KYRGYZ REPUBLIC
MINISTRY OF TRANSPORT AND COMMUNICATION

Central Asia Road Links Project – Kyrgyz Republic

Environmental Impact Assessment (EIA)

Date: October 17, 2013

Table of Contents

Tables

Figures

Appendix

Abbreviations

ACP	Asphalt concrete plan
AADT	Average Annual Daily Traffic
BoQ	Bill of Quantities
CFPP	Chance Find Procedure Plan
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMP	Environmental Mitigation Plan
EPNR	Especially Protected Natural Reserve
FS	Feasibility Study
GDP	Gross Domestic Product
IEE	Initial Environmental Examination
IMA	Independent Monitoring Agency
IUCN	International Union for the Conservation of Wildlife
FSU	Former Soviet Union
KDTP	Kyrgyzdortransproject
KR	Kyrgyz Republic
MoTC	Ministry of Transport and Communications
NAEP	National Environment Action Plan
NTFP	Non-Timber Forest Products
NGO	Non-Government Organization
NSC	National Statistical Committee
NMT	Non-Motorized Transport
NRRP	National Road Rehabilitation Project
PCR	Physical Cultural Resources
PIU	Project Implementation Unit
PSC	Project Supervision Consultant
RoW	Right of Way
RP	Resettlement Plan
RMU	Road Maintenance Unit
RPF	Resettlement Policy Framework
SAEPF	State Agency for Environment Protection and Forestry
SNiP	Строительные нормы и правила/ FSU Construction Norms and Standards
SEE	State Ecological Expertise
ToR	Terms of Reference
USAID	US Agency for International Development
USD	US Dollar
WB	World Bank
WWF	World Wildlife Fund for Nature

1. Introduction and Background

1.1 Introduction

The Kyrgyz Republic is a landlocked, small country of approximately 200,000 km^2 without connection to any seaport and with poor air and road transport connections. About 95 % of the territory is mountains. It is part of Central Asia (Figure 1).

The Kyrgyz Republic is a sparsely populated country. The population is 5,365,167 (2010)[1], of which 1,827.4 (approximately one third) to live in towns and 3,448.7 (two third) to live in rural areas. There are enclaves with a high population density in the southern part of the country (part of Fergana valley), which is populated by people of different nationalities. The Republic is multi-ethnic with a predominance of the Kyrgyz - 70.9%. Russian - 7.8%, Uzbeks, living predominantly in the Fergana Valley - 14.3%, and other ethnic groups (Dungans, Ukrainians, Uigurs, Tatars, Kazakhs, Tajiks, Turks, Chinese, Koreans and Germans) - 7%. More than 75 % of population (approx. 3.6 m people) are Muslims. The population is clustered in two key regions: the Fergana Valley in the South West, and the Chui Valley in the North. The administrative-territorial division includes seven areas: Jalal-Abad, Issyk- Kul, Naryn, Osh, Talas, Chui, Batken and 2 town under administration of the Kyrgyz Republic (Bishkek and Osh).

With a gross national product (GDP) of $4,616,156,122 (2010), a low labour and social protection (8.2% unemployment rate, 2008), with a poverty level of 33.7 % (2010)[2] and a life expectancy of 69 years (2009) the Kyrgyz Republic is one of the poorest and least industrialized countries in Europe and Central Asia (ECA) region. However, the literacy rate (according to official statistical data) is remaining high as in other former Soviet states: 99% of people from 15 years of age and older (2009)[3].

The economy is now predominantly agricultural and is estimated to represent 63.3 % of GDP in 2007, compared with 35% in 2001. Hence the agricultural sector has almost doubled in the same period. Since the break-up of the FSU in 1991, economic activities have declined and customary trading patterns as well as industrial-technological relations have been disrupted, resulting in a dramatic fall in demand for transport. The volume of freight (in ton-km) in 1995 was less than 20% of that in 1990, while passenger movements fell by more than 50% over the same period. In 2011 the volume of road freight composed 36.4 million tons what corresponds to 96.6 % of the total carriage of freight.

1.2 Project Background

Within the framework of Central Asia Regional Economic Cooperation (CAREC) Program, the countries of Central Asia are working together to increase regional transport connectivity by coordinating investments in transport infrastructure and aligning respective policy and regulatory reforms to make the impacts of those investments sustainable. This is to improve the region's

[1] The World Bank Data / Countries and Economies Kyrgyz Republic The World Bank
[2] "The Survey of well-being of the population of the country in 2010", Bishkek, 2011
[3] The World Bank Data

competitiveness, reduce poverty and expand trade, both among Central Asian economies, regionally, and globally. CAREC program focuses on investment and other activities along six transport corridors that link north, south, east and west through Central Asia.

Specifically, the Governments of Tajikistan and the Kyrgyz Republic approached the World Bank to consider financing for the Osh-Khujand road corridor of which the Osh – Baken – Isfana Road is an integral part.

The proposed Central Asia Road Links program is being prepared as part of a regional program on improvements of priority road links in Central Asia which is expected to have substantial positive impacts on poverty reduction and economic growth, not only because of the high population density along the catchment area of the corridor, but also high poverty rates and related impacts on cohesion and migration.

The following road sections which will link the Kyrgyz Republic with its neighboring countries are expected to be financed by the proposed program: (a) Isfana to border crossing point at Kairagach/Madaniyat (36.08 kilometers), (b) Batken to Tortkul (14.30 kilometers) and (c) Batken to border crossing point at Kyzyl Bel/Guilston (6.11 kilometers.

Figure 1: Kyrgyz Republic

1.3 Background of the Study Road

The Osh – Batken – Isfana road with its total length of 360 km runs along the southern border of Fergana Valley, basically across the territory of Batken oblast in parallel with the state border of Uzbekistan and Tadzhikistan. This road is a continuation of the Bishkek-Osh road and connects the southwestern region of the republic with Osh city. Also the given corridor is a continuation of Osh-Sary-Tahs-Irkeshtam road it provides the shortest exit from the western oblasts of Uzbekistan and northern part of Tadzhikistan to the border with PRC.

Some of the sections of the Osh – Batken – Isfana road have already been rehabilitated under the on-going National Road Rehabilitation (Osh-Batken-Isfana) Project (NRRP). At several sections works are going on now whilst other sections still remain untouched in poor condition due

to a lack of funding. Detailed designs and tender documents exist for the entire length of the Osh – Batken – Isfana road.

2. Legal and Administrative Framework

2.1 Requirements for Environmental Assessment in the Kyrgyz Republic

Environmental impact of the proposed Project is regulated by a number of environmental legislative acts of the Kyrgyz Republic. The Project provides the usage of old pavement in the existing right-of-way (ROW). New alignments through pasture land and agricultural land were also taken into consideration. As to extraction of materials - the project plans to use licensed borrow pits that have already been in operation. Basically extraction of construction material from unlicensed borrow pits including river beds must be prevented by the construction supervision. It is planned to use the arterial roads available for all borrow areas for material haulage and therefore no new disturbance sources should occur. According to the article 10 of the Kyrgyz Republic State Environmental Expertise Act, the EIA is required for construction of new roads (facilities) (sections Sulukta – Koltso; Isfana bypass and Chek East - Chek - Chek West).

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.

The KR **Environmental Protection Act** dated June 16, 1999 № 53 (as amended by the KR Acts dated 4.02.2002 № 22, 11.06.2003 № 101, 11.08.2004 № 113, 6.08.2005 № 124, 27.04.2009 № 131, 11.03.2013 № 36)	Defines the policy and regulates the legal relations applicable to natural management and environmental protection in the Kyrgyz Republic.
Article 17: Environmental requirements to location, designing, construction, reconstruction and commissioning of enterprises, structures and other facilities	Arrangements for location as well as for design, construction and commissioning of industrial facilities has to be carried out according to legislation and requires the approval of the state environmental expertise
Article 22: Environmental Protection from Harmful Physical Effects	It is forbidden to exceed the standard maximum allowable limits of industrial and other noises, vibrations, electromagnetic fields and other harmful physical effects on human health and environment.
The KR **State Environmental Expertise Act** dated June 16, 1999 № 54 (as amended by the KR Acts dated 11.06.2003 № 102, 26.02.2007 № 21)	Regulates the legal relations applicable to the state environmental expertise.
Article 3: Objects (Facilities) of State Environmental Expertise	Feasibility studies and designs of construction, reconstruction, expansion, technical upgrading, temporary closing and liquidation of objects (facilities).
Article 10: Environmental Impact Assessment	EIA is arranged and made when preparing the feasibility evaluations for: - new construction, reconstruction, expansion and technical upgrading of operating economic and other facilities that affect or can affect the environment.

Tab. 1 Relevant laws and regulations on the environmental impacts of road projects

Article 10 of the **KR State Environmental Expertise Act** defines the activities that require EIA and the process to undertake the EIA. The following activities require implementation of an EIA:

- Concepts, programs and plans for sectoral or territorial socio-economic development;
- Plans for the integrated use and/or protection of natural resources;
- Master plans for cities and settlements as well as other town-building; and
- Any new construction, reconstruction, expansion or re-equipment of operating economic entities or other entities which are likely to have impacts on the environment

According to the Temporary Instruction for Procedure for Performance of Environmental Impact Assessment of Planned Economic and Other Activities (Instruction 1), the documentation prepared must reflect the full extent of the project and meet the specified requirements for EIA, while to ensure consistency of EIA reports, the Instruction on Procedure for Performance of Environmental Impact Assessment of Planned Activity should be fully consulted (Instruction 2). According to Instructions 1 and 2 the EIA must include:

- Description of the project or planned activity;
- Possible alternatives for the project or planned activity;
- Description of the existing environment;
- Types and degree of impact on environment and population;
- Forecast on any possible changes in environmental quality;
- Description of socio-economic and ecological consequences; and
- Actions to prevent environmental damage or mitigate the level of ecological risk.

Once prepared the EIA is reviewed by the authorized government body on environmental protection.

Further important laws are:

- Law of Kyrgyz Republic on Protected Natural Territories;
- The Forest Code; Land Code of the Kyrgyz Republic;
- Law on Peasant Farm; Law on State Registration of Rights to Immovable Property;
- Law of the Kyrgyz Republic on Licensing;
- Law of the Kyrgyz Republic on Pastures; and
- Law of the Kyrgyz Republic on Subsoil.

Environment policy of the Kyrgyz Republic is anchored in the 1995 National Environment Action Plan (NEAP) which effectively shaped the evolution of the country's environmental laws and regulations. The two most significant pieces of legislation being the Law on Environmental Protection (No. 53 of June 16 1999) and Law on Ecological Expert's Review (No. 54 of June 16 1999).

2.2 Assessment Requirements of the World Bank

The World Bank undertakes environmental screening of proposed projects to determine the appropriate extent and type of environmental assessment (EA). The World Bank classifies proposed projects into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

- Category A – describes a proposed project if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. EA for a Category A project is an environmental impact assessment (EIA) which examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives (including the "without project" situation), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance;
- Category B – describes a project if its potential adverse environmental impacts on human populations or environmentally important areas (including wetlands, forests, grasslands, and other natural habitats) are less adverse than those of Category A projects. These impacts are site-specific; few if any are irreversible; and in most cases mitigation measures can be designed.
- Category C – describes a project if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project;
- 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.

2.3 Recommended Categorization of the Project

The World Bank’s system of environmental categorization is determined according to the likelihood and magnitude of risk associated with a project (and subprojects) when implemented without mitigation.

Basically all of the project sections are considered to be Category B since impacts can be mitigated on site. The following Tab. 2 shows sections of the project roads, major impacts to be expected, mitigation measures and proposed categorization according to the assessment requirements of the World Bank. The sections were named according to 0 and 0.

Section	Impacts	Mitigation measures	Proposed Categorization	Comments
km 216 – Batken; Isfana – Sulukta B1, B2, B2A, I1, I2, I3, I6 Alternative 0	Impact during construction phase	Prevention of dust, noise, pollution	B	existing alignment, no widening required
Isfana to border crossing point at Kairagach/Madani yat I7, I9	Impact on landscape (erosion) impact on existing flora and fauna in central part of the section	Slope stabilization, planting of two trees and bushes instead of one to be cut, speed limits	B	alignment on existing farm track in the beginning, already heavily impacted by man (existing erosion caused by cattle), central part of the alignment within pasture land
Batken to Tortkul	Existing alignment	Prevention of dust, noise, pollution	B	Existing alignment
Batken – to border crossing at Kyzyl Bel/Guliston	Impact during construction phase	Prevention of dust, noise, pollution	B	existing alignment, no widening required

Tab. 2 Sections of the project roads, impacts, mitigation measures and categorization according to World Bank requirements

2.4 World Bank Safeguards Requirements

The objective of environmental and social safeguards is to prevent and mitigate undue harm to people and their environment in the development process. Safeguard policies are the cornerstone of the assistance provided to developing countries by their development partners. The policies provide guidelines for donors and borrowers in the identification, preparation, and implementation of programs and projects. The following safeguards requirements were considered during implementation of the EIA.

2.4.1 Environmental Assessment (OP/BP 4.01)

This policy requires EA of projects to help ensure that they are environmentally sound and sustainable. EA evaluates a project's potential environmental risks and impacts; examines project alternatives; identifies ways of improving the project by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts. Projects that will affect the environment (temporary or permanently) will be subject to EA. The depth of the EA is function of the level of socio-environmental risk associated with a project (i.e. the project category) and depending on the significance of impacts, either an EIA or IEE is required. As some alignments are proposed to be Category A and B and some risks for the environment cannot be excluded according to World Bank policy an EIA was conducted.

2.4.2 Natural Habitats (OP/BP 4.04)

This policy promotes and supports natural habitat conservation and improved land use by requiring that projects integrate conservation of natural habitats and the maintenance of ecological functions into the project design. If a project is located in a protected area or considered as a critical or sensitive area from an environmental point of view, or if a project can cause irreversible damages to such areas, it will be excluded from financing. Fauna and flora of steppe habitat is likely to be impacted in one road section (Sulukta – Koltso, about 4 km). This OP/BP has been applied accordingly.

2.4.3 Physical Cultural Ressources (OP/BP 4.11)

This policy requires the protection of "cultural property" (including archaeological, historic, religious sites as well as areas of unique natural value). Cultural property comprises remains left by previous human inhabitants and unique natural environmental features such as canyons and waterfalls. Projects that will significantly damage non-replicable cultural property will be excluded from funding. Projects shall include a plan for the protection and/or enhancement of cultural properties accidentally encountered (“chance findings”). This OP/BP plays a minor role during this assessment as impacts on cultural property are unlikely to appear.

2.4.4 Forests (OP/BP 4.36)

The Bank's current forests policy aims to reduce deforestation, enhance the environmental contribution of forested areas, promote reforestation, reduce poverty, and encourage economic development. This policy includes adoption of a comprehensive and environmentally sound forestry conservation and development plan that clearly defines the roles and rights of the government, the private sector, and local people. As forests do not exist within the project area this OP/BP plays a minor role within the EIA to be conducted.

2.4.5 Involuntary Resettlement (OP/BP 4.12)

This policy covers the direct economic and social impacts that are caused by the involuntary taking of land resulting in (i) relocation or loss of shelter; (ii) loss of assets or access to assets; or (iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on livelihoods. If a project requires either land acquisition or resettlement (as defined above) either a shortened or full Resettlement Plan (RP) will be required, depending on the scale of the impact (significant or non-significant).

Update of the existing Resettlement Policy Framework and (RPF) and preparation of an RP is implemented under the FS since some resettlement action cannot be excluded under this project (new alignment Sulukta – Koltso I9, Isfana bypass, new alignment Chek East - Chek - Chek West, B9).

3. Methodology of the Environmental Impact Assessment

The purpose of the EIA is to define the baseline environmental conditions in order to identify and assess the impacts of the various activities of the proposed project. As noted already, this project has already been the subject of an EIA and several investigations. This report has updated the original EIA, supplemented it with new and more recent data, and included an analysis of World Bank requirements and those of Kyrgyz Republic. In addition an Environmental Mitigation Plan (EMP) and Environmental Monitoring Plan have been prepared.
The following methodology was applied:

- Existing baseline data (including all available environmental legislation and guidelines) and relevant reports from previous projects were collected, reviewed and analysed.
- Discussions held with local experts from the Ministry of Environment, Ministry of Transport and Communications and the local associate, Kyrgyzdortransproekt
- Informal interviews and participatory discussions were held with people living and working along the project roads. This includes a number of consultations along the project road in 2006 and 2007 as part of the Maintenance of Regional Road Transport Corridors Project;
- Additional public consultation has to be carried out in cities of the project area (Batken and Isfana) after publication through MoTC due to changes in design, environmental and social issues
- Design and engineering data were reviewed and taken into account to identify environmental impacts and mitigation measures during design, construction and operating phase.
- A field trip has been implemented from 6 June to 9 June 2013 to examine the proposed alignments from the environmental point of view

The potential environmental impacts have been assessed according to the World Bank policy and the Kyrgyz environmental legislation. In addition institutional aspects have been taken into consideration.

4. Description of the Project

4.1 General

The project being described under this FS consists mainly of road rehabilitation and upgrade, but in addition of new alignments to be considered. Since road rehabilitation mainly comprises improvements along the existing alignment, significant environmental impacts are not usually encountered in these sections.

A new alignment is proposed to bypass the city of Isfana on mainly agricultural land (fields and pastures). A new alignment is suggested to connect Sulukta with the village of Koltso to bypass Tajik territory. This alignment will follow agricultural land and steppe habitat. Description of impacts and mitigation measures were taken into consideration in Chapter 6.

4.2 Description of the sections to be financed under the Project and potential impacts

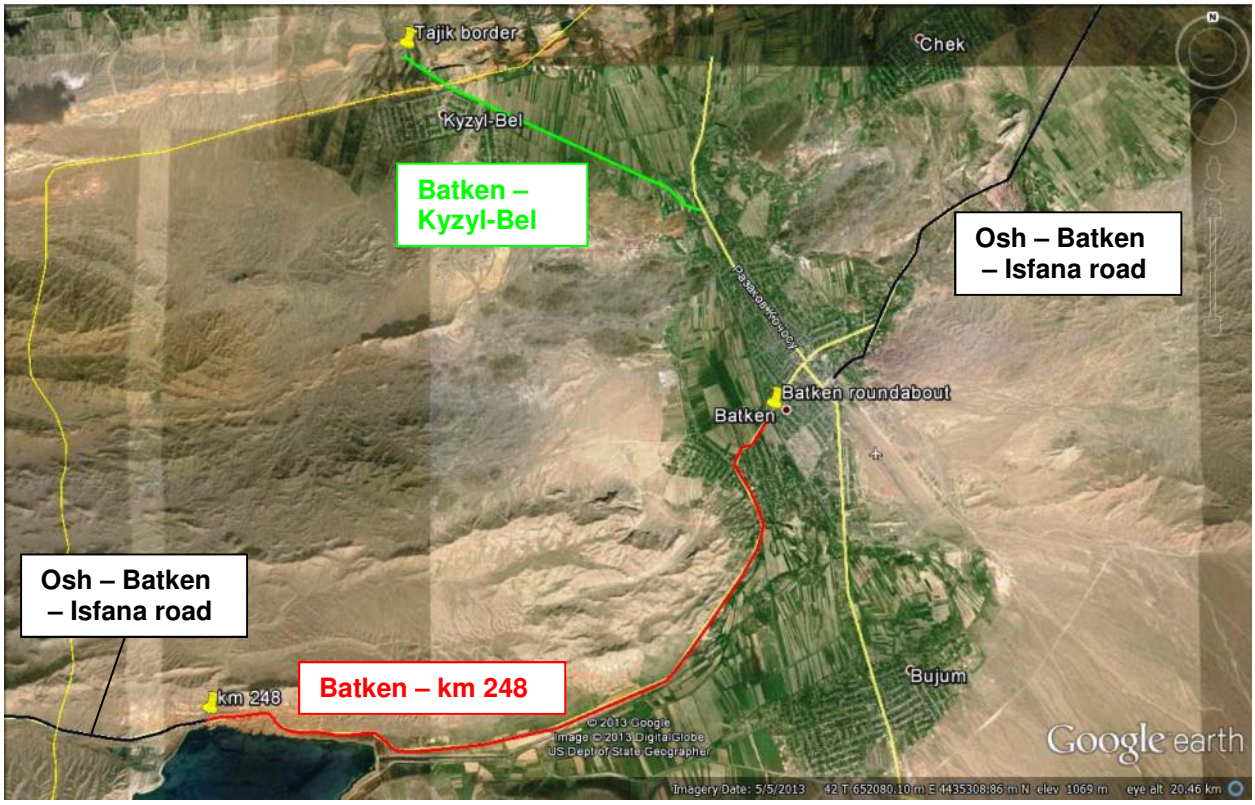


Figure 2: Project sections Batken

Note: The Kyrgyz / Tajik border shown is partly not correct due to obviously incorrect data in Google Earth

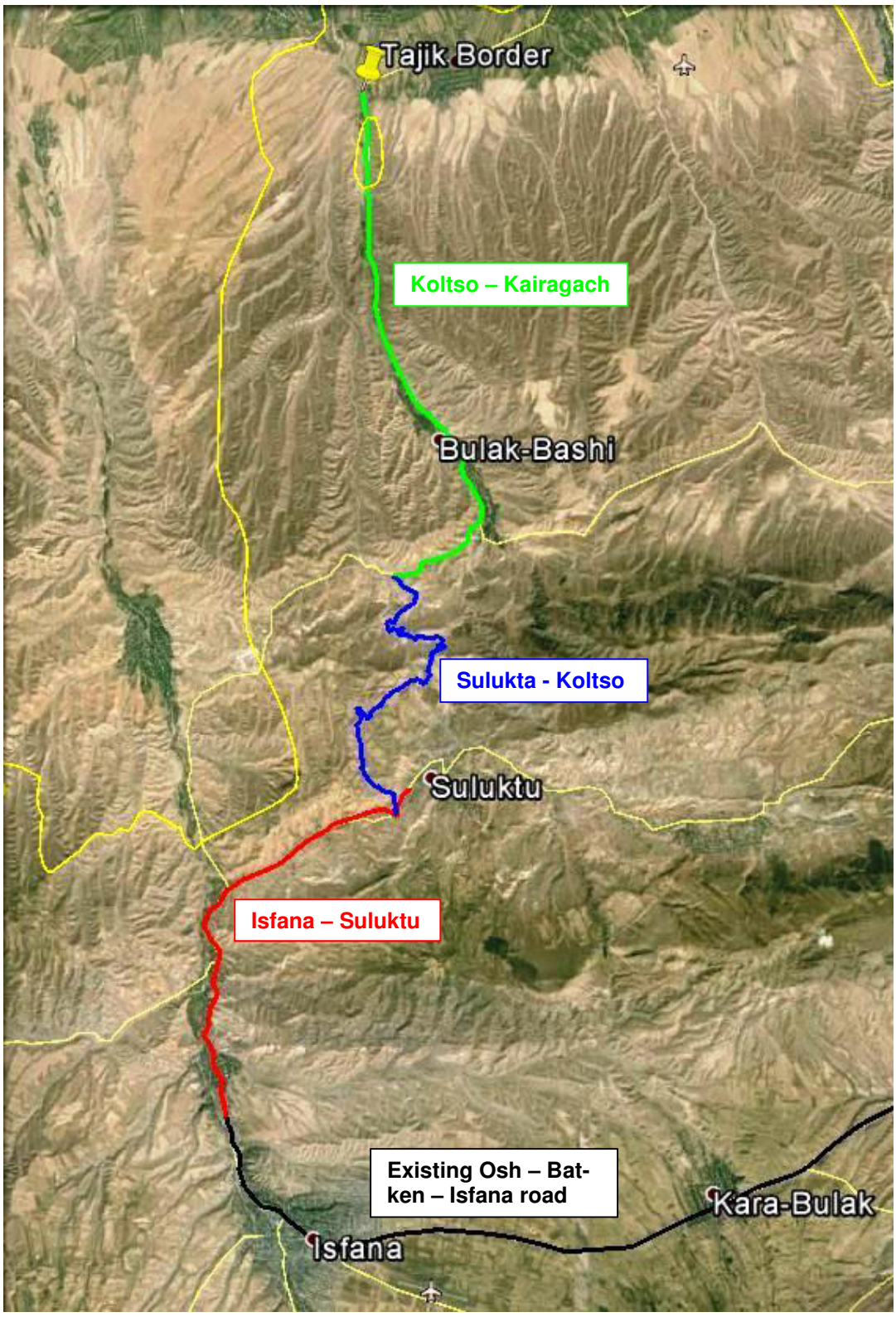


Figure 3: Isfana – Kairagach project sections

Note: The Kyrgyz / Tajik border shown is partly not correct due to obviously incorrect data in Google Earth

4.2.1 Batken to border crossing point at Kyzyl Bel/Guliston (6.11 kilometers)

The road section from Batken to the Tajik border starts at a left turn form Razakov Street behind Batken. From here it follows the existing asphalt road at a length of ca. 6.1 km to the border with Tajikistan behind Kyzyl-Bel. The existing elevation varies between 934 and 979 m. One three-span bridge was investigated in this section.

The main parameters for a road category IV SNIP KR 32-01:2004 for these sections are as follows:

- width of the road embankment – 10 m;
- carriageway width: 6,0 m (2 x 3, 00 m);
- width of shoulder: 2,00 m (2 x 2,00 m). 0.50 m (2 x 0.50 m) shoulders have to be paved;
- carriageway cross fall 2 %;
- shoulder inclination 4 %;

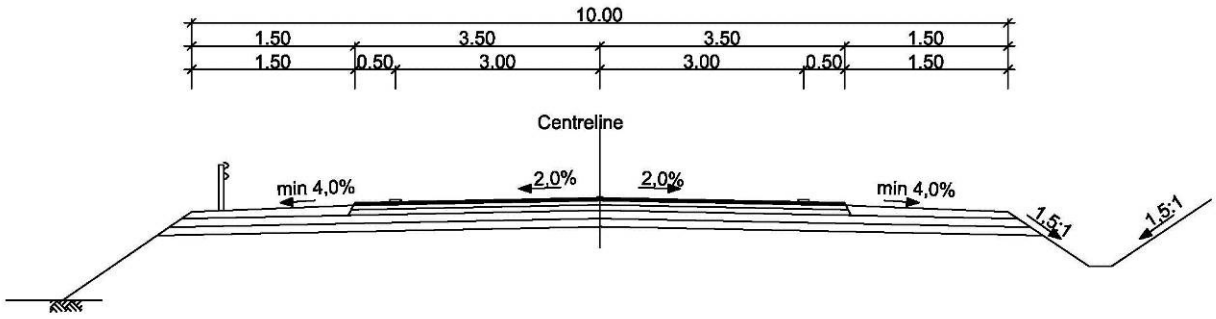


Figure 4: Cross Section of a Road Category IV

Potential impacts
The Loss of agricultural land, disruption of animal habitats and cutting of migrating corridors is not expected for this option. Trees on both sides of the road have a positive aesthetical effect and mitigate erosion processes on the embankments and on adjacent edges of agricultural land. Moreover they stabilize the road embankments and filter traffic emissions on neighboring agricultural land. Cutting of trees will be mitigated by planting of new trees alongside the upgraded alignment to preserve these effects for the future.

4.2.2 Batken to Tortgul (14.30 kilometers)

Starting at the roundabout km ca. 238 in Batken, the alignment then follows the existing asphalt road till the start of new asphalt at the recently reconstructed section. The total length of the section accounts for approx. 14.3 km with an elevation in the range from 1040 m to 1183 m.

Potential impacts
This section exists already. Upgrade of this section is intended including pavement and widening in places. Losses of vegetation structures (bushes and trees) should be mitigated by plant-

ing of two bushes and trees for each one to be cut. Fragmentation of animal habitats is not expected.

4.2.3 Isfana to border crossing point at Kairagach/Madaniyat (36.08 kilometers)

From approx. design km 6+200 the alignment follows the existing road towards the Tajik border. Whilst the current road to Tajikistan turns to the left at a junction in the settlement of Samat, the proposed alignment continues slightly right on the existing road to Sulukta. This is to bypass a bulge of Tajik territory into Kyrgyzstan and to avoid a road section where a massive landslide has occurred in the past. The existing railway level crossing in Sulukta was defined as the end of the section, having a length of about 11.9 km from design km 6+200 behind Isfana.

The new alignment continues in general northwards till it reaches the existing road to Tadzhikistan again in the settlement of Koltso. Turning right here the alignment will follow the existing road until the border crossing point at Kairagach is reached. Elevations of the whole design section vary from 610 m to 1418 m. The border crossing is the end of the section to be studied with a total length of approx. 42.26 km.

A more detailed description of the project and construction activities is provided in the FS. The main parameters for the road from Isfana to the Tajik border via Sulutka follow road category III SNIP KR 32-01:2004:

- width of the road embankment – 12 m;
- carriageway width: 7,0 m (2 x 3, 50 m);
- width of shoulder: 2.50 m (2 x 2,50 m). 0.50 m (2 x 0.50 m) shoulders have to be paved;
- carriageway crossfall 2 %;
- shoulder inclination 4 %;

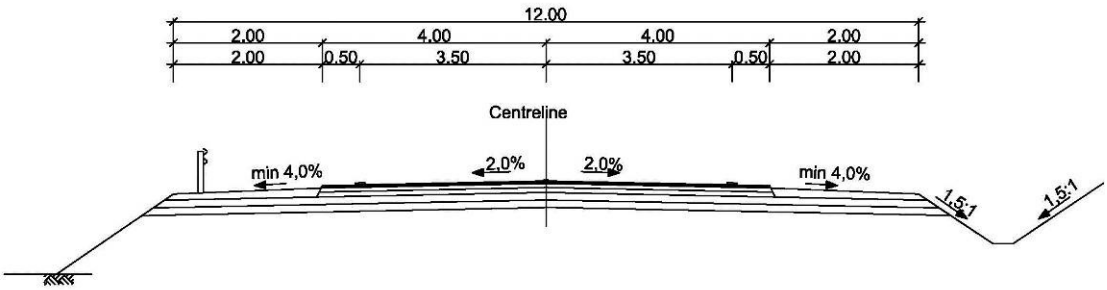


Figure 5: Cross Section of a Road Category III

Potential impacts

This alignment starts about 1 km west of Sulukta to follow an existing farm track for about 1 km. This area has been already severely impacted by man. Erosion from cattle treading, rain and snow melt is visible on the slopes. In addition the beginning of this section is already character-

ized by losses of vegetation structures and disruption of animal habitats. No major impact is expected from the alignment in this area.

Then the alignment runs through pasture land which is not intensively used. Typical semi-desert and dry-steppe vegetation still exists in some places.

The next 5 km are already impaired by man. The road follows partly existing farm tracks and crosses an existing railway track for about five times and power lines. The railway is out of order. It has been used in Soviet times. The last 3 km to Koltso are already heavily impaired. Erosion and landslides are visible due to cattle threads and surface water runoff that appears after heavy rain and during snow melt.

Construction works in the central part of this section shall be implemented only within the future road track to prevent further erosion and to protect steppe vegetation and animal habitats. Physical impairment of the roadside vegetation has to be minimized. Slope stabilization has to be carried out very carefully to prevent erosion. This alignment should be monitored after construction. If animal kills are observed additional mitigation measures have to be implemented (speed limits).

4.3 Need for the Project – the "Do – Nothing – Option"

The project road provides national and regional access to other Central Asian republics such Tadzhikistan and Uzbekistan. Poor maintenance has been cited as one of the main factors which had resulted in the present deterioration of the road network with the resulting extra costs to both regional and national economies.

Improved roads and access, therefore, require more emphasis on a sustainable road network maintenance program, as well as road maintenance capacities and skills to achieve and sustain the benefits from the investment. A program must be put in place to ensure that the regional road network does not deteriorate further. Maintenance equipment should therefore be kept functional regardless of circumstances.

In view of the above, a "do nothing" or "without project" option is not feasible since economic growth of Kyrgyzstan depends on good road networks. Basically rehabilitation of existing alignments in the ROW improve environmental conditions through reduction of dust emissions. Dust is the largest contributor of air emissions in Kyrgyzstan (Chapter 5.1.5). Impacts on the environment from upgrading of existing roads and from construction of new road sections can be mitigated.

4.4 Traffic Volumes and Transport Modes

0 and 0 give an overview of the project area including the road network which was used for the calculation of the traffic volumes (Batken and Isfana road network).

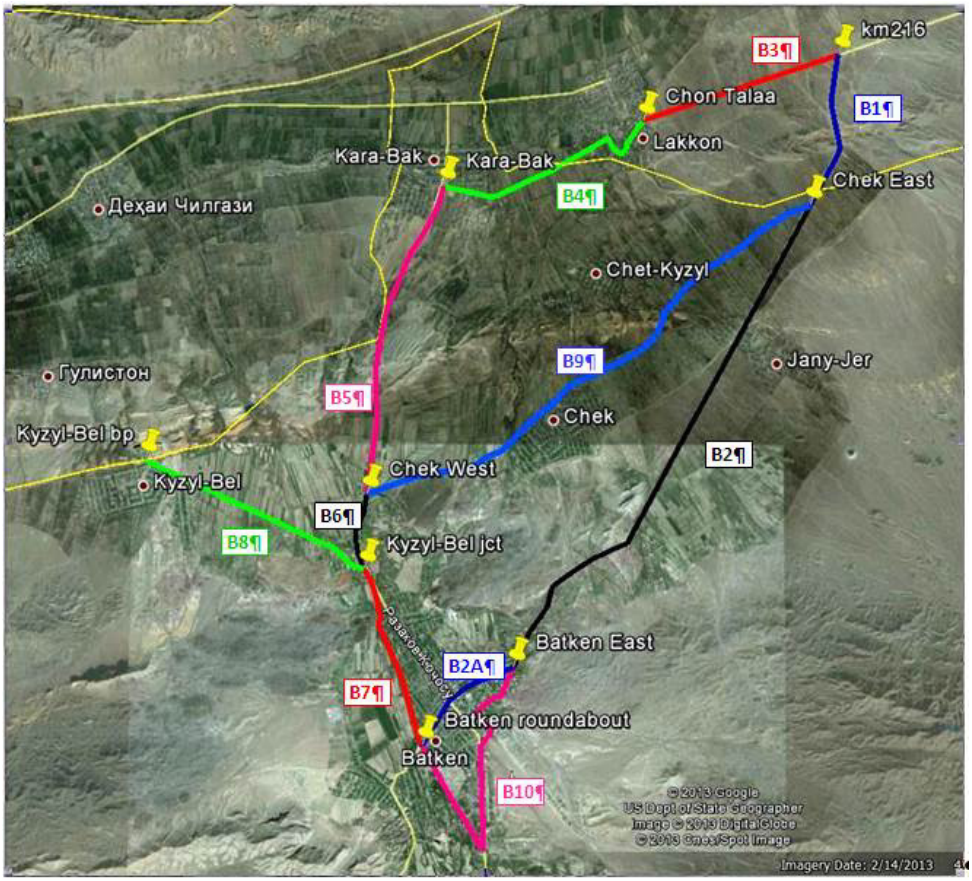


Figure 6: Batken road network

Figure 7: Isfana road network

The present day traffic volumes and forecasts for 2016 and 2035 are summarized for the Batken road sections in Tab. 3 and for Isfana road network in Tab. 4.

Section	From	to	2013	2016	2035
B1	M-13 km216 jct	Chek east jct.	754	769	1,522
B2	Chek East jct	Batken east	1,007	1,086	2,176
B2A	Batken east	Batken roundabout	1,980	3,380	6,721
B3	M-13km 216jct	Chon Talaa	414	903	1,768
B4	Chon Talaa	Kara-Bak	414	903	1,768
B5	Kara-Bak	Chek West jct.	1,006	1,874	3,727
B6	Chek West jct.	Kyzyl Bel jct.	890	1,676	3,332
B7	Kyzyl Bel jct.	Batken roundabout	4,381	1,676	3,332
B8	Kyzyl Bel jct.	Kyzyl Bel bp	375	640	1268
B10	Batken southern link		---	2,367	4,705
New Sections	**from**	**to**	**2013**	**2016**	**2035**
B9	Chek east jct	Chek west jct	---	215	420

Tab. 3 Traffic forecast for Batken bypass and Tajik border (annual average daily traffic)

Section	From	to	2013	2016	2035
I1	Isfana east	Isfana central	3,283	2,422	4,824
I2	Isfana central	Isfana west	2,936	1,993	3,963
I3	Isfana west	Samat	2,936	5,202	10,347
I4	Samat	Koltso	1,734	0	0
I5	Koltso	Kairagach bp (Tajik)	832	1,474	2,928
I6	Samat	Sulukta west	1,017	3,938	7,853
I7	Sulukta west	Sulukta central	1,017	1,808	3,624
New Sections	**From**	**to**	**2013**	**2016**	**2035**
I8	Isfana east	Isfana west	-	2,246	4,469
I9	Sulukta west	Koltso	-	2,958	5,872

Tab. 4 Traffic forecast for Isfana bypass and Tajik border (annual average daily traffic)

The forecast of growth shows increasing traffic volumes for the Batken and Isfana road sections. Significant increase in traffic is also expected for international traffic (e. g. Section B8 Kyzyl Bel; Section I5 Koltso - Kairagach, Tadzhikistan). Therefore rehabilitation and upgrade of the road network and/or construction of new alignments is highly needed.

4.5 Borrow Pits and Quarries - Construction Material

Natural sources for aggregates suitable for road construction are available in the needed quantities in the area adjacent to the construction sites. Several existing and operating quarries in the country have been investigated during previous project stages as well as during recently carried out investigations.

To provide the object with road-construction materials under environmental and economic aspects, various existing quarries were investigated within the design section. It is recommended to use these existing quarries for construction purposes as follows:

1. Deposit-Quarry of gravel-sandy mix at km 3+500 – km 6+500 from the beginning of the section (approx. km 279+467 – km 282+467), 50 m to the left.

2. Deposit-Quarry of gravel-sandy mix at km 13+250 – km 13+650 from the beginning of the section (approx. km 289+750 – km 290+150) and km 20+550 – km 21+050 (approx. km 297+000 – km 297+500).

3. Deposit-Quarry of pebble soil is located in dry “sai”, 50 m to the left from km 59+450 (approx. km 335+900).

4. Deposit-Quarry of pebble soil “Kara-Bulakskoye” is located to the right from km 79+450 (approx. km 356+000), at the distance 50 – 400 m.

5. Sand and Gravel Quarry at Tamchisai (Figure 12)

6. Rugged stone is recommended to take from the deposit of limestone "Andarakskoye", it is located at the distance of 15 km to the left from km 360+000 of the road “Osh-Isfana.

7. Gravel and sand to the right of km 340+250 - 7.1 km from the start point at the Isfana - Sulutka section (Samat Settlement)

Extraction of construction material from licensed quarries mentioned above must be part of the tender documents. Extraction of construction material from unlicensed quarries and river beds must be prevented by the construction supervision.

Cement can be provided by the South Kyrgyz Cement Factory in the town of Kyzyl - Kiya situated between Osh and Batken. It was founded in December 2009. The factory produces 968 tons of cement per year.

There are not sufficient sources of bitumen producing companies in the Kyrgyz Republic. It is suggested to import bitumen from the neighbouring countries (Kazakhstan and Tadzhikistan) or Russia for road construction.

5. Description of the Existing Environment

This chapter describes the baseline environmental conditions relevant to the road project.

5.1 Physical Characteristics

5.1.1 Topography

The topography of landlocked Kyrgyz Republic is very diverse. Its absolute height ranges from 400 m to 7,000 m. It includes several mountain ranges drawn mainly in east-west and near east-west directions and several dividing intermountain valleys and areas. The average height of the area is 2,750 m above sea level, the highest point is Pobeda Peak (7,439 m) situated in the Central Tenir Too, at the edge of the Boz-Kyr ridge in the eastern extension of Kakshaal Too, by the boundary of China. The lowest point (401 m) is in the Leylek region of Batken area, in the vicinity of Tajik boundary.

The Kyrgyz Republic is a high mountain region, where several of the highest parts of Tien-Shan mountain range are located. In terms of relief structure the Kyrgyz Republic is divided into the several geo-morphological zones: downhill declivity, plains, adyrs (hills) and foot-hills, inter-mountain hollows, mid-range zones, and highly elevated (alpine) zones. Across the project area the topography of the road ranges from flat valleys to high plains. The main topographical features are shown in Tab. 5.

Batken	Depressions: Batken – elevation 900 – 1,500 m, 60 km in length and 24 km in width;
Isfara - Isfana	elevation 900 – 1,600 m, 120 km in length and 26 km in width;
Isfana - Sulukta	Hilly range, Elevation 1,114 – 1,350 m, 16 km in length
Fergana	elevation 400 – 1,200 m, 340 km in length and 160 km width;

Tab. 5 Topographical Features of the Project Area (Source: State Agency for Environment Protection & Forestry 2006)

5.1.2 Geology, Soils and Minerals

The Kyrgyz Republic comprises several distinct geologically structured regions, with a foundation of sedimentary volcanic layers of middle and higher Palaeozoic, and Lower Palaeozoic and Precambrian rocks and with variable extents of metamorphosized volcanic shale rocks and epidot-chloritic, quartzitic-chloritic, seritcitic, and silicious schists.

Soils are the products of destruction of primary (Palaeozoic) and secondary (Mesozoic) rocks and deposits, loess-like loams and pebble conglomerate quaternary layers in the valleys and diluvium in the alpine zones. Different types of soils occur in the project area; soils of syrt plateaus, and soils of mountain slopes. The main characteristics of the soils in the project area include: significant soil diversity, gray earth, gray-brown and brown soils and marked hydrothermal activity, gray rocky gravel soil, sandy loam, clayey soil and medium erosion potential (including inner soil erosion).

The following mineral resources can be found within the project area:

- Gravel – general Osh-Batken-Isfana area;
- Dolomite - close to Isfana.

In the investigated area around Batken alluvial and pre-alluvial quaternary sediments consisting of loamy, gravel and clayey soils prevail. The thickness of the topsoil varies between 0.1 and 0.2 m.

The existing formation around Isfana can generally be characterized as tectonic-erosive and tectonic-sedimentary with slight quaternary sediment.

5.1.3 Landslides, Avalanches and Earthquake Activity

The Kyrgyz Republic is a highly disaster prone country, being exposed to 20 different kinds of natural hazards, the most dangerous in terms of prevalence and, recurrence and damage include; earthquakes, debris flow, flash floods, landslides, rock-falls, and avalanches. In order, the regions most affected by natural disaster are Jalal-Abad, Osh, Chui, and Issyk-Kul, experiencing approximately 425, 275, 175, and 150 events respectively over the period 1993 – 1999.

The greatest risk of landslides and spring floods comes from breakthrough of high altitude lakes, created by glaciers, snow or rock avalanches or glacial clay. The risk of a snow avalanche is at its maximum in February and March in the Osh-Batken area.

The project area is located at the edge of the Central Asian Fold Belt in the Tien-Shan Mountain System formed by the collision of the Siberian and the North Chinese, Tarim, Afghan-Tajik and Kazakhstan-North Tien-Shan plates. The area east of the project road is still very seismically active. Earthquakes with magnitudes of six-seven on the Richter scale are rather frequent and there are records of catastrophic earthquakes in the relatively recent past.

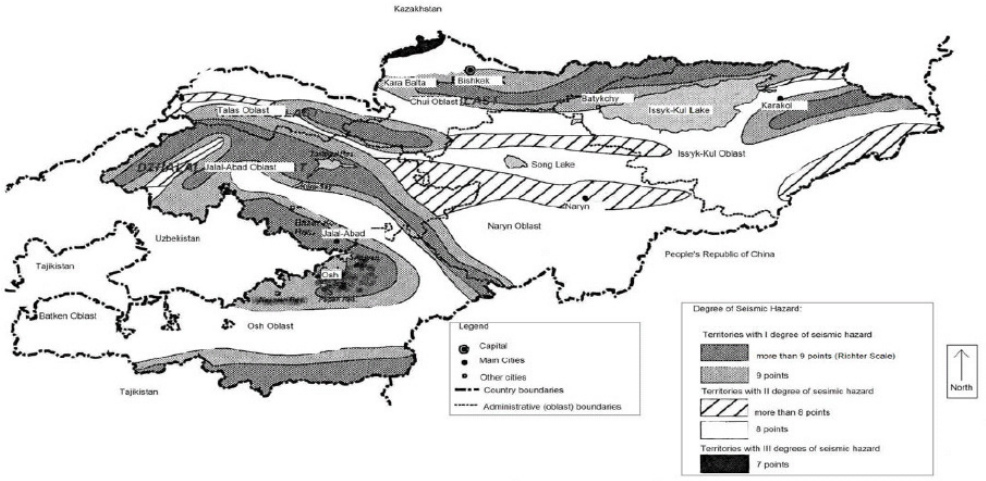


Figure 8: Seismic Activity Map of Kyrgyzstan

5.1.4 Erosion

Some locations of the project area is subject to erosion.

The erosion includes:

- Bank erosion, close to roads;
- Line erosion along the road bed in the ditches and atmospheric flows, irrigating waters, temporary waterways;
- Erosion of road slopes as a rule at the sections with overflow;
- Erosion of lower slopes at the sections with location of small engineering structures (pipes/culverts), especially at the sections of mudflow valleys

Bank erosion of Kara-Suu and Jangakty rivers takes place.

Small mudflow pebble sediments and mudflow “sais”, valleys are mainly formed of Pliocene-low quaternary, semi-consolidated pebble conglomerates. The road often crosses transit zones of mudflows.

5.1.5 Climate and Air Quality

The climate of the Kyrgyz Republic varies according to altitude and topography. There are two distinct types of climate in the country being either continental – hot summer, wet spring and autumn, and cold winter (fogs, rain and snow); or, diverse – clearly expressed dry summer and wet and cold winter (rain, snow fall and permafrost) with snow also falling in autumn and spring.

The climate of the project area is diverse and includes the following characteristics:

- Average annual temperature between -3 and 3 °C;
- Average maximum temperature is 30 °C;
- Average minimum temperature is -35 °C;
- Temperature range in July between 15 and 41 °C;
- Temperature range in January between -6 to -2 °C;
- Average rainfall 328 – 580 mm, decreasing westwards.

Although air emissions in Kyrgyz Republic have been steadily decreasing from 662,000 tonnes in 1989 to 239,000 tonnes in 1998, the contribution from mobile sources has increased from 73 % to 83 % over the same period[4]. Dust is the largest contributor accounting for 46 % of emissions, followed by SO2 (26%), CO (12%) and NOx (8%).

The average annual per capita emissions are in the order of 51 kg (significantly lower than OECD average of 80 kg). The ADB's Country Environmental Analysis comments that while the decline in the country's industrial sector has resulted in greatly reduced levels of air pollution this has been more than offset in urban areas by an increase in vehicular emissions. Air pollution from vehicles is exacerbated by the use of locally made ethylene petrol and an obsolete vehicle fleet.

Air quality also differs across the project area, largely as a result of micro-climates and density of industry and transport routes. The level of air pollution is especially high in cities and towns. Major contributors including vehicle emissions (leaded or poor quality gasoline and diesel), and emissions from mining and processing industries.

There are also concerns regarding trans-boundary air pollution, especially in the Ferghana Valley (Jalal-Abad and Osh – Batken) which is shared by Uzbekistan, Tadzhikistan and Kyrgyz Republic. Uzbekistan is the largest contributor to air pollution in the Ferghana Valley because of its higher emissions and prevailing wind patterns, some of this pollution is transmitted to Kyrgyz territory.

5.1.6 Groundwater Resources

Surface water courses originating mostly from mountainous areas create conditions for the formation of aquifers. The capacity of these resources depends on rainfall, snow melt and the abundance of glaciers in the upper reaches of the rivers. The complex geological structure of the territory, diversity of kinds of rocks and lengthy period of their formation, relief and climate, as well as human activities (irrigation and water-supply) have defined the peculiarities of hydro-geological and hydro-chemical conditions of ground water resources. The climate becomes more arid in the eastern part of the project area. The ground water table is reported to be at 92 m under surface near Batken.

[4] UNDP/Economic Commission for Europe; *Kyrgyzstan: Environmental Performance Reviews* (Geneva, 2000).

5.1.7 River Catchment Areas and Surface Water Resources

The hydrology of the Kyrgyz Republic is a complex pattern of rivers and lakes, and includes the longest river in the country (Naryn) which traverses Jalal-Abad and Naryn district and represents a nearly third of the country's water volume. Rivers of importance in the Ferghana valley (Osh - Jalal-Abad) are Kara-Darya, Kugart, and Kara-Unkur irrigating significant areas of land. The river systems and water resources in the project area are as follows:

District	River / Water Resource	Features
Osh Batken	Isfairmsay/ Shakhimardan	Catchment area 2,200 km^2, length 122 km, av. Annual flow 22.9 m^3/sec
	Naiman	Watershed of 1,300 km^2, length 112 km, Reservoir

Source: State Agency of Environment Protection & Forestry (2006)

Tab. 6 River Systems and Water Sheds of the Project Area

5.2 Biological Resources

5.2.1 Flora

The Kyrgyz Republic is characterized by a high level of biodiversity of plants, the concentration of plants is two to three times higher than in other Central Asian countries, with some 3,786 kinds of higher plant and 3,600 kinds of lower plant species being registered. Eighty-nine of the plant species found in the Republic were listed as endangered in 2005.[5]

Approximately 4 % of the country is under forest cover and the area of forests has been halved over the past 80 years, the period between 1930 and late 1970s alone saw a reduction from 1.3 million ha to 624,000 ha.[6] The natural forests are composed of more than 120 wood species, rivers and lakeshores in the flatlands have dense thickets of elm, poplar, reeds and shrubs, while the alpine and high mountain ecosystems comprise both rare and endangered species.[7]

The biggest fir woods are in the north with very few fir woods in the south. Juniper woods occupy half of the forest area, and are mainly concentrated in the south and southwest in the Alay and Turkestan Mountain Ranges, as well as in Ferghana and Chatkal Valleys. In the south, the juniper grows to some 18 m in height, and the bushy variety is prevalent in the subalpine zone.

[5] Government of Kyrgyz Republic - SAPF; Third National Report - Convention on Biological Diversity, (Bishkek, 2005).
[6] ADB a, and UNDP/Economic Commission for Europe;
[7] World Bank/Global Environment Facility; Regional Plan of West Tien-Shan Biodiversity Conservation, (Astana, Bishkek, Tashkent, 2005)

The Kyrgyz nut and fruit woods are among the largest in the world. They occupy 27,000 ha and represent a unique natural formation, growing mainly in the Ferghana and Chatkan Mountain Ranges at an altitude of 1,000 – 2,200 m. Ferghana zone is the centre of origin for wild relatives of important horticulture and agricultural species.

The main flora species found in the project area are as follows:

- walnut (Juglans regia)
- Turkestani maple (Acer turkestanicum)
- Shrenk's fir (Picea schrenkiana)
- Semenov's abies (Abies semenovii)
- walnut (Juglans regia)
- juniper, Sogdian
- wild prune (Prunus sogdiana)
- Turkestan hawthorn (Crataegus turkestanica)
- dog bramble (Rosa canina)
- barberry (Berberis spp.)
- black currant (Ribes meyerii)
- almond (Amygdalus)
- pistachio (Pistacia vera)
- pear (Pyrus spp.)
- wild rose.

Edward's Pentilium, ("Ryabchik Eduardo",*Aigul's flower*) is a threatened and protected flower species. It grows extensively in the region around Batken at Aigul Tash mountain, the highest mountain of the district. This species occurs also in mountainous areas of Afghanistan.

Along the project road alignments through desert and semi-desert landscape areas species of the Salsoloideae, Asteraceae and Cyperaceae families can be found With regard to elevation these landscapes are located lower than dry-steppe and steppe. The following Tab. 7 shows types of habitat in the project area and dominant species to be found there:

Type of Habitat	Soil types	Flora
Desert	Light and common black earth	Salsoloideae (Climacoptera brachiata); Asteraceae and Cyperaceae families (Artemisia prolixa, Carex pachystylis)
Semi-desert	Dark black earth	Acantholimon family (Acantholimon alatavicum)

Source: State Agency of Environment Protection & Forestry (2006)

Tab. 7 Types of Biotope in Project Area

5.2.2 Fauna

Despite its small area the Kyrgyz Republic provides habitat for one per cent of all known species on earth (and three per cent of all fauna) and lies at the centre of a biodiversity "hotspot"[8].

The fauna of Kyrgyzstan is relatively varied and non-homogeneous in its origin. The known species of vertebrates include more than 75 kinds of fish, four kinds of amphibians, 33 reptiles plus some 368 birds and 83 mammals. In all, there are more than 500 kinds of vertebrates, and more than 20,000 – 30,000 kinds of protozoa and invertebrates[9]
Many animal and plant species are concentrated in relatively small areas and are therefore especially vulnerable. Some 71 plant species and 122 animal species are threatened.

Plants	Total No.	Threatened (%)	Animals	Total No.	Threatened (%)
Lower plants	3,676	NA	Fish	75	8
Higher plants	3,786	2	Amphibians	4	75
Annelid worms	1,282	1	Reptiles	33	15
molluscs	168	1	Birds	368	10
insects	10,290	1	Mammals	83	18

Source: UNDP/Economic Commission for Europe (2000)

Tab. 8 Threatened Species of the Kyrgyz Republic

Kyrgyzstan's ecology is diverse in its relief, climatic conditions, flora and fauna. Many animal and plant species are concentrated in relatively small areas and are therefore vulnerable. With the purpose of protecting its current biological diversity, the country has introduced its Red Book which lists endangered species, as shown in Tab. 9.

[8] ADB a; op cit
[9] UNDP/Economic Commission for Europe; op cit

Species	1991	1992	1993	1994	1995	1996	1997	1998
Marco Polo sheep				16,296	15,747	15,289	16,658	18,050
(European) bison	9	10	5	8	8	3	3	3
Ibex				59,128	69,227	65,572	70,543	71,069
Roe deer	5,285	6,128	5,410	5,810	6,370	5,551	5,362	5,029
Siberian deer	450	450	450	300	237	235	278	258
Bear	216	237	276	274	245	233	226	337
Deer	129	91	90	94	92	95	97	98
Lynx	13	13	11	9	28	33	39	38
Snow leopard	22	15	20	15	22	22	32	31

Tab. 9 Number of Species registered in the Red Book of Kyrgyzstan

The animals of the deserts and semi-deserts are limited in their composition of types, this being the result of the poor living conditions and the small total areas involved. Most of the reptiles in Kyrgyzstan are found in the desert habitats. These include turtles, agamas, lizards and racerunners (Eremias arguta). The fauna of the sand deserts is generally richer than the fauna of the deserts with compacted soils. The desert fauna of Kyrgyzstan is however poor in comparison to Central Asia in general. Amphibians are very scarce in these deserts and semi-deserts.

The fauna of the steppes include marmots (Marmota baibacina, Marmota caudate), porcupine (Hystrix leucura), mice and moles (Microtus gregalis, Microtus avalis), wolf (Canis lupus), badger (Meles meles), goitered gazelle (Gazella subgutturosa), Pallas's cat (Felis manul) and other cats are widely spread and quite common in the steppes.

Figure 9: Poitered gazelle (Gazella subgutturosa), marmot (Marmota baibacina), wolf (Canis lupus), badger (Meles meles), - threatened species of steppe, Kyrgyzstan

The animals of the forests differ noticeably depending on the type of forest. The most ancient types are fruit and nut forest, which formerly occupied large territories and are now preserved as relic islands in the Chatkal and Fergana mountain ranges. Their fauna has preserved some particular features. Typical birds include doves, owls and warblers. The fauna of the nut and fruit forests is typically diverse and has links with the southern regions of Asia and the Mediterranean. However, the fauna of the coniferous forests relates to European-Siberian boreal. Relatively few mammals live near water in Kyrgyzstan. Stoat (or ermine, Mustela erminea) and weasel (Mustela nivalis) were brought in and their populations grew large in many places.

Birds are numerous in all of the varied habitats of Kyrgyzstan. Birds of prey, falcons, eagles, and owls, were once common inhabitants of the steppes a few decades ago, but cultivation, hunting (which was only prohibited fairly recently) and excessive use of pesticides has had a harmful effect on predatory birds, causing them to relocate to more austere but more beneficial terrain.

Almost one third of the bird species in Kyrgyzstan relate to water. However, most of them do not nest and the nesting species are not numerous. Among the latter, lapwing, snipe, redshank and little ringed plover are the most common. Wading birds such as snipe, black winged stilt and lesser sand plover are found on the pebbly sand banks of mountain streams. Pallas's Sandgrouse is a typical of the bird of the desert region. In the dry mountain areas species such as wheatears, skylarks and sparrows are found.

Common and black terns are commonly found at the nesting places. Caspian grebe and Slavonian grebe are nesting more often in Chong-Kol and other reservoirs, the red-necked grebe,

little grebe and great crested grebe being less common. Grey heron, bittern and corncrake have been observed and also single pairs of demoiselle crane and crane. The true birds of the steppes include the Houbara Bustard and Little Bustard, of which only the Little Bustard nests in Kyrgyzstan. The following animal species occur in the project area:

- Stone marten (Martes foina)
- bear (Ursus spec.)
- marmot (Marmota spec.)
- Indian porcupine (Hytrix)
- Wood mouse
- Turkestani rat
- Hare (Lepus)
- Red wolf (Canis alpinus)
- Centralasian otter (Lutra lutra)
- Gazelle (Gazella subgutturosa)
- Wolf (Canis lupus)

Source: State Agency of Environment Protection & Forestry (2006)

The following bird species were observed and detected during the field trip in the area of Isfana bypass:

- Sky lark (Alauda)
- Oriole (Oriolus)
- Hoopoe (Upupa epops)
- Nigthingale (Luscinia)
- Bunting (Emberiza)

5.2.3 Protected Areas

Preservation of biological diversity is controlled by the Government. The Kyrgyz parliament has adopted a number of laws aimed at regulating the use of nature, one of them being the UN Convention on Biological Diversity which has been ratified by Kyrgyzstan.

Reserves are regarded as unique territories or areas of most typical geographic features. The purpose of the reserves is to preserve and protect certain species or habitats.

National Parks are territories which preserve specific national ecological, historical and cultural landscapes and nature in general. Specific areas are allocated for recreational, educational, scientific and cultural purposes.

The Kyrgyz Republic has also passed ten laws to support biodiversity conservation. Protected areas in Kyrgyz Republic have a three-fold classification; Zapovednik – state reserves or pro-

tected areas with complete protection (255,000 ha); national parks which include territories which preserve important national ecological, historical and cultural landscapes and nature in general, with specific areas allocated for recreational, hunting, educational, scientific and cultural purposes (259,000 ha); Zakaznik – a botanic or geological reserve with lower levels of protection, hunting and collection of NTFP (non-timber forest products) are allowed (391,000 ha). It is noteworthy that, since independence, the number of national parks and reserves has doubled and now cover approximately 4% of the country as a whole (904,000 ha), however, this is still short of the global average of about 6 %.

Item	1991	1992	1993	1994	1995	1996	1997	1998
No. of national parks and reserves	5	5	5	7	7	8	11	11
Area of reserves and national parks (1,000 ha)				163.9	163.9	174.7	332.6	329.0

Tab. 10 Development of Protected Areas in Kyrgyzstan

Zapovednik (State Reserves) – eight in total - are managed by SAEPF (State Agency for Environmental Protection and Forestry) and have an IUCN classification of I. The national parks (nine) and zakaznik (70) are managed by SAEPF and are IUCN categories II and III respectively, there are also several nature memorials that have an IUCN categorization of IV.

Protected areas (State Reserves, National Parks and National Reserves) are to be found east of the project area (Tab. 11). These areas are not touched by the project.

Name	Location	Area (ha)	Description
Kyrgyz Ata	Nookat district	11.200	National park – forest protection, regulated eco-tourism
Kulunatinski	Border with Naryn	72,600	preservation of small fir treegroves
6 geologic reserves	Nookat, Aravan		preservation of caves and waterfall in Paleozoic limestone
That-i-Suleyman	Osh City	60	preservation of natural geologic complex around Sulaiman mountain

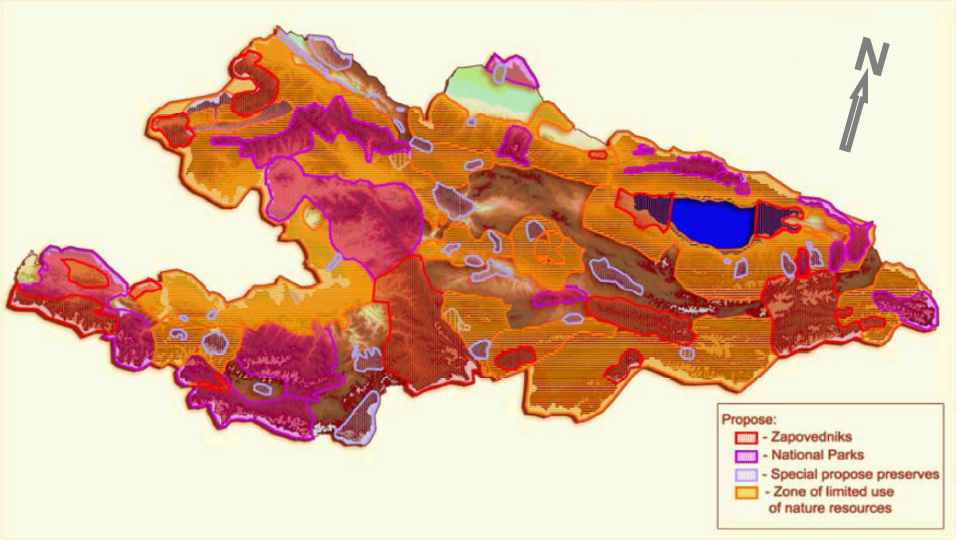
Tab. 11 Protected Areas: State Reserves, National Parks and Reserves

Only 15 of the zakaznik (natural reserves) are larger than 5,000 ha and therefore large enough to be considered as multi-habitat reserves and have deteriorated conditions due to hunting[10].

[10] Economic Commission for Europe; op cit

There are no State Reserves in the project area (Figure 12). The Ayktul forest reserve in Batken is located south of the project road adjacent to the border with Tadzhikistan.

The World Bank's Global Environmental Facility and Regional Implementation Units of Kazahkstan, Kyrgyz Republic and Uzbekistan have been working on a biodiversity conservation plan for a "trans-boundary protected area" for the West Tien-Shan area. In Kyrgyz Republic the area includes all of Jalal-Abad district, approximately half of Talas district and a small part of Osh district. As part of the overall plan for biodiversity conservation of the West Tien-Shan area, the plan proposes extensions to some existing reserve areas in Kyrgyz Republic, including the Besh Aral and Uzun-Akhmat state reserves.



Source - Fourth National Report on Conservation of Biodiversity of the Kyrgyz Republic (UNDP 2008)

Figure 10: State Reserves of Kyrgyzstan

5.3 Socio – Economic Characteristics

5.3.1 Industry

In the post-Soviet era, mining has been an increasingly important economic activity. The Kumtor Gold Mine, which opened in 1997, is based on one of the largest gold deposits in the world. New gold mines are planned at Jerooy and Taldy–Bulak, and a major gold discovery was announced at Tokhtonysay in late 2006. The state agency Kyrgyzaltyn owns all mines, many of which are operated as joint ventures with foreign companies. Uranium and antimony, important mineral outputs of the Soviet era, no longer are produced in significant amounts. Although between 1992 and 2003 coal output dropped from about 2.4 million tons to 411,000 tons, the government plans to increase exploitation of Kyrgyzstan's considerable remaining deposits (estimated at 2.5 billion tons) in order to reduce dependency on foreign energy sources. A particular target of this policy is the Kara–Keche deposit in northern Kyrgyzstan, whose annual output

capability is estimated at between 0.5 and 1 million tons. The small domestic output of oil and natural gas does not meet national needs.

In the post-Soviet era, Kyrgyzstan's industries suffered sharp reductions in productivity because the supply of raw materials and fuels was disrupted, and Soviet markets disappeared. The sector has not recovered appreciably from that reduction; if gold production is not counted, in 2005 industry contributed only 14 % of the GDP. Investment and restructuring have remained at low levels, and the electricity industry (traditionally an important part of industry's contribution to GDP) has stagnated in recent years. Government support is moving away from the machine industries, which were a major contributor to the Soviet economy, toward clothing and textiles. Food processing accounted for 10 to 15 % of industrial production until encountering a slump in 2004. In recent years, the glass industry has surpassed clothing and textiles in investment received and as a contributor to GDP. In the early 2000s, the construction industry has grown steadily because of large infrastructure projects such as highways and new gold mines. Housing construction, however, has lagged because of low investment.

5.3.2 Agriculture

Based on data from 1st of January 2012 according to the state registration 53 % of the total area of the Kyrgyz Republic is designated for agricultural use. Approx. 85 % of the agricultural land represents pasture land and almost 12 % farm land. The total area of arable land of the Kyrgyz Republic accounted for 1159.2 thousand hectares in 2011. Agriculture activities are concentrated in the valleys. A World Bank study noted that irrigated cropland makes up three quarters of cultivated crop land, and this compares well with other Central Asian countries which together provide an average of 26 %.

The agriculture sector of Kyrgyz Republic makes up about 35 % of gross national product. Its main products include meat, leather, wool, sugar, cotton, silk, vegetables, fruit, and tobacco. Livestock breeding accounts for 60 % of all agricultural income, the remaining 40 % stemming from crop production. By 1998, even though agricultural production had increased by 4.1 %, gross domestic product (GDP) had not increased equally (increasing by only 1.8 %). Agriculture contributes significantly to regional GDP of all districts, and contributes to about 56 % of GDP in Osh and Batken.

The main crops grown in the project area are sugar beet, corn, grain, rice, tobacco, cotton, potato, fruits, vegetables, oil bearing vegetables, and animal fodder.

5.3.3 Population and Demographics

The National Statistics Committee (NSC) estimated the total population at the end of 2007 was 5.2 million. The largest populations are concentrated around the big cities of Bishkek and Osh. Approximately 14 % of the population lives in high mountain regions (>1,500 m), and these people amongst the poorest and least served by public institutions. The population is mainly concentrated in Bishkek and the Chui zone, in the Ferghana zone (in Osh city, the Osh, Batken and Jalal-Abad districts) and in the east of the Issyk-Kul district. More sparsely populated is the territory of the Talas and Nary districts.

The population of Osh District is 1.148 million (21 % of the total population), and the population of Batken District is 448,900 (8 % of the total population, 2012). There are eleven significant

settlements along the Batken district section of the road. The project road passes through areas of both dense urban population and vast rural areas.

The three largest ethnic groups in the Kyrgyz Republic are the Kyrgyz, Uzbek and Russian. Kyrgyzs are the majority with 69.6%. Uzbeks are about 14.5% respectively. Among the 'other' are communities of Dungan (Chinese Muslim), Tajik, Korean, Ukrane, Uygur, Tatar, Kahzak and Turkish.

5.3.4 Livelihood and Poverty

The simplest poverty indicator is the share of poor population (poverty level in the country) defined as the share of the population -, whose per capita consumption is less than the poverty line. Similarly the extreme poverty level is defined as the share of the population, whose per capita consumption is less than the extreme poverty level.

However, poverty line indexed to average consumer price indexed, applied as the threshold for poverty measurement. The cost value of the general poverty line in 2010 was valued at 20,937.08 soms per year per capita, and the cost value of extreme poverty line was 12,608.44 soms. Tab. 12 provides information of poverty and extreme poverty data of all districts, cities and the Kyrgyz Republic.

SL	Region	Poverty Level	Rank	Extreme Poverty	Rank
1	Kyrgyz Republic	33.7%(national)	7th	6.7% (national)	2nd
2	Batken	33.5%	6th	5%	3rd
3	Jala-Abad	44.7%	2nd	1.1%	7th
4	Issyk-Kul	35.5%	5th	2.3%	6th
5	Naryan	53.5%	1st	12%	1st
6	Osh	41.9	4th	3%	5th
7	Talas	42.3	3rd	5%	3rd
8	Chui	21.5	8th	3.5%	4th
9	Bishkek	15%	9th	0.5%	9th

Tab. 12 Poverty and extreme poverty level by region (2010)

Tab. 13 provides detailed information of poor families and populations of seven districts, two major cities and average value of Kyrgyz Republic.

Number of Poor Families according to income levels in oblast on 1 January 2012								
No	**Name**	**Number of families**	**Population**	**Households Income Levels (soms/per child/month)**				
				0-370	371-1050,70	1051 - 1744.80	Total 0-1744.80 soms	% Poor
1	Bishkek	266,395	871,000	2,553	4,379	11,502	18,434	6.9
2	Osh city	57,392	258,111	3,492	3,640	3,887	11,019	19.2
3	Chui	218,365	797,200	2,283	14,398	14,279	30,960	14.2
4	Talas	47,976	228,796	8,320	6,958	3,599	18,877	39.3
5	Batken	100,846	441,320	16,903	17,690	13,739	48,332	47.9
6	Issyk-Kul	115,048	479,859	6,025	6,349	5,911	18,285	15.9
7	Osh	217,294	1,098,032	51,440	34,170	23,592	109,202	50.3
8	Jalal-Abad	218,203	1,033,590	53,774	20,488	16,977	91,239	41.8
9	Naryn	65,384	276,347	16,387	15,132	8,045	39,564	60.5
10	Republic	1,306,903	5,484,255	161,177	123,204	101,531	385,912	29.5
Source: Ministry of Social Development of KR, September, 2012.								
Notes: Poverty Classifications: Guaranteed Minimum Consumption Level (GMCL) is 370 Soms per perchild per month.								
Very poor are classed as receiving 371-1050.7 Soms per person per month; Poor are classed as receiving 1050.7-1744.8 Soms per person per month.								

Tab. 13 List of poor families in Kyrgyz Republic

5.3.5 Cultural Heritage

There are no cultural-historical and architectural monuments on the site of works and near it, so the project realization will have no impacts concerning this aspect.

6. Assessment of the Environmental Impacts and Mitigation Measures

6.1 Baseline Environmental Considerations

Water, wind and pasture erosion are some of the most significant factors affecting the environment in Kyrgyzstan. Erosion is a major threat, not only to the physical and biological environment, but also for the people dependent on arable land for farming or on land fertile enough for grazing. At present, only some 7 % of the area of the country is covered with arable soil. Pastures cover about half of the country, but more than one third of this area is only available for summer grazing as a result of the high altitude.

Of the total land area affected by erosion, 63% is considered as pasture erosion, 30 % water erosion and 7 % wind erosion. One fifth of the pasture erosion area and one quarter of the wind and water erosion area are regarded as severely eroded. The severity of the problem is best illustrated by the fact that, of all land fertile enough for farming or grazing, 24 % is regarded as

severely eroded (severely eroded areas, as classified in the Atlas of the Kyrgyz Republic, are those where over half of the land area is eroded). The methods and criteria which were used to derive these figures are not defined in the source, but nevertheless it is clear that erosion is one of the fundamental environmental problems in the country. Thus, these issues should not be overlooked in any project, especially one having direct impacts, positive or negative, on erosion.

However in the Batken to Isfana road corridor, the main active form is isolated concentrated erosion at existing perennial or frequently running natural rivers and streams, and mudflow activity. Wind erosion also occurs. The main reason for wind erosion is desiccation of fine-grained granular non-cohesive local soils, either as a result of drainage of water resources by surface channels or groundwater extraction or drought, and removal of vegetation cover. The soils in these areas consist to a high percentage of gravel, in a cohesive matrix. Basically the terrain is naturally barren and sparsely vegetated because of low precipitation mainly in the summer.

Erosion processes caused by human activities occur mainly in the outskirts of settlements due to overgrazing and cattle treading especially on steep slopes. Care must be taken to ensure that the new or existing roads to rehabilitate do not further aggravate erosion in vulnerable terrain.

As previously mentioned, Kyrgyzstan's ecology is diverse in many respects. Many species are threatened. This is due to climate change, availability of water, use of pesticides and destruction of habitats. River bottoms should not be used as borrow pits for gravel to preserve this habitat. River extraction has been common practice for many years. Spawning grounds, feeding habitats and habitats for juvenile fish were impaired. Fish populations and species composition changed during the past 10 to 20 years. Populations of new fish species introduced by man grew very rapidly while populations of original species declined.

6.2 Screening of Impacts

Screening is used to determine the extent of the environmental studies required for the project. This screening is carried out in accordance with the checklist contained in World Bank's Environmental Assessment Sourcebook. Using criteria such as the type, scale and location of project, the sensitivity of the environment and the magnitude of the impacts, the purpose of this checklist is to screen out those impacts of no significance thus enabling the emphasis to be placed on those impacts which require measures for their mitigation.

The purpose of mitigation is the avoidance or reduction of any potential adverse environmental impacts. There are often different alternatives to mitigate certain effects. Selecting mitigation methods to be used should therefore be a joint process between the engineering and environmental specialists. The methods used should be economically feasible and the best available. The selection of appropriate mitigation methods is not however, enough to guarantee the desired outcome. Co-operation and supervision is needed to ensure that the method is implemented correctly. Adequate supervision is frequently neglected.

Each environmental factor which could be affected by implementation of the project has been addressed, and the scope and importance of each potential environmental impact has been assessed. The following definitions of significance of impact have been used in the environmental impact screening:

- **No impact** - a potential impact is assessed as having no impact if the project activity is physically removed in space or time from the environmental component, or if the impact is so small as to be un-measurable (i.e. negligible). No mitigation measures are required for project activities that will create 'no impact';

- **Minor impact** (positive or negative) - if an impact occurs but does not meet the criteria for a major impact it is considered minor. For minor negative impacts, appropriate mitigation measures have been identified;

- **Major impact** (positive or negative) - an impact is major if the project has the potential to affect an environmental component. The following criteria are used to determine whether an impact is major; (i) spatial scale of the impact (site, local, regional, or national/ international); (ii) time horizon of the impact (short, medium, or long term); (iii) magnitude of the change in the environmental component brought about by the project activities (small, moderate, large); (iv) importance to local human populations; (v) compliance with international, national, provincial, or district environmental protection laws, standards, and regulations; and (vi) compliance with guidelines, policies, and regulations of Kyrgyz Republic and World Bank. Where potential major negative impacts are identified, mitigation measures are developed to reduce them to acceptable levels; and

- **Unknown impact** - the potential impact of the project will be assessed as being unknown if the magnitude of the effect cannot be predicted for any of the following reasons; (i) the nature and location of the project activity is uncertain; (ii) the occurrence of the environmental component within the study area is uncertain; (iii) the time scale of the effect is unknown; or (iv) the spatial scale over which the effect may occur is unknown. Where possible mitigation measures are identified for impacts categorized as 'unknown impacts'.

Mitigation measures have been developed according to the following hierarchy:

- The first priority is to make changes to the subproject design or location during the preconstruction phase to avoid the potential impact;
- The second priority is to make changes to the subproject design or location, or to implement other measures to minimize the scale or magnitude of the impact, or confine it to less sensitive areas;
- The third priority is to implement measures to mitigate any residual impacts to an acceptable level of impact; and

- The fourth and final priority is to compensate any residual impacts through 'in kind' compensation or monetary compensation.

There are several types of impacts to be considered. Direct impacts are caused by a project activity, and occur at the same time and place and can be created during both project construction and operation. Direct impacts will be limited in this project because the work is to be concentrated within existing rights-of-way (ROW) of the road for the most part, and along currently unformed tracks and routes.

Indirect impacts, which may include growth-inducing impacts, are caused by a project activity, or the overall project, and while they are later in time or farther removed in distance, they are still reasonably foreseeable.

Short-term impacts, like the noise and fumes associated with heavy equipment occur during road construction and are usually without long-lasting effects. Long-term impacts, on the other hand, could affect regional land use and development patterns and even mobility and migration. Long-term environmental impacts in this project might occur where new alignments have to be considered. Impacts during design stage and alternative alignments were discussed accordingly (Chapter 6.2.1).

The environmental screening for the project identifies the range of potential environmental impacts that occur from activities proposed for the subprojects. Where the environmental impact is deemed to be major (or significant) mitigation measures are provided, generally to be incorporated into the project design documents.

Impacts created during construction activities are dependent on a number of factors including the temporary use of land and its rehabilitation post-construction, 'best practices' being employed during construction activities, coordination and cooperation with local authorities in terms of impact management, and strict enforcement of environmental conditions included in project bid documents and specifications and adherence to a comprehensive EMP.

The following section describes the environmental impacts that will occur as a result of implementation of the proposed road project. It also describes the developed mitigation measures that aim on mitigating the identified impacts to the technically feasible minimum.

The text distinguishes in between the different project stages, the design, construction and operational phase of the project. Ultimately, all proposed measures for impact avoidance or mitigation that relate to construction will be incorporated into the bidding or contract documents thereby becoming binding elements of the construction and construction supervision contracts.

6.2.1 Impacts and Mitigation Measures - Design Phase

In this chapter various options for the implementation of some road sections are introduced and discussed form the environmental point of view. Within the planning process the chosen alignment was developed in close cooperation between the design team and environmental planners. This iterative planning process aimed at avoiding and minimizing potential impacts as far as technically feasible. The following items have to be considered mainly:

- Loss of vegetation structures

- Loss of agricultural land
- Disruption of habitats and animal migration routes
- Impact on existing settlements
- New alignment in a formerly not built up area
- Impact on landscape
- Surface sealing and embankments

The following alternatives are compared at design stage:

Batken Route Options

Alternative 0 – Rehabilitation of existing thoroughfare Batken, section B 2A (Figure 6) – selected alignment

No adverse impact during design phase is expected for the rehabilitation of the existing thoroughfare. Some local widening is required, but no impacts on the environment are expected for the design phase because only some fences or walls have to be relocated. Cutting of trees and bushes in places is likely.

Alternative 1 - Design of KDTP 2009, section B10 (Figure 6) - Batken Bypass

Batken bypass follows existing roads. No widening is required and no major impacts on the environment are expected for the design phase therefore. Cutting of trees and bushes in places is likely.

Alternative 2 - Northern Link around Batken, sections B3 - B4 - B5 - B6 (Figure 6) – selected alignment

Km 216 – Chon Talaa – Kara Bak - Chek west – Kyzyl Bel jct. - Batken, Razakov Street

This section starts at km 216 and running through farm land to the village of Chon Talaa. The existing alignment is currently designed as an avenue and has trees (maple, Acer) on both sides. The upgrade design requires cutting of trees on one road side to implement the road width to consist of two lanes, shoulders and embankments. Straightening of the existing alignment is intended in Chon Talaa. Cutting of about three poplar trees and partly demolition of a wall has to be conducted. Cutting of about five willows has to be implemented at the main junction in the next village Kara Bak to improve visibility conditions and upgrade of the existing alignment. No adverse impact is expected from Kara Bak to Razakov Street at Batken since the existing alignment is wide enough for the designed road.

Loss of agricultural land, disruption of animal habitats and cutting of migrating corridors is not expected for this option. Trees on both sides of the road have a positive aesthetical effect and mitigate erosion processes on the embankments and on adjacent edges of agricultural land. Moreover they stabilize the road embankments and filter traffic emissions on neighboring agricultural land. Cutting of trees should be mitigated therefore by planting of new trees alongside the upgraded alignment to preserve these effects for the future. Cutting of poplar trees and wil-

lows in Chon Talaa and in Kara Bak can easily by mitigated by planting new trees of these fast growing species.

Alternative 3 - Northern Link around Batken, sections B6, B9 (Figure 6)

Km 219/220 – Chek East - Chek - Chek West - Kyzyl Bel jct. – Batken Razakov Street

The alignment starts at km 219/220 and follows agricultural land up to the north eastern outskirts of the village of Chek. The landscape is characterized by a high density of agricultural wood (trees and bushes). The alignment runs through fields and pastures from Chek to Chek West. Cutting of trees and bushes has to be implemented. Extensive new plantations alongside and in the vicinity of the road are required as a mitigation measure. In addition acquisition of agricultural land has to be conducted. The design of this new alignment results in surface sealing within range of the driving lanes and paved shoulders and cover of formerly natural surfaces with artificial fill material. Water infiltration rate will reduce and surface runoff increase. To mitigate impacts from increased road surface runoff and potential impact on the watercourse it is suggested to provide semi permeable drainage ditches alongside the road to avoid that potentially polluted or contaminated storm water from the road would be discharged uncontrolled into watercourses if this option should be implemented.

Animal habitats will be fragmented probably and cutting of animal migration routes cannot be excluded. Bringing a new alignment into a formerly not built up area will add a technical element to the former not built up landscape and will be considered as an impact. To compensate for this impact, trees and shrubs shall be planted alongside the new alignment.

Basically adverse impacts can be mitigated. However, this alignment cannot be recommended since mitigation measures and land acquisition are considered to be more cost intensive than measures to be implemented for alternative 2. Alternative 2 was assessed to be more uncritical than alternative 3 from the environmental point of view.

Batken - km 248 of Osh - Batken - Isfana

This section exists already. Upgrade of this section is intended including pavement and widening in places. Losses of vegetation structures (bushes and trees) should be mitigated by planting of two bushes and trees for each one to be cut. Fragmentation of animal habitats is not expected.

Isfana Route Options

Alternative 0 – Rehabilitation of the existing thoroughfare, sections I1, I2 (Figure 7) – selected alignment

Rehabilitation of the existing thoroughfare in Isfana shows no adverse impact on the environment. No vegetation losses or disruption of animal habitats are expected. Land acquisition is not required. No long termed mitigation measures are required. This option is uncritical from the environmental point of view. Cutting of bushes and trees cannot be excluded entirely.

Alternative 1 – Design Isfana Bypass, section I8 (Figure 7)

The bypass starts east of Isfana and follows an existing gravel road and agricultural land on the first 1.6 km. Then it turns west into a valley and runs through pasture land. Several seasonal water courses are to be crossed. Existing rock walls keep untouched from construction activities. Birds to breed in hollows and caverns of these rock walls were found during the field trip.

Acquisition of agricultural land is required. Planting of trees alongside the road has to be implemented to mitigate noise and air emission. Slopes of the bypass have to be fixed carefully to prevent soil erosion and mudflow. Disruption of animal habitats is not expected since the alignment runs close to existing settlements. Surface water from the bypass should not drain into seasonal water courses to prevent water pollution. Impacts can be mitigated on site.

Samat - Koltso

Rehabilitation of the Existing Alignment, section I4, I7 (Figure 7)

No adverse long termed impacts are expected to rehabilitate the existing alignment. This option is uncritical from the environmental point of view. As this road section runs through Tajik territory rehabilitation cannot be recommended.

Sulukta - Koltso

Construction of new Alignment, section I9 (Figure 7) - selected alignment

This alignment has a length of 10.7 km (Figure 4). It starts about 1 km west of Sulukta to follow an existing farm track for about 1 km. This area has been already severely impacted by man. Erosion from cattle treading, rain and snow melt is visible on the slopes. In addition the beginning of this section is already characterized by losses of vegetation structures and disruption of animal habitats. No major impact is expected from the alignment in this area.

Then the alignment runs through pasture land which is not intensively used. Typical semi-desert and dry-steppe vegetation still exists in some places.

The next 5 km are already impaired by man. The road follows partly existing farm tracks and crosses an existing railway track for about five times and power lines. The railway is out of order. It has been used in Soviet times. The last 3 km to Koltso are already heavily impaired. Erosion and landslides are visible due to cattle threads and surface water runoff that appears after heavy rain and during snow melt.

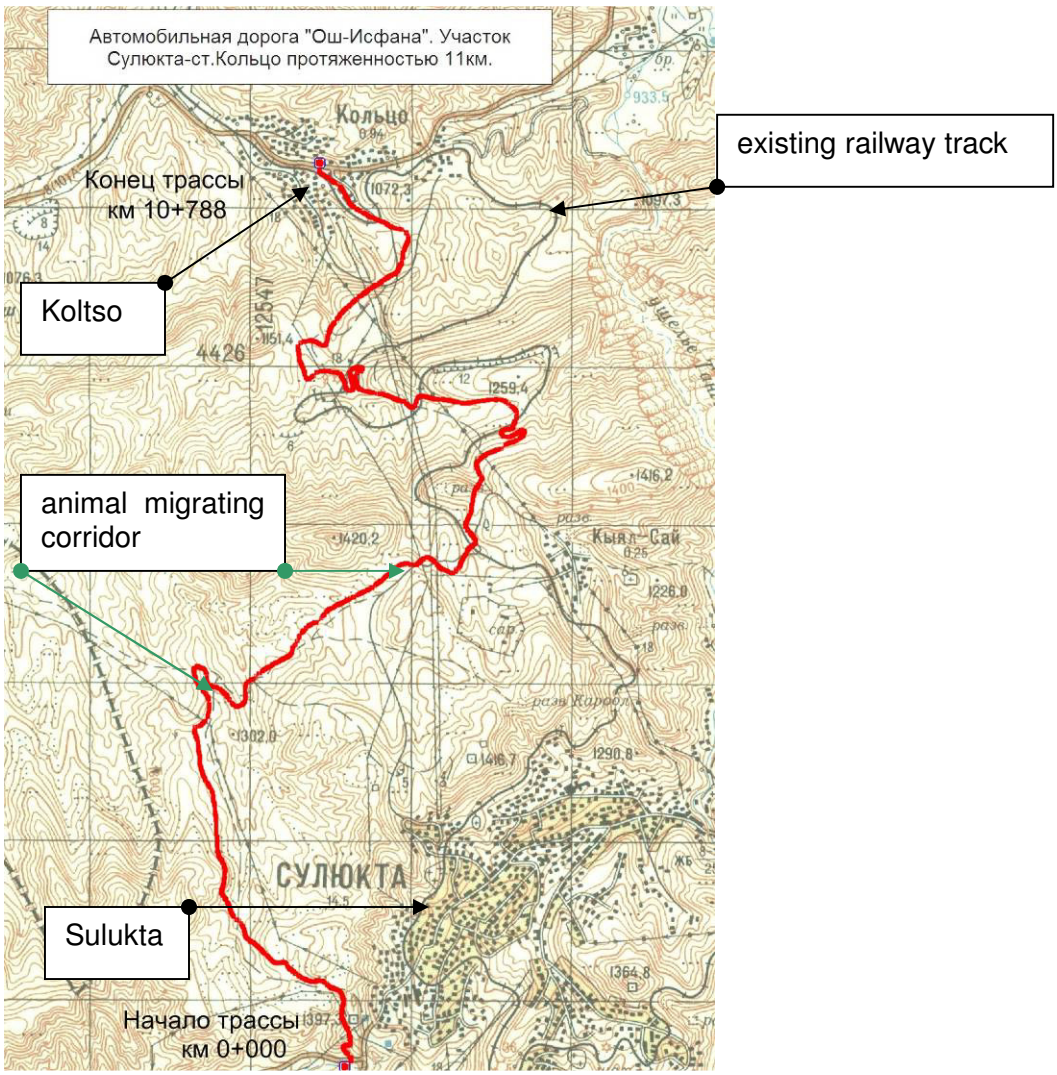
Construction works in the central part of this section shall be implemented only within the future road track to prevent further erosion and to protect steppe vegetation and animal habitats. Physical impairment of the roadside vegetation has to be minimized. Slope stabilization has to be carried out very carefully to prevent erosion (chapter 6.2.2). This alignment should be monitored after construction. If animal kills are observed additional mitigation measures have to be implemented (speed limits).

Sulutka - Koltso
Alignment on the existing narrow gauge railway track - selected alignment

This alignment has a length of about 11.9 km. It starts at the northern outskirts of Sulutka. Some buildings have to be demolished because widening of the railway track is required. Then the alignment runs through pasture land. Erosion and losses of vegetation are visible on the slopes caused by cattle threads. The central part of this alignment runs through pasture land which is not intensively used. Typical steppe flora and fauna exists. The topography has been impaired heavily by man at the end of the alignment at the outskirts of Koltso. Landslides and erosion are visible.

Basically upgrade of the existing railway track should be preferred compared to construction of a new alignment from the environmental point of view since the existing railway track has already been impaired by man and losses of vegetation and disruption of animal habitats would be less.

Construction works in the central part of this section shall be implemented only within the future road track to prevent further erosion and to protect steppe vegetation and animal habitats. Physical impairment of the roadside vegetation has to be minimized. Slope stabilization has to be carried out very carefully to prevent erosion (chapter 6.2.2). This alignment should be monitored after construction. If animal kills are observed additional mitigation measures have to be implemented (speed limits).



Legend — designed alignment

Figure 11: Designed new Alignment Sulutka – Koltso

6.2.2 Impacts and Mitigation Measures – Construction Phase

6.2.2.1 Impacts on the Physical Environment - Construction Phase

6.2.2.1.1 Air Quality

During construction the rehabilitation and ongoing maintenance works will have a minor impact on local air quality through emission of exhaust from vehicles and asphalt, aggregate and concrete plant, as well as through dust generation from vehicles transporting materials and from exposed stock-piles of material. The rehabilitation of the road, including construction of new sections, will result in reduction of dust emissions compared with existing unpaved or damaged sections. The project's monitoring plan requires that baseline conditions be recorded prior to the

reconstruction works in order that air quality can be monitored both during and post rehabilitation works.

Air quality impacts from asphalt plant, aggregate crushers, and dust emissions have been addressed in the above sections. The following mitigation measures have to be implemented by the contractor to reduce emission levels of construction equipment:

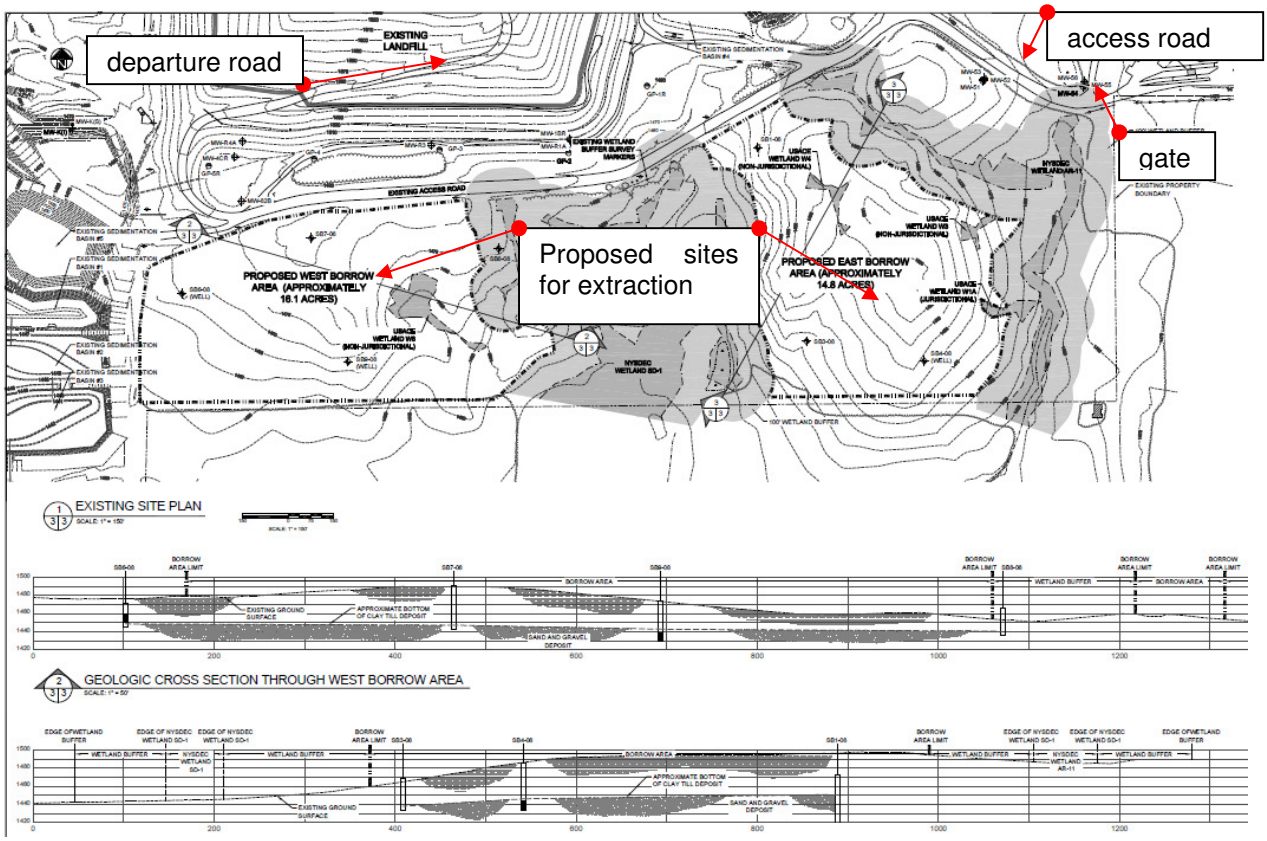
- Burning of waste or materials is prohibited
- Construction equipment has to be to a good standard and fitted with pollution control devices. The equipment (including the pollution control devices) will be checked at regular intervals to ensure they are maintained in working order and the checks will be recorded by the contractor as part of environmental monitoring;
- Prohibition of the use of equipment and machinery that causes excessive pollution (i.e. visible smoke) at project work sites;
- Ensuring that all vehicles transporting potentially dust-producing material are not overloaded, are provided with adequate tail-boards and side-boards, and are adequately covered with a tarpaulin (covering the entire load and secured at the sides and tail of the vehicle) during transportation;
- During periods of high wind any dust generating activities will not be permitted within 200 m of populated settlements located in the direction of prevailing wind;
- Material stockpiles being located in sheltered areas and be covered with tarpaulins or other such suitable covering to prevent material becoming airborne;
- Regular watering/spraying of unpaved project roads and all unpaved roads being used for haulage of materials during the dry season;
- Preparation of a dust suppression program, submitted to the Project Implementation Unit (PIU) prior to commencement of the works. The plan (which can be included in the EMP) will detail the action to be taken to minimize dust generation (e.g. spraying unpaved roads with water, covering stock-piles, and blasting with use of small charges etc.) and will identify the type, age and standard of equipment to be used; and
- Periodic air quality monitoring.

6.2.2.1.2 Quarries and Borrow Pits

Quarry sites were identified during detailed design. In order to reduce impacts associated with quarry activities and borrow pits, contract documents will specify only licensed quarrying operations to be used for material sources (Figure 12). If licensed quarries are not available the contractors will be responsible for setting up dedicated crusher plants at quarry sites approved by the PIU and SAEPF. Further, for all borrow sites, contractors will ensure that they acquire appropriate environmental permits from SAEPF before sourcing the material.

The contractors will be required to prepare a plan to identify the sources of material and that will be used for the embankments. The plan will be agreed with the engineer of the construction works supervisor and submitted to PIU, which will ensure that the plan is implemented. The materials and spoil plan should show the location of any borrow pits to be used and the measures to be taken to rehabilitate these pits upon finalization of the project. PIU will approve and monitor implementation of the plan.

Prior to the start of the construction, the contractor should also prepare a borrow area operation plan indicating the borrow area, access and departure road, proposed area for extraction of material, and geological cross section (Figure 12).



(Source: Waste Management of New York, Chaffee Facility, 2009)

Figure 12: Outline of a Borrow Area Operation Plan

The following good practice for excavation, material storage and transportation is recommended:

- top soil must be stored separately, covered and used for re-vegetation of borrow area or slopes at the construction site
- material has to be excavated only in designated areas in coordination with PSC
- excavated material has to be stored at designated areas in coordination with PSC
- excavated material should not be stored in the vicinity of open water courses to prevent siltation or obstruction of water ways

- The contractor has to wet unpaved routes which go next to settlements to suppress dust pollution when hauling material from borrow pits
- fine material (sand) has to be covered with tarpaulin to prevent dust generation and contamination of transport roads
- Aggregate load has to be wetted by the contractor to reduce potential dust emissions
- trucks must not be overloaded to prevent road accidents

To mitigate the impacts from quarry sites and borrow pits, it is recommended that in addition to the preparation of the materials and spoil plan, that bid and contract documents specify that (i) pit restoration will follow the completion of works in full compliance all applicable standards and specifications; (ii) arrangements for opening and using material borrow pits will contain enforceable provisions; (iii) the excavation and restoration of the borrow areas and their surroundings, in an environmentally sound manner to the satisfaction of the project supervision consultant (PSC) Site supervision by PSC will be required before final acceptance and payment under the terms of contracts; (iv) topsoil from borrow pit areas will be saved and reused in re-vegetating the pits to the satisfaction of the PSC. Extraction of construction material from the river bed should be avoided to prevent erosion and destruction of the river banks including alongside infrastructure (roads, settlements).

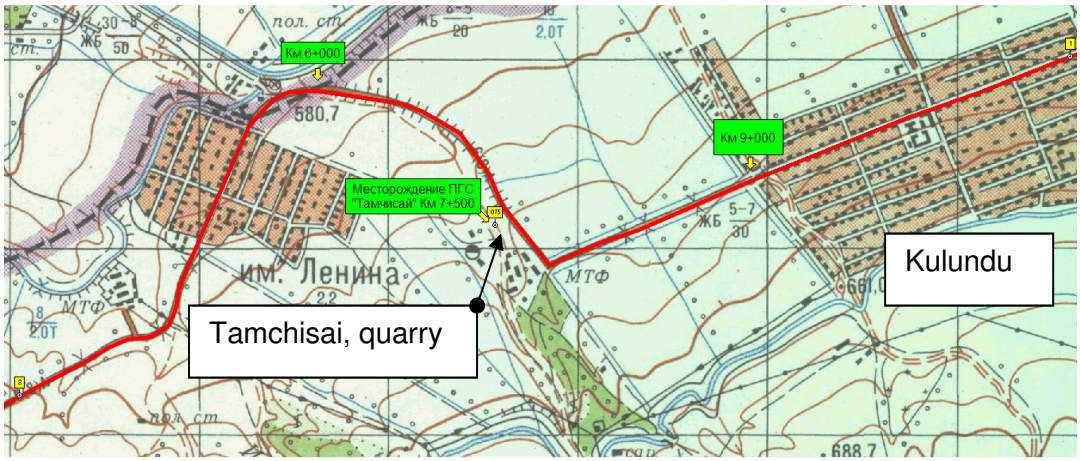


Figure 13: Sand and Gravel Quarry at Tamchisai", km 7+500

6.2.2.1.3 Landscape

Natural landscape is considered to be a valuable factor in the inhabitant's perception and also an important part of the ecological balance. Therefore, the need of inclusion the road into the natural landscape is of great importance. A good integration of the road into the landscape provides psychological clearness of the road for drivers, while change of landscapes on the road promotes traffic safety. The requirements for a combination of road design with natural landscape cannot be underestimated.

However, being in the surrounding landscape, the existing road does not improve the aesthetics. Most parts of the existing roads are unpaved. Some parts have the old asphalt-concrete surface. The surface is uneven and wavy.

The existing reinforced concrete culverts and bridges and the sub-grade of the roads are in bad condition. Considering the above mentioned facts, the design of the rehabilitated road, which will improve landscape of the road.

Construction of new alignments will disturb the existing landscape (agricultural land, pastures). Plantation of trees and bushes alongside the road will be an adequate mitigation measure.

6.2.2.1.4 Soils, Erosion and Slope Stability

Surplus material from earth works is expected according to the road design. Cut and fill estimation of Isfana – Sulutka – Koltso section is as follows (Tab. 14):

Section	Length	Fill (m^3)	Cut (m^3)	Ditches (m^3)	Top soil (m^3)	Remarks
Isfana - Sulutka	17.469	90,600	291,700	8,600	9,400	bypass Isfana included
Sulutka - Koltso	10.788	76,450	715,880	6,000	45,720	
Total	28,257	167,050	1,007,580	14,600	55,120	
surplus			**855,130**			

Tab. 14 Calculation of Cut and Fill Volumes for Isfana – Sulutka and Sulutka - Koltso

Surplus material originating from earth works has to be disposed properly without adverse impact on landscape and nature. Basically this material could be used for noise protection walls and stabilization of slopes or as embankment material if suitable. It is suggested to use this material as fill material for re-cultivation of mine galleries or open pit mines. Reuse for road construction should also be taken into consideration if the material is suitable. Disposal on existing landfills cannot be recommended since the volume of the excavated material will exceed existing capacities. Disposal of this material close to the road alignment has to be prevented to protect landscape and nature. Environmentally sound disposal of cut material and reuse of cut material for road construction must be part of the tendering documents.

Soil characteristics and topographic conditions have to be taken into account in the proposal of works and maintenance activities.

The main impacts on soil and slope stability during rehabilitation works are from (i) loss of agricultural soil or soils of high productive value; (ii) extraction of fill materials from rivers and/or borrow pits; (iii) conversion of the existing land uses such as agriculture and grassland to stockpiles of materials; (iv) soil erosion in areas of mountainous slopes, side slopes, and uncompacted embankments; and (v) soil contamination of from chemicals and/or construction material spillage.

Sulutka – Koltso – New Alignment

Earth embankments and material stockpiles will be susceptible to erosion, particularly during the rains and re-suspension of dust during the dry seasons. Certain types of road improvements, e.g. road widening, result in increased runoff and/or increased velocities that could lead to loss of soil.

Suitable excavated material will be re-used wherever possible, the engineering investigations noted that quality of existing material is highly variable along the road and in many cases reuse for the project will not be possible. However, this does not preclude its re-use for local roads that require maintenance to a lower standard, and village roads may be upgraded through re-use of surplus reclaimed AC pavement.

Impacts will be mitigated by:

- All required materials will be sourced in strict accordance with Government guidelines, project provisions, and the EMP;
- Priority will be given to location of material stock-piles, borrow pits and construction camps on unused land and non-agricultural land. All land will be rehabilitated to its original or better condition upon completion of the project works;
- The side slopes of cuttings and embankments will be designed to reflect soil strength and other considerations as included in the project specifications in order to prevent erosion;
- To prevent soil erosion gabion baskets for river bank protection will be included in the engineering design;
- For embankments greater than 6 m, stepped embankments will be used;
- Material that is susceptible to erosion will be replaced by adequate material around bridges and culverts;
- Random and uncontrolled deposition of excavated material will not be permitted. Suitable deposite sites will be designated (generally wide gently sloping areas located away from streams and rivers) at a maximum average spacing of approximately 1 km, and usually with a tipping zone from the road edge of not more than 10m width (unless a wider area clearly will not be detrimental), to minimise the area affected by depositing and requiring reinstatement;
- Re-vegetation of exposed areas including; (i) selection of fast growing and grazing resistant species of preferably local grasses and shrubs; (ii) immediate re-vegetation of all slopes and embankments if not covered with gabion baskets; (iii) placement of fiber mats to encourage vegetation growth, although due to the arid conditions in most of the road, this may only feasible where there is regular rainfall or other natural water supply;

- Acquisition of all necessary permits and approvals for location of construction camps, quarry sites and sources of construction materials from SAEPF and local government agencies prior to any construction or erection of camps and extraction of material;

6.2.2.1.5 Water Quality

The project has the potential to create some short-term and minor adverse impacts on water quality including (i) an increase in silt loads at culverts and bridge sites; (ii) construction materials such as gravel, sand, and fill being washed out into local streams and rivers during rain; (iii) hydro-carbon leakage and/or spills at storage and mixing plant locations; and, (iv) discharge of waste water and sewage from work camps to local streams and rivers.

There will also be longer term environmental benefits created by the project through upgrading of gravel road sections to asphalt and reduced silt laden run-off from unpaved roads in the rainy season.

In addition to a number of the items outlined above employed to mitigate soil erosion and effects on slope stability that will also mitigate adverse effects on water quality, the following measures will be included in the engineering design and EMP:

- Interference with natural water flow in rivers, water courses or streams within or adjacent to work sites, and also prevention of abstraction from, and pollution of, water resources in the project sites will not be permitted;
- Water courses, rivers, streams, lakes, drains, canals and ditches within and adjacent to project works sites will be protected from pollution, silting, flooding or erosion as a result of project activities;
- Streams, rivers and watercourses (including drains) within and adjacent to the work sites will be kept free from debris and any material or waste arising from project works;
- Sediment controls such as silt fences, coffer dams and silt barriers and other devices will be included in the engineering design to prevent both siltation and silt migration during project activities in the vicinity of rivers and streams.
- Discharge of sediment laden construction water or material (including dredged spoil) directly into surface waters will not be permitted. All such construction water will be discharged to settling ponds or tanks prior to final discharge;
- Water used for dust suppression purposes will be discharged to specially constructed settlement tanks allowing for sedimentation of particulates. After settlement the water may be re-used for dust suppression and rinsing of vehicles and equipment;
- Hydro-carbons, petroleum products to be used in bitumen mixes, and other chemicals will be stored in secure and impermeable containers or tanks located away from surface waters, the storage areas will require a concrete base or other forms of containment that will

allow any spills to be contained and immediately cleaned up. Any contaminated soil will be handled according to SAEPF standards;

- Spoil and material stock piles will not be located near waterways, rivers or streams;
- All storm drainage will be adequately contoured, sized, and lined where necessary;
- Construction and work camps will be equipped with sanitary latrines that do not pollute surface waters. A waste management plan, covering all liquid and solid waste, will be prepared by the contractor and submitted to the PIU;
- Discharge or deposit any material or waste into any waters except without the approval from the relevant regulatory authorities will not be permitted; and
- All water, waste-water and other liquids used or generated in execution of project works and activities will be collected and disposed in an approved manner in an approved location and will not cause either pollution or nuisance.
- Water for technical needs and water for contractor's camp should be taken from the canal (km 235+050) to preserve natural water courses.

6.2.2.2 Impacts on the Biological Environment - Construction Phase

6.2.2.2.1 Flora and Fauna

No adverse impact upon habitats and flora of the project area during construction phase are expected as a result of road rehabilitation on existing alignments:

Batken to Tortkul
Batken to border crossing point at Kyzyl Bel/Guliston

Isfana – Sulukta existing alignment
Koltso – Bulak Bashi - Tajik border at Kairagach existing alignment

No mitigation measures are required for flora and fauna concerning the above mentioned sections.

Minor impacts are expected for the following options:

Sulutka – Koltso - new alignment.

The new alignment runs through pasture land which is not intensively used. Typical steppe vegetation still exists in some places. Disruption of animal habitats, loss of steppe vegetation and cutting of animal migrating corridors cannot be excluded. Planting of trees and bushes is required as a site specific compensation measure (two trees and two bushes for each tree and each bush to be cut) to mitigate the disruption of animal habitats. Untouched habitats in the near surroundings of the alignment can be regarded as a refugium for steppe vegetation and

animals. Basically cutting of trees and bushes has to be minimized. Introduction of a speed limit might be introduced as a mitigation measure to protect animal migrating routes in the long run. Construction of the road should be implemented only on the future road track in the central part of the alignment.

Contractor's Work Camp

Sites for contractor work camps will all be approved by the PSC and will not be permitted in any ecological important or sensitive areas.

In terms of impacts on fauna, there is the potential for construction workers to poach edible animals and birds of the locality in spite of prohibitions. The contractors will be responsible for providing adequate information to the workers regarding the protection of fauna.

Poaching is regulated by the Law on Animal World (1999) and Regulations on Hunting in Kyrgyz Republic (2003) as well as the Criminal Code, 1997 (Article 276 Illegal Fishing and Article 278 Illegal Hunting). Illegal logging or tree cutting is also regulated by the Criminal Code (Article 279 Illegal Tree and Scrub Cutting) and the Code of Administrative Responsibility No. 198 (Article 127 Illegal Tree Cutting).

Contractors will be responsible for supplying appropriate and adequate fuel in workers' camps (coal, liquid gas, electricity etc.) to prevent fuel-wood collection. Construction vehicles shall use carefully-located designated temporary access and haulage roads to minimize damage to habitats.

6.2.2.2.2 Protected Areas

The alignments of the road sections do not touch protected areas (Figure 10).

6.2.2.2.3 Impacts on the Social Environment during Construction Phase

Noise and Vibration

During construction, there will be a temporary adverse impact due to the noise of the construction equipment, especially heavy machinery. Compaction equipment, blasting operations for cuts and excavation of foundations and grading produces noise and vibration. Construction noise is generally intermittent, attenuates quickly with distance, and depends on the type of operation and location and function of equipment.

Noise levels will be monitored, as required in the monitoring plan, to ensure they meet national standards as shown in the table below.

L_{eq} (dB)	L_{max} (dB)	Activity Category
Day = 45	Day = 60	Areas immediately adjacent to hospitals and sanatoriums
Night = 35	Night = 50	
Day = 55	Day = 70	Areas immediately adjacent to dwelling zones, dispen-

Night = 45	Night = 60	saries, rest homes, hotels, libraries, schools

Legend: Leq – sound level equivalent
Lmax – maximum sound level

Source: Information Publishing Center of Goskomsanepidnadzor (Russian Federation, 1994)

Tab. 15 Ambient Outdoor Noise Standards in Kyrgyzstan

The most sensitive areas within the project area are hospitals, housing areas and rest homes. Consideration will be given to installation of a noise barrier if construction (or operation) noise levels exceed the national standards or cause nuisance or interfere with school or health service provision activities.

Vibration during the construction period will also be a significant consideration, particularly vibratory rolling of the granular pavement layers, or blasting, or diversion of abnormal amounts of public traffic onto usually lightly trafficked side roads. Some of the existing structures close to the road are of mud-bound construction or otherwise of poor quality, and may be damaged by vibration. The contractor will be required to carry out trials of his proposed construction methods close to vulnerable structures, for prior approval, and will not be permitted to use methods which will cause damage (even if he offers to be responsible for compensation). A joint (building owner/consultant/contractor/PIU) dilapidation survey of vulnerable structures close to the new road will be carried out before construction. This will be used to verify any claims of damage allegedly caused by his work, for possible compensation. In addition, a similar prior survey will be made of condition of the road and adjacent structures along proposed diversion roads (whether to be used by the general public only, or by construction traffic also), which will be required to be maintained to at least their preconstruction condition, and reinstated after use.

Cooperation between the contractor and the local residents is essential and it is the responsibility of the project supervision consultant to arrange meetings between these parties and arrange such matters as work schedules (hours of equipment operation, traffic lanes to be kept open, diversion roads, etc.), locations of work camps and material storage areas, and siting of rock crushers and batch plants. Measures to be included in the project to mitigate the effects of noise and vibration include:

- Requirements in the EMP and contract documents that all exhaust systems be maintained in good working order and that regular equipment maintenance will be undertaken;
- The contractor will prepare a schedule of operations that will be approved by the project supervision consultant. The schedule will establish the days and hours of work for each construction activity and identify the types of equipment to be used;
- Prohibition of any construction activities between 10 pm and 6 am in settlements or close to sensitive receptors such as hospitals and schools;
- The contractor will consult with the community in respect of construction activities and potential noise and vibration impacts. The consultation process will be facilitated by the project supervision consultant;

- Blasting will only be carried out during the day and according to a pre-established schedule, the adjacent communities will be notified of the blasting times well in advance;
- Use of blasting mats to reduce noise during blasting operations;
- Prior to commencement of construction, the contractor, in conjunction with the project supervision consultant, will undertake a dilapidation survey (including photographs) of all buildings adjacent to the new road and diversion roads (also the original pavement condition of diversion roads);
- Trials of the contractors' equipment (especially vibratory rollers) will be carried out adjacent to vulnerable structures, and if cracking or other damage is observed to occur, the contractor will be required to amend their working methods to avoid damage (for example, use of non-vibratory rollers with thinner layers or cement stabilization, or increased asphalt thickness);
- Use of low volume charges will reduce the potential for vibration induced damage to structures; and
- In the event of damage proven to be due to the contractor's activities, owners of structures will be fully compensated.

Impacts on Access and Traffic

The project will cause temporary impacts on local access and traffic in rehabilitation areas during the construction period due to detours and traffic inconveniences, also local roads could be damaged during transportation of borrow materials or by construction equipment, or by abnormal amounts of diverted public traffic, and this issue was raised during consultation. Mitigation of the foregoing impacts will include:

- Contracts will include a clause specifying that care must be taken during the construction period to ensure that disruptions to traffic and road transport are minimized. The contractor shall ensure that the roads remain open to traffic during construction activities;
- The contractor will prepare a traffic control plan, to be approved by the project supervision consultant. The plan will include haulage and work site routes, traffic control devices, temporary fencing, barriers and barricades, detours, traffic signs and speed limits, and safe passage of pedestrians;
- Prior to construction activities, the contractor will install all signs, barriers and control devices needed to ensure the safe use of the road by traffic and pedestrians, as required by the traffic control plan;
- Signs, crossing guards and other appropriate safety features will be incorporated at grade level rail and road crossings;

- Local authorities and residents in a working area will be consulted before any detours for construction or diverted public traffic are established;
- Footpaths and roads will kept free of debris, spoil and other material at all times;
- Disposal sites and haul routes will be identified and coordinated with local officials; and
- Construction vehicles will use temporary roads constructed for that purpose to minimize damage to agricultural land and local access roads. Where local roads are used, they will be maintained and reinstated to their original condition after the completion of work.

Health and Safety

The project's construction phase can cause a range of health and safety impacts. The main impacts on health and safety are associated with (i) risks from construction work (noise, risk of injury), (ii) facilitation of transmission of communicable disease; (iii) contamination of local water supplies; and (iv) traffic safety issues.

The transmission of communicable diseases such as sexually transmitted infections (STIs) and even HIV/AIDS is a potential impact posed by construction workers engaging in either commercial sex or sexual relationships with local people. The civil works phase of the project can pose risks for both the construction workforce and the communities along the roads for the civil works/construction period. High risk groups in the project area include traders, people from household who travel for marketing or selling, seasonal migrants, poor rural people (who risk passing it on to their spouses or partners), intravenous drug users (IDUs), and commercial sex workers (CSWs).

Potential impacts to local water supplies include the possibility of temporary construction camps and the water supply and wastewater disposal associated with them. Contract provisions to ensure that these facilities are properly sited will be incorporated in project contract documents. Road improvement projects can also inadvertently cause adverse impacts on road and traffic safety as a result of higher vehicle speeds due to improved road conditions. The proposed rehabilitation works do not include design improvements that could encourage higher speeds above the design speed. However some improvements may be carried out to improve safety, particularly line-of-sight, and at accident black spots. In towns, the design speed will be set at the statutory speed limit for such areas, with prominent speed limit and hazard signage and a ban on non-delivery parking, which are usually strictly enforced by the traffic police, and footpaths, pedestrian crossings, and other safety features. The project will create safety benefits as a result of reducing the conflicts between NMT and motorized traffic.

Currently both NMT and motorized carts mix with regular traffic in towns, even though they are much slower, swerve in and out of the main traffic stream, and make frequent stops. This situation is exacerbated by the use of the road by road-side sellers, who stand in the road with boxes of fruit, vegetables and tobacco to sell.

The main reason that users of NMT and the motorized carts travel with the main traffic stream, despite it being hazardous, is because the road shoulders are either gravel or earth, in many cases the gravel has disappeared leaving large holes and in other cases the existing shoulders also act as the drain and are often filled with water, making it impossible for use by NMT or pedestrians. Reducing the risk of accidents and improving the safety of pedestrians, NMT users

and road-side sellers can be achieved by providing hard (sealed) shoulders in the road design, if budget permits, or at least strong, self-draining outward fall.

Air and noise pollution, which can affect the social as well as physical environment, have already been discussed.

Mitigation measures for the foregoing impacts include:

- Each contractor will recruit an environmental, health, and safety officer (ESO) to address health and safety concerns and liaise with the project supervision consultant and communities;
- 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;
- The contractor will provide personal protection equipment, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection, in accordance with relevant health and safety regulations, for workers;
- Implementation of a STIs/HIV/AIDS awareness and prevention campaign which includes HIV in the Workplace seminars and training provided through UNAIDS;
- Provision of hard, instead of soft shoulders, and road markings and signage to enhance safety and indicate that NMT and pedestrians should use the shoulders, rather than mix in the main stream if traffic;
- The contractor will provide adequate health care facilities including an HIV/AIDS education post and first aid facilities within construction sites;
- Contractors will ensure that no wastewater is discharged to local water bodies and safe and clean drinking water is provided to all workers;
- No site-specific landfills will be established at the construction camps;
- Septic tanks and garbage receptacles will be set up at construction work sites and camps, which will be periodically cleared by the contractors to prevent outbreak of diseases;
- Provision of adequate protection to the general public, including safety barriers and marking of hazardous areas in accordance with relevant safety regulations;
- Provision of safe access across the construction site to people whose settlements and access are temporarily severed by road construction.

6.2.2.2.4 Impacts on Cultural Resources

The assessment included a process involving local communities in the process of identifying, assessing, surveying and protecting physical cultural resources. The heritage and cultural resources in the wider project area will not be impacted by the project works as they are located sufficiently far from the works corridor.

In the event that a “chance” finding is made during any pre-construction clearance activities or construction works, the EMP, Appendix 1, and the construction contracts include specific guidelines for the management of “chance finds” and management of physical cultural resources discovered during road project implementation.

6.2.2.2.5 Other Social Impacts

Construction camps may place stress on resources and infrastructure of adjacent communities which could lead to antagonism between residents and workers. To prevent such problems, the contractor will provide temporary facilities in the camps such as health care, eating and sleeping areas (including a cook and provision of meals), water supply, and prayer areas.

The project has the potential to contribute to local poverty reduction through provision of income generation opportunities such as construction employment and provision of goods and services to workers.

The mitigation measures require a number of specific provisions to be included in contract documents including provisions for (i) a set aside for jobs for the poor (60% of the direct unskilled and semi-skilled labour), including a minimum number of persons to be given agreed structured training for more skilled posts; (ii) explicitly prohibiting the use of foreign unskilled and semi-skilled workers or unskilled and semi-skilled workers from elsewhere in Kyrgyzstan unless there are no local unskilled and semi-skilled workers available; (iii) payment of legal wages to workers; (iv) no use of trafficked or child labour for construction and maintenance activities; (v) inclusion of women as well as poor in the local construction force, in accordance with the local gender balance, to the maximum extent possible; (vi) no differential wages being paid between men and women for work of equal value; and (vii) use of locally sourced materials used in the rehabilitation to the maximum extent possible;

6.2.3 Impacts and Mitigation Measures - Operating Phase

6.2.3.1 Impacts on the Physical Environment - Operating Phase

6.2.3.1.1 Air Quality

Following the rehabilitation of the road, the project (through increased traffic) will create air pollution such as HC, CO, NOx, SO2 and particulate matter. The current volume of traffic (between 375 and 4,400 AADT) and forecasted traffic growth are such that emissions will remain below ambient air quality standards.

Emission standards are authorized under Kyrgyz Republic’s Environmental Law and should be enforced to alleviate these sources of pollution. The anticipated levels of traffic and the excessive capacities of the road network (and therefore lack of congestion and concentration of traffic) are likely to result in more significant adverse impacts to air quality in the busier project areas without the project since dust production is enormous on existing roads.

Proposed road rehabilitation activities are unlikely to have any substantial impact on the numbers of vehicles using the roads and consequent impact on air quality. Increases in traffic are

likely, but as a function of economic recovery and development. No diverted or generated traffic is likely to result from the rehabilitation activities alone. Economic recovery may lead to increased vehicular travel, and, if so, the rehabilitation will facilitate the flow of the increased traffic - but will not have induced it.

The project has the potential to reduce the volume of dust and particulates released into the atmosphere as a result of gravelling and asphalting the existing unformed earth roads/tracks and repairing poor condition pavements which generate dust within 20 m to 30 m corridor along the road. Reduction in dust emissions will improve air quality, reduce health risks to communities living along the road, reduce damage to the biological environment, and reduce soil erosion through slope stabilization and pavement rehabilitation.

Maintenance of vehicles to maintain an acceptable level of, or to reduce, emissions is beyond the purview of the project.

The conclusion in respect of air quality is that the project road is likely to continue to operate at well under their design capacity and no significant air quality impacts warranting mitigating actions in the operational phase are anticipated.

6.2.3.1.2 Soils, Erosion and Slope Stability

During operation, release of spoil and particulates into water courses in the project area will be reduced as a result of retaining of protection structures and gabion baskets for embankment protection. No mitigation measures are required for the operating phase.

6.2.3.1.3 Water Quality

Potential impacts on water quality and availability of water for domestic or agricultural use are not expected to occur. Storm water from the road does not drain directly into open water courses. Storm water will not be used as drinking water. Negative impacts on water quality due to accidental spills with polluting or hazardous material cannot be excluded completely. Preparation of an alarm plan at the fire department to prevent soil and water pollution could be a mitigation measure.

During operation, negative impacts on water quality could be caused by accidental spills of polluting or hazardous materials if they occur near water courses. The road rehabilitation activities will not induce accidents and therefore there are unlikely to be any additional incidents over and above those that would occur without the project, hence no mitigation measures are proposed.

As noted above, there will also be longer term environmental benefits for water quality created by the project through upgrading of earth road sections and reduced silt laden run-off from earth roads in the rainy season. Water quality in water courses adjacent to the road may show slight improvements after road rehabilitation and maintenance due to reduced erosion from improved embankment slopes and stabilization by rip-rap or other material including vegetation to prevent soil erosion.

Proposed improvements to drainage structures will facilitate passage of high flows and reduce scouring and bank erosion in the vicinity of the road, ensuring the integrity of the surface of the road.

6.2.3.2 Impacts on the Biological Environment – Operating Phase

6.2.3.2.1 Flora and Fauna

No impacts on flora are expected during the operating phase. Cutting of migrating corridors and disruption of animal habitats at the Sulukta – Koltso - Section 0) cannot be excluded completely. There is a potential for road kills depending on traffic forecast and speed limits. If road kills will happen design of wildlife underpasses to improve migration issues should be taken into consideration. Installation of speed limits is suggested in addition. The PIU should install road signs in sensitive areas.

6.2.3.2.2 Protected Areas

Operation phase activities will not create any impacts on protected areas, as the project road is not located near protected areas. Awareness campaigns for the education of road users on the importance of the ecologically sensitive sites will help to protect and preserve them. The PIU will be encouraged to install road signs in sensitive areas.

6.2.3.3 Impacts on the Social Environment – Operating Phase

6.2.3.3.1 Noise

Even under the most optimistic scenario of increased commercial traffic, the ambient noise level after the completion of rehabilitation activities along the roads (operating period) will not be of sufficient magnitude to require acoustical mitigation.

As noise is a function of traffic volume, ambient noise levels will not be appreciably increased in the short term. Noise should be monitored in the long run if traffic volume will increase significantly and exceed outdoor noise standards of Kyrgyzstan (Tab. 15). Mitigation measures have to be implemented accordingly (speed limits, noise barriers). There are a number of sensitive receptors i.e. hospitals, schools and public buildings were noted along sections of the roads (mostly in the towns and settlements). Speed limits to reduce noise levels are adequate mitigations measures at these receptors.

6.2.3.3.2 Health and Safety

Traffic safety of the project road will be improved. Conflicts between different forms of transport will be reduced by the improvement of shoulders and improved signage will be provided at intersections, bridges, and railroad crossings.

7. Institutional Requirements

The following section presents a discussion of the environmental management activities that will be undertaken as part of overall project implementation. The roles and responsibilities of various organizations in undertaking these activities are then defined and the institutional strengthening activities that will be required to allow those organizations to achieve their nominated roles and responsibilities are identified.

An environmental monitoring program has been prepared and the cost associated with its implementation has been prepared on a preliminary basis.

7.1 Organization Roles and Responsibilities

The overall organizational structure for environmental management for the project is shown in 0.

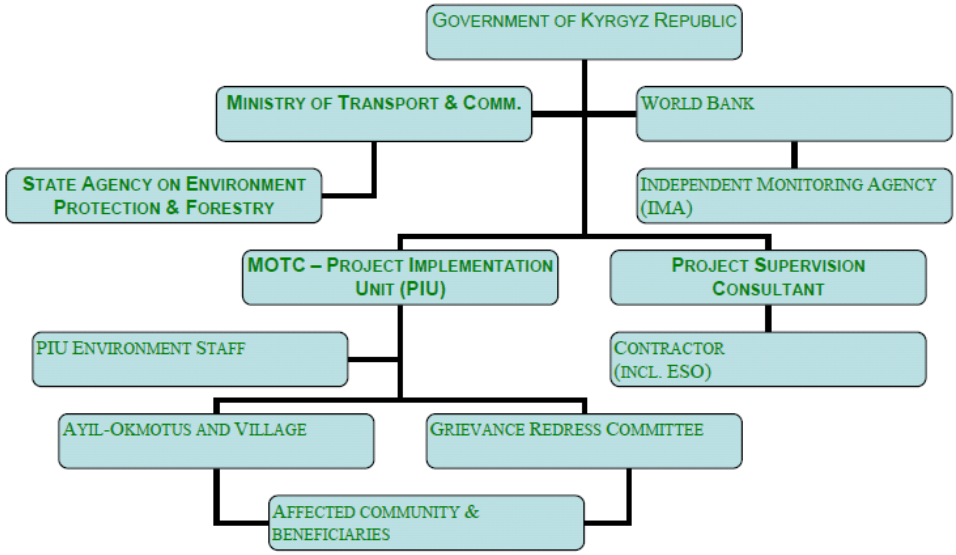


Figure 14: Organizational Structure for Environmental Management

7.2 Ministry of Transport and Communication

MoTC has overall responsibility for preparation, implementation and financing of environmental management and monitoring tasks as they pertain to the project. MoTC will exercise its functions through the PIU which will be responsible for general project execution, and which will be tasked with day-to-day project management activities, as well as monitoring.

Specialist staff will be assigned to the PIU to undertake all environmental assessment related tasks. The PIU environment staff will be supported by the PSC (Project Supervision Consultant). The PSC's team will need to provide an environmental monitoring specialist and social impact monitoring specialist. Currently there are no full-time staff in the PIU assigned to environmental

assessment, management or monitoring. Such tasks be undertaken on a project by project basis by Consultants.

In the implementation of environmental management and monitoring tasks specific technical assistance will be provided by:

- Environmental specialists that are part of the project supervision consultant's team. The specialists will assist in all aspects of environmental planning and implementation, internal monitoring and evaluation (M&E), and training of PIU and relevant government staff on environmental assessment and World Bank's Environment Policy; and

- An independent monitoring agency (IMA) could be hired to (i) conduct periodic monitoring and evaluation, (ii) third party validation of implementation of the IEE and EMP activities, and (iii) to ensure that all the identified adverse impacts are being/have been mitigated.

The State Agency for Environmental Protection and Forestry (SAEPF) will be consulted during the feasibility and detailed design processes and will also be requested to confirm, or otherwise, the categorization of the project. The SAEPF will be requested to review the EIA and approve the project for its environmental importance. Ongoing consultation with SAEPF will be required during the implementation of the project.

The rural communities and village leaders and organizations will assist in arranging meetings with, facilitating consultation with, and providing information about, affected communities and environmental impacts. An account of the process will be an integral part of the internal monitoring report prepared by PIU.

World Bank clearance of this EIA will be provided by a World Bank Environment Specialist.

Responsibilities for the implementation of the monitoring requirements of this EIA are shown in Tab. 16. Implementation of mitigation measures during the construction stage will be the responsibility of the contractor in compliance with the contract specifications and loan requirements. The environmental specialists of project supervision consultant will supervise the monitoring of implementing mitigation measures during the construction stage. The domestic environmental specialist will coordinate with the international environmental specialist for resolving complicated issues that arise in the field and to provide continuously updated information in order to submit reports to PIU and World Bank.

After project completion, MoTC will be in charge of the operation and maintenance of the project roads. PIU in cooperation with the district/regional administrations will undertake routine and random monitoring and analyze samples in SAEPF's analytical control laboratory in Bishkek as scheduled in the monitoring plan.

Project Stage	Responsible Organization	Responsibilities
Detailed Design	PIU	Review and approve environmental mitigation and management measures. Translation of mitigation measures into clauses in contract documentation
Construction	Contractor	Implementation of required mitigation measures
	Project supervision consultant, PIU	Supervise contractor's implementation of environmental measures on a daily basis. Enforce contractual requirements
	Project supervision consultant, Independent monitoring agency (IMA), SAEPF	Audit construction phase through environmental inspections and review monitoring data. Submission of quarterly reports. Provision of awareness/training to workers and technology transfer to the contractor.
Operation	PIU	Provide budget to undertake environmental monitoring
	MoTc's regional maintenance department	Undertake environmental monitoring and prepare bi-annual reports
	PIU, SAEPF, World Bank	Review monitoring reports

Tab. 16 Responsibilities for Environmental Monitoring

It is considered that no formal long-term environmental monitoring is necessary following the construction of the roads.

It is desirable that the formal acceptance of the works following the completion should include a full examination of the contractor's compliance with the specified requirements for the protection of the environment. This should include verification of the proper clean-up and restoration of all temporary work sites (quarries, camps, etc) and of the proper landscaping, planting and draining of all borrow and spoil areas.

In the longer term, it is essential that the road authorities monitor the effectiveness of the erosion and rockfall protection measures. Some form of reporting should be implemented to ensure that information regarding defects in design or construction methods is fed back to the centre and to the design organisations.

It is also recommended that periodic assessments of the fatality rate of livestock and migratory herds and migratory animals especially at new alignments if to be built (i.e. Koltso - Sulukta) due to traffic impact be carried out. Corrective measures should be taken if the frequency of such occurrences increases significantly.

The different phases of the implementation of the EIA are as follows:

1. Planning of the road project with special account being taken of:

- areas with large excavations (cuttings) and embankments, and quarries for construction materials,
- soil reserves for embankments and dumping areas for spoil,
- storage areas for toxic waste and garbage,
- locations of temporary batching and other material processing plants,
- contractors' camps,
- sources of water for construction purposes,
- temporary access roads and other temporary constructions,

2. Obtain written agreement from local administrative authorities concerning spoil dumps, burial of garbage, contaminated soils and toxic substances.

3. Obtain written permits (from local authorities, representatives of the environmental protection authority and sanitary inspector) concerning permanent and temporary allotment of land area for road construction, quarries, spoil dumps, contractors' camps, batching plants and other materials processing plant.

4. Agree any changes with the local agencies responsible for the irrigation networks if these are affected by the project.

5. Agree the planning requirements for bridges and other structures in rivers or other water bodies with the agencies responsible for fisheries and the local representatives of the environmental protection authorities.

7. Monitor (by measurement) emissions to the atmosphere and discharges into the ground during construction.

8. Monitor (by measurement) vehicle emissions during the operation of the road.

9. Monitor (by measurement) noise levels in towns and other settlements during construction, and the subsequent operation of the road.

10. Monitor effects of construction-related vibrations, contractor to be responsible for any avoidable damage caused by himself. Contractors who do not comply with the legislative requirements must be held responsible for the violations and required to compensate for any damages caused.

Following approval of the EIA document, a copy of the approval and a summary of the document will be sent to all relevant communities and villages. Information regarding the approved project and the proposed environmental management measures will be posted at suitable locations on the project site.

8. Environmental Mitigation Plan

The construction phase, including bridge and culvert reconstruction, has the potential to cause the greatest number of adverse impacts. These can be mitigated and/or avoided.

Potential Impact	**Mitigation Measures**	**Responsibility**	**Costs**
Construction Phase			
discovery of physical/heritage resources	Stop activity, prepare "chance find procedures (Appendix)	Contractor, PIU and SAEPF	part of construction costs
Erosion or sedimentation caused during clearing or earthworks	Install sediment fences and/or sediment traps to collect sediment before it enters watercourses	Contractor	part of construction costs
	Minimize size and duration of cleared areas		no costs
	Undertake progressive re-vegetation of cleared areas		part of construction costs
	Avoid clearing activities during heavy rain where possible		no costs

Potential Impact	Mitigation Measures	Responsibility	Costs
Soil erosion, land slide or rock fall	Undertake progressive re-vegetation of cleared areas	Contractor	part of construction costs
	Embankments in areas of steep slopes to be stepped	Design and contractor	part of construction costs
	Side slopes of cuttings and embankments designed to reflect soil strength etc	Design and contractor	part of construction costs
	Re-use excavated material wherever possible	Contractor, construction site supervision	no costs
	Rip-rap, retaining structures, gabion baskets etc to be used wherever necessary for slope and river-bank protection	Design and contractor	part of construction costs
Setting up and utilization of construction camp			
Soil contamination from spillage of oil or other chemical substances	Store chemicals, fuel and oil products in secure area / compound, with concrete floor and weatherproof roof	Contractor	Part of construction costs
	Ensure construction plant is maintained in good condition and any leaks are quickly repaired	contractor	Part of construction costs
	Remediation of soil spills	contractor	Part of construction costs
	Storage of hazardous substances at minimum distance of 100m from water courses	contractor	
	Installation of car washing chambers	contractor	Part of construction costs
	preparation of an emergency response plan	Contractor, MoTC/PIU, fire department	Part of construction costs

Potential Impact	Mitigation Measures	Responsibility	Costs
Waste disposal problems from solid waste generated during construction activity or wastes generated in construction camps	Prepare and implement "waste management plan"	contractor, PSC	Part of construction costs
	Train construction workers in appropriate waste disposal methods	contractor	Part of construction costs
	Remove waste regularly from site for disposal to landfill	contractor	Part of construction costs
	Install waste collection and temporary storage facilities in construction camps	contractor	Part of construction costs
	Ensure construction camps are maintained in a clean and hygienic conditions	contractor	Part of construction costs
	Consult with local authorities to plan construction worker housing arrangements	contractor	Part of construction costs
Discharge of waste water from contractor's camp	Wastewater from construction camps must not discharge into water bodies, installation of latrines and environmentally friendly disposal of waste water	contractor	Part of construction costs
Construction workers cause social disruption or sanitation / health conditions	Train workers on appropriate interactions with local community and institute awareness program about sanitation and communicable diseases. Implement HIV awareness and prevention campaign (incl. HIV in the Workplace training for workers)	Contractor, NGO or UNAIDS	Part of construction costs

Potential Impact	Mitigation Measures	Responsibility	Costs
Establishment and operation of asphalt plants and aggregate crushers - odor and safety risks	acquiring the needed asphalt from an existing asphalt plant	Contractor	Part of construction costs
	Installation downwind of settlements at a distance of 1000 m or more.	Contractor / PSC / PIU	Part of construction costs
	Asphalt plants and crushers shall not be located close to plantations and farm land	Contractor / PSC / PIU	Part of construction costs
	the contractor must receive all relevant permissions and the site selection for the asphalt plant and aggregate crusher	Contractor, MoTC, PSC	Part of construction costs
	Provide spill and fire protection equipment and submit an emergency response plan to the authority in responsibility prior to operation of the asphalt plant	Contractor, MoTC, PSC	Part of construction costs
Establishment and operation of asphalt plants - Water pollution due to spilled bitumen	Bitumen will not be allowed to enter either running or dry stream beds 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 immedi-	Contractor, PSC, local fire department	Part of construction costs

Potential Impact	Mitigation Measures	Responsibility	Costs
	ately contained and cleaned up. Development of an emergency response plan		
Air pollution from dust or exhaust emissions (CO, NOx, SOx, etc)	Implement dust suppression measures including watering of exposed surfaces	contractor	Part of construction costs
	Cover all trucks carrying dispersible materials to or from the construction site	contractor	Part of construction costs
	Minimize size and duration of cleared areas	contractor	Part of construction costs
	Ensure all construction vehicles and equipment are well maintained	contractor	Part of construction costs
Interference with existing infrastructure (telecom, electricity, water, waste water)	Research of underground cables and pipes	contractor	Part of construction costs
Clearing of vegetated areas	Undertake progressive re-vegetation of cleared areas with fast-growing, native species. Avoid the felling of road-side trees wherever possible	contractor	Part of construction costs
Exploitation of local resources incl. poaching	Poaching or felling trees that are not required to be cleared or removed by the project within the project areas will be forbidden Contractor will impose sanctions on any worker for poaching for felling trees unnecessary for the project	contractor	

Potential Impact	Mitigation Measures	Responsibility	Costs
Noise from construction machinery and equipment	Ensure all construction vehicles and equipment are well maintained	contractor	Part of construction costs
	As far as possible limit noisy construction activities to day time hours in the vicinity of houses and hospitals and to night time hours in the vicinity of schools; construction activities from 7.00 am to 7.00 pm to be discussed with local stakeholders	contractor	Part of construction costs
	concrete and asphalt mixing stations must not located nearby residential areas, schools and hospitals	contractor	Part of construction costs
	Inform nearby community of schedule and duration of construction works	Contractor, PSC, PIU	Part of construction costs
	Provide workers with noise abatement equipment (ear-plugs etc)	contractor	Part of construction costs
Changes to road safety / traffic movements, property access	Install signage and lighting in vicinity of works on public roads	contractor, local authorities, police	Part of construction costs
	Install temporary access to affected properties	contractor	Part of construction costs
	Rebuild good quality permanent access to affected properties on completion of construction works	contractor	Part of construction costs
	inform nearby community of schedule and duration of construction works	contractor	Part of construction costs

Potential Impact	Mitigation Measures	Responsibility	Costs
	limit construction vehicle movements to main transport routes as far as possible	contractor	Part of construction costs
	Development of a traffic control plan	Contractor, PIU, MoTC	Part of construction costs
Interference with commercial activities on roadside	Install temporary access to affected properties	contractor	Part of construction costs
	rebuild good quality permanent access to affected properties on completion of construction works	contractor	Part of construction costs
	Notify nearby community of schedule and duration of construction works not less than two weeks in advance of works.	contractor	Part of construction costs
Employment or livelihood benefits from employment of local people	Maximize the number of local people involved in the construction works	contractor, PSC	Part of construction costs
Visual and landscape impacts	Re-vegetation measures, use of stored topsoil;	contractor	Part of construction costs
	Only material from licensed borrow pits to be used for construction; excavated material to be used as fill material for base layer and embankments if suitable to reduce volume of surplus material	contractor, PSC	Part of construction costs
Disposal of surplus soil, excavated material	Disposal at designated site (mining pits, mining galleries); storage of top soil to be used for re-vegetation, reuse of surplus material for road construction	Contractor / PSC / PIU	Part of construction costs
Risks to public or construction worker health or safety	Provide safety equipment to workers and train them in its	contractor	Part of construction costs

Potential Impact	Mitigation Measures	Responsibility	Costs
	use		
	Secure construction site and restrict access by local community	contractor	Part of construction costs
Operating Phase			
Changes to road safety	Installation of road safety/speed limit signage where accidents are likely to occur	MoTC, local authorities, police	
	Work with local authorities to carry out enforcement of traffic regulations on upgraded roads	MoTC, local authorities, police	
Environmental damage from accidents involving spills of chemicals or other hazardous substances	Install speed limits and warning signs in areas of difficult driving conditions; no transportation of hazardous substances in water protection areas; development of emergency plan	MoTC, PIU, fire department	
Changes in dust levels or air quality	Upgrade / rehabilitation of the road decreases dust generation	PIU / MoTC	
	Vehicle emissions must be monitored according to national standards	PIU / MoTC	
	Implement landscaping along the roadside and in settlements to reduce dust impacts	MoTC	
	Work with local authorities to ensure regular cleaning of the road surface	PIU / MoTC	
	Work with local authorities to implement regulations for trucks to wheel washing and covering of dispersible loads	PIU / MoTC	

Potential Impact	Mitigation Measures	Responsibility	Costs
Erosion at water courses crossings (bridges and culverts), or in areas of fill or embankments	Implement stabilization and anti-scouring measures as required at bridges and culverts	PIU / MoTC	
areas of standing water	Drain and fill areas of standing water	PIU / MoTC	
surface water or groundwater pollution from contaminated road surface runoff	Undertake regular maintenance and cleaning of roads; construction of water retention measures	PIU / MoTC	
	Work with local authorities to restrict movements of polluting vehicles	PIU / MoTC / Police	
	Maintenance of road drainage system	PIU / MoTC	
Changes to visual amenity & landscape values	Cutting back of roadside vegetation	PIU / MoTC	

Tab. 17 Environmental Management Plan

9. Environmental Monitoring Plan

Environmental monitoring is a very important aspect of environmental management during construction and operating phase of the project to safeguard the environment. During construction, environmental monitoring will ensure the protection of landslide, side slope, and embankment from potential soil erosions. Borrow pits restoration, quarry activities, material storages, location of asphalt plants, community relations, and safety provisions are discussed within the EMP. During operation, air, noise, and surface water quality monitoring of the roads will be an important parameter of the monitoring program.

In response to the environmental impacts identified during the study, an environmental monitoring plan has been developed and is presented in Tab. 18. The contract documents will contain a list of all required mitigation measures (Chapter 6) and a time frame for the compliance monitoring of these activities. The monitoring will comprise surveillance to check whether the contractor is meeting the provisions of the contract during construction.

The project supervision consultant in cooperation with PIU during project implementation will be required to:

- Develop an environmental auditing protocol for the construction period, and formulate a detailed monitoring and management plan;

- Supervise the environmental monitoring (to be sub-contracted) regularly, and submit quarterly reports: the main parameters to be monitored are outlined in Tab. 18 and
- Supervise the subproject roads regularly, and submit quarterly reports based on the monitoring data and laboratory analysis report. The main parameters to be monitored by the contractor are outlined in Tab. 18. The contractor and the supervising consultant will be responsible for subcontracting data collection of environmental monitoring to a recognized organization (e.g., SAEPF's Analytical Control Laboratory).

A lump sum budget is allocated to cover monitoring cost during operating phase of the project. PIU will hire a consultant for environmental monitoring and ensure that the road is monitored regularly during construction works.

The following measures will be taken to provide an environmental compliance monitoring program during project implementation:

- The tender and contract documents will clearly set out the contractor's obligations to undertake the environmental mitigation measures as set out in Chapter 6 of this EIA and to be appended to contract specifications;
- The recommended environmental mitigation cost should be included as an item in the Bills of Quantities. This will ensure that there is specific environmental mitigation budget and will be implemented as required. During the procurement, contractors will be encouraged to include these costs in their rates and present the mitigation cost as a line item in the Bill of Quantities.
- The PIU will recruit an environmental supervising consultant (PSC) who will be responsible for implementing the contractor's environmental, safety and health responsibilities. The consultant will cooperate with the local administration.

Parameter	Location	Monitoring	Frequency	Responsibility	Costs
Construction Phase					
quarries	Road corridor	Visual inspection to ensure fill is only obtained from designated quarries per EMP	Weekly	Contractor / PIU / PSC	Part of construction and supervising costs
	Quarry site	Visual inspection to ensure quarry rehabilitation is conducted per EMP	weekly	Contractor / PIU / PSC	Part of construction and supervising costs
Surplus excavated material	Road corridor	Disposal of material at designated sites as per EMP	Weekly / daily	Contractor / PIU / PSC	Part of construction and supervising costs
Material Storage Sites	Road corridor	Visual inspection. Ensure vegetation clearance has been minimized.	monthly	Contractor / PIU / PSC	Part of construction and supervising costs
Erosion	Road corridor	Visual inspection of prevention measures per EMP and occurrence of erosion	monthly	Contractor / PIU / PSC	Part of construction and supervising costs
Rock fall	Active rock fall sections, steep slopes	Visual inspection	monthly	Contractor / PIU / PSC	Part of construction and supervising costs
Storage of hazardous substances	Construction camp	Visual Inspection of storage facilities as per EMP and emergency response plan	monthly	Contractor / PIU / PSC	Part of construction and supervising costs

Parameter	Location	Monitoring	Frequency	Responsibility	Costs
		containment of hazardous materials, oil spills, and work-site accidents.	monthly	Contractor / PIU / PSC	Part of construction and supervising costs
Waste management	Construction camp	Visual inspection that solid waste is disposed properly	monthly	Contractor / PIU / PSC	Part of construction and supervising costs
Surface Water Quality	Bridge sites	Visual inspection of water management per EMP			
	Directly downstream of pollution event	DO, COD, SS, fecal coliform, conductivity, turbidity, pH, temperature; additional parameters to be defined	After pollution event	Contractor / PIU / PSC	To be paid by originator of spill
Air quality	Asphalt plant	Visual inspection to ensure asphalt plant is located >500 m from residential areas	monthly	Contractor / PIU / PSC	Part of construction costs
	dust	Visual inspection to ensure dust suppression plan being implemented; Particulate matter and smoke per EMP	monthly	Contractor / PIU / PSC	Part of construction costs
noise	Sensitive areas	dBA at sensitive areas as per EMP	monthly	Contractor / PIU / PSC	Part of construction costs

Parameter	Location	Monitoring	Frequency	Responsibility	Costs
vibration	Sensitive areas	Ensure mitigation measures are being implemented as per EMP	monthly	Contractor / PIU / PSC	Part of construction costs
Re-vegetation	Road corridor	Monitoring of progress of re-vegetation activities as per EMP			
community	Road corridor	Consult with Local authorities and community groups along the alignment to monitor environmental concerns	ongoing	Contractor / PIU / PSC	Part of construction costs
Operating Phase					
noise	Sensitive areas (densely settled areas, schools, hospitals)	dBA at sensitive areas as per EMP	Twice/year for 3 years or after complaint. Mid-term monitoring	PIU, World Bank, MoTC and regional road departments	
Air quality	Sensitive areas (densely settled areas, schools, hospitals)	Particulate matter and smoke as per EMP	Twice/year for 3 years or after complaint. Mid-term monitoring	PIU / World Bank, MoTC and regional road departments	
erosion	Road subproject corridors	Visual assessment of erosion resulting from project	Twice/year for 3 years or after complaint. Mid-term monitoring	PIU / World Bank, MoTC and regional road departments	

Parameter	Location	Monitoring	Frequency	Responsibility	Costs
Water quality	Road corridor	Visual assessment of increased suspended solids from areas of erosion	Twice/year for 3 years or after complaint. Midterm monitoring	PIU /World Bank, MoTC and regional road departments	
Road safety	Road corridor	Collect road accident data	Twice/year for 3 years or after complaint. Midterm monitoring	PIU /World Bank, MoTC and regional road departments	
Re-vegetation	Road corridor	Ongoing monitoring of re-vegetation as per EMP	Twice/year for 3 years or after complaint. Midterm monitoring	PIU / World Bank, MoTC and regional road departments	

Tab. 18 Environmental Monitoring Plan

Costs of side-slope protection such as gabion baskets, rockfall protection (fences etc) and retaining structures are considered to be standard engineering practices and requirements for road rehabilitation works and as such are not included as costs of environmental mitigation, these costs will be included in the detailed design costs. The following costs during construction phase will also be part of the construction costs:

- building of storage compounds for hazardous substances in the contractor' camp
- dust suppression measures during construction phase
- re-vegetation measures
- air quality monitoring
- dust monitoring
- soil and erosion monitoring
- water quality monitoring
- social and community impact monitoring
- noise and vibration monitoring

10. Public Consultation and Disclosure

10.1 Public Consultation

The following authorities and institutions were informed about the ongoing project activities:

- MoTC
- World Bank
- SAEPF

Various public consultations took place in the past such as consultation with the communities through focus group meetings in various villages along the roads and informal interviews (including the 2001 studies). In addition a socioeconomic survey was carried out in the communities along the project road as part of ADB's 2006/2007 study. Additional consultations have also been undertaken in 2009.

A summary of the consultation outcomes is provided in the following:

Consultations with the communities in the project area revealed that they use the roads frequently for visiting and trading in local markets and for access to services such as health clinics and schools located in rayon headquarters. People who work in the nearby towns use the road for their daily travel and those who migrate to neighbouring oblasts in search of employment also use the road.

The communities expressed positive responses towards the need for the road improvements as well as ongoing maintenance of the roads. They are of the opinion that the project will improve and augment transportation and linkages between project districts as well with neighboring countries (PRC, Uzbekistan and Tajikistan) which are seen as vital in harnessing the use of resources, expanding markets and increasing employment opportunities.

The main environmental issues arising from these discussions and consultations were as follows:

- The bad condition and poor maintenance of the existing road.
- To deal with long standing problems which affect the communities as well as the road, especially seasonal streams/mudflows.
- Threats to safety posed by increased speeds (especially children and livestock) in case that new roads would be built.
- The condition of the road and detours during the construction stage (experiences in 1997 with similar works on the Bishkek to Osh road).
- Effect of noise and vibrations on adjacent buildings (often constructed of weak adobe (rounded river boulders arranged in herringbone courses with mud cement), during construction (especially blasting although few if any houses are situated close to rock excava-

tions and other possible such areas, and vibratory rollers), and due to public traffic. However it should be noted that the route is sparsely populated except for the towns and villages. Also these effects will be mitigated in the project design.

- The possible long-term consequences of careless construction, use of explosives, the use of river beds as borrow pits and the like, etc.
- The pollution of roadside pastures if traffic becomes heavy.
- The uncertainty of the citizens along the existing roads concerning the future condition of the existing roads (on sections to be substituted by new alignments).
- The vagueness, lack of unity and equality of the legislation and instructions which
- hampers proper environmental management and confuses road administrators and contractors.
- The diversity in environmental management.
- The future state of the environment on those sections of the roads to be substituted by
- new alignments (lack of road maintenance, inevitably increasing erosion, new "wild" routes, etc.)

There was a general consensus that there will be no potential adverse impacts, which could not be avoided or significantly mitigated by good design and engineering practice. Most of the effects are connected to the rehabilitation works within settlements, towns and villages.

Should further investigation reveal that there is a need for land acquisition and resettlement, and a resettlement plan is to be prepared, then separate consultations will be undertaken with affected households and stakeholders in respect of that process.

During the consultations the following suggestions were made; (i) engage local skilled and unskilled workforce in the rehabilitation works and further look at the possibility of community participation in ongoing maintenance; (ii) restrict the contact of construction workforce with villagers, carefully monitor the workforce and prohibit workers from drinking while working, and restrict access to construction sites and camps by locals; (iii) co-ordinate rehabilitation works with local authorities; (iv) take into consideration probability of rock-falls, torrents, and landslides; and (v) build high quality and solid roads that could serve long-term.

Further, the conclusions of the assessments conducted since 2001 are that the absorptive capacity of project beneficiaries is considered adequate and their willingness to participate is high. There is an educated but currently under-employed labour force available. Transport cost savings will be substantial for existing traffic, benefiting almost all residents of the primary impact area and providing them with the means to make any necessary contributions, so long as those contributions are proportional to their benefits. Improved transport in the primary impact area is necessary for economic development.

Additional public hearings and consultation of stakeholders should be conducted because of changes in road design. Additional road sections were investigated within this EIA compared to the previous design. Public consultation should be organized in towns within the project area (Isfana and Batken) after publication through MoTC. Once done,

detailed minutes of the consultations will be enclosed to the final version of this EIA / EMP.

10.2 Disclosure

The EIA documenting the mitigation measures and consultation process will be submitted to PIU and World Bank and will be available for public review. The affected people and the local communities expressed support for the project during the consultations as they clearly saw the benefit to the community as well as the region. More informal consultation and disclosure will be done during implementation through:

- The preparation and dissemination of a brochure in Kyrgyz, Russian and other languages as required, explaining the project, works required and anticipated timing of the works; and

- Setting up a formal grievance redress committee with a representation from the affected people. The project supervision consultant in association with the contractor will be responsible for managing the effective grievance redress program.

Following approval of the EIA, a copy of the approval and a summary of the document will be sent to all relevant communities. Information regarding the approved project and the proposed environmental management measures will be posted at suitable locations on the project site. Disclosure will conform to the policies of World Bank which requires that environmental assessment reports for World Bank projects be accessible to interested parties and the general public. The EIA as part of World Bank project documents will be uploaded onto the World Bank website and made available through the Development InfoCentre as well as on the website of the PIU of MoTC.

11. Findings, Recommendations and Conclusions

The main findings of this EIA are that there are no significant adverse environmental effects resulting from the proposed road sections provided that full compliance with the recommendations set out below and the provisions of the EMP are achieved.

The following recommendations result from this EIA:

- Apart from the realignments, the design of the rehabilitated road should not deviate significantly from the existing road alignment.
- Designs should make full provision for the incorporation of the various mitigation measures previously described.
- Contract documentation shall include appropriate clauses to cover all of the environmental protection requirements previously listed in chapter 8 and 9. Construction material (gravel

and sand) should only be taken from licensed borrow pits. Surplus material should be disposed in an environmental friendly way.

Appendix

Chance Find Procedure Plan

Contracts for civil works involving excavations should normally incorporate procedures for dealing with situations in which buried physical cultural resources (PCR) are accidentally discovered or unexpectedly encountered. The final form of these procedures will depend upon the local regulatory environment, including any 'chance find' procedures already incorporated in legislation dealing with antiquities or archaeology.

The chance finds procedures plan (CFPP) will require the following elements:

1. Definition of Physical Cultural Resources

1. Definition of Physical Cultural Resources This section should define the types of PCR covered by the procedures in Kyrgyz law and regulation and World Bank's Policy on Cultural Property. In some cases the Chance-Finds procedure is confined to archaeological finds; more commonly it covers all types of PCR. In the absence of any other definition from the local cultural authorities, the following definition could be used: "movable or immovable objects, sites, structures or groups of structures having archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance".

2. Ownership

This section should state the identity of the owner of the artifacts found. Depending on the circumstances, the owner could typically be, for example, the state, the government, a religious institution, the land owner, or could be left for later determination by the concerned authorities.

3. Recognition

This is the most difficult aspect to cover. As noted above, in PCR-sensitive areas, the procedure may require the contractor to be accompanied by a specialist. In other cases, the procedures may not specify how the contractor will recognize a PCR, and a clause may be requested by the contractor disclaiming liability.

4. Procedure upon discovery

<u>Suspension of Work</u>

This paragraph may state that if a PCR comes to light during the execution of the works, the contractor shall stop the works. However, it should specify whether all works should be stopped, or only the works immediately involved in the discovery, or, in some cases where large buried structures may be expected, all works may be stopped within a specified distance (for example, 50 m) of the discovery. This issue should be informed by a qualified archaeologist.

After interruption of the work, the contractor must immediately report the discovery to the construction supervision.

The contractor may not be entitled to claim compensation for work suspension during this period. The construction supervision may be entitled to suspend work and to request from the contractor some excavations at the contractor's expense if he thinks that a discovery was made and not reported.

Demarcation of the Discovery Site

With the approval of the Resident Engineer, the contractor is then required to temporarily demarcate, and limit access to, the site.

Non-Suspension of Work

The procedure may empower the Resident Engineer to decide whether the PCR can be removed and for the work to continue, for example in cases where the find is one coin.

Chance Find Report

The contractor should then, at the request of the construction supervision, and within a specified time period, make a Chance Find Report, recording:

- Date and time of discovery;
- Location of the discovery;
- Description of the PCR;
- Estimated weight and dimensions of the PCR;
- Temporary protection implemented.

The Chance Find Report should be submitted to the construction supervision, and other concerned parties as agreed with the cultural authority, and in accordance with national legislation.

The construction supervision, or other party as agreed, is required to inform the cultural authority accordingly.

Arrival and Actions of Cultural Authority

The cultural authority undertakes to ensure that a representative will arrive at the discovery site within an agreed time such as 24 hours, and determine the action to be taken. Such actions may include, but not be limited to:

- Removal of PCR;
- Execution of further excavation within a specified distance of the discoverycpoint;
- Extension or reduction of the area demarcated by the contractor.

These actions should be taken within a specified period, for example, 7 days. The contractor may or may not be entitled to claim compensation for work suspension during this period.

If the cultural authority fails to arrive within the stipulated period (for example, 24 hours), the construction supervision may have the authority to extend the period by a further stipulated time.
If the cultural authority fails to arrive after the extension period, the construction supervision may have the authority to instruct the contractor to remove the PCR or undertake other mitigating measures and resume work. Such additional works can be charged to the contract.

Further Suspension of Work

During this 7-day period, the Cultural authority may be entitled to request the temporary suspension of the work at or in the vicinity of the discovery site for an additional period of up to, for example, 30 days.

The contractor may, or may not be, entitled to claim compensation for work suspension during this period.

However, the contractor will be entitled to establish an agreement with the cultural authority for additional services or resources during this further period under a separate contract with the cultural authority.