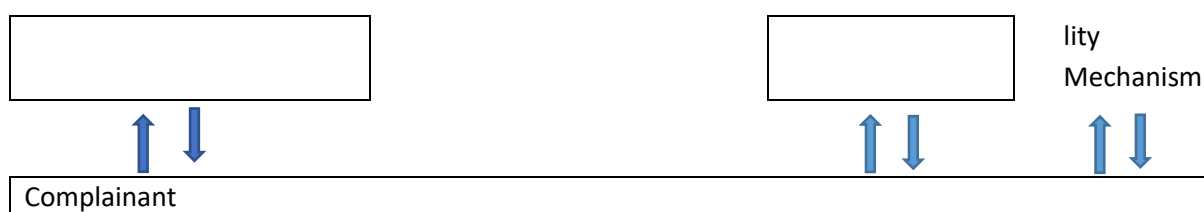
449. If affected persons want to register a complaint with the ADB, the Focal Person will inform the complainants that they can refer their complaints through the ADB Tajikistan Resident Mission for proper coordination with the responsible project officer and relevant staff. Alternatively, the complainants 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 29 - Grievance Resolution Process





C. District (Local) Level Grievance Redress Committee

450. Under the Order⁶¹ 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 was established according to the following composition;

Table 32 – Composition of GRC at District (Local) level

Full Name	Position	E-mail	Phone
N. Kabirzoda	First Deputy of Mayor of t. Levakant	N/A	904-43-21-87
A. Faizgulzoda	Chairman of land management committee	N/A	904-57-10-01
M. Iusufv	Head of the Architecture and Urban Planning Department of t. Levakant	N/A	907-12-54-44
Sh. Abosov	Head of Environmental Department of t. Levakant	N/A	909-79-80-44
S. Khalimzoda	Chairman of Jamoat Guliston	N/A	908-89-31-89
F. Sultonov	Chairman of Jamoat Vakhdat	N/A	905-01-31-81

Table 33 – Representatives of the GRC at PIU level composed of PIURR Safeguards Unit Specialists

Khabibuloev Dilovar Project Manager of Bokhtar-Dangara road project 14 Ayni Street, 4th Floor, Dushanbe. Tajikistan Tel: +992 90 788 30 98	Temurzoda Sherali Lead Resettlement specialist of Project Implementation Unit for Roads Rehabilitation 14 Ayni Street, 4th Floor, Dushanbe. Tajikistan Tel: +992 (37) 222 20 78	Khurmatzoda Fathiddin Main specialist on Environmental issues of Project Implementation Unit for Roads Rehabilitation 14 Ayni Street, 4th Floor, Dushanbe. Tajikistan Tel: + 992 (37) 222 20 78
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⁶¹ 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".

Email: dilovar_khabib@mail.ru	+992 900 53 44 44 +992 933 09 40 03 Email: sherali@piu.tj	+992 901 907 000 Email: fathiddin_888@mail.ru
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D. Complaints received by Contractor(s)

451. 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.

452. 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.

453. 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.

454. 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.

455. 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.

456. 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

457. 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

458. 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.

X. CONCLUSION AND RECOMMENDATIONS

459. This is the Initial Environmental Examination (IEE) report for the reconstruction of the Dangara-Guliston road section.

460. In terms of its environmental impacts the Project is ranked as category B. It involves the widening and resurfacing on an existing road. Based on the traffic load and traffic forecast, the road has been divided into two sections which also differ in terms of the magnitude of impacts.

461. The Project Road will be upgraded to category I. Hence 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.

462. The rehabilitation will be carried out on the already existing alignment and confined to the existing RoW as far as technically feasible. 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.

463. 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.

464. 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.

465. In the light of the Corvid-19 crisis, the consultation process needed to adapt to the required precautions and extra care in order to protect the consulted people, stakeholders and also the Project team against any potential spreading of COVID-19. This put a significant challenge to the consultation. Although no large-scale public gathering or traditional public consultation meetings were organized the final objective could be achieved and persons directly affected by road project as well as population within project influence area are being informed on the possible social and environmental impacts and benefits of the Dangara-Guliston road's reconstruction project. Project affected persons and stakeholder met during the SES were handed out a brochure which informs about the Project, its impacts and benefits.

466. In addition, two public consultation meetings were carried out on 17 November 2021. During the meetings the participants were informed about the results of the IEE and took the opportunity to ask questions and raise concerns. The main concern of Project Affected People was on reducing the social impacts (encroachment into private assets). The raised concerns are taken into consideration and the design of the relevant section will be adjusted to further mitigate and avoid loss of private structures by keeping the designed cross section.

467. 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.

468. 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, CSC-IES, and an ornithologist 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

469. 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

470. 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 - REPORT ON WATER QUALITY

Rehabilitation of Dangara – Guliston Road



Executor: Rustamov Egamberdi
Odinabekov Tillokhon.

Instrumental baseline report on environmental impact, water quality monitoring, GPS measurements.

Dushanbe – 2020

LIST OF ABBREVIATIONS

CEP RT – Committee for Environmental Protection under the Government of Tajikistan

IEM – Initial Environmental Monitoring

EMP – Environmental Management Plan

MPC – Maximum permissible concentration

FIP – Fish industry purposes

BOD – Biological oxygen demand

MPL - Maximum permissible level

AMC - Analytical Monitoring Center

Figure 30 - basic laboratory of the CAC



Environmental monitoring of water resources was carried out in accordance with the legal framework of the Law on Environmental Protection of Tajikistan and the Water Code of Tajikistan

Criteria for assessing the quality of water ecosystems

- Criteria for quality assessment are any set of quantitative indicators characterizing the properties of the objects under study and used for their classification or ranking. Quality assessment of freshwater reservoirs is carried out on three main aspects, including the following sets of indicators:
- factors related to the physical-geographical and hydrological description of the reservoir as an integral natural or water management facility;
- monitoring indicators of the composition and properties of the water environment that provide a formalized assessment of quality of water and its compliance with existing regulations;

- a set of criteria that assess the specifics of the structural and functional organization of hydrobionts and the dynamics of the development of water biocenoses.
- The main water object in the project area is the Vakhsh River, the main tributary of the Amudarya River.

A. INTRODUCTION

This report covers the element of Initial environmental monitoring (IEM) of the environment in the area of impact by the Dangara-Guliston road rehabilitation Project.

B. MONITORING OBJECTIVES

- Water quality analysis;
- GPS testing;

Assessment and documentation of the results of the initial environmental survey in the area of impact and construction of the new Dangara-Guliston road.

The work was carried out on 01 - 02 August, 2020.

C. SCOPE OF THE STUDY AS PART OF THE INITIAL ENVIRONMENTAL MONITORING

Quality of water

19 water samples were collected for chemical analysis to obtain baseline data:

- 1) Km 0+00 of the Dangara – Guliston project road. Irrigation ditch.
- 2) Km 0+600 of the project road. Left side. Water discharge canal.
- 3) Entrance to Ismat Sharipov village. Irrigation canal.
- 4) Km 2+0 Drinking water. Ismat Sharipov village.
- 5) End of Ismat Sharipov village. Right side of the road. Irrigation canal.
- 6) Water discharge canal. Left side of the road. End of Ismat Sharipov village.
- 7) Water discharge canal. Left side of the project road. Shokhbul village.
- 8) Irrigation ditch. Right side of the project road. Etalka village.
- 9) Irrigation canal. Entrance to Karomat village. Left side.
- 10) 50m above the bridge, a canal, Khuramzamin village. The project road.
- 11) 50m below the bridge, a canal, Khuramzamin village. The project road.
- 12) Km 9+600 Water discharge canal. Left side.
- 13) Km 9+600 Project Road. Ditch. Right side.
- 14) Km 14 + 800 Project Road. 50m above the diversion canal.
- 15) Km 14 + 800 Project Road. 50m below the diversion canal
- 16) Km 19 + 500 50m above, a ditch used as a discharge by fish reservoir
- 17) Km 19 + 500 50m below, a ditch used as a discharge by fish reservoir
- 18) Km 22+00 Project Road. Water spring.
- 19) Km 33 + 800 Water spring

*

D. **ENVIRONMENTAL LAWS OF THE REPUBLIC OF TAJIKISTAN**

Table 34 - ENVIRONMENTAL LAWS

№ п/п	Title of the document	When a document is approved
1.	Law of the Republic of Tajikistan "On Environmental Protection"	August 2, 2011
2.	Law of the Republic of Tajikistan "On Environmental Expertise"	April 16, 2012
3.	Law of the Republic of Tajikistan "On Air Protection"	December 28, 2012
4.	Law of the Republic of Tajikistan "On Environmental Monitoring"	March 25, 2011
5.	Water Code of RT	October 20, 2000
6.	Law of the Republic of Tajikistan "On Drinking Water and Drinking Water Supply"	December 29, 2010

E. **ENVIRONMENTAL MONITORING**

Water quality monitoring

Tajikistan builds its policy in the field of water relations based on the need for sustainable development of the country's economy, environmental security, compliance with the principles of international law and enhancement of cooperation.

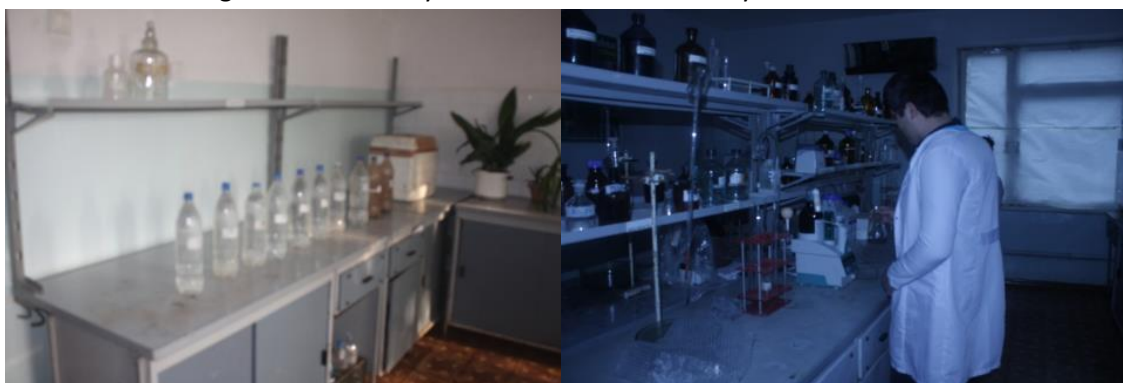
Priorities in rational use and protection of water resources are defined in the "Concept for rational use and protection of water resources in Tajikistan", approved by the Government of Tajikistan (2001).

The chemical composition of water in Vakhsh river remains constant, with a hydro carbonate class of the calcium group. According to the concentration of dissolved substances, Vakhsh river belongs to the freshwater group.

Figure 31 - Selection of samples of water from the spring at km 33+800 and Dangara diversion canal.



Figure 32 - Conducting a chemical analysis of water in a laboratory.



This report is a survey of the environment prior to the construction and rehabilitation phase of 48 km of Dangara -Guliston road in order to obtain baseline data.

№ 000414


**СИСТЕМАИ МИЛЛИИ АККРЕДИТАТСИЯИ
ҶУМҲУРИИ ТОҶИКИСТОН**
МУАССИСАИ ДАВЛАТИИ
«МАРКАЗИ МИЛЛИИ ОИД БА АККРЕДИТАТСИЯ»
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АТТЕСТАТИ
АККРЕДИТАТСИЯИ ОЗМОИШҶОҲ

Дар феҳристи давлатии системаи миллии
аккредитатсияи Ҷумҳурии Тоҷикистон

аз «28» октябри соли 2019

№ Т.1 762.37100.02.061-2019
ба қайд гирифтаи шудааст.

то «28» октябри 2021 эътибор дорад.

Аттестати мазкур таъдиқ мекунад, ки Маркази назорати таҳлилии Кумитаи хифзи
муҳити зисти назди Ҳукумати Ҷумҳурии Тоҷикистон
номгуи озмоишҳои санҷишӣ (марказ)

шаҳри Душанбе, кӯчаи Шамсӣ-5/1,
суроға

ба талаботҳои Системаи миллии аккредитатсияи Ҷумҳурии Тоҷикистон мутобики талаботи
ИСО/МЭК 17025-2009 «Талаботҳои умумӣ оид ба صلاحиятнокии озмоишгоҳҳои таъхисӣ ва
калибровкакунонӣ» аккредитатсия карда шудааст.

Доирати назорати таъдиқ дар аттестат замима (6-саҳифа) оварда шудааст.


Директор
Ҷ.М.  **Чумазода Б. Х.**

Figure 34 - Conductivity meter, Bathometer, Titrometer, pH – meter, Spectrophotometer.





Analysis methodology

Water samples taken at approved locations were delivered to the laboratory of the Analytical Control Center of the Committee for Environmental Protection under the Government of Tajikistan in Dushanbe for analysis.

The samples were analyzed using standardized chemical and physical-chemical methods:

- Drinking water. GOST – 2874-82.
- Drinking water, field methods of analysis. GOST – 1030-81.
- Unified methods of water quality research, Part 1.
- Methods of chemical analysis of water, volume 1, Moscow, - 1987.
- Unified methods of water quality research, Part 2.
- Methods of chemical analysis of water, volume 2, Moscow, - 1983.
- Monitoring parameters:
- Mineralization
- Electrical conductivity
- BOD 5
- Petroleum products
- Data on equipment and calibration
- pH – potentiometric methods on a pH meter of grade pH Level-1
- Suspended substances, dry residue, oil products were determined by weight (gravimetric) method: based on the weight of Japanese production (Shimadzu).

- BOD 5 – by the tetrametric method
- Conductivity - by a conductometer manufactured in India
- Nitrates, nitrites, ammonium, chlorine - by a spectrophotometer.

F. Conclusion

Based on the results of the chemical analysis of water samples in the project impact area, we came to the following conclusion:

- At the time of monitoring of significant anthropogenic and industrial impact in the project impact area.
- Chemical analysis of the water quality of the canals, the river "Posyolok" meets the requirements of GOST 2874-84, established for drinking needs.
- The results of the analysis showed that some indicators exceed the norms of drinking water and fishery standards at the maximum permissible concentration. On mineralization, samples No.10 - 1.3 and No. 11 -1.3 times, on BOD5 (biological oxygen demand) samples No.10 - 2.7 times, samples No.11 - 2.5 times, samples No.15 - 1.4; on turbidity, samples No.3-7.7, samples No.5-9,5, samples No.6-14.2, samples No.7-21.4, samples 16,2, samples No.10-800.9 , samples No.11- 800.6, samples No.13-22.9, samples No.15- 14.5 times the norms of drinking water. On suspended solids, samples No.6-2.1, samples No.8-8,5. Samples No.9-6.4 No.10-997.3, samples No.11-959.6, samples No.12-4.1 times higher than fishery standards.
- Long-term observations show that the small river is in trouble at 59 + 500, the suspended matter concentration and turbidity in its tributaries are seasonal, especially in the flood period, and the location of the small river is clayey. Excess of the maximum allowable concentration in terms of mineralization is background contamination.

Pollution in water basin

- The main sources of pollution in the water basin are the irrigation water discharged by dehqan farms. This water contains suspended substances and petroleum products.

Table 35 - The result of water quality analysis

№	Locations where water samples taken	Latitude	Longitude	Name of ingredients	Tajikistan standard (MPC)		Factual
					Sanitary and domestic	Fishery	
1	2	3	4	5	6	7	8
1	Km 0 + 00 of the Dangara – Guliston project road. Ditch with irrigation water	37°57.657 ¹	0,68°40.793 ¹	pH	6.5 – 8.5		7.4
				Temperature °C		7.4	19.2
				Suspended substances, mg / l	0.25	0.75	0.36
				Oil products, mg / l	0.05	550	отс
				Mineralization, mg / l	1000	-	420.0
				BOD ₅ , mg O/l	3.0	3.0	1.4
				Turbidity, mg / l	1.5	-	6,1
				Electrical conductivity, O / cm		720	360
2	Km 0+600 of the project road. Left side. Water discharge canal.	38°04.285 ¹	069°20.663 ¹	pH	6.5 – 8.5		7.8
				Temperature °C			21,1
				Suspended substances, mg / l	0.25	0.75	1.46
				Oil products, mg / l	0.05	0.05	0.01
				Mineralization, mg / l	1000	1000	820.0
				BOD ₅ , mg O/l	3.0	3.0	2.2
				Turbidity, mg / l	1.5	-	9.8
				Electrical conductivity, O / cm	-	-	640
3	Entrance to Ismat Sharipov village. Irrigation canal.	38°03.612 ¹	069°20.764 ¹	pH	6.5 – 8.5		7.9
				Temperature °C			23.2
				Suspended substances, mg / l	0.25	0.75	1.1
				Oil products, mg / l	0.05	0.05	0.01
				Mineralization, mg / l	1000	1000	830
				BOD ₅ , mg O/l	3.0	3.0	3.2
				Turbidity, mg / l	1.5	-	11.6
				Electrical conductivity, O / cm	-	-	620

4	Km 2+0 Drinking water. Ismat Sharipov village.	38 ⁰ .03.610 ¹	069 ⁰ .20.768 ¹	pH	6.5 – 8.5		7.1
				Temperature °C			14.0
				Suspended substances, mg / l	0.25	0.75	0.36
				Oil products, mg / l	0.05	0.05	ots
				Mineralization, mg / l	1000	1000	440
				BOD ₅ , mg O/l	3.0	3.0	1.4
				Turbidity, mg / l	1.5	-	6.2
				Electrical conductivity, O / cm	-	-	460
5	End of Ismat Sharipov village. Right side of the road. Irrigation canal	38 ⁰ .03.000 ¹	069 ⁰ .20.797 ¹	pH	6.5 – 8.5		7.8
				Temperature °C			25.0
				Suspended substances, mg / l	0.25	0.75	1.4
				Oil products, mg / l	0.05	0.05	0.02
				Mineralization, mg / l	1000	1000	680
				BOD ₅ , mg O/l	3.0	3.0	2.8
				Turbidity, mg / l	1.5	-	14.2
				Electrical conductivity, O / cm	-	-	640
6	Water discharge canal. Left side of the road. End of Ismat Sharipov village	38 ⁰ .02.995 ¹	069 ⁰ .20.831 ¹	pH	6.5 – 8.5		7.6
				Temperature °C			24.1
				Suspended substances, mg / l	0.25	0.75	1.6
				Oil products, mg / l	0.05	0.05	0.02
				Mineralization, mg / l	1000	1000	820
				BOD ₅ , mg O/l	3.0	3.0	3.1
				Turbidity, mg / l	1.5	-	21.4
				Electrical conductivity, O / cm	-	-	610
7	Water discharge canal. Left side of the project road. Shokhbul village.	38 ⁰ .02.403 ¹	069 ⁰ .21.162 ¹	pH	6.5 – 8.5		7.6
				Temperature °C			23.2
				Suspended substances, mg / l	0.25	0.75	1.4
				Oil products, mg / l	0.05	0.05	0.01
				Mineralization, mg / l	1000	1000	920

				BOD ₅ , mg O/l	3.0	3.0	3.7
				Turbidity, mg / l	1.5	-	32.1
				Electrical conductivity, O / cm	-	-	680
8	Irrigation ditch. Right side of the project road. Etalka village.	38 ⁰ .01.878 ¹	069 ⁰ .21.579 ¹	pH	6.5 – 8.5		7.8
				Temperature °C			24.0
				Suspended substances, mg / l	0.25	0.75	1.8
				Oil products, mg / l	0.05	0.05	0.01
				Mineralization, mg / l	1000	1000	840
				BOD ₅ , mg O/l	3.0	3.0	2.8
				Turbidity, mg / l	1.5	-	24.3
				Electrical conductivity, O / cm	-	-	460
9	Irrigation canal. Entrance to Karomat village. Left side.	37 ⁰ .51.606 ¹	068 ⁰ .54.872 ¹	pH	6.5 – 8.5		7.2
				Temperature °C			22.1
				Suspended substances, mg / l	0.25	0.75	4,8
				Oil products, mg / l	0.05	0.05	0.02
				Mineralization, mg / l	1000	1000	870
				BOD ₅ , mg O/l	3.0	3.0	2.9
				Turbidity, mg / l	1.5	-	19.4
				Electrical conductivity, O / cm	-	-	580
10	50m above the bridge, a canal, Khuramzamin village. The project road.	38 ⁰ .01.156 ¹	069 ⁰ .21.467 ¹	pH	6.5 – 8.5		8.1
				Temperature °C			20.1
				Suspended substances, mg / l	0.25	0.75	748.0
				Oil products, mg / l	0.05	0.05	0.041
				Mineralization, mg / l	1000	1000	1320
				BOD ₅ , mg O/l	3.0	3.0	8.2
				Turbidity, mg / l	1.5	-	1230
				Electrical conductivity, O / cm	-	-	890
11	50m below the bridge, a canal, Khuramzamin	38 ⁰ .01.177 ¹	069 ⁰ .21.479 ¹	pH	6.5 – 8.5		8.2
				Temperature °C			20.2

	village. The project road.			Suspended substances, mg / l	0.25	0.75	719.7
				Oil products, mg / l	0.05	0.05	0.042
				Mineralization, mg / l	1000	1000	1310
				BOD ₅ , mg O/l	3.0	3.0	8.5
				Turbidity, mg / l	1.5	-	1224
				Electrical conductivity, O / cm	-	-	916
12	Km 9+600 Water discharge canal. Left side.	37 ⁰ .59.734 ¹	069 ⁰ .23.701 ¹	pH	6.5 – 8.5		7.6
				Temperature °C			23.1
				Suspended substances, mg / l	0.25	0.75	1.7
				Oil products, mg / l	0.05	0.05	0.01
				Mineralization, mg / l	1000	1000	660
				BOD ₅ , mg O/l	3.0	3.0	2.7
				Turbidity, mg / l	1.5	-	8.6
				Electrical conductivity, O / cm	-	-	340
13	Km 9+600 Project Road. Ditch. Right side.	37 ⁰ .59.552 ¹	069 ⁰ .20.801 ¹	pH	6.5 – 8.5		7.4
				Temperature °C			21.4
				Suspended substances, mg / l	0.25	0.75	6.1
				Oil products, mg / l	0.05	0.05	ots
				Mineralization, mg / l	1000	1000	440
				BOD ₅ , mg O/l	3.0	3.0	2.3
				Turbidity, mg / l	1.5	-	34.4
				Electrical conductivity, O / cm	-	-	360
14	Km 14 + 800 Project Road. 50m above the diversion canal.	37 ⁰ .56.855 ¹	069 ⁰ .19.521 ¹	pH	6.5 – 8.5		7.4
				Temperature °C			22.1
				Suspended substances, mg / l	0.25	0.75	1.4
				Oil products, mg / l	0.05	0.05	0.01
				Mineralization, mg / l	1000	1000	620
				BOD ₅ , mg O/l	3.0	3.0	3.4
				Turbidity, mg / l	1.5	-	42.1

				Electrical conductivity, O / cm	-	-	462
15	Km 14 + 800 Project Road. 50m below the diversion canal.	37 ⁰ .56.751 ¹	069 ⁰ .19.442 ¹	pH	6.5 – 8.5		7.6
				Temperature °C			22.2
				Suspended substances, mg / l	0.25	0.75	1.8
				Oil products, mg / l	0.05	0.05	0.014
				Mineralization, mg / l	1000	1000	654
				BOD ₅ , mg O/l	3.0	3.0	3.2
				Turbidity, mg / l	1.5	-	21.8
				Electrical conductivity, O / cm	-	-	420
16	Km 19 + 500 50m above, a ditch used as a discharge by fish reservoir	37 ⁰ .54.537 ¹	069 ⁰ .20.985 ¹	pH	6.5 – 8.5		6,8
				Temperature °C			24,0
				Suspended substances, mg / l	0.25	0.75	1.2
				Oil products, mg / l	0.05	0.05	ots
				Mineralization, mg / l	1000	1000	420
				BOD ₅ , mg O/l	3.0	3.0	2.6
				Turbidity, mg / l	1.5	-	11.6
				Electrical conductivity, O / cm	-	-	380
17	Km 19 + 500 50m below, a ditch used as a discharge by fish reservoir	37 ⁰ .54.447 ¹	069 ⁰ .21.029 ¹	pH	6.5 – 8.5		6.8
				Temperature °C			24.1
				Suspended substances, mg / l	0.25	0.75	1.4
				Oil products, mg / l	0.05	0.05	Ots
				Mineralization, mg / l	1000	1000	390
				BOD ₅ , mg O/l	3.0	3.0	2.4
				Turbidity, mg / l	1.5	-	12.8
				Electrical conductivity, O / cm	-	-	385
18	Km 22+00 Project Road. Water spring.	37 ⁰ .53.369 ¹	069 ⁰ .21.460 ¹	pH	6.5 – 8.5		7.4
				Temperature °C			22.1
				Suspended substances, mg / l	0.25	0.75	0,52
				Oil products, mg / l	0.05	0.05	Ots

				Mineralization, mg / l	1000	1000	760
				BOD ₅ , mg O/l	3.0	3.0	2.1
				Turbidity, mg / l	1.5	-	8.8
				Electrical conductivity, O / cm	-	-	445
19	Km 33 + 800 Water spring	37 ⁰ .47.092 ¹	069 ⁰ .23.122 ¹	pH	6.5 – 8.5		7.1
				Temperature °C			18.1
				Suspended substances, mg / l	0.25	0.75	0.69
				Oil products, mg / l	0.05	0.05	0.00
				Mineralization, mg / l	1000	1000	820
				BOD ₅ , mg O/l	3.0	3.0	2.6
				Turbidity, mg / l	1.5	-	18.2
				Electrical conductivity, O / cm	-	-	480

Notes:

MPC in the water of a reservoir used for fish farming purposes (MPC_{вp}), - the concentration of a harmful substance in the water, which should not have a harmful effect on fish populations, primarily commercial ones.

Maximum permissible discharge (MPD) - the mass of substances in waste water, the maximum allowed for discharge with the established regime at this point of the water facility per unit of time in order to ensure water quality standards in in a monitoring point

Annex 2 - REPORT ON AIR QUALITY AND NOISE

Rehabilitation of 48 km Dangara-Guliston Road



Executor: Rustamov Egamberdi
Odinabekov Tillokhon.

Instrumental baseline report on environmental impact, air quality inspection, noise measurement, GPS testing

Dushanbe – 2020

List of abbreviations

CEP RT – Committee for Environmental Protection under the Government of the Republic of Tajikistan

IEM – Initial Environmental Monitoring

EMP – Environmental Management Plan

MPC – Maximum permissible concentration

CO – Carbon monoxide

NO₂ – Nitrogen dioxide

TSS – Total suspended solids

MPL - Maximum permissible level

AMC - Analytical Monitoring Center

SPZ – Sanitary Protection Zone

CONTENTS

1. Monitoring of atmospheric air quality
2. Characteristics of the measuring range of the device
3. Points of instrumental measurements
4. GPS Testing
5. Notes: Atmospheric air
6. Noise measurement
7. Notes: Noise
8. Conclusion
9. Recommendations
10. List of references and regulatory documents
11. Details of initial environmental monitoring
12. Proposal

A. **MONITORING OF ATMOSPHERIC AIR QUALITY**

Protection of the atmosphere is one of the main tasks of nature protection. The Law on Environmental Protection outlines precisely the problem of anthropogenic air pollution and sets priorities for air protection. The Law on Air Protection establishes the main principles of air protection and rational use in the country, economic mechanisms and responsibilities, as well as directions for activities of state bodies

Tajikistan's standards are stricter than international standards, but more general. For example, Western countries have different size standards for particulate matter (PM-10, PM-2.5), while Tajikistan uses the concept of dust, which is closer to the total amount of suspended particulates (TSP). Also, many international standards for air pollutants differ in terms of the time of external exposure, while Tajikistan's standards are based on average.

471. Table 36 - Maximum allowable concentration in air (MAC)

Pollutants	Standards, mg / m ³
(TSP) – PM ₁₀ / PM _{2.5}	0.150
Nitrogen dioxide (NO ₂)	0.085
Carbon oxide (CO)	5.0
Sulphur dioxide (SO ₂)	0.50
Nitric oxide (NO)	0.4

Departmental control over the protection of atmospheric air, including compliance with the standards of maximum permissible emissions of pollutants into the air and harmful physical effects on it, is carried out by nature users. In this case, it is carried out by the contractor.

Instrumental measurements were carried out in period of 01 – 02 August 2020 in the daytime 10.00 - 18.00 h.

B. **CHARACTERISTICS OF THE MEASURING RANGE OF THE DEVICE**

Table 37 - Range Characteristic

№	Substances		Ingredients	Range of measurements,
1	PM ₁₀ и PM _{2.5}			0.05 – 1.0
2	Nitrogen dioxide		NO ₂	0.03-2.5
3	Sulfur dioxide		SO ₂	0.025-5
4	Carbon monoxide		CO	1.5-10
5	Nitric oxide		NO	0.03 – 2.50

C. INSTRUMENTAL MEASUREMENTS WERE MADE AT 25 POINTS 3 TIMES IN THE FOLLOWING AREAS

- 1) Km 0+00 junction in the road Dangara-Guliston
- 2) Entrance to I.Sharipov village
- 3) Exit from I.Sharipov village.
- 4) Entrance to Shokhbur village.
- 5) Middle of Shokhbur village.
- 6) Exit from Shokhbur village, km 5 +500.
- 7) Entrance to Khuramzamin village.
- 8) Khuramzamin village, near secondary school No.8
- 9) Exit from Khuramzamin village, km 7+600.
- 10) Km 14+400, near a canteen.
- 11) Km 17+ 800, entrance to Bulyoni Poyon village.
- 12) Km 19+ 00, middle of Bulyoni Poyon village, near a first-aid post.
- 13) Bulyoni Poyon fish farming reservoir
- 14) Km 20+ 600 Bulyoni Poyon village.
- 15) Km 21+300 Bulyoni Poyon village.
- 16) Km 22 +00. Project road
- 17) Km 30 + 300 Kayumobod village.
- 18) Km 32 +500. Project road
- 19) Exit from Dangara district.
- 20) Entrance to Bahoriston village.
- 21) Km 35+300 near Bahoriston Traffic Police Post.
- 22) Km 38+100 Entrance to Guliston
- 23) Km 44+ 00 junction at Gulrez village.
- 24) Km 46 +00. Project road
- 25) Km 48 +200 junction at Guliston

D. GPS TESTING AT 20 POINTS FOR ATMOSPHERIC AIR AND NOISE TESTING

Table 38 - Atmospheric Air

No	Location	Latitude	Longitude
1	Km 0+00 junction in the road Dangara-Guliston	37° 57. 657 ¹	068° 40. 793 ¹
2	Entrance to I.Sharipov village	38° 03. 612 ¹	069° 20. 764 ¹
3	Exit from I.Sharipov village	37° 50. 627 ¹	068° 51. 210 ¹
4	Entrance to Shokhbur village.	38° 03. 000 ¹	069° 20. 797 ¹
5	Middle of Shokhbur village	37° 02. 285 ¹	069° 21. 279 ¹
6	Exit from Shokhbur village, km 5 +500	38° 01. 840 ¹	069° 21. 593 ¹
7	Entrance to Khuramzamin village	38° 01. 269 ¹	069° 21. 538 ¹
8	Khuramzamin village, near secondary school No.8	38° 00. 935 ¹	069° 21. 393 ¹
9	Exit from Khuramzamin village, km 7+600	38° 00. 640 ¹	069° 21. 253 ¹
10	Km 14+400, near a canteen.	37° 57. 109 ¹	069° 19. 545 ¹
11	Km 17+ 800, entrance to Bulyoni Poyon village.	37° 55. 315 ¹	069° 20. 239 ¹
12	Km 19+ 00, middle of Bulyoni Poyon village, near a first-aid post	37° 54. 789 ¹	069° 20. 747 ¹
13	Bulyoni Poyon fish farming reservoir	37° 54. 537 ¹	069° 20. 985 ¹
14	Km 20+ 600 Bulyoni Poyon village.	37° 54. 071 ¹	069° 21. 489 ¹

№	Location	Latitude	Longitude
15	Km 21+300 Bulyoni Poyon village.	37° 53. 742 ¹	069° 21. 467 ¹
16	Km 22 +00. Project road.	37° 53. 369 ¹	069° 21. 460 ¹
17	Km 30 + 300 Kayumobod village	37° 48. 842 ¹	069° 22. 074 ¹
18	Km 32 +500. Project road	37° 47. 724 ¹	069° 22. 698 ¹
19	Exit from Dangara district	37° 47. 252 ¹	069° 22. 934 ¹
20	Entrance to Bahoriston village	37° 46. 838 ¹	069° 23. 187 ¹
21	Km 35+300 near Bahoriston Traffic Police Post.	37° 46.235 ¹	069° 23.551 ¹
22	Km 38+100 Entrance to Guliston.	37° 45.528 ¹	069° 24.850 ¹
23	Km 44+ 00 Junction at Gulrez village.	37° 43.788 ¹	069° 27.502 ¹
24	Km 46 +00. Project road.	37° 44.472 ¹	069° 28.996 ¹
25	Km 48 +200 junction at Guliston	37° 44.582 ¹	069° 29.791 ¹

Note: Instrumental measurement of atmospheric air and noise was carried out at a pressure of 754 – 751 mmHg, wind speed 3 – 5 m/sec, humidity 13 - 18 %, and temperature 35 - 370C.

Location 1. Km 0+00 Junction in the road Dangara-Guliston.

	Types of particles	Maximum permissible standards	Actual			Average
			Measurement			
№	Parameter	Standard of Tajikistan, mg/m³	№ 1	№ 2	№ 3	
1	PM ₁₀ и PM _{2.5}	0.15	0.036	0.020	0.010	0.022
2	NO ₂	0.085	0.0019	0.0016	0.0014	0.0016
3	SO ₂	0.50	0.0012	0.0011	0.0012	0.0012
4	CO	5.0	0.26	0.25	0.23	0.24
5	NO	0.4	0.0019	0.0015	0.0011	0.0015

Location 2. Entrance to I.Sharipov village

	Types of particles	Maximum permissible standards	Actual			Average Parameter
№	Parameter	Standard of Tajikistan, mg/m³	№ 1	№ 2	№ 3	
1	PM ₁₀ и PM _{2.5}	0.15	0.020	0.020	0.019	0.020
2	NO ₂	0.085	0.0015	0.0013	0.0013	0.0014
3	SO ₂	0.50	0.0014	0.0012	0.0011	0.00123
4	CO	5.0	0.25	0.23	0.22	0.23
5	NO	0.4	0.0021	0.0020	0.0020	0.0020

Exit from I.Sharipov village

	Types of particles	Maximum permissible standards	Actual	Average Parameter
			Measurement	

№	Parameter	Standard of Tajikistan, mg/m ³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.025	0.023	0.022	0.023
2	NO ₂	0.085	0.000	0.000	0.000	0.000
3	SO ₂	0.50	0.0010	0.0010	0.0010	0.0010
4	CO	5.0	0.26	0.25	0.22	0.24
5	NO	0.4	0.000	0.0001	0.000	0.0001

Location 4. Entrance to Shokhbur village

	Types of particles	Maximum permissible standards	Actual Measurement			Average Parameter
№	Parameter	Standard of Tajikistan, mg/m ³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.020	0.023	0.022	0.022
2	NO ₂	0.085	0.002	0.001	0.001	0.001
3	SO ₂	0.50	0.002	0.001	0.001	0.002
4	CO	5.0	0.05	0.04	0.05	0.05
5	NO	0.4	0.001	0.002	0.001	0.001

Location 5. Middle of Shokhbur village

	Types of particles	Maximum permissible standards	Actual Measurement			Average Parameter
№	Parameter	Standard of Tajikistan, mg/m ³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.017	0.018	0.016	0.017
2	NO ₂	0.085	0.005	0.005	0.004	0.005
3	SO ₂	0.50	0.002	0.003	0.003	0.003
4	CO	5.0	0.04	0.05	0.05	0.05
5	NO	0.4	0.006	0.005	0.004	0.005

Location 6. Exit from Shokhbur village, km 5 +500.

	Types of particles	Maximum permissible standards	Actual Measurement			Average Parameter
№	Parameter	Standard of Tajikistan, mg/m ³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.012	0.010	0.010	0.010
2	NO ₂	0.085	0.004	0.002	0.000	0.003
3	SO ₂	0.50	0.004	0.003	0.001	0.003
4	CO	5.0	0.07	0.04	0.05	0.053
5	NO	0.4	0.004	0.001	0.001	0.002

Location 7. Entrance to Khuramzamin village.

	Types of particles	Maximum permissible standards	Actual			Average Parameter
			Measurement			
№	Parameter	Standard of Tajikistan, mg/m³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.018	0.017	0.015	0.015
2	NO ₂	0.085	0.004	0.003	0.003	0.003
3	SO ₂	0.50	0.003	0.004	0.002	0.003
4	CO	5.0	0.06	0.06	0.04	0.05
5	NO	0.4	0.003	0.003	0.003	0.003

Location 8. Khuramzamin village, near secondary school No.8

	Types of particles	Maximum permissible standards	Actual			Average Parameter
			Measurement			
№	Parameter	Standard of Tajikistan, mg/m³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.017	0.016	0.012	0.014
2	NO ₂	0.085	0.006	0.003	0.003	0.0041
3	SO ₂	0.50	0.003	0.002	0.001	0.002
4	CO	5.0	0.05	0.04	0.04	0.04
5	NO	0.4	0.005	0.004	0.003	0.004

Location 9. Exit from Khuramzamin village, km 7+600.

	Types of particles	Maximum permissible standards	Actual			Average Parameter
			Measurement			
№	Parameter	Standard of Tajikistan, mg/m³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.015	0.013	0.011	0.013
2	NO ₂	0.085	0.0004	0.0001	0.000	0.0001
3	SO ₂	0.50	0.0001	0.000	0.000	0.0001
4	CO	5.0	0.02	0.04	0.03	0.03
5	NO	0.4	0.001	0.001	0.001	0.001

Location 10. Km 14+400, near a canteen.

	Types of particles	Maximum permissible standards	Actual			Average Parameter
			Measurement			
№	Parameter	Standard of Tajikistan, mg/m³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.016	0.014	0.013	0.014
2	NO ₂	0.085	0.004	0.004	0.003	0.003
3	SO ₂	0.50	0.002	0.001	0.001	0.001
4	CO	5.0	0.04	0.05	0.04	0.04

5	NO	0.4	0.001	0.001	0.001	0.001
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Location 11. Km 17+ 800, entrance to Bulyoni Poyon village.

	Types of particles	Maximum permissible standards	Actual			Average Parameter
			Measurement			
№	Parameter	Standard of Tajikistan, mg/m³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.017	0.014	0.014	0.015
2	NO ₂	0.085	0.006	0.004	0.004	0.004
3	SO ₂	0.50	0.002	0.001	0.001	0.001
4	CO	5.0	0.04	0.04	0.04	0.03
5	NO	0.4	0.003	0.002	0.001	0.002

Location 12. Km 19+ 00, middle of Bulyoni Poyon village, near a first-aid post.

	Types of particles	Maximum permissible standards	Actual			Average Parameter
			Measurement			
№	Parameter	Standard of Tajikistan, mg/m³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.025	0.024	0.025	0.024
2	NO ₂	0.085	0.007	0.005	0.004	0.005
3	SO ₂	0.50	0.002	0.002	0.002	0.002
4	CO	5.0	0.05	0.02	0.02	0.03
5	NO	0.4	0.005	0.003	0.001	0.003

Location 13. Bulyoni Poyon fish farming reservoir.

	Types of particles	Maximum permissible standards	Actual			Average Parameter
			Measurement			
№	Parameter	Standard of Tajikistan, mg/m³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.02	0.015	0.014	0.010
2	NO ₂	0.085	0.008	0.005	0.003	0.005
3	SO ₂	0.50	0.003	0.002	0.002	0.002
4	CO	5.0	0.06	0.004	0.003	0.022
5	NO	0.4	0.005	0.003	0.001	0.003

Location 14. Km 20+ 600 Bulyoni Poyon village.

	Types of particles	Maximum permissible standards	Actual			Average Parameter
№	Parameter	Standard of Tajikistan, mg/m³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.02	0.019	0.018	0.02

2	NO ₂	0.085	0.000	0.000	0.000	0.000
3	SO ₂	0.50	0.0003	0.0001	0.0001	0.0001
4	CO	5.0	0.06	0.04	0.04	0.04
5	NO	0.4	0.000	0.000	0.000	0.000

Location 15. Km 21+300 Bulyoni Poyon village

№	Types of particles Parameter	Maximum permissible standards Standard of Tajikistan, mg/m ³	Actual Measurement			Average Parameter
			№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.016	0.015	0.014	0.015
2	NO ₂	0.085	0.000	0.002	0.002	0.002
3	SO ₂	0.50	0.001	0.001	0.001	0.001
4	CO	5.0	0.006	0.004	0.003	0.004
5	NO	0.4	0.001	0.001	0.001	0.001

Location 16. Km 22 +00. Project road

№	Types of particles Parameter	Maximum permissible standards Standard of Tajikistan, mg/m ³	Actual Measurement			Average Parameter
			№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.012	0.010	0.011	0.011
2	NO ₂	0.085	0.007	0.006	0.006	0.006
3	SO ₂	0.50	0.002	0.002	0.002	0.002
4	CO	5.0	0.05	0.04	0.03	0.04
5	NO	0.4	0.004	0.004	0.003	0.003

Location 17. Km 30 + 300 Kayumobod village.

№	Types of particles Parameter	Maximum permissible standards Standard of Tajikistan, mg/m ³	Actual Measurement			Average Parameter
			№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.018	0.017	0.015	0.016
2	NO ₂	0.085	0.009	0.007	0.006	0.007
3	SO ₂	0.50	0.003	0.003	0.003	0.003
4	CO	5.0	0.08	0.08	0.06	0.06
5	NO	0.4	0.004	0.003	0.002	0.002

Location 18. Km 32 +500. Project road

	Types of particles	Maximum permissible standards	Actual Measurement			Average Parameter

№	Parameter	Standard of Tajikistan, mg/m ³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.022	0.021	0.020	0.020
2	NO ₂	0.085	0.0010	0.0011	0.001	0.0011
3	SO ₂	0.50	0.008	0.008	0.008	0.008
4	CO	5.0	0.35	0.33	0.33	0.33
5	NO	0.4	0.008	0.008	0.008	0.008

Location 19. Exit from Dangara district.

	Types of particles	Maximum permissible standards	Actual Measurement			Average Parameter
№	Parameter	Standard of Tajikistan, mg/m ³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.020	0.020	0.020	0.020
2	NO ₂	0.085	0.009	0.008	0.007	0.008
3	SO ₂	0.50	0.008	0.008	0.008	0.008
4	CO	5.0	0.23	0.24	0.24	0.23
5	NO	0.4	0.005	0.004	0.003	0.004

Location 20. Entrance to Bahoriston village

	Types of particles	Maximum permissible standards	Actual Measurement			Average Parameter
№	Parameter	Standard of Tajikistan, mg/m ³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.025	0.024	0.023	0.024
2	NO ₂	0.085	0.007	0.008	0.005	0.007
3	SO ₂	0.50	0.007	0.005	0.005	0.006
4	CO	5.0	0.06	0.06	0.06	0.06
5	NO	0.4	0.005	0.005	0.005	0.005

Location 21. Km 35+300 near Bahoriston Traffic Police Post.

	Types of particles	Maximum permissible standards	Actual Measurement			Average Parameter
№	Parameter	Standard of Tajikistan, mg/m ³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.024	0.024	0.024	0.024
2	NO ₂	0.085	0.007	0.008	0.007	0.007
3	SO ₂	0.50	0.008	0.005	0.005	0.006
4	CO	5.0	0.08	0.08	0.07	0.08
5	NO	0.4	0.005	0.005	0.005	0.005

Location 22. Km 38+100 Entrance to Guliston.

№	Types of particles	Maximum permissible standards	Actual			Average Parameter
			Measurement			
№	Parameter	Standard of Tajikistan, mg/m³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.022	0.022	0.021	0.022
2	NO ₂	0.085	0.005	0.005	0.004	0.005
3	SO ₂	0.50	0.005	0.005	0.005	0.005
4	CO	5.0	0.06	0.06	0.06	0.06
5	NO	0.4	0.004	0.004	0.003	0.004

Location 23. Km 44+ 00 Junction at Gulrez village

	Types of particles	Maximum permissible standards	Actual			Average Parameter
№	Parameter	Standard of Tajikistan, mg/m³	Measurement			
			№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.025	0.024	0.023	0.024
2	NO ₂	0.085	0.007	0.008	0.005	0.007
3	SO ₂	0.50	0.007	0.005	0.05	0.006
4	CO	5.0	0.06	0.06	0.06	0.06
5	NO	0.4	0.004	0.004	0.004	0.004

Location 24. Km 46 +00. Project road

	Types of particles	Maximum permissible standards	Actual			Average Parameter
№	Parameter	Standard of Tajikistan, mg/m³	Measurement			
			№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.02	0.021	0.020	0.020
2	NO ₂	0.085	0.006	0.006	0.004	0.006
3	SO ₂	0.50	0.003	0.002	0.000	0.002
4	CO	5.0	0.06	0.06	0.06	0.06
5	NO	0.4	0.004	0.003	0.003	0.003

Location 25. Km 48 +200 junction at Guliston

	Types of particles	Maximum permissible standards	Actual			Average Parameter
			Measurement			
№	Parameter	Standard of Tajikistan, mg/m³	№ 1	№ 2	№	
1	PM ₁₀ и PM _{2.5}	0.15	0.025	0.025	0.025	0.025
2	NO ₂	0.085	0.007	0.008	0.007	0.007

3	SO ₂	0.50	0.007	0.005	0.005	0.006
4	CO	5.0	0.06	0.06	0.06	0.06
5	NO	0.4	0.006	0.006	0.006	0.006

Note: In all tables instrumental air measurements no excess of MPC standards was detected.

E. **NOTES / ATMOSPHERIC AIR**

Definitions and Concepts that Characterize the State of the Natural Environment and the Harm Caused to it.

Admissible is an environmental load under which a deviation from the normal state of the ecological system does not exceed natural changes and, therefore, does not cause undesirable consequences in living organisms and does not lead to deterioration of the quality of the environment.

Normalization of the quality of the environment is carried out in order to establish maximum admissible norms of impact, which guarantee the ecological safety for the population, preservation of the gene pool, ensuring the rational use and reproduction of natural resources in conditions of sustainable development of economic activity.

Maximum Permissible Concentrations (MPC) are the standards that establish the concentration of a harmful substance in a unit of volume (air, water), mass (soil) or surface (skin of workers), which, when exposed for a certain period of time, practically do not affect human health and do not cause adverse effects in his offspring.

Maximum one-time MPC (MPC mr) is the concentration of a harmful substance in the air of populated areas that does not cause a reflexive (including sub-sensory) reactions in the human body, when inhaling, during 20 minutes.

Average daily MPC (MPC cc) - concentration of the harmful substance in the air of inhaled areas that should not have a direct or indirect impact on a person by inhalation for an unlimited period of time (years).

Environmental monitoring - information system of observations, assessment and forecast of changes in the state of the environment created to highlight the anthropogenic component of these changes against the background of natural processes.

Maximum permissible emission (MPE) - the mass of a substance in the waste gases, the maximum allowed to be released into the atmosphere per unit of time.

Temporarily agreed emission of harmful substances (EHS) – the mass of substance in exhaust gases that exceeds MPE but allowed to be emitted for some time (usually necessary for technical improvement of production). For newly designed enterprises, the values of the EHS are not established.

Environmental Problems in the Production of Road Construction Materials

The increasing volumes and pace of construction on the territory of the GTS determine the development of permanent and temporary (at the construction stage) production of road building materials of various types: quarries of crushed stone, gravel, sand, stone crushing plants, bases for the preparation of organic binder emulsions, plants for processing tar into bitumen, asphalt concrete plants, cement concrete plants, factories of reinforced concrete structures, etc.

Sources of emissions of pollutants at road construction materials manufacturing enterprises are shown in table below.

Table 39 - Emissions of pollutants at road construction materials

Source	Dust	Oxides of			Hydrocarbons
		carbon	nitrogen	sulphur	
Quarries and quarrying roads	+	+	+	-	+
Crushing - sorting machines	+	-	-	-	-
Places for loading, unloading and storage of mineral materials	+	-	-	-	-
Bitumen storage (tar storage)	-	-	-	-	+
Reactor plant for the preparation of bitumen from tar	-	+	+	+	+
Bituminous melting plant	-	+	+	+	+
Asphalt mixing plant	+	+	+	+	+
Emulsion plant	-	+	+	+	+
Places of loading and unloading cement, drying drum of an asphalt concrete plant	+	+	+	+	-
Road transport	+	+	+	-	+

Notes:

- 1) Carbon oxides, nitrogen oxides and hydrocarbons in quarries are formed during explosions and the operation of internal combustion engines.
- 2) Sulfur oxides during the operation of drying drums are emitted when using sulfur-containing liquid fuel (fuel oil).

As a result of the work of production enterprises, the concentration of pollutants released into the atmosphere should not exceed the established maximum permissible concentrations (MPC) of pollutants in the atmospheric air of the populated areas at the border of the sanitary protection zone (SPZ) of this enterprise. The requirements of SanPiN-2.2.1/2.1.1.1031-01 stipulate that the manufacturing enterprises, including road facilities, will be separated from residential buildings by sanitary protection zones

Figure 35- Air sampling



F. **NOISE MEASUREMENT AT 25 POINTS IN THE DAYTIME**

No	Locations where measurement made	Noise standards in decibels, (max) 10.00 - 18.00	Baseline indicators, decibels (max)
1	Km 0+00 junction in the road Dangara-Guliston.	55 - 45	52.6
2	Entrance to I.Sharipov village.	55 - 45	48.4
3	Exit from I.Sharipov village	55 - 45	55.0
4	Entrance to Shokhbur village.	55 - 45	53.8
5	Middle of Shokhbur village	55 - 45	55.0
6	Exit from Shokhbur village, km 5 +500	55 - 45	54.4
7	Entrance to Khuramzamin village	55 - 45	56.7
8	Khuramzamin village, near secondary school No.8	55 - 45	57.5
9	Exit from Khuramzamin village, km 7+600	55 - 45	47.0
10	Km 14+400, near a canteen.	55 - 45	55.1
11	Km 17+ 800, entrance to Bulyoni Poyon village.	55 - 45	54.6
12	Km 19+ 00, middle of Bulyoni Poyon village, near a first-aid post	75 - 75	55.3
13	Bulyoni Poyon fish farming reservoir	55 - 45	42.5
14	Km 20+ 600 Bulyoni Poyon village.	55 - 45	53.2
15	Km 21+300 Bulyoni Poyon village.	55 - 45	54.8
16	Km 22 +00. Project road	75 - 75	52.5
17	Km 30 + 300 Kayumobod village	55 - 45	52.7
18	Km 32 +500. Project road	75 - 75	55.0
19	Exit from Dangara district	75 - 75	53.6
20	Entrance to Bahoriston village	55 - 45	53.2
21	Km 35+300 near Bahoriston Traffic Police Post.	55 - 45	51.4
22	Km 38+100 Entrance to Guliston	55 - 45	50.9
23	Km 44+ 00 junction at Gulrez village.	55 - 45	52.1
24	Km 46 +00. Project road	75 - 75	49.7
25	Km 48 +200 junction at Guliston	55 - 45	55.0

Note: In the above shown Table the testing shows that the average daily noise is below sanitary standards

Figure 36 - Noise measurement



G. **Notes / Noise**

Permissible levels of noise from external sources in premises are established under condition of ensuring normal ventilation of premises (or residential premises, wards, classes - with open vents, transoms, narrow sashes of windows).

Equivalent and maximum sound levels in dBA for noise generated by motor vehicles, 2 m from the protecting structures of residential buildings, hotel buildings, dormitories, facing the main streets of the city and district are allowed to accept above 10 dBA.

Standards of Tajikistan in accordance with sanitary norms SN 2.2.4/2.1.8.562-96 (provided by the sanitary-epidemiological supervision service of the Ministry of Health of Tajikistan)

55-45 dBa (max) - Living sector
75-75 dBa (max) – Commercial area
80-80 dBa (max) – Industrial zone
50-40 dBa (max) – Hospitals
55-55 dBa (max) – Schools, library

The noise level in the Project area of influence in August 2020 did not exceed the permissible norms.

H. **FINDINGS**

Based on the results of instrumental measurements and noise levels in the project area, the authors of the environmental impact monitoring came to the conclusion:

- At the time of monitoring no significant anthropogenic impacts have been recorded in the Project area.
- No extreme environmental impacts are expected during the construction process.
- The Project management is required: Take additional mitigation measures in terms of parameters:
 - inorganic dust content in the atmosphere;
 - noise level content.
- The Project Management should coordinate with the CEP under Government of RT; obtain permission to release pollutants into the atmosphere; and dispose (store) the industrial, solid domestic and construction wastes in the natural environment.

I. **RECOMMENDATIONS**

- In atmospheric air, in the project impact area, the content of inorganic dust, nitrogen dioxide, sulfur dioxide, nitrogen oxide and carbon monoxide should be monitored on a monthly basis, as well as emissions of vehicles should be monitored, both carburetor and diesel.
- The noise level at all points should be tested on a monthly basis.

J. **LIST OF REFERENCES AND REGULATORY DOCUMENTS**

- Maximum permissible concentrations (MPC) of pollutants in the atmospheric air of populated areas (list 3086-84).
- Maximum permissible concentrations (MPC) of pollutants in the air of the working area.
- Sanitary norms for designing industrial enterprises SN 245-71

- Guidance document. Nature protection. Atmosphere. Requirements for the accuracy of industrial emissions control. Methodical instructions. RD 52704.59-85. Moscow, 1986.

K. **DETAILS OF INITIAL ENVIRONMENTAL MONITORING**

- Air and noise quality monitoring.
- Air monitoring methodology.
- Noise monitoring methodology.
- Collection of methods for determining the concentration of pollutants on industrial emissions. L.: Gidrometeoizdat, 1987.
- Monitoring parameters

PM ₁₀ и PM _{2.5}
Carbon monoxide (CO)
Sulphur dioxide (SO ₂)
Nitrogen dioxide (NO ₂)
Nitric oxide (NO)

- The following device was used to measure the atmospheric air:
- Gas analyzer – GANG-4 A.



- A noise meter was used to monitor the noise
- Noise was measured by noise meter TESTO-815.



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I. NOISE MONITORING

TAJ: ROAD NETWORK SUSTAINABILITY PROJECT (DANGARA – GULISTION SECTION)

NOISE ASSESSMENT REPORT

8. Introduction

This noise impact assessment was prepared for the construction of the Dangara – Guliston road section. The noise study will be part of the overall impact assessment process and is part of the supplementary ESIA report.

Some of the most pervasive sources of noise in the environment come from transportation systems. Traffic noise is a dominant noise source in urban and rural environments accounting for about 80 % of total noise pollution.

Traffic noise has a variety of adverse impacts on human health. Community noise, including traffic noise, is already recognised as a serious public health problem by the World Health Organization, WHO.

An increase in traffic volumes, vehicle speeds, or the amount of heavy trucks will increase traffic noise levels. Therefore, an assessment has been undertaken to determine future traffic noise levels at sensitive receptors located adjacent to the project roads.

The purpose of the project noise assessment was to assess potential changes in noise levels due to the Project and to determine if the Project meets relevant noise regulations. The approach for the Project noise assessment was to:

- determine the relevant assessment criteria for road traffic noise along project road corridor
- predict road traffic noise levels for the Year 2040 at sensitive receptor locations in the study area
- recommend practical noise attenuation strategies (if required).

9. Project Description

The Dangara-Guliston Project Road section spans 49 km and is a crucial route of regional significance in the southern region of the Republic. It is part of the Bokhtar-Okmazor-Dangara-Guliston road, a vital trunk road of international importance in Tajikistan. It facilitates key transport links and the supply of agricultural products and industrial raw materials. The road partly traverses hilly terrain, featuring small curves and steep gradients. The Dangara-Guliston road connects the districts of Dangara, Farkhor, and A. Hamadoni, linking the Jamoats of Korez, Ismat Sharif, and Guliston to the cities of Dangara and Guliston. The map in the following Figure 1 provides an overview of the Project Road.

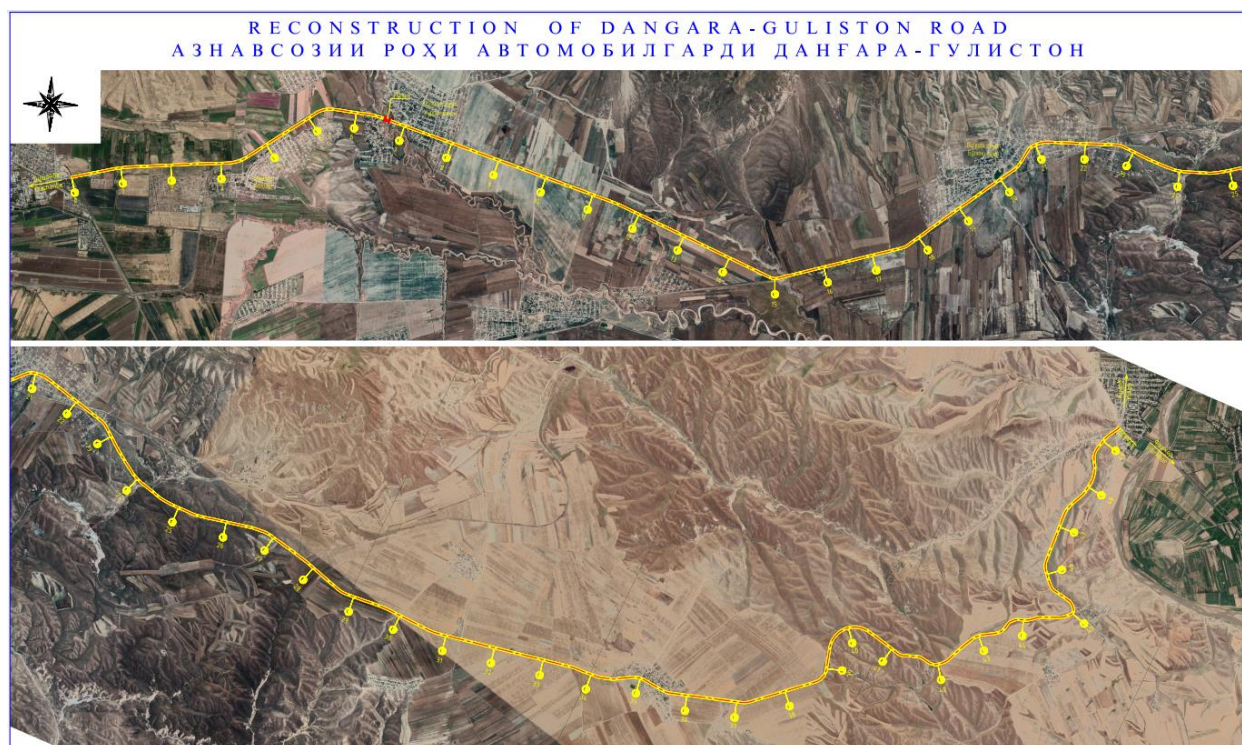


Figure 37 – Project Location Map of the Dangara-Guliston Road

The existing road is classified as technical category III and comprises one carriageway with two traffic lanes. Traffic volume assessments indicate that the current road category is insufficient for anticipated future traffic volumes. Therefore, an upgrade to two carriageways with four lanes is necessary.

The designed cross-section of the road includes four driving lanes, a central dividing strip, shoulders, and sidewalks within the green zones in settlements. Sidewalks are located on both sides and, in some areas, on one side of the road. According to the Terms of Reference for the design, a bicycle path is provided along the entire length of the road (on the right side). Depending on the terrain, twenty-four types of cross-sections were adopted during the project development, as detailed in Book 1 of the technical project documentation - Typical Drawings. The following figures illustrate the typical cross-sections outside settlements. The width of the cross-section including the bicycle lane and the shoulders is 29 to 30 meters as compared to the approximately 10 meters of the existing road (2 x 3,75 m driving lanes plus shoulders).

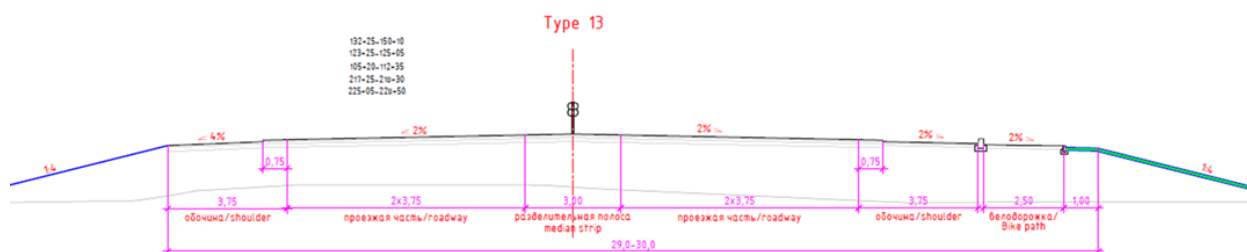


Figure 2 - Typical cross section outside settlements (4-lanes. Technical Category I)

The detailed design road was developed in accordance with the current regulatory documents of the Republic of Tajikistan.

- GNiP RT 32-02-2012 "Highways";

- GNiP RT 30-01-2018 "Urban planning. Planning and development of settlements";
- SNiP 3.06.03-85 Highways.

The design includes the widening of the road to 4-lane standard (technical road category Ib in rough design, construction of interchanges and the improvement of alignment, where necessary).

10. Fundamentals of Traffic Noise

Traffic noise is usually a composite of noises from engine exhaust and tire-road surface interaction. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired. Noise levels near roads depend mainly on following main variables:

6. Traffic volume
7. Traffic speed
8. Amount of heavy trucks (as a percent of total trucks)
9. Distance from the roadway
10. Intervening topography

Generally, traffic noise increases with higher traffic volumes (more vehicles means more noise), higher speeds (faster vehicles makes more noise, and more heavy trucks (trucks makes more noise than passenger vehicles).

Sound is the sensation produced in the ear as a result of fluctuations in air pressure, superimposed on the steady atmospheric pressure. The ear responds to these much smaller fluctuations with great sensitivity.

The magnitude of noise is usually described by a ratio of its sound pressure to a reference sound pressure, which is usually twenty micro-Pascals (20 μ Pa). Since the range of sound pressure ratios varies greatly over many orders of magnitude, a base-10 logarithmic scale is used to express sound levels in dimensionless units of decibels (dB). The commonly accepted limits of detectable human hearing sound magnitudes is between the threshold of hearing at 0 decibels and the threshold of pain at 140 decibels.

Sound frequencies are represented in units of Hertz (Hz), which correspond to the number of vibrations per second of a given tone. A cumulative 'sound level' is equivalent to ten times the base-10 logarithm of the ratio of the sum of the sound pressures of all frequencies to the reference sound pressure. To simplify the mathematical process of determining sound levels, sound frequencies are grouped into ranges, or 'bands.' Sound levels are then calculated by adding the cumulative sound pressure levels within each band, which are typically defined as one 'octave' or '1/3 octave' of the sound frequency spectrum.

The commonly accepted limitation of human hearing to detect sound frequencies is between 20 Hz and 20,000 Hz, and human hearing is most sensitive to the frequencies between 1,000 Hz – 6,000 Hz. Although people are generally not as sensitive to lower-frequency sounds as they are to higher frequencies, most people lose the ability to hear high frequency sounds as they age. To accommodate varying receptor sensitivities, frequency sound levels are commonly adjusted, or 'filtered', before being logarithmically added and reported as a single 'sound level' magnitude of that filtering scale. The 'A-weighted' decibel filtering scale applies numerical adjustments to sound frequencies to emphasize the frequencies at which human hearing is sensitive, and to minimize the frequencies to which human hearing is not as sensitive. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. An A-weighted sound level is described as L_A dB.

0 below describes typical A-weighted noise levels for various noise sources and shows levels of noise associated with common activities.

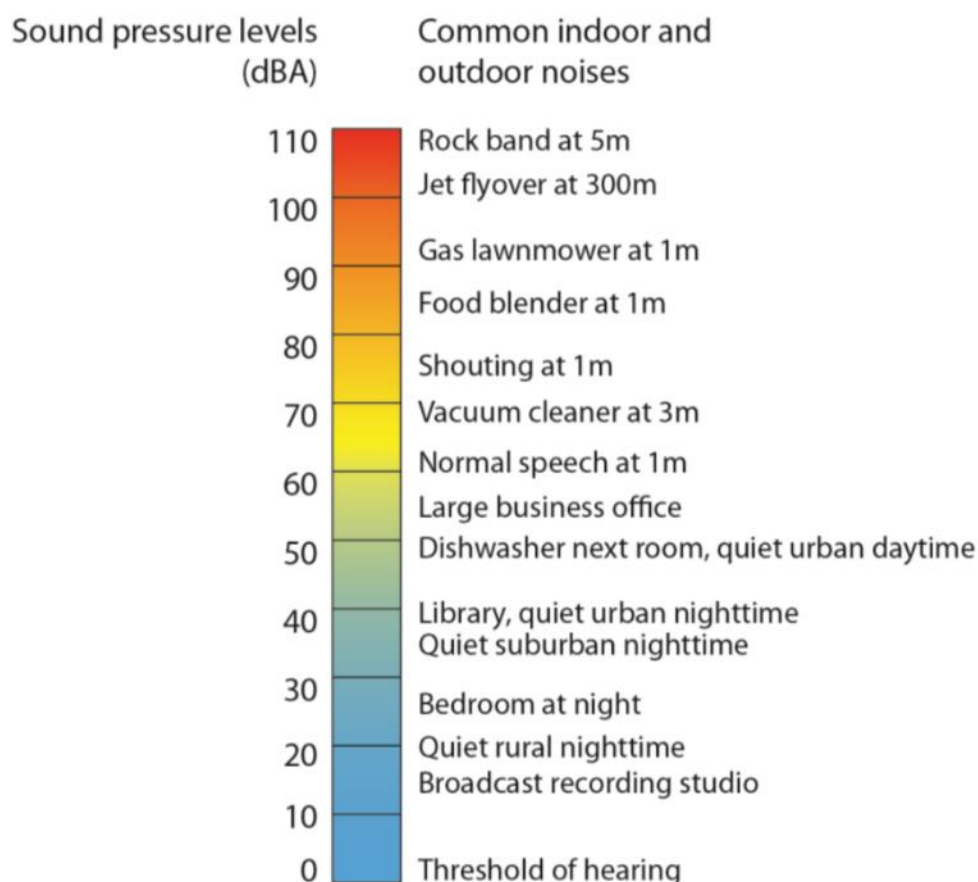


Figure 3 - Decibel levels of Common Noise Sources

Source: A Guide to Noise Control in Minnesota

Decibel Addition

Because decibels are logarithmic units, sound pressure levels cannot be added arithmetically. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions.

Human Response to Changes in Noise Levels

Doubling sound energy results in a 3-dB increase in sound. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different than what is measured.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dB changes in sound levels. In typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound

energy (e.g., doubling the volume of road traffic) that would result in a 3-dB increase in sound would generally be perceived as barely detectable.

Table 1 - Change in Decibel Level and Perceived Changes in Loudness

Change in dB(A)	Perceived Changes in Loudness
± 1 dB(A)	Not Noticeable
± 3 dB(A)	Threshold of Perception
± 5 dB(A)	Noticeable Change
± 10dB(A)	Twice (Half) as Loud
± 20 dB(A)	Four Time (One Fourth) as Loud

Source: A Guide to Noise Control in Minnesota

11. Traffic Noise Criteria

Tajikistans noise quality standards based on International Sanitary Norms adopted by CIS countries (SanPin 2.2.4/2.1.8.562-96) and in general equivalent to World Bank EHS / IFC standards.

Table 2 - Tajikistan Noise Standards

Area	Day time limits in dBA	Night time limits in dBA
Residential area	55	45
Commercial area	60	50
Hospitals	35	25
Schools, Library	45	45
Hotels, etc.	60	50

In Appendix 2 a synopsis is given on the specific standards for noise emissions in Tajikistan. In addition, the standards are compared with international guidelines and standards. In general, it can be concluded that the Tadjik system of environmental standards is well developed, but the IFC standard for noise is more stringent and therefore the guideline of the International Finance Corporation (IFC) is used for assessing the impacts of noise. This guideline provides criteria and guidance for noise control from a development beyond the property boundaries.

The criteria of the IFC guidelines specifies that noise levels measured at noise receptors must not be 3 dB(A) greater than the background noise levels or exceed 55 dB(A) during the day or 45 dB(A) during the night in residential areas and 70 dB(A) in commercial areas.

Table 3 - Noise Level Guidelines

Receptor	One Hour LAeq (dB(A))	
	Day time 07:00 – 22:00	Night time 22:00 – 07:00
Residential; institutional; educational	55	45
Industrial; commercial	70	70



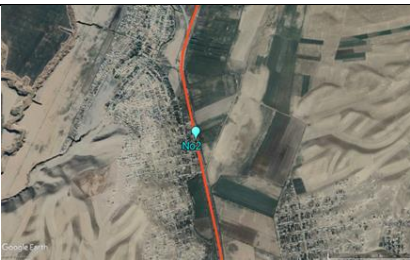

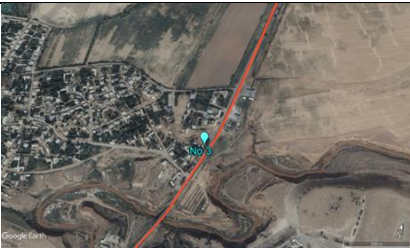
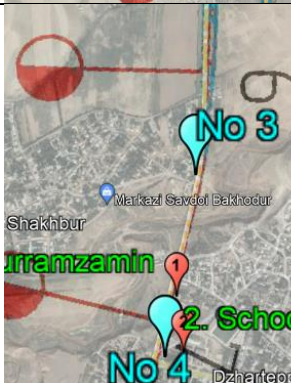
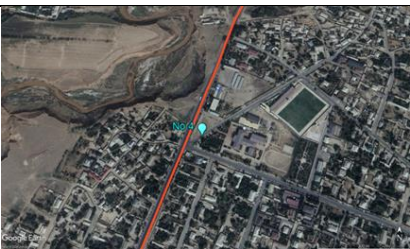

Note: For acceptable indoor noise levels for residential, institutional, and educational settings refer to WHO, 1999








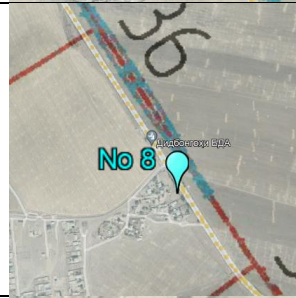


Source: IFC, EHS Guidelines, Noise Management

12. Receptor Selection

In the frame of the baseline measurements for air quality, several locations at sensitive/typical receptors were identified and baseline measurements for air quality were carried out. These selected receptors are also used for the noise modelling. The location of the receptors for noise calculation are presented in the Table below.

Table 4 – Receptors for Noise Calculation

Nr.	Description	Google Image (Source: KMZ)	Road Chainage	Chainage location
1	Location of Monitoring Point 1st Km 0+000, "Aziz" dining room. Interchange of the Bokhtar-Dangara highway.		KM 0+500	
2	Monitoring Point No. 2. Village I. Sharipov. Near a residential building		KM 4 +200	
3	Monitoring Point No. 3. Khurramzamin village, near residential buildings		Km 6 + 400	
4	Monitoring Point No. 4. Khurramzamin village near school No. 8		Km 7 + 120	

Nr.	Description	Google Image (Source: KMZ)	Road Chainage	Chainage location
5	Monitoring point No. 5 (Residential buildings in the village of Bulyoni Poyon)		Km 20 + 900	
6	Monitoring Point No. 6 (Bulyoni Poyon, School No. 84)		Km 21 + 350	
7	Monitoring Point No. 7 (Bakhoriston village)		Km 35 + 500	
8	Monitoring point No. 8 (Shukhrater village, 300 m from the traffic police post)		KM 36 + 670	
9	Monitoring Point No. 9. Market square at the end of the project road (At the intersection with the Guliston-Farkhor road).		KM 49 + 100	

All receptors are assumed to be one story residential buildings.

13. Road Traffic Noise Calculation and Prediction Model

The noise modelling and planning software SoundPLAN essential, Version 5.1, was used for the development of predictive noise models for the project. SoundPLAN is a widely-used environmental noise modelling and prediction software developed by SoundPLAN GmbH, Germany. The road noise sources and sound propagation model included in the analysis follow German guideline RLS-19 for road traffic noise predictions.

RLS-19 is an effective calculation model, able to determine the noise rating level of road traffic. The RLS-19 model shows a good correlation between the measured and projected noise levels proving to be an adequate tool for road traffic noise prediction. The model requires an input of data regarding the average hourly traffic flow, separated into heavy and light vehicles, the average speed for each group, the dimension, geometry and type of the road and of any natural and artificial obstacles. This model also takes into account the main features which influence the propagation of noise, such as obstacles, vegetation, air absorption, reflections and diffraction. In particular it makes possible to verify the noise reduction produced by barriers and takes into account also the reflections produced by the opposite screens.

Terrain points from the design drawings are imported into SoundPLAN to create a Digital Terrain Model (DTM). The DGM is a digital representation of the ground surface and used in the calculation of the noise level at any receiver point.

The methodology adopted for the noise prediction is shown briefly summarized in the following Figure 4.

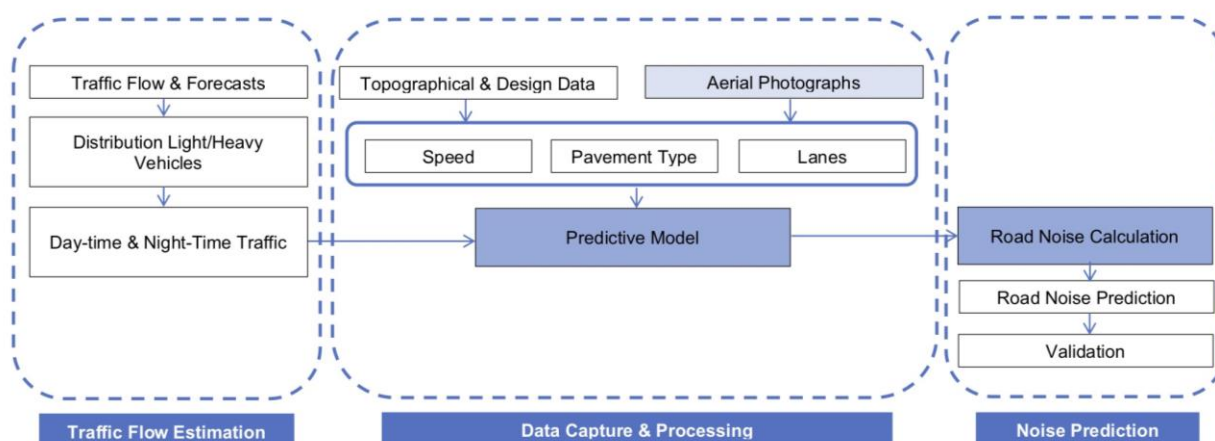


Figure 5 - Methodology Adopted for Traffic Noise Prediction

6.1 Road Traffic Data

Traffic noise increases with traffic volume and the proportion of heavy vehicles. Traffic forecasts for the base year 2024, and future year 2040 were provided for the project road by the Traffic Engineer/Transport Economist. To reduce Greenhouse Gas (GHG) emissions from the transport sector, Tajikistan is promoting the use of E-vehicles. Due to uncertain of the proportion of E-vehicles in the further vehicle fleet, in the noise calculation the traffic forecast of year 2040 has been used and no provisions for E-vehicles were considered.

The provided traffic data for the project road are shown in Table 5 below.

Table 5 – Traffic Forecast in AADT

Year	Motor-cycle	Car	Utility	Mini-bus	Bus	2-axle truck	3-axle truck	≥4-axle truck	AADT
2024	92	8,784	468	33	10	353	73	65	9,878
2040	143	13,670	728	51	16	549	114	101	15,373

Since the noise impacts are calculated during the one-hour period, the peak hour traffic volumes for day and night time have been deviated from the forecasted traffic volumes based on the hourly distribution of the traffic established during the traffic counts.

The vehicle classes are consolidated to the requirements of RLS-19< into following vehicle classes:

- Motorbikes/Motorcycles
- Cars and light vehicles u to 3.5 tons overall weight
- Truck group 1: trucks without trailer and busses with a total weight over 3.5 tons
- Truck group 2: trucks with trailer, articulated trucks with a total weight over 3.5 tons.

According to the IFC Guidelines daytime is defined between 07:00 and 22:00 and nighttime between 22:00 and 07:00. Existing traffic count data from manual classified traffic counts carried out in 2018 have been analyzed to identify the peak hour proportion of the AADT for daytime and nighttime traffic. The same proportion ratio has been used to determine the forecasted peak hour traffic in 2040 based on the predicted AADT. The hourly traffic data used for the noise modelling are shown in Tables 6 and 7.

Table 6 - Traffic Data 2024 per hour

Year: 2024	Day time	Night time
Motorcycles	5	1
Cars and Light Vehicles per hour	534	93
Trucks Group 1 per hour	21	4
Trucks Group 2 per hour	8	1
Total per hour	568	99

Table 7 - Traffic Data 2040 per hour

Year: 2040	Day time	Night time
Motorcycles	8	1
Cars and Light Vehicles per hour	831	145
Trucks Group 1 per hour	32	6
Trucks Group 2 per hour	12	2
Total per hour	884	154

6.2 Vehicle Speed

The lowest traffic noise for a typical traffic mix occurs at about 30 km/h. Increasing average vehicle speed above this increases traffic noise. Estimated operating speeds are used to predict road traffic noise levels and based on the road characteristic of the designed road. The vehicle speeds used in the noise modelling are shown in Table 8.

Table 8 - Vehicle speed

Vehicle speed (km/h)		Remarks
Cars	Trucks	
50	50	Receptors are located in settled areas and therefore a vehicle speed adjusted to build-up areas are considered

6.3 Road Surface

In the noise calculation, an asphalt concrete surface in accordance with ZTV Asphalt-StB 07/13 are considered for the existing (base year 2024) and project road section (year 2040).

6.4 Road Alignments and Terrain Elevation

The road alignment and terrain elevation are imported in SoundPLAN from the topographical survey and road design. Based on the imported terrain and design data a Digital Terrain Model (DTM) were created, which is a representation of the topographical reality. Roads are considered as line elements. For the noise calculation, the place of emission is in the middle of the outer lanes in accordance with RLS-19. The gradient of the project road (rate of climb/decent) is evaluated by SoundPLAN based on the set of coordinates from the road design. The slope of the road influences vehicle noise. As slope increases, engine noise increases because engines need to work harder.

6.5 Limitation

Traffic noise modelling procedures are not applicable in situations where the existing acoustical environment is not dominated by an existing road traffic noise source. Road traffic noise models are not capable of accurately determining existing noise levels where road traffic noise is not the dominant contributing acoustical characteristic. Generally, the procedures are intended for sites that are currently influenced by road traffic noise and will be similarly affected by the proposed road improvement project. In areas dominated by background (non-road) noise sources such as jet, monitored (rather than modelled) noise levels should be used to determine existing worst noise hour levels, thereby accurately representing the existing noise environment.

14. Results and Conclusion of Traffic Noise Predictions

The road noise prediction consists of the project road alignment and forecasted further traffic data. Noise levels for the base year 2024 and future years 2040 (after 16 years from the base year) were calculated and compared to the relevant criteria. The results of the noise prediction at the selected receptors are presented in the Table below. The location of the receptors, predicted noise levels and the corresponding noise contours for residential areas, are presented in Appendix 3 and 4.

Widening of the road for construction of U-turns, construction of interchanges and improvement of alignment leads to different levels of impacts at different receptors.

However, although the traffic noise levels at some receptors exceed the desirable level of 55 dB(A) in daytime and 45 dB(A) in nighttime in accordance to IFC standard, it should be noted that the increase of the noise levels between the base year 2024 and the reference year 2040 will be less than 3 dB(A) and therefore no additional noise abatement measures are required. The 3 dB(A) criteria is applicable as in settled areas the project road alignment will use mainly the right-of-way of the existing road. The area is pre-polluted due to existing traffic and the increase of the ambient noise level from the anticipated traffic increase is below the threshold of perception.

Table 9 - Results of Noise Modelling

Point No.	Location (Chainage)	Permissible Noise Level IFC Guidelines dB(A)		Measured Daily Ambient Noise Level in 2020 Maximum dB(A)	Predicted Noise Level 2024 in dB(A)		Predicted Noise Level 2040 in dB(A)		Difference Noise Level 2024 - 2040 in dB(A)		Requirement of additional noise protection measures based on the 3 dB(A) Rule between Base Year and Reference Year 2040
		LAeq day time	LAeq night time		LAeq day time	LAeq night time	LAeq day time	LAeq night time	day	night	
1	CH 0+500	55	45	52.6	52.6	44.9	54.7	47.1	2.1	2.2	no
2	CH 4+200	55	45	55.0*	52.7	45.0	53.1	45.5	0.4	0.5	no
3	CH 6+400	55	45	56.7	53.2	45.6	55.1	47.5	1.9	1.9	no
4	CH 7+120	55	45	57.5	51.1	43.4	53.0	45.4	1.9	2.0	no
5	CH 20+900	55	45	53.2	49.6	41.9	50.9	42.9	1.3	1.0	no
6	CH 21+350	55	45	54.8	50.7	43.0	52.8	44.8	2.1	1.8	no
7	CH 35+500	55	45	53.2	53.6	46.9	56.5	48.9	2.9	2.0	no
8	CH 36+670	55	45	51.4	51.2	43.6	52.7	45.2	1.5	1.6	no
9	CH 49+100	55	45	55.0	51.7	44.1	52.3	44.6	0.6	0.5	no

Note: * Entrance to I.Sharipov village: 48,4 dB, Exit from I.Sharipov village: 55.0 dB

Annex 5 Glossary

Ambient Noise: All-encompassing noise at a given place and time. This is usually a composite of sounds from all sources near and far, including any specific sources of interest.

Amplitude: The strength or magnitude of the pressure of a sound wave.

A-Weighted Sound Level: Expressed in dB(A). Frequency- weighted sound pressure level approximating the frequency response of the human ear. It is defined as the sound level in decibels measured with a sound level meter having the metering characteristics and a frequency weighting specified in the American National Standards Institute Specification for Sound Level Meters, ANSI S 1.4–1983. The A- weighting de-emphasizes lower frequency sound sounds below 1,000 Hz (1 kHz) and higher frequency sounds above 4 kHz. It emphasizes sounds between 1 and 4 kHz. A-weighting is the most commonly used measure for traffic and environmental noise throughout the world.

Best practice environmental management: The management of the activity to achieve a minimization of the activity's environmental harm through cost-effective measures assessed against the current international and national standards applicable to the activity.

dB Decibel, which is 10 times the logarithm (base 10) of the ratio of a given sound pressure to a reference pressure; used as a unit of sound.

dB(A) Unit used to measure 'A- weighted' sound pressure levels.

Emission Level: A measure of the noise output of a single vehicle. It is the maximum noise level, in dB(A), observed during a pass by of the vehicle at 25 m.

L_{Aeq,T}: Exposure to noise for the duration of a given time interval T (a 24-hour period, a night, a day, an evening) is expressed as an equivalent sound pressure level (measured in dB(A)) over the interval in question

Loudness: The judgment of intensity of a sound in terms of which sounds may be ranked on a scale from soft to loud. On this scale, a doubling of a reference sound energy is barely perceptible to the human ear, a tripling of the sound energy is readily perceptible, and 10 times the sound energy is about twice as loud. Decreasing the sound by the same factors has a reciprocal effect—reducing the reference sound energy to one-tenth of the original energy the sound is perceived as half as loud. Although loudness depends primarily on the intensity of the sound, it also depends on the sound's frequency and wave form.

Mitigation: Reduction in severity.

Noise: Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

Noise Barrier: A physical obstruction that is constructed between the highway noise source and the noise sensitive receptor(s) for the purpose of lowering the noise level, including stand-alone barrier structures, berms (earth or other materials), and combination berm/barrier structure systems

Noise Contour: An imaginary line shown on a plan along which all sound levels are equal.

Predicted Existing Traffic Noise Level: The traffic noise level that is determined through the use of the Traffic Noise Model for existing roadway conditions.

Predicted Future Traffic Noise Level: The traffic noise level that is determined through the use of the Traffic Noise Model for the future design year traffic and roadway geometry, including build and no-build alternatives.

Receptor: Most basically defined as any natural or artificial sensor that can perceive, register, or be affected by sound (e.g., human ear, microphone). In the context of a noise analysis a receptor is a single specific dwelling unit or the equivalent of a single dwelling unit.

RLS-19: Guidelines for Noise Protection on Roads (Richtlinien für den Lärmschutz an Straßen), 2019, German Calculation method for Noise Prediction

Sound: A vibratory disturbance created by a moving or vibrating source in the pressure and density of a gaseous, liquid medium or in the elastic strain of a solid that is capable of being detected by hearing organs. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to the ears. The medium of main concern is air.

Traffic noise: The total noise resulting from road traffic, including both light and heavy vehicles, steady and intermittent traffic flow and specific events such as the use of engine brakes.

WHO: World Health Organisation

Annex 6 Environmental Standards for Noise Emissions

Topic	National Standards / Requirements	International Guidelines / Standards	Adopted Project Standard	Rationale
	Tajikistan ¹	IFC Environmental, Health, and Safety General Guidelines		
Night time noise limits for human protection	<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):</p> <ul style="list-style-type: none"> Inside residential and public buildings: <ul style="list-style-type: none"> Hospital and sanatorium's wards, and operating rooms: 25 dB(A); Residential rooms in apartments, rest houses, boarding houses, houses for the elderly and disabled, sleeping rooms in kindergartens, and residential schools: 30 dB(A); Rooms in hotels and hostels: 35 dB(A); In residential and other areas: <ul style="list-style-type: none"> Recreational areas immediately adjoining hospital buildings and health centres: 35 dB(A) Areas immediately adjoining residential buildings, polyclinics, dispensary, rest houses, homes for the elderly and disabled, kindergartens, schools and other educational institutions, libraries: 45 dB(A); Areas immediately adjoining hotel and dormitory's buildings: 50 dB (A) 	<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>Outdoor:</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>Exception 1: IFC standard will prevail from 22.00 to 23.00</p> <p>Exception 2: areas adjoining hotels and dorms where IFC standard is more stringent 45 dB (A)</p> <p>The 3 dB criteria in IFC Guideline for increase in background levels applies also to rehabilitation / upgrading projects.</p>	<p>Most stringent and provides more comprehensive measurement criteria</p>

¹ According to International Sanitary Norms adopted by CIS countries (SanPin 2.2.4/2.1.8.562-96)

Traffic Noise Assessment



Topic	National Standards / Requirements	International Guidelines / Standards	Adopted Project Standard	Rationale
	Tajikistan ¹	IFC Environmental, Health, and Safety General Guidelines		
Day time noise limits for human protection	Noise emissions at the day time (07:00-23.00) should not exceed the following levels (SanPin 2.2.4/2.1.8.562-96): <ul style="list-style-type: none">• Inside residential and public buildings:<ul style="list-style-type: none">– Hospital and sanatorium's wards, and operating rooms: 35 dB(A);– Consultation rooms of polyclinics, ambulant clinics, dispensers, hospitals, and sanatoria 35 dB(A).– Classrooms, teachers' common room, school and other educational organization's auditoriums conference halls, and public reading rooms 40 dB(A).– Residential rooms in apartments, rest houses, boarding houses, houses for the elderly and disabled, sleeping rooms in kindergartens, and residential schools: 40 dB(A);– Rooms in hotels and hostels: 45 dB(A);– Halls of cafes, restaurants, eating rooms: 55 dB(A);– Shops trade halls, passenger halls in airports and stations, consumer services centres: 60 dB(A);• In residential and other areas:<ul style="list-style-type: none">– Recreational areas immediately adjoining hospital buildings and health centres: 45 dB(A)– Areas immediately adjoining residential buildings, polyclinics, dispensary, rest houses, homes for the elderly and disabled, kindergartens, schools and other educational institutions, libraries: 55 dB(A);– Areas immediately adjoining hotel and dormitory's buildings: 60 dB (A)– Rest areas at the territory of hospitals and sanatoria 35 dB (A)– Recreation areas at the territory of micro-districts, and residential areas, rest houses, houses for the elderly and disabled, children's playgrounds in kindergartens, schools and other educational institutions: 45 dB (A)	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: Outdoor Residential.; institutional, educational.: Daytime (07:00-22:00): 55 dB(A) Industrial, commercial: Night time (22:00-07:00): 70 dB(A).	Tajik standards with daytime defined as 07:00 – 22:00 in line with IFC EHS General guidelines. Exception: areas adjoining hotels and dorms where IFC standard is more stringent 55 dB (A) The 3 dB criteria in IFC Guideline for increase in background levels applies also to rehabilitation / upgrading projects.	Most stringent and provides more comprehensive measurement criteria

Annex 7 Receptor Location and Predicted Noise Levels for Year 2024

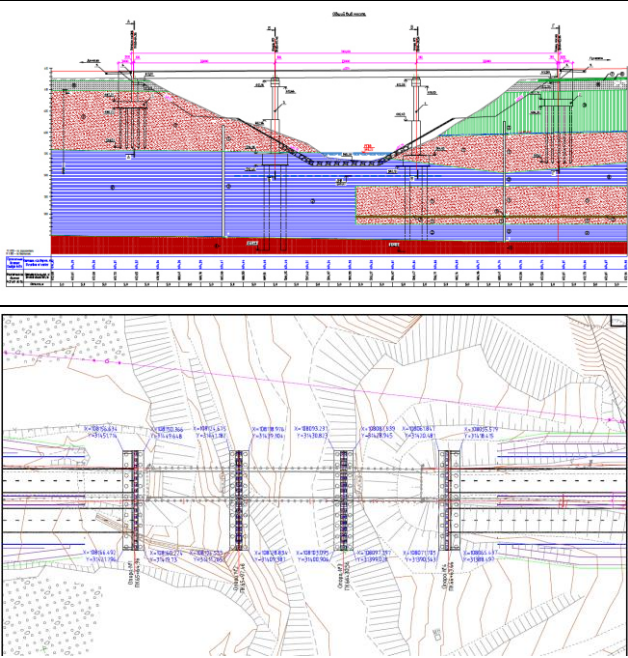

Annex 8 Receptor Location and Predicted Noise Levels for Year 2040

Annex 3 - ALIGNMENT SHEETS

The following alignment sheets provide an overview of sensitive receptors alongside the road.


No.	Location	KM	Issue / Picture	Baseline parameters / additional remarks
1	Dangara, shortly after project start	0+500	Residential house on right hand side. Sensitive receptor regarding noise and air emissions 	Noise and air quality monitoring will be conducted within villages traversed by Project Road and identified sensitive receptors
2	Dangara district	2+000	Tree plantations alongside Project Road. 	Mitigation and compensation measures required. Tree losses need to be compensated by new plantings at a ratio of 1:2.
3 a		6+500	Bridge over Tairsu River	

	Existing Bridge over Tairsu River			<p>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>
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No.	Location	KM	Issue / Picture	Baseline parameters / additional remarks
3 b	Designed bridge over Tairsu River			<p>The designed bridge has a length of 100.4m. It is because of the upgrade from 2 to 4 lanes and the rise of the gradient that the river's embankments need to be relocated backwards and flattened for stabilization.</p>
4	Tairsu River	6+500	<p>Water crossing. Sensitive receptor regarding potential water pollution.</p> 	<p>Water quality baseline measurements have been carried out. Water monitoring in surface waters crossed by Project Road will be conducted according to the monitoring programme.</p>
5	Chainage 17+600	17+600	<p>Different types of land use alongside the Project road. Cotton, wheat, pasture.</p>	<p>Due to cross section widening</p>




Dangara – Guliston Road Section

Traffic Noise Assessment

No.	Location	KM	Issue / Picture	Baseline parameters / additional remarks
				lost of agricultural land. Compensation will be done according to valuation report and LARP.
6	Chainage 27+300	27+300	<p>Project Road traversing alongside pasture.</p> 	Implementation of cattle crossings according to agreement with local authorities and farmers.
7		33+800	Spring. Sensitive receptor regarding potential water pollution.	Water quality baseline

Dangara – Guliston Road Section

Traffic Noise Assessment

No.	Location	KM	Issue / Picture	Baseline parameters / additional remarks
	Dangara Diversion Channel			measurements have been carried out. Water monitoring in surface waters crossed by Project Road will be conducted according to monitoring programme.
8	Surkhob River	8 km distance from Project end.	Proposed borrow area at Surkhob River 	Noise and air quality monitoring at crushing machine. Borrow site restoration after end of extraction activities.
9	Cemetery close to end of Project road. Photo taken from the South on 30.04.2024	Km 48+000 RHS; Photo taken from the South on 30.04.2024		Cemetery delineated by fence.

Annex 4 - BIODIVERSITY SURVEY

REPORT

**Biodiversity Surveys for the
Rehabilitation and Reconstruction of
Khulbuk – Temurmalik – Kangurt, Dangara – Bokhtar,
Dangara – Guliston road sections**

PERFORMER:

Alikhon Latifi, Chairman of the Association of Hunters of Tajikistan, candidate of biological sciences, the Consultant.

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Dushanbe 2020

INTRODUCTION

Floodplains and river valleys are complexes of ecotone-type intrazonal biotopes, which determines their role in the dynamics of the region's ecosystems. To date, the transformation of floodplain landscapes as a result of human activities (growth of settlements, plowing of valleys, transformation of floodplain forests to other land use, expansion of pasture areas, increased recreational load, etc.) has led to a significant change in the ecosystems of floodplains and river valleys. Against the background of anthropogenic transformation of landscapes, the results of studying the ecology of communities are increasingly being used in planning a system of environmental measures. In addition ecosystem diversity is one of its main measurable characteristics.

Objective: The possible impact of the Project roads reconstruction on biodiversity was studied for the following Project roads: Khulbuk - Temurmalik - Kangurt; Bokhtar – Dangara and Dangara – Guliston. The focus of this study is the identification of the impacts which the Project road have on the species richness and population diversity of flora and fauna in the Project area of influence.

Material and methodology

The studies were conducted by using primary and secondary data. Primary data were obtained during the nesting season and in winter period by using the classical route method. This means that the investigators drove along the existing road and at each location at which any valuable habitat-structures appeared, these sections were surveyed by walking and monitored by use of a binocular. Secondary data were obtained from study of scientific and Project related literature and Internet Search.

The survey was conducted in 2020 within the period of the lockdown due to the Corona pandemic. Therefore, the survey didn't involve any consultation activities. Also, no NGO was consulted. The main center of Biodiversity located next to the Project roads is the Dangara massif - to which we give a brief description.

The Dangara massif is located within the interfluvium of the major Rivers. Vakhsh and Pyannj. Project area is between the Vakhsh ridge and the valley of the Kyzylsu river at an altitude of 550-570 m above sea level. The north-western border runs along the southern slopes of the Vakhsh ridge and the Sarsarak mountains. In the south, crossing the valley of the river. Toirsu, reaches the left bank of the river. Kyzylsu continues to hilly hills, covering the Selbursai reservoir. In the west, on the outskirts of the Dangara massif, there is a valley of the salty river Toirsu flowing through a deep loessic ravine. On the right bank of the river. Kyzylsu, bypassing Kongurt, the border reaches the eastern spurs of the Vakhsh ridge.

In the middle of the massif are parallel roads and railways connecting the city of Kulyab with the cities of Bohtar and Dushanbe.

Prior to development, the Dangara massif was used as autumn-winter pastures. After damming the Vakhsh river for construction of the Nurek hydroelectric station and the Nurek reservoir (length of about 70 km, width from 800-900 m to 3-4 km), the possibility of flooding the Dangara massif appeared. To date, about 20-25% of virgin and fallow lands have been developed.

The development of the Dangara massif influenced the state of the avifauna of the region. At the beginning of the XX century, the usual nesting species here were: *Otis tarda*, *Chlamydotis undulata*, *Burhinus oedipnemos*, *Pterocles orientalis*, *Pterocles alchata*. By the middle of the XX century, the nesting grounds of most of these species had disappeared. For the species *Tetrax tetrax* no sustainable population survived in the Dangara massif due to the land use changes caused by irrigation activities.



Bustard (*Otis tarda*)

Until the 1960-1970s of the XX century, it was still possible to observe stable flights of bustards and grouse. Our monitoring observations of recent years have shown that only single birds *Otis tarda*, *Chlamydotis undulata*, *Burhinus oedicephalus*, *Pterocles orientalis*, *Pterocles alchata*, *Tetrax tetrax* occasionally fly within the Dangara massif.

According to the results of our research conducted in the last 14 years and analysis of the literary sources of the Dangara massif, about 68 species and subspecies of wild birds belonging to 10 orders and 26 families were identified. By the nature of their stay, they are divided into settled - 18 species, migratory-nesting - 34, migratory - 12, wintering - 21 and migratory - 1 species (table). Criterion A1 refers to 11 species of birds under global threat of extinction: *Aegypius monachus*, *Aquila heliaca*, *Circus macrourus*, *Falco vespertinus*, *Falco naumanni*, *Falco cherrug*, *Otis tarda*, *Tetrax tetrax*, *Chlamydotis undulata*, *Columba eversmanni*, *Coracias garrulus*.



little bustard (*Tetrax tetrax*)

Criterion A3 refers to 10 species limited to one biome: *Ammoperdix griseogularis*, *Iraria gutturalis*, *Oenanthe finschii*, *Oenanthe xanthoprigna*, *Oenanthe picata*, *Hippolais languida*, *Phylloscopus neglectus*, *Sitta tephropunctata*, *Emberiza buehleri*, *Emberiza hortulana*. From 44 species and subspecies of birds listed in the Red Book of the Republic of Tajikistan on the Dangara massif, the following Red Book species of birds can be found: *Aegypius monachus*, *Neophron percnopterus*, *Gypaetus barbatus*, *Aquila chrysaetos*, *Hieraaetus pennatus*, *Accipiter nisus*, *Falco cherrug*, *Falco peregrinus* *babylonicus*, *Ammoperdix griseogularis*, *Otis tarda*, *Chlamydotis undulata*, *Pterocles orientalis*.



Golden eagle (Aquila chrysaetus)

Common wintering birds are: *Apus apus*, *Apus melba*, *Merops apiaster*, *Merops persicus*, *Coracias garrulous*, *Upupa epops*, *Corvus corax*, *Alauda cristata*, *Alauda arvensis*, *Melanocorypha calandra*, *Hirundo rustica*, *Anthus spinoletta*, *Motacilla alba*, *Saxicola caprata*, *Oenanthe picata*. In ravines and loess niches nest: *Falco tinnunculus*, *Athene noctua*, *Otus scops*, *Bubo bubo*.



Eurasian eagle (*Bubo bubo*)

Land development for sowing of leguminous crops contributed to an increase in the number of waterfowl, near-water and large grain-eating birds. A monitoring survey of the number of wintering waterfowl and near-water birds in the Dangarinsky massif and in the vicinity of the Selbursai reservoir established a large concentration of birds belonging to *Anseriformes*, *Gruiformes*, *Charadriiformes*, *Lariformes*. It turned out that many species of wintering waterfowls on feeding adhere to the arable and virgin lands of the Dangara massif, and at night flock to the Selbursaysky reservoir, located to the south. According to the annual counts of the number of wintering birds in the above mentioned territories, more than 18 thousand birds are counted, belonging to: *Anser anser*, *Anas*, *Anas strepera*, *Tadorna ferruginea*, *Anas Penelope* *Aythya ferina*, *Aythya fuligula*, *Mergus merganser*, etc. In fields with winter crops about 500 *Grus grus* individuals winter each year.



Common crane (*Grus grus*)

The Selbur reservoir, located on the right bank of the river Kyzylsu attracts wintering birds to a watering place and spend the night from all over the Dangara massif. The presence of the Selbursai reservoir in the southeast of the Dangara massif is one of the important environmental factors that play a decisive role in the accumulation of several hundred thousand waterfowl and near-water birds, cranes, gulls, daytime predators and passerines during wintering, migration and nesting.

Pisces in the Kyzylsu and Toirsu rivers are represented by the following: there is a marinka - *Schisothorax intermedius*, a carp - *Ciprinus carpio*, a catfish - *Silurus*: Marinka and carp are found in the Selbursai reservoir.

Amphibians (Amphibia) are represented by: a lake frog - *Rana ridibunda* and a green toad - *Bufo viridis*.

Reptiles - Reptilia: steppe tortoise (*Testudo horsfieldi*), Caspian bare-footed gecko (*Gymnodactylus caspius*), steppe agama (*Agama sanguinolenta*), gray monitor lizard (*Varanus griseus*), yellow-bellied glass lizard (*Ophisaurus apodus*), Asian long-necked Skink (blue-eyed) *Eumeces schneideri*, worm-shaped blind snake (*Typhlops vermicularis*), oriental strangler (*Eryx tataricus*), multi-colored snake (*Coluber ravergeri*), cobra (*Naja axiana*), gyurza (*Vipera lebetina*).

Terrestrial fauna - Mammalia. Until the end of the XX century, the open spaces of the Dangara massif; adhered to numerous gazelles (*Gazella subgutturosa*). To date, they have disappeared without a trace. On the slopes of the Vakhsh ridge and at the foot of Mount Sarsaryak there are urial (*Ovis vignei*) and screw-goat (*Capra falconeri*). They are included in the Red Book of Tajikistan. Over the past 30 years, the number of wild boars (*Sus scrofa*) has increased dramatically.



Urial (*Ovis vignei*)

Among predatory mammals, there are: wolf (*Canis lupus*), fox (*Vulpes vulpes*), striped hyena (*Hyaena hyaena*), ligation (*Vormela peregusna*), reed cat (*Felis chaus*) and jackal (*Canis aureus*). Until the mid XX century, the leopard (*Felis pardus*) inhabited the Dangara massif. Porcupine (*Hystrix leucura*), Turkestan rat (*Rattus turkestanicus*), plate-toothed rat (*Nisokia indica*), Eastern mole rat (*Ellobius lopus*), large gerbil (*Rhombomys opimus*), hare (*Lepus tolai*) are found.

The flora of the Dangara massif is typically semi-desert, the vegetation is predominantly grassy. Vegetation begins in mid-February, active flowering in early spring, March-April. From mid-May, vegetation begins to fade. In the vegetational belt characterized by short bluegrass the following species prevail: bulbous bluegrass (*Poa bulbosa*) and sedges, particularly *Carex pachystylis*. In the foothill sand dzhangals: Richter's hodgepodge (*Salsola Richteri*) and white saxaul (*Haloxylon persicum*) prevail. In addition there are mostly ephemeral cereals: *Psilurus aristatus*, *Parapholis spec.* and others. In the upper belt there are longer growing ephemeroids, mainly *Phlomis bucharica*. In the hollows between the hills, species of the genera *Tamarix* and *Rosa* are found.

On the territory of the Dangara massif the most common crops are grain, melons, cotton, and fodder. In addition there are orchards and winter-spring pastures.

Identified locations and structures of biodiversity significance along the Dangara-Guliston Road with coordinates are shown in the following table.

Dangara – Guliston Road Section

Traffic Noise Assessment

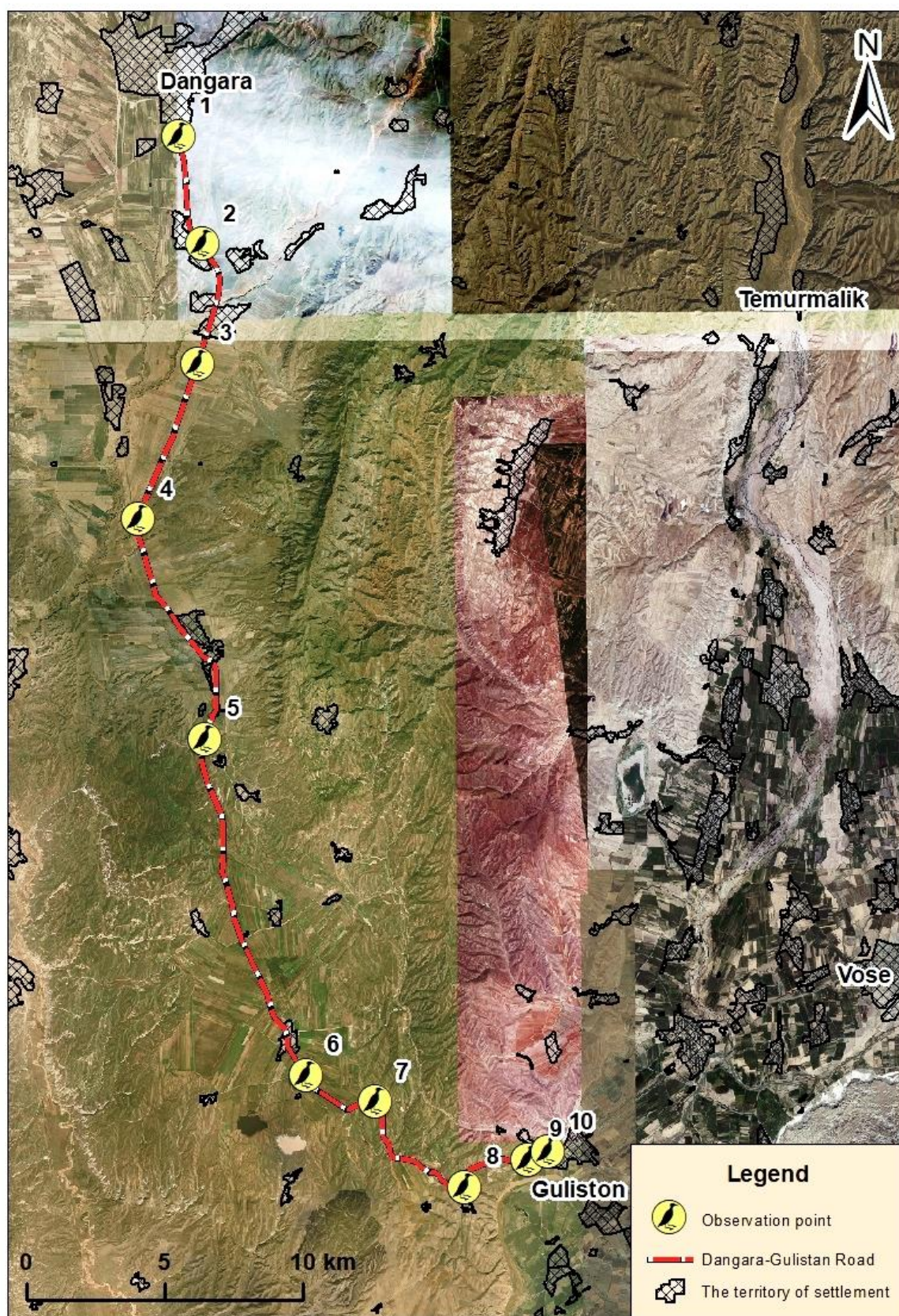
points on the map	Geographical coordinates	Remark
1.	N 38° 04' 34.0" E 069° 20' 33.5" height 577 m above sea level. m.	Dangara start point
2.	N 38° 02' 26.6" E 069° 21' 03.2" height 622 m above sea level m	At the exit from the city of Dangara, willow thickets are located on both sides, where <i>Acridotheres tristis</i> , field and Indian sparrows nest
3.	N 38° 00' 06.5" E 069° 21' 01.8" height 606 m above sea level m	Nesting colonies in loess cliffs begin on both sides. Nesting places of <i>Coracias garrulus</i> , <i>Acridotheres tristis</i> , <i>Green and Golden Merops</i> , Indian Sparrow, <i>Athene noctua</i> and possibly <i>Columba livia</i>
4.	N 37° 57' 04.0" E 069° 19' 31.5" height 535 m above sea level m	A small apricot orchard on the left, where a colony of Indian sparrows nests.
5.	N 37° 52' 44.8" E 069° 21' 09.6" height 615 m above sea level m	Changing the landscape. The hilly terrain begins. Here, the winter stay of the <i>Grus grus</i> and the <i>Anser anser</i> is most likely. It is also possible to stay here for the Bukhara mountain sheep (urial). A large concentration of <i>Buteo buteo</i> , <i>Falco naumanni</i> , and <i>Accipiter nisus</i> is observed. This is indirect evidence of the presence of a large number of rodents of different species
6.	N 37° 46' 09.9" E 069° 23' 37.3" height 741 m above sea level m	A nesting colony of <i>Passer domesticus</i> in a mulberry orchard when entering the Vose River (at the pass).
7.	N 37° 45' 37.6" E 069° 25' 19.2" height 747 m above sea level m	Colonies in cliffs for about one kilometer. Nesting sites of <i>Coracias garrulus</i> , <i>Acridotheres tristis</i> , <i>Green and Golden Merops</i> , <i>Passer domesticus</i> located on cliffs along the road.
8.	N 37° 43' 57.4" E 069° 27' 32.1" height 654 m above sea level m	Colonies in cliffs for about one kilometer. Nesting sites of <i>Coracias garrulus</i> , <i>Acridotheres tristis</i> , <i>Green and Golden Merops</i> , <i>Passer domesticus</i> located on cliffs along the road.
9.	N 37° 44' 29.2" E 069° 29' 05.2" height 517 m above sea level m	Large colony in clay cliffs on both sides. Nesting areas of <i>Coracias garrulus</i> , <i>Acridotheres tristis</i> , <i>Green and Golden Merops</i> , <i>Passer domesticus</i> .
10.	N 37° 44' 38.3" E 069° 29' 34.8"	End point when entering the village of Guliston

Dangara – Guliston Road Section

Traffic Noise Assessment

	height 462 m above sea level m	
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The following map shows the identified locations and structures of biodiversity significance along the Dangara-Guliston Road. The conducted biodiversity survey revealed 8 sites of biodiversity-significance along the Dangara-Guliston Project road (sites numbered 2 to 9 in the map). All identified sites are bird nesting sites.



1. Dangara – Guliston road. Identified bird nesting sites.

Impact on biodiversity

The potential impact of the project on biodiversity is relatively low due to the fact that the road is built in an already broken channel and is located in a degraded environment, which has been subjected to anthropogenic impact for many years (in particular, grazing).



Hilly areas on the Dangara-Guliston section. (traces of anthropogenic impact are clearly visible).

Ecosystems have been substantially transformed since the previous construction work was carried out in Soviet times. During construction, major impacts will include direct loss of habitat in the immediate vicinity of the project road, within the construction work areas adjacent to the road. There will also be interference and inconvenience associated with construction activities, mainly noise and vibration effects. Loss of habitat will typically affect areas of relatively low biodiversity value. The greatest impact will occur when individual plantings of the territory of increased interest for biodiversity, primarily any remnants of ancient fruit trees, for example, from the Khulbuk side, mulberry plantations on which representatives of the weaver family (*Passer domesticus* and *Passer montanus*) and the starling family (*Sturnus roseus*). The same situation exists in the Dangara-Guliston section. There are several colonies of

weaver sparrows (Indian and possibly black-breasted sparrows). It is necessary to avoid, if possible, the cutting down of plantings and the destruction of colonies.



Nesting colonies of Indian and black-breasted sparrows in garden and forest plantations along the route.

It is not currently believed that the magnitude of this impact will have any significant impact on biodiversity; however, mitigation will be implemented to further guarantee this. Impacts related to disturbance of peace, silence and order will affect the fauna, which uses landscapes along the route to shelter, find food or carry out other activities within the distance of construction work.

In particular, this will include especially nesting birds that directly nest in cliffs along the roads and cannot change nesting sites. These mainly include representatives of the roller family (*Coraciidae*), such as the European roller (*Coracias garrulous*), the bee-eater family (Golden beetle (*Merops apiaster*)) and

wintering sheltering reptiles and amphibians, which are sensitive to such landscape disturbances. Representatives of the starling family (lane or Indian starling (*Acridotheres tristis*)) and of the weaver family (Indian sparrow (*Passer domesticus*)) also nest on cliffs of roads, which can change nesting sites. The Project list contains 13 species of trigger species for the Dangara massif of birds that are of the least concern. Part of this fauna is listed in the Red Book, in particular, the Saker Falcon (*Falco cherrug coasti*), which covers a large territory and which will not be seriously affected by the construction.





Nest colonies on clay cliffs in different areas

I would like to add that the destruction of colonies on clay cliffs, although it causes quite serious damage to biodiversity, is temporary. Our studies in other areas along the Tajik routes, where similar destruction of colonies were observed during rehabilitation, showed expensively that over time, colonies begin to recover. This is clearly visible on the Dushanbe-Kurgan-Tyube road.

Complete restoration of the colonies is expected to be 5-6 years. This is because the clay or loess cliff doesn't disappear but is relocated backward within the Project road's cut sections. Therefore the nest holes are destroyed but not the cliffs respectively the nesting habitat. Breeding birds come back to the relocated cliffs and build new nests. Based on experience from other road Projects this happens within a time period of 5.6 years.



Saker Falcon (*Falco cherrug coasti*)



Сизоворонка (*Coracias garrulous*)



Щурка золотистая (*Merops apiaster*)



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Щурка зеленая (Merops persicus)

Mitigation

The potential impact of the project on biodiversity is considered limited, however, mitigation measures should be taken for this:

Control examination of the full route in order to clearly identify features / species / areas of particular interest for conservation (for example, ancient fruit trees, natural forest plantations, suitable species of nesting birds, plants listed in the Red Book, etc.);

Implementation of the Environmental Management Plan, which will document the results of the control survey and the detailed measures that need to be taken to protect these species.

During the bird nesting season which includes the time period from 01st of March to 30th of September no tree felling, and no cutting of the loess cliffs identified as bird nesting sites is allowed. This is to avoid the most sensitive windows for sheltering species (Tajikistan has no regulations regarding this matter).

In cases where this is not possible, preliminary checks of the elements immediately before work and subsequent fencing and exclusion of workers and construction objects from the zone where these species are present during construction until they are no longer used;

Workforce awareness training program to prevent hunting / poaching / collecting rare seeds, etc.

Sympathetic restoration of temporary building sites, i.e., re-planting of local plant and animal species with increased biodiversity value.

USED LITERATURE

- Abdusalyamov I.A. (1971). Fauna of the Tajik SSR. Birds. T. XIX, part 1. Dushanbe: Donish. 299 p.
- Abdusalyamov I.A. (1973). Fauna of the Tajik SSR. Birds. T. XIX, part 2. Dushanbe: Donish. 250 s
- Abdusalyamov I.A. (1977). Fauna of the Tajik SSR. Birds. T. XIX, part 3. Dushanbe Donish. 279 p.
- Abdusalyamov I.A. Repl. ed. Red Book of the Tajik SSR. (1988). Dushanbe: Donish. S. 14-160.
- Abdusalyamov I.A. (2003). About the wintering of the gray crane in southern Tajikistan.
- Abdusalyamov I.A. (2004). Information on the number of gray cranes in Tajikistan in 2003-2004 // Newsletter No. 7-8. International Crane Protection Fund. Moscow. (Newsletter No. 7-8. Crane Working Group of Eurasia). C. 74-76.
- Abdusalyamov I.A. (2004). The current state of the species diversity of vertebrates and their distribution in the main ecosystems. // Fauna and animal ecology of Tajikistan. Dushanbe. S. 28-53.
- Abdusalyamov I.A. (2004). Current status of the number of wintering wetland birds in Southwest Tajikistan. // Bosphore territory "Ysyk-Köl. The second issue. The collection of materials of the V Issyk-Kul Symposium on October 24-25, 2003, Cholpon-Ata. Bishkek. S. 30-31.
- Abdusalyamov I.A., Solokha A.V., Abdulnazarov A.G., Mirzobahodurova, Sh.R. (2005). Monitoring and conservation of Anseriformes in Tajikistan. // III International Symposium: Anseriform birds of Northern Eurasia. Abstracts of the report. St. Petersburg. S. 5-6.
- Bulletin No. 6. - Eurasia Cranes Working Group. Moscow. June 2003. (Newsletter No. 6, June. Crane Working Group of Eurasia). C. 9-10.
- Chernov S.A. (1959). Reptiles. Fauna of the Tajik SSR, t. 18. Tr. IZIP AN Taj.SSR. Stalinabad, vol. 48.220 s.
- Chernyshev V.I. (1958). Fauna and ecology of mammals of the tugai of Tajikistan. Tr. IZIP AN Taj.SSR. Dushanbe: Publishing House of the Academy of Sciences of the Tajik SSR, T. 85. 167 p.
- Ivanov A.I. (1940). Birds of Tajikistan. M.-L.: Publ. USSR Academy of Sciences. 299 p.
- Ivanov A.I. (1945). Wintering of birds in the lower river. Watch in southern Tajikistan. // Izv. TFAN, No. 6. P. 36-59.
- Ivanov A.I. (1969). Birds of the Pamir-Alai. L.: Ed. USSR Academy of Sciences. 448 p.
- Said-Aliyev S.A. Amphibians and reptiles of Tajikistan. Dushanbe: Donish. 147 p.
- Sokov A.I. (1979). (1993). The fauna of Tajikistan. Mammals are artiodactyls. T. XX, part V. Dushanbe Donish. 338 p.
- Solokha Alexander. (2006). Results from the International Waterbird Census in Central Asia and the Caucasus 2003-2005. Wetlands International. C. 25-28.

THE SPECIES COMPOSITION AND THE NATURE OF THE OCCURRENCE OF BIRD SPECIES IN THE DANGARINSKY MASSIF

№	Russian name	Latin names	English names	Nature of the stay	Remark
I	Отряд Поганкообразные- Podicipitiformes – Grebes				-
1	Сем. Поганковые	Podicipitidae	Grebes	-	-
1	Большая поганка	<i>Podiceps cristatus</i>	Great grested grebe	winter	A rare species for Southwest Tajikistan.
II	Отряд Гусеобразные – Anseriformes – Anseriformes				-
2	Сем. Утиные	Anatidae	Anatides		-
2	Хохлатая чернеть	<i>Aythya fuligula</i>	Tufted duck	flight, winter	Occurs from 5 to 15 individuals
3	Красноголовый нырок	<i>Aythya ferina</i>	Common Pochard	Nestle, winter	Numerous species are found in 100-500 individuals during wintering.
4	Красноносый нырок	<i>Netta rufina</i>	Red-Crested Pochard	nestle, winter	Numerous species are found in 50-100 individuals during wintering
5	Широконоска	<i>Anas clypeata</i>	Northern Shoveler	flight, winter	There are single features during wintering.
6	Свиязь	<i>Anas penelope</i>	(Euraspean) wigeon	flight, winter	There are single features during wintering.
7	Шилохвость	<i>Anas acuta</i>	Northern Pintail	flight, winter	There are single features during wintering.
8	Серая утка	<i>Anas strepera</i>	Gadwall	nestle	There are single features during wintering.
9	Кряква	<i>Anas platyrhynchos</i>	Mallard	nestle, winter	It occurs during wintering from 15 to 25 individuals.
10	Огарь	<i>Tadorna ferruginea</i>	Ruddy Shelduck	nestle, winter	There are single features during wintering.
11	Серый гусь	<i>Anser anser</i>	Grey lag goose	winter	Numerous species are found in 450-500 individuals during wintering
III	Отряд Хищные птицы – Falconiformes – Bird of prey				-
3	Сем. Ястребиные	Accipitridae	Hawsk, accipitrides	-	-
12	Чёрный коршун	<i>Milvus korschun</i>	Black Kite	winter	Single individuals hibernate during flight forms flocks of up to 600 individuals
13	Чёрный гриф	<i>Aegyptus monachus</i>	Cinereous Vulture	settled	The species is included in the Red Book of Tajikistan. Vulnerable view of VU.
14	Белоголовый сип	<i>Gyps fulvus</i>	Griffon vulture	settled	A rare but stable occurring species.

№	Russian name	Latin names	English names	Nature of the stay	Remark
15	Стервятник	<i>Neophron percnopterus</i>	Egyptian Vulture	nestle	The species is included in the Red Book of Tajikistan. Vulnerable view of EN.
16	Бородач	<i>Gypaetus barbatus</i>	Bearded vulture	settled	The species is included in the Red Book of Tajikistan. Vulnerable view of EN.
17	Беркут	<i>Aquila chrysaetus</i>	Golden eagle	settled	The species is included in the Red Book of Tajikistan. Vulnerable view of VU.
18	Могильник	<i>Aquila heliaca</i>	Imperial eagle	flight	A rare migratory bird. Occurs not every year ..
19	Орёл-карлик	<i>Hieraetus pennatus</i>	Booted Eagle	nestle	The species is included in the Red Book of Tajikistan. Vulnerable view of EN.
20	Обыкновенный канюк	<i>Buteo buteo</i>	Common buzzard	flight, winter	A rare but stable occurring species.
21	Ястреб-перепелятник	<i>Accipiter nisus</i>	(Europea) sparrow-hawk	flight, winter	The species is included in the Red Book of Tajikistan. Vulnerable view of EN.
22	Полевой лунь	<i>Circus cyaneus</i>	Hen Harrier	flight, winter	A rare but stable occurring species.
23	Степной лунь	<i>Circus macrourus</i>	Pallid harrier	flight	A rare but stable occurring species
4	Сем. Соколиные	Falconidae	Falcons	-	-
24	Туркестанский балобан	<i>Falco cherrug coasti</i>	Saker Falcon	settled	The species is included in the Red Book of Tajikistan. Vulnerable view of EN.
25	Сапсан	<i>Falco peregrinus brevirostris</i>	Peregrine Falcon	winter	The number of species continues to decline.
26	Рыжеголовый сапсан	<i>Falco peregrinus babylonicus</i>	Peregrine Falcon	winter	The species is included in the Red Book of Tajikistan. Vulnerable view of EN.
27	Кобчик	<i>Falco vespertinus</i>	Red-footed	flight	There are single individuals.
28	Степная пустельга	<i>Falco naumanni</i>	Lesser Kestrel	nestle	Rare view
IV	Отряд Куриные – Galliformes –Fowl-like birds				-
5	Сем. Фазановые	Phasianidae	Pheasants, peacocks	-	-

Traffic Noise Assessment

№	Russian name	Latin names	English names	Nature of the stay	Remark
29	Пустынная куропатка	<i>Ammoperdix griseogularis</i>	See-see Partridge	settled	The species is included in the Red Book of Tajikistan. Vulnerable view of EN.
V	Отряд Журавлеобразные – Gruiformes – Gruiformes				-
6	Сем. Настоящ. журавли	Gruidae	Granes	-	-
30	Серый журавль	<i>Grus grus</i>	Common [gray] crane	flight	The last decades have a numerous look.
7	Сем. Дрофиные	Otididae	Bustards	-	-
31	Дрофа	<i>Otis tarda</i>	Great Bustard	nestle, winter	It is included in the Red Book of RT. Vulnerable view of CR. Not nesting
32	Стрепет	<i>Tetrax tetrax</i>	Little Bustard	flight, winter	A small wintering species.
33	Джек	<i>Chlamydotis undulata</i>	Houbara Bustard	nestle	It is included in the Red Book of RT. Vulnerable view of CR. Rare migratory
VI	Отряд Голубеобразные – Columbiformes – Pigeons, doves				-
8	Сем. Голубиные	Columbidae	Pigeons, doves	-	-
34	Сизый голубь	<i>Columba livia</i>	Rock Pigeon	settled	It is inhabited in human settlements. Nests in attics and in ravines with clay soils.
35	Бурый голубь	<i>Columba eversmanni</i>	Yellow-eyed Pigeon	nestle	Rare view
9	Сем. Рябковые	Pteroclididae	Sandgrouse	-	-
36	Чёрнобрюхий рябок	<i>Pterocles orientalis</i>	Black-bellied Sandgrouse	nestle, winter	The species is included in the Red Book of Tajikistan. Vulnerable view of EN.
37	Белобрюхий рябок	<i>Pterocles alchata</i>	Pin-tailed Sandgrouse	nestle, winter	Not always a met
VII	Отряд Совеобразные – Strigiformes – Owls				-
10	Сем. Настоящие совы	Strigidae	(Typical) owls	-	-
37	Домовый сыч	<i>Athene noctua</i>	Little Owl	settled	It inhabits cultural landscapes. Nests in burrows, caves, hollows and in attics.
38	Сплюшка	<i>Otus scops</i>	Eurasian Scops-owl	nestle	The usual look.

№	Russian name	Latin names	English names	Nature of the stay	Remark
39	Филин	<i>Bubo bubo</i>	Eurasian Eagle-owl	settled	Inhabits forests near rivers, lakes and swamps. Nests in rocks and empty nests of other birds
VIII	Отряд Стрижеобразные – Apodiformes – Swifts, Hummingbirds			-	-
11	Сем. Настоя. стрижи	Apodidae	Swifts	-	-
40	Черный стриж	<i>Apus apus</i>	Northern Swift	nestle	Normal breeding species.
41	Белобрюхий стриж	<i>Apus melba</i>	Alpine swift	nestle	Inhabits and nests in conglomerate and loessous steep river banks
IX	Отряд Ракшеобразные –Coraciiformes –Coraciiformes				-
12	Сем. Зимородковые	Alcedinidae	Kingfishers	-	-
42	Обык. зимородок	<i>Alcedo atthis</i>	(Common) kingfisher	nestle	Inhabits rivers, lakes and other bodies of water with clear water. Breeds in burrows on cliffs
13	Сем. Сизоворонковые	Coraciidae	Rollers	-	-
43	Сизоворонка	<i>Coracias garrulus</i>	European Roller	nestle	It inhabits dry landscapes from forests to deserts. Nests in hollows of other birds
14	Сем. Щурковые	Meropidae	Bee-eaters	-	-
44	Золотистая щурка	<i>Merops apiaster</i>	Bee-eater	nestle	Inhabits steppe spaces with ravines and steep river banks. Breeds in burrows on cliffs.
45	Зелёная щурка	<i>Merops superciliosus</i>	Blue-cheeked	nestle	Inhabits steppe spaces with ravines and steep river banks. Breeds in burrows on cliffs
15	Сем. Удововые	Upupidae	Hoopoes	-	-
46	Удод	<i>Upupa epops</i>	Hoopoe	nestle	Adheres to the coastal strip with woody vegetation.
X	Отряд Воробьиные – Passeriformes –Perching birds				-
16	Сем. Жаворонковые	Alaudidae	Larks	-	-
47	Степной жаворонок	<i>Melonocorypha calandra</i>	Calandra Lark	settled	It lives in open spaces: meadows, fields. Nests in dimples lined with dry herbs.

Traffic Noise Assessment

№	Russian name	Latin names	English names	Nature of the stay	Remark
48	Хохлатый жаворонок	<i>Galerida cristata</i>	Crested Lark	settled	Common widespread sedentary bird.
49	Полевой жаворонок	<i>Alauda arvensis</i>	Sky lark	flight, winter	It lives in open spaces: meadows, fields.
17	Сем. Ласточковые	Hirundinidae	Swallows	-	
50	Деревенская ласточка	<i>Hirundo rustica</i>	European swallow	nestle	It lives in human settlements. Builds a nest of mud on village buildings.
18	Сем. Трясогузковые	Motacillidae	Wagtails, pipits		-
51	Туркестан. белая трясогузка	<i>Motacilla alba personata</i>	Pied wagtail	nestle, winter	Settles on an open area near roads, fields, in gardens and parks. Breeds in the form of a hole on the ground
52	Горный конёк	<i>Anthus spinoletta</i>	Water Pipit	nestle, settled	Inhabitant of dry forest species. Nests on the ground in the form of dimples lined with leaves and thin branches.
19	Сем. Дроздовые	Turdidae	Thrushes	-	
53	Обыкновенная каменка	<i>Oenanthe oenanthe</i>	Northern Wheatear	nestle	Inhabits deserts, steppes, forests and mountains. Nests among dry, open rocky areas.
54	Чёрная каменка	<i>Oenanthe picata</i>	Variable Wheatear	nestle	Rare bird.
55	Златогузая каменка	<i>Oenanthe xanthopyrma</i>		nestle	A small nesting bird.
56	Соловей-белошейка	<i>Irania gutturalis</i>		nestle	Nesting bird.
57	Чёрный чекан	<i>Saxicola carpata</i>	Pied Buchchat	nestle	The inhabitant of the meadows of the cultural landscape. Nests on the ground among low and rare grass.
20	Сем. Славковые	Sylviidae	Old World warblers	-	-
58	Иранская пеночка	<i>Phylloscopus neglectus</i>	Plain Leaf-warbler	nestle	Adheres to the coastal strip with shrubby vegetation.
21	Сем. Поползни	Sittidae	Nuthatches	-	-
59	Скалистый поползень	<i>Sitta neumayer tephronota</i>	Eastern Rock Nuthatch	settled	Adheres to the foot of rocky slopes.
22	Сем. Овсянковые	Emberizidae	Buntings	-	
60	Овсянка Стюарта	<i>Emberiza stewarti</i>	White-capped bunting	nestle	Adheres to rocky slopes with sparse shrubs.

Traffic Noise Assessment

№	Russian name	Latin names	English names	Nature of the stay	Remark
23	Сем. ткачиковые	Ploceidae	Weavers	-	-
61	Индийский воробей	<i>Passer domesticus</i>	House Sparrow	nestle, settled	Common numerous nesting bird. Breeds in ravines.
62	Полевой воробей	<i>Passer montanus</i>	Tree sparrow	settled	Common numerous sedentary bird. Breeds in ravines
24	Сем. скворцовые	Sturnidae	Starlings	-	-
63	Майна	<i>Acridotheres tristis</i>	Common [Indian] myna	settled	Numerous sedentary bird. Like the Indian sparrow, it occupies a nesting site of bee-eater in ravines of roads.
64	Розовый скворец	<i>Sturnus roseus</i>	Rose-coloured Starling	nestle	. Foothill nests and less often open spaces and watering places.
25	Сем. иволговые	Oriolidae	Oriolus	-	-
65	Иволга	<i>Oriolus oriolus</i>	European Golden Oriole	nestle	Widespread nesting bird gardens.
26	Сем. врановые	Corvidae	Crows	-	-
66	Сорока	<i>Pica pica</i>	Eurasian Magpie	settled	Widespread sedentary bird
67	Чёрная ворона	<i>Corvus corone</i>	Carrion crow	settled	It lives in groups of trees among fields, meadows and settlements. Nests on tall trees.
68	Ворон	<i>Corvus corax</i>	Raven	settled	Settles in rocky places. Nests on rocks, ravines and trees

Note: Ос. – settled, Гн. – nestle, Пр. – flight, Зим. – Winter. EN = endangered (species)

Annex 5 - MOM OF PUBLIC CONSULTATIONS

**Minutes of the Public Consultation
On
Environment, Social and LAR issues for
Dangara - Guliston road Section**

Date: November 17, 2021

Time: 10:00

Location: Jamoat Ismat Sharif

Participants:

1. Local Residents (in total 27 participants)
2. Representatives of Jamoats Ismat Sharif and raisi Mahalas of local villages
3. Representatives of PIURR, Sherali Temurzoda and Mr. Fathiddin Hurmatzoda
4. Consultants of Kocks Consult GmbH: Jurgen Mayer, Lela Shatirishvili and Fozil Fozilov

Agenda:

- Brief review of Road Network Sustainability Project and description of Dangara - Guliston road Section
- Project benefits, expected environmental impact and mitigation measures
- Discussion on expected social and LAR impacts, eligibility and principles of compensation as defined in the LARP in compliance with country legislation and ADB IR guidelines (SPS 2009); essence of cut-off date, Importance of participatory involvement of APs in DMS and all field surveys, brief description of valuation methodology exercised during determination of compensation unit rates.
- Grievance redress mechanism, GRC and rules for GRM application
- Question – Answer session

On November 17, 2021 the official Public Disclosure Meeting was held in the Meeting of Hall of Jamoat Ismat Sharif. At the beginning of presentations, the handout materials⁶³ were provided to each and every participant together with a bottle of hand sanitizer and facial mask.

Mr. Fathiddin Hurmatzoda, Lead Resettlement Specialist at PIU opened the meeting and briefed the audience on the objectives of pending road project and its importance for the local population, road users and future development of country economy.

Mr. Jürgen Meyer briefed the audience of the findings of the Initial Environmental Examination (IEE), technical parameters, road category and cross sections. He also explained the importance of environment assessment to identify the project's impact on physical, biological and human environment and develop suitable mitigation and monitoring measures to the technically best possible degree.

Mrs. Shatirishvili described major aspects and objectives of Land Acquisition and Resettlement Plan (LARP) prepared in compliance with ADB SPS 2009, country legislation and best international practice. She described the activities undertaken during LARP preparation and highlighted their importance to develop fair compensation package for each and every project affected household and legal or physical person.

⁶³ Project Information Pamphlet is provided in Annex 1 of this LARP.

Mr. Fozil Fozilov continued the presentation of social and LAR impacts and touched upon the method of calculation of compensation unit rates for affected structures, annual crops, perennials and replacement saplings; spoke about additional one-time allowance allocated for vulnerable and severely affected households, etc.

Additionally, he once again explained the importance of the **cut-off date, June 25, 2020** as defined for the given project; touched on the legislative instruments of country legislation as used in general practice during implementation of land acquisition and resettlement projects.

At the end of each presentation, reference was made to the Grievance Redress Mechanism and Grievance Redress Commission on the district and national levels operating during the entire project cycle and being available for any aggrieved person.

After the completion of presentation, the panel opened a question-answer session. In the closing phase, the PIU representative once again voiced that the MOT/ADB and PIU will put all efforts to ensure LARP implementation procedures were held smoothly through meaningful negotiations with APs. The official Public Meeting was then closed.

Question-Answer Session:

Question 1: Our dehkan land will be affected by road project. Is any cash compensation considered for renovation of land certificate?

Answer: Certainly, all project affected Dehkan farms in addition to compensation for affected assets will receive onetime allowance to cover the costs and pay for the fee required to renew land certificates.

Question 2: In case our residential house is affected by the proposed road project will we be provided with the architectural design drawings for a new house?

Answer: Road project design company is not responsible to provide this service. However, all owners of project affected houses shall apply to local rayon department of Architecture and Urban Planning and review and pick up most suitable design for a new house to meet the requirements established by the Department.

Question 3: How will we receive the cash compensation?

Answer: You will receive cash compensation at the Bank. New individual bank accounts will be opened for you so that each of you will be able to withdraw cash at any time and fully or partially at your preference.

Question 4: We, several households currently live in one residential house, potentially to be affected by the road project. What is going to happen if your house is to be demolished?

Answer: Each and every such case of project affected residential house will be reviewed and considered very carefully to specify the scope of project impact to assets and inhabitants. The decision will be made in agreement with the AHs to ensure livelihood standards of APs and AHs are not deteriorated as a result of pending road project.

The list of the participated in the public consultation with signatures is attached.

Мо иштироккунандагони машварати ҷамъиятӣ оид ба лоиҳаи “Устувори шабакаи роҳҳо”, татбики лоиҳаи “Барқарорсозӣ ва бехтаркунонии роҳи автомобилгарди Данғара-Гулистон” маълумотҳои муфидро дар бораи лоиҳаи болозикр, Сиёсати БОР оид ба кафолатҳои иҷтимоӣ, масъалаҳои экологӣ, ҳукуку уҳдадорихоӣ онҳо дар рафти татбики лоиҳа ва дигар меъёрҳои дар қонунгузории Ҷумҳурии Тоҷикистон дарҷгардида қорҳои фаҳмондадиҳӣ, Механизм ва Кумитаи баррасии арзу шикоятхоро гирифтём.

We are the following signatories, participated in the public consultation to get some useful information on the project "Sustainability of the road network", implementation of the project "Reconstruction and improvement of the Dangara-Guliston" road, ADB social security policy, on Environmental issues, rights and responsibilities in the implementation of the project and other norms required by the legislation of the Republic of Tajikistan, public information activities, the Mechanism and complaints review committee.

Н. Данғара 3.9. Намат Шариф

№	Ному Насаб\Name and Surname	Шахсият\Position	Имзо\Signature
1	Рахмонов А.	амбикор	
2	Рахмонов Б.	назарқарор	
3	Муратов А.	бекор	
4	Муратов М.	бекор	
5	Алиев Ҷ.С.	соҳибдор	
6	Сафаров Н.И.	назарқарор	
7	Зоилов М.З.	хушмушар	
8	Мирзаева	доктор	
9	Рахмонов Ҷ.	доктор	
10	Зоилов М.З.	доктор	
11	Зоилов М.З.	бекор	
12	Маматов М.	бекор	
13	Алиев Ҷ.С.	бекор	
14	Алиев Ҷ.С.	чирок	
15	Алиев Ҷ.С.	Б/Таб	
16	Алиев Ҷ.С.	бекор	
17	Алиев Ҷ.С.	бекор	
18	Алиев Ҷ.С.	назарқарор	
19	Алиев Ҷ.С.	назарқарор	
20	Алиев Ҷ.С.	назарқарор	
21	Алиев Ҷ.С.	назарқарор	
22	Алиев Ҷ.С.	назарқарор	
23	Алиев Ҷ.С.	назарқарор	
24	Алиев Ҷ.С.	назарқарор	
25	Алиев Ҷ.С.	назарқарор	
26	Алиев Ҷ.С.	назарқарор	
27	Алиев Ҷ.С.	назарқарор	

Photos of Public Consultation meeting in Jamoat Ismat Sharif



Minutes of the Public Consultation
On
Environment, Social and LAR issues for
Dangara - Guliston road Section

Date: November 17, 2021

Time: 14:00

Location: Jamoat Guliston

Participants:

1. Local Residents (in total 27 participants)
2. Representatives of Jamoat Guliston and raisi Mahalas of local villages
3. Representatives of PIURR, Sherali Temurzoda and Mr. Fathiddin Hurmatzoda
4. Consultants of Kocks Consult GmbH: Jurgen Mayer, Lela Shatirishvili and Fozil Fozilov

Agenda:

- Brief review of Road Network Sustainability Project and description of Dangara - Guliston road Section
- Project benefits, expected environmental impact and mitigation measures
- Discussion on expected social and LAR impacts, eligibility and principles of compensation as defined in the LARP in compliance with country legislation and ADB IR guidelines (SPS 2009); essence of cut-off date, Importance of participatory involvement of APs in DMS and all field surveys, brief description of valuation methodology exercised during determination of compensation unit rates.
- Grievance redress mechanism, GRC and rules for GRM application
- Question – Answer session

On November 17, 2021 the official Public Disclosure Meeting was held in the Meeting of Hall of Jamoat Ismat Sharif. At the beginning of presentations, the handout materials⁶⁴ were provided to each and every participant together with a bottle of hand sanitizer and facial mask.

Mr. Fathiddin Hurmatzoda, Lead Resettlement Specialist at PIU opened the meeting and briefed the audience on the objectives of pending road project and its importance for the local population, road users and future development of country economy.

Mr. Jürgen Meyer briefed the audience of the findings of the Initial Environmental Examination (IEE), technical parameters, road category and cross sections. He also explained the importance of environment assessment to identify the project's impact on physical, biological and human environment and develop suitable mitigation and monitoring measures to the technically best possible degree.

Mrs. Shatirishvili described major aspects and objectives of Land Acquisition and Resettlement Plan (LARP) prepared in compliance with ADB SPS 2009, country legislation and best international practice. She described

⁶⁴ Project Information Pamphlet is provided in Annex 1 of this LARP.

the activities undertaken during LARP preparation and highlighted their importance to develop fair compensation package for each and every project affected household and legal or physical person. Mr. Fozil Fozilov continued the presentation of social and LAR impacts and touched upon the method of calculation of compensation unit rates for affected structures, annual crops, perennials and replacement saplings; spoke about additional one-time allowance allocated for vulnerable and severely affected households, etc.

Additionally, he once again explained the importance of the **cut-off date, June 25, 2020** as defined for the given project; touched on the legislative instruments of country legislation as used in general practice during implementation of land acquisition and resettlement projects.

At the end of each presentation, reference was made to the Grievance Redress Mechanism and Grievance Redress Commission on the district and national levels operating during the entire project cycle and being available for any aggrieved person.

After the completion of presentation, the panel opened a question-answer session. In the closing phase, the PIU representative once again voiced that the MOT/ADB and PIU will put all efforts to ensure LARP implementation procedures were held smoothly through meaningful negotiations with APs. The official Public Meeting was then closed.

Question-Answer Session:

Question 1: Are there any mitigation measures considered to project affected perennials grown on state land, specifically for non-fruit bearing trees that will not be cash compensated to local residents?

Answer: Replacement Deciduous trees will be planted along the edges of new road as mitigation measures considered under IEE.

Question 2: In case we do not have legal documents on our residential house to be affected by road project will be still be cash compensated for project affected structure and be allowed to construct new house on remaining portion of our land parcel?

Answer: Any structure, residential, supplementary and/or commercial will be cash compensated at full replacement value to allow you to build a new structure of similar size and designation. In addition, onetime allowance will be issued to you to pay official fees and obtain required legal documents (land certificate, construction permit and technical passport) as well.

Question 3: We have a large land and planned to build another house for your married son. Now as a result of road project some portion of land may be taken, leaving us with not enough land to build another house. What can we do if that happens?

Answer: based on preliminary impact assessment we found out that in some locations we may revise the ROW. Keeping in mind all such points during the additional round of impact assessment each and every land parcel attached with residential dwellings will be closely examined. Your active participation in census, SES, title search and inventory of project affected structures, improvements and all assets is rather important to clearly identify the actual impact and define the most suitable and fair compensation and relevant entitlements and ensure your living conditions and livelihood is maintained at least to pre-project levels if not significantly improved.

Question 4: When will start the civil works?

Answer: Before commencement of any civil works the LARP will be prepared, approved and implemented and once all APs/AHs are fully cash compensated and the ROW vacated. The information on commencement of civil works will be notified to local residents and relevant road signs will be provided to ensure road safety of pedestrians and road users.

The list of the participated in the public consultation with signatures is attached.

Мо иштироккунандагони машварати ҷамъиятӣ оид ба лоиҳаи “Устувории шабакаи роҳҳо”, татбиқи лоиҳаи “Барқарорсозӣ ва бехтаркунонии роҳи автомобилгарди Данғара-Гулистон” маълумотҳои муфидро дар бораи лоиҳаи болозикр, Сиёсати БОР оид ба кафолатҳои иҷтимоӣ, масъалаҳои экологӣ, ҳуқуқи ухладорҳои онҳо дар рафти татбиқи лоиҳа ва дигар меъёрҳои дар конунгузории Ҷумҳурии Тоҷикистон дарҷгардида корҳои фаҳмондадихӣ, Механизм ва Кумитаи баррасии арзу шикоятхоро гирифтём.

We are the following signatories, participated in the public consultation to get some useful information on the project "Sustainability of the road network", implementation of the project "Reconstruction and improvement of the Dangara-Guliston" road, ADB social security policy, on Environmental issues, rights and responsibilities in the implementation of the project and other norms required by the legislation of the Republic of Tajikistan, public information activities, the Mechanism and complaints review committee.

Н. Восеъ, 3.10. Гулистон.

№	Ному Насаб\Name and Surname	Шахсият\Position	Имзо\Signature
1	Сайидмуҳаммад	Қоризафар	
2	Зоблатов Сухроб	Султон	
3	Шароҳимов	Зобризо	
4	Мирзошариф	Қоризафар	
5	Ҳаҷимов	Қоризафар	
6	Ҳаҷимов	Қоризафар	
7	Ҳаҷимов	Қоризафар	
8	Ҳаҷимов	Қоризафар	
9	Ҳаҷимов	Қоризафар	
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13	Ҳаҷимов	Қоризафар	
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25	Ҳаҷимов	Қоризафар	
26	Ҳаҷимов	Қоризафар	
27	Ҳаҷимов	Қоризафар	

Photos of Public Consultation meeting in Jamoat Guliston



Additional Public Consultations Conducted in 2023

Minutes of the Public Consultation

On

Environment, Social and LAR issues for

Dangara - Guliston road Section

Date: March 4, 2023

Time: 12:00

Location: Jamoat Ismat Sharif

Participants:

1. Local Residents (in total 7 participants)
2. Representatives of Jamoats Ismat Sharif and raisi mahalas of local villages
3. Representatives of PIURR, Shodikhon Nodirkhonov
4. Consultants of Kocks Consult GmbH: Lela Shatirishvili and Fozil Fozilov

Agenda:

- Brief review of Road Network Sustainability Project and description of Dangara - Guliston road Section
- Project benefits, expected environmental impact and mitigation measures
- Discussion on expected social and LAR impacts, eligibility and principles of compensation as defined in the LARP in compliance with country legislation and ADB IR guidelines (SPS 2009); essence of cut-off date, Importance of participatory involvement of APs in DMS and all field surveys, brief description of valuation methodology exercised during determination of compensation unit rates.
- Grievance redress mechanism, GRC and rules for GRM application

Question – Answer session

On March 4, 2023 the official Public Disclosure Meeting was held in the Meeting of Hall of Jamoat Ismat Sharif. At the beginning of presentations, the handout materials⁶³ were provided to each and every participant together with a bottle of hand sanitizer and facial mask.

Mr. Shodikhon Nodirkhonov, Lead Resettlement Specialist at PIURR opened the meeting and briefed the audience on the objectives of pending road project and its importance for the local population, road users and future development of country economy. He briefed the audience technical parameters of proposed road, road category and cross sections. He also discussed mitigation and monitoring measures to be exercised during civil works to address project environment and social impacts.

Mrs. Shatirishvili described major aspects and objectives of Land Acquisition and Resettlement Plan (LARP) prepared in compliance with ADB SPS 2009, country legislation and best international practice. She described the activities undertaken during LARP preparation and highlighted their importance to develop fair compensation package for each and every project affected household and legal or physical person.

Mr. Fozil Fozilov continued the presentation of social and LAR impacts and touched upon the method of calculation of compensation unit rates for affected structures, annual crops, perennials and replacement saplings; spoke about additional one-time allowance allocated for vulnerable and severely affected households, etc.

Additionally, he once again explained the importance of the **cut-off date, June 25, 2020 as defined for the entire project** and specifically for the given project as March 14, 2023 was defined as the cut-off date for the Dangara-Guliston road section LARP. He touched on the legislative instruments of country legislation as used in general practice during implementation of land acquisition and resettlement projects.

At the end of each presentation, reference was made to the Grievance Redress Mechanism and Grievance Redress Commission on the district and national levels operating during the entire project cycle and being available for any aggrieved person.

After the completion of presentation, the panel opened a question-answer session. Mrs. Lela Shatirishvili answered the questions of participants. In the closing phase, the PIU representative once again voiced that the MOT/ADB and PIURR will put all efforts to ensure LARP implementation procedures were held smoothly through meaningful negotiations with APs. The official Public Meeting was then closed.

Question-Answer Session:

Question 1: Who will be in charge calculation the compensation amount for affected structures?

Answer: Valuation Report will be prepared by the professional appraisers of the State Unitary Enterprise (SUE). During the valuation process the appraisers will adhere country legislation, International Valuation Standards and ADB guidelines to ensure that amount of cash compensation is calculated at full replacement value that will allow the AP built a new structure of similar size and designation. Besides, in compliance with ADB SPS 2009 guidelines all APs are eligible to collect salvaged materials from affected structures. Also, in addition to compensation for affected assets eligible AP will receive onetime allowance to cover the costs and fees to obtain construction permit and update land use certificate.

Question 2: What shall be do if the cowhouse is affected by the project?

Answer: Cash compensation calculated at full replacement cost will be issued to the cowhouse owner. Certainly, in agreement with the owner sufficient time will be allocated enough to build a new another cowhouse before road works commence.

Question 3: Shall we obtain construction permit to build a new structure?

Answer: You need to follow official procedures and rules. During LARP implementation PIURR representatives will provide you all needed technical assistance and advise you on required steps to obtain construction permit as need prior to commencement actual construction works on your land parcel.

Question 4. How will we receive the cash compensation if we do not have bank account?

Answer: PURR representative will assist you to open the bank account. You will receive cash compensation at the Bank. You will be able to withdraw cash at any time and fully or partially at your preference.

List of participants.

perennials and replacement saplings; spoke about additional one-time allowance allocated for vulnerable and severely affected households, etc.

Additionally, he once again explained the importance of the **cut-off date, June 25, 2020 as defined for the entire project** and specifically for the given project as March 14, 2023 was defined as the cut-off date for the Dangara-Guliston road section LARP. He touched on the legislative instruments of country legislation as used in general practice during implementation of land acquisition and resettlement projects.

At the end of each presentation, reference was made to the Grievance Redress Mechanism and Grievance Redress Commission on the district and national levels operating during the entire project cycle and being available for any aggrieved person.

After the completion of presentation, the panel opened a question-answer session. Mrs. Lela Shatirishvili answered the questions of participants. In the closing phase, the PIU representative once again voiced that the MOT/ADB and PIURR will put all efforts to ensure LARP implementation procedures were held smoothly through meaningful negotiations with APs. The official Public Meeting was then closed.

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Answer: Valuation Report will be prepared by the professional appraisers of the State Unitary Enterprise (SUE). During the valuation process the appraisers will adhere country legislation, International Valuation Standards and ADB guidelines to ensure that amount of cash compensation is calculated at full replacement value that will allow the AP built a new structure of similar size and designation. Besides, in compliance with ADB SPS 2009 guidelines all APs are eligible to collect salvaged materials from affected structures. Also, in addition to compensation for affected assets eligible AP will receive onetime allowance to cover the costs and fees to obtain construction permit and update land use certificate.

Question 2: What shall be do if the cowhouse is affected by the project?

Answer: Cash compensation calculated at full replacement cost will be issued to the cowhouse owner. Certainly, in agreement with the owner sufficient time will be allocated enough to build a new another cowhouse before road works commence.

Question 3: Shall we obtain construction permit to build a new structure?

Answer: You need to follow official procedures and rules. During LARP implementation PIURR representatives will provide you all needed technical assistance and advise you on required steps to obtain construction permit as need prior to commencement actual construction works on your land parcel.

Question 4. How will we receive the cash compensation if we do not have bank account?

Answer: PURR representative will assist you to open the bank account. You will receive cash compensation at the Bank. You will be able to withdraw cash at any time and fully or partially at your preference.

List of Paerticipants.

Dangara – Guliston Road Section

Traffic Noise Assessment

Rehabilitation Road Project Dangara - Guliston






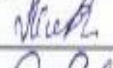





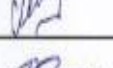





Проект реабилитации автодороги Дангара – Гулистон

District / Район Дангара

Jam'at / Джамлат Имом Шериф

Village / Деревня Шохбур

Date / Дата 04.03.2023

# №	FULL NAME / Ф.И.О	Telephone / Телефон	Signature / Подпись	Gender / Пол MF, M/J
1	Колов Ермекмур	903 007317		M
2	Доиров Саъзам	909 709050		M
3	Рахмонов Карим М.	905 03 04 20		M
4	Туллов Курбокаий	"		M
5	Келимбетов Бозорча	903236147		
6	Мухомматов Рухматов	902 720736		M
7	Сабиров Шерош	107 22 57 97		M
8	Забиров Ширдин	555539999		M
9	Сулхонидов Фаизиддин	900702476		
10	Нуганов Шавкатдиль	201636333		
11	Туллов Саъидназар	900 10 88 00		M
12	Туллов Шамолмурдин	903-81-22-11		M
13	Рахмонов Саъзам	90300023		M
14	Туллов Бегмурод	907.97.14.24.		M
15	Рахмонов Саъзам	912025710.		
16	Рахмонов Ермекмур			
17	Исломов Умар	988-74-74-53		

Traffic Noise Assessment

Date / Data 04.03.2023

[illegible]

Photos



Minutes of the Public Consultation

On

Environment, Social and LAR issues for

Dangara - Guliston road Section

Date: March 7, 2023

Time: 13:00

Location: Hospital in Jamoat Ismat Sharif

Participants:

1. Hospital personnel (in total 15 participants)
2. Consultant of Kocks Consult GmbH: Lela Shatirishvili

Agenda:

- Brief review of Road Network Sustainability Project and description of Dangara - Guliston road Section
- Project benefits, expected environmental impact and mitigation measures
- Discussion on expected social and LAR impacts, eligibility and principles of compensation as defined in the LARP in compliance with country legislation and ADB IR guidelines (SPS 2009); essence of cut-off date, Importance of participatory involvement of APs in DMS and all field surveys, brief description of valuation methodology exercised during determination of compensation unit rates.
- Grievance redress mechanism, GRC and rules for GRM application
- Question – Answer session

On March 7, 2023, Mrs. Lela Shatirishvili, the International Social Safeguards Consultant of Kocks met with the female personnel of the Jamoat Ismat Sharif Hospital. The Meeting was held during the lunch break in the lobby of the Hospital and attended by the doctors, nurses, technical staff of hospital. Several local women after the appointment with their doctor decided to stay and attend the meeting. Mrs. Shatirishvili discussed the objectives of road project, its benefits and importance for the local population, road users and future development of country economy. She talked on nature of road works and mitigation measures for monitoring social, environmental and HSE aspects of civil works. She described major aspects and objectives of Land Acquisition and Resettlement Plan (LARP) prepared in compliance with ADB SPS 2009, country legislation and best international practice. She described the activities undertaken during LARP preparation and highlighted their importance to develop fair compensation package for each AH and AE.

She explained the importance of the **cut-off date, June 25, 2020 as defined for the** entire project and specific that March 14, 2023 was defined as the cut-off date for the Dangara-Guliston road section LARP. She briefly explained the method of calculation of compensation unit rates for affected structures, annual crops, perennials and replacement saplings; spoke about additional one-time allowance allocated for vulnerable and severely affected households, etc.

Special attention was given to health and safety of young and elderly during the civil works, preventive measures for child labor and gender-based violence, influx of labor force during civil works and importance to follow health and safety instructions. She explained the importance of Grievance Redress Mechanism, purpose of local GRCs and rules for GRM application.

After the completion of presentation, the panel opened a question-answer session. Mrs. Lela Shatirishvili answered the questions of participants.

Question-Answer Session:

Question 1: When will the road works start?

Answer: Prior to commencement of any civil works the final LARP is to be approved, cash compensations fully paid and relevant compliance report approved by the donor.

Question 2: We hope provision of access to the Hospital and Polyclinic is considered during the road related works so that we are able to receive the patients and Emergency Health Care is provided as needed. Please advise.

Answer: Absolutely! Traffic management plan will be prepared and closely followed by Contractor to completely eliminate any change of road blockage and during civil works. Permanent uninterrupted access to hospital and all other public facilities will be ensured by the Contractor and Supervision Company during the entire project cycle.

List of Participants.

Rehabilitation Road Project Dangara - Guliston
Проект реабилитации автодороги Дангара – Гулистон

District / Район Делта Jamoat / Джамлат Менгеш Village / Деревня Менгеш Date / Дата 07.03.2023

#	FULL NAME / Ф.И.О	Telephone / Телефон	Signature / Подпись	Gender / Пол M/F, MDK
1	Мирзоева Шайхуза	907114042	<i>Shaykuzoda</i>	Ж
2	Абдуллоева Гулгуза	908132800	<i>Gulguza</i>	Ж
3	Жафариева Шириншо	934181365	<i>Shirinsho</i>	Ж
4	Зайналова Шайхуза	907036888	<i>Shaykuzoda</i>	Ж
5	Шайхоннор Саидмуратов	003113360	<i>Saidmuratov</i>	Ж
6	Жафарова Ибрагимовна	908896458	<i>Ibratimovna</i>	Ж
7	Чодировна Исраиловна	90460402	<i>Isratimovna</i>	Ж
8	Чодировна Саидмуратовна	933707881	<i>Saidmuratovna</i>	Ж
9	Шайхузова Саидна	908662744	<i>Saidna</i>	Ж
10	Гузариёва Шайхоннор	907318162	<i>Shaykhonnor</i>	Ж
11	Жафарова Шайхоннор	904448003	<i>Shaykhonnor</i>	Ж
12	Саидмуратова Шайхоннор	002024038	<i>Shaykhonnor</i>	Ж
13	Шайхоннорова Саидна	000404281	<i>Saidna</i>	Ж
14	Жафарова Шайхоннор	935426204	<i>Shaykhonnor</i>	Ж
15	Жафарова Шайхоннор	907578675	<i>Shaykhonnor</i>	Ж

Photo taken after Consultation Meeting conducted on March 7, 2023 with the Ismat Sharif Hospital personnel.



Minutes of the Public Consultation

On

Environment, Social and LAR issues for

Dangara - Guliston road Section

Date: April 15, 2023

Time: 13:00

Location: Meeting Hall of Public School No 35 in village Vose of Guliston rayon

Participants:

Participants:

1. Local Residents (in total 23 participants)
2. Representatives of Jamoat and raisi mahalas of village Vose
3. Representatives of PIURR, Shodikhon Nodirkhonov
4. Consultants of Kocks Consult GmbH, Fozil Fozilov

Agenda:

- Brief review of Road Network Sustainability Project and description of Dangara - Guliston road Section
- Project benefits, expected environmental impact and mitigation measures
- Discussion on expected social and LAR impacts, eligibility and principles of compensation as defined in the LARP in compliance with country legislation and ADB IR guidelines (SPS 2009); essence of cut-off date, Importance of participatory involvement of APs in DMS and all field surveys, brief description of valuation methodology exercised during determination of compensation unit rates.
- Grievance redress mechanism, GRC and rules for GRM application
- Question – Answer session

On April 15, 2023 the official Public Disclosure Meeting was held in the Meeting of Hall of Public School No 35 of village Vose. At the beginning of presentations, the handout materials⁶⁴ were provided to each and every participant together with a bottle of hand sanitizer and facial mask.

Mr. Shodikhon Nodirkhonov, Lead Resettlement Specialist at PIURR opened the meeting and briefed the audience on the objectives of pending road project and its importance for the local population, road users and future development of country economy. He briefed the audience technical parameters of

proposed road, road category and cross sections. He also discussed mitigation and monitoring measures to be exercised during civil works to address project environment and social impacts.

Mr. Fozil Fozilov described major aspects and objectives of Land Acquisition and Resettlement Plan (LARP) prepared in compliance with ADB SPS 2009, country legislation and best international practice. He described the activities undertaken during LARP preparation and highlighted their importance to develop fair compensation package for each and every project affected household and legal or physical person.

Mr. Fozil Fozilov discussed social and LAR impacts and touched upon the method of calculation of compensation unit rates for affected structures, annual crops, perennials and replacement saplings; spoke about additional one-time allowance allocated for vulnerable and severely affected households, etc.

Additionally, he once again explained the importance of the **cut-off date, June 25, 2020, as defined for the entire project** and specifically for the given project as March 14, 2023 was defined as the cut-off date for the Dangara-Guliston road section LARP. He touched on the legislative instruments of country legislation as used in general practice during implementation of land acquisition and resettlement projects.

At the end of each presentation, reference was made to the Grievance Redress Mechanism and Grievance Redress Commission on the district and national levels operating during the entire project cycle and being available for any aggrieved person.

After the completion of presentation, the panel opened a question-answer session. Mr. Nodirkhonov and Fozilov answered the questions of participants. In the closing phase, the PIU representative once again voiced that the MOT/ADB and PIURR will put all efforts to ensure LARP implementation procedures were held smoothly through meaningful negotiations with APs. The official Public Meeting was then closed.

Question-Answer Session:

Question 1: Is the underground passage considered near the bus station in village Bahoriston?

Answer: No, underground passage is not considered at km 35+000. However, nearby at km 35+100 will be organized pedestrian crossing.

Question 2: I have unfinished structure (foundation) and a toilet along the Dangara-Guliston road at km 34+000. Will road works affect this?

Answer: We have conducted thorough demarcation and recorded all affected structures. Your foundation and toilet are not located within the road project ROW and will not be affected.

Question 3: When is it expected to start road construction activities?

Answer: Civil works of Dangara-Guliston road section are to be launched in near future, tentatively by the end of 2023.

List of Participants.

Dangara – Guliston Road Section

Traffic Noise Assessment

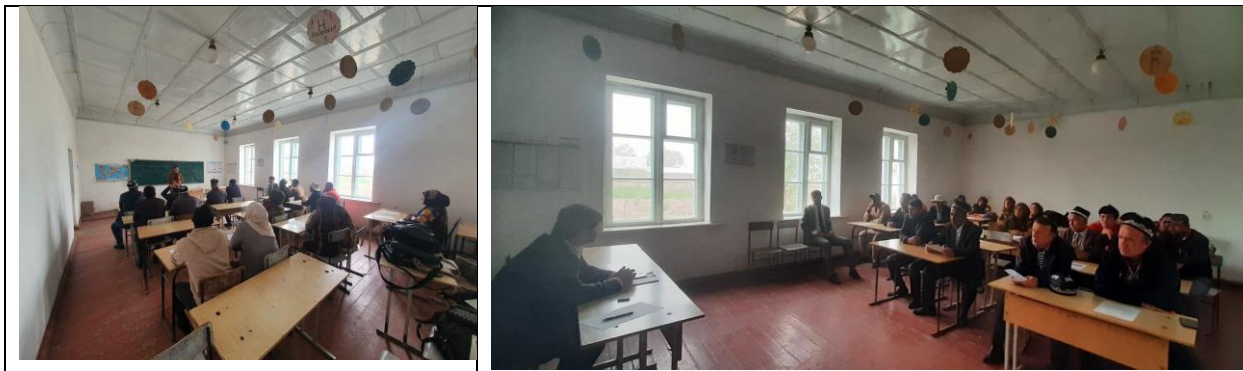
Rehabilitation Road Project Dangara - Guliston

Проект реабилитациии автодороги Дангара – Гулистон

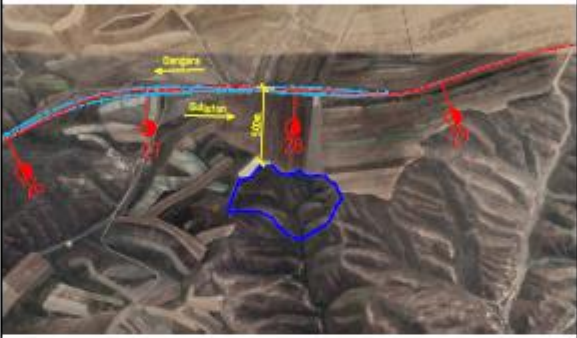


District / Район Босев Jamoat / Джамнат Гулистон Village / Деревня Бакорисгон Date / Дата 15.04.2023.

# №	FULL NAME / Ф.И.О	Telephone / Телефон	Signature / Подпись	Gender / Пол MF, MOK
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3	Амарзонов Ғалим Ҳ	555404242		M
4	Абдуев Исломид	9049884746		M
5	Ғулибонисов Абдулло	904838009		M
6	Шарилова Бибига	909334300		Ж
7	Мирзоева Салима			Ж
8	Уматова Сафарид	907323218		Ж
9	Алонов Гуланголи	985.51.71.31		Ж
10	Ғауизева Робия			Ж
11	Мирзоєрова Муниматисо	883833898		Ж
12	Мирзоєров Амаззод	904-63-73-15		M
13	Алонова Мастура	904-44-88-63		Ж
14	Махмудов Махмуд	884086008		M
15	Ғулиев Ғалим	556789191		M
16	Алонов Анвар	903042580		M
17	Махмудов Махмуд	904952295		M

Photos taken on April 15, 2023 during the public consultation meeting.



Annex 6 - IDENTIFIED AREAS FOR SURPLUS MATERIAL DISPOSAL

Approximate sections of the excavation soil dump along the Dangara - Guliston Road				
No. dump sites	Location, km	For section, km	Local map	Dump soil volume, m ³
1	28+000	26+000 to 27+000		300 000
2	40+500	40+000 to 42+000		666 000
3	42+500	42+000 to 45+000		950 000

Annex 7 - BASELINE MEASUREMENTS ON VIBRATION AND AIR QUALITY INCLUSIVE PM 10 AND PM 2.5

TAJ: Road Network Sustainability Project
(Dangara–Guliston Section)

Baseline monitoring report on vibration and quality of atmospheric air



Customer: Kocks Consult GmbH Stegemannstr. 32 – 38 56068 Koblenz, GERMANY.

Executor: Agency for Hydrometeorology of the Committee for Environmental Protection under
Government of the Republic of Tajikistan

Dushanbe, April 2024

Table of contents

1	List of abbreviations	4
2	Introduction	5
3	Vibration report	5

4	Air quality report	8
5	Conclusions and recommendations	12
6	List of used literature and regulatory documents	13
7	Appendix: Maps and Photos of Monitoring Points	14
	Laboratory Accreditation Certificate	29
6.		

Tables

Table 1. Data from instrumental measurements of vibration level	7
Table 2. Data from instrumental measurements of atmospheric air quality	9

List of Cards:

Map 1. Layout of monitoring points along the Dangara-Guliston highway	6
Map 2. Location of monitoring point No. 1. Km 0+000, “Aziz” dining room. Interchange of the Bokhtar-Dangara highway.	14
Map 3. Location of monitoring point No. 2.	15
Map 4. Location of monitoring point No. 3	17
Map 5. Location of monitoring point No. 4	18
Map 6. Layout of monitoring point No. 5	20
Map 7. Location of monitoring point No. 6	22
Map 8. Layout of monitoring point No. 7	24
Map 9. Location plan of monitoring point No. 8 in the village of Shahreter	26
Map 10. Layout of monitoring point No. 9	27

Photos

Photo1. Vibrometer “Assistant”	6
Photo 2. Mobile laboratory passport	10
Photo 3. Gas analyzers	11
Photo 4. Installation for measuring the climatic conditions of the region (wind speed, air pressure, humidity, wind direction, temperature)	11
Photo 5. Km 0+000, “Aziz” dining room. Intersection with the Bokhtar-Dangara highway.	14
Photo 6. Measurement of air quality parameters in the village I. Sharipov	15
Photo 7. Vibration level measurement near a residential building	15
Photo 8. Vibration level measurement at monitoring point No. 3	17
Photo 9. Deployed monitoring station near secondary school No. 8 19	18

Photo 10. Vibration level measurement near secondary school No. 8	19
Photo 11. Measurement of air quality parameters near a residential building at monitoring point No. 5	20
Photo 12. Measurement of vibration level at the fence of a residential building at monitoring point No. 5	21
Photo 13. Measurements of atmospheric air quality parameters near school No. 84	22
Photo 14. Measuring the vibration level in the courtyard of school No. 84	23
Photo 15. Measuring air quality near a residential building in the village of Bahoriston	24
Photo 16. Measuring the vibration level in the courtyard of a residential building	25
Photo 17. Measurement of atmospheric air parameters in the village of Shahreter	26
Photo 18. Preparing the station for on-site measurements	27
Photo 19. Vibration level measurement at monitoring point No. 9	28

1. Список аббревиатур Abkürzungsverzeichnis

CN&R	Construction norms and regulations
CH ₄	Hydrocarbons
CO	Carbon Monoxide
LS	Left side
MAC	Maximal allowable concentration
MPE	Maximum permissible emissions
MPC	Maximum permissible concentration
MPL	Maximum permissible level
NH ₃	Ammonia
NO	Nitrogen Monoxide
NO ₂	Nitrogen Dioxide
PM	Particulate Matter
RS	Right side
SO ₂	Sulfur Dioxide
SS	State standard
TSP	Total Suspended Solids
TSS	Total Suspended
pH	Humidity

hPa Pressure

a/d Average daily

max/s Maximum single

,

2. Introduction

The Republic of Tajikistan is actively working on constructing and reconstructing the main roads of the country, recognizing the importance of motor transport in the transportation of economic goods and passengers.

In accordance with the legislation of the Republic of Tajikistan and the requirements of International financial institutions, it is mandatory to evaluate the environmental effects of a project on the environment and come up with measures to either prevent or minimize these effects to a level that is acceptable. To determine the condition of environmental factors, an Initial Environmental Examination (IEE) is carried out, which includes basic environmental monitoring before commencing work.

This report covers the initial monitoring of air quality and vibration levels in the area of influence of the Project for the reconstruction and expansion of the Dangara-Guliston highway from two to four lanes.

The beginning of the Project Road (km 0+000), the junction of the Bokhtar-Dangara road with the Dushanbe-Dangara-Kulyab road in the south-eastern direction of the city of Dangara.

End of the Project Road located at (km 48+200) in Guliston village, Vose district.

3. Vibration report

Specialists of the Agency for Hydrometeorology of the Committee for Environmental Protection under the Government of the Republic of Tajikistan carried out instrumental measurements of vibration levels at 9 points on the Dangara-Guliston road (see Map 1). Each measurement point was carried out three times within forty minutes using an Assistant brand vibrometer (photo1). Table 1 shows the arithmetic mean vibration data.



Photo 1. Vibrometer "Assistant"

Map 1. Layout of monitoring points along the Dangara-Guliston highway

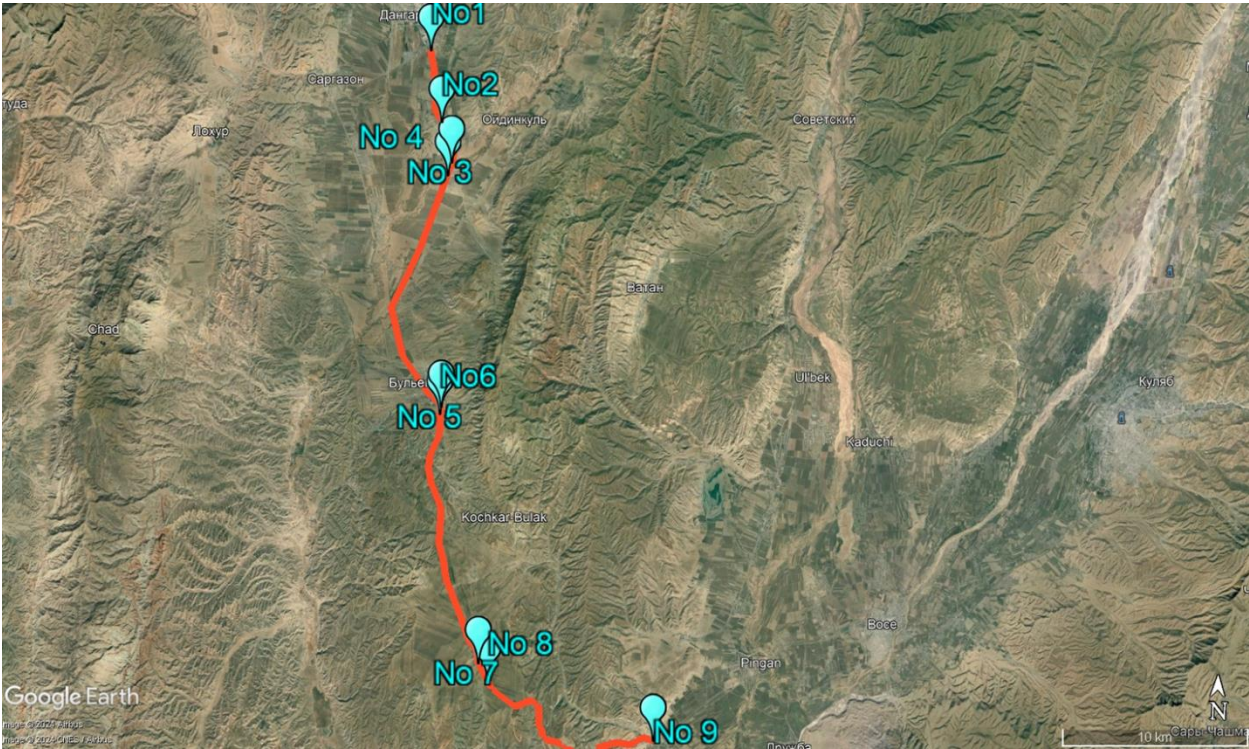


Table No. 1 Data of instrumental measurements of vibration level

№	Location.	Latitude/ longitude	Side of the road.	Distance from the edge of the road	Height.	Vib/mtr	MPL ⁶⁵	Weather conditions				
								Wind speed	Direction	Tempe- rature	Pressure	Relative humidity (PH)
				m	m	d/b	d/b	m/s	Dtg	C°	hPa	%
1	Dining room "Aziz" km 0+000	38°04'32.97" 069°20'35.77"	LS	20	625	45	72	2,9	343	11,4	713	74
2	Jamoat I. Sharipov km 4+000	38°02'21.94" 069°21'11.76"	RS	25	623	38	72	1,05	306	12,7	714	70
3	Danghara – Shobur km 6+300	38°01'18.75" 069°21'31.76"	RS	20	605	37	72	0,8	201	13,5	714	68
4	Danghara – Khurramzamin km 6+850	38°00'56.17" 069°21'25.23"	LS	50	623	38	72	1,5	326	14,3	715	65
5	Dangara – Bulyoni Poyon, km 20+000	38°00'55.94" 069°21'24.60"	LS	30	733	37	72	5,3	63	15,0	705	66
6	Durakhshon1 school No. 84 km 22+850	38°00'55.94" 069°21'24.60"	RS	40	728	36	72	5,1	229	15,0	706	63
7	Bakhoriston km 35- 300	37°46'40.87" 069°23'14.24"	RS	25	715	35	72	2,8	27	15,5	704	63
8	Shuhrater km 36+600	37°46'40.94" 069°23'13.91"	RS	15	741	35	72	2,0	31	14,4	701	67
9	Dangara – Guliston	37°46'40.94"	RS	20	462	35	72	2,2	88	16,1	725	61

⁶⁵ The maximal permissible level of vibration for the public and residential buildings is taken based on the SanPin 1.2.3685-21 Standard (Table 5.36) from the year 2021, which is applied in several CIS countries, including Tajikistan.

Dangara – Guliston Road Section

Traffic Noise Assessment

	km 48+200	069°23'13.91"										
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Table No. 1 shows that the vibration level in the area of influence of the Project does not exceed the permissible standards and ranges from 35 to 45 dB, which is below the permissible standards for vulnerable receptors (school, hospital, childcare facilities, residential areas, etc.).

It is anticipated that during the construction phase, provided the contractor strictly adheres to regulations and construction technology, the population of the villages along the Dangara-Guliston road will not experience discomfort and harmful impacts on structures and social facilities (houses, schools, catering, and service outlets).

4. Results of ambient air quality measurements

Ambient air quality in the area of influence of the Dangara-Guliston Project was monitored using a mobile laboratory manufactured by the Russian Federation in St. Petersburg (photo attached).

Table No. 2 shows the results of instrumental measurements of atmospheric air for 9 ingredients, as well as the climatic parameters of the region at nine points. Measurements at each point were carried out continuously for 40 minutes, with automatic recording of the results. The tables show automatically derived weighted average results for the entire measurement period.

Photos and location maps of the points are given in the Annex.

The results of measurements indicated that the content of all ingredients is well below the MAC. However, the readings indicate a relatively high level of PM10 and PM2.5 at points No. 1 and No. 9. The PM10 levels were recorded between 0.054 mg/m³ - 0.063 mg/m³, and the PM2.5 levels were between 0.029 mg/m³ - 0.049 mg/m³. It is worth noting that these points have more intense automobile traffic compared to other points, which may be the cause of the higher levels of PM10 and PM2.5.

Measurements were made under the following climatic conditions:

- air temperature 11.4-16.3 C0.
- air humidity 61-74%.
- pressure 701-715 hPa.
- wind speed 1.5-5.3 m/s.

Table No. 2. Data of instrumental measurements of atmospheric air quality

CO mg/m³	NO mg/m³	NO ₂ mg/m³	SO ₂	NH ₃	CH ₄	Latitude/ longitude	PM10 mg/m³	PM2,5 mg/m³	Wind speed	Direction	Temperatu re C°	Pressure	PH %	Height	Mag/mtr
MPC 3 a/d 5 max/s	MPC 0,06 a/d 0, max/s	MPC 0,04 a/d 0,085 max/s	MPC 0,05 a/d 0,5 max/s	MPC 0,05 a/d 0,2 max/s	MPC 50 max/s		MPC 0,06 a/d 0,3 max/s	MPC 0,035 a/d 0,16 max/s	m/s	Dtg					
1. Dangara – Dining room “Aziz” km 0+000															
0,55	0,047	0,063	0,005	0,014	0,12	38°04'32.97” 069°20'35.77”	0,054	0,029	2,9	343	11,4	713	74	625	7,40
2. Dangara – И Jamoat I. Sharipov 4+000km															
0,24	0,008	0,018	0	0,011	1,32	38°02'21.94” 069°21'11.76”	0,011	0,005	1,05	306	12,7	714	70	623	7,44
3. Dangara – Shobur 6+300km															
0,43	0,035	0,042	0	0,003	1,05	38°01'18.75” 069°21'31.76”	0,020	0,013	0,8	201	13,5	714	68	605	7,35
4. Dangara – Khurramzamin 6+850km															
0,37	0,010	0,027	0	0,011	1,27	38°00'56.17” 069°21'25.23”	0,022	0,017	1,5	326	14,3	715	65	623	7,31
5. Dangara – Bulyoni Poyon, km 20+000															
0,25	0,007	0,027	0,001	0,007	1,24	38°00'55.94” 069°21'24.60”	0,023	0,020	5,3	63	15,0	705	66	733	7,38
6. Dangara - Durakhshon1 school No. 84 km 22+850															
0,22	0	0,013	0	0,005	0	38°00'55.94” 069°21'24.60”	0,030	0,027	5,1	229	15,0	706	63	728	7,36

7. Dangara – Bakhoriston km 35-300															
0,17	0,011	0,016	0,001	0,015	1,33	37°46'40.87" 069°23'14.24"	0,029	0,026	2,8	27	15,5	704	63	715	7,36
8. Dangara – Shuhrater km 36+600															
0,35	0	0,012	0	0,014	1,11	37°46'40.94" 069°23'13.91"	0,033	0,029	2,0	31	14,4	701	67	741	7,33
9. Dangara – Guliston km 48+200															
0,69	0,014	0,021	0	0,001	1,24	37°46'40.94" 069°23'13.91"	0,063	0,049	2,2	88	16,1	725	61	462	7,31



Photo #2. Passport of the mobile laboratory

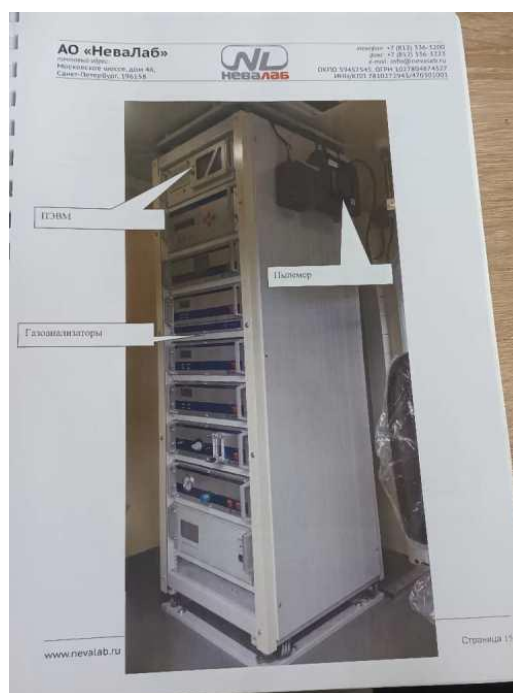


Photo 3. Gas analyzers



Photo 4. Installation for measuring climatic conditions of the region
(wind speed, air pressure, humidity, wind direction, temperature)

5. Conclusions and Recommendations

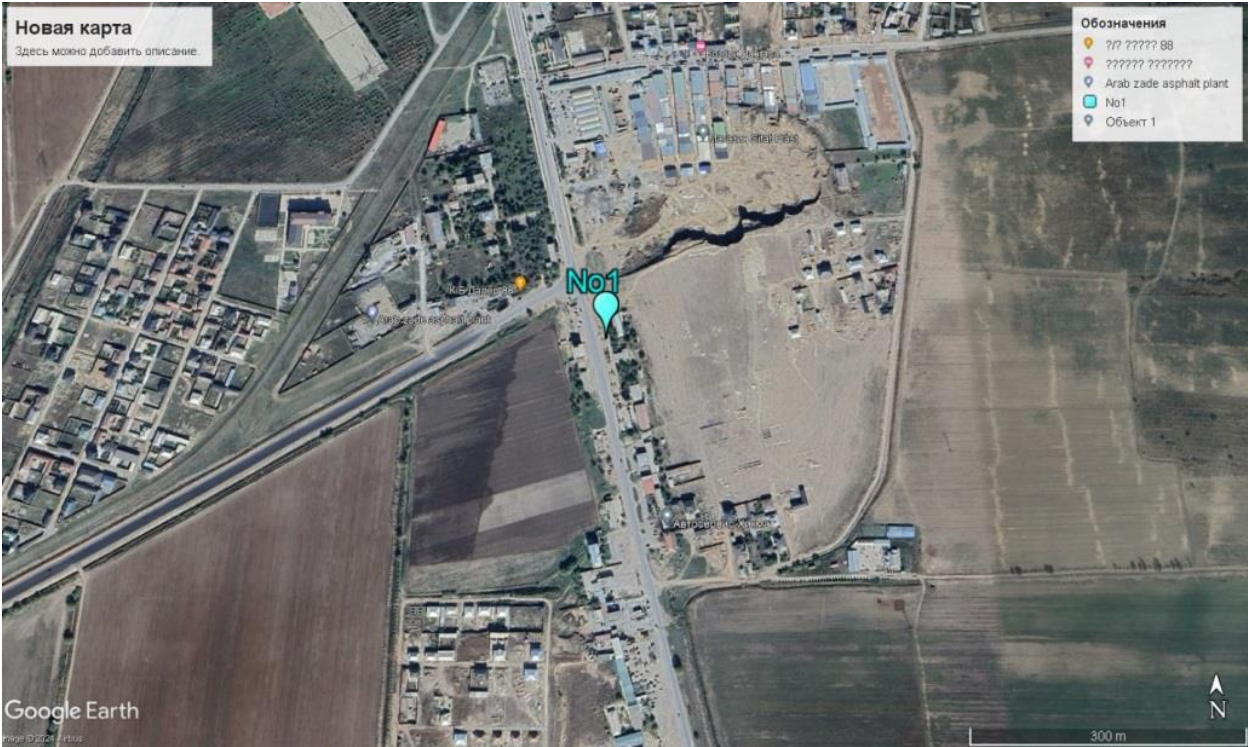
1. Table No. 1 indicates that the vibration levels present in the vicinity of the Project road do not exceed the permissible standards and are within the range of 35 to 45 dB. This range is well below the permissible standards for sensitive receptors such as schools, hospitals, childcare facilities, and residential areas
2. At the construction phase, with strict compliance with the norms and construction technology on the part of the Contractor, the population of the villages along the Dangara-Guliston road will not experience discomfort and the harmful impact on structures and social protection facilities will be minimal (houses, schools, catering and service points).
- 3 The chemical composition of the atmospheric air in the area of influence of the Project is stable. No exceedance of MAC has been recorded.
4. The content of particulate matter at all locations is recorded well below the MPC.
5. It should be noted that PM10 and PM2.5 were measured at high humidity, low temperature and low wind speed.
6. The maximum level of dustiness is expected in this area and Tajikistan as a whole in the summer and fall. For this reason, we consider it necessary to repeat the monitoring of PM10 and PM2.5 content in June-July 2024 before the commencement of construction work on the project road.

6. List of used literature and normative documents

1. Law of the Republic of Tajikistan "On Environmental Protection".
2. Law of the Republic of Tajikistan "On protection of atmospheric air".
3. Maximum permissible concentrations (MPC) of pollutants in the atmospheric air of populated areas (list 3086-84).
4. Maximum permissible concentrations (MPC) of pollutants in the atmospheric air of urban and rural settlements. GN 2.1.6.3492-17.
5. Maximum permissible concentrations (MPC) of pollutants in the air of the working zone.
6. Guiding document. Nature protection. Atmosphere. Requirements for accuracy of industrial emissions control. Methodological guidelines. RD 52704.59-85. M ., 1986.
7. Guidance document. Guidelines for the control of atmospheric pollution. RD 52.04.186-89. M ., 1991.
8. WHO Global Air Quality Recommendations. Regarding particulate matter (PM_{2.5} PM₁₀, ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide).
9. Sanitary rules and regulations. SanPiN 1.2.3685-21. Hygienic norms and requirements to ensure safety and (or) harmlessness for humans of habitat factors.

7. Appendix: Maps and Photos of Monitoring Points

Monitoring Point No. 1. Km 0+000. Intersection with the Bokhtar-Dangara road

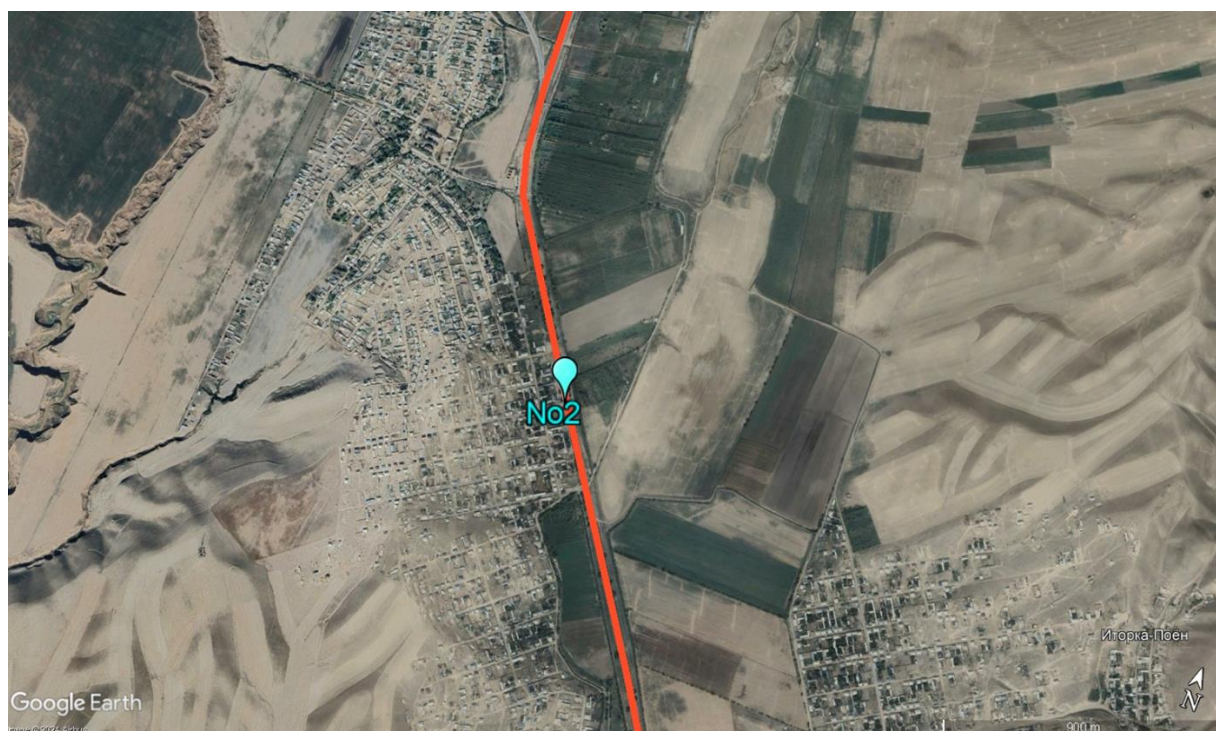


Map 2. Location of Monitoring Point 1st Km 0+000, “Aziz” dining room. Interchange of the Bokhtar-Dangara highway.



Photo 5. Km 0+000, “Aziz” dining room. Intersection with the Bokhtar-Dangara highway

Monitoring Point No. 2. Village I. Sharipov. Near a residential building.



Map 3. Location of monitoring point No. 2.

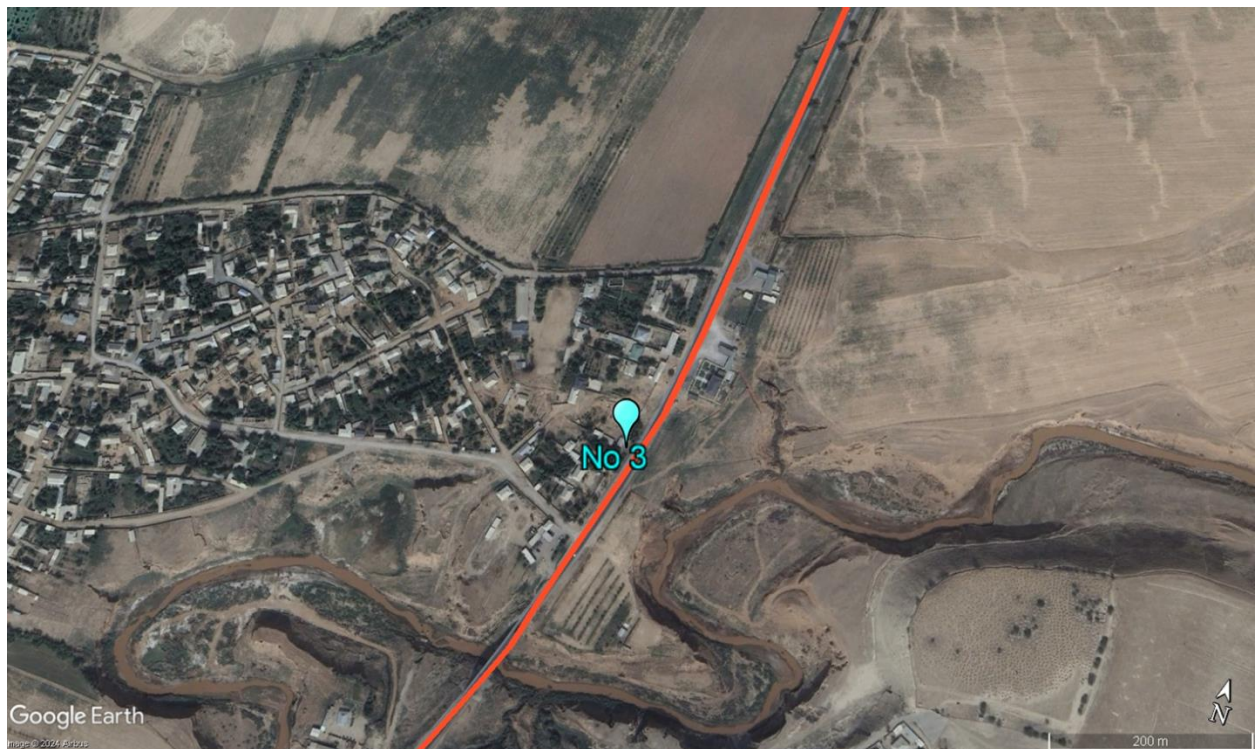


Photo 6. Measurement of air quality parameters in the village I. Sharipov



Photo 7. Vibration level measurement near a residential building

Monitoring Point No. 3. Khurramzamin village, near residential buildings



Map 4. Location of monitoring point 3

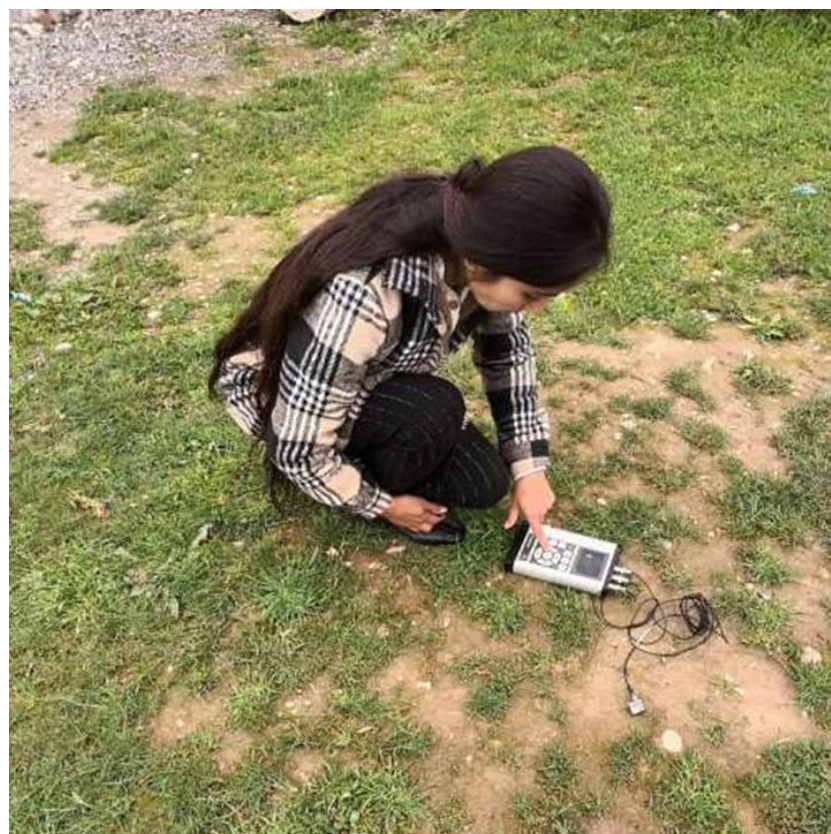
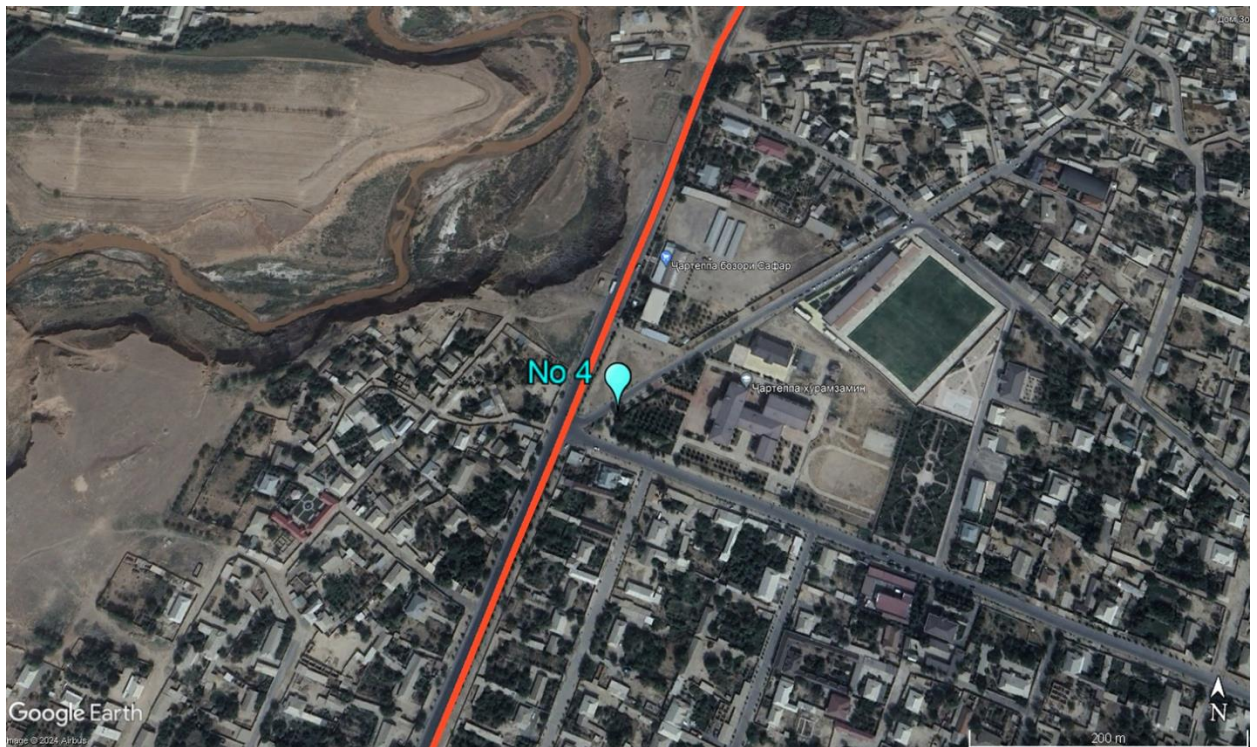


Photo 8. Vibration level measurement at monitoring point No. 3

Monitoring Point No. 4. Khurramzamin village near school No. 8



Map 5. Location of Monitoring Point No. 4



Photo 9. Deployed monitoring station near secondary school No. 8



Photo 10. Vibration level measurement near secondary school No. 8

Monitoring point No. 5 (Residential buildings in the village of Bulyoni Poyon)



Map 6. Layout of Monitoring Point No. 5



Photo 11. Measurement of air quality parameters near a residential building at monitoring point No. 5



Photo 12. Measurement of vibration level at the fence of a residential building at monitoring point No. 5

Monitoring Point No. 6 (Bulyoni Poyon, School No. 84)



Map 7. Location of monitoring point No. 6



Photo 13. Measurements of air quality parameters near the school 84



Photo 14. Measuring the vibration level in the courtyard of school No. 84

Monitoring Point No. 7 (Bakhoriston village)



Map 8. Location plan of Monitoring Point No. 7



Photo 15. Measuring air quality near a residential building in the village of Bahoriston



Photo 16. Measuring the vibration level in the courtyard of a residential building

Monitoring point No. 8 (Shukhrater village, 300 m from the traffic police post).



Map 9. Layout of monitoring point No. 8 in the village of Shahreter



Photo 17. Measurement of atmospheric air parameters in the village of Shahreter

Monitoring Point No. 9. Market square at the end of the project road (At the intersection with the Guliston-Farkhor road).



Map 10. Layout of monitoring point No. 9



Photo 18. Preparing the station for on-site measurements



Photo 19. Vibration level measurement at monitoring point No. 9

Laboratory Accreditation Certificate

7

№ 000877


СИСТЕМАИ МИЛЛИИ АККРЕДИТАТСИЯИ
ҶУМҲУРИИ ТОҶИКИСТОН
МУАССИСАИ ДАВЛАТИИ
«МАРКАЗИ МИЛЛӢ ОИД БА АККРЕДИТАТСИЯ»
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АТТЕСТАТИ
АККРЕДИТАТСИЯИ ОЗМОИШҶОҲ

Дар феҳристи давлатияи системаи миллии
аккредитатсияи Ҷумҳурии Тоҷикистон

аз «31» январӣ соли 2023

№ TJ 762. 37100. 02.006- 2023
ба қайд гирифта шудааст.

то «31» январӣ соли 2025 эътибор дорад.

Аттестати мазкур тасдиқ мекунад, ки Санҷишгоҳи мониторинги инфосшавии
атмосферӣ, обҳои рӯизаминӣ ва нурафкании «Раёсати мониторинги муҳити зисти
Агентии обухавошиносӣ»


номгуи озмоишгоҳи таҳҳисӣ (марказ)

шаҳри Душанбе, кӯчаи Гафуров 373
суроға

дар Системаи миллии аккредитатсияи Ҷумҳурии Тоҷикистон мутобиқи талаботи
стандартҳои байнидавлатии ГОСТ ИСО/МЭК 17025-2019 «Талаботи умумӣ ба
салоҳиятнокии озмоишгоҳҳои таҳҳисӣ ва калибровкакунонӣ» аккредитатсия карда
шудааст.

Замима: Доираи аккредитатсия дар ҳаҷми 2 -саҳифа.


Директор
Ч.М.


Ҷумазода Б. Ҳ.