Initial Environmental Examination

Project number: 49042-004
October 2016

TAJ: CAREC Corridors 2, 5, and 6 (Dushanbe–Kurgonteppa) Road Project

Prepared by the KOCKS Consult GmbH for the Ministry of Transport of the Republic of Tajikistan and the Asian Development Bank. This is a revised version of the draft originally posted in August 2016 available on https://www.adb.org/projects/documents/taj-carec-corridors-2-5-6-dushanbe-kurgonteppa-aug-2016-iee

ВАЗОРАТИ НАҚЛИЁТИ
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МИНИСТЕРСТВО ТРАНСПОРТА
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На №_____

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Transport Specialist
Transport and Communications Division
Central and West Asia Department
Asian Development Bank

Contract - TA-8945 TAJ: CAREC Corridors 2, 5, and 6 Road Project (Dushanbe–Kurgan-tube)

Subject: – Disclosing of the Initial Environmental Examination (IEE)

Dear Mr. Mr. Kamel Bouhmad,

The Ministry of Transport of the Republic of Tajikistan reviewed the revised version of the Initial Environmental Examination, which is submitted to the Asian Development Bank and informs that has no objection regarding its disclosure in the ADB website.

Sincerely,

Minister Sh.Ganjalzoda

INITIAL ENVIRONMENTAL EXAMINATION (IEE)

Project Number: 49042-004
October 2016

REPUBLIC of TAJIKISTAN

Central Asia Regional Economic Cooperation Corridors 2, 5, and 6 (Dushanbe – Kurgonteppa) Road Project

Prepared by the KOCKS Consult GmbH for the Asian Development Bank and Ministry of Transport of the Republic of Tajikistan.

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ABBREVIATIONS

ADB	-	Asian Development Bank
AH	-	Asian Highway Standard
AIDS	-	Acquired immune deficiency syndrome
AP	-	Affected People
CAREC	-	Central Asia Regional Economic Cooperation
CS	-	Construction Supervision
CEP	-	Committee for Environmental Protection under the Government of Tajikistan
EA		Executive Agency
EMP	-	Environmental Management Plan
FS	-	Feasibility Study
GAI		Road Traffic Police
GHG		Green House Gas
GoT	-	Government of Tajikistan
HIV	-	Human Immune Deficiency Virus
IEE	-	Initial Environmental Examination
IMF		International Monetary Fund
IPPC		Intergovernmental Panel on Climate Change
KM	-	Kilometer
LAR	-	Land Acquisition and Resettlement
LARP		Land Acquisition and Resettlement Plan
masl		meter above sea level
MoT	-	Ministry of Transport
NGO	-	Non-Governmental Organization
PAP	-	Project-Affected Person
PPTA	-	Project Preparatory Technical Assistance
RAP	-	Resettlement Action Plan
RoW	-	Right-of-Way
RP	-	Resettlement Plan
SA	-	Social Assessment
SC	-	Supervision Consultant
SES		socio economic survey
SPS		Safeguard Policy Statement
STD	-	Sexually Transmitted Disease
SSEMP	-	Site Specific Environmental Management Plan
TA	-	Technical Assistance
TOR	-	Terms of Reference
UNFCCC		United Nations Framework Convention on Climate Change
USD	-	United States Dollar
VAT	-	Value Added Tax
VOC	-	Vehicle Operating Cost

EXECUTIVE SUMMARY

1. The road forms part of CAREC (Central Asia Regional Economic Cooperation) Corridors 2, 5 and 6. The 82 km long road section from Dushanbe to Kurgonteppa was divided into two phases. The Phase 1 starts 3.382 km to the North of Dushanbe Gate and ends at village Chashmasoron. The Phase 2 covers the remaining road length until Kurgonteppa.

2. This report is the Initial Environmental Examination (IEE) for the project Phase 1 (33.2 km section). The construction works involves widening of the road from two to four lanes over most of the existing road, except for a 3.4km section immediately South of Dushanbe.

3. Although the IEE focuses on Phase 1, it also assesses Phase 2 as an associated facility with a lower level of a detail. The approach to include both phases in this IEE is based on the stipulations in the ADB's Safeguard Policy Statement (SPS).

4. IEE is required for category B Projects in order to warrant compliance of the Project with the ADB Safeguard Policy Statement (June 2009). As such the IEE provides a road map to the environmental measures needed to prevent and/or mitigate negative environmental effects associated with the development project. The IEE also provides a detailed description of the direct and indirect environmental effects associated with the Project during key periods of work, namely the design, pre-construction, construction and operational phase.

5. The project area is located in a hilly terrain ranging in altitude from 400 to 1000 m. Regarding its surface morphology it can be divided from North to South into a rolling section (approximately 15 km), a mountainous section (approximately 13 km) and a flat section (54 km).

6. There are no specially protected natural areas (PAs) in the immediate vicinity of the project area. One strictly protected area – Tigrovaya Balka Natural Reserve is located at the distance of 45 km to the north of Kurgonteppa. The right-of-way of the project road sections in terms of natural zoning runs through two neighboring natural provinces: Hissar (from Dushanbe to pass Fahrobad) and Vakhsh (from pass Fahrobad to Kurgonteppa).

7. Phase 1 of the Project road crosses the Kofarnigon River with its associated floodplain. Additional significant structures are the tree rows that are stretching over many parts of the Project road. Among the planted species are pines and cypresses. Where drainage or irrigation channels are running parallel to the Project road, deciduous trees such as elms, planes, poplars and willows dominate.

8. The land use alongside the Project road can be divided into three broad main categories comprising urban environment and settlements, agricultural land, and grassland (steppe), which for most of its part is used as pasture land. Most prominent agricultural crops are apples, grapes, cherries, apricots, pistachio and cotton. The land under cultivation is irrigated.

9. Based on the conducted impact analysis, the environmental impacts of the Dushanbe – Kurgonteppa road rehabilitation are evaluated as site specific. Typically, projects upgrading road to four lanes with separation cause split communities, and create obstacles for farmers and villagers in accessing their fields, etc. However, proper design and other mitigation measures will avoid or substantially minimize those impacts while improving road safety.

10. After Project implementation, during operational stage, 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 classified as B for environmental impacts, in line with the ADB SPS (2009).

11. An Environmental Management Plan (EMP) and Monitoring Programme have been elaborated as part of the IEE. The EMP considers the whole project cycle, namely the design-construction-, and operational- phase of the Project.

INTRODUCTION

A. Project Background and Purpose of the Report

12. The project will support the government's program to progressively improve the road by (i) expanding its width from two to four lanes, to address the impending capacity constraints; (ii) improving its surface condition by structural overlays of the existing pavement and construction of new pavements, to address the condition constraints; and (iii) providing well-designed safety facilities to address the existing road safety deficiencies. The project will also serve to take stock, draw lessons and analyze the institutional gaps on road safety and road asset management with the view to incrementally strengthening MOT's capacities on these aspects. This approach will support a policy dialogue that will run parallel with the progressive improvement of the road and will be closely coordinated with other development partners active in the transport sector.

13. The 82 km long road section was divided into two phases according to priority. The first phase covers approximately 33.2 km of road section from Dushanbe to the south. The end point of this first phase is located at village Chashmasoron. The second phase than covers the remaining road section until Kurgonteppa.

14. ADB contracted the Kocks Consult GmbH; Germany in cooperation with State Unitary Enterprise "Research, Design and Survey Institute" Tajikistan in December 2015 as a consultant for the PPTA and consequently for preparation of all documents which are required according to the ToR.

15. This is the Initial Environmental Examination (IEE) report. The IEE is required for category B Projects in order to warrant compliance of the Project with the ADB Safeguard Policy Statement (June 2009). As such the IEE provides a road map to the environmental measures needed to prevent and/or mitigate negative environmental effects associated with the development project. The IEE also provides a detailed description of the direct and indirect environmental effects associated with the Project during key periods of work, namely the design, pre-construction, construction and operational phases.

16. In detail the IEE (i) identifies and analyzes all significant impacts; (ii) describes their extent, duration and severity; (iii) formulates the required mitigation and monitoring measures and presents it all in the form of an Environmental Management Plan (EMP) and Monitoring Programme.

17. This IEE comprehensively covers the Phase 1 of the Project Road. The Phase 2 is covered as an associated facility (with lesser details). The IEE for the Phase 2 will be prepared based on this IEE. The approach to include both phases in this IEE is based on the stipulations in the Safeguard Policy Statement (SPS) of ADB. Following appendix 1 Phase 2 needs to be interpreted as an associated facility to Phase 1 and there will be cumulative impacts from future development of the Project. Therefore the scope of this IEE was defined as environmental assessment of Phase 1, and assessment of cumulative, and induced impacts of the whole road (Phases 1 and 2).

18. Work on the IEE started in March 2016. In the following background information on the Republic of Tajikistan, the Project and the environmental baseline conditions within the Project's area of influence are given.

19. The Republic of Tajikistan (herein referred to as 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 China, the Kyrgyz Republic, Uzbekistan and Afghanistan. The population of Tajikistan has reached 8,161.0 thousand people in 2013. Population density is 57.2 persons / km².

20. Dushanbe, the capital of Tajikistan, is the country's political and economic hub with a population of 775,800 in 2013 which is about 9.5% share of the whole Tajikistan. Population density in Dushanbe is high and shows 7,758.0 persons / km².

21. Kurgonteppa, the southern endpoint of the Project road, is one of the largest cities in the province of Khatlon. The province borders with Afghanistan in the South and is susceptible to the influence of the current conditions in Afghanistan. It also has a high poverty rate.

22. The Project road forms the northern part of the Dushanbe-Nihzny Pyani road which by connecting Dushanbe and the province of Khatlon to Afghanistan, is one of the most significant international transport corridors in the country. Particularly since the opening of the Nihzny Pyani Bridge at the border with Afghanistan traffic volumes on the Project road have considerably increased and contributed much to its current state of deterioration of pavement conditions.

23. Taking the above described aspects of the Dushanbe to Kurgonteppa road together it becomes obvious that its rehabilitation/reconstruction is of urgent need.

24. The Project alignment is expected to follow the existing road alignment, with the possible exception of limited realignments to improve geometric characteristics, elimination of safety hazards and to avoid areas subject to severe soil erosion or unstable slopes. Based on the results of the conducted economic and traffic analysis it was decided that the road shall be designed to cater for 4 lanes over its whole length.

25. The existing cross section allows four lanes only within the initial 3.882 km from starting point to Dushanbe gate. The rest of the existing RoW complies with 2 lanes only and widening of the RoW and the road's cross section is therefore required over nearly the whole Project length.

26. There are no bypass options in Phase 1 therefore none are given in this IEE report.

27. The benefit of the proposed project will be improved connectivity and access to markets. The outcome of the project will be efficient movement of freight and passenger traffic along the Dushanbe – Kurgonteppa road. After implementation of both phases the project outputs will be: (i) 82 km of reconstructed road from Dushanbe to Kurgonteppa, (ii) strengthened road asset management system, and (iii) improved road safety.

B. Study Area and Project Categorization

28. For purposes of establishing the environmental conditions, the overview of regional data is followed by the description at the project level if data is available. For purposes of the impact assessment it needs to be distinguished in between the core impact area and the wider zone of influence.

29. The 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. A detailed description of the impacts is given in the chapter on impacts and mitigation measures. An envelope of 200 meters wide on each side of the project road over its entire length is identified as the core impact area. The road sections where sensitive receptors are present, such as schools, hospitals or other places where people congregate are given particular attention so that ample mitigation is formulated. In phase 1 of the Project no school, kindergarten, mosque or hospital are located closer than 50 m to the future Project corridor's edge. For road sections that cross rivers, the impact assessment is 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.

30. 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.

31. The magnitude of environmental impacts of the Dushanbe – Kurgonteppa road rehabilitation is evaluated as site specific. Typically projects upgrading road to Category 1 road with separation cause split communities, and 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.

32. After Project implementation, during operational stage, 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 was classified as environmentally **category B**. This classification is in line with the 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."

C. Methodology

33. The project's environmental and social assessment needs to comply with both the legal requirements of Tajikistan and the ADB safeguard policies. Consequently, the methodology used for the preparation of this IEE report is based on the ADB Safeguard Policy Statement (2009) and the existing Tajikistan's environmental and social legislation and permitting procedure.

34. Although this IEE focuses on Phase 1, it also assesses Phase 2 as an associated facility with a lower level of a detail. The approach to include both phases in this IEE is based on the stipulations in the ADB's Safeguard Policy Statement (SPS). Following Appendix 1 Phase 2 needs to be interpreted as an associated facility to Phase 1 and there will be cumulative impacts from future development of the Project. Therefore the scope of this IEE was defined as a

detailed environmental assessment of Phase 1, and assessment of cumulative, and induced impacts of the whole road (Phases 1 and 2).

35. The Project area was visited for surveying of baseline data many times by the international and national consultants during the time period from March to May 2016. In addition, consultation meetings were conducted on the basis of Jamoats for all the 19 villages potentially affected by the Project. The purpose of the consultation was to inform people about the project, to receive their feedback and to incorporate their comments and concerns as far as technically feasible. Details on the conducted consultations are given in the LARP document. The consultations were on social and environmental issues. For purpose of obtaining environmental information from Project affected people and stakeholders a questionnaire was used as a guidance tool. Data and information obtained during the consultations have been included where appropriate. Additional background data and information was obtained from published and unpublished sources, e.g., on: climate, topography, geology and soils, natural resources flora and fauna, agriculture, and socio-economic data. After finalization of the draft IEE report an additional public consultation meeting which included a presentation of the results of the environmental and social assessment was held in the conference room of the Ministry of Transport (MoT) on July 12, 2016.

36. For establishing of baseline conditions noise measurements were conducted alongside the Dushanbe urban section North of Dushanbe gate and within settlements. The results of the measurements were compared with the standards of Tajikistan. During construction period there will be a continuous monitoring of noise and vibration, air and water quality as reflected in the Environmental Monitoring Programme, which is part of this IEE report.

I. LEGAL, POLICY AND ADMINISTRATIVE FRAMEWORK

37. 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 ADB Safeguard Policies that will be applied in the project.

A. Environmental Clearance Requirements

38. 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 road has been qualified as category "B".

1. Government Environmental Laws, Regulations and Guidelines

Legislation

39. 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.

40. 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 it was 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).

41. Other important environmental legal acts include:

- The Law on Hydro-meteorological Activity (No. 86 as of December 2, 2002);
- The Law on Production and Safe Handling of Pesticides (No. 1 as of April 22, 2003);
- The Law on Protection and Use of Flora (No. 31 as of May 17, 2004);
- The Law on Protection of the Population and Territories from Emergency Situations of Natural and Manmade Origin (No. 53 as of 15 July 2004);
- The Law on Biological Safety (No. 88 as of March 1, 2005);
- The Law on Animal World Conservation and Use (No. 354 as of January 5, 2008);
- The Law on Soils Conservation (No. 555 as of October 16, 2009);
- The Law on Subsoils (No. 983 as of July 20, 1994, wording as of RT Laws No. 120 as of November 4, 1995, No. 351 as of January 5, 2008, No. 471 as of December 31, 2008 and No. 663 as of December 29, 2010);

- The Law on Potable Water and Drinking Water Supply (No. 670 as of December 29, 2010);
- The Law on Environmental Education (No. 673 as of December 29, 2010);
- The Law on Environmental Information (No. 705 as of March 25, 2011);
- The Law on Environmental Monitoring (No. 707 as of March 25, 2011);
- The Law on Environmental Audit (No. 785 as of December 26, 2011);
- The Law on Specially Protected Natural Areas (No. 786 as of December 26, 2011);
- The Law on Use of Renewable Energy Sources (No. 857 as of January 12, 2012);
- The Law on Food Safety (No. 890 as of August 1, 2012);
- The Law on Atmospheric Air Protection (No. 915 as of December 28, 2012);
- The Law on Pastures (No. 951 as of March 19, 2013);
- The Law on Biological Management and Production (No. 1001 as of July 22, 2013);
- The Law on Radioactive Waste Management (No. 1002 as of July 22, 2013);
- The Law on Ensuring Sanitary and Epidemiologic Safety of Population (No. 49 as of December 8, 2003, wording as of RT Laws No. 441 as of October 6, 2008, No. 481 as of December 31, 2008, No. 793 as of December 26, 2011 and No. 1010 as of 22.07.2013);
- The Law on Energy Conservation and Efficiency (No. 1018 as of September 19, 2013);
- The Law on Fishing and Protection of Fishery Resources (No. 1021 as of September 19, 2013).
- The Law on Energy Saving (No. 524 as of February 6, 2002);
- The Law on Industrial and Domestic Waste (No. 44, as of May 10, 2002, wording of the Republic of Tajikistan Law No. 736 as of July 28, 2011); and
- The Law on Ensuring of Environmental Safety of the Road Transport (No. 1214 as of August 8, 2015).

International legal instruments

42. The Republic of 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).

Environmental Assessment

43. There are two laws in the country that stipulate all aspects of the EA: (a) Law on Environment Protection; and (b) Law on Ecological Expertise. The Chapter V, Articles 35-39 of the Law on Environment Protection (2011), introduces the concept of state ecological review (literally, state ecological expertise[1] – 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.

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

a. draft state programs, pre-planning, pre-project, and design documentation for economic development;
b. regional and sectoral development programs;
c. spatial and urban planning, development, and design;
d. environmental programs and projects;
e. construction and reconstruction of various types of facilities irrespective of their ownership;
f. draft environmental quality standards and other normative, technology, and methodological documentation that regulates economic activities;
g. existing enterprises and economic entities.

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

45. 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 EA 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.

46. An EIA is a component of the SEE, as set out in the 2011 Environmental Protection Law and in the 2012 Law on State Ecological Expertise, which comprises both the department within the Committee for Environmental and the process as well. Conducting the EIA is the responsibility of the project proponent. The State Ecological Review[2] - which comprises the process component only - for all investment projects is the responsibility of the GoT Committee for Environmental Protection (CEP) and its regional offices. Furthermore, according to the 2012 Law on State Ecological Expertise, 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.

47. According to the 2012 Law on Ecological Expertise, ecological expertise is intended to prevent negative impacts on the environment as a result of a proposed activity, forecast impacts from activities that are not considered as necessarily damaging to the environment and create databases on the state of the environment and knowledge about human impact on the environment.

48. This Law on Ecological Expertise and the Law on Environment Protection envisage two types of ecological expertise – State ecological expertise and public ecological expertise, which are not given equal importance. While State ecological expertise is a prerequisite for beginning any activity that may have an adverse environmental impact, public ecological expertise becomes binding only after its results have been approved by a State ecological expertise body.

49. The State Ecological Expertise is authorized to invite leading scientists and qualified outside specialists to participate in the review. Approval should be issued within 30 days, unless the project developer agrees to an extension, and remains valid for two years, if the decision is positive. For very complicated projects the term of consideration and approval can be extended till 60 days.

50. According to the Law on SEE the public ecological expertise of economic activities or other activities implementation of which can negatively impact the environment of population which live in relevant area can be carried out by any public organization and citizen. They have right to send the proposals to the responsible government bodies concerning environmental issues of implementation planned activities; to receive information on results of conducted state ecological expertise from relevant responsible bodies. The materials reflecting the public expertise delivered to the experts‘ commission should be taken into consideration under preparation of conclusion of state ecological expertise and decision making on realization of expertise object. The public ecological expertise is carried out under the state registration of

[2] State Ecological Review which is also commonly referred as State Environmental Review means the process only.

application of public organization. The registration can be done by local executive authorities (during 7 days) in place where the expertise activities are planned. The public organizations which are organizing this expertise, should inform the population of initiation of expertise and then on its results.

51. The legal and regulatory system for the EIAs also include:

- Procedure of Environmental Impact Assessment (adopted by the Resolution of the Government of the Republic of Tajikistan No. 509 as of 01.08.2014).
- Procedure to implement State Ecological Expertise (approved by the Resolution of the Government of the Republic of Tajikistan No. 697 as of December 3, 2012).
- Guidelines on the composition and order of development of content and structure of the documentation to be submitted for review (SEE), as well as coordination and approval of all projected budget or investment estimations, design drawings or documentation that must be developed in coordination with the SEE3, buildings and structures and EIA chapters, Strategic Environmental Assessment SEA and feasibility documents; and
- List of objects and types of activity for which preparation of documentation on Environment Impact Assessment is mandatory (adopted by the Resolution of the Government of the Republic of Tajikistan No. 253 as of June 3, 2013).

52. The elaborated existing normative legal base is intended for determination of legal basis for implementation of projects and their compliance with state requirements for environmental protection and mitigation of environmental impact.

53. In the Republic of Tajikistan, the organizations with most responsibility for environmental monitoring and management currently are the Committee for Environmental Protection (CEP) under the Government of the Republic of Tajikistan (GoT), the Sanitary Inspectorate of the Ministry of Health, the Inspectorate for Industrial Safety and the Mining Inspectorate. An environmental licensing system exists in relation to handling hazardous waste and mineral extraction. An environmental permitting system regulates the use of natural resources.

54. The Environmental Protection Law states that a SEE should be conducted by the CEP, which is designated as a duly authorized state environmental protection body. The CEP has a comprehensive mandate that includes policy formulation and inspection duties. The CEP has divisions at oblast (region), city and rayon (district) level, in the form of Departments of Environmental Protection (DEPs), within the Hukumat (local administration) at each city or rayon.

Public Participation

55. Article 12 of the Environment Protection Law 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 citizens‘ comments and suggestions.

[3] All projected budget or investment estimations, design drawings or documentation must be developed in coordination with the SEE.

Licenses

56. Licenses are legal instruments to regulate certain potentially hazardous activities where minimal qualifications and strict adherence to rules are required to ensure that they are carried out efficiently, safely and do not result in potentially very significant and irreparable damage to the environment and human health .In particular, licenses are required for handling hazardous waste; for activities in industrial safety, sources of ionizing radiation, production and handling of pesticides and other agrochemicals. They are issued by the relevant industry regulator (ministry or committee) or an entity to which it has delegated such right. Licensing is also used to ensure the most efficient and sustainable use of natural resources. For example, licenses are required for prospecting, collecting or extracting mineral resources (borrow areas), or for constructing underground facilities not related to mining.

Environmental Permits

57. Permits are meant to ensure the sustainable use of natural resources. There are two types of permits: (a) permits to use natural resources; and, (b) permits for emissions or discharges. The natural resources use permits allow their holders to take a certain number or amount of a particular natural resource within a defined territory and time period. They are issued both to individuals (e.g. to hunt a particular species of animal or harvest particular factories) and to organizations (e.g. permits to extract ground or surface water for a particular use). By law, permits are needed for any commercial use of any resource. The authority that issues the permit and the legislation (government resolution) that applies depend on the resource. Permits to discharge polluted matter are issued by the relevant inspectorate (e.g. previous State Water Inspectorate or State Air Inspectorate – now departments) of the local state environmental protection committees to industrial or agricultural enterprises and municipal utilities that release by-products into the environment. The permits allow releasing a certain amount of polluted matter (gases, liquids, solid waste) into the environment. The permits are normally granted for one year and indicate the maximum allowed concentration of the pollutants in the released matter, the maximum volume of the polluted matter and the pollutants allowed.

State Environmental Program 2009-2019

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

2. ADB Safeguards

59. As noted previously the Dushanbe to Kurgonteppa road has been classified as category “B” for Environmental Assessment. The categorization was carried out based on ADB's Safeguard Policy Statement (2009). Because the Project is environmentally categorized as B, an IEE is required. An initial step in determining a project’s environmental category is to prepare a Rapid Environmental Assessment (REA) screening checklist, taking into account the type, size, and location of the proposed project. A preliminary REA for the Dushanbe to Kurgonteppa

road had already been prepared in 2015 at the project's concept stage. Considering the new alignment considerations which among others included the new starting point (3.382 km North of Dushanbe gate) and the widening to 4 lanes over the whole Project length the REA was updated and resubmitted by the consultant to ADB on April 30. 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.

60. Public consultation meetings on social and environmental issues were carried out in May and June in the following villages: Dahanakkik, Obi-Shifo, Lohur and Chimteppa. Minutes were taken and are attached to this report.

61. The IEE report is to be submitted to the Committee for Environmental Protection under the Government of Tajikistan to obtain the SEE (State Ecological Expertise) for the Project.

B. Environmental Standards

62. 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 меъёрхои санитари) are sanitary rules and norms (standards).

63. Environmental quality standards in Tajikistan ensure both MPC (Tajiki: ПДК) and MPE (Tajiki: ПДВ). The maximum permissible concentration (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 maximum permissible (or allowable) emissions (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.

64. The Table 1 gives an overview of the National Standards and regulations that are applicable to the Project.

Tab. 1 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). 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
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

#	Title - National Standards - GOSTs
	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
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

65. 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 Tadjik system of environmental standards is well developed and for the purpose of the present Project it is in line with the requirements of IFIs. It was therefore decided to use the Tajik standards as the reference in the present Project.

Tab. 2 Environmental Standards for Emissions to the Atmosphere

	National Standards / Requirements	Adopted Project Standard			Rationale
Topic	**Tajikistan**	**IFC Environmental, Health, and Safety General Guidelines (or IFC PS)**	**IFC Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development**		
Emissions of Ozone Depleting Substances	No relevant numeric standard	No relevant numeric standard (*Although 'no new systems or processes should be installed using CFCs, halons, 1,1,1-trichloroethane, carbon tetrachloride, methyl bromide or HBFCs'*).	No relevant numeric standard.	Consistent with applicable international conventions apply the principle that the will be no utilisation of ozone depleting substances (halons, PCBs, CFCs, HCFCs) and IFC	Good practice
GHG emissions	No relevant numeric standard		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

Tab. 3 Environmental Standards for Ambient Air

	National Standards / Requirements Tajikistan standards[4],	**IFC/World Bank Guidelines / Standards**	**General IFC Environmental, Health, and Safety Guidelines (Wastewater and ambient air quality)**	**Adopted Project Standard (mg/m^3)/ 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_2O_5 0.002 Vinyl acetate 0.15 HCl 0.2 HF 0.005 Fe_2O_3 0.04 HNO_3 0.4 H_2SO_4 0.1 Xylol 0.2 Manganese and its oxides 0.001 Copper oxides 0.002	Where set, national air quality standards apply. If no national standards are set then apply WHO standards WHO guidelines, $\mu g/m^3$: $PM_{2.5}$ 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)	Emission concentrations as per General EHS Guidelines, and: H_2S: 5 mg/Nm^3	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_2O_5 0.002 Vinyl acetate 0.15 HCl 0.2 HF 0.005 Fe_2O_3 0.04 HNO_3 0.4 H_2SO_4 0.1 Xylol 0.2 Manganese and its oxides 0.001	Tajikstand and supplemented by WHO where necessary to achieve most comprehensive suite[5]

[4] 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
[5] The IFC cites WHO ambient air quality guidelines typically apply only in jurisdictions where there are no national standards in place.

	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_2S 0.008 Turpentine 1 Ethyl alcohol (ethanol) 5.0 Butyl alcohol (butanol) 0.1 Propane alcohol (propanol) 0.3 Methyl alcohol (methanol) 0.5 Styrene 0.003 Soot 0.05 CO 3.0 Phenol 0.01 Formaldehyde 0.003 Fluoride (HF, SiF4) 0/05 Freon (all brands) 10 Chromium trioxide 0.0015 Chlorine 0.03 ZnO 0.05 Ethylene oxide 0.03			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_2S 0.008 Turpentine 1 Ethyl alcohol (ethanol) 5.0 Butyl alcohol (butanol) 0.1 Propane alcohol (propanol) 0.3 Methyl alcohol (methanol) 0.5 Styrene 0.003 Soot 0.05 Phenol 0.01 Formaldehyde 0.003 Fluoride (HF, SiF4) 0/05 Freon (all brands) 10 Chromium trioxide 0.0015 Chlorine 0.03 ZnO 0.05 Ethylene oxide 0.03	

Tab. 4 Environmental Standards for Water Quality & Discharges to Water [6]

	National Standards / Requirements	**IFC/World Bank Guidelines / Standards**	**Adopted Project Standard**	**Rationale**
Topic	**Tajikistan**	**IFC Environmental, Health, and Safety General Guidelines**		
Discharge to surface water: **Effluent water**	List of MPC quality of water at surface water bodies (Requirements to water quality in fishery water bodies)[7] 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 Tital 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	Tajik MPC as most stringent standard supplemented by IFC where needed for comprehensive suite

[6] For drinking water see Tab. 5.
[7] 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 ..

	National Standards / Requirements	IFC/World Bank Guidelines / Standards	Adopted Project Standard	Rationale
Topic	**Tajikistan**	**IFC Environmental, Health, and Safety General Guidelines**		
			Calcium (Ca) 180 Silicon (SiO_3^{2-}) 1.0	
Water quality - freshwater	List of MPC above (mg/l)	No numeric standards	Tajik MPC for surface water bodies	Tajik as only relevant

Tab. 5 Drinking Water Standards

The project has set numeric standards for the following waters:

DRINKING WATER GENERAL ANALYSIS CONTENT AND LIMITS						
Parameter	**Units**	**Tajikistan Standard[5)]**	**WHO Standard**	**EU Standard[3]**	**Project Standard [8] (mg/l unless stated otherwise)**	
Physical Quality						
pH	---	6-9	6–9	6.5-9.5	TS	6-9
Total Dissolved Solids	mg/l	1000	---		TS	1000
Hardness	Mg-eqv/l	7.0	---		TS	7.0
Turbidity	EMF (formasine) or mg/l (caoline)	1.5	---	Acceptable to consumers and no abnormal change	TS	1.5
Inorganic Chemical Quality						
Aluminium (Al)	mg/l	0.5	---	0.2	EU	0.2
Ammonium ion (NH_4)	mg/l		---	0.5	EU	0.5
Antimony (Sb)	mg/l	0.05	0.02	0.005	EU	0.005
Arsenic (As total)	mg/l	0.05	0.01	0.01	EU	0.01
Barium (Ba)	mg/l		0.7	---	TS	0.7
Beryllium (Be)	mg/l		---	---	TS	
Boron (B)	mg/l		0.5	1.0	WHO	0.5
Cadmium (Cd)	mg/l	0.001	0.003	0.005	TS	0.001
Chloride ion (Cl^-)	mg/l	350	---	250	EU	250
Chlorine (Cl)	mg/l	0.3-0.5 (free) 0.8-1.2 (bounded)	5	---	TS	0.3-0.5 (free) 0.8-1.2 (bounded)
Chromium (Cr^{+6}) (Cr^{+3})	mg/l	0.05 0.5	0.05	0.05	TS	0.05 0.5

[8] Project standard represents most stringent for each parameter

DRINKING WATER GENERAL ANALYSIS CONTENT AND LIMITS						
Parameter	**Units**	**Tajikistan Standard[5)]**	**WHO Standard**	**EU Standard[3]**	**Project Standard [8] (mg/l unless stated otherwise)**	
Copper (Cu)	mg/l	1.0	2	2.0	TS	1.0
Cyanide (CN)	mg/l		0.07	0.05	EU	0.05
Fluoride ion (F^-)	mg/l		1.5	1.5	EU	1.5
Hydrogen Sulphide (H_2S)	mg/l		---	---	TS	
Iron (Fe)	mg/l	0.3	---	0.2	EU	0.2
Lead (Pb total)	mg/l	0.03	0.02	0.01	EU	0.01
Manganese (Mn)	mg/l		0.4	0.05	EU	0.05
Mercury (Hg)	mg/l		0.001	0.001	EU	0.001
Molybdenum (Mo)	mg/l		0.07	---	WHO	0.07
Nickel (Ni)	mg/l	0.1	0.02	0.02	EU	0.02
Nitrate ion (as NO_3^-)	mg/l	45	50	50	TS	45
Nitrite ion (as NO_2^-)	mg/l		3 or 0.2	---	TS	3.0
Phosphate ion (PO_4^{2+})	mg/l	3.5	---	---	TS	3.5
Selenium (Se)	mg/l		0.01	0.01	TS	0.01
Silicon (Si)	mg/l	10	----	----	TS	10
Silver (Ag)	mg/l		---	---	TS	0.05
Sodium (Na)	mg/l		---	200	TS	200
Sulphate ion (SO_4^{2+})	mg/l	500	---	250	EU	250
Strontium (Sr)	mg/l		---	---	TS	---
Uranium (U)	mg/l		0.015	---	WHO	0.015
Vinyl Chloride (C_2H_3Cl / H_2C)	mg/l		0.0003	0.0005	WHO	0.0003
Zinc (Zn)	mg/l	5.0	---	---		5.0
Other quality parameters						
Petrochemicals	mg/l	0.1		0.1-5	TS	0.1
Sufactants (anionic)	mg/l	0.5		----	TS	0.5
COD	mg/l	----		150-400	EU	150-400

DRINKING WATER GENERAL ANALYSIS CONTENT AND LIMITS						
Parameter	**Units**	**Tajikistan Standard[5)]**	**WHO Standard**	**EU Standard[3]**	**Project Standard [8] (mg/l unless stated otherwise)**	
Permanganate oxizability	mg/l	5		----	TS	5
Specific electrical conductivity	$2x10^{-3}$			----	TS	$2x10^{-3}$

Note:

1. This table shows upper limit values, unless indicated otherwise as a range or lower limit value.
2. This table does not include organic chemicals, detergents, pesticides or disinfection by-products. Refer to WHO Guidelines for Drinking Water Quality for Chemical Lists and Guideline Values, the most stringent of which will also form the project standard.
3. EU Council Directive 98/83/EC of 3rd November 1998
4. EU Standard for radioactivity expressed as Tritium 100 Bq/l with a total indicative dose of 0.1 mSv/year
5. SanPin 2.1.4.1074-01.
6. **) – for climatic region III

Tab. 6 Environmental Standards for Waste

Topic	Tajikistan Standards / Requirements	IFC Environmental, Health, and Safety General Guidelines	Adopted Project Standard	Rationale
Waste treatment and disposal (onshore)	No numeric standards stated in the source documents. All waste produced must be handled and disposed of in accordance with national law on waste of production and consumption.	No relevant numeric standard.	No relevant numeric standard.	All waste produced must be handled and disposed of in accordance with national law on waste of production and consumption.
Secondary containment of liquid wastes	No numeric standards stated in the source documents. No numeric standards stated in Tajik legislation.	Secondary containment (SC) is included wherever liquid wastes are stored in volumes greater than 220 litres. The available volume of SC should be at least 110% of the largest storage container, or 25% of the total storage capacity (whichever is greater).	No relevant numeric standard.	IFC Environmental, Health, and Safety General Guidelines Secondary containment (SC) is included wherever liquid wastes are stored in volumes greater than 220 litres. The available volume of SC should be at least 110% of the largest storage container, or 25% of the total storage capacity (whichever is greater).

Tab. 7 Environmental Standards for Noise Emissions

	National Standards / Requirements	International Guidelines / Standards	Adopted Project Standard	Rationale
Topic	**Tajikistan[9]**	**IFC Environmental, Health, and Safety General Guidelines**		
Night time noise limits for human protection	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): • Inside residential and public buildings: – 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: – Recreational areas immediately adjoining hospital buildings and health centres: 35 dB(A) – Areas immediately adjoining residential buildings, policlinics, 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)	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: Night time (22:00-07:00): 45 dB(A) Industrial, commercial: Night time (22:00-07:00): 70 dB(A)	Tajik standards apply with night time defined as 22:00 – 07:00 in line with IFC EHS General Guidelines. Exception 1: IFC standard will prevail from 22.00 to 23.00 Exception 2: areas adjoining hotels and dorms where IFC standard is more stringent 45 dB (A)	Most stringent and provides more comprehensive measurement criteria

[9] According to International Sanitary Norms adopted by CIS countries (SanPin 2.2.4/2.1.8.562-96)

	National Standards / Requirements	International Guidelines / Standards	Adopted Project Standard	Rationale
Topic	**Tajikistan[9]**	**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): • Inside residential and public buildings: – Hospital and sanatorium's wards, and operating rooms: 35 dB(A); – Consultation rooms of policlinics, 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: – Recreational areas immediately adjoining hospital buildings and health centres: 45 dB(A) – Areas immediately adjoining residential buildings, policlinics, dispensary, rest houses, homes for the elderly and disabled, kindergartens, schools and other educational institutions, libraries: 55 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)	Most stringent and provides more comprehensive measurement criteria

	National Standards / Requirements	International Guidelines / Standards	Adopted Project Standard	Rationale
Topic	**Tajikistan[9]**	**IFC Environmental, Health, and Safety General Guidelines**		
	– 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)			

Vibration Standards

In Tajikistan, there are no state standards for vibration. However vibration levels will be monitored during construction phase within settlements. Baseline levels will be established before construction starts.

III. DESCRIPTION OF THE PROJECT

A. Overview

66. CAREC 2020 will seek to improve industrial competitiveness through transport connectivity, and development of economic corridors. Developing the economic corridors can help diversify the region's industries and make them competitive through technology, logistics, and other business support services. The project road is part of CAREC transport corridors. The impact of the project will be enhanced regional integration and inclusive economic growth in Tajikistan.

67. The government has requested ADB assistance to improve portions of CAREC corridors 2, 5, and 6 by upgrading the 82 km Dushanbe–Kurgonteppa road, for which ADB has programmed two projects (Phase 1 and Phase 2) in 2016 and 2018 as presented in the Tajikistan country operations business plan, 2016–2018. The first Phase will focus on improving an approximately 33 km section of the road from Dushanbe to Chashmasoron, hereinafter referred to as the project road.

68. The outcome of the project will be improved efficiency and safer movement of goods and people on selected sections of the Dushanbe to Kurgonteppa road. The outputs of the project will be:

i. improved road conditions, facilities, and safety along and in the vicinity of the project road;
ii. strengthened institutional capacity of MOT regarding financial management, road safety, and road asset management; and
iii. completed procurement readiness for the next section of the road to be improved, from Chashmasoron to Kurgonteppa.

69. Output I is physical and will include 3 components:

a. About 33 km of road designed to a 100 km/h standard with an average international roughness index of less than 2 m/km

b. Adequate road safety feature installed and functional on the project road

c. At least 600 households in the vicinity of the project road connected to solar power backup solutions. The project will introduce clean energy technologies—such as solar street lighting and solar-based backup systems—to enhance power reliability and efficiency along the project road. This will contribute to improved living standards in the villages along the project road, and to reduced carbon dioxide emissions.

70. Conditions of the existing road can be described as follows. The main important damages and deficiencies of the existing Project road refer to the deteriorated pavement conditions and inadequate road markings and traffic signs. Guardrails on high embankments and alongside steep valleys in mountainous sections are lacking which is a serious safety issue. In addition drainage problems occur because of malfunctioning of the existing facilities. The JICA report dated November 2015 provides quantitative data on the existing road regarding pavement conditions, bridges, culverts and traffic safety facilities.

B. Type and Category of Project

71. The proposed Project, to which this IEE is addressed, will upgrade an approximately 33 kilometers road section between Dushanbe and Chashmasoron, improve facilities and road safety along this road, strengthen institutional capacities of the Ministry of Transport (MOT) and relevant project stakeholders, and complete advance procurement action for the next section of the road to be improved. The project is categorized as Category "B" for environment as it is described in the chapter "Introduction" under the head "Study Area and Project Categorization". Therefore an IEE was prepared for Phase 1 and Phase 2 as an associated facility.

C. Need for Project

72. The Dushanbe – Kurgonteppa road is the most important transport corridor from Dushanbe to the South and further to Afghanistan. Traffic, especially heavy traffic will significantly increase within the next decade. Considering the already described deficiencies of the Project road, especially with regard to traffic safety and by also considering the future increase of traffic the reconstruction of the Project road including its widening to four lanes is urgently needed.

D. Project's Costs

73. The project is estimated to cost $96.4 million as detailed below.

Project Investment Plan
($ million)

Item		Amount
A.	**Base Costs**	
	1. Civil works	73.3
	2. Equipment	1.9
	3. Land acquisition and resettlement	0.8
	4. Consulting services	4.7
	5. Incremental administrative expenses	0.5
	Subtotal (A)	**81.2**
B.	**Contingencies**[c]	**12.5**
C.	**Financing Charges During Implementation**[d]	**2.7**
	Total (A+B+C)	**96.4**

Source: ADB's estimates

E. Location

74. The Dushanbe – Kurgonteppa road starts in Dushanbe, 3.382 km North of Dushanbe gate. The road crosses the Kofarnigon River and runs south through the districts of Rudaki, Khuroson, A. Djami and Bukhtar. Before crossing the Vakhsh River the Project road bends to a southwestern direction until it reaches its endpoint in Kurgonteppa. The following map provides an overview.

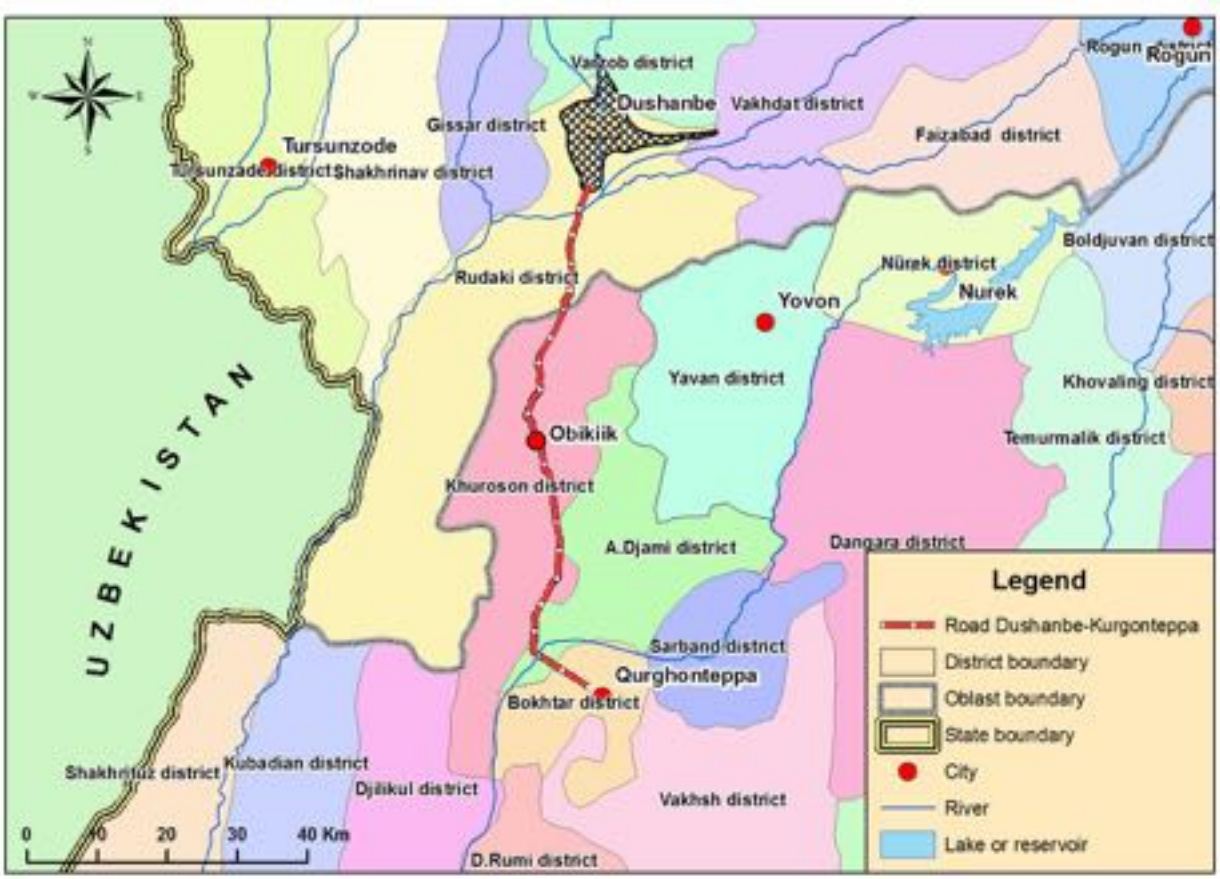


Fig. 1: The Project road

75. The road section is part of the Central Asia Regional Economic Cooperation (CAREC) transport corridor as can be seen in the following map.

Fig. 2: The Central Asia Regional Economic Cooperation Corridors

F. Size or Magnitude of Operation

76. The Phases 1 and 2 of the Project involves the reconstruction inclusive widening to 4 lanes of the 82 km road section from Dushanbe – Kurgonteppa. The construction works involves widening of the cross section from 2 to 4 lanes for most of the road. 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.

G. Traffic Volume

77. Traffic growth forecasts have been developed with regard to the existing traffic volumes on the project road, as revealed by the traffic surveys, and anticipated national and regional economic development.

78. The Phase 1 of project road was further divided into six homogeneous sub-sections in terms of traffic volume and composition between significant settlements, terrain type and junctions. For the purposes of preliminary geometric and structural design, and the evaluation of economic benefits, the volume and composition of current and future traffic needs to be known. To achieve the objectives of the traffic study following traffic surveys were used JICA report

"Data Collection Survey on a Road between Dushanbe and Kurgan-Tyube in Republic of Tajikistan, November 2015" confirmed with manual counting done by Kocks Consult in March 2016.

79. The six homogenous subsections in terms of traffic characteristics are shown in the following table.

Tab. 8 Observed Average Annual Daily Traffic

Section ID	*Name of the Section*	*AADT 2015*
1	Km 0 to Dushanbe Gate (km 3+382)	17,280
2	Dushanbe Gate to Yangikhayot (km 11+156)	10,547
3	Yangikhayot to start of mountainous section (km 13+571)	10,547
4	Mountainous section up to km 21+511	7,176
5	End of mountainous section to end of rolling section (km 27+511)	7,176
6	End of rolling section for 2.2km flat (km 33+200)	7,176

AADT = Annual Average Daily Traffic, ID = identification, km = kilometer
Source: JICA (2015) validated with additional manual traffic counts.

80. Future traffic was estimated for a 25 year period between 2016 and 2040. The growth rate for normal traffic was based on available GDP forecasts.

Tab. 9 Forecast AADT including generated Traffic

Section ID	**2020**	**2025**	**2030**	**2035**	**2040**
1	21,806	26,763	31,233	35,326	39,150
2–3	13,302	16,315	19,036	21,528	23,855
4–6	9,052	11,106	12,959	14,656	16,241

AADT = annual average daily traffic.
Source: JICA (2015) and Asian Development Bank estimates.

81. Based on the traffic forecasts, the Dushanbe – Kurgonteppa road section was designed as a Class 1 road according to Asian Highway Standards.

H. Proposed Schedule for Implementation

82. The schedule for the construction activities has not been decided at the time of preparation of this report.

I. Detail of the Project

83. The following details on the Project refer to the Phase 1 only, the 33.2 km from Dushanbe to the South. Details for the Phase 2 will only be developed after the FS for phase 1 is finalized.

84. The completed road will have two carriageways each with two traffic lanes 3.5m wide, separated by a median typically 3m wide in rural areas and narrower where the road passes through villages and difficult mountain terrain. This complies with the Tajikistan standard for roads of this category, and with Asian Highway standards. Since the existing two lane road will reach capacity within five years, the proposed two carriageway four lane configuration is appropriate. The project road alignment will follow the existing road alignment, because of terrain considerations and also to minimize land acquisition, with some adjustments to horizontal and vertical alignments to meet the required standards. The design speed will

typically be 100 km per hour, which is appropriate for a road of this class in the terrain through which it passes.

85. The completed road will have a flexible pavement with asphaltic concrete surfacing. The pavement structure has been designed using appropriate design methods based on the traffic projected to use the road over a 20-year period following project completion, from 2019 to 2038, assuming two asphaltic concrete overlays during this period to provide the additional strength required for traffic loading for the latter part of the road's service life. The road design takes into account the severe weather conditions that the road will experience, which range from high temperatures in summer to below freezing with heavy snowfalls in winter. Relevant disaster risks and climate change adaptation and mitigation measures have also been factored into the design (drainage structures, slope stability, and solar street lighting).

86. The road design has taken into account road safety to international standards. The design will be subjected to detailed road safety audits before construction commences, during construction and prior to final acceptance of the completed road. The road design also reflects consultations with communities living adjacent to the road, as a result of which several underpasses for people, livestock and agriculture, pedestrian crossings with appropriate warning devices, and other community-relevant facilities, will be provided.

87. There is one overpass for pedestrian crossing designed in Obi Shivo at km 6+500. This overpass also allows school children to safely cross the Project road.

88. Underpasses are designed at km 8+500, 19+630, 22+180 and 24+710. In addition, livestock crossings are designed at km 6+920, 31+810 and 33+730. The complete list of bridges, culverts, underpasses and livestock crossings is given in the below tables under the heading bridges and culverts.

J. Bridges and Culverts

89. The Phase 1 of the Project entails the reconstruction of 5 bridges, 8 Box Culverts and 41 Culverts. The most significant bridges are the following: at km 1+795 the road crosses an irrigation channel. The existing bridge will be rehabilitated (bridge number 1). At km 4+730 – 5+025 (Length 295 m) the Project crosses the Kafirnigan river (bridge number 2 + 2a). The existing bridge will be rehabilitated. In addition a new bridge will be constructed on the left side, parallel to the existing bridge. At km 6+694 the road crosses a channel within Obi Shivo (bridge number 2.1). The existing bridge culvert will be removed and a new bridge constructed. At km 9+825 the existing bridge will be rehabilitated (bridge number 3).

Tab. 10 List of Bridges, Underpasses, and Pedestrian Overpass

Road	Bridge No.	Location Km	Name of obstacles	Type of Work	Spans (m)	Type of Superstructure	Length (m) **	Width (m) **	Area (m²) **	Note
Dushanbe – Kurgonteppa Road Phase I	B-1	1+795	Channel	**R**	1x14,1	pre-cast segments	14,8	27,3	404,0	Rehabilitation of the existing bridge
	B-2	4+875	Kafirnigan River	**R**	9x33	pre-cast segments	298,9	15,4	4.603,0	Rehabilitation of the existing bridge
	B-2a	4+875	Kafirnigan River	**N**	9x33	pre-cast segments	298,9	12,25	3.663,0	New parallel bridge on the LHS
	B-2.1	6+650	Pedestrian Bridge	**N**	1x27	steel construction				Additional bridge
	B-2.2	6+694	Obi Shur River	**N**	1x15	pre-cast segments	16,1	23,5	378,3	Removal of existing box culvert, New Bridge in the same place
	B-2.3	8+500	Earth Rural Road	**N**	1x6	RC slab in-situ				Additional bridge
	B-3	9+825	A3C-Lyaur-Isanbay	**N**	1x33	pre-cast segments	33,9	22,5	762,8	Removal of existing bridge, New Bridge in the same place
	B-3.1	19+630	Earth Rural Road	**N**	1x6	RC slab in-situ				Additional bridge
	B-3.2	22+180	Earth Rural Road	**N**	1x6	RC slab in-situ				Additional bridge
	B-3.3	24+710	Earth Rural Road	**N**	1x6	RC slab in-situ				Additional bridge

Abbreviations

N New bridge construction
R Rehabilitation of existing bridge

Tab. 11 List of Culverts and Livestock Crossings

Road	Culvert No.	Location Km	Name of obstacles	Type of Work	No. of Opening	Length (m) **	Width (m) **	Height (m) **	Area (m²) **	Proposed activities
Dushanbe – Kurgonteppa Road Phase I	KBC-01	6+694	Channel	**R**	3	25,00	3x 4,0	2,50	345,00	Removal of existing culvert, replaced by a new Bridge No. 2.2 at the same place
	KBC-01a	6+920	Livestock Crossing	**N**	1					Additional Box culvert
	KBC-02	7+756	Ravine	**R**	1	58,00	2,50	2,00	168,20	Rehabilitation of the existing culvert
	KBC-03	8+417	Ravine	**R**	2	61,00	2x 4,0	2,50	561,20	Rehabilitation of the existing culvert
	KBC-03a	10+752	Dry Valley	**N**	1	40,00	4,00	2,50	184,00	Removal of existing bridge B-4, new Box culvert 4x2,5 m, L=ca.40 m
	KBC-04	11+890	Channel	**N**	1	23,50	4,00	2,00	108,00	Removal of existing culvert and replaced by a new Box culvert 4x2m
	KBC-05	12+220	Channel	**R**	1	35,00	2,50	2,00	112,00	Rehabilitation of the existing culvert
	KBC-06a	20+420	Ravine	**N**	1	35,00	4,00	2,50	161,00	Removal of existing bridge B-5, new Box culvert 4x2,5 m, L=ca.35 m
	KBC-08	24+013	Ravine	**N**	1	30,00	5,00	2,50	174,00	Removal of existing culvert and replaced by a new Box culvert 5x2,5m
	KBC-09	24+495	Ravine	**N**	1	30,00	5,00	2,50	174,00	Removal of existing culvert, replaced by a new Box culvert 5x2,5m
	KBC-09a	31+810	Livestock Crossing	**N**	1					Additional Box culvert
Dushanbe - Kurgonteppa	KBC-09a	32+952	Channel	**N**	1	22,50	4,00	2,50	104,00	Removal of existing culvert and replaced by a new Box culvert 4x2,5m
	KBC-09b	33+660	Canyon	**N**	1	60,00	4,00	2,50	276,00	Removal of existing culvert and replace by a new Box culvert 4x2,5m

Road	Culvert No.	Location Km	Name of obstacles	Type of Work	No. of Opening	Length (m) **	Width (m) **	Height (m) **	Area (m²) **	Proposed activities
	KBC-09c	33+730	Livestock Crossing	**N**	2	35,00	2x 4,0	2,50	322,00	Removal of existing bridge B-6, new Box culvert 2x 4x2,5 m, L=ca.35 m
	KBC-10	34+284	Ravine	**N**	3	35,00	3x 4,0	2,50	483,00	Removal of existing culvert, replaced by a new Box culvert 3x 4x2,5
	KBC-11	35+990	Ravine	0	0	0	0	0	0	Removal of existing culvert, not necessary (new road center line and new ravine bed)
	KBC-12	36+166	Ravine	0	0	0	0	0	0	Removal of existing culvert, not necessary (new road center line and new ravine bed)

K. Quantities for the project

90. The quantities for cut and fill material are approximately:

a. Cut: 1,650,000 m^3
b. Fill: 695,000 m^3

L. Disposal Sites

91. As can be seen in the above figures approximately 1,000,000 m^3 of surplus material will be generated by the Project which needs to be safely disposed. The identified potential areas for deposition of surplus material are shown in the below figures. The identified sites have been agreed with the Ecological Department, Land Use System and Rudaki District Authority. Additional mitigation measures to be adhered by the contractor are described under the headline “Earthworks” in the chapter “Impacts and Mitigation Measures”.

Fig. 3: Disposal Site 1. North of village Kahramon.

Fig. 4: Disposal Sites 2, 3, 4, 5 and 6. South of Village Ingichka in Mountain Section

Fig. 5: Disposal Site 7. South of Dahanikiik

IV. ALTERNATIVES

92. As already described above the chosen alignment remains on the existing alignment over nearly the whole Phase 1. However in order to reduce the environmental and social impacts and also in order to improve driving comfort and safety on the new road various alternatives were considered. There are two possible kinds of alternatives. The first one is spatially very small scale and refers to shifting of the centerline, either to the right or to the left side. This is in order to reduce impact on nearby social and environmental assets by extending from 2 to 4 lanes to the opposite side of the respective structures. This was done in cooperation with the design team and social and environmental planners as an iterative process aiming at avoiding and minimizing potential impacts as far as technically feasible.

93. The second alternatives refer to the mountain section of the Phase 1 several spatial options were considered in the feasibility stage of the Project. The below figure provides an overview of the initially considered 3 spatial options.

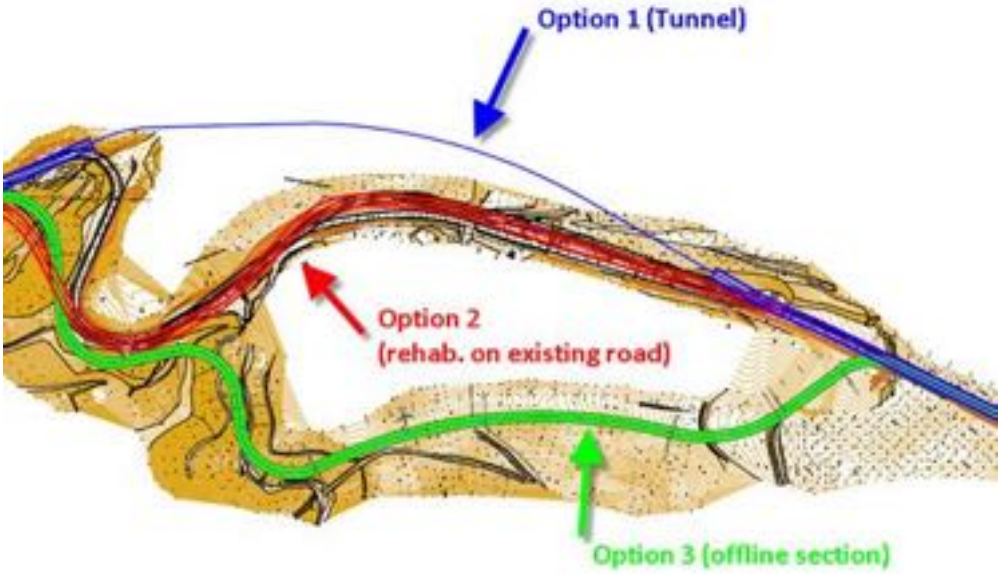


Fig. 6: Initially considered options

94. Further analysis revealed that neither the tunnel (Option 1) nor the proposed offline section (Option 3) were feasible. Therefore Option 2 was chosen but with some major changes in order to be able to construct the new alignment whilst keeping the existing road open to traffic. The chosen alignment is shown in the figure below (source Google earth).

Fig. 7: Chosen alignment mountain section

95. The following table provides an overview of the compared variants according to various criteria, including environmental and social assessment criteria:

Tab. 12 Comparison of Investigated Alternatives within the Mountain Section

Investigated Option	Advantages	Disadvantages	Environmental Impacts	Social and Resettlement Impacts
Option 1 (Tunnel)	**Specific Environmental Advantages:** From environmental point of view the tunnel would have the following advantages: Avoidance of any disruption of animal migration pattern. No loss of topsoil.	High costs. Estimated costs $25.00/m². Total costs §40,000,000.00. Therefore not feasible.	Potential impact on ground water. Would need to be determined. In addition suitable disposal sites for surplus material would need to be identified.	No impacts on social and Resettlement Criteria expected.
Option 2 (rehabilitation of existing road)	Fill kept to a minimum. Utilisation of some of the existing pavement. **Specific Environmental Advantages:** No new disruption of landscape or animal migration pattern.	Road closed for considerable period during construction. Road slope exceeds maximum permitted gradient for long sections Very deep (>45 m) cutting for nearly 600 m Higher earthwork volumes will increase construction duration Large quantities of spoil to dispose of Additional long bridge (260 m) across deep valley (cost $7 million) Winter maintenance of very deep cutting will be problematic	Potentially high erosion rates including landslide due to very deep cut slopes. Mitigation measures for slope stability and drainage required to minimize risk of erosion and landslide. Environmentally suitable sites for disposal of surplus material need to be identified.	No impacts on social and Resettlement Criteria expected.

Investigated Option	Advantages	Disadvantages	Environmental Impacts	Social and Resettlement Impacts
Option 3 (Offline section)	Road kept open during construction period. Design in accordance with the standards. Fill / cut quantities closely in balance. Winter maintenance easier.	Deep cutting (>25 m) for over 350 m. Two high (30 m) embankments (cost $3 million).	New disruption of landscape and animal migration pattern.	Potential impact on Socioeconomic Environment and Resettlement.
Chosen Alignment (Improved Option 2)	During construction time the existing road is kept open to traffic.	The modified option 2 avoids road closure during construction. No significant disadvantages identified.	Due to short realignment section there is only minor disruption of landscape and animal migration pattern as compared to option 3.	No impacts on social and Resettlement Criteria expected.

96. In terms of social impacts the investigated alternatives 1 and 2 are equal because none of the alternatives encroaches into significant private or public assets. There might be impacts for option 3 because state owned agriculturally used land is traversed. Regarding environmental impacts the “option 2” and the chosen alignment (option 2 modified) rank as the best options. Remaining on the existing alignment would have the disadvantage that the road needs to be closed during considerable time of construction. In addition huge quantities of spoil would be generated that need to be safely disposed. Therefore, it can be concluded that the chosen alignment is the best compromise. It traverses some agricultural land and grassland (steppe) adjacent to the existing road. There is no encroachment in environmentally significant structures and the chosen option is therefore environmentally uncritical.

97. The “no Project” option implies that the existing road from Dushanbe to Kurgonteppa will not be improved and that the road would be left in its present state as characterized by the damages and deficiencies described under headline “III Project Description” which consist of deteriorated pavement conditions and inadequate road markings and traffic signs. In addition, guardrails on high embankments and alongside steep valleys in mountainous sections are lacking which is a serious safety issue. The main deficiency however refers to the present road category which is a two lane road and is not catered to the forecasted traffic development which only can be safely and efficiently handled by a Category 1 four lane road. Therefore, the “no project” alternative cannot be considered as a serious option.

V. DESCRIPTION OF THE ENVIRONMENT

98. In general, the study area is located in a hilly terrain ranging in altitude from 400 to 1000 m. Regarding its surface morphology it can broadly be divided from North to South into a rolling section which starts at km 0 and ends at km 14, a mountainous section which starts at km 14 and ends at km 21, a further rolling section from km 21 to km 27 and a second mountainous section from km 27 to km 39 and a flat section ranging from km 39 to the end of the Project (Phase 1 and Phase 2) in Kurgonteppa. In term of physical and biological environment there are only few environmentally significant structures located along the Project road, the most important ones being the Kofarnigon and Vakhsh Rivers and their associated floodplains. In addition several smaller water courses are crossed.

99. Additional significant structures are the tree rows that are stretching over many parts of the Project road. Among the planted species are pines and cypresses. Where drainage or irrigation channels are running parallel to the Project road deciduous trees such as elms, planes, poplars and willows dominate.

100. In terms of human environment an important concern which arose during initial consultation meetings are the cemeteries located along the Project road within Khurason District close to the village of Obikiik. Following initial consultations people are concerned about potential encroachment of the project road. As a mitigation measure any road widening is proposed to be carried out on the opposite side of the cemeteries. The design needs to consider this in order to avoid any impact on the cemeteries as far as it is technically feasible. The cemeteries are located in Design Phase 2 of the Project.

101. The land use alongside the Project road can be divided into three broad main categories comprising urban environment and settlements, agricultural land and grassland (steppe) which for most of its part is used as pasture land. Most prominent agricultural crops are apples, grapes, cherries, apricots, pistachio and cotton. The land under cultivation is irrigated. The

following map which is taken from the JICA report (2015) provides a general overview of the land use characteristics in the vicinity of the Project area.

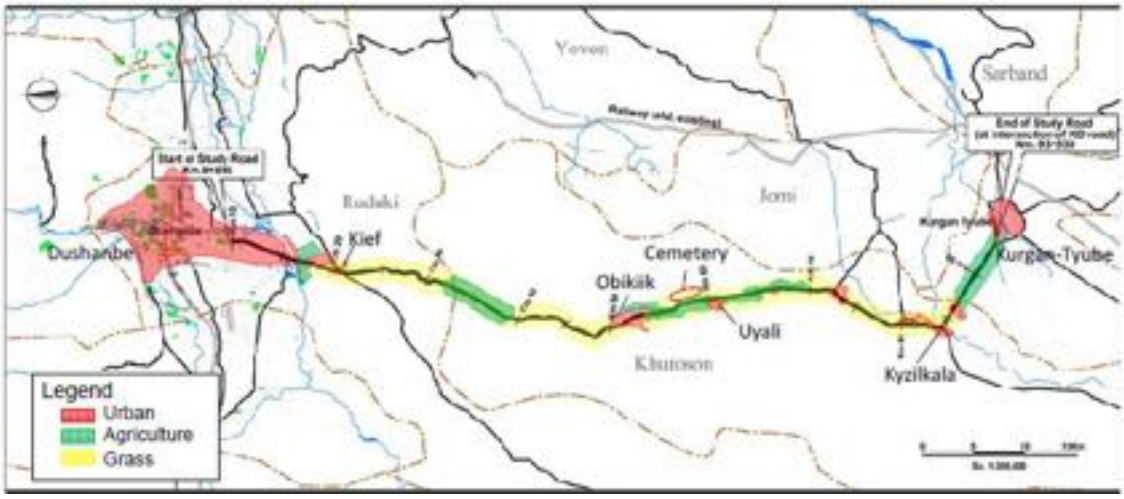


Fig. 8: Land use alongside the Project road

102. In the following an overview is given on the physical, biological and socioeconomic conditions in the project area.

A. Physical Resources in Project Area

1. Topography

103. The topography of Tajikistan is very diverse. Mountains occupy around 93% of Tajikistan. The main elements of Tajikistan's geography are the following: the Kuramin Mountain Range and the Mogoltau Mountains, Fergana Depression, Hissar-Alai Mountains (the South Tian Shan), the depressed area in southwestern Tajikistan (Tajik depression), and Pamir. Altitudes range from 300 to 7495 meters above sea level. The recent relief of Tajikistan is the result of activities of alpine tectonic movements of the earth surface as well as the denudation process. The majority plain territories of the country are the broad areas of river valleys or the vast depressions between the mountains. Most of the country's population is concentrated in these particular areas along with the main fields of industrial production and agricultural potential of the county.

104. The topography of the study area can be divided from North to South into a rolling section, a mountainous section and a flat section.

2. Geology and Seismicity

105. Geologically, the study area belongs to the Tadjik depression. Prevailing sediments are of late Mesozoic and early Cenozoic age. Within the river valleys of the Kofarnigon and Vakhsh Rivers alluvial deposits prevail. The prevailing sediments are soft and mostly unconsolidated. This makes the slopes susceptible to landslides, particularly in sections with high relief energy (mountainous part of the road). During consultation meeting in Obikiik it was reported by the Depute chairman of the Khurason District that only few years ago after heavy precipitation a

serious mudflow destroyed a settlement south of Obikiik. Houses were under mud and many cattle died. Houses of people needed to be removed and rebuilt at a save place.

106. For purpose of description of the geological characteristics of the study area the geological map of scale 1:500000 has been chosen (Fig. 3).

107. The alignment starts from the southern rim of Dushanbe in Upper Quaternary deposits made of sand, gravel and loams. Further on the road crosses river Kofarnigon and its floodplain which is of Holocene age and presented by fluvial deposits of sand, sandy loams, bench gravels and loams. Then the alignment crosses a rolling area of combined Palaeogene and Cretaceous deposits presented by clays, chalky clays, limestones, plasters, dolomite and conglomerates. Further crosses spurs of ridge Aktau combined also Cretaceous and Palaeogene breeds, places blocked Middle Quarternary deposits, presented loess-like loams, bench gravels, loess. Then the road line goes down on a terrace of the river Vakhsh, combined Upper Quarternary deposits presented by sand, bench gravels and loams. Further road crosses also a channel of the river Vakhsh combined by modern deposits by the presented sand, sandy loams, bench gravels and loams. The route line comes to an end at the northwest termination of Kurgonteppa located on terrace above flood-plain combined Upper Quarternary deposits by presented sand, bench gravels and loams.

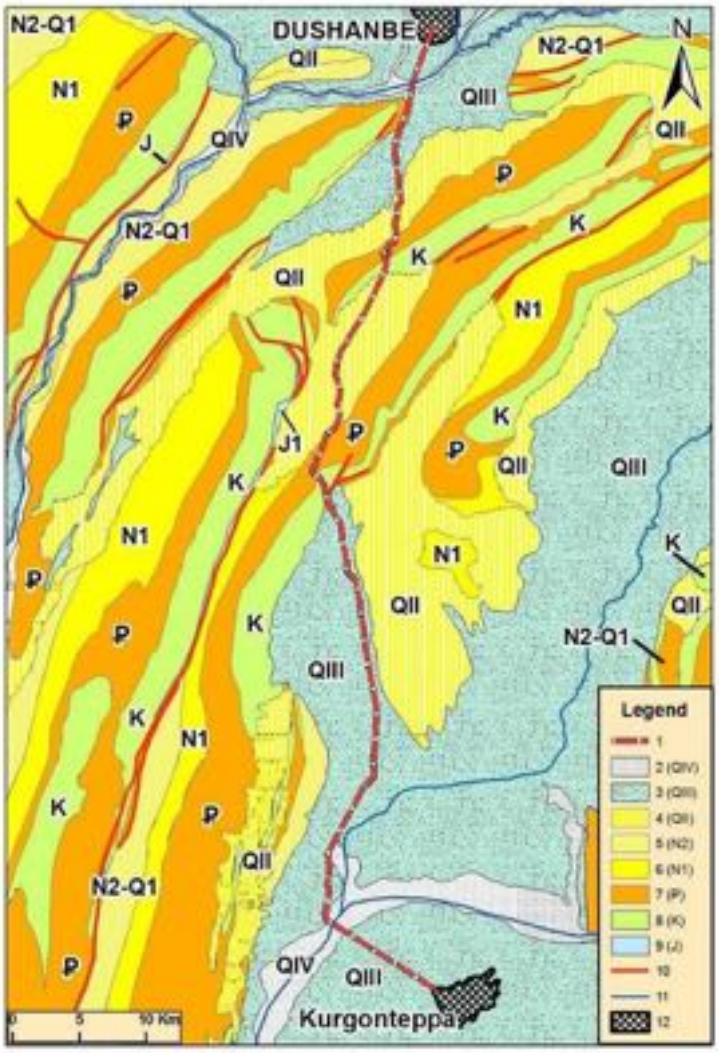


Fig. 9: Geology of the Study Area

108. The Dushanbe to Kurgonteppa road is located within a seismic active zone. There are many active faults in Tajikistan and large scale earthquakes have occurred five times in the past, large one has not occurred after 1998. Earthquakes are the most dangerous and unpredictable hazards that can happen to the Project road. The initial part of the alignment crosses a zone of the Iljaksky deep fault, capable to generate earthquakes with magnitude to 7.5 and to cause concussions to 9 degree. The road most part passes in a zone possible 8 and 7 degree concussions (Fig. 6).

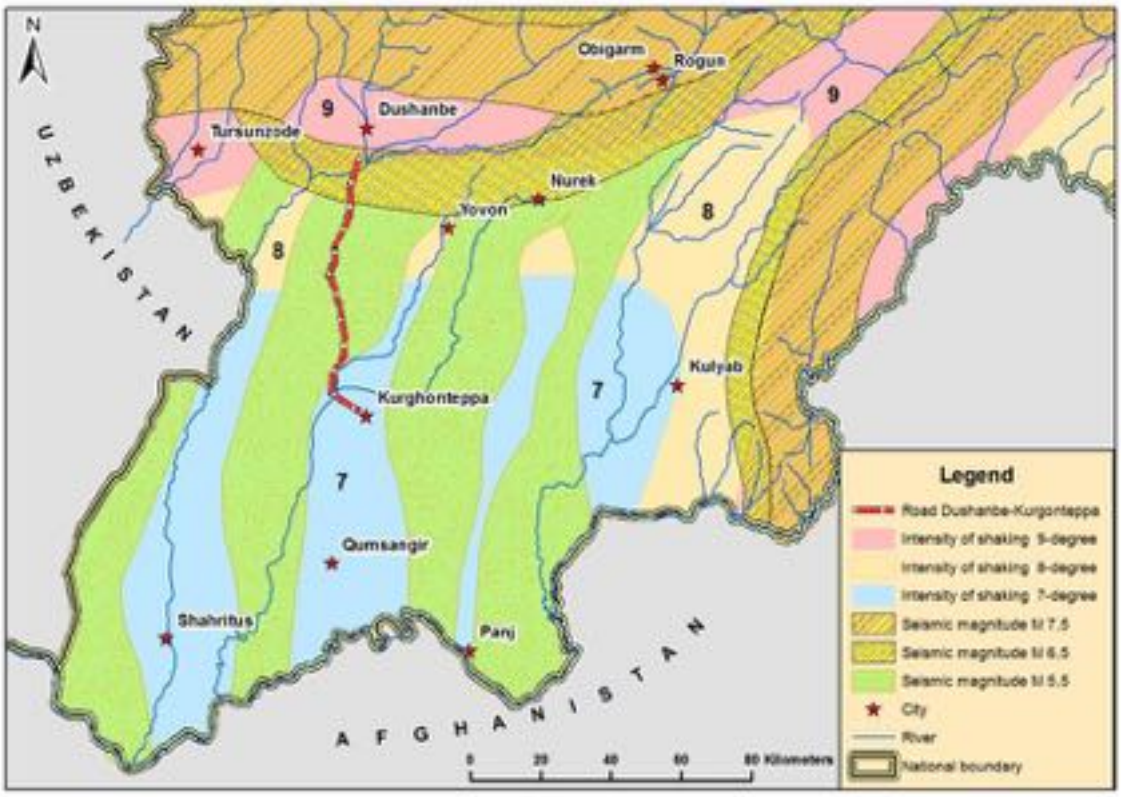


Fig. 10: Seismicity in the Study Area

3. Soils

109. Regarding the soils there is a distinguished gradient from the more humid Northern part of the study area to the very dry southern part.

110. Within its initial stretch the Project road traverses light-grey soils (Fig. 7). Further to the south the alignment is crossing spurs of the Aktau ridge. There the grey soils are replaced by carbonate and mountain brown soils. Going down to the valley of the river Vakhsh the road line takes place again on grey soils from dark to light.

111. The soils of the study area are highly productive and much of the area is used for agricultural use. In the dry southern part of the Project area agricultural use is however only possible when soils are irrigated.

112. Soil erosion is a major environmental concern throughout the Republic of Tajikistan due to seismic activity, 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.

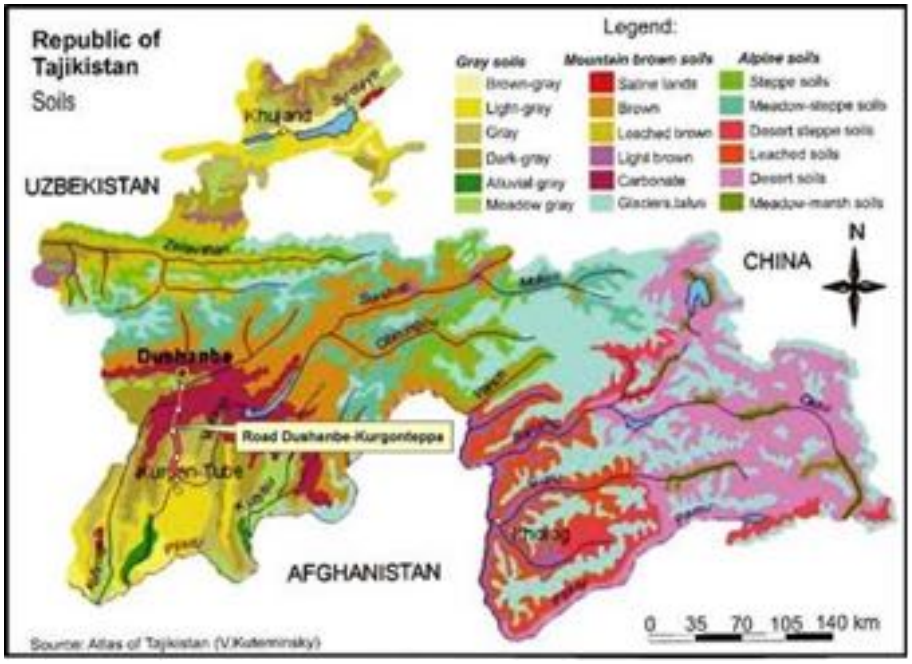


Fig. 11: Soils

113. As described in the Geotechnical Report most of the soils in the study area evolved from loess sediments. Loess consists of fine silty sand. Loess soils and sediments are firm and stable when dry, and can be stable even when cut vertical, but are readily collapsible and erodible when saturated with water. Therefore the road's drainage system is of major concern as it is shown in the below photographs.

Fig. 12: Challenging soil characteristics aggravated with improper drainage give rise to rapid damage to road structures at several locations

114. The existing project road is aligned over flat, rolling and mountainous terrain. The road sections over flat and rolling terrain are fairly stable and do not need special attention regarding slope instability, except for the drainage managements. A part of the road in the mountainous section of the project is to be newly aligned to achieve a satisfactory allowable longitudinal gradient which at present is higher than allowable in existing road. Due to the nature of topography the new alignment consists of high embankments over narrow valleys and steep cuts to maintain an allowable road gradient. Based on the above described soil characteristics of the Project area utmost care need to be taken not to dump cut material over the valley slope and disturb the fragile slopes, unless a retaining structure is provided beforehand at the bottom of the valley.

115. In order to prevent gully erosion the final valley slope attained shall be covered with fast surface covering (spreading) grass or turf. Any concentrated water flow over any valley slope must be avoided. Hill slopes for the new road shall be cut to almost vertical as dry soil slopes are fairly stable. In case the height of cut is greater than 6m, a series of 6m high cuts with 2 to 3m wide benches in between the cuts shall be provided. It is also suggested that there is a distance of minimum 3m between the edge of road formation and the foot of high cut hill slopes for the safety of the road.

4. Climate

116. 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.

117. The climate in the central and south-west regions of Tajikistan where the Project is located is characterized by climate, with rather hot summers and warm winters. The cold period lasts 90-120 days, the warm period – 275-235 days. 75-85% of annual sum of precipitations happens from December to May. The climate might affect the construction season in the Project area which can be limited between February and December. Table 12 and Figure 8 indicate the average temperature and precipitation levels by districts.

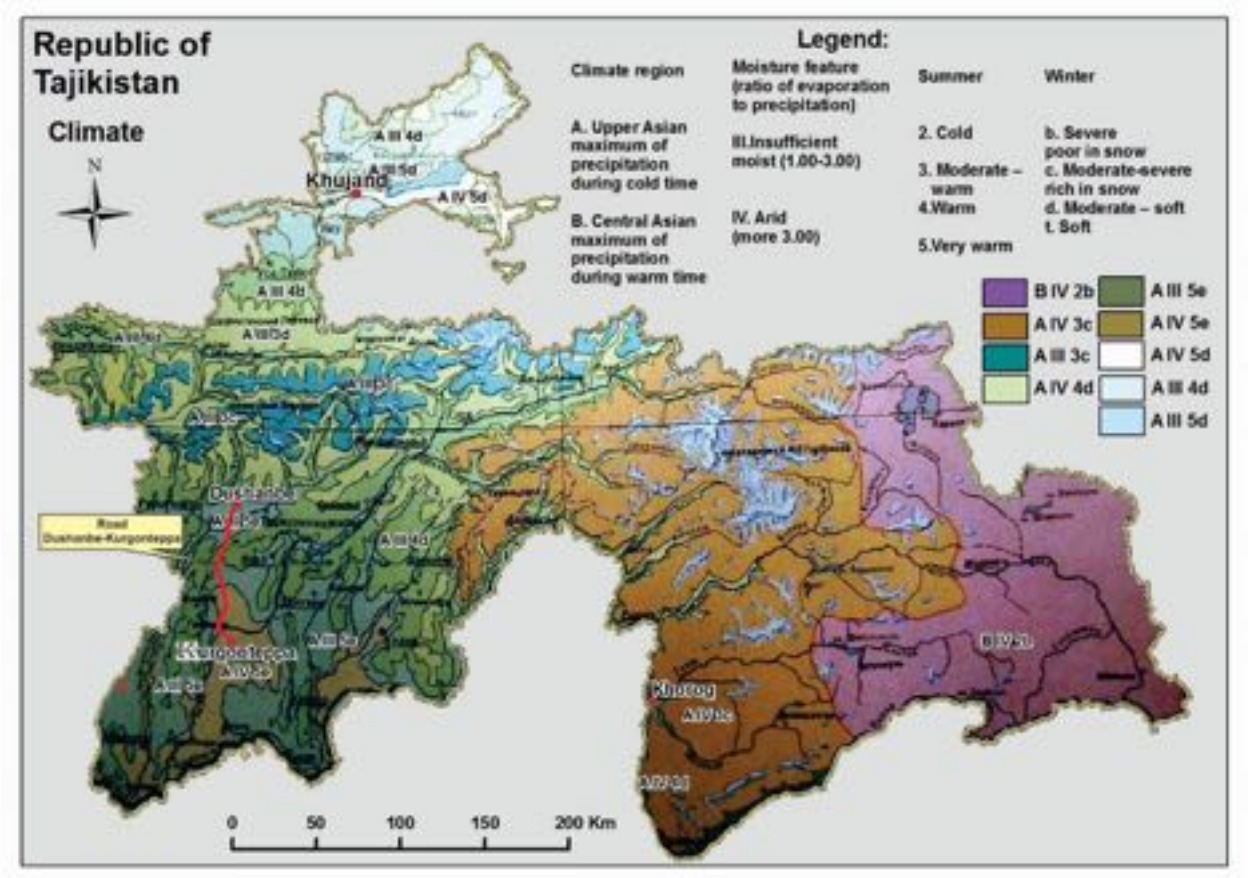
Tab. 13 Temperature & Precipitation, by district

District	Month	Avg. High Temperature	Avg. Low Temperature	Avg. Annual Temperature	Annual Precipitation
Dushanbe	January	15-20^{0}C	–3,5^{0}C	14.6 ^{0}C	250-653 mm
	July	35-40^{0}C	12-17^{0}C		
Rudaki	January	20-22^{0}C	–3,3^{0}C	16.3 ^{0}C	175-541 mm
	July	35-40^{0}C	18-20^{0}C		
Khuroson	January	22-25^{0}C	–3,5^{0}C	16.5 ^{0}C	150-686 mm
	July	40-42^{0}C	18-20^{0}C		
A. Djami	January	22-25^{0}C	–2,2^{0}C	17,5 ^{0}C	50-193 mm
	July	40-45^{0}C	22-28^{0}C		
Bokhtar	January	22-25^{0}C	–2,0^{0}C	17,6 ^{0}C	50-194 mm
	July	40-45^{0}C	20-25^{0}C		

District	Month	Avg. High Temperature	Avg. Low Temperature	Avg. Annual Temperature	Annual Precipitation
Kurgonteppa	January	22-25^{0}C	–2,0^{0}C	17,6 ^{0}C	50-194 mm
	July	40-45^{0}C	20-25^{0}C		

Source: Tajikistan National Agency for Hydrometeorology

Fig. 13: Climate in Tajikistan

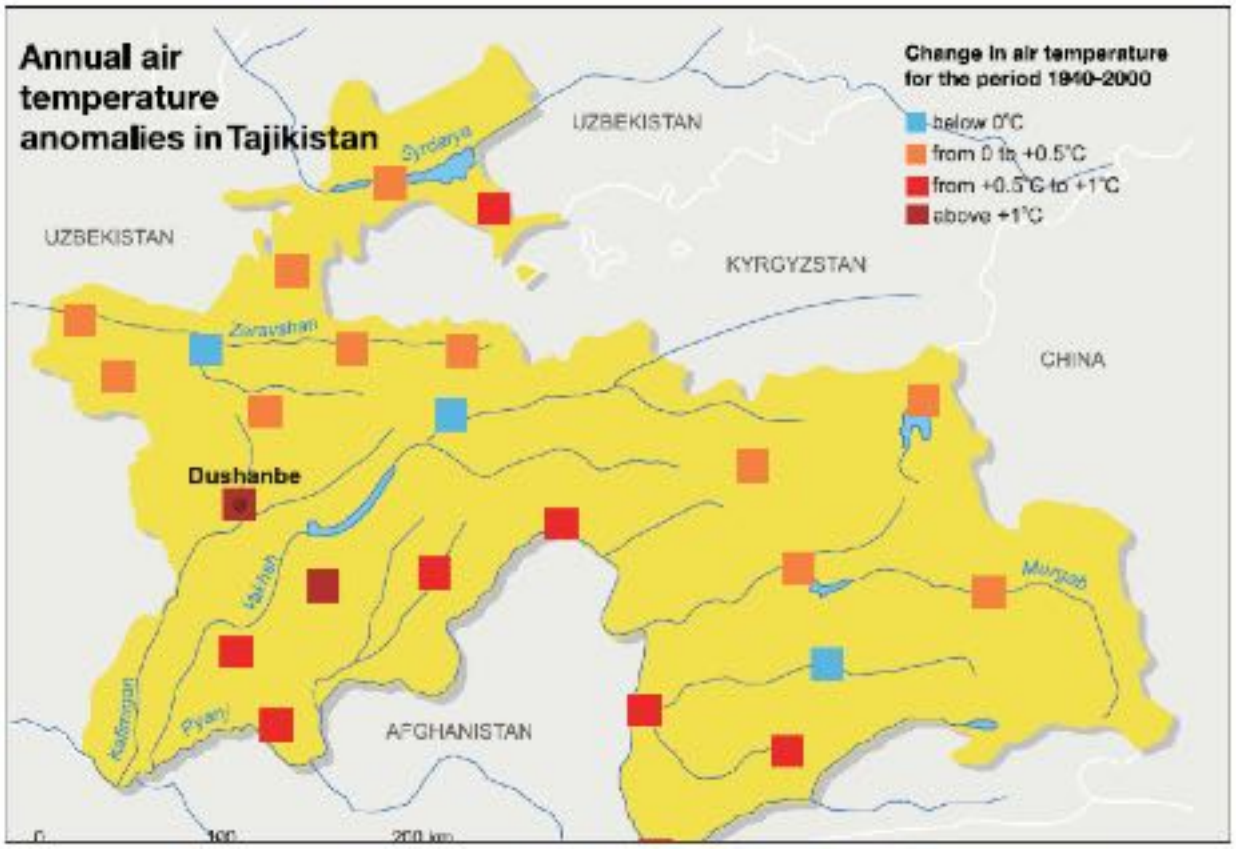


Climate Change

118. Climate change has been identified as an increasing threat to the environment in Tajikistan. The greatest concern has been an increase in air temperature, which has serious implications for its glaciers and water resources. Ground air temperatures are increasing in most districts and high altitude zones. The biggest increase of annual mean temperature has been at Dangara at 1.2°C and Dushanbe at 1.0°C over a 65- year period. In mountainous areas, 1.0-1.2°C was observed in Khovaling, Faizabad and Iskashim. However Figure 9 below indicates moderate changes in the area around the Project Road except its sections adjoining to Dushanbe. There has also been an increase of the number of days maximum temperatures have reached 40°C or over. There has been an increase in east and south - east (warm) winds, and a decrease in west and south - west (cold) winds. Thunderstorms and hailstorms, both associated with cold fronts, have decreased.

119. According to projections, climate change and its consequences like extreme temperatures, isolated anomalous rainfall and natural disasters will continue to have serious impacts on road infrastructure. However new road infrastructure such as tunnels, improved alignments and pavements will considerably reduce travel time and consequently fuel consumption, which in turn will lead to reduced emissions and increased road safety as well as improved transport communication between the regions and remote districts of the country.

Fig. 14: Annual Air Temperature Anomalies in Tajikistan



Source: Reaching the Tipping Point: Climate Change in Tajikistan. Oxfam, 2009.

120. Droughts will likely be more intense and frequent in the future. One of the worst droughts was in 2001 where, in the lowland arid region of the Amu Darya River Basin (e.g. Karakalpakstan), access to water was halved. According to the IPCC (2007) - the projected decrease in mean precipitation in Central Asia will be accompanied by an increase in the frequency of very dry spring, summer and autumn seasons. Changes in seasonality and amount of water flows from river systems are likely to occur due to climate change. Changes in runoff of river basins could have a significant effect on the power output of hydropower generating countries like Tajikistan, which is the third highest producer in the world10. Currently about 98% of the electricity in Tajikistan is generated from hydropower11. This source of energy produces

[10] Impacts, Vulnerabilities and Adaptation, Fourth Assessment Report, IPCC, 2007
[11] On the average. For example in 2013 99.5% of energy was generated from hydropower.

a minimum level of carbon dioxide and has a great potential for development and growth. Therefore, energy consumption could increase and still result in a smaller demand for other sources of energy. Also, neighboring countries could use electricity from Tajikistan to reduce their carbon footprint.

121. Since 2010, coal mining has increased as a measure to address the seasonal energy deficits and as a substitute for gas imports, which are often problematic. This coping strategy might result in an increase in carbon dioxide emissions in the near future. From an environmental point of view this option is not ideal, however the country's acute energy deficit, coupled with population growth, slow the pace of development and consequently the capacity to eliminate poverty.

122. In order to implement the UNFCCC commitments and strengthen climate protection and adaptation measures, to date Tajikistan has produced three National Communications on climate change. Tajikistan is one of the pioneers in the preparation of a National Action Plan for climate change mitigation (2003) within its territory. This plan includes adaptation measures many of which are being implemented and recommendations on updating the National Action Plan are currently being developed.

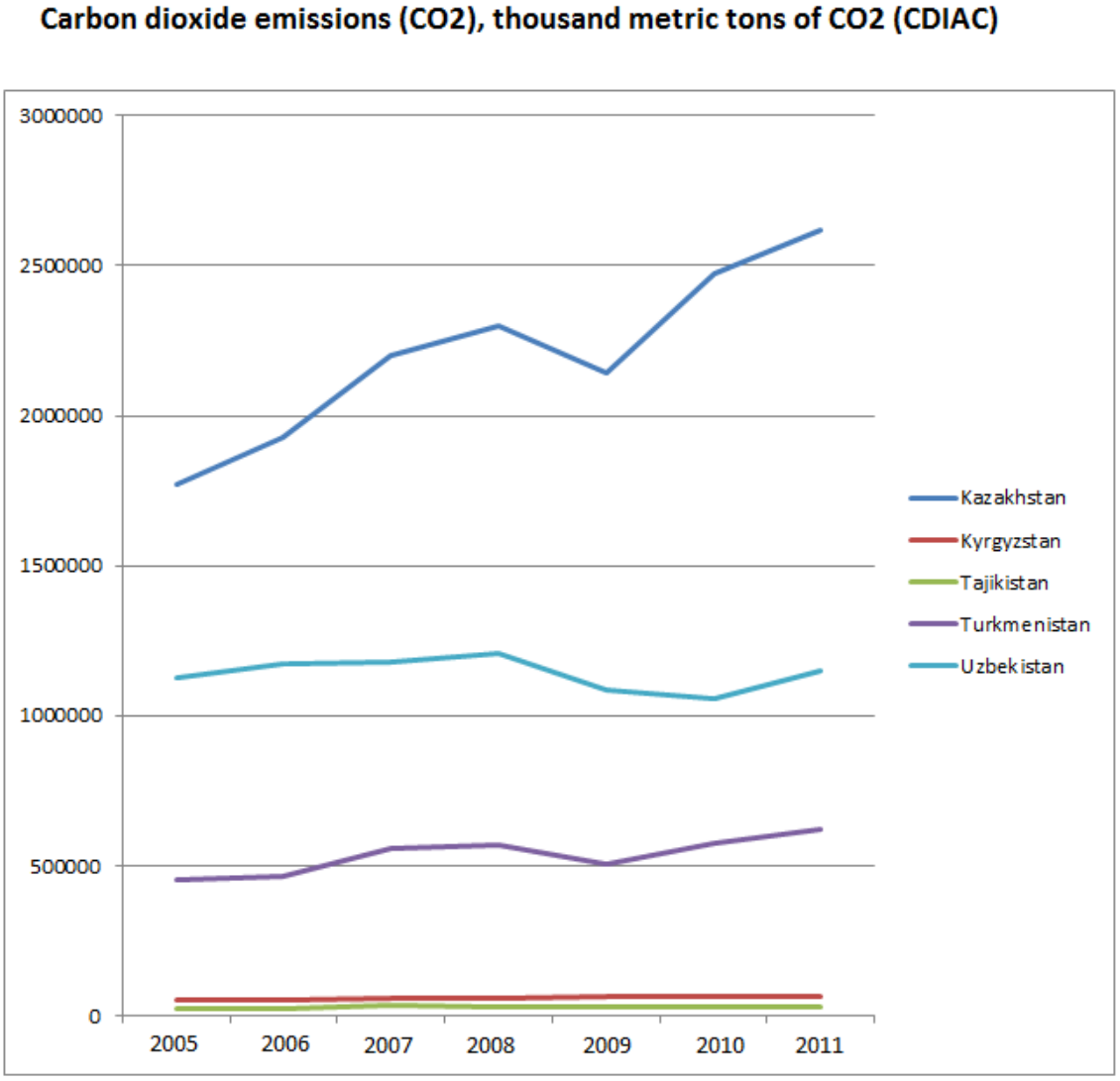
123. Currently Tajikistan's contribution to Carbon Dioxide emissions in Central Asia is negligible[12]. See Figure 8 below. Despite the fact that the country does not have quantitative UNFCCC commitments on the reduction of emissions, the current level of emissions as compared to 1990 have reduced by one third, mainly due to the collapse of the Soviet Union and structural changes resulting from the transition to a market economy and independence. During the last decade, the level of carbon dioxide has remained quite stable, however in the current decade an increase of emissions is expected.

124. Since the late 1990s to the present, agriculture has been the main source of GHG emissions. Considering the low level of mechanization, underfeeding of livestock, and limited use of fertilizers, emissions from the agriculture sector of Tajikistan are lower than in the other countries of Asia and Europe. Opportunities for any considerable reduction of carbon footprint in agriculture are therefore limited, while the measures in other economic subsectors are more promising, especially in energy and industry.

125. In CO_2 equivalent, the contribution of greenhouse gases from the Energy sector for different years was between 14% and 67% of total emissions for the corresponding year. In 2010 GHG emissions in the energy sector was 1.2 mln tons or <10% than the emissions in 1990. During the same year, the International Energy Agency estimated that energy emissions in Tajikistan reached 2.8 mln tons per year[13]. The difference occurs because of the lack of balance between supply and demand, and also due to different calculation and registration methods.

[12] According to the last inventory of GHG emissions (2004-2010) and as confirmed by international sources, the level of absolute and per capita emissions in Tajikistan remains the lowest in Central Asia. GHG emission was less than 28 thousand metric tons in 2011, i.e. twice less than Kyrgyzstan and almost 100 times less than Kazakhstan.

[13] http://www.iea.org/statistics/statisticssearch/report/?country=TAJIKISTAN&product=indicators&year=2010



Source: Carbon Dioxide Information Analysis Center as cited at http://mdgs.un.org/

Fig. 15: CO_2 Emission in Central Asia

Air quality

126. The Project Road traverses relatively flat and low-mountainous landscape interspersed with small villages clinging to the ROW. As such there is relatively little industrial activity that may produce air quality impacts. One of the main sources of air pollution in the region relates to the burning of fossil fuels for heating, cooking and power within the urban areas, although this impact is being reduced as more portions of the population become powered by hydroelectricity from Tajikistan's vast hydro resources. The other main source of emissions in the ROW is from

vehicle movements which can be classified in two categories; emissions from the combustion engines, and dust related impacts from the movement of vehicles.

127. Emissions from the combustion of fuel, at present rates, are relatively low due to the low volume of traffic on the road. It can be noted, that Tajikistan's contribution to Carbon Dioxide emissions in Central Asia is negligible, thus indicating that any increase in emissions from vehicles operating on the rehabilitated road is unlikely to be a significant contributor to CO_2 emissions in the region.

128. Some sections of the road, have degraded to an extent that little asphalt remains on such places of the road, thereby vehicle movement create high volumes of dust, especially within the dry summer months. Tajikistan has a set of air quality standards; they are indicated by Table 13.

Tab. 14 Air Quality Standards

##	**Pollutant**	**Tajikistan Standard[14] mg / m^3**
1.	Particulate Matter	0.150
2.	Nitrogen Oxide (NO)	0.060
3.	Nitrogen Dioxide (NO2)	0.040
4.	Sulphur Dioxide (SO2)	0.050
5.	Carbon Dioxide	3.000
6.	Ammonium	129.0.200

Source: Asian Development Bank. Environmental Profile of Tajikistan. 2000.

5. Water Resources

130. Tajikistan is rich in water resources. It is necessary to note that mountains of Central Asia occupying 20% of the total area of the Aral Sea basin (350 thousand sq. km) gives 90% of surface runoff. The rivers of Tajikistan are important sources of fresh water for the Aral Sea. The glaciers and permanent snow feed the rivers of the Aral Sea basin with over 115 km³ of water a year. The major rivers are the Syr Darya (total length 2,400 km), which flows for 195 km across the Fergana Valley in the north, the Zaravshan, which runs through central Tajikistan, and the Kofarnigon, Vakhsh and Panj rivers, all of which together all of which together drain more than three fourths of Tajikistan's territory and form Amu Darya. On average, 51.2 km³ of water is formed on the territory of Tajikistan which comprise around 44 % of annual water flow of the Aral Sea basin rivers: in the basin of Amu Darya River - 50.5 km^3 and Syr Darya River - 0.7 km³. The total catchment area of these rivers (with tributaries) in Tajikistan is estimated being over 120,000 km².

[14] Based on the Russian standard GN 2.1.5.1338-03 on maximum allowable (permissible) concentrations for pollutants in the outdoor air of populated areas.

Tab. 15 Transboundary Waters in the Basin of the Aral Sea[15]

Basin/sub-basin(s)	Catchment area (km²)	Recipient	Riparian countries
Amu Darya[16]	***612,000***	Aral Sea	AF, KG, TJ, UZ, TM
- Surkhan Darya	13,500	Amu Darya	TJ, UZ
- Kofarnigon	11,590	Amu Darya	TJ, UZ
- Vakhsh	39,100	Amu Darya	KG, TJ
- Pyanj	113,500	Amu Darya	AF, TJ
-- Pamir[17]	***10,000***	Panj	AF, TJ
-- Bartang[18]	***24,700***	Panj	AF, TJ
Syr Darya[19]	***782,600***	Aral Sea	KZ, KG, TJ, UZ
- Naryn[20]	***59,900***	Syr Darya	KG, UZ
- Kara Darya	28,630	Syr Darya	KG, UZ
- Chirchik	14,240	Syr Darya	KZ, KG, UZ
-- Chatkal	7,110	Chirchik	KG, UZ
Zaravshan[21]	***41,800***	Desert sink	TJ, UZ

131. Tajikistan's water resources mainly arise owing to glacier melting and precipitation. Total surface water reserves in Tajikistan's glaciers and snowfields are estimated at 550 km³. Many of them are located in the basins of high-mountain rivers (such as Obihingou, Gunt, and Muksu) as well as in other areas. Glaciers and snowfields occupy about 6% of country's territory. Over 1,300 lakes contain 44 km³ of water, including 20 km³ of surface fresh water and 24 km³ of saltwater. Their total area is about 705 km².

132. The Project Road is located within Kofarnigon and Vakhsh River basins. The following map shows the surface water resources with regard to the study area. The most prominent surface waters are the Rivers Kofarnigon and Vakhsh.

[15] Source: http://www.unece.org/fileadmin/DAM/env/water/blanks/assessment/aral.pdf

[16] Estimation: While some literature sources quote a basin area of up to 612,000 km^2, the water divide can only be correctly established in the mountainous part of the basin (309,000 km^2); therefore many hydrologists refrain from giving figures for the total basin area.

[17] No exact figure. Some hydrologists give various figures from 5,000 km^2 to 10,000 km^2.

[18] https://ru.wikipedia.org/wiki/%D0%91%D0%B0%D1%80%D1%82%D0%B0%D0%BD%D0%B3

[19] Estimation: Some literature sources quote a basin area of up to 782,600 km^2. As with the Amu Darya, the water divide can only be correctly established in the mountainous part of the basin. Thus, many hydrologists do not give a figure for the total basin area but state that 142,200 km^2 of the basin area is upstream of the point where the river leaves the Fergana Valley.

[20] Estimation: The literature gives various figures for the size of the catchment area, from 58,370 km^2 to 59,900 km^2.

[21] Estimation: Due the sheer impossibility of determining the size of the catchment area, many hydrologists simply give a figure of 17,700 km^2 for the mountain part of the catchment area. https://www.unece.org/fileadmin/DAM/env/water/publications/assessment/Russian/G_PartIV_Chapter3_Ru.pdf

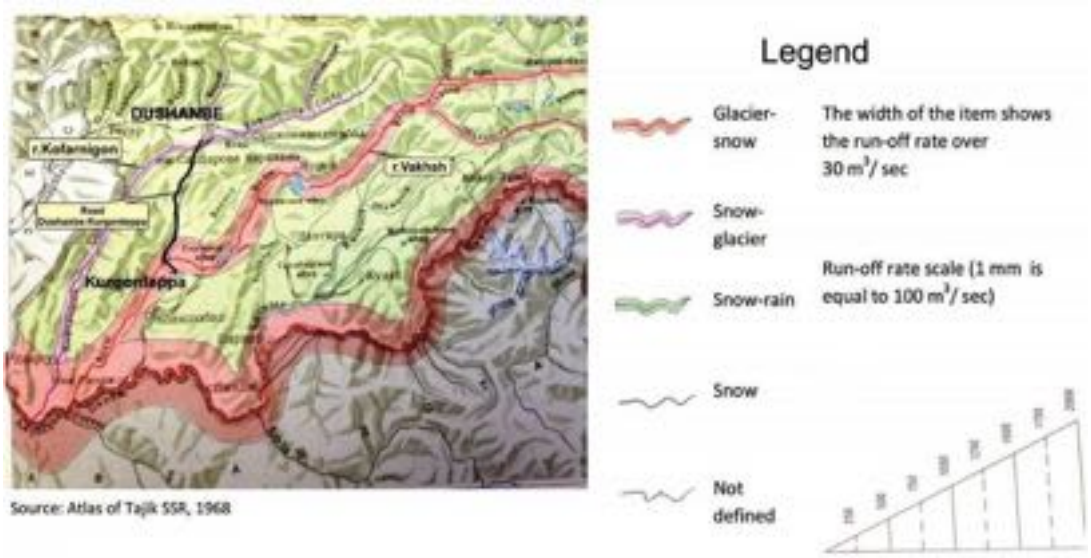


Fig. 16: Surface Water Resources in the Study Aarea

133. Both rivers have a hydrological regime that is particularly influenced by snow and glacier melting. The basic characteristics of the Kofarnigon and Vakhsh river are shown in the Table 15.

Tab. 16 Characteristics of the Kofarnigon and Vakhsh Rivers

№	River	Catchment area, km^2	Length, km	River fall, m	Average annual flow, m^3/s
1	Kofarnigon	11700	386	2270	155
2	Vakhsh	39100	691	4350	618

5.1 Water quality

134. The Vakhsh River's feeding is snowfield/glacier melting and precipitation (snow-rain), flood - in period from February to June, maximum runoff is in June. The Kofarnigon River's feeding is precipitation and snowfield-glacier melting, flood - in period from February to June, maximum runoff is in June. Water mineralization is about 500-800 mg / L in the high water and 800-1000 mg / L in the low water period, the composition of water is calcium sulfate.

135. Tajikistan has also water quality standards for surface watercourses with selected parameters as indicated by Table 16.

Tab. 17 Water Quality Standards

##	**Parameter**	**Limit Value**
1.	Oxygen	Winter – 4.0 mg/litre Summer – 6.0 mg/litre
2.	Salt ammonium	0.5 mg/litre
3.	BOD	3.0
4.	Oil and petrochemicals	0.05
5.	Iron	0.05

6.	Copper	0.001
7.	Zink	0.01
8.	Phenols	0.001
9.	Chlorides	300
10.	Sulphates	100
11.	Calcium	180
12.	Potassium	50
13.	Suspended Matter	1000

S*ource*: State Committee for Statistics. Environmental Protection in Tajikistan: Statistical Summary 1990-2000. 2002 edition (in Russian).

136. For more details please see chapter “environmental standards”.

137. According to the National Geoscience Database of Tajikistan, both the Vakhsh and Kofarnigon rivers are subjects to pollution from industry and settlements, including BOD, antimony and mercury. Please see the Figure below illustrating levels of wastewater discharge to main river basins in Tajikistan.

138. Baseline data on water quality will be measured in the Kofarnigon and Vakhsh rivers as well as the smaller natural water courses and irrigation channels that are crossed by the Project road. The measurements will serve as baseline indicators during the construction stage. Parameters for measurement are indicated in the alignment sheets and in the chapter "baseline measurements".

5.2 Ground Water

139. Ground water level is varying from low levels within a range of 1 m to 5 m below ground in the river floodplain of Kofarnigon River to very deep levels up to 20 m. There are no wells in the project area of phase 1 of the Project.

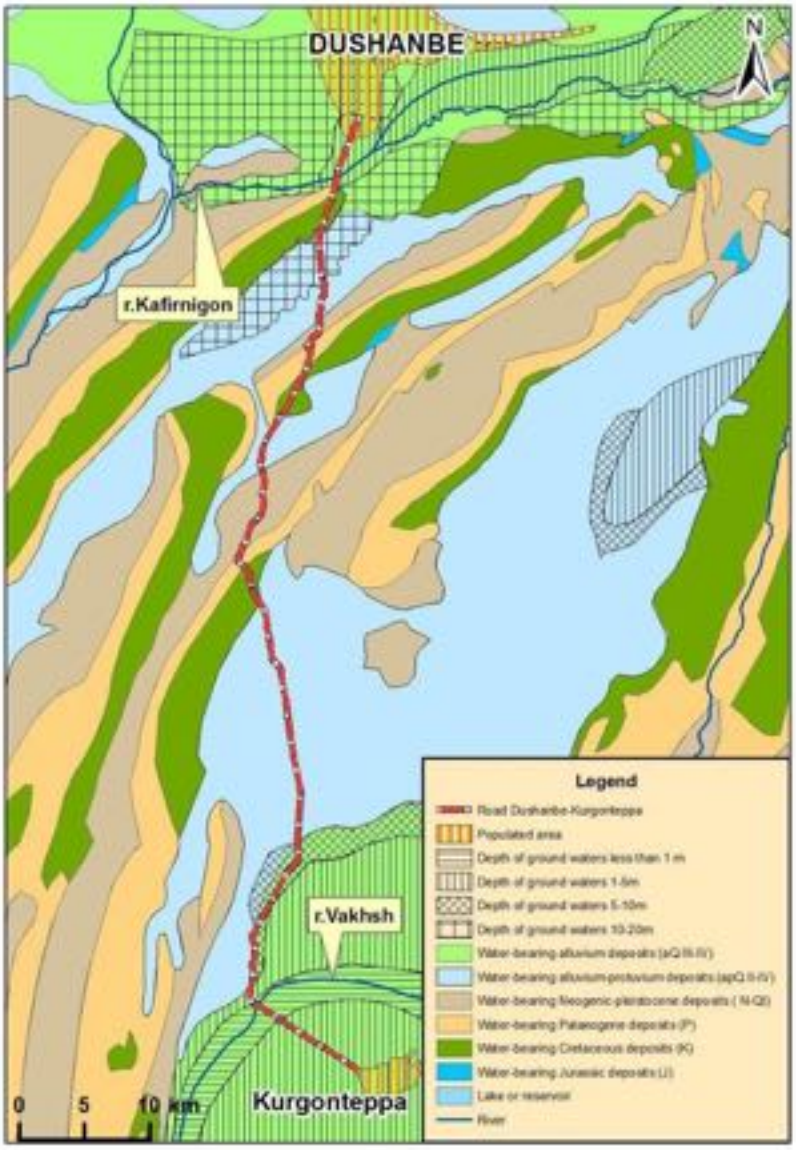


Fig. 17: Ground Water Resources in the Study Area

7. Noise

140. Existing ambient noise levels within the Project road corridor are attributable to vehicular traffic, construction and quarrying operations. Sensitive receptors concerning noise emissions are schools, hospitals mosques or other social infrastructure facilities. They are located within the settlements alongside the Project road. Within Phase 1 of the Project road no school, kindergarten, hospital or mosque are located closer than 50 m to the Project's RoW. This is illustrated in the below aerial overview showing Obi Shivo village at km 6.5. Obi Shivo is the only village that is traversed by the Project road within phase 1 of the Project.

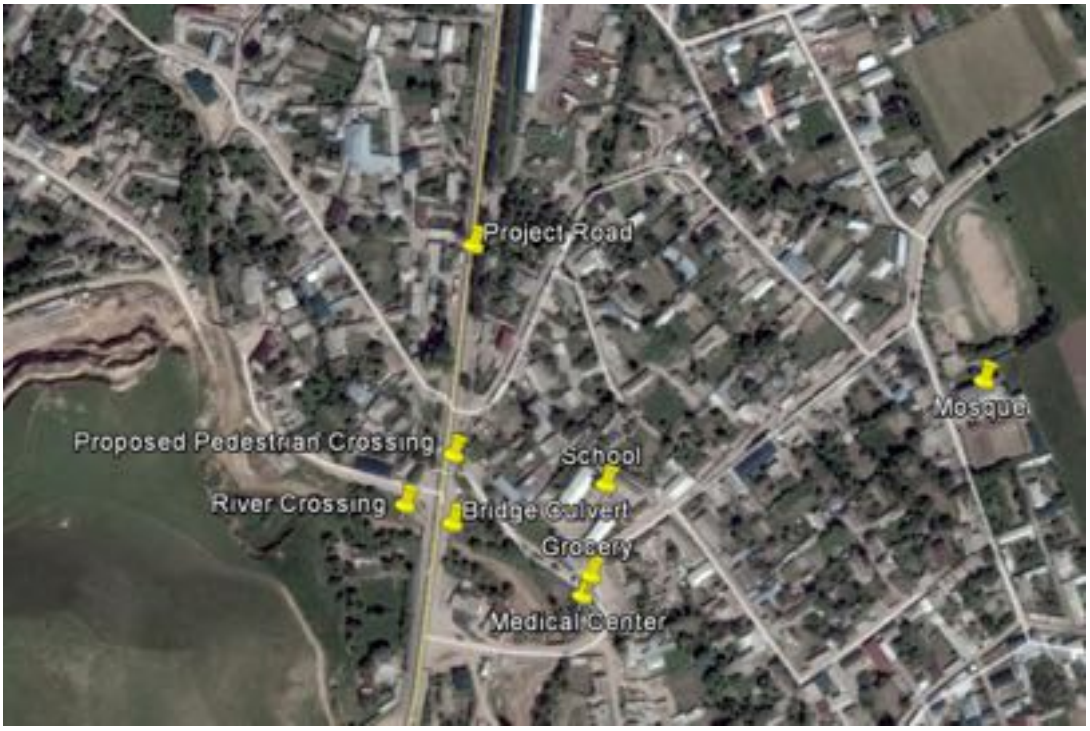


Fig. 18: Noise sensitive receptors

141. Noise level standards in Tajikistan are shown in the chapter on environmental standards.

142. Baseline measurements for noise at identified sensitive hotspots and sensitive receptors need to be measured before construction activities start. The respective locations are indicated in the alignment sheets.

143. During the field surveys noise measurements were conducted. The results are depicted in the following table.

Tab. 18 Results of Noise Measurements (12 May 2016, Day Time)

No	Location	Noise Standards in dB		Baseline indices	Latest monitoring indices
		07.00-23.00	23.00-07.00	12 May 16 (day time)	[date]
1.	Turn, km 00+00	75	75	45	
2.	Dushanbe gate, km 03+200	75	75	52	
3.	Bridge Kofarnihon, km 04+200	75	75	40	
4.	Obi Shifo vil., km 05+700	55	45	47	
5.	Obi Shifo vil., cafe, km 05+900	55	45	41	
6.	Obi Shifo vil., bridge, km 06+100	55	45	59	
7.	Field, km 10+00	75	75	53	
8.	Before the pass, km 16+900	75	75	40	

No	Location	Noise Standards in dB		Baseline indices	Latest monitoring indices
9.	Roadside cafe, km 29+400	75	75	45	
10.	Daganakiik vil., bridge, km 34+500	55	45	40	
11.	Obikiik town, center, km 38+500	55	45	55	
12.	Gardens, km 41+500	75	75	60	
13.	Gardens, km 42+500	75	75	60	
14.	Uyali town, entrance, km 57+400	75	75	46	
15.	Uyali town, bazar, km 58+300	75	75	55	
16.	Bridge Vakhsh, km 68+800	75	75	50	
17.	Kurgonteppa town, end, km 77+400	75	75	55	

Noise Standards (day time-night time):
55-45 dBA (max) - Residential area
75-75 dBA (max) - Commercial area
80-80 dBA (max) - Industrial area
50-40 dBA (max) - Hospitals
55-55 dBA (max) - Schools, Library

B. Ecological Resources in Project Area

144. 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.

145. 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 2090 to 3160 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 -6ºC. 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.

Tab. 19 Main Components of Biodiversity in Tajikistan[22]

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

146. 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.

147. 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.

148. The environment of the project road sections is consisting mostly of agricultural land, grassland, pasture and settlements. There are no specially protected natural areas (PAs) in the immediate vicinity of the project area. One protected area – Tigrovaya Balka Natural Reserve is located at the distance of 45 km to the north of Kurgonteppa: that is why it can be concluded that no protected area is in the vicinity of the Project road. The right-of-way of the project road sections in terms of natural zoning runs through two neighboring natural provinces: Hissar (from Dushanbe to pass Fahrobad) and Vakhsh (from pass to Kurgonteppa).

1. Flora

149. Hissar province has quite rich vegetation and the area of the road falls under the belt of ephemeral plants. First of all, it is bluegrasses and sedges, the road also cross the habitat of Caucasian skeleton, pistachio, almond, and hawthorn. Over the past 50-60 years, these habitats are severely degraded and heavily modified by human. There is artificial planting of ash, poplar, willow, elm, plane tree, and so on, as well as farmland. Mulberry groves (*Morus alba*, White Mulberry) are common within the vicinity of the study area.

[22] First National Report on Biodiversity Conservation and National Biodiversity Strategy and Action Plan, 2003

150. For vegetation Vakhsh Valley can be attributed to the desert and steppe (300-800 m above sea level) belt and the low-mountain (800-1300m) belt, as well as the river valley belt. Vakhsh River with its tributaries forms here three floodplain terraces. Surrounding hills and mountains are low and ranges on average reach heights of 1.000-1.500 masl (highest peak of Mundy-tau is 2.227 masl). The natural vegetation consists of short meadow grass and sedges as well as other ephemeral vegetation23, in some places are growing almonds and pistachios. Natural vegetation now is severely destroyed or almost altered by the influence of anthropogenic factors. Vakhsh valley is the most significant region of Tajikistan for agricultural cultivation with its greatest share of cotton.

151. Across the road the most common plant species are the following: bluegrass (*Poa bulbosa*), sedge (*Carex pachystilis*), astragalus (*Astrogalus*), wormwood (*Artemisia scotina*), calligonum (*Calligomm griseum*), Circassian (*Salsola richteri*), medusahead (*Thaeniatherum asperum*), maple (*Acer lactum*), Walnut (*Inglana regia*), wild almonds (*Amygdalus bucharica*), apple (*Pirus malus*), cherry (*Prunus divaricata*), plum (*Mahaleb*), willow (*Salix*), birch (*Betula alba*), also found poplar, and juniper (Juniperus polycarpos) on the slopes.

152. Ephemeral vegetation occupies the foot of the Hissar and Turkestan ranges. They can be found mainly at autumn and winter pastures. The vegetation here is very low, its mass is small, but it is great eaten by all kinds of animals. More tall wheatgrass provide high mowing and used as hayfields or pastures. In this area also large plants of the family *Apiaceae* are common (Feruls, Prangos), rhubarb (*Rheum ribes*) and ram (*Polygonum polymorphum*) can be found.

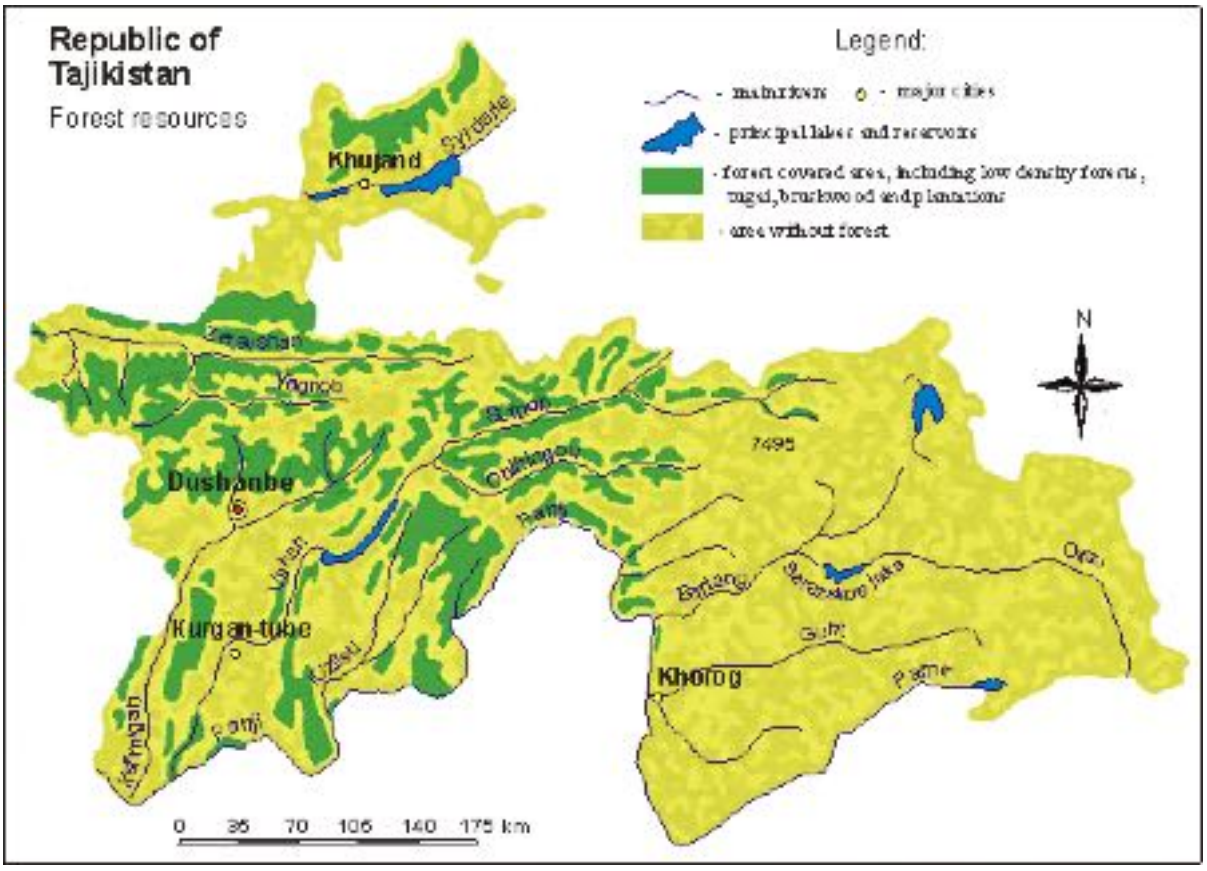
153. In the area adjoining to the Project road grow some rare and endangered plant species such as *Weisia papillosissima Lasar, Stroganovia Tolmaczoyii Junuss, Crocus korolkowii, Allium suworowii, Tulipa praestans, Tulipa tubergeniana* and *Anemone bucharica*. However all of them grow on the hill and low-mountain slopes and the Project road will not affect them.

154. The Vakhsh Valley has a rather long history of human settlement featuring agricultural development with industrial activity, and this is true of the Project corridor. As such, within the immediate vicinity of the Project Road very little flora is present. Most vegetation in the Project Area now occurs in agricultural land and gardens, growing fruits, vegetables, and cereals. Both introduced and local species and varieties are used. Besides homes and private plots, in many portions of the road land immediately adjoining the road is used for vegetable growing, cereals and orchards. Either side of the road, rows of trees has been planted. Most are young (from 5 to 10 years in age) and some of them between 20 and 30 years in age approximately. Around 80% are ornamental species, primarily poplar (*Populus*) species, willow, fir-tree, pine and acacia species which make up around 50% of the total. The remaining 20% are fruit trees, including apples, walnut and mulberry.

155. No important, rare, endangered, or protected species of flora are found within or in the vicinity of the road during this study. Please see Figure 14 below.

[23] Community of small mesophytic herbaceous plants, which vegetate in the winter and spring seasons and drying in summer. In the lowlands of Tajikistan is dominated by species such as Bluegrass (*Poa bulbosa*) and Desert Sedge (*Carex pachystilis*). Above the foothills there are wheat grass and barley *Piliferous bulbous*.

Fig. 19: Reserved Forest in Tajikistan



2. Fauna

156. Fauna of Tajikistan is characterized by the 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.

157. 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. This 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.

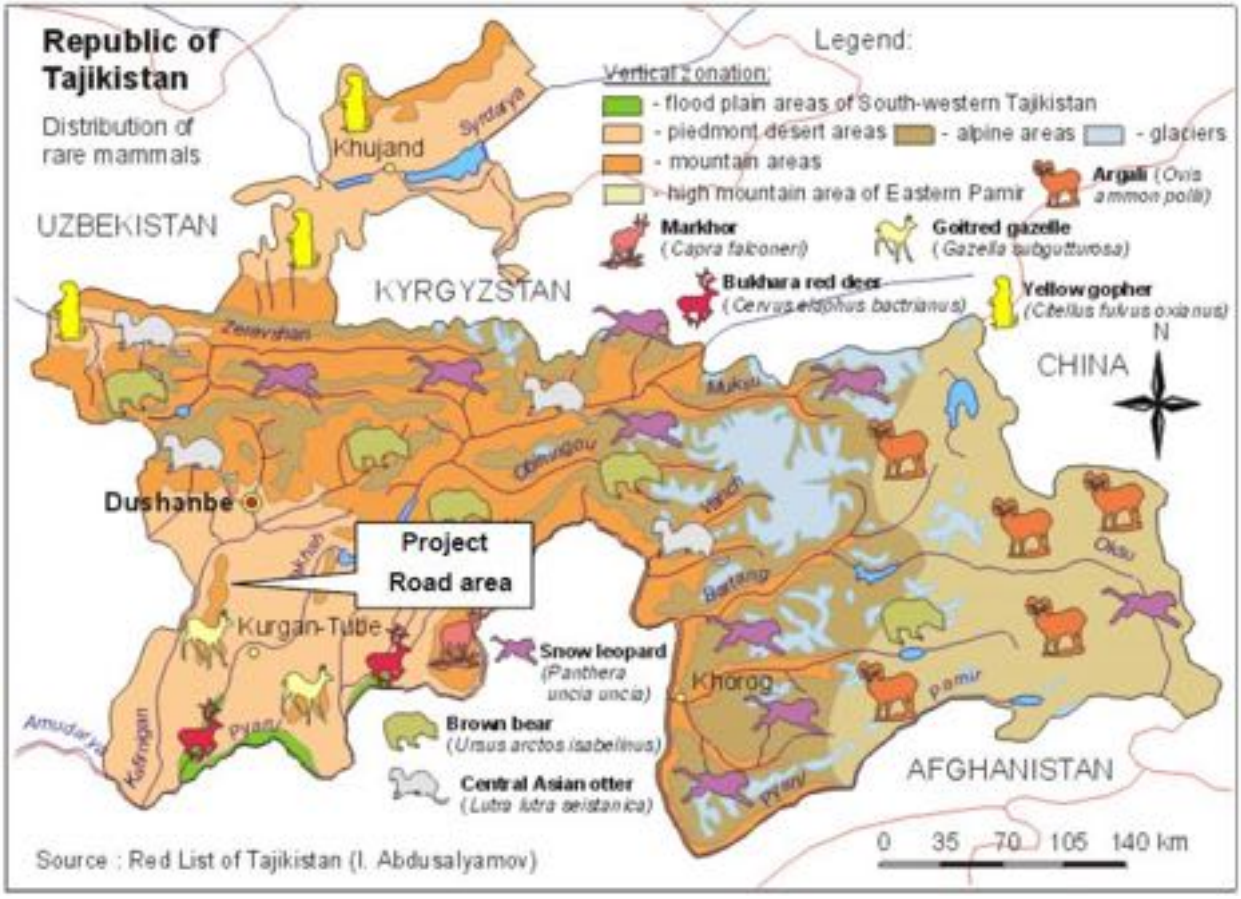
Mammals - Wolf, Fox, Porcupine (Hystrix), Tolai Hare (*Lepus tolai*), Turkestan Rat, Wood Mouse, Vole (Microtus), Gerbils (Gerbillus), Long-eared Bat, Horseshoe Bat, Pipistrelle (*Pipistrellus pipistrellus*), Long-eared Hedgehog et al. Rare and endangered species such as Porcupine, Vormela peregusna, 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 - Cirprinidae (23), the second largest number of species is Cobitidae, also known as the True loaches (11), the third - Sturgeons - Accipenseridae (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. Special protection measures are needed to organize in the upper reaches of the rivers Vakhsh and Kofarnigon at the time of spawning of Amudarya trout (*Salmo trutta axianis*).

Insects - Among rare and endangered insects which could be found in the vicinity of the road are following: arboreal mantis, *Empusa pennicornis Pallas, Carabus tadzhikistanus, Nola elaeagni*. All of them might live near the road and may occasionally pass the road.

158. There are no critical habitats for these species within or in the vicinity of the Project Road. No important, rare, endangered, or protected species or habitats are found within the Project Corridor during this study (see Figure 15 below). However, it is recommended to install Information boards on all extinct, rare and endangered species for the population awareness raising. This instrument might be most efficient and cost effective method for conservation of endangered and rare animals.

Fig. 20: Distribution of rare animals (Red List of Tajikistan)



3. Desertification

159. Since the 1930s there has been intensive reclamation of foothill and floodplain valleys to increase the area of arable land in Tajikistan but up to 100 thousand ha of floodplain, pistachio, and partially broad-leaved forests were destroyed in the process. During the economic and energy crises in 1990s juniper forests, which are difficult to reforest, were cut down. Deforestation and animal grazing in forest areas have had a negative impact on the quality and diversity of forests and the natural regeneration of forests have practically stopped.

160. Pasture makes up 80% of agricultural land and is mainly found in the Khatlon region and the DRS. Pasture stocking today is lower than during the Soviet period 25 years ago and the condition of pastures is not adequate. In the east of the Pamir the condition of the teresken (Eurotea) pastures has become critical. Here, due to a lack of energy sources, people have started a massive uprooting of teresken that is a valuable animal fodder, and this has resulted in the desertification of highland pastures. In other districts cattle often graze near human settlements, thus local pastures have become overgrazed and degraded. More than half of the natural pastures in the country are in the highlands at altitudes varying from 1,700-2,000 to 3,500 masl.

161. The causes of land degradation are multiple, complex, and vary across Tajikistan's regions, but to a greater extent deterioration and exhaustion of land resources is the result of admittedly incorrect and destructive agricultural practices, overgrazing, deforestation and cutting down of bushes, forest degradation. Main active factors are wind and water erosion.

162. While natural factors contribute to soil erosion, unsustainable human behavior accelerates the process to an intolerable degree: it is estimated that 97% of agricultural land in Tajikistan has some level of erosion. Land degradation caused from erosion due to overgrazing is estimated to affect approximately 3 million hectares, or 85% of pastures (Asian Development Bank, 2004). In addition, excessive use of pesticides and fertilizers has resulted in the contamination of soil and waterways.

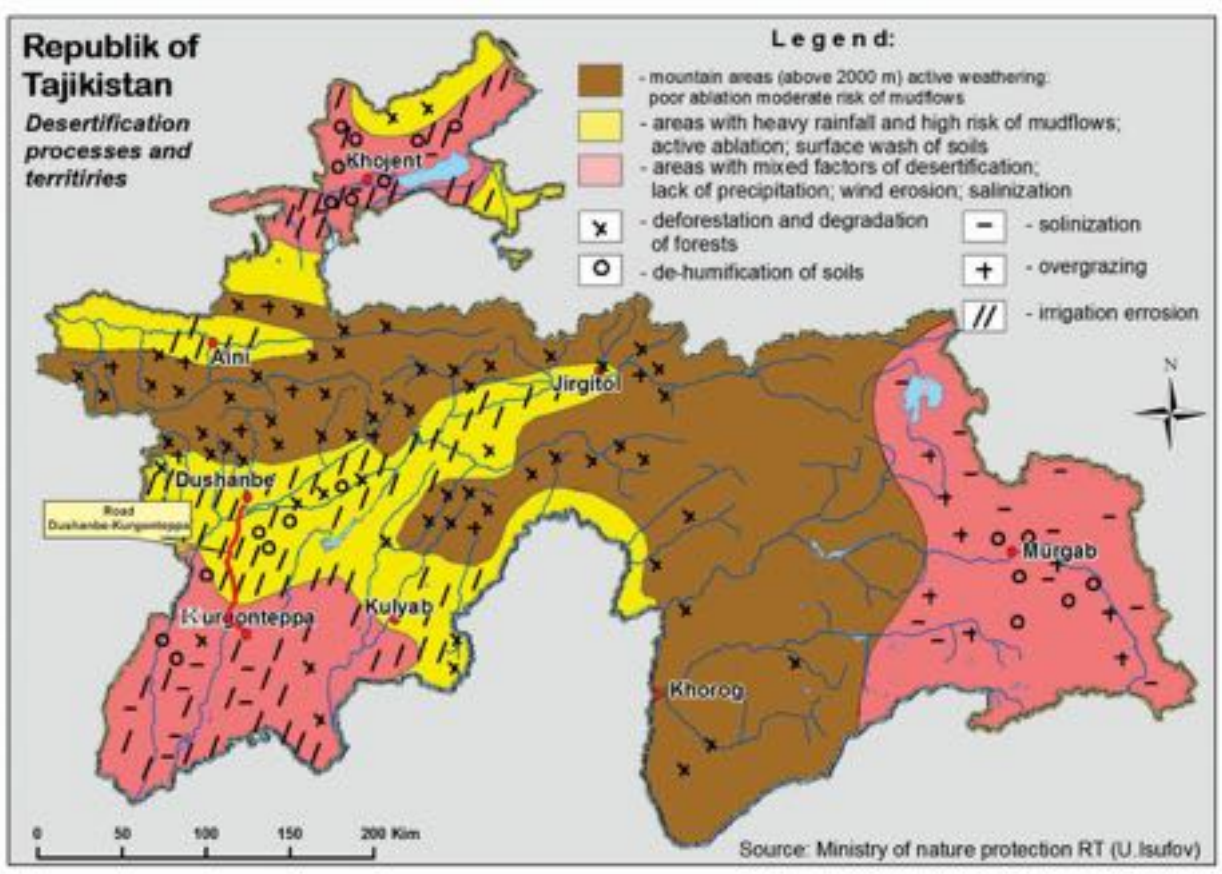


Fig. 21: Desertification in Tajikistan

163. The erosive processes are especially active in the foothill regions where poorly cemented sandstones, loess like loams, and similar rock predominate lending themselves to washing out and wind erosion. The two main factors underlying the process of soils degradation in Tajikistan are water erosion and gully erosion. However, anthropogenic factors accentuate the erosive processes through intensive development of agriculture on slopes and unsustainable cultivation practices.

164. The incidence and causes of soil degradation vary across the country, depending on natural features, climate and land use. In the south of mostly low hills there are small sites of the unfixed sand and zones of strong degradation (e.g. in Karadum and Kumjalolkum). Above these zones there are semi-fixed sands and areas of weak and medium degradation. Among the sandy massifs there are raised areas, which are strongly subjected to water erosion. In the limits of Yavan, Gozimalik, Vakhsh and other districts there are sites of different degrees of erosion, mainly caused by water. In the limits of irrigated zones, a wide variety of erosion processes are at work. On the slopes of the mountain ranges (Babatag, Aktau, Karatau), a number of sites face water erosion to varying degrees. See Table 18 below.

Tab. 20 Distribution of soil erosion[24]

Administrative districts and provinces	Degree of erosion (%)					
	Non-eroded	Weakly eroded	Middle eroded	Strongly eroded	Very strongly eroded	Common area
Kurgonteppa group of districts	3.2	18.8	51.8	18.0	8.2	96.8
Kulyab group of districts	2.0	14.0	43.0	26.4	14.6	98.0
Sughd province	2.8	4.5	58.6	22.0	12.1	97.2
Hissar group of districts	4.3	9.4	40.2	31.5	14.6	95.7
Garm group of districts	0.5	4.2	35.1	32.9	27.3	99.5
GBAO	–	4.2	32.8	37.8	25.4	100

165. Tajikistan's widespread land degradation will increase the sensitivity of the land to climate change impacts, while the implications of climate change for the agriculture sector and the role of the Sustainable Land Management can play in climate change adaptation are considered to be highly significant for Tajikistan[25].

166. Within the Project Area soil erosion is resulting in significant impacts to the Project Road. Figure 17 shows an example of existing erosion impacts.

[24] ADB TA 5941-REG: Combating Desertification in Asia. Tajikistan Country Situation paper (CSP) prepared by Shiv Saigal, 2003.
[25] Pilot Program for Climate Resilience (PPCR). Wolfgramm et al (2011).

Fig. 22: Gully erosion alongside the Project Road

C. Socioeconomic Environment

167. This Chapter presents the findings on the major socio-economic characteristics of the affected Project communities. The chapter is based on information received from the Jamoats' Key-Informants, country statistical data and data collected through the socio-economic surveys and census undertaken in the Project area. The main objective of the SES and census surveys is to understand the existing socio-economic environment and vulnerability of affected people in the Project area, to use the data for preparation of the LARP budget and to identify groups and persons who may need an additional support due to the Project impact.

1. Profile of the Project Area

168. Tajikistan is a Central Asian country bordering Afghanistan, China, Kyrgyzstan and Uzbekistan. According to the census 2008, the country population was 7,373,800. However, the estimation of population in 2015 amounts to 8,610,000 people. Tajikistan is divided into 4 regions and capital Dushanbe: Sughd, Khatlon, Gorno-Badakhshan and Region of Republican Subordination. Each region is divided into several districts (Rayons) which are subdivided into the village-level self-governing administrative units – Jamoats. There are 58 Rayons and 368 Jamoats in Tajikistan.

169. The Phase 1, which is 33.2 km long, traverses through two Rayons: Rudaki and Khurason with five affected Jamoats. Rayon Rudaki has 462,000 people living in 190 villages and 69,800 households. Rayon Khurason has 106,216 inhabitants living 85 villages and in 8,242 households. Out of 275 villages in two Rayons traversed by the Project road, 19 villages are located in the Project corridor. The following tables present demographic and economic profile of the Project Rayons and villages located in the Project corridor.

Tab. 21 Population in the Rayons traversed by the Project road

Rayon	Population	Male	Female	No of households	No of villages	No of affected villages
Rudaki	462,000	233,800	228,200	69,800	190	10
Khurason	106,216	53,263	52,853	8,242	85	9
Total	**568,216**	**287,063**	**281,053**	**78,042**	**275**	**19**

170. The major economic activities in the Project Rayons are agriculture and animal husbandry. Wheat is the major cash-crop in the area cultivated on 20,397 hectares, following by pastures and fallow land. Fruit production is widely spread in the area with almost 5,000 hectares under grape, apples, cherries, apricots and other fruits (table 20).

171. Animal husbandry is widespread in the Project area. Almost each household having some land, also have some livestock. Animals raised in the area include cattle, sheep, goats and horses. The Rayons' statistics shows that there are 169,053 sheep and goats, 99,281 cattle and 5,393 horses in these two Rayons.

172. Nevertheless, reported poverty is acutely present in the region. Partial de-monetization of the economy, the growing internationalization of the labor market, increasing reliance on non-market forms of production and inter-household transfers all mean that the calculation of household incomes and expenditures involves a complex mix of in-cash, in-kind, official, unofficial and informal payments (Falkingham, 1999b).[26]

Tab. 22 Economic Profile of Project Rayons

Rayon	Wheat (ha)	Grape (ha)	Cotton (ha)	Orchards (ha)	Other (pasture etc.	Horses (No)	Sheep/ goats (No)	Cows (No)
Rudaki	15,493	723	496	1,745	9,716	1,859	98,208	66,379
Khurason	4,904	895	0	1,390	13,884	5,393	70,845	32,902
Total	**20,397**	**1,618**	**496**	**3,135**	**23,600**	**7,252**	**169,053**	**99,281**

Source: Rayons' and Jamoats' statistics

173. There are 53,483 people in 19 villages located in the Project corridor. In total, there are 28,050 males and 25,433 females living in 8,959 households. The affected villages' population ranges from 380 people in Chashmasor to 8,405 people in Gulbuta. Three largest villages, Gulbuta, Somonien, Chimtepa and Gulparvar belong to Rudaky Rayon which is closer to

[26] A Profile of Poverty in Tajikistan, Jane Falkingham, https://core.ac.uk/download/files/67/93913.pdf

Dushanbe. The below table provides a synopsis of the population in the villages alongside the phase 1 of the Project road.

Tab. 23 Population alongside the Project road

Rayon	Jamoat	Village along the Project Road	Population	Male	Female	No of Households
Rudaki	Chugultepa	Obishifo	3.406	1.732	1.674	480
		Navbunyod	2.751	1.511	1.240	502
	Lohur	Tubek	3.212	1.625	1.587	402
		Hayoti nav	1.642	830	812	243
		Alabaytal	862	436	426	140
	Chimtepa	Gulparvar	6.866	4.054	2.812	1.429
		Kahramon	2.152	1.151	1.001	398
		Chimtepa	6.912	3.539	3.373	808
		Gulbuta	8.405	4.286	4.119	1.564
		Somonien	7.772	3.979	3.793	1.687
Khuroson	Fahroobod	Fahroobod	1.874	960	914	242
		Vahdat	2.757	1.423	1.334	386
		Hisorobod	1.143	607	536	150
		Somoniyon	835	420	415	119
		Bohoriston	681	373	308	90
		Chashmasor	380	193	187	52
	Galoobod	Daganakiik	1.279	670	609	175
		Chasmasor	417	203	214	69
		Navbunyod	137	58	79	23
Total			**53.483**	**28.050**	**25.433**	**8.959**

The below map shows the villages that occur alongside the Project road in section 1.

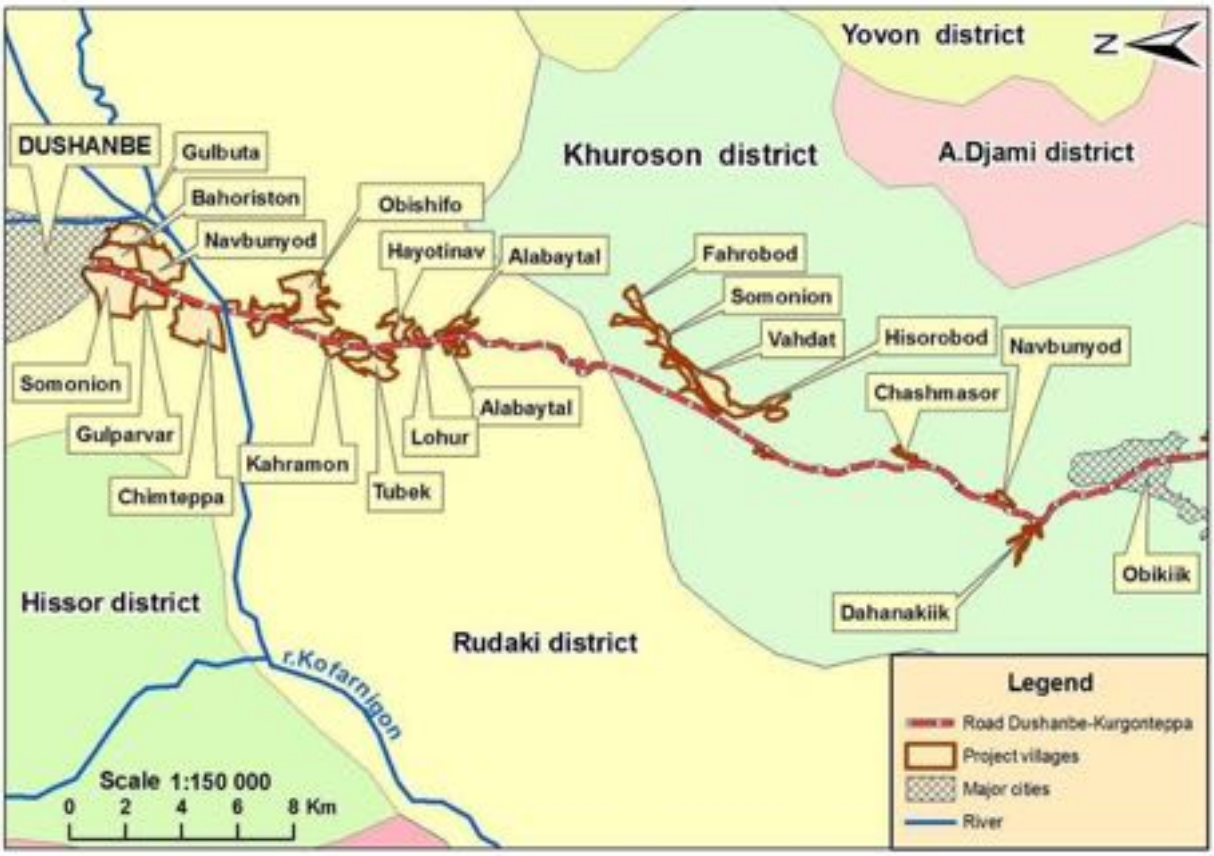


Fig. 23: Settlements alongside phase 1 of the Project

174. There are 3,516 poor households in two Project Rayons. Out of this, around 10% live in 19 Project villages. Ten affected villages in Rudaki Rayon villages have 123 poor households, while nine villages in Khurason Rayon have 230 poor households. The data on poor households headed by a woman were not available for most of the Project villages. Analysis of available data for six Rudaki villages shows that 51.5% of poor households are headed by a woman.

Tab. 24 Poverty on Project Rayons

Gender	No of poor HH in Rayons	No of poor HH in Project villages
Rudaki	2,891	123
Khurason	625	230
Total	**3,516**	**353**

175. The economic data on Project villages reflect the data at the Rayons' level. The major economic activities in all Project villages are agriculture, orchards and animal husbandry. The nineteen villages have 2,378 hectares under wheat and 5 hectares under cotton. The land area of 6,812 hectares is mostly grazing land. Fruit trees, such as apples, cherries, sower cherries, apricot and peaches are mostly found in the Project villages. There are 2,364 hectares of fruit trees in the Project villages and 454 hectares of grapes.

176. Animal husbandry is widely spread in the village households. There are 12,312 sheep and goats and 10,797 cattle. Some households have a couple of horses as they are not commonly kept in the area. In total, there are 337 horses in 19 Project villages.

Key Facilities and Infrastructure

177. Each Project Jamoat (local authority), has a mostly combined primary and secondary school, mosque, health-post and shops and small businesses along the central village road. Some villages are distant from the road but their lands are located along the Project road. Other services such as hospitals, larger markets and administrative services are based in Jamoats' and Rayon centers.

178. Electricity is available in all project villages. However, during the dry seasons when the production of electricity is lower, the villages get the electricity supply for a couple of hours a day.

179. Piped water is available in some villages mostly those closer to Dushanbe, while other villages rely on wells, collection of rain water in basins and cisterns and purchasing water for the daily usage. Consequently, only 6 households have a hot-water system in the house as the piped water is not everywhere available. Only one surveyed household has an in-house flush toilet while all other have a latrine. There is no waste water treatment in any of the Project villages.

180. Every surveyed household has a TV set and 48 households own a satellite dish. Computer and internet are not widely used in the villages, but the mobile phone is used in around 96% of surveyed households. Only 14 households have a computer and 3 have the internet connection. Other facilities, such refrigerator and electric stove are amenities in 72.86% and 71.43% of surveyed households respectively. Considering that the piped water are not widely available, washing machines are found in 40% of the households. The air conditioner is available in 18.57% of the households and almost a half of the surveyed households (48.57%), have a car. Other assets listed are some agriculture machinery and a couple of minivans and motorbikes. The below table provides a synopsis.

Tab. 25 Household Assets and Amenities

Items	No of households	%
Latrine	69	98.57
Piped water in house	6	8.57
Hot water system	6	8.57
TV	70	100.00
Satellite dish	48	68.57
Computer	14	20.00
Internet	3	4.29

Items	No of households	%
Mobile phone	67	95.71
Refrigerator	51	72.86
Washing machine	28	40.00
Electric stove	50	71.43
Air conditioner	13	18.57
Motorbike	4	5.71
Car	34	48.57
Mini van	2	2.86
Agriculture machinery	6	8.57

181. Out of 70 surveyed households, 63 households own 63.5 hectares of land. On average, individual land holding ranges around 1 ha. Around two thirds of the land is dry and one third irrigated land. Mostly cultivated are wheat, maze, vegetables and grape and apples. There are 14 hectares of pasture land. Forty-three households have some animals. Mostly, people have cows, sheep, goats and chicken.

Gender, Ethnicity and Religion

182. There are 329 (50.23%) females and 326 (49.77%) males in the surveyed sample. The number of male-headed households amounts to 82.86% of all household heads, while 17.14% of surveyed households are headed by a woman.

183. Out of the total number of surveyed households, Tajiks are the largest group with 57 households (81.43%), followed by 8 (11.43%) Uzbeks' households and 5 (7.14%) of others. All households are Muslims.

4. Transport and Traffic accidents

184. Well-functioning transport sector is crucial to the Republic of Tajikistan because of the mountainous terrain of the land locked country. It is important from many different aspects, including economic, social, and political.

185. The development of the transport sector is very important for landlocked Republic of Tajikistan as it will help ensure a cost-effective access to regional and domestic markets. It will also help generate employment and provide services throughout the country.

186. This review process clarified that there are massive improvements required regarding the road safety situation and high casualty numbers in the Republic of Tajikistan. However, there are a number of initiatives that have already been undertaken.

187. Current and past statistics for traffic accidents are in detail given in the road safety report. The following table provides an overview.

Tab. 26 Vehicle crash statistics for the last 15 years for Tajikistan

Year	Number of vehicles	Crashes	Deaths	Injured
2001	231336	1373	395	1557
2002	220391	1388	414	1625
2003	218677	1379	421	1621
2004	222972	1402	415	1556
2005	231762	1725	483	2037
2006	246411	1479	435	1740
2007	268018	1775	468	2046
2008	304219	1674	497	1935
2009	337425	1666	482	1924
2010	357869	1574	411	1748
2011	369818	1401	438	1592
2012	374598	1381	442	1527
2013	395868	1466	472	1605
2014	423303	1514	446	1726

Source: GAI statistics

5. Cultural and Historical Sites

188. No historically or culturally significant sites have been identified along the road sections during this study. However the Consultant visited Institute of History, Archeology and Ethnography under the Academy of Sciences of Tajikistan (Institute) to verify these issues. The Consultant was informed that along the Project road are located several ancient cemeteries (mazars) and settlements which might be considered as historical and cultural heritage. This information need to be verified by further joint field study together with the PIU RR and the Institute.

189. Settlement Halkadzhar (IV-VI centuries AD) is located in 1.5 km to the NW of the village of the same name. It is located on the edge of the terrace of the left bank of the river Vakhsh. From the east the settlement is limited by the steep coastal cliffs, to the south and south-west by deep artificial canyon (which was dug during the road construction), to the west it is limited by deep ravine. This site is most important as it is located in close vicinity of the Project road. Please see pictures below.

Fig. 24: Mazar at Obikkik (dating is not clear) is located NW of the village Obikkik.

VI. ALIGNMENT SHEETS

190. The Alignment Sheets in the Annex 2 provide an overview of environmental hotspots and sensitive receptors alongside the Project road.

VII. BASELINE MEASUREMENTS

A. Air Quality

191. Air measurements need to be conducted at the locations indicated in the alignment sheets. Locations for air quality measurements are within the village of Obi Shifo, between km 6+00 and 6+500 (one measurement at 6+000, 6+250 and 6+500 respectively). In addition there need to be air quality measurements near the asphalt plant and the aggregate crusher. Baseline measurements are to be taken prior to construction start. Than regular monitoring measurements required during construction phase will be conducted.

B. Water Quality Measurements

192. Water quality measurements will be conducted for water quality in the Kofarnigon River and the River that is crossed in Obi Shivo for the first phase of the Project prior to construction start. Than regular monitoring measurements during construction phase of the Project will be conducted.

C. Noise Measurements

193. Noise measurements need to be conducted at the locations indicated in the alignment sheets. Locations for noise measurements are within the village of Obi Shifo, between km 6+00 and 6+500 (one measurement at 6+000, 6+250 and 6+500 respectively). Baseline measurements are to be taken prior to construction start. Than regular monitoring measurements during construction phase will be conducted. Initial measurements were undertaken during the conducted site surveys.

VIII. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

194. Based on the results of the conducted field surveys and environmental assessment, the project's environmental impacts were identified and described and suitable mitigation measures prepared. The Project involves the reconstruction and widening of an existing road. Over most part of its length widening of the existing cross section will be required, which at certain sections will result in significant social and environmental interferences during construction stage, and, if not properly mitigated, during operation stage. There will however remain only low impacts once the Project has been finalized. 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.

195. This environmental assessment covers the entire length of the Project Road. This chapter is, however, more specific for the Phase 1 of the Project (33.2 km from Dushanbe to the South). The approach to include both phases was taken because Phase 2 needs to be interpreted as an associated facility to Phase 1 and there will be cumulative impacts from future development of the Project. For impact assessment an envelope of 200 meters wide on each side of the project road over its entire length is identified as the core impact area. The road sections where sensitive receptors are present, such as schools, hospitals or other places where people congregate are given particular attention so that ample mitigation is formulated. In Phase 1 of the Project no school, kindergarten, mosque or hospital are located closer than 50 m to the future Project corridor's edge. For road sections that cross rivers, the impact assessment is 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. This is the case for the Kofarnigon river (Phase 1) and the Vaksh river (Phase 2). Both riverbeds are proposed for material extraction.

196. Main impacts refer to the human environment, particularly because loss of building and other structures, mainly within the village of Obi Shifo and also 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. In phase 1 of the Project no school, kindergarten, mosque or hospital are located closer than 50 m to the future Project corridor's edge. In summary main impact categories arise from the following activities: (i) construction works within or close to settlements result in loss of trees and building structures, noise impacts, emission of pollutants to air and vibration which is especially of concern when the Project road comes close to sensitive receptors, (ii) site clearance activities result in loss of top soil and vegetation structures, (ii) aggregate sourcing, crushing of aggregates and asphalt plant operation may have severe impacts in case of unsuitable site selection or management. Additional impacts refer to iii) impacts from bridge rehabilitation, (v) potential impacts on surface waters and potential impacts on natural habitats and biodiversity. In the following chapters the impacts and mitigation measures are described. They have been divided into pre-construction phase (design phase), construction phase, and operation phase impacts. The chapter is structured according to activities.

A PRE-CONSTRUCTION (DESIGN PHASE)

1. Road alignment within ecologically sensitive areas

Impacts

197. There are no legally protected areas alongside the project road and only few structures of local environmental significance to be considered during the design stage. For phase 1 of the Project these are described in the following.

198. Crossings of the Kofarnigon (Phase 1), Dahanakiik and Vaksh (Phase 2) rivers and their associated floodplain. Potential impacts refer to possible oil spills from old or badly maintained vehicles, but also large scale water pollution may occur in case of severe casualties (e.g. if there is an accident of an oil transporting truck). Such casualties could have impacts on aquatic fauna and also pollute the crops in the irrigated fields.

199. Encroachment into valuable road side vegetation structures. As shown in alignment sheet number 7 road trees and shrubs in dense stands extend over a stretch of about 1 km before the road is traversing alongside the village of Yangikhayot on the left hand side. Tree species are mainly elms (*Ulmus spec.*) and willows (*Salix spec.*) Adjacent to the road are irrigation channels and small wetlands with reed (*Phragmites australis*). Due to widening to 4 lanes tree losses cannot be prevented.

200. Additional potential impacts on the trees may include compaction of soil over the roots of the tree, alteration of ground levels besides the tree stem foot (fill up of more than 30 cm of tree stem area damages the tree), 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.

Mitigation Measures

201. In order to minimize risks to the ecologically valuable river floodplains 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.

202. Tree losses that cannot be prevented will be compensated by new tree plantings at the respective locations alongside the Project road. Plantations shall be executed after technical works have been completed. Plantations shall be restricted to spring (March - April) and/or autumn (October). Locations for planting are within the new RoW at the locations where tree losses occurred. Therefore no additional land acquisition for tree planting is required. However the design will avoid tree losses as far as technically feasible by adjusting the roads center line. Tree losses on private land are compensated within scope of work of the Resettlement Action Plan (RAP). Suitable species for road side planting are cypresses and pines. If irrigation channels are running alongside the road, than species requiring more moisture such as walnut (Juglans regia), maple (Acer negundo), elm (Ulmus carpinifolia), poplar (Populus alba), willows (Salix alba), and robinia (Robinia pseudoacacia) should be planted.

203. Additional mitigation of impacts to trees can 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.

2. Road alignment dissecting cattle crossings

204. Alongside the project road pasture land and livestock keeping (cattle, sheep) is a prominent land use. Consequently project affected people having their pasture land within the roads vicinity request that this issue is considered in the Project design and animal underpasses shall be designed. The issue was raised during the consultation meetings that took place. There are regular migrations occurring using existing passages. The issue is that the existing passages are not considered to be safe and the extension of the road from 2 to 4 lanes poses an additional barrier to the migrations.

Mitigation Measures

205. In total 5 animal crossings were requested for the Phase 1 of the Project which runs along 19 villages. The location of the 5 animal crossings were indicated by the Road Department of the Jamoats are at the following chainages (Road Department Chainage, not project chainage): Km 18+500, Km 31+200, Km 34+000, Km 43+600, Km 48+400. The facilities already exist but need to be upgraded. The crossing at km 43+600 is an old railway bridge. All other crossings are underpasses.

206. Some of the crossings need to be enlarged to also cater for crossing of agricultural machinery.

207. Depending on the situation and if it is not possible to design cattle underpasses, other mitigation measures will be specified as appropriate. Possible mitigation measures would be the provision of warning signs in accordance with relevant road safety standards. In addition, reflectors may be provided on trees in the critical sections and the road fenced near pastures.

3 Project road traversing the village of Obi_Shivo

208. The project is not expected to have significant negative socio-economic impacts. The rehabilitation of the road will be done using the existing alignment. However, due to the widening of the cross section there will be need for encroachment into private and public building structures and assets.

Mitigation Measure

209. The resettlement Specialist will prepare a LARP which is covering the assessment of loss and the compensation procedure.

4. Bridge/Culvert Rehabilitation

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

211. 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.

212. Regarding the bridge rehabilitation, clear distinction needs to be made between impacts of bridges that are subject to only rehabilitation and bridges that require partial or total reconstruction. For example: (i) bridges needing only rehabilitation and are in fair condition; (ii) bridges needing widening or partial reconstruction but which have enough loadbearing capacity are in satisfactory to poor condition; and (iii) bridges which need reconstruction for lack of loadbearing capacity are in poor condition. Bridges for rehabilitation may require corrosion treatment for rusted reinforcement structures, which can cause severe water pollution.

213. The largest bridge in Phase 1 is the one over the Kofarnigon river. The bridge still have enough bearing capacity but need to be reconstructed because of cross section widening. The existing bridge over Kofarnigon River will be rehabilitated. To the left side a new bridge will be reconstructed.

Mitigation Measures

214. The lower parts of the bridge embankment have to be protected against erosion. This will be done using protection plates to prevent the erosion process. Detailed design of the respective protection measure is presented in the technical design documentation for the respective bridges. An example of bridge slope protection is presented in the below figure.

Fig. 25: An example of bridge slope protection

B. CONSTRUCTION PHASE

1. Impacts due to site clearance activities

215. Site preparation and clearance includes stripping and temporary storage of top soil. If top soil is not properly managed it can lead to erosion, siltation, obstruction of water courses and drainage, and loss of top soil 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

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

217. To ensure proper soil management the contractor will submit a soil management plan prior to commencing this operation. This plan will include measures for minimizing water and wind erosion, measures to minimize loss of fertility in top soil, timeframes, haul routes, disposal sites, and a re-cultivation plan in case of new borrow pits need to be opened. 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 shall provide spoils stockpiles with grass cover.

2. Break up of old pavement layers and asphalt

218. The breaking up of the old pavement and asphalt layer will cause noise emissions, air emissions and vibrations. In addition a significant amount of spoil will be generated which will be reused in the subbase for the new pavement.

219. Air quality impacts, noise and vibration are temporary. Sources include construction machinery, dust generated from construction works, haul roads, exposed soils, and material stock piles. Noise is temporary and results from operating construction machines. Vibration is caused by operating of construction machinery and hauling of materials.

Mitigation Measures

220. Within settlements, of particular concern is the village of Obi Shifo a monitoring programme will be established for the construction stage. The parameters to be monitored are indicated in the Environmental Monitoring Programme.

221. For purpose of spoil reduction it is proposed to recycle construction materials. Recycled material from the existing pavement and special recycling techniques shall 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.

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

223. Prior to commencing the activities, the contractor will submit a waste management plan indicating detailed management of the waste produced in the project, including proper waste disposal sites.

3. Impacts due to earthworks

224. Particularly within the mountainous section of the road a significant amount of earthworks need to be conducted. The quantities for cut and fill for the 33.2 km section are as

follows: fill (695,000 m³) and cut (1,650,000 m^3). Therefore, the project will generate approximately 1,000,000 m³ of surplus spoil.

Mitigation Measures

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

226. For final disposal of surplus spoil suitable sites have been identified which are shown in chapter “III Description of the Project” under the headline “L Disposal Sites”. The identified sites have been agreed with the Ecological Department, Land Use System and Rudaki District Authority.

227. The contractor shall dispose the surplus material within the identified sites by adhering to the following measures for impact mitigation and erosion protection:

228. Any stockpile of disposed surplus material will be allocated at least 100 m distance from any water course and no woody vegetation shall 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, shall be sawn for stabilizing the disposed material.

4. Reconstruction of new pavement inclusive widening of existing road

229. The reconstruction activities cause air quality impacts, noise and vibration. The impacts are temporarily restricted to the construction phase. Sources include construction machinery, dust generated from construction works, haul roads, exposed soils, and material stock piles. Noise is temporary and results from operating construction machines. Vibration is caused by operating of construction machinery and hauling of materials.

230. 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.

231. Compaction of soil on especially agricultural land can lead to degradation of its fertility. There are agricultural lands along the length of both project road sections.

Mitigation Measures

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

233. 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) the contractor should utilize construction machinery with low emission levels.

234. Settlements next to the project road will be exposed to some degree of vibration, but it will be insignificant to settlements more than 50 m away from the road.

235. Negative effects of noise are mitigated by limiting construction work to 06.00 am - 9.00 pm within 500 m of settlements, and by limiting hauling traffic through settlements. A limit for maximum noise of 70 dB(A) is set and strictly enforced in the vicinity of sensitive receptors within settlements. 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).

236. Construction stage monitoring is conducted for air quality, noise and vibrations as described in the EMP.

5. Impacts from borrow areas

237. The impacts related to establishment of borrow pits are largely dependent on the need for opening new pits. The proposed borrow area for Phase 1 of the Project is in Kofarnigon river bed. The borrow area is already in operation and therefore environmental impacts concerning potential disfigurement of landscape, vegetation losses and damage to access roads are kept to a minimum.

238. The proposed borrow area in Kofarnigon River bed is located close to the Project road at about km 3.3 about 1km to the left of the Project road. The investigations and previous test results indicate that the naturally occurring granular material in the project area is in most cases suitable for fill, capping and sub-base construction but requires in most cases further processing (crushing and screening). The impacts from utilizing borrow areas include siltation or obstruction of water ways and dust emissions from hauling of materials.

239. If borrow activities within the riverbed come closer than 1 km to the bridge over the Kofarnigon river there is the potential risk that due to changes in hydrology the bridge foundations might be impacted because of erosion processes in the channel bed.

240. According to the map on ground water resources in the study area (Fig. 12) the ground water level where the proposed borrow area is located is ranging between 1 and 5 m below ground. In addition the upper layers are mainly gravel and sand and highly permeable which makes the ground water susceptible to pollution. An additional potential impact refers to the possible change of the direction of ground water flow within vicinity of the extraction site.

Mitigation Measures

241. The contractor will refrain from storing material near surface waters to prevent siltation or obstruction of water ways.

242. 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 submit an Construction EMP which addresses also site specific dust reduction measures, including transportation and post-closure rehabilitation of borrow sites.

243. The access to selected the borrow area in Kofarnigon River bed is via the project road. The contractor must include mitigation measures for dust pollution by the settlements along the way. The hauling traffic should be carried out only between 6.00 am and 9.00 pm.

244. For purpose of protection of bridge foundations from erosion processes due to changed hydrology any borrow activities with the Kofarnigon river bed shall not be closer to the bridge foundations than 1 km.

245. 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 may occur. In addition before starting material extraction the contractor will need to obtain the environmental permit from the CEP which may also include provisions for landscaping measures after finalization of the extraction activities.

6. Asphalt Plants and Aggregate Crushers

246. Impacts from asphalt plants include pollutant and odor emissions, possible water pollution from bitumen spills, and safety risks. The impacts can 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.

247. Air quality impacts are temporary. Sources include construction machinery, fugitive emissions from asphalt plants, aggregate crushers, and dust generated from construction works, haul roads, exposed soils, and material stock piles. Noise is temporary and results from operating construction machines. Vibration is caused by operating of construction machinery and hauling of materials.

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

249. In road rehabilitation the most severe possible water quality impact could come from spilled bitumen or any petroleum products used to thin it with. 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

250. 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 1000 meters or more.

251. Bitumen will not be allowed to enter either running or dry streambeds and nor can 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.

252. The contractor shall have provisions for spill and fire protection equipment and shall submit an emergency response plan (in case of spills, accidents, fires and the like) prior to operation of the plant, and asphalt plants shall not be located close to plantations and productive land.

253. Bitumen storage and mixing areas must be protected against spills and all contaminated soil must be properly handled according to legal environmental requirements. Such storage areas must be contained so that any spills can be immediately contained and cleaned up.

254. 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 Construction Supervision Consultant.

255. Both, asphalt plant and aggregate crusher are sources of emission of noise, vibrations and air pollutants. Therefore regular monitoring measurements shall be conducted at these facilities as described in the monitoring table of the EMP.

7. Bridge Reconstruction Works

256. The Phase 1 of the road crosses the Kofarnigon River. In addition within Obi Shifo an irrigation channel is crossed by a culvert.

257. 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.

258. The impacts of stockpiling of top soil 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. These mitigation measures prevent also the impacts of increased sediment load on surface hydrology. Settlement ponds must be implemented to places where construction activities come near the natural water courses.

259. When construction activities are being carried out on or in the vicinity of watercourses improper handling and storage of materials (concrete, asphalt, lubricants, fuels, solvents) 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.

260. Within the floodplain of the Kofarnoigon River the ground water table is shallow, ranging in between 1 and 5 meters below ground.

261. Possible impact on water quality of surface waters refers to the rivers that are crossed by the Project road. There is the potential risk of leakage of hazardous substances such as oil into the shallow ground water during bridge construction activities.

Mitigation Measures

262. 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, impermeable, and bunded area far away from surface waters.

263. Water quality monitoring shall be conducted during construction stage for the following parameters: pH, dissolved oxygen, sulfate (mg/l), NH4-N (mg/l) and oil products. Reference measurements shall be conducted prior to construction start, monitoring measurements shall than be conducted during construction stage on a quarterly basis. At Kofarnigon River the monitoring locations shall be 500 m up- and downstream the bridge. Within the irrigation channel that is crossed in Obi Shivo the location for water sampling shall be 100 m up- and downstream the bridge.

264. 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 need to present a method statement on this.

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

266. The contractor shall 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 shall be submitted to the Construction Supervision and PIU.

267. Therefore storage of any hazardous construction material needs to be on sealed surfaces only in order to prevent leakages into the groundwater.

8. Operation of Working Camps

268. To mitigate the construction camp related impacts, the contractor shall arrange the facilities, services, and water supply of the work camp so that it won't compete on the same resources with nearby communities. The contractor shall 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.

269. 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.

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

271. 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 health, and safety specialist to address such concerns in the work sites. The specialist shall also liaise/work with the nearby communities when it is necessary for mitigation of health and safety concerns.

Mitigation Measures

272. Prior to construction works, the contractor shall provide a comprehensive Construction EMP covering the aspects that are described in the chapter "Environmental Management Plan".

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

274. Prior to commencing operation the contractor shall indicate proper sources of drinking and construction water which won't compete with local needs. This will be done together with local authorities.

275. For health and safety protection of workers and adjacent communities the following shall 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 protection equipment 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.

276. 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 shall be taken into consideration when deciding the place for the camp.

277. The contractor shall hire a qualified health and safety expert who will provide safety training to the staff according to the requirements of the individual work place. Prior to the commencement of works, the work site personnel shall be instructed about safety rules for the handling and storage of hazardous substances (fuel, oil, lubricants, bitumen, paint etc.) and also the cleaning of the equipment. In preparation of this the contractor shall establish a short list of materials to be used (by quality and quantity) and provide a rough concept explaining the training / briefing that shall be provided for the construction personnel.

278. The contractor shall 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.

279. 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 construction supervision consultants employed under the Project.

9. Traffic Impacts

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

281. 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

282. Prior to commencing operations the contractor shall 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.

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

284. The contractor shall enhance traffic safety by providing adequate signalization, lighting, traffic safety signs, barriers and flag persons for traffic control. Adequate training shall be provided to the workers on traffic control prior to commencing operations.

285. The contractor shall 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.

C. OPERATIONAL PHASE

1. Population and Communities

Potential impacts

286. *Settlement patterns*. No significant changes in settlement patterns are anticipated as a result of proposed road upgrading.

287. *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.

- *Split communities*. As the project will upgrade the road from 2 to 4 lane with separation it can cause split communities, and create obstacles for farmers and villagers in accessing their fields, etc.

- *Impacts on Current Modes of Transport*. As the project will upgrade the road category to the one with higher speed limit it can impede road crossings, restrict parking of informal public transport vehicles and reduce the attractiveness of current transport modes such as cartage.

- *Impacts on Bypassed Communities.* No bypasses are included in the project.

- *Impacts on Tourism*. The project could a positive impact on the tourism potential of the areas served by the improved roadways.

- *Impacts Related to Culture Shock*. Rapid exposure of isolated communities to increased communication and contact with the outside world may lead to significant

community impacts referred to as “culture shock”. No significant impacts of this nature are anticipated as a result of the project.

Mitigation Measures

288. In order to preserve the cohesion of the community the project design will make provisions for improved crossings and alternative crossings such as intersections, overpasses, and at grade crossings.

2. Traffic impacts

289. The proposed project will result in better road condition, increased speed of vehicles, and the increase of traffic volumes along the Dushanbe – Kurgonteppa road. This will lead to such impacts as elevated emissions and noise levels, and increased risk of accidents with possible result in spilled pollutants. As described in the environmental baseline chapter the only village traversed by the Project road within Phase 1 is Obi Shivo. In order to assess noise impacts during operational Phase noise levels within Obi Shivo were calculated by using the software “Soundplan” for the expected opening year 2020 and in addition for the year 2030. The calculation was conducted for day and night time. The results are shown in the below maps.

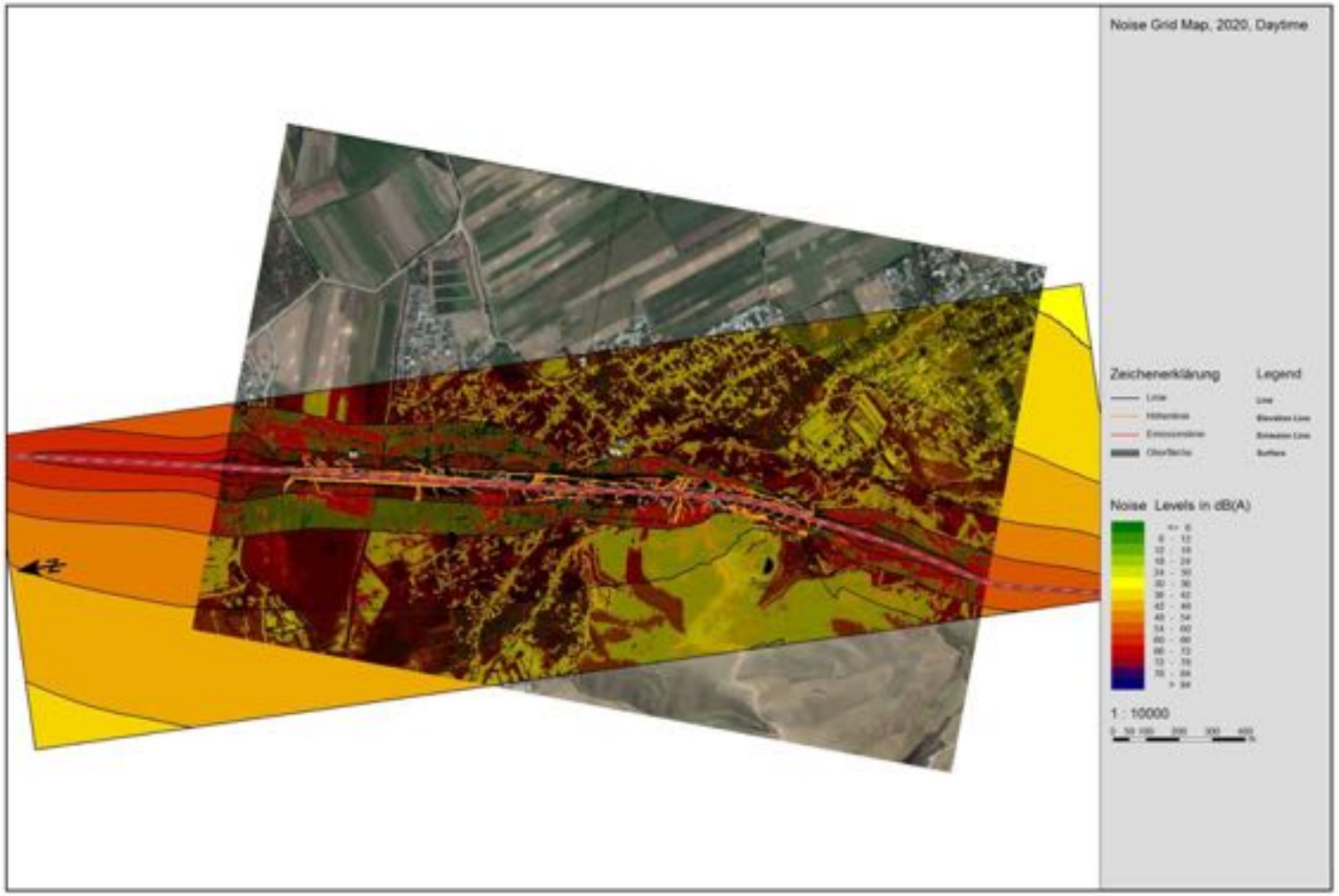


Fig. 26: Daytime noise levels in Obio Shivo for the year 2020

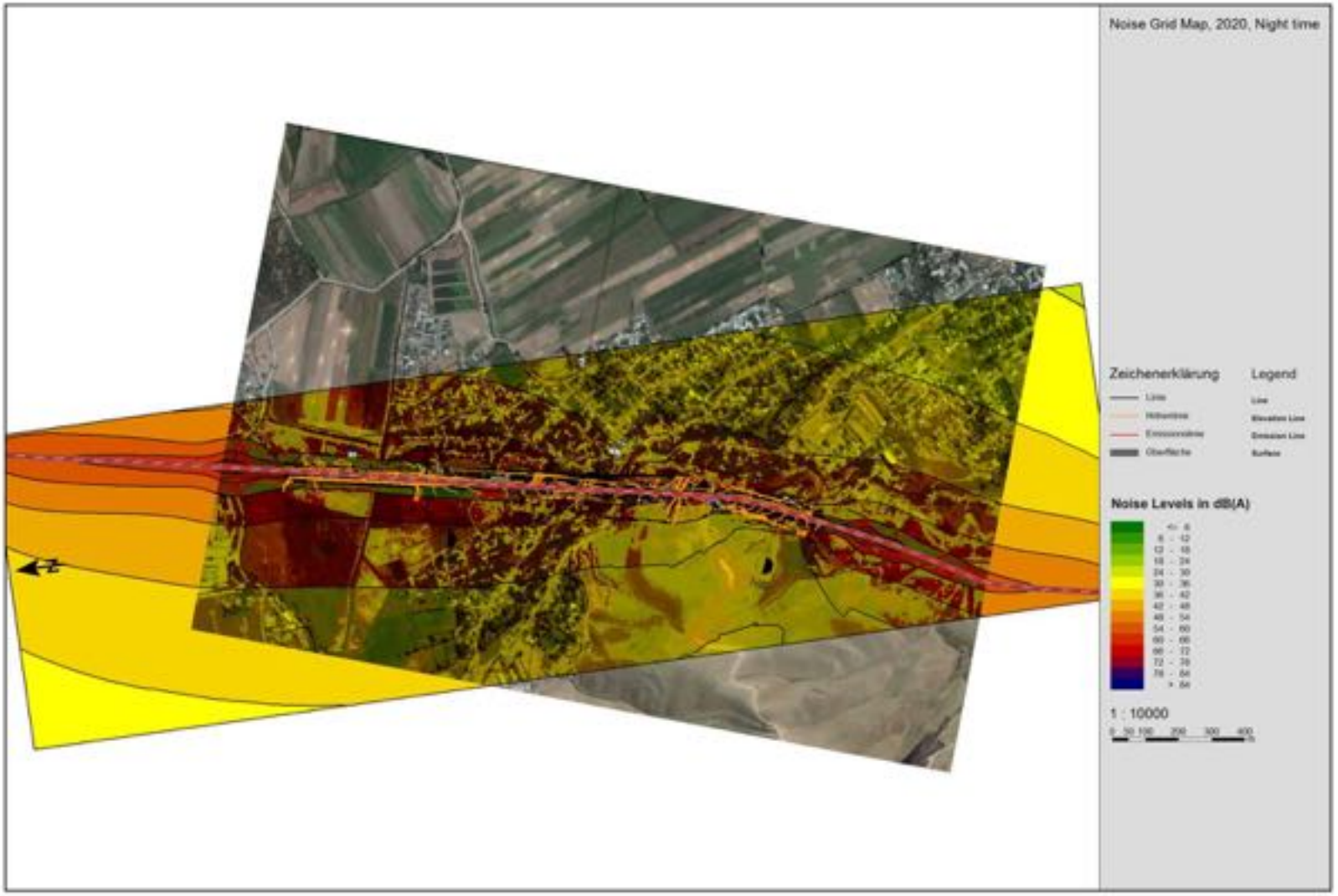


Fig. 27: Night time noise levels in Obi Shivo for the Year 2020

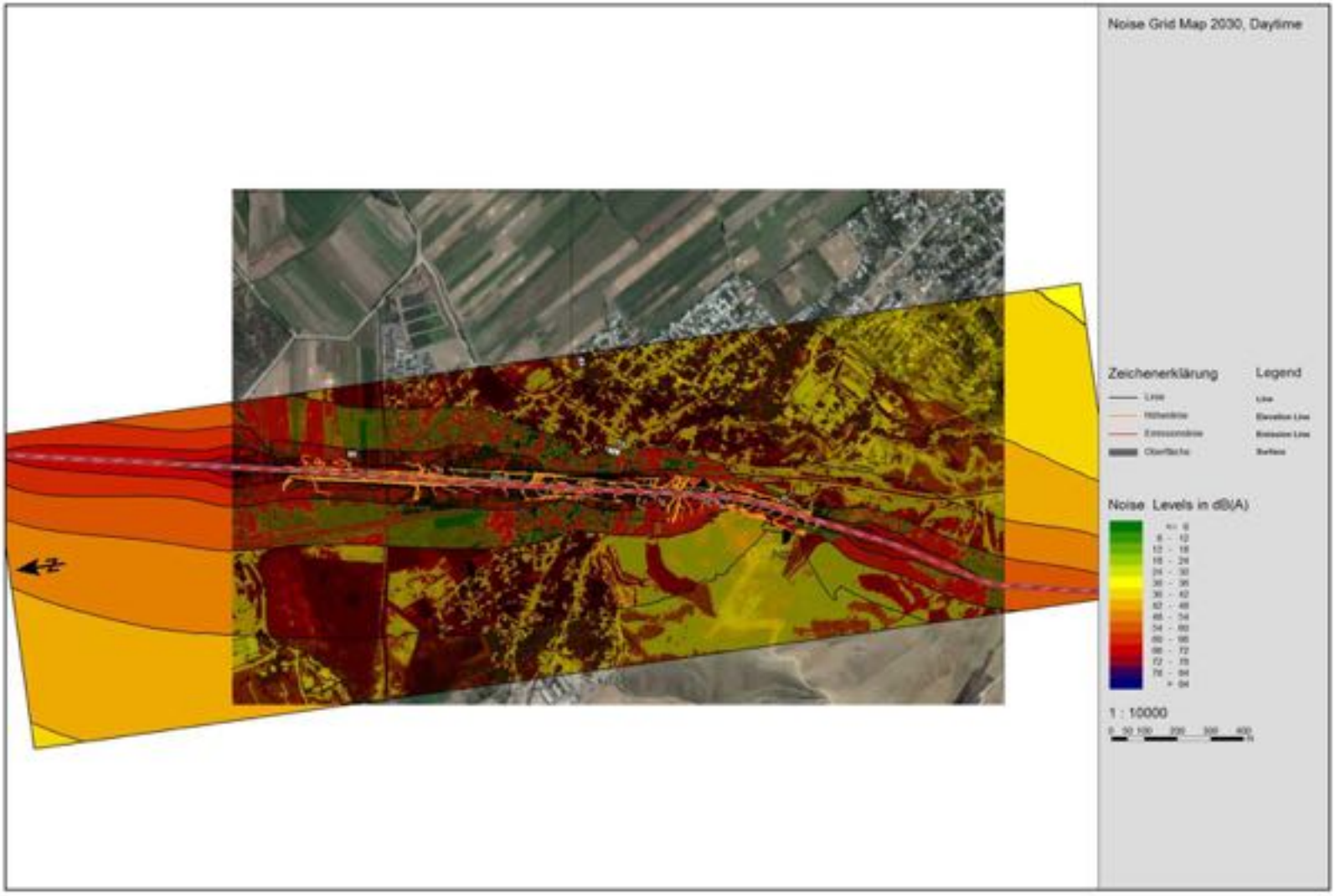


Fig. 28: Day time noise levels in Obi Shivo for the Year 2030

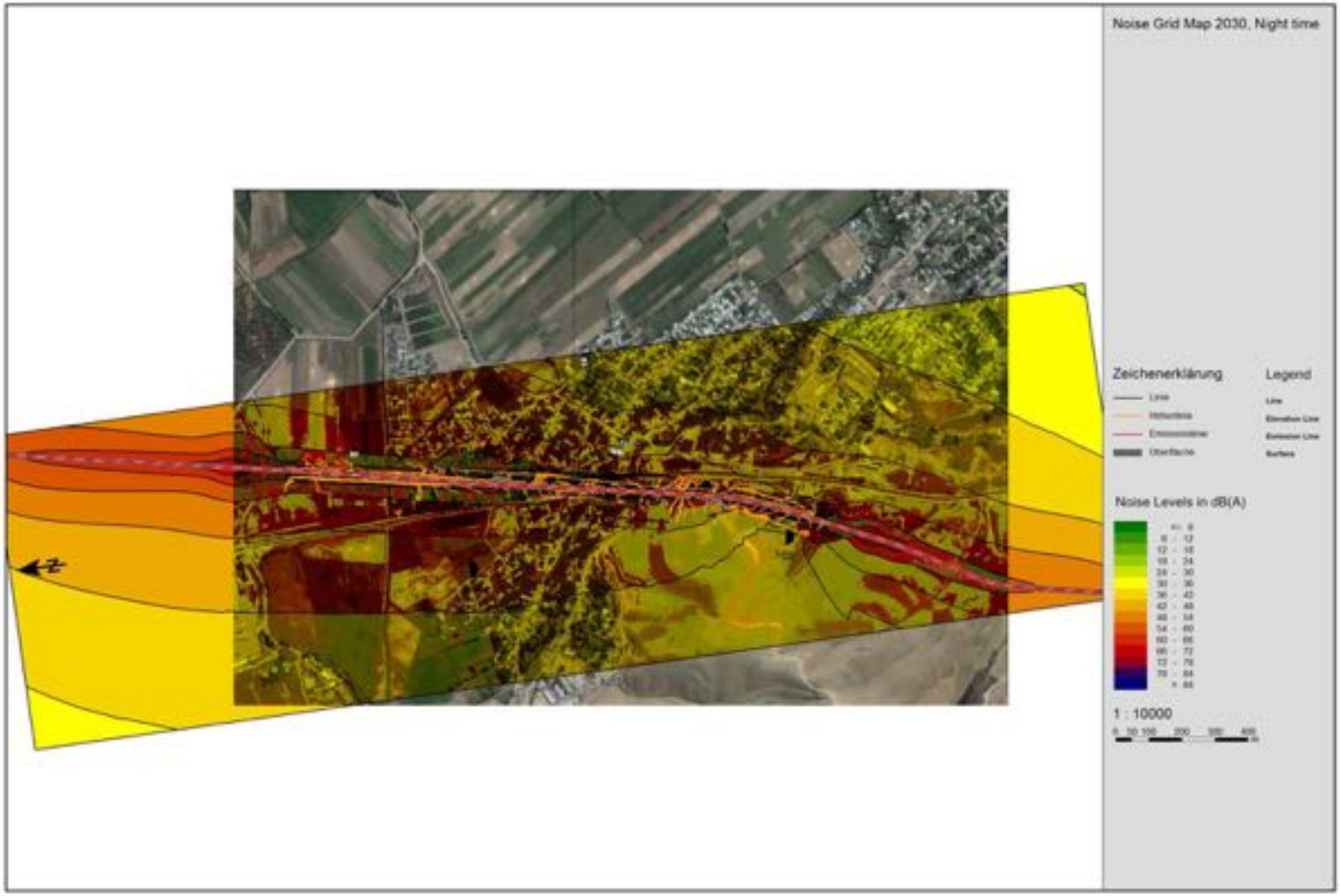


Fig. 29: Night time noise levels in Obi Shivo for the Year 2030

290. The above maps show the contour lines for different noise levels in dB (A). Based on the type of the respective noise affected building the classification of a measured noise level will differ. A value that is considered as “high impact” for a hospital can be still considered “low impact” for a manufactory shop. Therefore calculated noise impacts shown in the above maps were analyzed with regard to the identified sensitive receptors in Obi Shivo. The results are shown in the below table.

Tab. 27 Noise Impacts on Sensitive Receptors in Obi Shivo (Year 2020 and Year 2030)

	Day time		Night time	
Sensitive Receptor	Noise Standard (max)	Noise Level 2020 (est.)	Noise Standard (max)	Noise Level 2020 (est.)
School	55 dB (A)	52,5 dB (A)	45 dB (A)	n/a
Medical Center	55 dB (A)	51,5 dB (A)	45 dB (A)	n/a (para 292)
Mosque	55 dB (A)	44,7 dB (A)	45 dB (A)	37,7 dB (A)

	Day time		Night time	
Sensitive Receptor	Noise Standard (max)	Noise Level 2030 (est.)	Noise Standard (max)	Noise Level 2030 (est.)
School	55 dB (A)	54,0 dB (A)	45 dB (A)	n/a
Medical Center	55 dB (A)	53,0 dB (A)	45 dB (A)	n/a (para 292)
Mosque	55 dB (A)	46,2 dB (A)	45 dB (A)	39,0 dB (A)

291. According to “SanPin 2.2.4/2.1.8.562-96” noise emissions for areas immediately surrounding schools and other educational institutions should not exceed 55 dB (A) during day time (07:00-23.00). According to the conducted noise forecasts, emissions would comply with these standards by 2030.

292. The medical center needs to be classified as a policlinic with ambulant treatment only. Therefore, according to SanPin 2.2.4/2.1.8.562-96 noise emissions should not exceed 55 dB (A) during day time (07:00-23:00) and 45 dB (A) during night time. Because the policlinic has no bedrooms and also because there are no patients at night, the night standards are not considered to be a critical issue for the medical center. According to the conducted noise forecasts, emissions would comply with these standards by 2030.

293. Based on the results of the noise forecast, it is recommended to monitor the future traffic volumes and consider installation of noise protected windows in the school building, the medical center, and residential buildings where appropriate.

294. Other alternatives such as acoustic screens and tree belts were also considered but were not found suitable under the given conditions in Obi Shivo. Acoustic screens usually are not installed within urban areas or villages due to the damaging effect they have on the overall appearance of the scenery. Vegetation belts only have a limited effect on noise reduction. Especially under the given conditions within the village of Obi Shivo the available space is too narrow to establish a noise reducing vegetation belt. Therefore the option “noise protected windows” is preferred.

295. Road safety features such as speed control signs, proper road markings, streetlights, pedestrian crossing, livestock crossings and other visual means must be provided to the road.

3. Damages to Drainage and Erosion

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

Mitigation Measures

297. These 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. Warranty from the side of the contractor is for 1 year. After this year maintenance and repair, if required have to be done MoT.

D. Positive Impacts

298. There are many positive impacts associated with the Project. Main positive impacts refer to accessibility, regional cooperation and community impacts.

1. Accessibility and Regional Cooperation

299. The improvement of the Dushanbe – Kurgonteppa road is extremely important for a landlocked country such as Tajikistan It provides access to domestic and regional markets. It will help provide services throughout the country and generation of employment is also enhanced. In addition it is the most important direct surface link between Dushanbe and Afghanistan.

2. Community Impacts

300. Proposed improvements in the road carrying capacity and surface condition are expected to facilitate movement of people, produce, and products along these established travel corridors. Local residents will benefit from easier access to the market place and improved traffic safety. Manufacturers and processors will benefit from more reliable transportation links between suppliers of raw materials and major markets both within and outside the immediate area. Consumers may be able to more readily access these markets to obtain goods that were

previously unobtainable or prohibitively expensive. Within the project area many agricultural households cultivate fruits and vegetables for sale in local markets. The project road is crucial for transporting these products to market where they can be sold to consumers. The project will help alleviate poverty by facilitating transport of produce to more distant markets where grower can receive higher prices.

E. Cumulative Impacts

301. 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 Phase 1 and Phase 2 together, including all the ancillary facilities such as temporary diversions, access roads, borrow areas and disposal sites for surplus material. It thus integrates the identified impacts of Phase 1 and Phase 2 and analyses the social and environmental implications regarding the area of influence when both Project components are considered together.

302. As an example the impacts associated with the implementation of contractor's yard are assessed. Cumulative impacts may arise regarding the potential spread and increase of transmissible diseases due to a significantly larger workforce within the Project area of influence.

303. There are also positive cumulative impacts when considering both Project phases and their ancillary facilities like increased spending capacity.

304. In general it can be concluded that most of the identified Phase 1 specific impacts, positive and negative, will aggravate when assessed together. This is because additive, multiplicative and synergetic effects might occur.

IX. ENVIRONMENTAL MANAGEMENT AND MONITORING

A. INSTITUTIONAL REQUIREMENTS

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

306. The Construction EMP must be submitted within 30 days of the contract award and Preconstruction and Construction cannot commence until the Construction EMP is approved by the MoT and the Engineer.

307. The Bid Documents for the potential Contractor(s) shall 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 EMP and that he should prepare his own Construction EMP for the Project. Secondly, the EMP of the IEE shall 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 and Construction) and help him put costs to his proposal (such as costs for noise monitoring, etc).

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

309. The Contractor(s) will be responsible for the preparation of the Construction EMP. The preparation of the Construction EMP 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.

310. During the Construction phase the Contractor must retain the expertise of an Environmental Officer (EO) to update the SSEMP and to oversee and report on the operation throughout the contract period. The EO should be full-time member of contractor's staff.

311. The Construction Supervision Consultant team will include a national and international Environmental Specialist to ensure that the Contractor is compliant with his environmental obligations. Specifically, the Engineer should be responsible for preparing a monthly environmental report outlining the Contractors environmental performance during that period. The national specialist shall be engaged on a full time basis to undertake day to day monitoring of the contractors activities. He will be assisted by the International specialist who will provide intermittent inputs.

B. Environmental Management Plan

312. 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.

313. 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.

314. The EMP consists of two tables. Table 1 summarizes the environmental mitigation measures, and table 2 describes the environmental monitoring requirements. At the end is a statement which includes the timeframes and responsibilities for carrying out the environmental monitoring.

Tab. 28 Summary of Environmental Mitigation Measures

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION				
Activity / Location	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
DETAILED DESIGN PHASE				
Road alignment in areas of tree plantations. There is a considerable number of tree losses involved.	In some cases, tree losses that cannot be prevented. Main species are pines, cypresses, elms, poplars, willows and robinia.	Any tree losses are compensated by new plantations in the amount of 1 . Plantations shall be conducted after technical works have been completed. Planting time shall be restricted to spring (March till April) and/or autumn (September till October). Locations for tree plantings are within the existing Right of Way (RoW) at the locations where tree losses occur. Trees to be planted shall have the following parameters: 1,5 – 2 m height, age 5 – 6 years. Distance in between individual trees shall be 6 – 8 m. Species: pines, cypresses, elms, poplars, willows, walnuts and robinia	Design Consultant	PIU
Rehabilitation and/or replacement of existing culverts, implementation of new culverts?	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.	In the course of the road rehabilitation all existing culverts will be replaced. All culverts are sufficiently dimensioned in order to prevent any damages or blockages to the existing local irrigation systems.	Design Consultant	PIU
Reconstruction of bridge over Kofarnigon River	Potential water erosion processes at bridge and river embankments.	Design of erosion protection measures at lower parts of bridge embankments. Prefabricated concrete protection plates prevent erosion processes at the lower and lateral parts of bridge and river embankments. Detailed design of the respective protection measure is drafted in the technical design documentation for the respective bridges.	Design Consultant	PIU

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION				
Activity / Location	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
Road traversing through Obi-Shifo village in Rudaki district	Project road is traversing village of Obi-Shifo in Rudaki district. Current cross section is too narrow for 4 lanes. If standard cross section is implemented than there is encroachment in environmental structures and private and social property assets (tree losses, masonry retaining wall, private yards, building structures). Trees are pines and poplars.	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.	Executive Agency of the PIU	PIU
Road traversing alongside a cut slope of soft unconsolidated material which serves as a nesting site for various bird species.	Loss of nesting sites of various bird species as for instance the rose starling, barn sparrow and Indian starling	Design consultant will investigate possibility of widening the cross section to the opposite site. If this is not possible the construction works at this section shall consider nesting season.	Design consultant	PIU
Road traversing cattle crossings	Accidents because of collision with cattle	Design of cattle crossings or improvement of safety of existing crossings.	Design Consultant	PIU
CONSTRUCTION PHASE				
Top soil preservation	Loss of top soil.	Removing of top soil occurring within site clearing corridor. Topsoil shall be removed and stored for reuse. Long-term stockpiles of topsoil will immediately be protected to prevent erosion or loss of fertility. For erosion protection it will be sawn with a fast growing vegetation, e. g. grass	Contractor	Construction supervision (CS)
Disposal areas for stockpiling demolished pieces of structures, surplus soil, pieces of asphalt pavements etc.	Loss of valuable ecological structures if the selected disposal sites are not carefully selected.	No agricultural area or river floodplain shall be selected as disposal site. Minimum distance to any watercourses must be at least 100 m. Disposal sites shall be preferably on barren land without any wooden vegetation.	Contractor	Construction supervision (CS)
Road alignment in areas of tree plantations. Embankment filling of the tree stem area.	Tree losses due to embankment fill.	A maximum fill up of the tree stem area of 30 cm can be accepted. Fill up material in the tree stem area has to be organic soil. A filling up of more than 30 cm will damage the tree. In this case cutting can't be prevented and a new tree is to be planted as a compensation measure at the respective location within the existing RoW.	Contractor	Construction supervision (CS)

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION				
Activity / Location	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
		Species to be planted are pines, cypresses, elms, poplars, willows, walnuts and robinia Plantings shall be conducted after technical works have been completed. Planting time shall be restricted to spring (March till April) and/or autumn (September till October). Quality of newly to be planted trees shall be 16 to 18 cm of stem circumference in 1 m height.		
Bottom of embankment of designed road lying very close to tree rows	Potential damaging of trees during construction activities	Implementation of a temporary vegetation protection fence during construction activities.	Contractor	Construction supervision (CS)
Construction activities nearby valuable surface waters, in particular Kofarnigon and Dahanakiik River	Possible alteration of surface water hydrology resulting in increased sediment by increased soil erosion at construction site	Implementation of settlement ponds at locations where construction site comes close to natural watercourses to retain sediments and mitigate possible impacts on water hydrology. Oil and solid waste management need to be described in the SSEMP and consider these sensitive receptors (rivers and their floodplains). No campsite is allowed near river floodplains.	Contractor	Construction supervision (CS)
Operation of borrow areas and quarries	Potential disfigurement of landscape, vegetation losses and damage to access roads Increased dust emission Siltation and obstruction of surface waters	The proposed borrow area in Kofarnigon is already in operation. Therefore environmental impacts concerning potential disfigurement of landscape, vegetation losses and damage to access roads are kept to a minimum. Wet aggregates and/or provide cover on haul trucks to minimize dust emission and material spillage. Locate stockpiles away from surface waters. Prior to start material extraction the contractor submit his SSEMP through the Construction Supervisor (CS) to the Executing agency of the PIU indicating the location of the proposed extraction site as well as rehabilitation measures	Contractor	Construction supervision (CS), PIU

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION				
Activity / Location	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
		and implementation schedule for the borrow areas and access roads. Rehabilitation measures may not be necessary for borrow areas still in operation after road works have finished. The SSEMP needs to address the sensitive issues of avoidance of transportation through residential areas as far as technically feasible and closure rehabilitation.		
Operation of aggregate crusher	Increased dust emission and noise emission	Careful site selection of aggregate crusher in order not to interfere with any sensitive receptor. Distance to next settlement and residential houses at least 1000 m downwind. Site selection for aggregate crusher has to be approved by the PIU..	Contractor	Construction supervision (CS), PIU.
Operation of asphalt plant	Odor emission and safety risks	Asphalt plants shall be 1000 m downwind from any settlements and residential houses. Provide spill and fire protection equipment and submit an emergency response plan (in case of spills, accidents, fires and the like) to the authority in responsibility prior to operation of the plant. Secure official approval for installation and operation of asphalt plants from MoT.	Contractor	Construction supervision (CS), Executing agency of PIU.
	Water pollution due to spilled bitumen	Bitumen will not be allowed to enter either running or dry streambeds nor shall 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 according to legal environmental requirements. Such storage areas must be contained so that any spills can be immediately contained and cleaned up.	Contractor	Construction supervision (CS)
Site selection, site preparation and operation of contractor's	Potential soil and water pollution	The contractor shall submit documents for approval (short statement and site plan in	Contractor	Construction supervision

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION				
Activity / Location	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
yard		appropriate scale) which indicate: • Site location, surface area required and layout of the work camp. The layout plan shall also contain details of the proposed measures to address adverse environmental impacts resulting from its installation. • Sewage management plan for provision of sanitary latrines and proper sewage collection and disposal system to prevent pollution of watercourses; • 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; • 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. Prior to the commencement of works the site installations shall be inspected for approval. The selected site will not be on top of ground water area or near surface waters.		(CS); Safeguard Department in IPIG of MoTC
	Competition for water resources	Prior to establishment of the work camps, conduct consultations with local authorities to identify sources of water that will not compete with the local population.	Contractor	Construction supervision (CS)
Site selection, site preparation and operation of contractor's yard (continuation)	Health and safety risks to workers and adjacent communities	For health and safety protection of workers and adjacent communities the following shall be provided: • adequate health care facilities (including first aid facilities) within construction sites;	Contractor	Construction supervision (CS); PIU

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION				
Activity / Location	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
		• training of all construction workers in basic sanitation and health care issues, general health and safety matters, and on the specific hazards of their work; • personal protection equipment for workers, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection in accordance with legal legislation; • clean drinking water to all workers; • adequate protection to the general public, including safety barriers and marking of hazardous areas; • safe access across the construction site to people whose settlements and access are temporarily severed by road construction; • adequate drainage throughout the camps so that stagnant water bodies and puddles do not form; • sanitary latrines and garbage bins in construction site, which will be periodically cleared by the contractors to prevent outbreak of diseases. Where feasible the contractor will arrange the temporary integration of waste collection from work sites into existing waste collection systems and disposal facilities of nearby communities;		
Work site operation / Operation of equipment maintenance and fuel storage areas	Worker's health and soil / water pollution	The contractor shall hire a qualified health and safety expert who will provide safety training to the staff according to the requirements of the individual work place. Prior to the commencement of works, the work site personnel shall be instructed about safety rules for the handling and storage of hazardous substances (fuel, oil, lubricants, bitumen, paint etc.) and also the cleaning of the equipment. In preparation of this the contractor shall establish a short list of materials to be used (by quality and quantity) and	Contractor	Construction supervision (CS); EA of PIU.

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION				
Activity / Location	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
		provide a rough concept explaining the training / briefing that shall be provided for the construction personnel. Locate storage facilities for fuels and chemicals away from watercourses. Such facilities will be bounded and provided with impermeable lining to contain spillage and prevent soil and water contamination. Store and dispose waste/used oil consistent with environmental legal requirements. Work site restoration: After completion of construction works the contractor shall execute all works necessary to restore the sites to their original state (removal and proper disposal of all materials, wastes, installations, surface modeling if necessary, spreading and leveling of stored top soil).		
Operation of construction camp	Road construction projects bear a high potential risk to affect local communities and the health and well-being of those that live in or near to the temporary work camps by supporting the spread of 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.	Providing information to workers, encouraging changes in individual's personal behavior and encouraging the use of preventive measures. The goal of the information is to reduce the risk of HIV / STD transmission among construction workers, camp support staff and local communities.	Contractor	Construction supervision (CS), Ministry of Health
Earth works and various construction activities	Loss of topsoil	Topsoil shall be removed and reused to cover areas where excess materials will be dumped and on road embankments. In addition a soil management plan shall be provided 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.	Contractor	Construction supervision (CS)
Earth works and various construction activities	Siltation of surface waters and/or impact on soils due to improper disposal of	Mostly all excavated material will be reused. In addition the reclaimed asphalt pavement will be	Contractor	Construction supervision (CS)

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION				
Activity / Location	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
(continuation)	excess materials	recycled for the construction of new pavement. Thus potential impacts due to the need for disposal of excess material will be kept to a minimum.		
	Competition for water resources	Conduct consultation with local authorities to identify sources of water (for spraying and other construction requirements) that will not compete with the local population.	Contractor	Construction supervision (CS)
	Air pollution due to exhaust emission from the operation of construction machinery	The contractor will maintain construction equipment to good standard and avoid, as much as possible, idling of engines. Banning of the use of machinery or equipment that cause excessive pollution (e.g., visible smoke).	Contractor	Construction supervision (CS)
	Disturbance of adjacent settlements due to elevated noise levels	Restrict work between 06.00 am to 9.00 pm within 500m of the settlements. In addition, a limit of 70 dBA will be set in the vicinity of the construction site and strictly followed. In addition the following measures need to be implemented: Noise control at source (using less noisier equipment, mufflers, dampeners, enclosures, proper maintenance of equipment, providing training to operators, etc), noise control at path (using natural structures with screening properties and acoustic barriers).	Contractor	Construction supervision (CS)
	Soil compaction due to operation of heavy equipment	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	Construction supervision (CS)
Earth works and various construction activities (continuation)	Traffic impairment	Submit a traffic management plan to local traffic authorities prior to mobilization. Provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions Allow for adequate traffic flow around construction areas.	Contractor	Construction supervision (CS), EA of PIU.

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION				
Activity / Location	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
		Provide adequate signalization, appropriate lighting, well - designed traffic safety signs, barriers and flag persons for traffic control.		
Within settlements, encroachment into private and residential land	Dislocation or involuntary resettlement of people.	Resettlement Specialist will issue LARP covering assessment of loss and compensation procedure.	EA of PIU	EA of PIU
Within settlements, encroachment on business assets and / or Disturbance to business, people, activities and socio-cultural resources due to construction work	Loss of businesses and income of people operating their business within the existing RoW	Resettlement Specialist will issue LARP covering assessment of loss and compensation procedure. In addition the following mitigation measures shall be implemented: Inform all residents and businesses about the nature and duration of work well in advance so that they can make necessary preparations Limit dust by removing waste soil quickly; by covering and watering stockpiles, and covering soil with tarpaulins when carried on trucks Increasing workforce and use appropriate equipment to complete the work in minimum time in the important areas Avoid construction work in sensitive times like festivals near religious places	EA of PIU	EA of PIU
Within settlements disproportionate encroachment on poor people's assets.	Loss of wealth and property of poor people. Poor and vulnerable households might be affected.	Resettlement Specialist will issue LARP covering assessment of loss and compensation procedure.	EA of PIU	EA of PIU
Construction activities in close vicinity to existing infrastructure such as water supply pipes and other facilities, waste water discharge facilities, electricity lines etc.	Damage to infrastructure, supply cuts of infrastructure services.	Measures will be ensured in engineering designing to avoid any disturbance to the existing infrastructure. Prior to construction start the respective service agencies shall be informed about the construction work. Coordinate with respective agencies and provide prior information to the public in case of any required disruption in services during construction	Contractor	Construction supervision (CS); PIU

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION				
Activity / Location	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
Rehabilitation works within villages settlements and along sensitive receptors such as schools and hospitals.	Noise exceeding applicable noise standards. Vibrations may result in damage to local infrastructure, including private property and local (haulage) roads. In phase 1 of the project no mosque, school, kindergarten or hospital is located closer than 50 m to the road corridor.	For sensitive receptors such as schools and hospitals applicable noise standards shall be complied with as far as technically feasible by means of noise measurements and in case of exceed of standards, ascribe of time restrictions for construction activities between 6 am and 6 pm. For potential damages to local infrastructure, including private property and local (haulage) roads, compensation procedures will have to be established prior to the beginning of construction and approved by the engineer. In addition grievance redress procedures shall be put in place to facilitate communication between the contractor and potentially affected people. In addition haul routes and construction site access roads should be discussed and jointly approved between the contractor and local officials to minimize the risk of conflicts.	Contractor	Construction supervision (CS); PIU.
Construction activities close to building structures, particularly within village of Obi Shivo, close to bazars and gasoline stations. Aggregate extraction. Haulage of aggregates and construction equipment.	Potential Impact on Community Health and Safety	a. The community members will be advised on road safety with the key messages reinforced with communities throughout construction. b. Clear signs will be placed at construction sites including borrow pits, in view of the public, warning people of potential dangers such as moving vehicles, hazardous materials and excavation and raising awareness on safety issues. c. Heavy machinery will not be used after day light and all such equipment will be returned to its overnight storage area/position before night. d. All sites including storage areas will be made secure, prohibiting access by members of the public by fencing when appropriate.	Contractor	Construction supervision (CS); PIU.

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION				
Activity / Location	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
		e. Install barriers to keep pedestrians away from hazardous areas such as constructions sites and excavation sites. f. Install signage at the periphery of the construction site advising road users that construction is in progress. g. Strictly impose speed limits on construction vehicles along residential areas and where other sensitive receptors such as schools, medical places and other populated areas located. h. Provide security personnel in hazardous areas to restrict public access. j. If necessary, provide safe passageways for pedestrians crossing the construction site and for people whose access has been disrupted due to construction woks.		
Utilities Provision All sites where utilities will be interrupted	Potential impact on community health and safety	a. The affected people will be consulted during project implementation and will make the project contractors aware of any significant issues resulting from loss of electricity. b. People will be informed in advance of any power cuts and the duration of the cut will be made clear in order that they can plan around the lack of power.	Contractor	Construction supervision (CS); PIU.
Traffic Management. All construction sites	Potential impact on community health and safety	a. Implement a traffic management plan that will set out how access along the project road will be maintained safely during construction. b. Provide clear signs to guide road users and advise them on changes to road priorities in order to make their journey as smooth as possible and to ensure road safety as unanticipated changes e.g. change of lane, will be avoided. c. Ensure access in areas to be closed	Contractor	Construction supervision (CS); PIU.

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION				
Activity / Location	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
		temporarily by providing temporary/alternative access.		
Possible damage to properties and community facilities. Construction sites.	Community Health and Safety impacts	a. Immediately repair and/or compensate for any damage caused by construction works and activities to existing communities and their property and facilities b. Maintain access roads used for transport of construction materials and other construction related activities are maintained to ensure that they remain in at least in their pre-project condition for the duration of the project.	Contractor	Construction supervision (CS); PIU.
OPERATION PHASE				
4-lane road passes through Obi Shivo village	Within this section noise levels during operational phase might exceed the standards at identified sensitive receptors (school, medical center and residential buildings nearby the <Project road).	Based on the results of the noise forecast it is therefore recommended to monitor the future traffic development and consider installation of noise protected windows in the school building, the medical center and residential buildings	PIU	PIU
Increased traffic flow	Elevated levels of gaseous and noise emissions due to increased traffic. In addition increased pedestrian vs. vehicle accidents due to traffic volume and higher speed as a result of improved road design	Integrate in the engineering design safety features such as speed control signs, proper road markings, streetlights, pedestrian crossing, livestock crossing and other visual means.	Design Consultants	Construction Supervision (CS)
Increased traffic volumes and higher vehicle speeds	Increased risk of accidents with possible spills of harmful substances	Spill-contingency plan A contingency plan or emergency response plan is a set of procedures to be followed to minimize the effects of an abnormal event on the Project roads, such as a spill of oil, fuel or other substances that may harm drinking water resources or have adverse effects on the natural balance of sensitive areas. Additional measures to mitigate risk of accidents and spill of harmful substances are speed control and weight stations.	PIU	PIU
Damaged drainage or uncontrolled erosion.	Harmful environmental impacts resulting from damaged drainage or uncontrolled erosion.	Routine monitoring of drainage and erosion control at least twice a year.	EA in PIU	EA in PIU

315. Prior to construction works, the contractor shall provide a comprehensive Construction EMP covering the following aspects:

- Dust management which shall include schedule for spraying on hauling and access roads to construction site and details of the equipment to be used
- Layout of the work camp and details of the proposed measures to address adverse environmental impacts resulting from its installation
- Sewage management including provision of sanitary latrines and proper sewage collection and disposal system to prevent pollution of watercourses
- Waste management 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
- 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
- Soil 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 top soil, timeframes, haul routes and disposal sites for excess materials.
- Emergency response plan (in case of spills, accidents, fires and the like) prior to operation of the asphalt plant
- 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

316. The Construction EMP shall be submitted by the contractor for approval to the Construction Supervision Consultant

C. Environmental Monitoring Plan

317. Environmental monitoring is an important aspect of environmental management during construction and operation stages of the project to safeguard the protection of environment. During construction, environmental monitoring will ensure the protection of embankment from potential soil erosion, borrow pits restoration, quarry activities, location of work sites, material storages, asphalt plants, community relations, and safety provisions. During operation, air, noise, and surface water quality monitoring will be important parameter of the monitoring program.

318. The parameters to be monitored are outlined in the following plan. The client shall supervise the road project regularly, and submit quarterly reports based on the monitoring data and laboratory analysis report.

Tab. 29 Environmental Monitoring Plan

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored?	When is the parameter to be monitored? Frequency	Institutional responsibility
Construction stage					
Water quality in surface waters (rivers). For phase 1 this refers to Kofarnigon river and the irrigation channel in Obi Shifo.	pH, dissolved oxygen, oil products, turbidity, total suspended solids, conductivity, temperature, lead	Downs and upstream where the Project road crosses the rivers. For Kofarnigon river 500 m and for the irrigation channel in Obi Shifo 50 m up and downstream the existing bridge.	Measurement either directly in river water with a suitable measurement device or sample taking and measurement in a certified laboratory	Baseline measurements before construction activities commence. Than measurements on a quarterly basis during construction stage.	SC (Supervision Consultant) and EA of PIU.
Noise Rehabilitation works within settlements at locations where the Project road runs close to sensitive receptors such as schools, hospitals, mosques, bazars or other sensitive socioeconomic infrastructure.	Measurement of noise and vibrations-	Locations for noise measurements are within the village of Obi Shifo, between km 6+00 and 6+500 (one measurement at 6+000, 6+250 and 6+500 respectively).	By means of portable noise / vibration measurement device	Prior to construction and during construction activities. Establishment of baseline conditions before construction start. Than monitoring measurements on a quarterly basis during construction stage. Second round of baseline monitoring measurements to be conducted before construction start. Than on a quarterly basis during construction stage.	SC (Supervision Consultant).
Air quality deterioration	Dust, noise, SO2, NOx, CO	Locations for air quality measurements are within the village of Obi Shifo, between km 6+00 and 6+500 (one measurement at 6+000, 6+250 and 6+500 respectively). In addition there need to be air quality measurements near the asphalt plant and the aggregate crusher.	By means of suitable portable measurement device	Prior to construction and during construction activities. Establishment of baseline conditions before construction start. Than monitoring measurements on a quarterly basis during construction stage.	SC (Supervision Consultant).

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored?	When is the parameter to be monitored? Frequency	Institutional responsibility
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 30 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 construction supervision engineer.	During construction phase.	Construction Supervision (CS)
Top soil 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	Construction Supervision (CS
Equipment servicing and fuelling	Prevention of spilling of oil and fuel	Contractor's yard	Inspections; observations	Unannounced inspections during construction	Construction Supervision (CS)
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 hired Health and safety expert. Unannounced inspections during construction and upon complaint.	Construction Supervision (CS)
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	Construction Supervision (CS)

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored?	When is the parameter to be monitored? Frequency	Institutional responsibility
Material supply Asphalt plant	Possession of official approval or valid operation license	Asphalt plant	Inspection	Before work begins	Construction Supervision (CS)
Borrow areas	Possession of official approval or valid operation license	Sand and gravel borrow pit and / or quarry	Inspection	Before work begins	Construction Supervision (CS)
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	Construction Supervision (CS)
Stone		Job site / haul routes	Supervision spot checks	Unannounced inspections during work	Construction Supervision (CS)
Sand and gravel		Job site / haul routes	Supervision	Unannounced inspections during work	Construction Supervision (CS)
Surface water protection	Contractor's compliance with his approved method statement	Bridges and Culverts	Inspection	Unannounced inspections during bridge and culvert works	Construction Supervision (CS)
Air pollution from improper maintenance of equipment 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	Construction Supervision (CS
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 1st Year / EA of PIU in the subsequent Year(s)
Operational stage					

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored?	When is the parameter to be monitored? Frequency	Institutional responsibility
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 shall be elaborated (e.g. reflectors / local fencing, warning signs, speed reductions etc.)	Throughout the Year	MoT
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
Damaged drainage or uncontrolled erosion	Leakages in drainage system and damages due to erosion	Culverts and drainage facilities	Documentation	Throughout the Year	MoT
Possible exceedance of noise standards at school building in Obi Shivo and nearby residential houses based on the conducted noise modelling	Noise level	At school and medical center in Obi Shivo	By means of portable noise measurement device	In the opening year 2020. In subsequent years until 2030 one measurement per year.	MoT

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Tab. 30 Cost Estimate for Phase 1 Mitigation Measures (USD)

Description	Unit	Quantity	Rate USD	Amount USD
Included in Civil Works Contract				
Planting, maintenance and watering (during construction stage) of trees on the road side (see section 1 of EMP)	Pieces	4,000	22	88,000
Preparation of Construction EMP	Lump sum			TBD
Clearing of Construction Corridor	Lump sum			TBD
Removal and Storage of Topsoil	Lump sum			TBD
Protection of Water Resources	Lump sum			TBD
Management of Solid Waste and Sewage Waste from the Construction Camp	Lump sum			TBD
Potential restoration of Work and Storage Sites, Quarries and Borrow Pits, Construction Site Roads	Lump sum			TBD
Dust suppression measures during dry period (water spraying)	Periods	3 (daily during dry summer period)	5,000	15,000
Securing of Storage and Equipment Maintenance Areas.	Lump sum			TBD
Contractor's Safeguard Specialist	month	36	2,000	72,000
Noise protected windows (double glass windows). Delivery and installation.[27]	m²	500	100 USD per m²	50,000
Included in Project Management and Contract Supervision Consultant's Contract				
Supervision Consultant's National Environment Safeguard Specialist	month	36	3,000	108,000
Supervision Consultant's International Environment Safeguard Specialist	month	3	18,000	54,000
HIV / AIDS Seminar	Every 4 months during construction time	9	1,000	9,000
Total Mitigation Measures (A)				**396,000**

[27] It is recommended to monitor the future traffic volumes and consider installation of noise protected windows in the school building, the medical center, and residential buildings where appropriate.

Tab. 31 Cost Estimate for Baseline Monitoring (USD)

Description	Unit	Quantity	Rate USD	Amount USD
Included in Civil Works Contract				
Noise Monitoring. Baseline measurement. Than quarterly measurements over construction time in Obi-Shibo.	Number	65: 5 locations multiplied by 13. (1 baseline measurement and 12 construction period measurements)	100	6,500
Vibration Monitoring over construction period,	Number	As above	100	6,500
Dust and air pollutants measurement over construction period Location Obi-Shivo, Asphalt plant and aggregate crasher	Number	91: As above plus asphalt plant and aggregate crusher measurements	150	13,650
Water Quality Monitoring in Kofarnigon River and Creek in Obi Shivo	Number	20 (baseline measurements and quarterly measurements during bridge construction)	200	4,000
Total Monitoring Measures (B)				**30,650**

Grand Total (A) + (B)				**426,650**

X. STAKEHOLDER CONSULTATION AND INFORMATION DISCLOSURE

A. Consultation Process

319. The IEE process for the Dushanbe – Kurgonteppa road rehabilitation project includes stakeholder participation and consultation to help MoT to achieve public acceptance of the project. The purpose of the Public Consultation is 1) inform people about the project, 2) receive a feedback, 3) incorporate all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, etc. According to the SPS of ADB the Public Consultation begins early in the project preparation stage and is carried outon an ongoing basis throughout the project cycle". Consequently starting from the initial project stage consultations were conducted in all project affected villages. People were invited on Jamoat basis. All chairmen of Project affected Jamoats were contacted and invitation of all Project affected people in the villages arranged. In addition an official Public Consultation meeting was held in the MoT on July 12, 2016. Hence 2 rounds of consultations took place: 1-st scoping consultations with communities and second presentation of the environmental assessment.

320. During the consultation meetings the Project and the potentially occurring environmental and social impacts including possible mitigation measures were explained. The consultations were held on May 26 in village Daganakiik (Rayon Khurason), on May 27 in village Obi Shifo (Rayon Rudaki) , on May 31 in village Lohur (Rayon Rudaki), on June 2 at the Fuel Station in Jamoat Fahrobad (Rayon Khuroson) and on June 3 in village Chimteppa (Rayon Rudaki), After the Project presentation there was a question session in which Project affected people could raise their concerns. All people in the villages were invited to make sure that vulnerable groups are included. The concerns raised during the consultations are documented in the Minutes of meeting which are attached as annex "Public Consultation Meeting" to this report. As far as technically feasible people's concerns are considered in the Project design. One particular concern referred to connectivity and animal crossings. The issue is considered in the design and described in the chapter on impacts and mitigation measures.

321. The following consultations has been conducetd (Table 22). MoM of the consultations are attached.

Tab. 32 Consultations with Communities

No	Date	Location (Jamoat/Rayon)	No of participants		
			Males	Females	Total
1	26.05.2016	Daganakiik (Khurason Rayon)	26	28	54
2	27.05.2016	Chorgulteppa (Rudaki Rayon)	47	6	53
3	31.05.2016	Lohur (Rudaki Rayon)	19	1	20
4	01.06.2016	Fahroobod (Khurason Rayon)	18	0	18
5	03.06.2016	Chimteppa (Rudaki Rayon)	18	8	26
Total			**128**	**43**	**171**

322. After finalization of the draft IEE report an official public consultation meeting was arranged on July 12, 2016 in the conference meeting room of the MoT. Minutes of Meeting are attached in the annex. All representatives of project affected villages and Relevant NGO's, Ministries and Institutes potentially involved in the Project were invited.

B Information Disclosure

323. MOT will make the environmental assessment and other environment-related documents available in accordance with Tajikistan's and ADB requirements for disclosure. Timing for disclosure is scheduled immediately after obtaining of the SEE (State Ecological Expertise) m which is the clearance (environmental permit) from the State Agency of Environmental Protection.

324. After finalization the IEE reports documenting the mitigation measures and consultation process will be submitted to MoT and ADB and will be disclosed on ADB website.

C. Grievance Redress Mechanism

Objectives

325. The scope of the GRM addresses issues related to involuntary resettlement, social and environmental performance, and information disclosure.

326. The LARP includes in its scope the establishment of a responsive, readily accessible and culturally appropriate grievance redress mechanism (GRM) capable of receiving and facilitating the resolution of affected persons' concerns and grievances related to the project. There is one GRM which applies to social, resettlement and environmental concerns of project affected people and stakeholders. The GRM is a formalized way for the PIURR to identify and resolve concerns regarding environmental and social issues including DPs' grievances. It offers stakeholders and DPs a forum to voice their concerns, seek clarifications to their queries, or register complaints related to the Project's performance.

327. Any stakeholders and the DPs will have the right to file complaints and/or queries on any aspect of the Project, including environment, land acquisition and resettlement. Under the adopted grievance mechanism, the DPs may appeal any decision, practice or activity related to the Project. All possible avenues will be made available to the DPs to voice their grievances. The PIURR will ensure that grievances and complaints on any aspect of the project are addressed in a timely and effective manner.

328. The fundamental objectives of the Grievance Redress Mechanism are:

- To reach mutually agreed solutions satisfactory to both, the Project and the DPs, and to resolve any grievances locally, in consultation with the aggrieved party;
- To facilitate the smooth implementation of the LARP, particularly to cut down on lengthy litigation processes and prevent delays in Project implementation;
- To facilitate the development process at the local level, while maintaining transparency as well as to establish accountability to the affected people.
- To consider raised concerns and complaints on environmental issues as far as it is technically feasible;

329. The MOT issued a letter No 516 on 20 May, 2016, requiring the establishment and development of the GRM at the jamoat (sub-district) level. (Annex 5-1) The Grievance Redress Committees (GRC) are established at the jamoats at each Project district and the PIURR levels. The GRCs include the following institutions and their representatives:

- Rayon jamoat's chairman or person authorized by jamoat (raisi mahala);
- Land planning engineer
- The jamoat chairman (focal point to accept and register grievances);
- Rayon's State Committee on Land Use and Geodesy;
- Rayon's architecture department;
- State executive authority/ deputy head of district.

330. All grievances related to the Project will be addressed with the participation of the PIURR, Consultant and Contractor's representatives. In more complex cases, representatives of other authorized institutions will be invited. The GRM covers issues related to social, environmental and other safeguard issues under the ADB SPS 2009 and applicable laws of Tajikistan.

331. The PIURR members of the GRCs include:

- Chief Engineer

- Social safeguard specialist
- Environmental safeguard specialist
- MoT lawyer
- Other specialists as necessary

332. There are five Grievance Redress Committees at the jamoat level - one in each Project jamoat and one at the central level. A Focal Person (FP) is appointed at each Project jamoat and at the PIURR. The PIURR FPs participated in all consultations with communities and shared their contact details with participants for questions related to the Project and in the event of grievances for the entire duration of the Project, including the preparation and implementation of the LARP.

333. The GRCs will function for the duration of the project implementation. The PIURR and the PPTA Consultant conducted training for members of five GRC at the jamoat's level. (Annex 5-2 in the LARP document).

Grievance Resolution Process

334. Grievances can be lodged with the Focal Person at the jamoat's GRC. The jamoat's FP, in consultations with the PIURR safeguard specialist, will screen the grievance for eligibility. If eligible, the jamoat's FP will organize a meeting of the Grievance Redress Committee (GRC). The PIURR representatives will be informed and invited to the meeting.

335. 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 lodgment. 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.

336. 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. The PIURR representative will oversee the resolution of the complaint.

337. If the complaint is found to be invalid, the GRC formulates a response and sends a written letter to the complainant, explaining the reasons for the rejection. The complainant may lodge the case in the local court or at the ADB Accountability Mechanism at any time of the grievance process. The GRM at the Project level does not impede the access of DPs to the ADB Accountability Mechanism (AM) or to the country's judicial or administrative remedies. All complaints and resolutions will be properly documented by the PIURR and made available for review, monitoring and evaluation purposes.

338. If DPs want to register a complaint with the ADB AM, the Focal Person will provide the complainants the following contact information:

National Social Safeguards Focal Point
Resident Mission of Asian Development Bank in Republic of Tajikistan

45 Sovetskaya Street, Dushanbe. Tajikistan
Tel: 992 372 210558

and/or

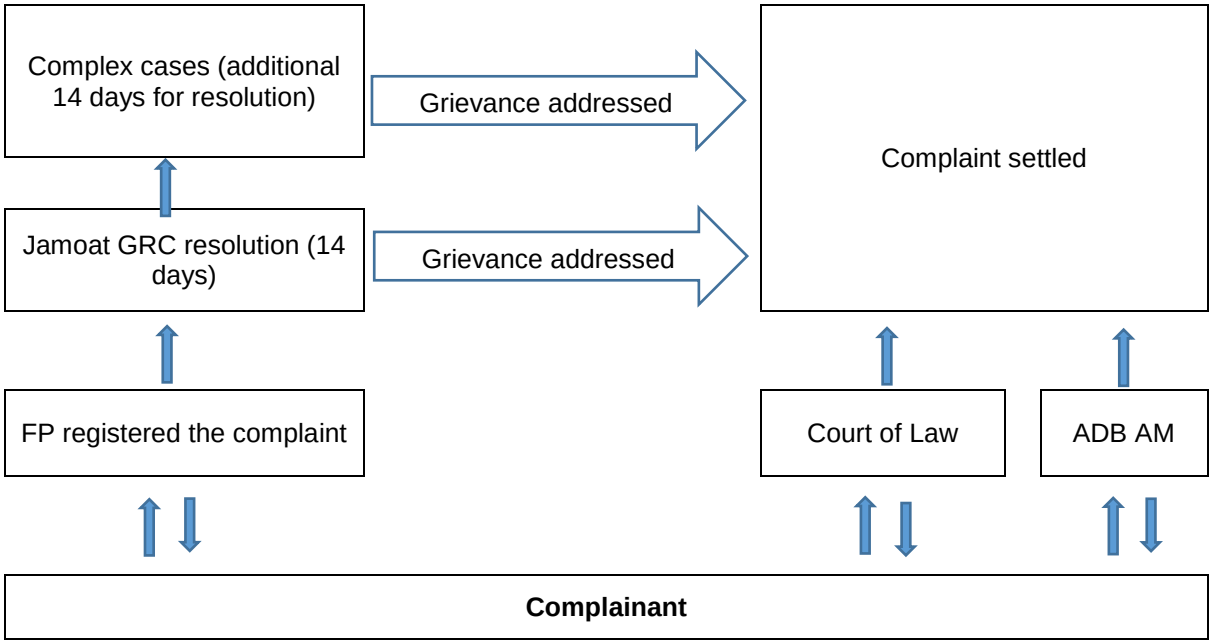
Special Project Facilitator Asian Development Bank
Email: to be access from www.adb.org/site/accountability-mechanism/contacts
Fax number: (63-2) 636-2490

339. When the grievance is forwarded to ADB (TJRM), ADB will contact PIU/MoT to review the case and suggest the resolution at the project level. In case of complex issues and not reaching an agreement, the case will be logged to the AM of ADB. All reports on the GRM decisions and evidences will be included.

340. All efforts will be made to settle issues at the Project level. All complaints and resolutions will be properly documented by the PIURR and made available for review, monitoring and evaluation purposes. PIU safeguard specialist keeps regular contact and will have a database for the whole project grievances cases including status of grievances. This report will be regularly included in monthly project progress reports.

341. The grievance redress process is shown in the Figure below.

Fig. 30: Grievance Redress Process



342. GRM proceedings may need one or more meetings for each complaint and may require field investigations by specific technical or valuation experts. Grievance cases shared by more than one complainant may be held together as a single case.

343. For appeals lodged directly to the MoT, the FP at PIURR will review the case together with the respective GRC at jamoat level and attempt to find a resolution together with the aggrieved person.

344. At each level of appeal, the GRC will be assisted, as required, by the professional capacity needed to solve specific cases. This may include among others:

- Jamoat and/or hukumat representatives
- Rayon land committee
- Representatives of the State Agency for Architecture
- The State Committee for Land Management and Geodesy (SCLMG)Ministry of Architecture
- State Agency for Environment and Forestry
- State Unitary Enterprise for Housing and Communal Services
- Technical expertise from professional engineers
- Other specialized organizations as necessary

Duties of GRC Members

Focal Point (FP)

345. Once the FP receives a written notification of a complaint s/he will:

- Based on the simple screening procedure, asses the grievance and determine if the grievance is eligible for the GRM; if eligible, register the grievance in the complaints logbook;
- Wright a grievance summary to be signed by the complainant and the FP indicating name of the complainant, date and place of presentation of complaint, description of complaint and supporting documents, if any;
- Send the complaint summary to all members of the local level GRC;
- Convey requests and enquiries of the complainants to PIURR/MOT and to the other members of the GRC at the local level;
- Organize a grievance redress meeting;
- Maintain records of each meeting and each communication between the FP/GRC and the complainants;
- Participate at appeal cases at all levels;
- Ensure the administrative and organizational support for GRC members.

Supervision Consultant Resettlement Specialist

346. Once notified of a complaint and invited the FP to a grievance meeting the Consultant will:

- Participate to all grievance meetings, provide opinions and analysis;
- Accompany eventual assessment/valuation specialists in the field,
- Provide other GRC members as relevant with opinion and suggestion for resolution to be reflected in the final meeting report.

GRC Chairperson / Head/Deputy of PIURR of MoT

347. Once notified that a complainant has lodged an appeal case at the central level, the GRC chairperson will:

- Review the local level GRC decision;
- Invite the GRC members to the meeting;
- Chair the GRC meetings and ensure that the minutes of the meeting are taken and shared with all relevant parties;
- Inform the aggrieved person of the GRC's decision;
- Ensure the administrative and organizational support for GRC members to work;
- Support the decision made by the GRC and follow up to ensure action is taken.

PIURR Project Coordinator

348. Once notified that a complainant has lodged an appeal case at central level project coordinator will:

- Participate in all grievance redress meetings at jamoat and central level, provide opinions and analysis;
- Ensure that records at jamoat GRC are maintained;
- Request additional assessment/valuation specialists' opinions and accompany them in the field if needed;
- Request that the chairperson organizes meetings, as necessary;
- Ensure a proper PIURR Complaint Register is maintained.

Representatives of the PIURR Safeguards Unit

349. Once notified that a complainant has lodged at the central level, the representatives of the PIURR safeguard and technical unit will:

- Participate in GRC meetings at local and central level;
- Prepare the chronology of events to understand the sequence of developments prompting the complaint;
- Provide opinion on resettlement impacts claimed by the claimant;
- Request that the chairperson organizes meetings, as necessary;
- Maintain communication between the GRC and the complainants.

Technical Experts

350. When requested by the PIURR to provide a 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.

4 GRC Complaint Register, Records and Documentation

351. The 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 GRCs for periodic review by the ADB. A sample of the GRC Grievance Registration Form can be found in Annex 5-2.

D. Implementation Arrangements

352. The overall responsibility for implementation of the Project lies at the GoT. The relevant organizational entity for the project implementation is the Execute Agency of the PIU which is part of the MoT.

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

354. Environmental permitting and monitoring of Project implementation is within the responsibility of the State Ecological Review Committee and its regional offices. Furthermore, according to the 2012 Law on State Ecological Expertise, 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).

355. Responsibilities for the implementation of the environmental mitigation measures and monitoring measures during construction phase will be taken over by the Supervision Consultant who will report to the PIU on a regular basis.

356. The tender and contract documents will clearly set out the contractor's obligations to undertake environmental mitigation measures set out in the Environmental Management Plan.

357. PIU will monitor and measure the progress of implementation of the EMP. In this regard semiannual monitoring reports during construction stage will be prepared by the Construction Supervision Consultant and submitted to within 1 month after the reporting period.

XI. CONCLUSION

358. IEE is required for category B Projects in order to warrant compliance of the Project with the ADB Safeguard Policy Statement (June 2009). As such the IEE provides a road map to the environmental measures needed to prevent and/or mitigate negative environmental effects associated with the development project. The IEE also provides a detailed description of the direct and indirect environmental effects associated with the Project during key periods of work, namely the design, construction and operational phase.

359. Based on the IEE Environmental impacts of the Dushanbe–Kurgonteppa road rehabilitation are evaluated as medium. This is because there will be widening of cross section required over nearly the whole Project length which will result in significant social and environmental interferences during pre-construction and construction stage. After Project implementation, during operational stage, 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.

Annex 1
Minutes of the Public Consultations

Minutes of the Public Consultation Meeting under the CAREC Corridors 2, 5 and 6 Road Project (Dushanbe-Kurgonteppa)

Date: May 27, 2016
Place of meeting: village Obi-Shifo in Jamoat Chorgulchashma, Rayon Rudaki
Meeting started: 09.00
Meeting ended: 11.50

Attended:
PIURR/MOT
Mr. Sherali Resettlement Specialist

Consultant «KOCKS CONSULT GMBH»
Dragica Veselinovich International Resettlement Specialist/Sociologist
Mahbuba Abdullaeva National Resettlement Specialist/Sociologist
Team of interviewers
Bakhtiyor Begmuradov National Environmental Specialist

Local Community (List is to be prepared by socio team).

Agenda: Presentation on Dushanbe-Kurgonteppa Road Rehabilitation Project

Sherali and Dragica made a presentation on Dushanbe-Kurgonteppa Road Rehabilitation Project to the local community (residents of Chorgulchashma Jamoat). The presentation covered the following issues: 1) who is going to finance the project implementation, 2) who will implement the project, 3) ADB policy, 4) economical and social benefits of the project 5) environmental impacts' mitigation measures. Also, people were explained about the Grievance Redress Mechanism to be applied towards APs and others having any relation to the project implementation. Sherali also informed on measures to be taken to reduce the environmental impacts. He explained that before commencement of construction works all households located along the road will be examined and their technical condition will be recorded in order to avoid complains during and after completion of construction works. And to avoid any losses it is recommended by the Government to stop any development activities including construction, rehabilitation or trees planting in right-of-way of the Dushanbe- Kurgonteppa road rehabilitation project since April 2016.

To enhance environmental awareness among the people Consultant's Environmental Specialist have distributed information leaflets containing information on environmental (extinct and rare species of flora and fauna, specially protected natural areas etc.), historical and archaeological monuments in right-of-way of the Dushanbe- Kurgonteppa road rehabilitation project. Along with this leaflet the project brochure and other relevant documents were distributed to stakeholders.

Upon completion of the presentation local residents asked a few questions. The focus was on how road safety measures would be implemented.

Question: What will happen to the trade outlets occurred within the project implementation zone? What will be the amount of compensation?
Dragica: All kiosks and other facilities built in a light construction will be temporary shifted from the construction site and returned back or constructed new one upon completion of the project. Capital structures most likely will be removed. Big trade facilities will be provided with access

roads. Construction of the road will be arranged in the way not to close the access to the customers. Thus we will minimize economical loss of physical and legal entities doing business. Construction works will cause only temporary inconveniences due to hard access to those complexes. The amount of compensation will be determined additionally during the activity of the resettlement commission, during preparation of the detailed design. The commission will thoroughly study each case/facility under impact of the project. All loses including undrawn profit will be compensated at least on average basis.

Question: How will be compensated the land plots, buildings or trade outlets if they have not any documentation?
Dragica: Owners of such properties will get so called reconstructive compensations. I.e. the compensation for reconstruction will be determined by the resettlement commission on individual basis.

Question: How the issue on cut plantations will be solved?
Dragica: First the owners of the trees to be cut will be identified. Upon implementation of the project all cut trees will be rehabilitated or compensated. The contractor will be responsible for plantation and watering the trees during a year upon completion of construction works with following handing them over to owners or local authority. Only local and drought-resistant species of trees and bushes would be planted.

Question: What are additional opportunities for earning additional profit by local people during rehabilitation works?
Sherali: Additional opportunities for local people are: the contractor will hire local workers, will rent office/accommodations/construction equipment/trucks/vehicles, workers will be required to buy goods and foodstuffs, they will use services of local people, etc.

Question: Will be the subways or overhead passages for pedestrians and/or cattle, drainage system constructed?
Dragica: For the moment it is not clear will be the subways or overhead passages for pedestrians and/or cattle constructed or not in your place. If such facility will be planned they will be then maintained by local governments. It is clear that the project includes construction of sidewalks, channels and drainage chutes.

Question: When will the construction start and how long will it last?
Sherali: It is expected that construction works will start in late autumn this year or early next year after completion and approval of the detailed design and after selection of the contractor. Total project implementation period is approximately three years.

Question: What is the width of the designed road?
Sherali: Designed width of the roadway including shoulders is up to 29 meters. Total width within the Right of Way is 50 meters each side. During the road construction works the culverts which are in bad conditions will be replaced. After replacement, the old ones will be handed over to local authorities.

Then Dragica explained that there would be the Grievance Redress Mechanism to be implemented within the frameworks of the Project. This mechanism would facilitate and speed up the feedback with the public.

The consultation with villagers, local official and government representatives in village Obi-Shifo

of Chorgulchashma Jamoat did not reveal any potential environmental issues or significant impacts that might result from the Project works.

At the end of the meeting Sherali thanked the participants for taking part in the public consultation meeting and expressed hope for successful cooperation in the course of the project implementation.




Minutes of the Public Consultation Meeting under the CAREC Corridors 2, 5 and 6 Road Project (Dushanbe-Kurgonteppa)

Date: May 31, 2016
Place of meeting: village Lohur in Jamoat Lohur, Rayon Rudaki
Meeting started: 08.00
Meeting ended: 10.30

Presented:
Consultant «KOCKS CONSULT GMBH»
Dragica Veselinovich International Resettlement Specialist/Sociologist
Team of interviewers
Bakhtiyor Begmuradov National Environmental Specialist

Local Community (List is to be prepared by socio team).

Agenda: Presentation on Dushanbe-Kurgonteppa Road Rehabilitation Project

Dragica made a presentation on Dushanbe-Kurgonteppa Road Rehabilitation Project to the local community (residents of Lohur Jamoat). The presentation covered the following issues: 1) who is going to finance the project implementation, 2) who will implement the project, 3) ADB policy, 4) economical and social benefits of the project 5) environmental impacts' mitigation measures. Also, people were explained about the Grievance Redress Mechanism to be applied towards APs and others having any relation to the project implementation. This mechanism would facilitate and speed up the feedback with the public. She also informed on measures to be taken to reduce the environmental impacts. She explained that before commencement of construction works all households located along the road will be examined and their technical condition will be recorded in order to avoid complains during and after completion of construction works. And to avoid any losses it is recommended by the Government to stop any development activities including construction, rehabilitation or trees planting in right-of-way of the Dushanbe- Kurgonteppa road rehabilitation project since April 2016.

To enhance environmental awareness among the people Consultant's Environmental Specialist have distributed information leaflets containing information on environmental (extinct and rare species of flora and fauna, specially protected natural areas etc.), historical and archaeological monuments in right-of-way of the Dushanbe- Kurgonteppa road rehabilitation project. Along with this leaflet the project brochure and other relevant documents were distributed to stakeholders.

Upon completion of the presentation local residents asked a few questions. The focus was on how road safety measures would be implemented.

Question: What will happen to the trade outlets occurred within the project implementation zone? What will be the amount of compensation?
Dragica: All kiosks and other facilities built in a light construction will be temporary shifted from the construction site and returned back or constructed new one upon completion of the project. Capital structures most likely will be removed. Big trade facilities will be provided with access roads. Construction of the road will be arranged in the way not to close the access to the customers. Thus we will minimize economical loss of physical and legal entities doing business. Construction works will cause only temporary inconveniences due to hard access to those complexes. The amount of compensation will be determined additionally during the activity of

the resettlement commission, during preparation of the detailed design. The commission will thoroughly study each case/facility under impact of the project. All loses including undrawn profit will be compensated at least on average basis.

Question: How will be compensated the land plots, buildings or trade outlets if they have not any documentation?
Dragica: Owners of such properties will get so called reconstructive compensations. I.e. the compensation for reconstruction will be determined by the resettlement commission on individual basis. All kind of property will be compensated.

Question: How the issue on cut plantations will be solved?
Dragica: First the owners of the trees to be cut will be identified. Upon implementation of the project all cut trees will be rehabilitated or compensated. The contractor will be responsible for plantation and watering the trees during a year upon completion of construction works with following handing them over to owners or local authority. Only local and drought-resistant species of trees and bushes would be planted.

Question: Will be the subways or overhead passages for pedestrians and/or cattle, drainage system constructed?
Dragica: For the moment it is not clear will be the subways or overhead passages for pedestrians and/or cattle constructed or not in your place. If such facility will be planned they will be then maintained by local governments. It is clear that the project includes construction of sidewalks, channels and drainage chutes.

Question: When will the construction start and how long will it last?
Dragica: It is expected that construction works will start in late autumn this year or early next year after completion and approval of the detailed design and after selection of the contractor. Total project implementation period is approximately three years.

Question: What is the width of the designed road?
Dragica: Designed width of the roadway including shoulders is up to 29 meters. Total width within the Right of Way is 50 meters each side. During the road construction works the culverts which are in bad conditions will be replaced. After replacement, the old ones will be handed over to local authorities.
The consultation with villagers, local official and government representatives in Jamoat Lohur did not reveal any potential environmental issues or significant impacts that might result from the Project works.

At the end of the meeting Dragica thanked the participants for taking part in the public consultation meeting and expressed hope for successful cooperation in the course of the project implementation.

Minutes of the Public Consultation Meeting under the CAREC Corridors 2, 5 and 6 Road Project (Dushanbe-Kurgonteppa)

Date: June 2, 2016
Place of meeting: Fuel station in Jamoat Fahrobod, Rayon Khuroson
Meeting started: 09.15
Meeting ended: 12.00

Presented:
Consultant «KOCKS CONSULT GMBH»

Dragica Veselinovich	International Resettlement Specialist/Sociologist
Mahbuba Abdullaeva	National Resettlement Specialist/Sociologist
Team of interviewers	
Bakhtiyor Begmuradov	National Environmental Specialist

Local Community (List is to be prepared by socio team).

Agenda: Presentation on Dushanbe-Kurgonteppa Road Rehabilitation Project

Dragica made a presentation on Dushanbe-Kurgonteppa Road Rehabilitation Project to the local community (residents of Fahrobod Jamoat and entrepreneurs). The presentation covered the following issues: 1) who is going to finance the project implementation, 2) who will implement the project, 3) ADB policy, 4) economical and social benefits of the project 5) environmental impacts' mitigation measures. Also, people were explained about the Grievance Redress Mechanism to be applied towards APs and others having any relation to the project implementation. This mechanism would facilitate and speed up the feedback with the public. She also informed on measures to be taken to reduce the environmental impacts. She explained that before commencement of construction works all households located along the road will be examined and their technical condition will be recorded in order to avoid complains during and after completion of construction works. And to avoid any losses it is recommended by the Government to stop any development activities including construction, rehabilitation or trees planting in right-of-way of the Dushanbe- Kurgonteppa road rehabilitation project since April 2016.

To enhance environmental awareness among the people Consultant's Environmental Specialist have distributed information leaflets containing information on environmental (extinct and rare species of flora and fauna, specially protected natural areas etc.), historical and archaeological monuments in right-of-way of the Dushanbe- Kurgonteppa road rehabilitation project. Along with this leaflet the project brochure and other relevant documents were distributed to stakeholders.

Upon completion of the presentation local residents asked a few questions. The focus was on how road safety measures would be implemented.

Question: What will happen to the trade outlets occurred within the project implementation zone? What will be the amount of compensation?
Dragica: All kiosks and other facilities built in a light construction will be temporary shifted from the construction site and returned back or constructed new one upon completion of the project. Capital structures most likely will be removed. Big trade facilities will be provided with access roads. Construction of the road will be arranged in the way not to close the access to the customers. Thus we will minimize economical loss of physical and legal entities doing business.

Construction works will cause only temporary inconveniences due to hard access to those complexes. The amount of compensation will be determined additionally during the activity of the resettlement commission, during preparation of the detailed design. The commission will thoroughly study each case/facility under impact of the project. All loses including undrawn profit will be compensated at least on average basis.
Question: How will be compensated the land plots, buildings or trade outlets if they have not any documentation?
Dragica: Owners of such properties will get so called reconstructive compensations. I.e. the compensation for reconstruction will be determined by the resettlement commission on individual basis. All kind of property will be compensated.

Question: How will be compensated the land plots and property which belong to army?
Dragica: Owner of such properties is state, i.e. government of Tajikistan. In such cases as army the project will not compensate any losses. GoT must determine how to restore damaged army property.

Question: How the issue on cut plantations will be solved?
Dragica: First the owners of the trees to be cut will be identified. Upon implementation of the project all cut trees will be rehabilitated or compensated. The contractor will be responsible for plantation and watering the trees during a year upon completion of construction works with following handing them over to owners or local authority. Only local and drought-resistant species of trees and bushes would be planted.
Question: Will be the subways or overhead passages for pedestrians and/or cattle, drainage system constructed?
Dragica: For the moment it is not clear will be the subways or overhead passages for pedestrians and/or cattle constructed or not in your place. If such facility will be planned they will be then maintained by local governments. It is clear that the project includes construction of sidewalks, channels and drainage chutes.

Question: When will the construction start and how long will it last?

Dragica: It is expected that construction works will start in late autumn this year or early next year after completion and approval of the detailed design and after selection of the contractor. Total project implementation period is approximately three years.

Question: What is the width of the designed road?
Dragica: Designed width of the roadway including shoulders is up to 29 meters. Total width within the Right of Way is 50 meters each side. During the road construction works the culverts which are in bad conditions will be replaced. After replacement, the old ones will be handed over to local authorities.

The consultation with villagers, local official and government representatives in Jamoat Fahrobod did not reveal any potential environmental issues or significant impacts that might result from the Project works.

At the end of the meeting Dragica thanked the participants for taking part in the public consultation meeting and expressed hope for successful cooperation in the course of the project

implementation.

Minutes of the Public Consultation Meeting under the CAREC Corridors 2, 5 and 6 Road Project (Dushanbe-Kurgonteppa)

Date: June 3, 2016
Place of meeting: village Chimteppa in Jamoat Chimteppa, Rayon Rudaki
Meeting started: 09.00
Meeting ended: 11.00

Presented:
PIURR/MOT
Project Manager
Resettlement Specialist

Consultant «KOCKS CONSULT GMBH»

Dragica Veselinovich	International Resettlement Specialist/Sociologist
Mahbuba Abdullaeva	National Resettlement Specialist/Sociologist
Team of interviewers	
Jurgen Meyer	International Environmental Specialist
Bakhtiyor Begmuradov	National Environmental Specialist

Local Community (List is to be prepared by socio team).

Agenda: Presentation on Dushanbe-Kurgonteppa Road Rehabilitation Project

Eraj and Dragica made a presentation on Dushanbe-Kurgonteppa Road Rehabilitation Project to the local community (residents of Chimteppa Jamoat). The presentation covered the following issues: 1) who is going to finance the project implementation, 2) who will implement the project, 3) ADB policy, 4) economical and social benefits of the project 5) environmental impacts' mitigation measures. Also, people were explained about the Grievance Redress Mechanism to be applied towards APs and others having any relation to the project implementation.

Then Eraj explained that there would be the Grievance Redress Mechanism to be implemented within the frameworks of the Project. This mechanism would facilitate and speed up the feedback with the public. He also informed on measures to be taken to reduce the environmental impacts. He explained that before commencement of construction works all households located along the road will be examined and their technical condition will be recorded in order to avoid complains during and after completion of construction works. And to avoid any losses it is recommended by the Government to stop any development activities including construction, rehabilitation or trees planting in right-of-way of the Dushanbe-Kurgonteppa road rehabilitation project since April 2016. Eraj informed participants on compensation mechanism in details, including compensation for property (land, buildings and facilities), for crops and trees, for yield, for lost profit etc.

To enhance environmental awareness among the people Consultant's Environmental Specialist have distributed information leaflets containing information on environmental (extinct and rare species of flora and fauna, specially protected natural areas etc.), historical and archaeological monuments in right-of-way of the Dushanbe- Kurgonteppa road rehabilitation project. Along with this leaflet the project brochure and other relevant documents were distributed to stakeholders.

Upon completion of the presentation local residents asked a few questions. The focus was on how road safety measures would be implemented.

Question: What will be the amount of compensation?
Dragica: The amount of compensation will be determined additionally during the activity of the resettlement commission, during preparation of the detailed design. The commission will thoroughly study each case/facility under impact of the project.
Eraj: All kiosks and other facilities built in a light construction will be temporary shifted from the construction site and returned back or constructed new one upon completion of the project. Capital structures most likely will be removed. Big trade facilities will be provided with access roads. Construction of the road will be arranged in the way not to close the access to the customers. Thus we will minimize economical loss of physical and legal entities doing business. Construction works will cause only temporary inconveniences due to hard access to those complexes. All loses including undrawn profit will be compensated at least on average basis.

Question: How will be compensated the land plots, buildings or trade outlets if they have not any documentation?
Dragica: Owners of such properties will get so called reconstructive compensations. I.e. the compensation for reconstruction will be determined by the resettlement commission on individual basis.

Question: What are additional opportunities for earning additional profit by local people during rehabilitation works?
Eraj: Additional opportunities for local people are: the contractor will hire local workers, will rent office/accommodations/construction equipment/trucks/vehicles, workers will be required to buy goods and foodstuffs, they will use services of local people, etc.

Question: Will be the subways or overhead passages for pedestrians and/or cattle, drainage system constructed?
Dragica: For the moment it is not clear will be the subways or overhead passages for pedestrians and/or cattle constructed or not in your place. If such facility will be planned they will be then maintained by local governments. It is clear that the project includes construction of sidewalks, channels and drainage chutes.

The consultation with villagers, local official and government representatives in village Chimteppa of Chimteppa Jamoat did not reveal any potential environmental issues or significant impacts that might result from the Project works.

At the end of the meeting Eraj thanked the participants for taking part in the public consultation meeting and expressed hope for successful cooperation in the course of the project implementation.

Minutes of the Public Consultation Meeting

under the CAREC Corridors 2, 5 and 6 Road Project (Dushanbe-Kurgonteppa)

Date: May 26, 2016
Place of meeting: village Daganakiik in Jamoat Galoabad, Rayon Khuroson
Meeting started: 09.00
Meeting ended: 11.50

Presented:
PIURR/MOT
Project Manager
Resettlement Specialist

Consultant «KOCKS CONSULT GMBH»

Dragica Veselinovich	International Resettlement Specialist/Sociologist
Mahbuba Abdullaeva	National Resettlement Specialist/Sociologist
Team of interviewers	
Bakhtiyor Begmuradov	National Environmental Specialist

Local Community (List is to be prepared by socio team).

Agenda: Presentation on Dushanbe-Kurgonteppa Road Rehabilitation Project

Eraj and Dragica made a presentation on Dushanbe-Kurgonteppa Road Rehabilitation Project to the local community (residents of Galaobod Jamoat). The presentation covered the following issues: 1) who is going to finance the project implementation, 2) who will implement the project, 3) ADB policy, 4) economic and social benefits of the project 5) environmental impacts' mitigation measures. Also, people were explained about the Grievance Redress Mechanism to be applied towards APs and others having any relation to the project implementation.

To enhance environmental awareness among the people Consultant's Environmental Specialist have distributed information leaflets containing information on environmental (extinct and rare species of flora and fauna, specially protected natural areas etc.), historical and archaeological monuments in right-of-way of the Dushanbe- Kurgonteppa road rehabilitation project. Along with this leaflet the project brochure and other relevant documents were distributed to stakeholders.

Upon completion of the presentation local residents asked a few questions. The focus was on how road safety measures would be implemented.

Question: When will the construction start and how long will it last? Who is the contractor?

Eraj: It is expected that construction works will start in late autumn this year or early next year after completion and approval of the detailed design and after selection of the contractor. Total project implementation period is approximately three years. The contractor will be selected based on results of the tender. It could be both local and foreign company.

Question: What will be the amount of compensation?

Dragica: The amount of compensation will be determined additionally during the activity of the resettlement commission, during preparation of the detailed design. The commission will thoroughly study each case/facility under impact of the project.

Question: What will happen to the trade outlets occurred within the project implementation zone?

Eraj: All kiosks and other facilities built in a light construction will be temporary shifted from the construction site and returned back or constructed new one upon completion of the project. Capital structures most likely will be removed. Big trade facilities will be provided with access roads. Construction of the road will be arranged in the way not to close the access to the customers. Thus we will minimize economical loss of physical and legal entities doing business. Construction works will cause only temporary inconveniences due to hard access to those complexes. All loses including undrawn profit will be compensated at least on average basis.

Question: How will be compensated the land plots, buildings or trade outlets if they have not any documentation?

Dragica: Owners of such properties will get so called reconstructive compensations. I.e. the compensation for reconstruction will be determined by the resettlement commission on individual basis.

Question: How will the issue on cut plantations be solved?

Dragica: First the owners of the trees to be cut will be identified. Upon implementation of the project all cut trees will be rehabilitated or compensated. The contractor will be responsible for plantation and watering the trees during a year upon completion of construction works with following handing them over to owners or local authority. Only local and drought-resistant species of trees and bushes would be planted.

Question: What are additional opportunities for earning additional profit by local people during rehabilitation works?

Eraj: Additional opportunities for local people are: the contractor will hire local workers, will rent office/accommodations/construction equipment/trucks/vehicles, workers will be required to buy goods and foodstuffs, they will use services of local people, etc.

Question: Will be the subways or overhead passages for pedestrians and/or cattle, drainage system constructed?

Dragica: For the moment it is not clear will be the subways or overhead passages for pedestrians and/or cattle constructed or not in your place. If such facility will be planned they will be then maintained by local governments. It is clear that the project includes construction of sidewalks, channels and drainage chutes.

Question: What is the width of the designed road?

Eraj: Designed width of the roadway including shoulders is up to 29 meters. Total width within the Right of Way is 50 meters. During the road construction works the culverts which are in bad conditions will be replaced. After replacement, the old ones will be handed over to local authorities.

Then Eraj explained that there would be the Grievance Redress Mechanism to be implemented within the frameworks of the Project. This mechanism would facilitate and speed up the feedback with the public. He also informed on measures to be taken to reduce the environmental impacts. He explained that before commencement of construction works all households located along the road will be examined and their technical condition will be recorded in order to avoid complains during and after completion of construction works. And to avoid any losses it is recommended by the Government to stop any development activities including construction, rehabilitation or trees planting in right-of-way of the Dushanbe-Kurgonteppa road rehabilitation project since April 2016.

The consultation with villagers, local official and government representatives in village Daganakiik of Galoabad Jamoat did not reveal any potential environmental issues or significant impacts that might result from the Project works.

At the end of the meeting Eraj thanked the participants for taking part in the public consultation meeting and expressed hope for successful cooperation in the course of the project implementation.

Minutes of the National Public Consultation
under the CAREC Corridors 2, 5 and 6 Road Project (Dushanbe-Kurgonteppa)

Date: July 12, 2016
Place of meeting: Conference Hall of the Ministry of Transport, Dushanbe
Meeting started: 14.30
Meeting ended: 16.50

Presented:
PIURR/MOT
Ghoibnazar Boronov Engineer/Project Manager

Consultant «KOCKS CONSULT GMBH»
Jurgen Meyer International Environmental Specialist
Dragica Veselinovich International Resettlement Specialist/Sociologist
Bakhtiyor Begmuradov National Environmental Specialist
Nozigul Davlatbekova Interpreter/Administrative Assistant

Stakeholders (scanned attendance list is attached).

Agenda:
• Presentations of phase 1 of the Project with main focus on the environmental and social assessment. Presentations were by means of power point.

• Question time and discussion

One week before the meeting the Summary IEE for phase 1 of the Project in Russian and English were prepared and disseminated (electronic version). Hard copies of the Summary IEE together with presentations were distributed to participants.
Jurgen and Dragica made two separate Power Point presentations on Dushanbe-Kurgonteppa Road Rehabilitation Project to the project key stakeholders.

The main information shared with the participants:
- Information about the Project
- Information about required and completed Project related activities
- Information on the cut-off-day
- ADB SPS 2009 and legal requirements of the Republic of Tajikistan
- Objectives of the Environmental and Social Assessment
- Process of drafting of the IEE and EMP and its further implementation
- Resettlement Action Plan
- Grievance Redress Mechanism;
- Environmental issues related to the Project
- Examples of environmental impacts' mitigation measures
- Importance of active involvement and the vital role of the local authorities (Hukumats and Jamoats), civil society organizations and other interested parties

Upon completion of the presentation stakeholders asked a few questions. The focus was on how road safety and environmental impacts mitigation measures would be implemented. The main questions related to the environmental issues along the whole Project road were handled by the environmental specialists and were as follows:

- When will the construction start?
- How many trees to be removed?
- Any endangered or important species or habitats are identified alongside the Project road?
- Did you consider the animal passes as we told you during the consultations in Jamoats?
- When the IEE report will be submitted to the State Environmental Review (Expertise)?
- When will the second phase of the Project start?
- How long it will take to finish the whole road?
- What are differences of proposed cross section for flat and mountainous terrains?
- Will local people be employed at the construction?

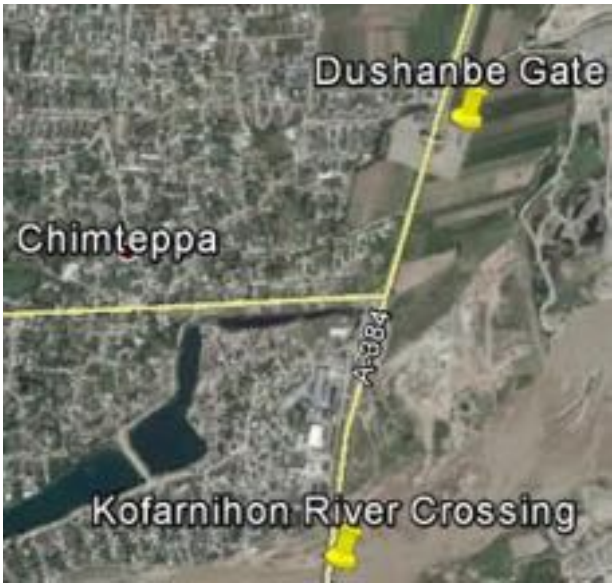
The questions related to the physical works and involuntary resettlement will be presented in the LARP report.

At the end of the meeting Jurgen and Dragica thanked the stakeholders for taking part in the public consultation meeting and expressed hope for successful cooperation in the course of the project implementation.

Annex 2: ALIGNMENT SHEETS

1. The following alignment sheets provide an overview of environmentally hotspots and sensitive receptors alongside the Project road with reference to the Project chainage. The alignment sheets serve as a base for the following impact analysis.

No.	Location	KM	Issue / Picture	baseline parameters / additional remarks
Section 1 of Project road (Dushanbe to km 33.200)				
1	Dushanbe urban section north of Dushanbe gate	Km 0+000 -3.382	Existing road cross section is already 4 lane. Residential houses are alongside the Project road, but distance is sufficient to exclude any negative interferences due to high noise levels. Alongside the Project road there are tree rows (mostly cypresses). The cross section already caters 4 lane and no tree cutting is required in this section. 	Noise measurements were conducted during field survey on May 12. Measurement results see above table 14.

No.	Location	KM	Issue / Picture	baseline parameters / additional remarks
2	Village of Chimteppa	Km 3.700	Project road is running alongside the village of Chimteppa. Consultation meeting in Chimteppa took place on May 3 at 09:00. No direct impact on villagers due to noise, vibration and air emissions expected due to sufficient distance of houses to road. Compensation because encroachment in private land. 	Issues considered in the LARP
3	Borrow area in floodplain of Kofarnigon River	Km 3.900	Material extraction from Kofarnigon river bed. Preferably the extraction site should be located upstream the bridge. This is for reason of protection of bridge foundation. In addition the extraction side shall have a distance of at least 500 m to the new bridge. 	Potential impacts to ground water and surface waters. Prior to start extraction activities approved licence required from CEP. Monitoring during construction stage.

No.	Location	KM	Issue / Picture	baseline parameters / additional remarks
3	River Kofarnigon	Km 4.500 approximately 1000 m to the left side of the Project road	Crossing of Kofarnigon River and its associated floodplain. 	Water quality measurement 500 m upstream and 500 m downstream the existing bridge for purpose of baseline establishment. Parameters pH, dissolved oxygen, sulfate (mg/l), NH4-N (mg/l) and oil products.
4	Aggregate processing	Km 3.5, approximately 700 m to the left side of the Project road	Material processing, crushing of aggregates and sieving. It is recommended to select site for aggregate crusher close to borrow area. 	Potential impacts regarding noise and air emissions, mainly dust. Baseline measurement (dust, air quality) before construction stage commences. Than regular monitoring.

No.	Location	KM	Issue / Picture	baseline parameters / additional remarks
5	Sensitive hotspot. Village Obi-Shifo village in Rudaki district.	KM 5.800	Project road is traversing village of Obi-Shifo in Rudaki district. Current cross section is too narrow for 4 lanes. If standard cross section is implemented than there is encroachment in structures and private and social property assets (tree losses, masonry retaining wall, private yards, building structures). Trees are pines and poplars. 	Mitigation and compensation measures required. Tree losses need to be compensated by new plantings. Private assets will be compensated according to LARP.
6	Continuation Sensitive hotspot. Village Obi-Shifo village in Rudaki district.	Km 6.500	Continuation of the situation as already described above. Additional different tree species (*Salix spec*., *Robinia pseudacacia, Ailanthus spec*.) and building structures (kiosks). For project section 1 the traverse of Obi-Shifo is the most critical stretch within settlement area. 	Private assets will be compensated according to LARP. Baseline measurement for air emissions, noise and vibrations before construction start. Than regular measurement during construction.

No.	Location	KM	Issue / Picture	baseline parameters / additional remarks
7			Roadside vegetation over a section of about 1 km before the road is traversing alongside the village of Hayoti Nav on the left. Tree species are Elms and willows. Adjacent to the road are irrigation channels and small wetlands with reed (*Phragmites australis*). Due to widening to 4 lanes tree losses cannot be prevented. 	Quantity of tree losses needs to be established. Losses will be compensated by new plantings.
8	Mountain section	Km 16	One of the alternatives considered is the elocation of road to the right. In this case blasting will probably be required. 	The distance to the next lying isolated building is approximately 800 m. There is no densely populated area or significant settlement within the perimeter of 3 km.

No.	Location	KM	Issue / Picture	baseline parameters / additional remarks
9	Existing animal migration		Potential disruption of existing animal migration pattern 	For Phase 1 of the Project road 5 animal crossings were proposed during consultation meetings. Safe animal crossings will be included in the technical design.
11	Mountain section	Km 29	Cut slope made of soft unconsolidated material. Holes in steep slope serve as a nesting site for various species of birds, as for instance the rose starling, barn sparrow and Indian starling. 	Construction works at this section shall consider nesting season.

No.	Location	KM	Issue / Picture	baseline parameters / additional remarks
Section 2 of Project road				
12	Dahanakiik River		Bridge crossing Dahnikiik River. Construction works should be conducted during summer – autumn when water level is low. 	Water quality measurement 100 m upstream and 100 m downstream the existing bridge for purpose of baseline establishment. Than regular monitoring during constriction stage. Parameters as indicated above for River Kofarnigon.
13	Dahanikiik River and adjacent slopes		It may be required to use an additional source for material extraction due to long distance haulage from Kofarnigon and Vakhsh river respectively. Boulders and bedrock slopes at Dahnikiik river are considered to be a suitable source for aggregates 	In case it is required to use this additional aggregate source all required licences and approvals need to be obtained. Approval from CEP required.

No.	Location	KM	Issue / Picture	baseline parameters / additional remarks
14	Obikiik		Within Obikiik potential impacts due to noise and air emissions during construction and operational stage. Potential vibration impacts on nearby building structures during construction stage.	Bypass option is considered for Obikiik. The investigation of this alternative is part of section 2 of the Project.
				
15	South of Obikiik		There are cemeteries located along the Project road within Khurason District close to the village of Obikiik. Following initial consultations people are concerned about potential encroachment of the project road	Part of section 2 of the Project
			Part of phase 2 of the Project. As a mitigation measure any road widening is proposed to be carried out on the opposite side of the cemeteries. The design needs to consider this in order to avoid any impact on the cemeteries as far as it is technically feasible.	

No.	Location	KM	Issue / Picture	baseline parameters / additional remarks
16	South of Obikiik over a stretch of approximate 5 km		Traverse of extensive orchards south of Obikiik. Considering the higher traffic volumes in the future it is proposed as a mitigation measure to plant roadside trees and shrubs. Besides its aesthetical value these plantations will reduce emission of pollutants on land for food production. 	Part of phase 2 of the Project
17	River. Approximate 1.5 km before traversing alongside the village Mekhnat		Crossing of river. Construction works should be conducted during summer – autumn when water level is low. 	Part of phase 2 of the Project

No.	Location	KM	Issue / Picture	baseline parameters / additional remarks
18	Entrance to Uyali town		Irrigation channel. Water quality monitoring is proposed during construction stage. 	Water quality monitoring during construction phase. Parameters pH, dissolved oxygen, sulfate (mg/l), NH4-N (mg/l) and oil products.
18	Uyali Town		Sensitive hotspot. Within Uyali town centre. Bazar and shopping area adjacent to Project road. 	Baseline measurement and Monitoring of Noise, Air Pollutants and Vibration required during construction phase.

No.	Location	KM	Issue / Picture	baseline parameters / additional remarks
19	South of Uyali		Planted tree row (Pines) along both sides of the Project road south of Uyali. Due to the widening of the cross section tree cuts cannot be prevented. 	Tree losses need to be compensated by new plantings.
20	Vakhsh River		Crossing of Vakhsh River and its associated floodplain. 	Baseline measurement for water quality 500m up- and downstream the new bridge during construction phase. Parameter as for River Kofarnigon.
21	Vakhsh River		Material extraction from Vakhsh river floodplain. Borrow area is already in operation. Borrow areas upstream the new Vakhsh bridge shall give priority to borrow areas downstream. This is for reason of protection of bridge foundation.	Prior to start extraction activities approved licence required from CEP. Monitoring during construction phase..

No.	Location	KM	Issue / Picture	baseline parameters / additional remarks
22	Vakhsh River valley		Facilities for aggregate crushing nearby extraction site in Vakhsh river floodplain. It is recommended to try to use these facilities. 	Part of phase 2 of Project.
23	Kurgonteppa		End of Project road in Kurgonteppa. Sensitive hotspot. 	Baseline measurement and monitoring of noise, air pollution and vibration during construction phase. Part of Phase 2 of Project.