Initial Environmental Examination

Project No.: TA 8887-KGZ
May 2018

KGZ: CAREC Corridors 1 and 3 Connector Road Project (Section Balykchy (Km 0) to kilometer - post 43 (Km 43))

This Initial Environment Examination in Detailed Design Stage was prepared by Japan Overseas Consultants/ DI"KYRGYZDORTRANSPROEKT for the Ministry of Transport and Roads of Kyrgyz Republic and for the Asian Development Bank, by updating the IEE Report in the Feasibility Stage prepared by Kocks Consult GmbH / Finnish Overseas Consultants Ltd. / CAC Consulting.
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ABBREVIATIONS

A-1	-	Achaeological Assessment Report for Section 1 in 2018
ADB	-	Asian Development Bank
ADT	-	Average Daily Traffic
AIDS	-	Acquired Immune Deficiency Syndrome
AP	-	Affected People
BoQ	-	Bill of Quantities
CAREC	-	Central Asia Regional Economic Cooperation
CEWP		Construction Environmental Work Plan
CITES	-	Convention on International Trade in Endangered Species
CO	-	Carbon Monoxide
CSC	-	Construction Supervision Consultant
CW	-	Civil Works
dBA	-	A-weighted decibels
DO	-	Dissolved oxygen
EA	-	Executing Agency
EIA	-	Environmental Impact Assessment
EIP	-	Environmental Impact Permit
EMoP	-	Environmental Monitoring Plan
EMP	-	Environmental Management Plan
FCM	-	Family Medicine Centres
GRM	-	Grievance Redress Mechanism
h, hr	-	Hour
Ha	-	Hectare
HIV	-	Human Immunodeficiency Virus
IA	-	Implementing Agency
IEE	-	Initial Environmental Examination
IES	-	International Environmental Specialist
IPIG	-	Investment Projects Implementation Group
KDTP	-	Kyrgyzdortransproekt
Kg	-	Kilogram
Km	-	Kilometer
Kpa	-	Kilopascal
LAR	-	Land Acquisition and Resettlement
LARP	-	Land Acquisition Resettlement Plan
LHS	-	Lefthand Side
Ls	-	Lump Sum
m^2	-	Square Meter
m^3	-	Cubic Meter
Max.	-	Maximum
ME	-	Ministry of Economics KR
Min.	-	Minimum
MOF	-	Ministry of Finance KR
MoTR	-	Ministry of Transport and Road of the Kyrgyz Republic
MoCIT		Ministry of Culture, Information and Tourism of the Kyrgyz Republic
MPC	-	Maximum Permissible Concentrations
N-1	-	Noise Assessment Report for Section 1 in 2018
NES	-	National Environmental Specialist
NGO	-	Non-Governmental Organization
No.	-	Number

NO_2	-	Nitrogen Dioxide
PAM	-	Project Administration Manual
PAP	-	Project-Affected Person
PBM	-	Performance-based maintenance
PER	-	Public Environmental Review
PPMS	-	Project Performance Management System
PPTA	-	Project Preparatory Technical Assistance
RAP	-	Resettlement Action Plan
RHS	-	Righthand Side
ROW	-	Right-of-Way
RP	-	Resettlement Plan
SA	-	Social Assessment
SAEPF	-	State Agency on Environment Protection and Forestry
SER	-	State Environmental Review
SETI	-	State Ecological and Technical Inspection
SO_2	-	Sulfur Dioxide
SPS	-	Safeguard Policy Statement
SSEMP	-	Site Specific Environmental Management Plan
TA	-	Technical Assistance
TMP	-	Traffic Management Plan
TOR	-	Terms of Reference
TPH	-	Total Petroleum Hydrocarbon
TSP	-	Total Suspended Particulates
UNFCC	-	United Nations Framework Convention on Climate Change
V-1	-	Vibration Assessment Report for Section 1 in 2018
WHSP	-	Worker's Health and Safety Plan

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A. Executive Summary

Introduction

1. This report is the Initial Environmental Examination (IEE) report for Section 1. As part of the project, the following studies and additional reports have been prepared:

   - Noise Modelling and Assessment Report for Section 1 (Annex M);
   - Vibration Modelling and Assessment Report for Section 1 (Annex N); and
   - Archaeological Survey and Assessment Report and Proposed Plan for Section 1 (Annex O).

   The findings of these reports are summarized in this main text of the IEE report and the detailed studies are attached.

2. The Government of the Kyrgyz Republic has requested the Asian Development Bank (ADB) to identify, formulate, and prepare an ensuing loan and/or grant for the CAREC Corridors 1 and 3 Connector Road. The main outcome of the PPTA is to prepare a feasibility study suitable for donors financing. The project scope also includes soft components to tackle sector-wide issues. Agreement needs to be reached with the government on the exact details, including: (i) improve efficiency of road asset management in the Kyrgyz Republic, (ii) support the government with institutional reforms in transport sector, (iii) introduce performance based maintenance contracts, and (iv) improve road safety in the Kyrgyz Republic. The proposed Project will improve the following socio-economic indicators of the regions of the Kyrgyz Republic:

   - Reduce the cost of passenger and cargo transportation between southern and Issyk-Kul and Naryn regions by providing direct access.
   - Reduce transport costs due to route cutting and better road conditions.
   - Increase in local and international transportation and movement.
   - Origination of additional income-generating opportunities for local residents
   - Creation of new jobs
   - Good state of vehicles/Reduction of operating costs

   The Section “Balykchy (Km 0) to kilometer-post 43 (Km 43)” will be financed by ADB.

3. This is the environmental assessment study undertaken for the Detailed Design Stage of the project in accordance with the ADB requirements and has been prepared based on the previous IEE Report prepared during the Feasibility Stage, wherever possible, as was initially prepared by KOCKS and approved by ADB.

4. According to the categorization of ADB Safeguard Policy Statement, the project belongs to category “B” and doesn’t require preparation of an Environmental Impact Assessment (EIA) report. As a part of the ADB Policy, the project requires preparation of an Initial Environmental Examination (IEE) report.

   In the legislation of the Kyrgyz Republic, in accordance with the changes, according to the Regulation on the procedure for conducting environmental impact assessment in the Kyrgyz Republic No. 60 dated February 13, 2015, this stage is considered as Initial Environment Examination at the Detailed Design Stage and is documented through an IEE report. The categorization of projects, according to the legislation of the Kyrgyz Republic, is not carried out, therefore the EIA report and the IEE report can be considered as equivalent.

   The IEE study for Section “Balykchy (Km 0) to kilometer-post 43 (Km 43)” is being conducted based on secondary information from a number of available sources, and primary data obtained from field parametric measurements along with the observations gathered from several field visits. Environmental public consultation was done and was attended by residents of the communities mentioned as well as those from surrounding villages.

Policy, Legal, and Administrative Framework

5. The IEE study was in conformance with the national legal framework of Kyrgyzstan consisting of the important laws in environmental protection, water protection, cultural heritage, public

health, and other national environmental legislations. In addition, International Treaties that Kyrgyzstan was a signatory were also considered as part of the overall framework.

6. The Environmental assessment in the Kyrgyz Republic is founded on two subsystems:

(i) OVOS (the Russian acronym for “Assessment of Environmental Impacts”), and
(ii) Ecological Expertise (State Environmental Review, SER).

The resulting IEE is presented for public consultations, after which revisions are done according to the public’s feedback. Subsequently, the OVOS report, Statement of Environmental Consequences, and other supporting documentations are submitted for the State Environmental Review (SER). After which the project may be approved, rejected or send for re-examination.

7. Under ADB approval requirements, a set of specific safeguard requirements are required to be met by the Borrowing Country in addressing environmental and social impacts and risks. The project would undergo Screening and Categorization, formulation of Environmental Management Plan and Public Disclosure. Public Consultations for Category B would be required so that views of affected groups are taken into account in the design of the Project and within the mitigation measures proposed.

In order to determine the possible impact of project activities on rare and endangered species of animals, as well as data validation as biological resources within the corridor project site Balykchy (0-43 km), located in the zone of the biosphere reserve "Issyk-Kul", on March 27, 2017 a meeting was organized with the General Directorate of Biosphere Territory (GDBT) "Issyk-Kul" under the State Agency on Environment Protection and Forestry under the Government of the Kyrgyz Republic, GDBT representatives, representative of ADB, Environmental specialists of IPIG MOTR and EPTISA / JOC.

8. During the discussion regarding the conditions of biological resources in the area of Balykchy road section (km0-43), the rehabilitation of which is being considered in the framework of CAREC Corridor 1 and 3 Connector Road Project Balykchy Section (0 km) to the kilometer post (43 km), the following was confirmed by the representatives of the General Directorate of "Issyk-Kul" Biosphere Reserve:

The section of Balykchy corridor is located, according to the zoning of the biosphere territory of "Issyk-Kul", in the sanitation zone, i.e. in the zone that includes anthropogenically disturbed territories that require regeneration and remediation measures (the Regulation on the Biosphere Territory "Issyk-Kul" approved by the Government of the Kyrgyz Republic on January 24, 2000 No. 40).

The territory of the project section of the road, since the time of construction in the 70s of the 20th century, has been under anthropogenic influence for a long time. Separate cordons or observation stations on this site are not installed due to the lack of such a need.

Rare and endangered species of animals included in the IBAT system and found on the biosphere territory (the list is attached in Section J, IEE), it is in the area of Balykchy Section that they practically do not occur, since they live in high-altitude areas.

In connection with this, carrying out of the rehabilitation works in the specified project section of the road will not have a potential negative impact on the available biological resources of the biosphere territory, including on the Red Book species of animals, on the species of animals included in the IBAT system.

Also, representatives of the GDBT were recommended to act as precautionary mitigating measures within the project and to promote anti-poaching activities that are included in the EMP.

Minutes of Protocol Meeting is presented in Appendix H2.

Description of the Project

9. The project road Section “Balykchy (Km 0) to kilometer-post 43 (Km 43)” is a 43-km east to west highway. This Section begins at a roundabout located at the entrance to Balykchy town. There are 5 roads that converge at this point, and one of which is the Section of the project road, which radiates in the southeast direction. Generally, this Section follows the existing alignment up to

post 43 (Km 43). A good stretch of this section (around 29 km) is within Issyk-Kul oblast while around 14 km is within Kochkor District of Naryn Oblast.

10. The details of the proposed road Section project are:

- Rehabilitate and pave the project road to Technical Category II from Balykchy (Km 0) to kilometer-post 43 (Km 43) according to Kyrgyzstan National Standard with Geometrical and Structural Requirements with 95 km/h design speed outside the settlement areas and 60 km/h within the villages.
- Rehabilitation, repair and/or replacement of bridges and culverts.
- Construction of side drains and other drainage structures.
- Provision of retaining walls and river protection measures, where necessary.
- Provision of adequate road signing and marking.
- Provision of safety barriers.

11. The road is to be designed according to Kyrgyz geometric design standard, and accordingly, it shall be sufficient to carry the traffic loading efficiently within its projected service life. Effectively, these will be a two-lane road consisting of a carriageway width (sum of the width of lanes) and the width of the shoulders. The design elements for the cross section of the project road are as follows:

- Number of lanes: 2
- Lane width: 3.5-3.75 m
- Carriageway width: 7.00-7.50 m
- Width of shoulder: 3.25-3.75 m (of which 0.50-0.75 m is paved)
- Total road width: 15.00 m

Description of the Environment

12. The road corridor is entirely contained within the mountain ranges of the Northern and Inner Tien Shan. The route passes through the mountain and plain part of the Issyk-Kul, Naryn Regions at an altitude of 700 to 3500 m above sea level, crossing the valleys of the rivers Chu. The climate in Issyk-Kul is referred to as a local steppe climate, described as continental with cold winters and hot summers. There is little rainfall throughout the year with the average annual rainfall of 390 mm. During the summer months (June-August), the average monthly high temperatures on the shores of the lake are around 20-25°C. Due to the confinement of the Terskey Ala-Too ranges, most of the climatic conditions of the project road are that of Issyk-Kul region. As part of the baseline information, parametric measurements for water quality in selected rivers, along with air quality and noise/vibration in sensitive receptors. Field measurements were done in the end of 2015 and the results are presented in this report.

The general characteristics of the areas on according to geo-botanical zones in Tong district - deserted steppe with fragments of forests and spruce forests. The flora of the Issyk-Kul Biosphere Reserve comprises around 1,500 species of plants within which there are some 30 species of very important wild medicinal plants. It has diverse and interesting fauna, with numerous endangered species finding refuge in its many unpopulated areas. As observed, the lake's western and eastern shores serve as a wintering place for waterfowl. It was estimated that the number of waterfowl and near water-living birds is around 67,000 from 29 different species. The mammals in the lake were known to be consisting of six orders and 34 species (including insectivores, chiropters, rodents, carnivore, lagomorphs and artiodactyls). Most of the rural population along the project road depends on subsistence agriculture and livestock. As a rural and countryside setting, agriculture is expected to be the main industry with the main crops as cereal crops and potatoes. The considered sensitive receptors in close vicinity to the project road are Balykchy (km 00+000), start of the road section and with considerable number of people around; and Tash-Saray (km 11 + 000) Residential areas near the road. The project road, and likewise this road section partly passes the Issyk-Kul Biosphere Reserve with four (4) Zones – (i) Core Zone; (ii) Buffer Zone; (iii) Transitional Zone; and Rehabilitation Zone. As per Regulation Biosphere Territory "Issyk-Kul", start of the road reconstruction of the Balykchy (00+000km) and highways are part of the Rehabilitation Zone.

Environmental Impacts and Mitigation Measures

13. The anticipated environmental impacts of the proposed road project are likely to be resulting directly from construction activities. Environmental and social impacts associated with the road construction consist of (i) impairment of access; (ii) dust generation; (iii) noise and vibration level aggravation; (iv) heightened emissions levels; (v) water contamination & sedimentation; (v) impacts on local flora and fauna; (vi) disruption to local economy; (vii) defacement of local topography; (viii) solid and liquid waste generation; (ix) road safety issues; and (x) impacts on archaeological sites.

14. The construction entails a number of activities which are expected to introduce impacts and disturbances to the general environment, especially during the construction period. Most of these impacts are confined within the right-of-way, construction sites, and facility sites; while some activities can affect the outlying areas or even a wider area, especially if not properly mitigated.

15. Avoidance of impacts can be executed by proper planning/preparation during the Pre-engineering and design phase. A number of mitigation measures have been proposed as part of this study.

Analysis of alternatives

16. In this IEE, two alternatives were considered:

    (i) Zero option - inaction/ do nothing
    (ii) The road reconstruction project

17. The “Zero option” alternative scenario means that the road stays “as is”, in which no rehabilitation works are considered. Considering the mentioned reasons and along with those presented in the “Country and Regional Strategy” and “Locality Specific Rationale”, the benefits of rehabilitating and reconstructing the road generally outweigh the expectations of the “Zero option” alternative.

18. The second alternative is considering road reconstruction in the section Balykchy (Km 0) to kilometer-post 43 (Km 43) through existing road.

Consultation, Participation and Information Disclosure

19. In accordance with ADB’s Public Communications Policy (2011) and SPS (2009), Public Consultation meeting for this section on the environmental aspects was undertaken on 17 March 2016 in Balykchy. During the public consultation organized by IPIG, with the assistance of PPTA consultants (Kocks Consult, GmbH), prepared PowerPoint presentation regarding the technical features of the project and explained the potential environmental and social impacts with corresponding mitigation measures. At these instances, the participants were able to express what they thought about the project and were given a chance to ask clarificatory questions during the open forum. Forms were provided to the people for them to write in their own comments which incorporated in the IEE and serve as recommendations in the design phase.

20. Details of the Public Consultation are provided in Section G. Consultation, Participation and Information Disclosure of this document. The IEE shall also be disclosed to a wider audience via the ADB website. During the project implementation, periodic environmental monitoring reports shall be submitted by IPIG on behalf of MoTR and correspondingly also be uploaded in the ADB website and in KGZ on MoTR website.

Grievance Redress Mechanism

21. The Grievance Redress Mechanism (GRM) is a process through which the affected people need a trusted way to voice and resolve concerns about the project and the project also finds an effective way to address affected people’s concerns. The GRM will cover issues related to social, environmental and other safeguard issues under ADB safeguard covenants and Kyrgyz Law.

22. With two stage appeals – the Local (village) Level and Central Level, along with greater participation of the local people, resolution of complaints will be better ensured. ADB itself has

additional mechanism in which a complainant can be appealed through the ADB Accountability Mechanism which is always accessible to the APs.

Environmental Management Plan

23. The Environmental Management Plan (EMP) for the project road, consisting of impact mitigation and monitoring plan, has been prepared as part of this IEE. A program of monitoring, the Environmental Monitoring Plan (EMP), is also developed herein to ensure that all concerned agencies take the specified action to provide the required mitigation, to assess the level of project impacts on environmental quality and to determine whether any additional measures may be necessary. This EMP will be part of the contract documents consisting of specified measures covering most of the possible issues that can occur will enable the avoidance, reduction, and mitigation of adverse impacts in the project cycle. The Contractor shall adopt the mitigation measures, particularly those for the construction into his Site Specific Environmental Management Plan (SSEMP) consistent with their own work program. Supplementary Plans will also be drawn up by the Contractor for specific situations to ensure a focused action on any problem that might arise.

24. Operational framework of the EMP involves the national agencies (IPIG-MoTR, SETI &SAEPF), ADB Safeguard Specialists, Construction Supervision Consultant (CSC), Contractor, with the local governments and recognizing roles of NGO's and people's organization at the project site. The cost for implementing EMP will be financed, specifically the costs of mitigation measures will be included in the construction contracts, and the cost for environmental monitoring will be included in the consulting service of the CSC.

25. The cost for implementing EMP will be financed by the loan, specifically the costs of mitigation measures will be included in the construction contracts, and the cost for environmental monitoring will be included in the consulting service of the CSC. Mitigation measures and a monitoring plan have been developed and incorporated into the EMP. Under the guidance of CSC, the contractor will have to submit general site-specific Environmental Management Plans on the basis EMP including following 13 annexes prior to commencing operations:

    (i) Dust Suppression Plan
    (ii) Blasting Works Management Plan
    (iii) Construction Noise Management Plan
    (iv) Vibration Management and Monitoring Plan
    (v) Surface Water Contamination Prevention Plan
    (vi) Borrow Pits Management Plan
    (vii) Batching Plant/ Cement Plant Management Plan
    (viii) Soil Management Plant
    (ix) Solid and Liquid Waste Management Plan
    (x) Cultural & Historical Sites Management Plan
    (xi) Safety Management Plan
    (xii) Camp and Workshop Management Plan
    (xiii) Material Processing Plants/Equipment and Storage Facilities Plan

    The SSEMP shall be endorsed by the construction supervision consultant before submission to IPIG for approval.

26. IPIG will promptly inform ADB of the occurrence of any risks or impacts, with detailed description of the event and proposed corrective action plan if any unanticipated environmental and/or social risks and impacts arise during construction, implementation or operation of the Project that were not considered in the IEE. IPIG will report any actual or potential breach of compliance with the measures and requirements set forth in the EMP promptly after becoming aware of the breach.

27. Monitoring and reporting. During construction, monitoring shall be done by CSC. Based on these monitoring results, CSC will submit quarterly project progress report reflecting environmental

safeguard compliance. CSC will assist IPIG in compiling and submitting semiannual monitoring reports (EMR) during project construction within one month after each reporting period. EMRs will be disclosed at ADB website and submitted to local authorities.

Conclusions and Recommendations

28. The IEE/EMP-EMP, as part of the contract documents, shall be adhered to by the Contractor. Accordingly, the Contractor shall require all his Sub-Contractors to follow also the EMP and such stipulations should also be shown in Sub-contracting agreements, which will be verified by the Engineer (or the CS Consultants).

29. Upon assessment of the impacts, the project is maintained at Environmental Category B; since the predicted impacts are “site-specific, with few irreversible, and in most cases mitigation measures can be readily designed and to be incorporated in the detailed designs.

30. Mitigation measures have been developed to be utilized for finalization in the detailed design phase, for implementation in the construction phase, and subsequently for the operations phase, to reduce all negative impacts to acceptable levels. As per assessment in this IEE, the proposed Road Project is unlikely to significant environmental impacts. To ensure environmental and social safeguards, the IEE recommends that:

- strict monitoring is done;
- measures be implemented;
- avoid socioeconomic impact – hire local people;
- contractor should have SSEMP approved before commencing construction works;
- baseline measurements and periodic monitoring be done;
- contractor to designate environmental staff;
- CSC to provide sufficient training on EMP implementation and compliance monitoring for the CSC engineers and to the Contractor’s staff;
- CSC to assist IPIG in monitoring and reporting on EMP implementation
- IPIG-MoTR shall oversee environmental compliance and ensure that reporting requirements are followed.

B. Policy, Legal, and Administrative Framework

1. Introduction

31. The Government of the Kyrgyz Republic (the government) has requested for a project preparatory technical assistance (PPTA) from the Asian Development Bank (ADB) to identify, formulate, and prepare an ensuing loan and/or grant for the CAREC Corridors 1 and 3 Connector Road. The main output of the PPTA is a feasibility study suitable for donors financing. The study will cover five (5) sections:

- **Balykchy (Km 0) to kilometer - post 43 (Km 43), approximately 43 kilometers (km)**,1
- Kochkor (Km 64) to Epkin (Km 89), approximately 24 km,2A
- Epkin (Km 89) to Bashkugandy [Formerly Dyikan] (km 159), approximately 70 km;2B
- Bashkugandy [former Dyikan] Dyikan (km 159) to Kyzyl-Zhyldyz (km 183), approximately 24km, where a Bypass Road is being envisioned to avoid the village of Chaek and part of Kyzyl-Zhyldyz; 3A and
- Aral (Km 195) to Too-Ashuu pass (Km 286), approximately 91 km. 3B

The Section “Balykchy (Km 0) to kilometer - post 43 (Km 43)” will be financed by ADB.

32. The project scope also includes soft components to tackle sector-wide issues. Agreement needs to be reached with the government on the exact details, including:

- improve efficiency of road asset management in the Kyrgyz Republic,
- support the government with institutional reforms in transport sector,
- introduce performance based maintenance contracts, and
- improve road safety in the Kyrgyz Republic.

The Investment Project Implementation Group (IPIG) within the Ministry Transport and Road (MoTR) that shall be the Executing Agency (EA) for this project during the construction stage. As initial part of the possible funding assistance, the ADB has engaged Kocks Consult GmbH, Germany, to prepare a Feasibility Study and Preliminary Design for the entire project. The consultancy scope also includes an Initial Environmental Examination (IEE); and a social and poverty analysis and impact assessments, in accordance with ADB’s Safeguard Policy Statement (SPS) 2009. Then, Japan Overseas Consultants was hired to upgrade this previous IEE to be finalized.

33. With reference to the Contract Agreement for Consultancy Services for the engagement, one of the main tasks of the Consultant is to update/upgrade the previous IEE report in Feasibility Stage to the IEE Report in the Detailed Design Stage Report for the project in accordance with the requirements of environmental legislations of the Government of Kyrgyzstan in addition to the ADB's Safeguard Policy Statement (SPS) 2009. Such environmental safeguard requirements specify that the borrowers/clients are to undertake an environmental assessment process which entails assessing impacts, planning, managing impact mitigations, preparing environmental assessment reports, disclosing information, undertaking consultation establishing a grievance mechanism, monitoring activities and reporting results. The IEE document shall also include particular environmental safeguard requirements pertaining to biodiversity conservation and sustainable management of natural resources, pollution prevention and abatement, occupational and community health and safety, and conservation of physical cultural resources.

34. This IEE document includes an Environmental Management Plan (EMP) that is the updated version of EMPs compared to as had been presented previously in F/S Stage, based on the updated identification of potential impacts, their characteristics, magnitude, distribution, and duration, sensitive receptors and affected groups in this D/D Stage. The EMP shall address the potential impacts and risks identified by the environmental assessment with the corresponding mitigation measures designed to minimize, reduce and mitigate (or compensate the affected parties) and to be implemented for the entire project cycle.

2. Extent of IEE Study

35. This Initial Environmental Examination (IEE) Report is for the Section Balykchy (Km 0) to kilometer - post 43 (Km 43), which has a distance of around 43 km. This road section shall be rehabilitated into Category II road. Accordingly, with its setting and mode of rehabilitation, the project undertaking is classified under the ADB Safeguard Policy Statement 2009 as environment Category B, requiring an Initial Environmental Examination. The purpose of this stage is to review and upgrade the previous IEE Report with more updated and quantitative environmental information additionally obtained/revealed, based on updated construction information such as detailed configuration of infrastructures on/along the road (culverts and power lines), more detail of earth work proposed, potential borrow pits, additional field monitoring and prediction of behavior of noise/pollutions in air and groundwater by sophisticated numerical method. Other environmental issues were also reviewed and confirmed such as fauna and flora, climate change, health, safety and social issues. Based on all the impacts additionally identified/reviewed, considering with the construction scope, it is expected that few impacts, if any, are irreversible, and in most cases mitigation measures can be designed to avoid or minimize them, as is same conclusion of previous IEE report.

36. The first Public Consultations meeting on the environmental aspects for Balykchy (Km 0) to kilometer - post 43 (Km 43), in accordance with Kyrgyz legislation on public access to the information and ADB's Public Communications Policy (2011) and SPS (2009), was undertaken on 17 March 2016 in Balykchy. This was organized by the IPIG-Motor through official communication to the local leaders inviting stakeholders in the surrounding villages.

3. Environmental Protection Legislation of Kyrgyz Republic

37. Environmental impact of the Balykchy (Km 0) to kilometer - post 43 (Km 43) Road Rehabilitation Project is regulated by several environmental legislative acts of the Kyrgyz Republic as shown in Table 1.

Table 1: Relevant Laws and Regulations on the Environmental Impacts of Road Projects

N	Legislation	Number & Year of adoption	Purpose / content
Main laws on environmental protection			
1	The Constitution of the Kyrgyz Republic	2010	Land, its mineral resources, airspace, waters, forests, flora and fauna and other natural resources are used, but at the same time are under protection. Everyone is obliged to take care of the environment, flora and fauna of the country.
2	The Environmental Safety Concept of KR	No.506 dtd. 23.11.2007	It establishes the basic principles of environmental policy and determines global, national and local environmental issues; priorities in the field of environmental protection at the national level as well as tools to ensure environmental safety.
3	National Sustainable Development Strategy of the Kyrgyz Republic for 2013-2017	No.11 dtd. 21.01.2013	Provides a conceptual sustainable development framework aimed to satisfy the needs of current generations and not to endanger at the same time the needs of future generations.
4	Law of KR “On Environmental Protection”	No.53 dtd. 1999 in the wording dtd. 27.04.2009	Establishes the basic principles of environmental protection and provides legal authority to establish environmental quality, designate special protected areas, promulgate rules and procedures for the use of natural resources, establish environmental monitoring and control system and reinforce procedures for overcoming emergency situations. Among the standards and norms of environmental quality authorized under this law and related to the project there are: Standards of Maximum Safe Concentration of Hazardous Substances in Air, Water; Standards of Natural Resources Use; Standards of Maximum Safe Noise, Vibration Levels and Other Hazardous Physical Impacts. This law establishes the requirements for environmental examination (environmental assessment) intended by economic or other activities to prevent potential adverse environmental impacts. In addition, it prohibits financing or implementation of projects related to the use of natural resources without obtaining approval from the State Environmental Expertise.
5	Law of KR "On Environmental Impact Assessment"	No.54 dtd. 1999, in the wording dtd. 04.05. 2015	The main law related to environmental assessment. Its task is to prevent negative impacts on human health and environment occurring as a result of economic or other activities, and to ensure compliance of these activities with environmental requirements of the country.
6	Law of KR "General technical rules and regulations for environmental safety in the Kyrgyz Republic"	No.151 dtd. 2009	Is meant to protect the environment. It determines the main provisions for technical regulation of environmental safety and establishes general requirements for ensuring environmental safety during design and operations of businesses and other facilities of all legal and physical entities.
7	Regulation on procedure for conducting environmental impact assessment in the Kyrgyz Republic	No. 60 dtd. 13.02.2015	Establishes the procedure for assessing the environmental impact of the proposed activity (hereinafter EIA). The purpose of EIA is to prevent and/or mitigate the environmental impacts of the proposed activity and other related social, economic and other consequences.
8	Regulation on Water Zones and Strips of Water Bodies Protection in the Kyrgyz Republic	No.271 dtd. 7.07. 1995	Defines the procedure for establishing water zones and strips of water bodies protection in the Kyrgyz Republic, establishes a regime of economic activity and land use located in the water protection zones and strips. This law also defines responsibility for keeping them in proper shape.
9	Rules for the protection of surface waters in KR	on March 14, 2016 № 128	These Rules govern the protection of surface waters from pollution and depletion, in the implementation of the water users of different types of business activities that have or may have an adverse impact on the status of surface waters, irrespective of their legal form, as well as regulate the procedure for implementation of measures for the protection of surface water.
10	Law of KR "On Protection of Atmospheric Air"	No.51 dtd. 1999, in the wording dtd. 09.08.2005	Governs the relations on use and protection of atmospheric air.
11	Law of KR "On Production and Consumption Waste"	No.89 dtd. 2001	Defines the national policy in production and consumption waste management. It is aimed at preventing negative impacts from production and consumption waste on the environment and human health while handling it and their maximum involvement in the economy as an additional source of raw materials.
12	Law of KR "On Protection and Use of Flora"	No.53 dtd. 2001	Establishes the legal framework for ensuring effective protection, rational use and reproduction of flora resources.
13	Law of KR "On Wildlife"	No.59 dtd. 1999, in the wording dtd. 24.06.2003	Establishes the legal relations in the context of protection, use and reproduction of wildlife.
14	Law of KR "On local self-government and local state administration"	No.101 dtd. 2011	Establishes the principles for setting-up local authorities at the level of administrative and territorial units of the Kyrgyz Republic.
15	Law of the KR "On industrial explosives";	No. 110 dtd 21. 05. 2015	Defines the legal framework for the regulation of explosives trafficking on the territory of the Kyrgyz Republic, and ensuring the safety of personnel working with explosive materials, the population, as well as the protection of property and the environment;
16	Regulation on the procedure of consideration and issuance of industrial safety authorization documents.	No.301 dtd. 30.05.2013	Establishes the procedure for consideration and issuance of legal entities and individuals, allowing documents authorized executive body, endowed with special licensing features in the field of industrial safety, including conduct of explosive works (procurement, storage of explosive; license for explosive work, etc.)
Legislation on Land Acquisition			

N	Legislation	Number & Year of adoption	Purpose / content
17	The Constitution of the Kyrgyz Republic	2010	Clause 12 recognizes a diversity of forms of ownership and guarantees equal legal protection of private, state, municipal and other forms of property (Clause 12, paragraph 1). Land can be of private, municipal and other forms of ownership except for pastures, which cannot be privately owned (Clause 12, paragraph 5). Property is indefeasible. No one can be arbitrarily deprived of his property. Seizure of property by the state against the will of the owner is allowed only by court decision (Clause 12, paragraph 2). Seizure of property for public purposes specified in the law is possible by the court decision with fair and advanced compensation of property cost and other damages caused as a result of such alienation. (Clause 12, paragraph 2).
18	Civil Code	No.16 dtd. 8.05.1996 in the wording dtd. 30.05.2013	Determines that the person whose right is violated can demand full compensation for damages, unless the law or agreement consistent with the law says otherwise (Clause 14, paragraph 1). The Civil Code specifies the following losses subject to compensation: expenses incurred or to be incurred by the person whose right is violated in connection with restoration of violated rights (Clause 14, paragraph 2); loss or damage to property (Clause 14, paragraph 2); lost income that would be received by the person under normal civil turnover conditions if his right was not violated (lost profits) (Clause 14, paragraph 2); Compensation for loss of profits along with the other costs, at least in the amount of such income, to the person losing land, assets or livelihood.
19	Land Code	No.45 dtd. 2.06.1999 in the wording dtd. 26.05.2009	Governs land relations in the Kyrgyz Republic, basis for the origin, procedure for exercise and termination of rights to land and their registration, and also aimed to create land and market relations in state, communal and private ownership of land and efficient use and protection of land. The Land Code is the main document, which regulates land use.
20	Law of KR «On transfer (transformation) of land»	No. 145 dtd. 15.07.2013	This law is developed in accordance with the Land Code of the Kyrgyz Republic and other normative legal acts of the Kyrgyz Republic. It defines the legal basis, conditions and procedure for transfer (transformation) of land from one category to another or from one type of land to another.
21	Law «On Highways»	No.72 dtd. 2.06.1998	According to Clause 4 the public roads are owned by the state and not subject to sale and cannot be passed into private ownership. This law (Clause 27) also provides that without prior approval of the State Automobile Inspectorate and the Ministry of Transport and Road of the Kyrgyz Republic the following is prohibited among others: trade on the roadside; placement of kiosks, pavilions and similar structures; and, unauthorized use of road lands (Clause 23)
22	Regulation on valuation of assets		Valuation of assets is made based on the Provisional Rules of activities of valuators and valuation organizations (Government Resolution #537 dtd. August 21, 2003), property valuation standards (Government Resolution #217 dtd. April 3, 2006) and other national legislative provisions.
Law on Protection and Use of Historical and Cultural Heritage			
23	The Law "On protection and use of historical and cultural heritage"	No.91 dtd. 26.07.1999	Establishes legal norms for protection and use of tangible historical and cultural heritage on the territory of the Kyrgyz Republic, which is of unique value for people. The law is mandatory for all legal entities and individuals. It defines their rights and obligations in the context of protection and use of tangible historical and cultural heritage. Historical and cultural heritage are the historical and cultural monuments associated with historical events in the life of the people, development of society and the state, material and spiritual creative works representing historical, scientific, artistic or other value.
Law on Access to Information			
24	The Law "On access to information held by public bodies and local self-government of the Kyrgyz Republic"	No.213 dtd. 28.12.2006	This law regulates the rights and obligations of public authorities to provide information to the local population, in order to achieve transparency of work of public awareness
International Conventions and Agreements			
25	UN Framework Convention on Climate	2000	Combating global climate change and its consequences.
26	Aarhus Convention on access to information, public participation in decision-making and access to justice on	2001	To support the protection of human rights to a healthy environment and wellbeing, access to information, public participation in decision-making and access to justice on issues related to the environment.

38. Ratification of international legal acts involves implementation of international requirements into the national legislation and harmonization of the Kyrgyz legislation with the international legislation. However, this process is moving very slowly in Kyrgyzstan given that conventions are really frameworks that need to be translated into national laws, a process that is time consuming and complicated.

4. Required ADB Environmental Approval

39. ADB requires the consideration of environmental issues in all aspects of its operations. Superseding the previous environment and social safeguard policies, ADB's Safeguard Policy Statement, 2009 (SPS, 2009) sets out the policy objectives, scope and triggers, and principles

for three key safeguard areas: (i) environmental safeguards, (ii) involuntary resettlement safeguards, and (iii) Indigenous Peoples safeguards.

40. ADB adopts a set of specific safeguard requirements that borrowers/clients are required to meet in addressing environmental and social impacts and risks. Borrowers/clients comply with these requirements during project preparation and implementation. The environmental safeguard requirements are indicated in Appendix 1 of SPS 2009 (Safeguard Requirements 1: Environment). This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, and loans involving financial intermediaries, and private sector loans.

41. In the ADB's Screening and Categorization, the nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts, and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts are assigned to one of the following four categories:[1]

- **Category A:** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
- **Category B:** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.
- **Category C:** Projects likely to have minimal or no adverse environmental impacts. No environmental assessment is required, although environmental implications are still reviewed.
- **Category FI:** proposed project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary.

42. Public Disclosure: ADB will post the following safeguard documents on its website so affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:

- For environmental Category A projects, draft EIA report at least 120 days before Board consideration;
- Final or updated EIA and/or IEE upon receipt; and
- Environmental Monitoring Reports submitted by Implementing/Executing Agencies during project implementation upon receipt

43. The Section Balykchy (Km 0) to kilometer - post 43 (Km 43) was classified based on ADB's Safeguard Policy Statement (2009), and ADB Methodological Guidelines on Environmental Assessment (2003) as a category "B", and IEE is required and regarded as the final environmental assessment report.

44. ADB also requires public consultation in the environmental assessment process. For Category-B projects, the borrower must consult with groups affected by the proposed program and with local nongovernmental organizations (NGOs) if possible. The consultation for this needs to be carried out as early as possible in the program cycle so that views of affected groups are taken into account in the design of the program and within the mitigation measures proposed. In this Grievance Redress Mechanism (GRM) is considered in Section H of this report.

[1]ADB. 2003. *Environmental Assessment Guidelines*, Manila.

5. Permitting Processes in Kyrgyz Republic

45. The assessment of the possible effects of economic and other activities on the environment and human health, as well as the development of a list of measures to prevent adverse effects (destruction, degradation, damage and depletion of natural ecological systems and natural resources), and improve the environment are carried out in the framework of environmental impact assessment provided the environmental legislation of the Kyrgyz Republic.

46. Environmental impact assessment is carried out according to the

- Regulations on the procedure for environmental impact assessment in the Kyrgyz Republic (13 February 2015, #60);
- Regulations on the procedure of the state ecological examination in the Kyrgyz Republic (7 May 2014, #248);
- Law "On Ecological Expertise" No.54 dtd. 1999, (with amendments as of 04 May 2015),
- Law "On Environmental Protection" No.53 dtd. 1999, and
- Law "General technical regulation on environmental safety."No.151 dtd. 2009.

47. The Environmental Management Plan (EMP) is developed on the basis of the EIA, design solutions and refined, is specified on each next stage of the project. EMP reflects all the possible negative impacts that have been identified EIA and includes mitigation measures these effects.

48. Environmental assessment in the Kyrgyz Republic is founded on two subsystems: (i) OVOS (the Russian acronym for “Environmental Impacts Assessment”), and (ii) Ecological Expertise (State Environmental Review, SER). The ecological assessment based on a “list”, project screening is done to determine whether a project is the subject to environmental assessment or not. For cases that this is required, an OVOS is conducted by an OVOS consultant hired by a Project Proponent. The environmental assessment proceeds with EIA documents which will be subjected for further reviews.

49. The resulting EIA/IEE is then presented for public consultations, after which revisions are done according to the public’s feedback. Subsequently, the OVOS report, Statement of Environmental Consequences, and other supporting documentations are submitted for the SER. After which the project may be approved, rejected or send for reexamination. The SER duration depends on the complexity of the project, but should not exceed 3 months after submission of all the IEE documents for the SER by the Project Proponent.

50. Continuation of the SER depends on the project, but cannot be more that 3 month after submission by the Initiator of the project with all EIA/IEE documents to SER. Public Environmental Review (PER) is organized and conducted by the initiation of the local people, local administrations and Civil societies, registered in the Kyrgyz Republic. The outputs of public environmental review is directed to the agency, which is implementing the state environmental expertise and to the agency, which is responsible for the decisions of implementing of the expertized objects.

51. Public Consultation had been held for the IEE during the Feasibility Stage. Conclusion of the public environmental expertise is recommendatory. It can be published in Mass Media, submitted to the local state administrations, initiators of the project, designers and other interested parties.

6. Environmental Standards

52. The following pollutants are to be monitored before, during and after construction. The environmental standards applied to the Project are also indicated together. International standards were also presented herewith for comparison with Kyrgyz standards; subsequently the more stringent standards shall be used as monitoring requirements.

Air quality

53. Maximum permissible concentrations of harmful substances in ambient air according to Kyrgyz and international standards below in the Table 2.

Table 2: Maximum Permissible Concentrations of Harmful Substances in the air

Pollutants	Maximum permissible concentration (mg/m^3)		Concentration averaging period	
	According to national legislation	According to IFC*	According to national legislation	According to IFC*
Dust	0.5	-	daily average	
PM_{10} (Reference only and not monitored)	-	0.01	-	
	-	0.025	-	24 hours
$PM_{2.5}$ (Reference only and not monitored)	-	0.02	-	
	-	0.05	-	24 hours
Sulphur Dioxide (SO_2)	0.5	0.02	daily average	24 hours
Nitrogen Dioxide (NO_2)	0.085	0.04	daily average	1 year
Carbon monoxide (CO)	3.0	0.1	daily average	Maximum daily 8 hour mean

*World Health Organization (WHO). WHO Ambient Air Quality Guidelines.

Noise

54. The Kyrgyz National Noise Standards are set out in Table 3. These take the form of design aims or noise limits, which are not sufficient for use in process of environmental impact assessment where the effect of change in noise levels need to be considered. In addition, the absolute noise levels provided in the Table do not provide specific internal noise levels for the community facilities identified within this study including for example shops or mosques.

Table 3: Kyrgyz Noise Standards

Description of Activity / Category	LAeq,T	LAmax,F
Areas immediately adjacent to hospitals and sanatoriums	Day 45 Night 35	Day 60 Night 50
Areas immediately adjacent to dwellings, polyclinics, dispensaries, rest homes, holiday hotels, libraries, schools, etc.	Day 55 Night 45	Day 70 Night 60
Areas immediately adjacent to hotels and dormitories	Day 60 Night 50	Day 75 Night 65
Recreational areas in hospitals and sanatoriums	35	50
Rest areas at the territories of micro-districts and building estates, rest houses, sanatoriums, schools, homes for the aged, etc.	45	60

The International Finance Corporation (IFC) Guidelines are set out in Table 4 below. These are again in the form of design aims, which it states have been taken from WHO Guidelines and which should not be exceeded. The levels of 55dB and 45dB for day and night time for dwellings are identical to those included in the Kyrgyz Standards, however they are levels below which there are no demonstrable effects of noise on health, and not levels at which there would be considered to be significant noise impacts. The level of 70dB for industrial and commercial premises is not appropriate as an environmental noise standard and is based on a WHO hearing damage criterion.

Table 4: IFC Noise Guidelines

Receptor	Noise Level Guidelines LAeq,1hr (dBA)	
	Daytime (07:00 - 22:00)	Night time (22:00 - 07:00)
Residential; institutional; educational	55	45
Industrial; commercial	70	70

The IFC guidelines also state that noise increases should not exceed 3dB, but do not distinguish between the assessment of temporary effects e.g. construction activities, and permanent effects e.g. changes in road traffic noise. However, in order to remain compliant with IFC Guidelines a noise change of 3dB is used to identify a significant construction noise impact, which is then rated using the semantic descriptors in Table 5 below.

Table 5: Semantic Description of Construction Noise Impact

Noise change (dB)	Description of Impact	Effect
Increase of 0.1-2.9 dB	Negligible	No Effect
Increase of 3.0-9.9 dB	Low	Negative Effect
Increase of 10.0-14.9 dB	Moderate	
Increase of 15 dB or more	Major	

In additon, IFC specifies that Occupational Noise Exposure shall not exceed 80dB for 8 hr.

Vibration

55. The British Standard BS 5228 [12] sets out guideline values in terms of peak particle velocity for human response to construction works and these are shown out in Table 3 below. Column three includes semantic descriptors of the scale of vibration impact which are equivalent to those commonly used in the assessment of construction vibration.

The overall results of the assessment are to be presented in the form of building vibration damage contours in vibration assessment report in the separate volume hence the human response to vibration must be considered in relation to these contours. Impacts to buildings and human are summarized in Tables 6 and 7 respectively.

Table 6: Building Vibration Assessment Criteria

Building Vibration Damage Risk Level	Building Description	Cosmetic Damage Threshold ppv (mm/s)
	Extremely fragile historic buildings, ruins, ancient monuments	2
High Risk A	Fragile buildings of clay construction with shallow (<1m) rubble footings	3
High Risk B	Fragile buildings of clay construction with concrete foundations/footings	3
Medium Risk	Residential brick built on concrete foundations/footings and light commercial	10
Low Risk	Heavy commercial, industrial and framed buildings	25

Table 7: BS 5228 Vibration Assessment Criteria for Human Perception

Vibration Level ppv (mms-1)	Description of Effect	Description of Impact
<0.3	Vibration unlikely to be perceptible	Negligible
0.3 to 1.0	Increasing likelihood of perceptible vibration in residential	Minor
1.0 to 10	Increasing likelihood of perceptible vibration in residential environments but can be tolerated at the lower end of the scale if prior warning and explanation has been given to residents	Moderate
>10	Vibration is likely to be intolerable for any more than a brief exposure to a level of 10mms-1	Major

Surface water

56. Monitoring qualities of surface water are presented in Table 8 below.

Table 8: Surface Water Quality Standards

Pollutants	Maximum permissible concentration (mg/m^3)	
	According to national legislation	According to EC legislation
Turbidity	Not less than 20/10 cm	Not less than 1,0 meters/depth
Oil Products	0,3 mg/L	not visible in the form of a film
pH	-	-
Total Suspended Solid (TSS)	Increasing 0.25 / 0.75	

GN 2.1.5.1315-03 with changes GN 2.1.5.2280-07 and SanPiN2.1.5.980-00, Directive 2006/44 / EC of the European Parliament and of the Council of 6.09 in '06 on the quality of fresh waters needing protection or improvement of quality in order to maintain fish life.

C. Description of the Project

1. Need for the Project

57. Since Kyrgyzstan is a mountainous, landlocked country, regional commerce depends heavily on road transport. As mentioned in Country Partnership Strategy with ADB, the road infrastructure has been routinely affected by climate-induced extreme events, including, landslides and mudslides. It is for this reason that further investment will be needed in the rehabilitation and maintenance of the road infrastructure.

58. The proposed project will help link the southern regions of Osh, Batken, and Jalal-Abad with the northern regions of Naryn, Issyk-Kul, Chu, and Talas, and then further connect to the regional corridors. The project will: (i) reduce the cost of passenger and cargo transportation between southern and northern regions by providing direct access, (ii) provide a more direct transit route between Kazakhstan and Tajikistan, and (iii) help stimulate economic activities such as trade.

2. Overview

59. This Section's starting point designated as Km 0, begins at a roundabout located at the entrance to Balykchy town. There are 5 roads that converge at this point as shown in Figure 1, and one of which is the Section of the project road, which radiates in the southeast direction. At the starting point, there are 2 stores found at the left-hand side, while 3 stores are found on the right-hand side. The first 8 kilometers is a straight path until the road reaches bank of Chu River, at which point it then turns south and meanders with the river for the next 6.5 km. Then it turns southwest in between mountains for 10 km and make an elbow turn to the east to run along Orto Tokoy Reservoir for around 17 km. When the road reaches the east edge of Orto Tokoy Reservoir, it turns southward along the bank of Chu River that drains into the reservoir until it meets with the newly constructed Bishkek-Naryn-Torugart Highway.

Figure 1. Starting Point of Project Area

60. The first 8 km straight path is somewhat flat and with seemingly enough space for a Category II road. The road crosses a railway after the first kilometer. After that, the road goes uninterrupted until it reaches the bank of Chu River. A number of industrial buildings and complexes can be seen from the road especially the area near the starting point to around 3.5 km. Beyond this point both sides of the road are barren areas with grass steppe, spiny weeds and scrub grasses. Aside from the row of trees at around Km 2 in front of the industrial complex, there are very few trees that dot the only one village, Tash-Saray, is bordered by the road at Km 11, with few houses found near the road. From around 8.4 km to 11.5 km, cultivated lands were found on the left-hand side while the Chu River bank is at the right-hand side.

61. The road goes along:

- Chu River at the km 8 + 000 there is an area 200 m long beside the road,

- Chu River at the km 10 + 000 there is an area 1,5 km long beside the road,
- Chu River at the km 11 +600 there is an area 2,0 km long at a distance of less than 50 m,
- Orto Tokoy Reservoir at the 33 - 40 km) at a distance of 200 m and
- Orto Tokoy Reservoir at the 40 - 43 km at a distance of 50 m.

Along the river bank shrub vegetation grows, in some places buckthorn, cattail, trees are presented from elm and willow as shown in Figure 2.

Figure 2. Project Areas near Chu River

62. As the road passes between two mountains at Km 14, the landscape turns into dry and arid with scrub grasses as the main vegetation. The valley is also somewhat flat with occasional rocky features. No settlements are found within this stretch but serve as graze land for stock animals as shown in Figure 3.

Figure 3. Project site (after Km 14)

63. From the eastward elbow turn up to the edge of Orto Tokoy reservoir the semi-arid landscape prevails with scrub grasses as the primary vegetation. Thence, the road runs around 9 km alongside Orto Tokoy Reservoir and enters Kochkor District, part of Naryn Oblast; which is arou

64. d 250-300 meters from the water edge. In the final stretch, the road runs alongside the Chu River that drains into Orto Tokoy Reservoir at the foothills of the mountain on the left and the river bank on the right as shown in Figure 4.

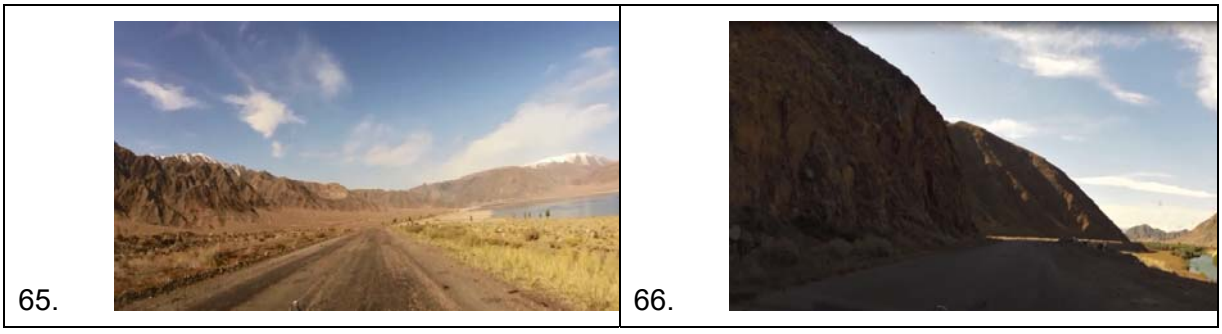

Figure 4. Project Site – Orto-Tokoy Reservoir

67. Bokonbayevo is the capital of Tong District, which serves as institutional as well as local commercial center. Kochkor is the capital of Kochkor District and within Naryn Oblast.

68. The Table 9 shows the Geographical Jurisdictions that the road section traverses or is near to.

Table 9: Geographical Jurisdictions along the Road Section

Oblast	Rayon	Town	Village	Section / km
Issyk-Kul		Balykchy	*(Junction in Balykchy)*	Km 0 – Km 43
			Orto Tokoy	
	Tong		Tash-Saray	
Naryn	Kochkor		*(Junction with Bishkek-Naryn-Torogart Road)*	

Source: The Consultant

69. The map of the project road is shown in Figure 5.

Figure 5: Location Map of the Road Section

3. Type and Technical Road Category of the Project

70. The Section "Balykchy (Km 0) to kilometer - post 43 (Km 43)" will be upgraded to Technical Road Category II along the existing alignment. The details of the proposed road project are:

- Rehabilitate and pave the project road to Technical Category II from Balykchy (Km 0) to kilometer - post 43 (Km 43) according to Kyrgyz National Standard with Geometrical and Structural Requirements (pavement works – replacement and/or construction of new pavement structure; road curvature improvements – for improve drivability and safety, curvatures and gradients will be improve, especially at existing narrow curves; carriage way widening – in a number of spots the road width will be widened to allow for safe two-way traffic, and pedestrian access; slope cuts – due to necessary widening and safety; slope stabilization – cuts will be stabilized by structural works);
- Rehabilitation, repair and/or replacement of bridges and culverts (bridge construction/repair – mostly repairs of bridge decks);
- Construction of side drains and other drainage structures (culverts and drainage works – replacement of old culverts and improvement of existing ones with installation of side ditches);
- Provision of retaining walls and river protection measures, where necessary.
- Provision of adequate road signing and marking (installation of road furniture – necessary safety features and furniture shall be installed at strategic locations along the road).

- Provision of safety barriers.
- The envisioned service life of the pavement based traffic load forecast is set at 20 years, with the normal routine and periodic maintenance

71. The road is to be designed according to Kyrgyz geometric design standard, and accordingly, it shall be sufficient to carry the traffic loading efficiently within its projected service life. Effectively, these will be a two-lane road consisting of a carriageway width (sum of the width of lanes) and the width of the shoulders. The design elements for the cross section of the project road are as follows:

- Number of lanes: 2
- Lane width: 3.5-3.75 m
- Carriageway width: 7.00-7.50 m
- Width of shoulder: 3.25-3.75 m (of which 0.50-0.75 m is paved)
- Total road width: 15.00 m

Typical pictures of sections Technical Category Road (Types 1-6) are shown in Figure 6 while those of ‘Types 7-11) are indicated in Figure 7.

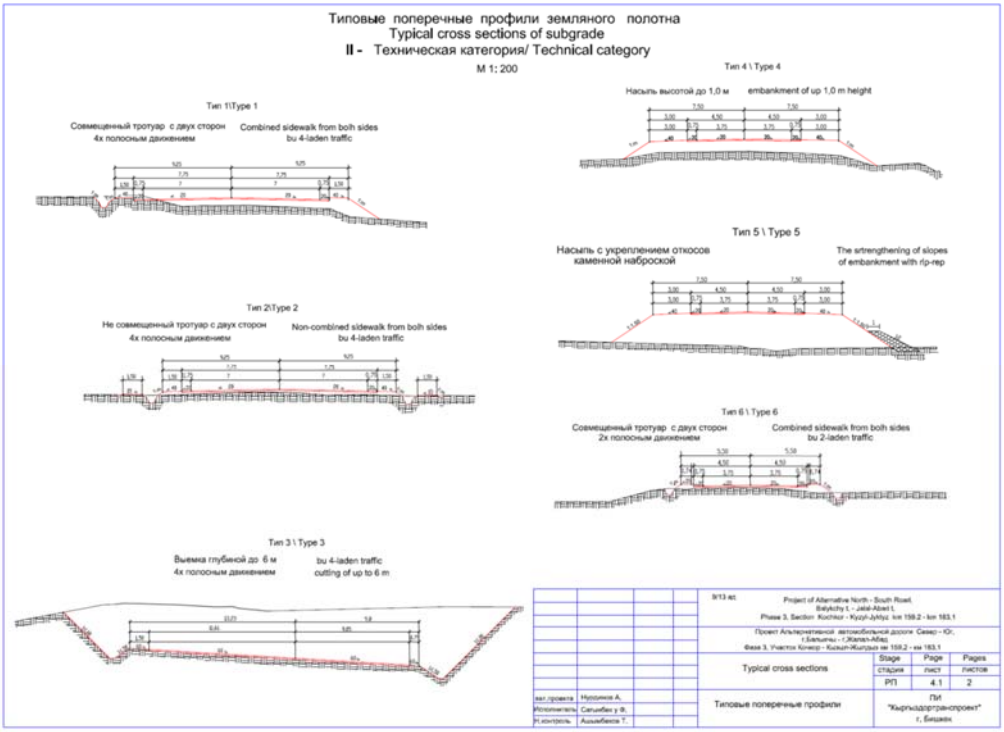

Figure 6: Technical Category II Road (Type 1-6)

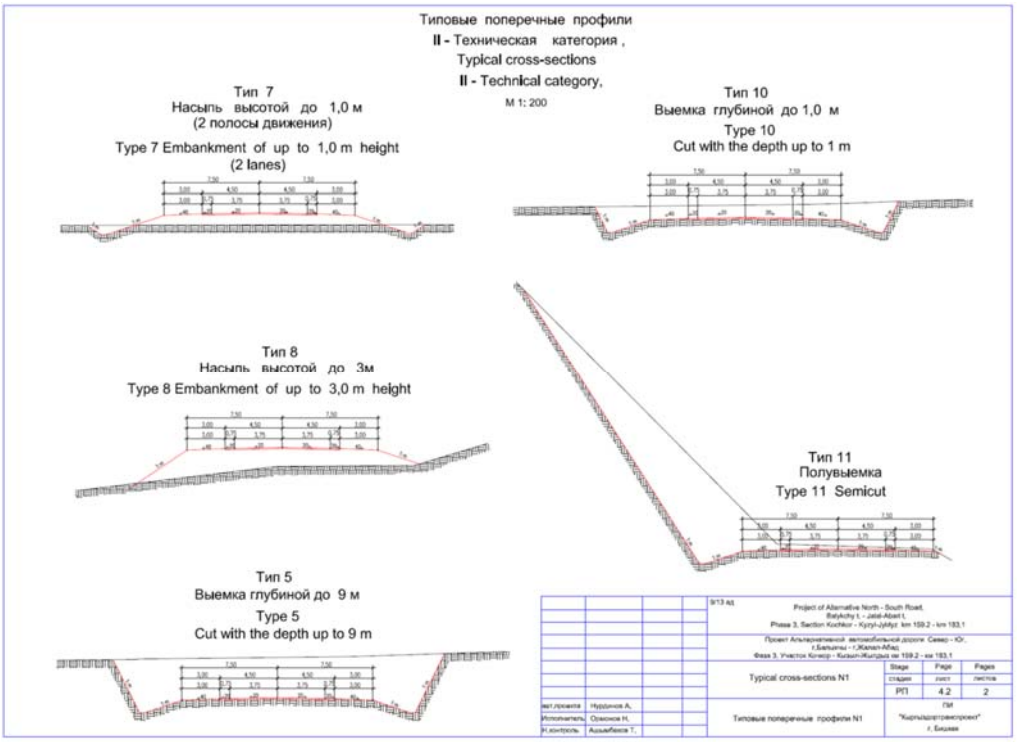

Figure 7: Technical Category II Road (Type 7-11)

72. Permanent land allocation for the subgrade is not required on the sections between settlements. Temporary land allocation for quarries, allocation construction machines and mechanisms is 20 hectares. During the construction provides arrangement of the construction site which will be identify on the detail design phase, and allocation for construction site have to - 1.0 hectares.

- Restoration and consolidation of alignment (stakeout);
- Coordination of the initiation and terms of construction works (with the traffic police, road administration, ecology administration, etc.);
- Preparation of the construction site;
- Preparation of sites for placing road equipment in the working area;
- Preparation of specialized areas for fuel storage;
- Felling of trees and clearing of areas;
- Demolition of existing engineering structures;
- Dismantling of fences;
- Demolition of buildings.

73. Planned volume of earthworks is shown in Table 10:

Table 10: Volume of Earthwork

Description	Unit	Quantity
Excavation of top soil (vegetative layer)	m^3	98,000
Excavation to spoil of unsuitable and surplus material, common soil	m^3	440,000
Excavation to spoil of unsuitable and surplus material, rocky ground	m^3	130,000
Formation of embankment, common material from cut	m^3	95,000
Provision of Subgrade, selected material		

74. Outline of earthwork is summarized in Annex A2. Embankment is filled with the maximum thickness of 5m but mostly less than 2m. For road trenches, existing slope is cut with maximum height of 12m.

3.1. Bridges and Culverts

75. There are three bridges (1 flume and 2 ravines) and 69 culverts which will be replaced along this section of the project road. Outlines of bridges are summarized in Table 11 while those of culverts are presented in Annex A3.

Table 11: Bridges in the Section

No.	Bridge Location	Name of crossing watercourse	Span Scheme	Bridge length, m	Design bridge width, m	Proposed Rehabilitation Measure
1	12+055	Flume	1 x 6.0	6.4	11.5+2x0.75	replacement
2	22+207	Ravine	1 x 6.0	6.2	11.5+2x0.75	replacement
3	31+750	Ravine	1 x 4.3	5	11.5+2x0.75	replacement

76. The Chu River flows alongside the project road. For baseline measurement of water quality the following spots were accepted:

- Chu River (10km) and;
- On the bridge (flume) (12+055km).

4. Temporary Ancillary Facilities

4.1. Material Sources and Cut & Fill

77. Considerable volume of materials will be obtained from borrow areas and will be used for construction of road embankments and bridge approaches. Opening of new borrow pits inside the Issyk-Kul Biodiversity Reserve is prohibited and it is recommended to use existing old borrow pits, located in sanitation zone, since several possible borrow areas are quite apparent in the general vicinity. Contractors involved in the recent road reconstruction works also can readily find potential areas for borrow materials which can be used for the bridge approach roads.

Should the Contractor be sourcing the materials from existing and operational quarry site, the contractor should exert influence on the operator that all required permits from local authorities, get approval from SAEPF are obtained and proper operational and management measures be instituted to minimize impacts to the general environment. If necessary, to consider the issue of opening new borrow pits to which the location requirements (remoteness of at least 500 meters from the lake) and, at the same time, outside of the Biosphere Reserve (i.e. transitional, buffer or core zone) and archaeological sites will be applied, as well as the practical experience of implementing the BNT-3 project, if it is necessary to open new quarries, the contractor must obtain all necessary permits for the allocation of plots for borrow pits and it will also be necessary to obtain ADB approval. Without the approval of ADB to open a borrow pit, the contractor cannot perform any work, even if there are milestones of permits from the state bodies of the KR (Ministries and Departments) and local authorities. This practice will avoid the possibility of negative impact on the environment. These steps are not required when using existing quarries or precast plants. In the case of private borrow pits all permits (licenses, coordination with local authorities, State Agency on Environment Protection and Forestry, etc.) is the responsibility of the owners of the quarry, which should be specified in the contracts concluded between the contractor and the owner of the quarry.

78. During the field investigations by the material specialist, suitable construction materials were located and inspected. Table 12 presents the list of possible borrow pit areas.

Table 12: Possible Borrow Areas

No.	km	Side	Description	Availability	Photo
1	3.5	LHS	Old borrow pit with sand and gravel. However, so many construction wastes were dumped illegally nearby. It is suggested not to use this borrow pit since this illegal dumping may be asked.	Not recommended	
2	5.	RHS	Sand and gravel together with asphalt mixing plan	Yes	
3	11	LHS	Sand and Gravel	Yes	
4	32.6	LHS	Sand and Gravel	Yes	

79. Should the contractor decide to use any area within the Issyk-Kul Biosphere area for as source for road materials, a more detailed survey of the area should be done and appropriate permit should be processed Issyk-Kul Reserve General Directorate.

4.2. Asphalt and Cement Batching Plants

80. In establishing asphalt plant at the site for the road pavement basically the binder course and the surface course; the Contractor should be guided by a number of items to protect the environment. Emissions will be produced in producing the asphalt mix likewise bitumen spill may occur during handling and mix preparation. For the cement batching plant for concreting works such as bridges, culverts and drainage works, cement dust can contaminate the air. In addition, the preparation, mixing and loading of concrete mix into the transit mixer and subsequent washing of trucks will result into soil and water contamination.

81. These two facilities should be situated at appropriate distances from the residences (not less than 500 m)2 as well as the river (not less than 150 m)3 so as not to result to water contamination. Within the project road, since the area is rural, there are ample spaces to set up these plants. The Contractor should obtain the necessary permits, negotiate properly with the landowners

[2] The asphalt plants need to be established on the territory of the industrial zone (0-6 km) or the zone of foothill areas ranging from 15 km and mainly use existing asphalt plants that are already installed on the 6 + 500 km, and on the 50 km (Semizbel village, there is an old borrow pit and asphalt plant).

[3] The water protection zone of the Chu River under the Regulations on the water protection zones and strips of water bodies in the Kyrgyz Republic, approved by Resolution of the Government of the Kyrgyz Republic on July 7, 1995 No 271, is 150 m on either side of the river bank.

and reinstate the area after usage at the end of the project. However, they are not allowed to open in the reserve zones (i.e. transitional, buffer or core zones and archaeological sites).

4.3. Construction Camp

82. Selection of the required land plots for organizing the construction camps is the Contractor/s responsibility, as well as negotiation with the owners of the lands and getting required permissions. There are free land plots to be used for the construction camps and Contractor has a choice to select relevant territory for the location. The proper maintenance of all the service and sanitary facilities at the construction camp falls under the direct responsibility of the Contractor under the supervision of the construction supervision engineer for the project. The sanitary facilities or ablution include toilets, urinals, showers, washstands and a laundry area. In addition, equipment and maintenance yard will also have to be sited accordingly. Waste water should not be discharged into the river. Solid waste collection and disposal should be planned properly in accordance with the requirements to the solid wastes. Solid waste disposal to the rivers are restricted.

5. Alternatives

83. In this section, two alternatives are being considered:

(i) Zero option – the «Inaction»/ do nothing alternative
(ii) The road reconstruction

The second Alternative is considering the road reconstruction in the section “Balykchy (Km 0) to kilometer - post 43 (Km 43)”. Reconstruction for the Category II road, on existing road.

6. Traffic Volume

84. Results of the Manual traffic counting road section converted into AADT by each vehicle type (Year 2015) in view of seasonal and daily correlation is shown in the Table 13 below[4].

Table 3: Results of Manual Traffic Count (2015)

	Name of the section	Vehicle Type	Car	Light Bus/Van	Medium Bus	Large Bus	Light Truck Pick Up	Medium Truck 2-axle	Heavy Truck 3-axle	Truck trailer	Truck Semi trailer	Total
1A	Balykchy 0 km – 42+939 km	Counting result	912	69	62	15	39	24	42	39	37	1239
		Day/Month Factor (Wednesday/August) = 0.814										
		AADT	742	56	50	12	32	20	34	32	30	1009

Source: KOCK’s Preliminary Report

85. As per estimate in the traffic study, the growth rate is as follows: (i) 2011-2024 = 4.2%; (ii) 2025-2029 = 3.7%; (iii) 2030-2035 = 3.2%; and (iv) 2036-2040 = 2.8%. After adding the diverted traffic and applying the growth rates the future traffic are around 1, 222 cars. Comparing this value with Road Classifications for Kyrgyz Republic, it shows that Category II road will be sufficient to service the future traffic.

86. It should be noted that, although future traffic will be increased, improved quality of road leads to positive environmental factors.

7. Proposed Schedule for Implementation

87. The schedule for the construction activities is at preliminary stage. he detailed design consultant will have to be recruited who will undertake the necessary design finalization along with all the contract documents. This IEE will form a part of the contract with specific provisions to form part of the Technical Specifications. The anticipated start of construction will be in 2019 or later. All construction period will take 2 years and plus 1 year for technical guarantee.

[4] This is part of the Economic Report for this PPTA

D. Description of the Environment

1. Geomorphology

88. The mountain ranges in the Kyrgyz Republic are part of the highest mountain ranges of the Tien Shan and Pamir-Alai. These mountains form natural geographic borders between Central Asia and China. Strongly dissected topography of much of the country is an important factor of its settlement and development. These are characterized by high rates of erosion landslides and rock falls. The road corridor is entirely contained within the mountain ranges of the Northern and Inner Tien Shan. The route passes through the mountain and plain part of the Issyk-Kul, Naryn regions at an altitude of 700 to 3500 m above sea level, crossing the valleys of the Chu River.

89. The main mountain ranges of the Inner Tien Shan (project zone) is describe as:

- In the north are Sandyk range and Jumgal-Too; northwest Suusamyr – Too range; and Kyzart range along the highway corridor.
- The Ridges / vertices:
- Ukek maximum height of 4356 meters, the average height of 4000 m, length of 30 km, maximum width of 20 km.
- Kyzart Ridge - maximum height of 4400 meters, the average height of 3800 m, length of 30 km, maximum width of 16 km.
- Sandyk Ridge - maximum height of 3947 meters, the average height of 3600 m, length of 50 km, maximum width of 12 km.
- Jumgal Ridge - Too maximum height of 4121 meters, the average height of 3800 m, length of 54 km, maximum width of 15 km.
- Suusamyr Ridge - Too maximum height of 4048 meters, the average height of 3500 meters, the length of 126 km and a maximum width of 31 km.
- At the Mid-cavity in the project area:
- Kochkor - hollow cavity of the bottom altitude 18002500 m, length of 80 km within the bottom, within the maximum width of the bottom 20 km.
- Jumgal - altitude valley bottom basin 15002600 m, length of 80 km within the bottom, within the maximum width of the bottom 25 km.
- Kyzyl-Oi - altitude valley bottom basin 1700-2400 m, the length of 9 km within the bottom, within the maximum width of the bottom 8 km.

90. Issyk-Kul hollow represents a depression of tectonic origin. The northern and southern shores of the lake are a band width of 5-10 km, gradually moving from the bottom to the lakeside terraces foothill hilly plains and on to the high mountain slopes and ridges Kungei Teskey Ala-Too. All human activities are concentrated in this band. The area is composed of Quaternary sediments, and the mountain ranges are mostly Paleozoic sedimentary and metamorphic rocks.

91. The area of road section covers various geomorphological relationships as follows:

- From km 0 to km 0.7 – from the roundabout to the first junction are built-up areas of the outskirts of Balykchy. The area is flat and the solid is generally loose earth with bush and shrub growth.
- From km 0.7 to km 4.00 – the area resembles like an arid semi-dessert with sparse shrub vegetation. The area is generally flat with very slight change in elevation as the road progresses.
- From km 4 to km 8 – low steppe hills on the left side while the right side is flat up to Chu River banks.
- From km 8 to km 12 – the road turns south and run along the Chu River on the right. The left sides of the road are areas Tash-Saray farmlands along the foot of the low hills.
- From km 12 to km 14 – the road encounters a rocky hill on the left side and is squeezed into a narrow pass with the Chu River on the right-hand side. In some portions the road rehabilitation may require some rocks to be scarified or even blasted.
- From km 14 to km 17 – the road turns to the west and runs between rocky mountains which are mainly made up of fractured and eroded boulders. The valley is arid and has very little vegetation which is mainly bushes.

- From km 17 to km 24 – some tree plantations are being found on the left-hand side, while the elevated right-hand side are mainly bushes. The road rounds a bend along the foothills of the mountain on the right and proceeds westward.
- From km 24 to km 32 – on the right-hand side be the rocky mountain's southern slope while the left-hand side is a sloping semi-dessert steppe area – eroded materials coming from the rocky mountains further south – the Terskey Ala-Too. This is a mountain range in the Tian Shan Mountains in Kyrgyzstan. This is composed of granites and granodiorites of Caledonian, and granites, metamorphic schists, quartzites, sandstones, and limestones of Paleozoic.
- From km 32 to km 40 – on the left-hand side, the road runs along buffer area of the southern shores of Orto-Tokoy Reservoir; while on the right-hand side are steppe areas which are agglomerates of loose rocks and soil deposits.
- From km 40 to km 43 – The road turns on a southwest direction and runs along Chu River that feeds into Orto Tokoy Reservoir on the right side. While on the left-hand side is a mountain segment of the rocky east-west mountain ranges. The road joins with the Bishkek-Naryn-Torugart Highway as its end point.

2. Soil and Geology

92. Lacustrine deposits represented by gravel and sand are spread on the 0 km - 17 km road section. At the end of the section, on the right bank terrace of the Chu River, lacustrine deposits are over covered by pebble gravel of alluvial origin. Thickness of lacustrine deposits is more than 5.0 m.

93. Rocky soil of deposit and metamorphous origin are developed on sections from 17 - 30 km.

94. Fill-up soil of the roadbed are represented by pebble and crushed stone soil with filer consisting of sand to loamy material with 15-30% content, including field stones of 5 to 30% Depth of fill is within 0.2 to 30.3 m. Roadbed subgrade consists of the following soil: crushed stone, pebble, gravel, clay loam and slate.

95. At the elevation of 1630-1850 m - there is plain-piedmont desert and is represented by the following soils: mountainous-valley, clay-colored and light-brown, absinthial gramineous vegetation. Piedmont mid-mountain steppe zone is at the elevation of 1850-2100 m, mountainous chestnut soils and black soil gramineous absinthial dry steppe, tall grass meadow steppes.

96. According to the seismic map regionalization of Kyrgyz Republic territory, the surveyed section relates to 8 point seismic zone (SNiP KR 20-02:2009).

3. Climate

97. The climate in Issyk-Kul is referred to as a local steppe climate, described as continental with cold winters and hot summers. There is little rainfall throughout the year with the average of annual rainfall 390 mm. During the summer months (June-August), the average monthly high temperatures on the shores of the lake are around 20-25°C. During the winter (December-March) below zero temperatures, but the lake does not freeze during the winter. The annual average temperature in the area is 5.8 °C.

98. Most part of the road section is within Issyk – Kul Oblast (km 0 to km 29) and the rest is part of Naryn Oblast. Due to the confinement of the Terskey Ala-Too ranges, most of the climatic conditions of the project road are that of Issyk-Kul region.

99. By climatic characteristics the surveyed road sections relates to V road climatic zone (SNiP KR 32-01:2004, Appendix B, table B.1)

4. Hydrology

100. There are three main water bodies that are relevant to the road section – Issyk Kul Lake, Chu River and Orto Tokoy Reservoir. No major river crosses the road section in this area; however, in several spots, the road is adjacent to the Chu River. At the start of the section in Balykchy, the road section is around 2.5-3.0 km to the water edge of Issyk Kul Lake. However, in between are built-up areas consisting of residential, commercial and industrial areas. Issyk-Kul (meaning

warm lake in Kyrgyz language), an endorheic lake in the northern Tian Shan mountains in eastern Kyrgyzstan, is the tenth largest lake in the world by volume, and the second largest saline lake after the Caspian Sea. Issyk-Kul Lake became a Ramsar site in 1975 and was considered water body of globally significant biodiversity (Ramsar Site RDB Code 2KG001) and forms part of the Issyk-Kul Biosphere Reserve.

101. Issyk-Kul Lake is 182 kilometers (113 mi) long, up to 60 kilometers (37 mi) wide, and an area of 6,236 square kilometers (2,408 sq. mi). It is at an altitude of 1,607 meters (5,272 ft.), and with depths reaching 668 meters (2,192 ft.). About 118 rivers and streams flow into the lake; the largest are the Djyrgalan and Tyup. It also is fed by springs, including many hot springs, and snow melt. Currently, the lake does not have any visible outlet, but some hydrologists hypothesize that, deep underground, lake water filters into the adjacent Chu River. Mineral deposits such as monohydrocalcite, one of the few known lacustrine deposits, are found at the bottom of the lake. The lake water's salinity is approx. 0.6%— compared to 3.5% salinity of typical seawater.

102. The road section encounters Orto Tokoy Reservoir at from km 32 to km 40. Currently, all throughout the section, the road height is higher than the highest water level of the reservoir. Built in 1957, Orto-Tokoy Reservoir is a reservoir of the Chu River, located in Kochkor District of Naryn Province of Kyrgyzstan at a surface elevation of 1750 m. It has a surface area of 24 km2, a maximum volume of 470 × 106 m3, and average depth of 46 m. Sanitary protected zone – 300 m (Annex G).

103. The road section situated closely to km 33-43, where the Orto Tokoy Reservoir starts on the Chu River and road comes next to the Chu River at km 8-14 that flows out from Orto Tokoy Reservoir. Orto-Tokoy Reservoir varies its water level based on seasonal fluctuation of Chu river runoff and it is located on the Chu River to provide irrigation water for the land in Chu valley.

104. The Chu River begins in the mountains of the central Tien Shan in glaciers. Flowing through the valley of Kochkor Chu river enters the Orto-Tokoy basin, which is compressed in the alignment of the mountain ranges and Kyzyl-Ompol, as shown in Figure 8. Archaly -Mazar. Behind the dam the river passes through the Boom gorge and merges with the Chon-Kemin river. The catchment area of Chu River is about 30 thousand km2. The Chu River is one of the biggest rivers in Kyrgyzstan, with a length of 1,070 km and a water basin of 67.5 thousand square km. Within the territory of Kyrgyzstan Chu River have over 4,892 tributes and channels flowing into it.

Figure 8: View of Chu River and Orto-Tokoy Water Reservoir

5. Fauna

105. The biodiversity of this area is represented by a variety of types of ecosystems[5]. The main types of ecosystems are the desert and semi desert.

[5]Source Atlas KR, Physical geography of Kyrgyzstan

106. Fauna. Desert part is inhabited by Siberian jerboa and tamarisk gerbil. In settlements, there are met house and lighter Spanish sparrows and turtledoves. Rooks, starlings and hoopoe keep close to settlements.

107. At foothills, there are field mice, Central Asian tolai hare and grey hamster. Such species of birds as Isabelline chat, black redstart, Buchanan bunting and eagle neophron inhabit in piedmont steppes.

108. See the Annex I to find list of birds found on the territory of Western Issyk-Kul due to monitoring results.

109. Below specified species of birds registered in the KR Red Book may inhabit in the project area.

110. Based on the analysis of the Red Data Book list of the Kyrgyz Republic, the species of birds and mammals in the territory of the planned activities are:

- *Aquila chrysaetos (Linnaeus)*
- *Circaetusgallicus (J.F.Gmelin)*
- *Syrrhaptesparadoxus (Pallas)*
- *Falco cherrugJ.E. Gray*
- *Accipiter badius (J.F.Gmelin) – on the data Biosphere Directorate (monitoring, spring 2015, amount - 2, migra*tion)

According to the list of birds included in IBAT system, it was determined that eight (8) species are not included in the Red Data Book, Kyrgyz Republic, 2006 as shown in Table 14.

Table 14: Species Listed in IBAT System and Red Data Book KR, 2006

Taxonomic group	Species	Common name	IUCN Red List Category	KZ Red Book
Birds	*Aegypiusmonachus*	Cinereous Vulture	NT	
Birds	*Aquila heliaca*	Eastern Imperial Eagle	VU	
Birds	*Aythyanyroca*	Ferruginous Duck	NT	
Birds	*Brantaruficollis*	Red-breasted Goose	EN	Absent
Birds	*Chlamydotismacqueenii*	Asian Houbara	VU	
Birds	*Circus macrourus*	Pallid Harrier	NT	
Birds	*Clangaclanga*	Greater Spotted Eagle	VU	
Birds	*Columba eversmanni*	Yellow-eyed Pigeon	VU	Absent
Birds	*Coraciasgarrulus*	European Roller	NT	
Birds	*Falco cherrug*	Saker Falcon	EN	
Birds	*Gallinago media*	Great Snipe	NT	Absent
Birds	*Gypaetusbarbatus*	Bearded Vulture	NT	
Birds	*Gyps himalayensis*	Himalayan Griffon	NT	
Birds	*Haliaeetusleucoryphus*	Pallas's Fish-eagle	VU	
Birds	*Limosalimosa*	Black-tailed Godwit	NT	Absent
Birds	*Neophronpercnopterus*	Egyptian Vulture	EN	
Birds	*Numeniusarquata*	Eurasian Curlew	NT	Absent
Birds	*Oxyuraleucocephala*	White-headed Duck	EN	
Birds	*Pelecanuscrispus*	Dalmatian Pelican	VU	
Birds	*Tetraxtetrax*	Little Bustard	NT	
Bivalves	*Euglesagurvichi*	Not available	DD	Absent
Fishes	*Capoetobramakuschakewitschi*	Chu Sharpray	DD	
Mammals	*Cuonalpinus*	Dhole	EN	
Mammals	*Lutralutra*	Eurasian Otter	NT	
Mammals	*Mustelaaltaica*	Altai Weasel	NT	Absent
Mammals	*Ovisammon*	Argali	NT	
Mammals	*Vormelaperegusna*	European Marbled Polecat	VU	
Snails and Slugs	*Segmentina servaini*	Not available	DD	Absent

IUCN categories are classified as in Figure 9.

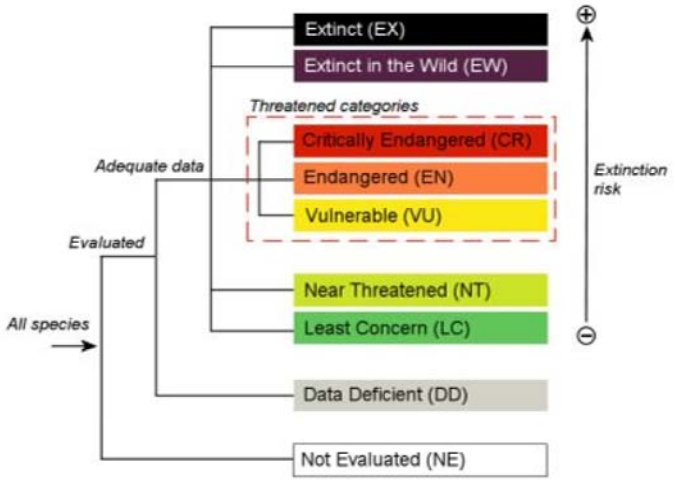

Figure 9: Classification Chart

111. Figure 10 shows location of project road while Figure 11 indicates the distribution of the species entered in the Red Book on the territory of the Issyk-Kul basin. The main Red Data Book species live mainly in mountainous areas. Given the large anthropogenic pressure on the foothills, to which the road section belongs, these species were not found. Therefore, risks of wild fauna collided by vehicles on the road seem to be less as well.

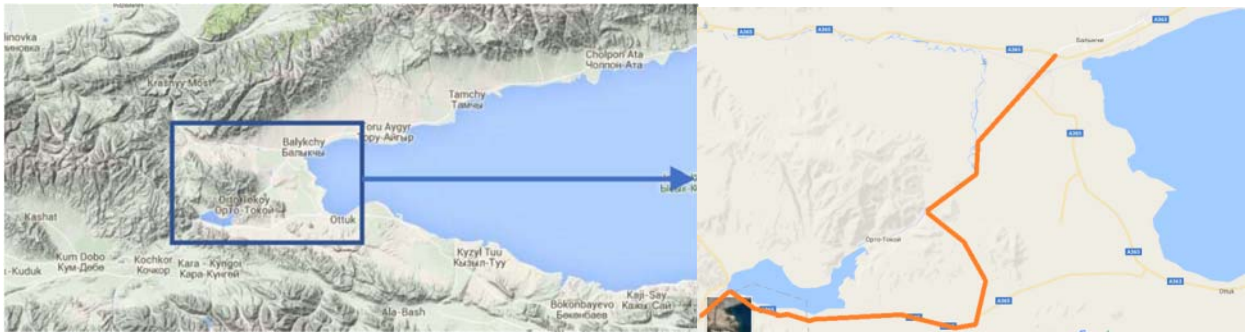

Figure 10: Location of Project Road

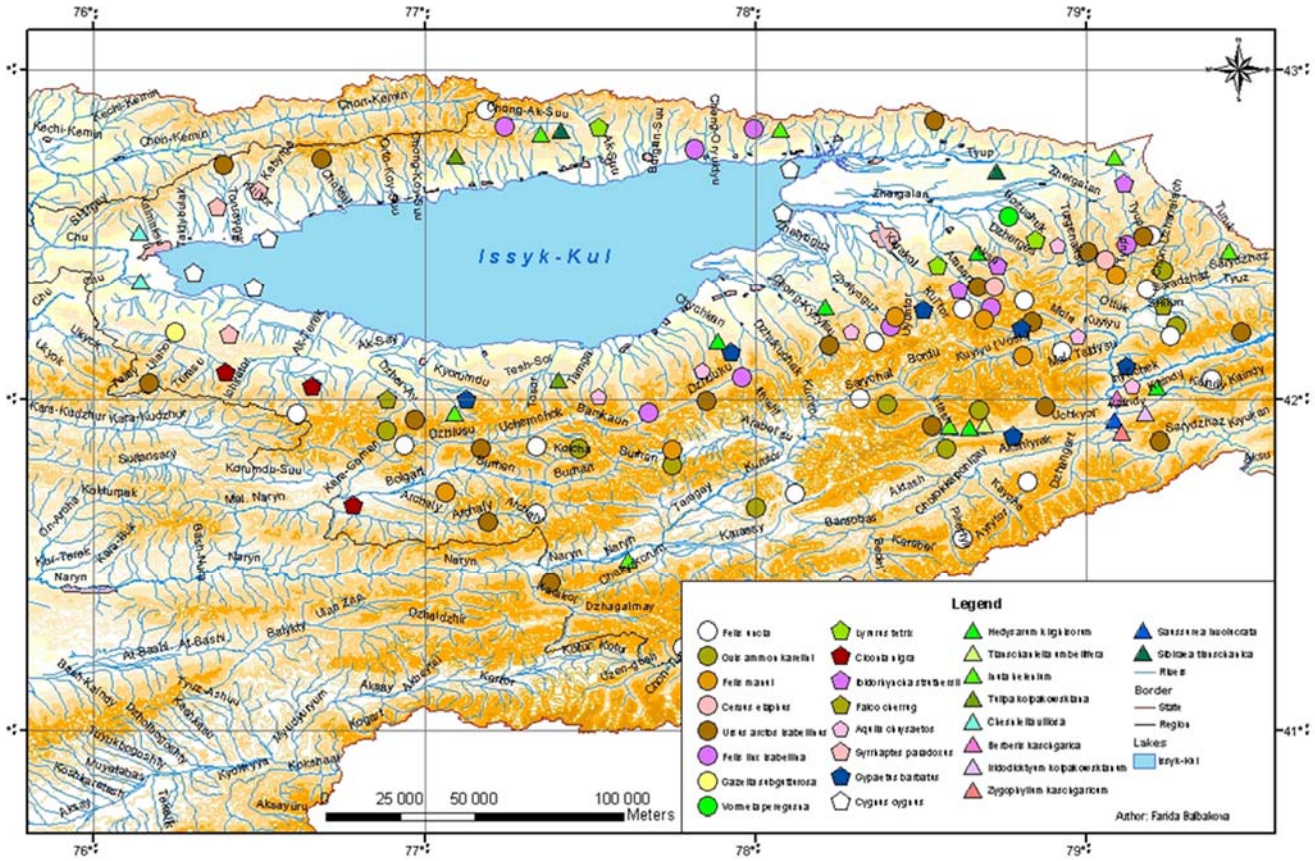

Figure 11: Species entered in the Red Book on the territory of the Issyk-Kul

112. The study was conducted based on technical discussions with Issyk-Kul Biosphere Reserve Directorate, in which they presented data; along with a discussion with the famous biologists Eric Shukurov and Sergey Kulagin, supplemented also by literature review (The Red Data Book of the KR, Physical geography of the KR, Atlas KR, etc.). More detailed information in Annex J.

113. These birds belong to the desert and semi-desert species; main feeding or hunting for these birds are in the foothills, and the mountain highlands (also see the Minutes of Meeting with General Directorate of “Issyk-Kul” Biosphere Reserve in Annex L).

114. The Project Zone is located in anthropogenic territory, so that these types of birds and mammals, if present, may be found only close to the mountains highland areas, habit areas are shown in the tables 1, 2 in Annex J and potential negative impact from construction works are not anticipated.

6. Flora

115. Vegetation grows up to foothills, particularly to the elevation of 1630-1850 m, there is plain-piedmont desert and is represented by the following soils: mountainous-valley, clay-colored and light-brown, absinthial gramineous vegetation. Piedmont mid-mountain steppe zone is at the elevation of 1850-2100 m, mountainous chestnut soils and black soil gramineous absinthial dry steppe, tallgrass meadow steppes. Rare absinthial-saltwort vegetation. Grasslands and sometimes bally crops could be met only at the outlet of mountainous valleys on alluvial cones watered by brooks. Soils are represented by poor brown soils, rarely by gray soils where sod-grass grow: feather grass sheep (*Stipa*), fescue, *Koeleria* as well as *Astragalus* and sub-shrubs, eurotia (*Krascheninnikovia ceratoides*), tansy (*Tanacetum*) and barbed caragana (*Caragana spinosa*).

7. Biosphere Reserve, Zoning, and Protected Areas

116. As of February 2011, the Protected Areas within Kyrgyzstan have an agglomerated area of 1,189,507 hectares, which is 6.3% of country's total area. These Protected Areas are composed of:

- *10 – Strict Nature Reserves (IUCN Category I),*
- *9 – Nature National Parks (IUCN Category II),*
- *19 - Natural Monuments (IUCN Category III),*
- *49 - Habitat/Species Management Areas, thereof:*
  - 23 - Botanical Reserves,
  - 10 - Forest Reserves,
  - 14 - Game (Zoological) Reserves,
  - 2 – Complex Reserves (IUCN Category IV).

117. The Nature Reserves (IUCN Category I) that were established for nature conservation and scientific research, and correspondingly prohibit any economic activity violating natural complexes. In addition, the Biosphere Territory of Issyk-Kul (established in 2000) has a status of protected area of national significance. By Ministerial Decree Issyk Kul Protected Area was set up for the purpose of: (a) conservation, reproduction and management of natural ecosystems with rich natural and cultural heritage; (b) recreational use; and (c) long-term ecological control, monitoring, research and education.

118. The Ramsar Convention was signed by the former Soviet Union in the 1970s and subsequently in 1976; the Issyk–Kul Nature Reserve was designated as a wetland of international importance. A government directive from January 2000 regulates the activity of the Issyk–Kul Biosphere Reserve Directorate (BRD). In September 2001, by decision of the United National Educational, Scientific and Cultural Organization (UNESCO), the Issyk–Kul Biosphere Reserve became number 411 on the list of world biosphere reserves. The Issyk–Kul Biosphere Reserve coincides with the borders of Issyk–Kul Oblast. In March 2003, with independent Kyrgyzstan this designation was reinstated following the ratification by Parliament on 10 April 2002. Succeeding, the former Issyk–Kul preserves have been registered as Ramsar sites with information needing to be updated with the secretary of the Ramsar Convention.

119. To pursue and maintain objectives sustainable development in the biosphere reserve, zones have been designated with separate preservations and use. Goals for protection and development differ from zone to zone, as do standards for use. In defining the zones, consultations were done with related government and non-governmental participants, the Issyk-Kul Biosphere Reserve, in accordance with UNESCO requirements. These zones consist of core, buffer, transition and rehabilitation zones. The zoning has major implications on future development of the region. Goals for protection and development differ by zones, as do standards for use. Table 12 summarizes zones and their description.

120. Ensuring that the Biosphere Reserve is not affected by Project activities, subcomponents have been suitably located and the Project ensures that intended activities comply with the designations: (i) Balykchy, the landfill is in the zone for "sanitation"; (ii) Cholpon-Ata, the landfill is within the transition zone, on land proposed for "extensive development". The main theme in these areas is for development of existing and proposed land use and designated for improvement and sanitation; and (iii) Karakol, the landfill is in the transition zone, similar to the one in Cholpon-Ata. Characteristics of each zone are summarized in Table 15.

Table 15: Zoning Criteria for the Issyk-Kul Biosphere Reserve

Zone	Sites	Description	Content
Core Zone	Glaciers	Primary source of water retreat/shrinkage Monitoring of changes in ecosystems, scientific research, other activities that do not disturb natural processes Stringent protections for entire natural complex	Stringent protection for the entire natural complex
	High mountain areas	Snow leopard habitat (3,000-4,000 m asl) Mountain goat habitat (largest concentration here)	
	Lakes	Habitat for rare waterfowl, fish, primary source of water resources	
	Forests and brush lands	Limited supply; Wildlife habitat	
	Existing reserves, preserves and national parks	Charged with environmental protection Legal guarantees in place	
Buffer Zone	Natural and historic sites	Scientific research sites	Usually surrounds or borders core zone
	Development of ecotourism	Traditional uses with extensive forms of economic activity, including regulated use of agricultural land, controller tourism, various forms of scientific research	
	High-mountain summer pasture	Infrequent winter wildlife habitat	
	Forests and brush lands (near settled areas)	Use crucial to local economy	
	Natural sites near settled areas	Environmental education sites, Scientific research and Ecotourism	
Transitional Zone	Agricultural lands, including summer and economic winter pastures	Primary source of agricultural products for local consumption	Environmentally-oriented activity
	Settled areas (towns, villages)	Population centers Economic centers	
	Certain sections along shores of major lakes	Fisheries / fish farms Development of ecotourism	
Rehabilitation Zone	Abandoned mines	Damaged ecosystems	Areas have suffered environmental damage and require restoration
	Other damaged sites	Subject to improvement	

Source: Biosphere Reserve Directorate

121. Furthermore from the Regulation Biosphere Territory "Issyk-Kul" (24 January 2000, amended 5th November 2002, 28th June 2005, 19th September 2006) under III. Territorial Division and Zonation:

122. Rehabilitation area includes anthropogenically disturbed areas that require regeneration and remediation measures (mineral deposits, tailings, highways, settlements, degraded land, stock trails and resting areas)".

123. Hence, starts of the road reconstruction (0 km Balykchy) and highway6 are considered part of the Rehabilitation Zone. Also in Annex H, the letter-answer from Issyk-Kul Reserve General Directorate, confirmed that road project is related to Rehabilitation Zone. The project location map is as shown in Figure 10.

8. Endogenous and exogenous processes

124. **Seismic hazard.** According to seismic regionalization of the Kyrgyz Republic territory, the project area relates to 8-point seismic zone (SNiP KR 20-02:2009).

125. **Mudflow hazard**. The schematic map shows areas where mudflow and flood may activate. Flood period lasts within the entire summer period on large rivers of the region, showing the peak flood in July at piedmont and dissected areas. Mudflow during flooding may happen one and more times a year.

126. **Slope flows** - the north-western part of the Balykchy and eastern part of the Orto-Tokoy Village, 10-14 km LHS of Chu River from the road 1km. But all these points situated far from of the project road, approximately 1- 5 km.

127. Locations of these hazards are indicated in Figure 12 while Table 16 summarizes these details. However, it is noted when there are intensive, locally concentrated atmospheric precipitations/ storm generated, mudflows and/or storm flooding areas that were not specified in the map may appear.

[6] On the Figure 8 general situation of Biosphere Reserve is shown, and highways in the Rehabilitation zone are not shown. Rehabilitation zone highlighted red, in accordance to Regulation and the Letter from Issyk-Kul Reserve General Directorate, Highways relate to the Rehabilitation zone.

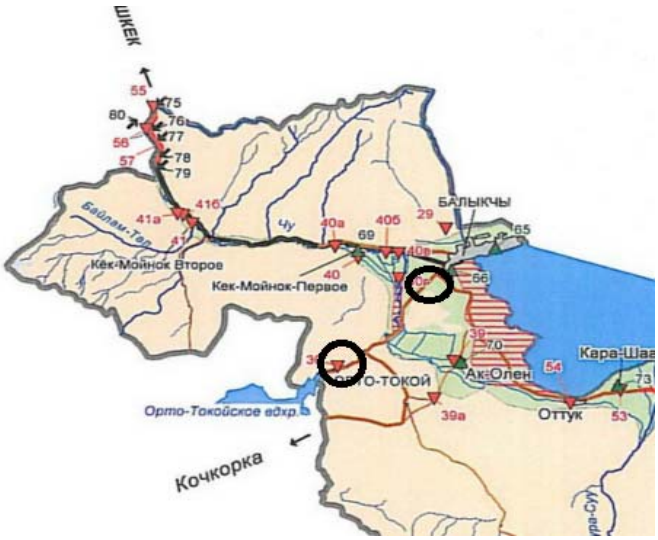

Figure 12: Possible Zones of Natural Disasters

Table 16: Forecast of Possible Activation of Mudflows and Floods

N	Rural district	River	Settlement	Facilities that might be affected
1	Balykchy	LHS Chu River	10 -14 km the road	Farmland beside the road
2	The Orto-Tokoy Village	Slope flows	Eastern part of the Orto-Tokoy Village	Sports club, sports ground, club, mosque and houses (made dams), 1-5km away from the road

Source: official website of Ministry of Emergencies, KR

9. Socio-economic Information

128. By 2009 census, Issyk-Kul Oblast has a population of 425,116 people, with than 2/3 of total population residing in rural areas. The capital of the oblast is Karakol. Within the oblast there are six colleges and lyceums, with some 2,580 students and 295 teachers. Higher education consists of six universities, with the largest in Karakol. Humanitarian education prevails over technical education. The districts in Issyk-Kul (and respective capitals are as follows): Ak-Suu District (Karakol); Jeti-Oguz District (Kyzyl-Suu); Tong District (Bokonbaev); Tup District (Tyup); and Issyk Kul District (Cholpon-Ata).

129. Ton region was formed in 1936 and it is located on the southwestern part of the Issyk-Kul hollow. The region's territory is of 7230 km2, the region borders on Zheti-Oghuz region on the east, on the south-west - on Naryn oblast, on the north-west - on Chu oblast. In administrative terms the region is divided into 9 village authorities: Ak-Terek (6 settlements), Kel-Tor (3), Kok-Moinok (3), Bolot Mambetovskiy (4), Kun-Chygysh (2), Ton (3), Tort-Kul (3), Ulakol (5), and Kadzhi-Sai (1). In territorial terms, the region includes Balyckchy Town of oblast significance (of 19 km2 area), which includes Balyckchy Town and Orto-Tokoy urban-type settlement.

130. According to data of the National Statistical Committee of the Kyrgyz Republic, total number of residential population of the region is 50.8 thousand people as of January 1, 2014.

131. Balyckchy. Town of oblast's area is 38 km2 with residential population of 45.1 thousand people (Balyckchy Town - 44.6 thousand people, Orto-Tokoy urban-type settlement with 0.5 thousand people). Average population density of the region is 7.8 persons per 1 km2.

132. Administrative center of the region is Bokonbaevo village with residential population of 10 648 people (according to 2009 census results). Number of households in the region is 10 986.

133. The region's territory is located between the southern bank of the Issyk-Kul Lake and Teskei Ala-Too range and has natural exit to the west from the hollow through Boom ravine. The range's piedmont is composed of Meso-Cainozoic deposits which is severely dissected by gorges and river valleys. Coastal zone of the lake is covered by lakeside flat lands, river fans; it is sometimes interrupted by giving place to piedmont ridges. Szyrts stretch to the south from the Teskei Ala-

Too range. Balykchy-Karakol and Bishkek - Torugart highways pass through the region's territory.

10. Cultural and Archaeological Resources

134. In March 2016 and April 2018, archaeological investigations were performed by local archaeologists historical and cultural heritage sites and objects in the vicinity of the project within the territories of Jumgal district of Naryn oblast and Jaiyl district of Chu oblast in accordance with the Technical instructions and norms of the method of archaeological investigations[7].

135. The objectives of the archaeological investigations are:

- Determining the presence or absence of monuments of historical and cultural heritage, their cultural significance, suspected object of cultural heritage along the entire length of the project road;
- Definition of preservation of cultural and containing deposits of historical and cultural heritage;
- Development of recommendations for the implementation of measures for the conservation of archaeological and cultural heritage.
- According to the results of field research, data cultural monuments were not detected in the visible area of the road route is elevated above ground facilities, so have not been identified and included in the survey list. Monuments are objects placed directly on the ground in the form of small hills and clusters of stones. In order to prevent possible impacts on cultural heritage in this area, it was decided to conduct archaeological research.

Within the section the significant archaeological resources consist of the following:

1) Sary-Bulun Northern 1 (Figure 13) and 2- around 8 km from Balykchy in the direction of Kochkor, (RHS) 35 m to the north-west from the road. A square, with sides 40 meters. The maximum height of the surviving walls reached 1.5 meters. This is ruin of roadside inn discovered in 1971-1973 by Vinnik D.F.

Figure 13: Sary-Bulun Northern 1

2) Graves and the cemetery of ethnographic time (18th-19th centuries), a medieval settlement. A bronze-age village in the Tash-Saray locality was recorded in Section 1 at 10,800 meters from the beginning of the road. The sites are located on the east side of the existing road. The earlier graves overgrew modern cemeteries. The graves are located about 40 meters from the existing road.

3) Archaeological complex Orto-Tokoy 1, about 33,000 - 34,000 meters from the beginning of the road. The complex consists of 4 villages dating from the Bronze Age (I-II millennium BC) having a complex structure, the burial ground of the Saks (VIII-III centuries BC), burial mounds located 75 m away from road in the minimum

[7] Provisional Regulations on the procedure of the archaeological survey. Approved by Decree of the Government on July 11, 2014 under the number 386;Avdusin DAField Archaeology of the USSR.- M., 1980. - p.58-113.

4) The burial ground of Orto-Tokoy 2, located at 34,800 – 34,900 meters from the beginning of the road and from the south side of the road away about 30m. Consists of 6 barrows of round shape with a diameter of up to 7 meters and a stone-earth embankment with a height of 0.5 meters. Located 30 meters from the existing road but appears to have been destroyed during the laying of a fiber-optic cable

5) The burial ground of Orto-Tokoy 3, located 35,500 – 36,400 meters from the beginning of the road and on the south side of the road. Consists of 29 barrows of rounded size with diameters of from 5 to 10 meters. There are rock and earth mounds of up to 0.5 meters in height. Located 60 meters from road

6) The burial ground of Ortho-Tokoy 4, located between 39,100 – 39,450 meters from the beginning of the road. On the south side of the road the site contains five mounds of round shape with a diameter of up to 7 meters. Rock and earth mounds are up to 0.5 meters in height. At a distance of about 120-180 meters form the road.

136. Based on the results of the research, a report has been prepared, the Archaeological Survey and Assessment Report and Proposed Plan for Section 1, which contains protection measures (presented as part of Annex O. This object of historical and cultural heritage is the object of study and protection of the Ministry of Culture, Information and Tourism of the Kyrgyz Republic (MoCIT KR). To prevent damage to the existing objects/ sites of cultural heritage a Protection Plan has been prepared, which is also presented as part of Annex O. The Contractor should respect and establish protection zones, procedures, management plans, in accordance to the plan and should work together with MoCIT KR and local government.

137. In accordance with the Law of the Kyrgyz Republic on historical cultural heritage in the event of cultural monuments found, all construction works must stop and report the findings to the local executive authorities or any other competent organization (Institute of History and Cultural Heritage, National Academy of Sciences; Department of History, Kyrgyz National University after Balasagyn), MoCIT KR.

11. Sensitive Receptors

138. Sensitive receptors are those areas where the occupants are more susceptible to the adverse effects of exposure contaminants, pollutants and other adverse substances that the activities may generate. These generally include residential area, bazaars, cultural sites and etc. Such facilities along the project road section as referred to the alignment sheet are:

1) Settlement

- Balykchy (km 00+000) – This is the start of the road section and with considerable number of people around (industrial zone, 3-4 km).
- Tash-Saray (km 11 + 000) – Residential areas near the road (nearest house from the ROW 10-11 m)

2) Cultural and historical sides:

- Sary-Bulun Northern 1 and 2 – 7,800 m from Balykchy
- Graves and the cemetery of ethnographic time located at 10,800m. The graves are located about 40 meters from the existing road.
- Archaeological complex Orto-Tokoy 1, about 33,000 - 34,000m
- The burial ground of Orto-Tokoy 2, located at 34,800 – 34,900 m and the south side of the road away about 30m.
- The burial ground of Orto-Tokoy 3, located 35,500 – 36,400 m and on the south side of the road.
- The burial ground of Ortho-Tokoy 4, located between 39,100 – 39,450m At a distance of about 120-180 meters form the road.

Figure 14 presents the aero photo that indicates that residential buildings (present road will be re-aligned and be situated nearer to the house in the future) while Figure 15 shows the industrial area in Balykchy.

Figure 14. Tash –Saray Residential Area

Figure 15: Industrial Zone, Balykchy

139. Aside from the possible impact due to noise, dust, vehicular emissions during construction and operations of the project, public safety can be a concern when trucks, equipment and construction materials are brought to the sites near these sensitive receptors. Disturbances may occur during construction hours and treatment period. Traffic safety may be concern with hazards to children as they walk or commute to and from schools.

12. Baseline Measurements

140. Baseline measurements in water quality, air quality and noise/vibration were obtained in selected spots. Water quality measurements were obtained where construction may impact river quality. Air quality and noise/vibration measurements were obtained in likely receptor areas. These results shall be used as reference parameters in monitoring the impacts of construction and operations of the project. International standards were also presented herewith for comparison with KGZ standard; subsequently the more stringent standards shall be used as monitoring requirements.

141. Water quality and air quality measurement were done by the Ecological monitoring Department of the SAEPF. While noise and vibration measurements were done by the Department of the sanitary protection of the Ministry of Health.

12.1. Water Quality Measurements

142. Sampling was done according to GOST P 51592-2000 “Water. General sampling requirements”, WSS 33-5.3.01-85 “Instruction on sampling for waste water analyses”. Legislative requirements were observed.

143. As baseline data in water quality, it is proposed that measurements would be done for the most relevant parameters: Turbidity, Oil Products, pH, Dissolved Oxygen (DO), Total Suspended Solid (TSS), Electric Conductivity (EC) and Temperature, although only Turbidity and Oil Products had been planned and measured in F/S stage. Therefore, the contracted laboratory was instructed to obtain the measurement in bodies of water. It was observed that the downstream areas utilize water from the river mainly for agriculture and domestic uses. Drinking water is obtained from installed wells and from springs. The results of such water quality testing only in F/S stage are shown in Table 17.

Table 17: Water Quality Measurement Results

No.	Locations	Km in Road	Turbidity, cm	Oil Products, mg/l
Maximum Permissible Concentrations (MPC)				
According to national requirements			Not less than 20	0.3
According to International legislation (EC)			Not less than 100 cm /depth	not visible in the form of a film
1	Chu River near Tash-Saray village	11 + 500	41	<0.05
2	Chu River Hydro-post, Bridge	42 +600	37	<0.05

Note: Measurements done in Nov. 30 – Dec. 3, 2015, Annex E.

As shown, the turbidity of water samples taken from Chu River are found to be not satisfying the standard. However, there is no factories at all in the upstream and this turbidity is considered as nature origin, unable to control.

12.2. Air Quality Measurements

144. Measurement results will serve as reference values for monitoring during the construction phase. Air quality was measured at 2 points along the road, which were identified as areas sensitive to air pollution due to the proximity of street markets and other special facilities.

145. In the project area there is no large industrial source of pollution affecting the air quality, but it is influenced by dust from cars. The nearest station air quality monitoring from the project area is located quite far away - in Tokmok (Chu valley) and Cholpon-Ata (Lake Issyk Kul). Naryn region has no air quality monitoring stations.

146. Most of roads are located along foothill and mountain areas with the perimeter surrounded by mountain ranges. The height of the terrain within 1630-1760 m above sea level. Sparse stepped vegetation is found in uninhabited areas. Occasionally, there are farmlands especially those near the Chu River; however, large portions along the project road are uninhabited.

147. The content of inorganic dust in the air due both to climatic conditions of the region and with the movement of vehicles. For air quality, the most relevant parameters to be measured would be Dust, SO_2, and NO_2. Accordingly, the contracted laboratory was instructed to obtain the measurement in populated areas along the project road. The results of such air quality testing are shown in Table 18.

Table 18: Air Quality Measurement Results

No.	Measurement Point Location	Chainage	Air Quality Parameters (mg/m^3)		
			Dust	SO_2	NO_2
Maximum Permissible Levels (KR standards)			0.5	0.5	0.085
Maximum Permissible Levels (IFC)			-	0.02	0.04
1	Balykchy (start of the Project road)	0+000	0.29±0.07	0.05±0.006	0.022±0.004
2	Tash-Saray, close to the Chu River, opposite the houses, LHS	11+000	<0.26	<0.05	0.027±0.005

Note: Measurements done in Nov. 30 – Dec. 3, 2015. Annex E.

Origin of SO_2 is usually coal burning and not related vehicle emission. It will not be seriously worsened even if vehicle numbers are increased.

12.3. Noise Measurements

148. In Section 1 the road runs through two populated areas with differing noise climates. The first is on the outskirts of Balykchy, which is a largely industrial area with the housing located to the east of the road. Noise levels at buildings alongside the road will be dominated by road traffic noise, however, further away from the road there is likely to be a contribution from industrial and commercial activities.

The second is the village of Tash Saray in which most of the houses lie at a distance of c.50-120m from the road, with c. 5 to the south of the village lying more closely to the road. Baseline noise levels at all these dwellings are dominated by road traffic noise, however at distances

further away from the road, traffic on local access roads and day to day activities at dwellings will contribute to overall noise levels.

An initial baseline noise survey was carried out in 2015, however there was no supporting documentation of the procedures (duration, equipment etc) used, and it was therefore deemed necessary to carry out additional monitoring as part of this study. Noise monitoring was carried out by JOC in May 2018, using equipment and methodology in compliance with the procedures set out in ISO 1996-2 2017, equivalent to BS 7445-1:2003 by the requirement of ADB policy to choose most strict international procedure. Short term monitoring comprised two non-contiguous one hour measurements at each chosen site. In addition, monitoring over a 24hr period was carried out at a site in. The results of the short term and 24hr monitoring are shown in Tables 19 and 20 below.

In Balykchy the two short term monitoring sites were located on the boundary of housing areas 45 to 80m to the east of the road and as expected, results show measured levels higher than calculated road traffic noise levels, partly as result of the contribution of noise from activity on the nearby industrial estates, but also due to increased traffic flow on the road itself. The results of the 24 hour monitoring at the side of the road in Balykchy are summarised in Table 20.

To the south of the village of Tash Saray, noise levels at the Mosque, 24m from the road, are dominated by road traffic noise levels and thus provide a good opportunity to the validate modelling assumptions. The measured values were corrected for the difference between actual and modelled road traffic counts, and the free field/façade correction of +3dB. The corrected result of c.52dB gave good agreement with calculated road traffic noise levels giving confidence in the accuracy of noise modelling on this section of the road.

Table 19: Results of Short term Noise Monitoring, Section 1

Rec No.	Distance to road	Location	Date	Start time	$L_{Aeq,1hr}$	Model Output(dB)
2	24	Mosque, Tash Saray	1/5/18 1/5/18	08:07:36 11:18:36	43.2 47.8	52.8
8	45	Nr. Housing estate Balychi	6/5/18 7/5/18	10:43:56 10:25:15	57.2 54.3	45.2
11	80	Nr. Housing estate Balychi	6/5/18 7/5/18	12:00:01 09:19:01	51.9 50.7	41.7
14	90	House Tash Saray village	6/5/18 7/5/18	14:16:01 08:05:12	54.1 41.5	42.4

Table 20: Results of 24hr Noise Monitoring, Balykchy, Section 1

	Day 07:00-19:00	Evening 19:00-23:00	Night 23:00-07:00
Measured noise level (dB)	61.6	59.9	54.6

**Name of the noisemeter used is Rion NL-52*

E. Environmental Impacts and Mitigation Measures

1. Impacts in the Project Phases

149. The environmental impacts and mitigation measures presented in this IEE Report were based on the results of the conducted field surveys. The Section “Balykchy (Km 0) to kilometer - post 43 (Km 43)” will entail upgrading of road along its existing alignment. In some spots, road runs close to sensitive receptors such residential areas, cultural and historical sites or others.

150. It is anticipated that main impacts will include the following: (i) noise, dust and vehicle emission, that are especially of high significance within the settlements alongside the Project road and where sensitive receptors are located such as schools, hospitals, mosques, cemeteries and other cultural historic objects in general; (ii) impacts on water courses and rivers due to bridge rehabilitation, earth work, blasting works along the rivers; (iii) impacts from material transportation from borrow sites; (iv) impacts of tree cutting alongside the Project road due to site clearance activities; (v) impacts from asphalt plant and aggregate crushers; and (vi) impacts from contractor's working camps. Impacts have been divided in to design phase, construction phase, and operation phase respectively.

151. There is no impact at preconstruction stage since there is no activity at the site. However, well planning/designing is necessary in the preconstruction stage to prevent environmental impacts caused during construction or operation.

152. Impact is associated with planning and designing of the road alignment in the areas with natural disasters (flooding, mudflow). The main types of natural disasters are mudflows, floods. Slope flows - the north-western part of the Balykchy and eastern part of the village Orto-Tokoy, 10-14 km LHS of Chu river from the road 1km. But all these points situated far from of the project road approximately 1- 5 km.

Prediction of Air Pollution

153. Air pollution along the road, 6m away from the road centerline was predicted during operations and construction respectively as in Table 21.

Table 21: Prediction of Air Pollution along Project Road

Year	Stage	Monitored or predicted	Hourly traffic no. Day time	Traveling speed	NO_2	Dust	SO_2
			No.	km/h	μg/m3	μg/m3	μg/m3
IFC Standard					40	-	20
Environmental standard in KG					85	500	500
2016	Before construction	Monitored	-	-	(20-30)	(290)	(<50)
		Predicted	70	60	28	<290	<50
2018	During construction	Predicted	79	60	124	<290	<50
	Operation	Predicted	79	95	30	<290	<50
2034	Operation	Predicted	159	95	33	<290	<50

() monitored figures by Kocks at the distance 3m from road edge 15m is the minimum ROW width from road centerline

“Dust” was included in “SPM” in the table.

Prediction was made at the location 5m away from the road based on the monitored figures as background in 2016. NO_2 does not satisfy the IFC standard during construction while it is acceptable range during operation. Dust will be satisfactory all time. The concentration of SO_2 originated from vehicle emission is unknown if it satisfies IFC standard or not according to the table. However, SO_2 calculated by experimental formula is as less than 5 μg/m^3 and, at least, there is no SO_2 pollution from vehicles in the future.

154. Dust is generated by present unpaved road mostly and the emitted portion of dust from vehicles is negligible to this 280 ppm. Therefore, no additional mitigation measures are required since dust concentration will be reduced even if vehicle number increases after paved in the future.

155. “Falling dust” generated by earth work and lorry passing over unpaved road at the location 20 away from car lane edge is 2 ton/km2 and no prevention measure is required. However, passengers just beside the road may suffer from these dusts. Water spraying hourly is must during dry season especially.

156. Other than at along road, air can be polluted at the locations of asphalt/concrete batching plants, rock crushing plant, soil/rock borrow pits, material stock piles by their activities such as mixing of aggregate, crushing stones, sieving sand, heating bitumen, excavation of soil/rock etc., although these shall be located sufficiently away from settlements. Water spraying is must as well

Air pollution during Construction

157. Concentration of NO_2 during construction was estimated vs distance from road, considering equipment, trucks and public traffic together, using safety side assumption, and plotted versus distance from the edge of car lane as Figure 16.

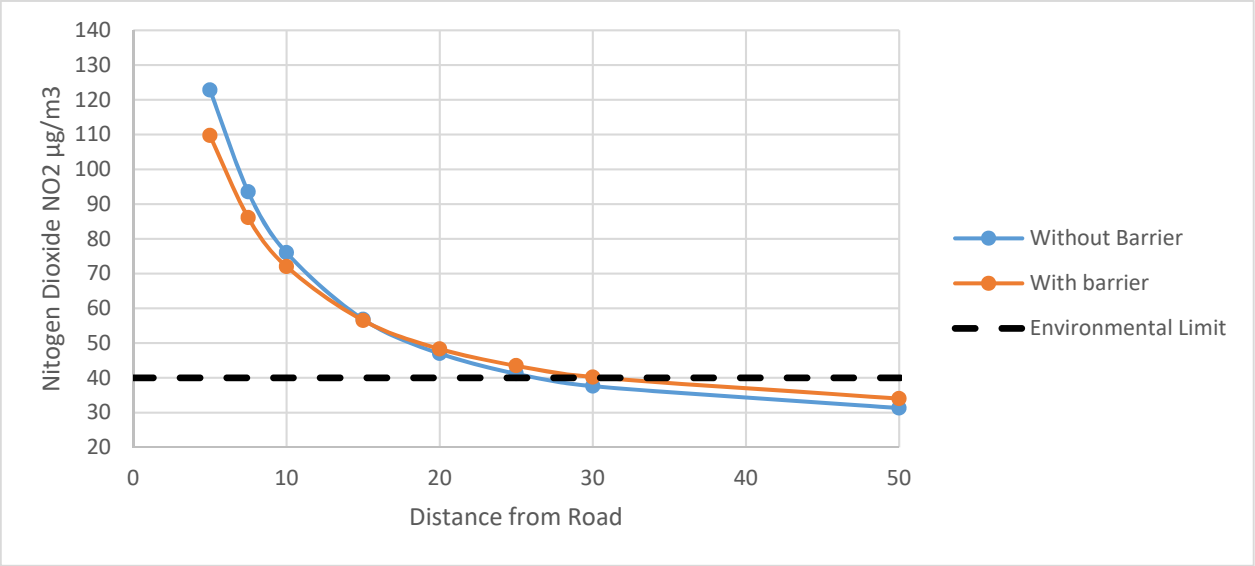

Figure 16: NO_2 concentration during Construction

158. All the houses located within 30m from the road will be affected during construction. As shown above, barrier is almost no effective to install for air pollution. 13 buildings, such as residence, office, café, gas station, shop and mosque, are affected by the exhausted gases from heavy equipment and dump trucks

159. However, similarly to the case of noise and vibration, air pollution during construction is just very tentative and short time only while the environmental standard is a threshold set assuming that 1% of receptors, being exposed to that much level’s pollution 24 hours for all his life, may get sick. Thus, the environmental standard is set for long term evaluation and is too safety side to apply for short term impact. Consultants believes several days’ exposure may be considered as physically negligible to health. However, polite explanation/door to door visit, among all, to elders is the must about what works are to be done for the purpose to let them be reassured and get cooperation.

Air Pollution after Operation

160. Air pollution can be expected because of increase of vehicle numbers and enlarged road width. Figure 17 predicts the NO_2 Contamination vs distance from road in 2034, which is end of road life 15 years if not maintained.

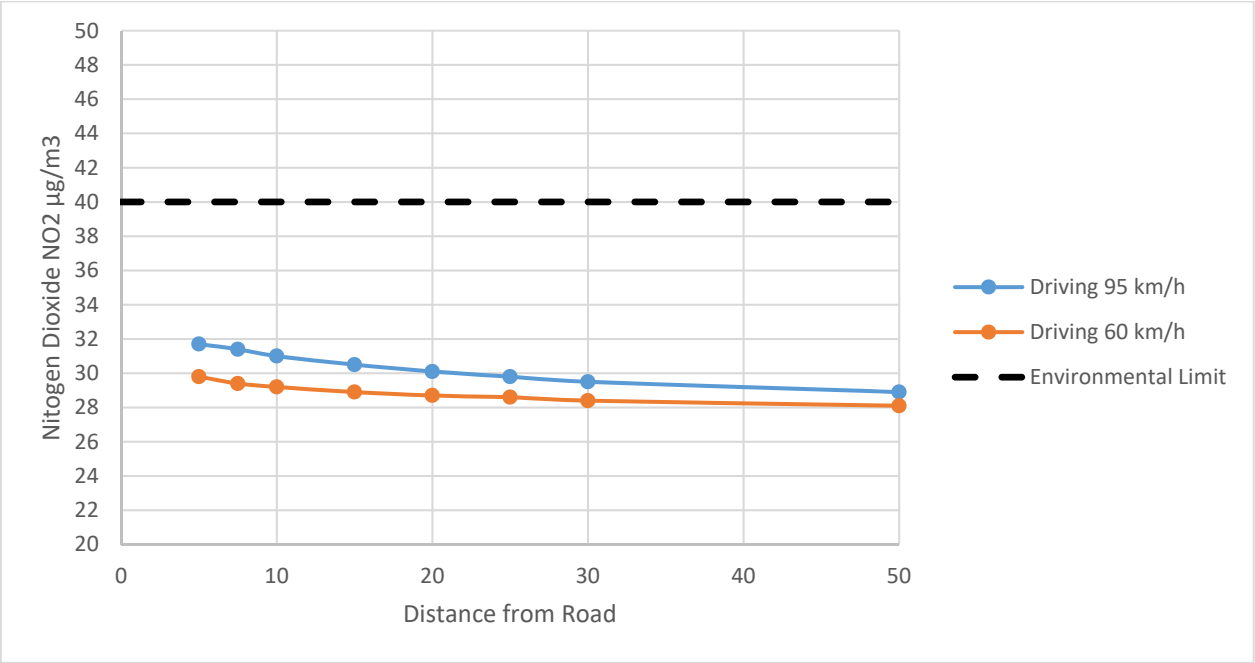

Figure 17: NO2 Concentration Predicted in the year of 2034

As shown in the above, concentration of NO2 is accepted in 2034 for both of design driving speeds.95km/h for outside of village and 60km/h inside.

Prediction of Noise during Construction

161. This section presents a summary of the results of the modelling study undertaken for noise during construction stage – detailed report presented as part of Annex M

162. The results of construction noise calculations are presented in Table 7 overleaf. The first column gives the receptor number (abbr. 'rec.') followed by, in column 2, the type of receptor e.g. shop or house (hse.), and in column 3, the floor number within the building. The location of the receptor number within the village is shown on the noise contour mapping in Appendix I of Noise Assessment Report as a supplementary volume, which should be referred to in conjunction with the Table 22.

Column 4 shows the daytime baseline noise levels LAeq,12hr (dB) for 2018 taken from the road traffic noise calculations. This level is used to calculate the noise increases for the five construction activities presented in the Table.

Details of construction noise effects are set out below for noise sensitive receptors alongside the road where it passes through the outskirts of Balykchy and the village of Tash Saray.

The levels of baseline (existing ambient) noise in each village are compared with IFC Guidelines, and for non-residential properties internal noise levels are compared with the relevant criterion for each building. This is followed by the discussion of construction noise impacts.

Balykchy

Baseline Noise Levels

On the outskirts of Balykchy existing road traffic noise levels at houses alongside the road are below the levels set out in the IFC Guidelines for the daytime period.

Construction Noise Effects

The majority of the houses on the outskirts of Balykchy (recs. 8 & 11) are set back from the road and though there will be major noise impacts, with windows closed, internal levels will be well below the threshold at which speech interference would occur. This includes potential residential areas within the Base (rec. 13). Noise levels at recs. 8 & 11will exceed IFC Guidelines by up to

15dB. There will be a major noise impact at the nearest dwelling (rec. 6) and noise levels will exceed the IFC Guideline by up to 18dB.

At the office building (rec. 10) with windows closed, internal noise levels will exceed internal noise criteria for office working when road construction is being carried out directly outside the building. Similarly, internal noise levels inside the shops and café (recs. 3,4 & 5) will also exceed internal noise criteria when work is being carried out directly outside.

Tash Saray

Baseline Noise Levels

In Tash Saray existing road traffic noise levels at the houses closest to the road to the south of the village (rec. 1) are equal to the levels set out in the IFC Guidelines during the daytime. Internal noise levels at the Mosque (rec.2) already exceed the internal noise criterion for a place of worship by c.3dB.

Construction Noise Effects

Construction of the road will give rise to major noise impacts at dwellings in Tash Saray. At the nearest house to the road (rec.1) internal noise levels resulting from construction may cause speech interference, particularly during the piling of the river embankment retaining wall and will exceed the IFC Guideline by up to c.35dB.

The use of the Mosque may also be impaired during working on the road immediately adjacent and during piling, however it may be possible to mitigate this effect by arranging work breaks to coincide with prayer times. However, in the other sections of the village, which lie between c.50-120m from the road, internal noise levels arising from the works are unlikely to interfere with normal activities.

Table 22: Results of Construction Noise Calculations

Rec. No.	Location	Floor	Baseline Noise	Activity Construction Noise Levels and Noise Increase									
				Preparation		Asphalt Breaking		Sub-base and base		Asphalt Laying		Embankment Piling	
			$L_{Aeq,12hr}$ (dB	$L_{Aeq,12hr}$ (dB)	Δ dB	$L_{Aeq,12hr}$ (dB)	Δ dB	$L_{Aeq,12hr}$ (dB)	Δ dB	$L_{Aeq,12hr}$ (dB)	Δ dB	$L_{Aeq,12hr}$ (dB	Δ dB
1	House Tash Saray	1	54.5	79.1	24.4	82.4	27.7	79.3	24.6	74.2	19.5	89.7	35.0
2	Mosque-Tash Saray	1	52.8	74.9	21.9	78.2	25.2	75.0	22.0	69.9	16.9	89.0	36.0
3	Shop	1	56.8	80.9	23.8	84.2	27.1	81.1	24.0	76.0	18.9	n/a	n/a
4	Shop	1	52.3	76.8	24.3	80.1	27.6	76.9	24.4	71.8	19.3	n/a	n/a
5	Cafe	1	54.0	75.2	20.9	78.5	24.2	75.4	21.1	70.3	16.0	n/a	n/a
6	Residential Block	1	47.2	65.7	18.3	69.0	21.6	65.9	18.5	60.8	13.4	n/a	n/a
6	Residential Block	2	51.1	69.5	18.2	72.8	21.5	69.6	18.3	64.5	13.2	n/a	n/a
7	Shop	1	55.5	79.6	23.9	82.9	27.2	79.8	24.1	74.7	19.0	n/a	n/a
8	Boundary of housing	1	45.2	66.1	20.7	69.4	24.0	66.3	20.9	61.2	15.8	n/a	n/a
9	Petrol Station	1	53.5	76.3	22.6	79.6	25.9	76.5	22.8	71.4	17.7	n/a	n/a
10	Offices	1	49.4	71.4	21.8	74.7	25.1	71.5	21.9	66.5	16.9	n/a	n/a
10	Offices	2	54.5	76.0	21.3	79.2	24.5	76.1	21.4	71.0	16.3	n/a	n/a
10	Offices	3	55.5	76.0	20.3	79.3	23.6	76.1	20.4	71.0	15.3	n/a	n/a
11	boundary of housing	1	41.7	60.4	18.5	63.7	21.8	60.6	18.7	55.5	13.6	n/a	n/a
12	Petrol Station	1	56.0	79.6	23.4	82.9	26.7	79.8	23.6	74.7	18.5	n/a	n/a
13	Base Offices/Accom	1	40.2	58.8	18.4	62.1	21.7	59.0	18.6	53.9	13.5	n/a	n/a
13	Base Offices/Accom	2	41.9	59.0	16.9	62.3	20.2	59.2	17.1	54.1	12.0	n/a	n/a
14	House-Tash Saray	1	42.4	57.1	14.5	60.3	17.7	57.2	14.6	52.1	9.5	77.3	34.7
15	House-Tash Saray	1	48.0	68.5	20.3	71.8	23.6	68.7	20.5	63.6	15.4	73.8	25.6

Prediction of Noise after Operation

163. The results of operational noise calculations are presented in Table 23 and detailed in Noise Modelling and Assessment Report presented as Annex M. The left-hand side of the Table is in a similar format to the construction noise results Table, with the first column giving the receptor number followed by, in column 2, the type of receptor e.g. shop or house (hse.) and in column 3, the floor number within the building. The location of the receptor number within the village is shown on the noise contour mapping in Appendix I which should be referred to in conjunction with the Tables.

Day and night time noise levels and changes in road traffic noise level are presented for the short term (Post Scheme 2019) and long term (Post Scheme 2034) assessments, and are presented to an accuracy of 0.1 dB

The noise contour maps give an estimate of the spatial extent of the daytime long-term noise change from the year 2019 without the scheme to 2034. The estimate is based on the assumption that there is no additional screening beyond that provided by the first row of houses, as marked on mapping, and that the existing ambient noise levels without traffic on the road i.e. noise generated during the daytime by traffic on local roads and daily activities at dwellings is 45dB LAeq,12hr in Balykchy and 35dB LAeq,12hr in Tash Saray. Note: the grid shown on the maps is at 500m spacing.

Details of operational noise effects are set out below for noise sensitive receptors alongside the road where is passes through the outskirts of Balykchy and the village of Tash Saray.

The levels of baseline (existing ambient) noise are compared with IFC Guidelines, and for non-residential properties internal noise levels are compared with the relevant criterion for each building. This is followed by the discussion of operational noise impacts.

Table 23: Results of Operational Noise Calculations

Rec. No.	Location	Floor	Noise Level (dB) Baseline		Noise Level (dB) Pre Scheme		Noise Level (dB) Post Scheme		Noise change (dB) Post-pre scheme		Noise Level (dB) Post Scheme		Noise change (dB) relative to 2019		Noise Level (dB) using 40kph		Noise change (dB) using 40kph	
			$L_{Aeq,12hr}$ 2018	$L_{Aeq,8hr}$ 2018	$L_{Aeq,12hr}$ 2019	$L_{Aeq,8hr}$ 2019	$L_{Aeq,12hr}$ 2019	$L_{Aeq,8hr}$ 2019	Δ dB 2019	Δ dB 2019	$L_{Aeq,12hr}$ 2034	$L_{Aeq,8hr}$ 2034	Δ dB 2034	Δ dB 2034	$L_{Aeq,12hr}$ 2034	$L_{Aeq,8hr}$ 2034	Δ dB 2034	Δ dB 2034
			Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
1	House Tash Saray	1	54.5	50.2	54.7	50.5	55.3	51.0	0.6	0.5	57.4	53.1	2.7	2.6	56.4	52.1	1.7	1.6
2	Mosque-Tash Saray	1	52.8	48.5	53.0	48.8	53.3	49.1	0.3	0.3	55.7	51.4	2.7	2.6	54.7	50.4	1.7	1.6
3	Shop-Balykchy	1	56.8	52.6	57.1	52.8	56.9	52.6	-0.2	-0.2	59.4	55.1	2.3	2.3	58.4	54.1	1.3	1.3
4	Shop-Balykchy	1	52.3	48.0	52.5	48.2	52.3	48.1	-0.2	-0.1	54.9	50.6	2.4	2.4	53.9	49.6	1.4	1.4
5	Cafe	1	54.0	49.8	54.3	50.0	54.1	49.8	-0.2	-0.2	56.6	52.3	2.3	2.3	55.6	51.3	1.3	1.3
6	Residential Block	1	47.2	42.9	47.4	43.2	47.3	43.0	-0.1	-0.2	49.9	45.6	2.5	2.4	48.9	44.6	1.5	1.4
6	Residential Block	2	51.1	46.8	51.3	47.1	50.9	46.7	-0.4	-0.4	53.6	49.4	2.3	2.3	52.7	48.4	1.4	1.3
7	Shop	1	55.5	51.2	55.7	51.4	55.5	51.2	-0.2	-0.2	58.1	53.8	2.4	2.4	57.1	52.8	1.4	1.4
8	Boundary of estate	1	45.2	41.0	45.4	41.2	45.4	41.1	0.0	-0.1	48.0	43.8	2.6	2.6	47.1	42.8	1.7	1.6
9	Petrol Station	1	53.5	49.2	53.7	49.4	53.4	49.1	-0.3	-0.3	56.0	51.7	2.3	2.3	55.0	50.7	1.3	1.3
10	Offices	1	49.4	45.1	49.6	45.3	49.4	45.2	-0.2	-0.1	52.1	47.8	2.5	2.5	51.1	46.8	1.5	1.5
10	Offices	2	54.5	50.2	54.7	50.5	54.5	50.2	-0.2	-0.3	57.1	52.9	2.4	2.4	56.1	51.9	1.4	1.4
10	Offices	3	55.5	51.2	55.7	51.5	55.5	51.2	-0.2	-0.3	58.0	53.8	2.3	2.3	57.0	52.8	1.3	1.3
11	boundary of state	1	41.7	37.5	41.9	37.7	41.9	37.6	0.0	-0.1	44.5	40.2	2.6	2.5	43.5	39.3	1.6	1.6
12	Petrol Station	1	56.0	51.7	56.2	51.9	56.0	51.7	-0.2	-0.2	58.5	54.3	2.3	2.4	57.5	53.3	1.3	1.4
13	Base Offices/Accom	1	40.2	35.9	40.4	36.1	40.3	36.1	-0.1	0.0	43.0	38.7	2.6	2.6	42.0	37.7	1.6	1.6
13	Base Offices/Accom	2	41.9	37.6	42.1	37.8	42.0	37.8	-0.1	0.0	44.7	40.4	2.6	2.6	43.7	39.4	1.6	1.6
14	House-Tash Saray	1	42.4	38.1	42.6	38.4	42.7	38.4	0.1	0.0	45.3	41.0	2.7	2.6	44.3	40.0	1.7	1.6
15	House-Tash Saray	1	48.0	43.8	48.2	44.0	47.8	43.5	-0.4	-0.5	50.9	46.6	2.7	2.6	49.9	45.6	1.7	1.6

Balykchy

Baseline Noise Levels

On the outskirts of Balykchy existing road traffic noise levels at houses alongside the road are below the levels set out in the IFC Guidelines for day and night time periods, with the exception of rec. 6, where they are c. 3dB above the prescribed night time levels on the upper floor. Internal noise levels at non-residential properties including the shops, café and offices are also below internal noise criteria appropriate for their usage.

Operational Noise Effects

Short term operational effects (2019)

The change in road traffic noise arising from the widening of the road from 2 to 4 lanes through the outskirts of the town will be less than 1dB and a negligible noise impact.

Long term operational effects (2034)

The intensification of road traffic, which is largely independent of the scheme, forecast to occur in the 15 year period following opening of the scheme, combined with the effect of the road widening will give rise to increases in road traffic noise of c. 2.3-2.6 dB at receptors alongside the road during both day and night time periods, which would be a negligible noise impact.

The estimated extent of the daytime noise increase is illustrated in Appendix I, Figures A1-A3.

Noise levels in the two shops, café and offices alongside the road would continue to meet their respective internal noise criterion.

Prediction of Construction Vibration

164. Table 24 is estimated for the damages to buildongs

Table 24: Minimum Distance of Rollers to Sensitive Houses not to cause Damages

Type of Vibration Roller	Type of Damage	
	Cosmetic Damage	Minor Structural Damage
No Vibration	No damage	No damage
Low Vibration	16	9
High Vibration	22	13

Based on the above table, following damages are predicted as in Table 25.

Table 25: Type of Damage Structures Suffer by High Vibration Rollers

No.	Structure	Distance from road, m	Side	Kilo-post	Damage predicted
1	House Tash Saray	25.00	L	11.670	No damage
2	Mosque-Tash Saray	28.00	L	11.680	No damage
3	Shop-Balykchy	0.00	L	0.130	Minor structural damage
4	Shop-Balykchy	10.00	R	0.050	Minor structural damage
5	Cafe	9.00	R	0.070	Minor structural damage
6	Residential Block	20.00	L	0.120	Cosmetic damage
6	Residential Block	20.00	L	0.120	Cosmetic damage
7	Shop	10.00	R	0.135	Minor structural damage
8	Boundary of housing estate	45.00	L	0.130	No damage
9	Petrol Station	22.00	R	0.700	Cosmetic damage
10	Offices	10.00	L	0.265	Minor structural damage
10	Offices	10.00	L	0.265	Minor structural damage

No.	Structure	Distance from road, m	Side	Kilo-post	Damage predicted
10	Offices	10.00	L	0.265	Minor structural damage
11	boundary of housing estate	110.00	L	0.275	Cosmetic damage
12	Petrol Station	22.00	L	1.450	Cosmetic damage
13	Base Offices/Accom	200.00	R	1.940	No damage
13	Base Offices/Accom	200.00	R	1.940	No damage
14	House-Tash Saray	90.00	L	11.665	No damage
15	House-Tash Saray	40.00	L	11.680	No damage

**Quated from table*

About 4 structures have cosmetic damage while 7 houses get minor structural damage by the use of high vibration rollers. Contours maps are attached in Vibration Assessment Report.

Prediction of Operation Vibration

165. No vibration damage is predicted after operation by passing vehicles

2. Mitigation measures

2.1. Construction phase

166. A specific environmental section shall be included within the main Bid Documents indicating that the Contractor shall be responsible for conforming to the requirements of the EMP. As such this EMP shall be included as an annex to the Contract Bid Documents.

167. Consistent with ADB's SPS 2009, the implementation of measures prioritizes on avoidance; followed by reduction; then mitigation; and finally, if all else fails, replacement of what was impacted or compensation to the impacted parties. Under the guidance of CSC, the contractor will have to submit site-specific Environmental Management Plans (SSEMP) on the basis EMP prior to commencing operations.

168. The general SSEMP, which will contain the method statement for construction, should also contain the following 13 annexes:

(i) Dust Suppression Plan
(ii) Blasting Works Management Plan
(iii) Construction Noise Management Plan
(iv) Vibration Management and Monitoring Plan
(v) Surface Water Contamination Prevention Plan
(vi) Borrow Pits Management Plan
(vii) Batching Plant/ Cement Plant Management Plan
(viii) Soil Management Plant
(ix) Solid and Liquid Waste Management Plan
(x) Cultural & historical sites Management Plan
(xi) Safety Management Plan
(xii) Camp and Workshop Management Plan
(xiii) Material Processing Plants/Equipment and Storage Facilities Plan

169. **Method Statement of Constructi**on – Contractor shall submit the construction method of statement, detailing the work process, area required and duration of the process. The typical construction process will entail:

Firstly, the closure or restriction of existing traffic at the work sites and establishment of detour road. The provision of the new detour road will entail, stripping and clearing of vegetation,

excavation, filling and leveling of the area, provision of embankment fill and necessary surfacing for the existing traffic.

Secondly, road widening will entail earthwork and breaking of rocks, which need to be hauled to some designated stockpiles. These works by themselves disturb the natural surroundings, and affect vegetation. It is important that measures for proper maintenance of the detour road be established to respond to traffic and community safety, control of dust, noise and emissions. Replanting of affected trees should be done as soon as possible and schemes for detour roads and soil stockpiles should favor tree preservations. Waterways should be respected and contamination should be prevented.

Thirdly, the bridge construction will start with the substructure such as the foundation systems and piers. This will be followed by the superstructure elements of girders, deck slab and railing. The construction of the superstructure components such as the girder and deck slab will involve installation of form works, casting of concrete and in some instances, post tensioning of tendons when necessary. The important guideline to be brought forward is the use of precast elements to minimize pouring and casting of superstructure elements over water to minimize contamination. Concrete batch plants will provide the necessary concrete for these structural elements from approved sites with operational guidelines in accordance with environmental protocols and industry standards.

Fourthly, demolition of existing pavement and bridges. This will involve scarifying old pavement structure, and earthworks to conform to design requirements. For the bridges, it will be breaking the structures at the existing connections and removal of deck and girder elements by use of heavy equipment. These old bridge components will be placed in designated areas, which will not impact the natural environment, impede traffic and cause safety concerns to the general public. The bridge abutments and underlying foundations will be excavated and removed to give way for replacement structures. This breaking, demolition and removal of old elements will generate considerable noise and dust and chunks of debris will drop into the existing waterway. To minimize the risk of water contamination, the demolition and construction activities will be highly advisable in the summer months.

Fifthly, construction of the new pavement and bridges. The pavement construction will entail embankment filling, subbase, base course and asphalt pavement layer construction. In the end the final wearing course will be laid along all throughout from the existing road, on to the approach roads, and onto the deck slab in such a manner to have smooth layer of road and bridge pavement. Embankment works will entail transport of approved fill materials from borrow pits or from cuts. The suitable materials for subbase and base course will come from quarries or borrow pits of approved properties. These pavement substructures will be engineered and compacted to desired degrees with the use of graders, and compactors in accordance with designs and specifications. The asphalt pavement layers will be provided by asphalt plants with crushed stones and rocks for the aggregate requirements. It will be the responsibility of the Contractor that asphalt plant would produce the necessary required bituminous mix in conformance to environmental requirements for asphalt plant siting and operations.

170. **Environmental specialist of CSC** inspects of Environmental Management Activity by the Contractor and submit monitoring reports quarterly and twice a year to IPIG.

171. **Committee of Grievance Redressing** shall be functioning to resolve disputes, if any, between Locals and Contractor.

172. For the Section “Balykchy (Km 0) to kilometer - post 43 (Km 43)”, the primary relevant issues consist of air and noise emissions, proper management of earthworks, waste materials and contractor’s camp management practices associated with fuel and lubricant management, work camp waste disposal, and occupation health and safety practices for the contractors’ workforce. The following is a discussion of highlights of the details provided in the EMP.

173. **Air quality** impacts may be expected to be generated by construction activities, such as, construction machinery exhausts, emissions from asphalt plants, dry exposed soils and material stock piles, dust from haul roads and construction activities, as well as aggregate crushers, but will be temporary. Sensitive receptor sites of Balykchy (km 00+000) and Tash-Saray (km 11 +

000) should be considered as areas of mitigation in terms of air quality, noise/vibration. Results of the periodic measurements can be referred to monitor the level of impacts and corrective/mitigation measures be performed when these parameters exceed their allowable limits.

To reduce emission levels of exhausted gases, together with noise and vibration as well, in general, the contractor must implement the following mitigating measures; (i) keep construction equipment in good condition (ii) prevent idling of engines by shutting off machineries not in use for more than 3 minutes (iii) prohibit use of machinery or equipment that cause excessive smoke emissions (iv) utilize low- emission type machineries and (v) install tentative noise (air pollution) barrier, if necessary.

To minimize dust, the contractor shall develop a Dust Suppression Plan and have it approved by the CSC. The Program will ensure:

- Unpaved haul routes leading to settlements are water-sprayed regularly to suppress dust.
- Trucks hauling earth/materials be covered when transporting materials, especially through settlements.
- Spraying water over hauling route, stock pile, borrow pit
- Introduction of low pollutant emission equipment, attached with proper muffler attached and regular maintenance
- Installation of barrier after monitoring if necessary
- Air quality measurements at receptor sites (primarily those specified in the baseline measurements) are done as prescribed in the Environmental Monitoring Plan.

174. **Material Transport Route** shall be planned properly incorporating Dust Suppression Plan. Estimates from the preliminary design for the section show those 668,000 cubic meters will be the cut volume and 135,600 cubic meters for fill volume for the road section. Truck traffic will considerably impact local roads as well as the communities they traverse. Haul routes should be planned with CSC in coordination with IPIG and local authorities, providing sufficient maintenance to minimize dust, noise generation and disturbance to residents by restricting the hauling time between 07:00 and 18:00.

175. **Blasting**- This paragraph deals with security measures for blasting operations. During the construction period, additional geological surveys will be conducted at the sites to avoid the use of blasting. Blasting Work Management Plan shall be prepared considering following:

Blasting work can have a negative impact on water body. Possible blasting works will be on the km 40 - 41 km. At the km 40 along the road is Chu River flows into the Orto-Tokoy reservoir. Water body is polluted with soils, dust, remnants of the rocky rocks, the surface layer of soil, vegetation; these contaminants can cause siltation of the water body, and the deterioration of water quality.

To prevent negative impacts from blasting works is necessary to protect water bodies with wooden boards (5m x 5m) mounted on poles. Use methods of drilling and blasting works (drilling small blast hole), such as the trace is small charges to prevent the explosion of a large expansion of the rock material, as well as its layered explosion in small amounts and remove.

Blasting operations in the fishery waters and river bank zones are permitted only in extreme cases where the performance of work by other means is impossible. This decision should be taken on the basis of the calculation of the dangerous explosion wave radius for fish or seismic zone actions in the explosions on the river banks. It should also include measures for screening in order to reduce the impact of the blast wave and the protection of fish fauna.

Blasting work is carried out in strict accordance with the Regulation on the procedure of consideration and issuance of industrial security authorization documents, No.301 dtd. 30.05.2013, for conduct of blasting. Before start the work, install and shield signs of the danger zone boundaries, which at the time of the explosions will be encircled with posts. The approximate radius is 450-500 m zone, adapted by calculation or Regulation. When the depth of wells is more than 10 m duplication of electric explosive network is required. Location of pits, wells, and cameras are applied to the executive plan of the explosive field. Militants (detonating

cartridges) set in the charges in final form. Blasting operations are carried out in a fixed time, as well as well-audible signals (ready, fire, rebound), which all should be well known. Explosives (explosives) are stored in special warehouses protected separately from explosives (NE). Installation of shields near power lines is obligatory mitigation measure during blasting works.

During blasting works, the following substances will be emitted into the atmosphere: Inorganic dust: 70-20% SiO_2, Carbon monoxide, Nitrogen (II) oxide, Nitrogen (IV) oxide. When blasting operations, emissions are considered as the burst release and are subject for calculation and counting to compare with maximum permissible emissions. Table 26 present the locations possible blasting area together with monitoring proposed.

Considering that the proposed blasting areas are located along the Chu River, it is necessary to provide the prevention of fragmentations during the blasting operations.

One way is a shelter made in the form of loose rocks laid between the shield and the surface of the exploded area.

This shelter is effective only when the vertical objects are destroyed.

The purpose of the invention is to increase the reliability of the method for preventing the scattering of pieces.

This is achieved by the fact that a cover of loose rocks is placed on the exploded surface on which the grid is previously laid.

During the blasting, a metal woven mesh detains the bulk of rock fragments, and small fragments are delayed by a layer of loading that practically does not scatter, but only swells.

The proposed shelter will reduce the fragmentation of rock fragments during the explosion by 2-3 times, and will shorten the time for conducting blasting operations 5-6 times.

Table 26: Possible Blasting Areas

No	Blasting sides	Monitoring
19 km +500	There is a narrowing of the road up to 12 m wide, at this point the Rockies, are likely to be carried out blasting, it is required to consider prevention of fragmentation of species during the blasting operations, as well as the development of hydraulic hammer.	Turbidity, Oil Products, pH, DO, TSS, Ec
41 km	The road narrows between mountains, it is necessary to excavate them with hydro hammer, as well as consider prevention of fragmentation of species during the blasting operations.	

In the area of road widening, horizontal wells will be drilled and explode by using explosive substance - ammonite 6 ZhV-90mm.

In order to reduce the environmental impact of blasting works, it is necessary to provide mitigation measures. The main measures are hydro-dust suppression and conduct of blasting works for breaking of rocks in small volumes stratified (top to bottom) horizontal blasting hole charges in small diameter with a preliminary pre-splitting along the contour of the explosive volume. Installation of shields near power lines is obligatory mitigation measure during blasting works.

During conduct of blasting works, information boards on blasting works at km 41-42 have to be installed on km 0 and 43. Traffic will be diverted through the Kuvaky pass by using existing route Bishkek - Issyk-Kul and Bishkek-Naryn.

Types and time of blasting works should be agreed with the General Directorate of Biosphere Reserve.

176. **Noise** effects arising from construction of road schemes are transient and it is not normal practice to provide mitigation in the form of barriers. Recommendation in Noise Modelling and Assessment Report for Section 1 in 2018 (Annex N) shall be followed.

Good communication with affected communities is often the most effective way to manage potential construction noise effects. Therefore, the Contractor should keep local residents

informed of the progress of the works, including when and where the noisiest activities will be taking place and how long they are expected to last. All noise complaints should be effectively recorded, investigated and addressed. Account should be taken of the needs of residents in choice of working hours and where possible these should be chosen to:

- Avoid night time and weekend working;
- Avoid working near mosques during prayer time; and to
- Carry out works near schools during holiday periods

In addition, the Contractor should consider general good working practices including the following which are particularly relevant to road construction:

- Modern, silenced and well-maintained plant and construction equipment should be used;
- All vehicles and plant should be fitted with effective exhaust silencers which should be maintained in good and efficient working order.
- Fitted acoustic covers should be kept in a good state of repair and should be kept closed when plant is in use.
- vehicles should not wait or queue on the road with engines running and plant in intermittent use should be shut down when not in use or where this is impracticable, throttled down to a minimum.
- If a site compound, or materials storage area is to be used, both it and any static plant within it should be sited as far as is practicable from noise sensitive buildings.
- Where activities, including delivery of material to site, cannot take place during normal working hours they should be carried out as close to normal working hours as is reasonably practicable.
- Concrete mixers should not be cleaned by hammering the drums.
- When handling materials, care should be taken not to drop materials from excessive heights.

177. **Prevention of Vibration Damage**- A vibration study has been undertaken to ascertain the level of impact vibration can occur to the nearest receptors (i.e. houses and structures). This section presents a summary of the mitigation measures and the detailed Vibration Modelling and Assessment Report for Section 1 is presented as Annex N.

Damages caused by vibration roller include (1) minor structural damage and (2) cosmetic damage, both of which, depending on the distance from the source of vibration, nearer to the vibrating roller, more severe the damages are.

As a result of the study the following options to mitigate vibration effects are being proposed as shown in Table 27. IPIG will work with the Engineer and design team to know which options from the below to take forward. In case Options 2 and 3 are taken forward, a Vibration Management and Monitoring Plan must be prepared by the Contractor and approved by IPIG.

Table 27: Options of Mitigation Measures for Vibration

OPTION 1	No Vibration
OPTION 2	OPTION 3
• Areas with houses within a 9m corridor – use of rollers with no vibration • Areas with houses between 9m and 22m corridor : o use of rollers with minimum vibration o use of ditches to reduce vibration at the houses o monitoring at the houses to ensure vibration at the houses does not go over 3mm/s. If vibration exceeds 3mm/s work to stop and continue with no vibration • Areas with houses at a distance of more than 22m: o Use of high vibration o use of ditches to reduce vibration at the houses o monitoring at the houses to ensure vibration at the houses does not go over 3mm/s. If vibration exceeds 3mm/s work to stop and continue with no vibration • Areas with sensitive archaeological/ ancient monuments within a 22m corridor – use of rollers with no vibration. When areas with sensitive archaeological/ ancient monuments are over 22m and low vibration is used, monitor at the monuments and ensure vibration does not exceed 2mm/s	• Areas with houses within a 16m corridor – use of rollers with no vibration • Areas with houses between 16m and 36m corridor : o use of rollers with minimum vibration o no ditches o monitoring at the houses to ensure vibration at the houses does not go over 3mm/s. If vibration exceeds 3mm/s work to stop and continue with no vibration • Areas with houses at a distance of more than 36m: o use of high vibration o no ditches o monitoring at the houses to ensure vibration at the houses does not go over 3mm/s. If vibration exceeds 3mm/s work to stop and continue with no vibration • Areas with sensitive archaeological/ ancient monuments within a 22m corridor – use of rollers with no vibration. When areas with sensitive archaeological/ ancient monuments are over 22m and low vibration is used, monitor at the monuments and ensure vibration does not exceed 2mm/s

178. **Surface Water Contamination Prevention Plan** – Surface Water Contamination Prevention Plan shall be prepared. Several types of waterways are found to be crossed by the project road or flows along the road. These are either man-made such as irrigation canals and flood control ditches, as well as naturally occurring rivers. Discussion with controllers and users of lake and river is required before construction.

To mitigate negative impacts on the waterways, the following must be implemented: (i) store stockpiles of topsoil and other such materials at a safe distance from surface waters; (ii) long term stockpiles must be covered with grass or other suitable coverings; (iii) create settlement ponds where construction activities are near natural waterways. Construction work shall be concentrated in dry season when there is no water flow.

Unsustainable construction practices such as improper handling and storage of construction materials (e.g., concrete, asphalt, lubricants, fuels, and solvents etc.) can pose risk of contaminating the waterways crossed by the project road. Embankments and construction materials like fill, sand and gravel can be washed out by rainwater into watercourses during downpours. Oil and grease from leaks in engines can also accumulate in surface waters and should be properly controlled. To prevent these, appropriate mitigation measures must be taken such as (i) regular maintenance of all construction equipment, (ii) chemicals and oil must be properly stored into impermeable and bounded areas away from surface waters.

Within the section, the critical spot is the Chu River. The Contractor should be extra careful in these spots as construction activities can directly contaminate the surface water and consequently affect the biological species in these areas. Contamination should be avoided and disturbance to biota be minimized. Water quality measurements should be done during actual periods of construction at these sites.

179. The roads within the water protection zones should include the collection of mud water from the roadway surface with its subsequent treatment or sewage to eliminate the pollution of water

sources. The quality of discharges into water bodies must meet the established requirements. In the water protection zones of rivers. It prohibits contamination of the earth surface, including the garbage dump, waste production, as well as parking cleaning and repair of motor vehicles and road construction machinery, fueling. All works in water protection zone must be carried out based of permission from local authorities.

180. **Bridge**- During the construction of bridges, dimensions of construction site shall be the minimum necessary. It should be placed at levels that minimize flooding as much possible. The discharge of polluted water, landfills, parking cars and the construction of temporary facilities shall be located not within the water protection zones (not less than 150m) on the banks of rivers. On construction sites should provide capacity for the collection of sewage and garbage. At the time of culvert construction, consultation with the users of the irrigation system will be undertaken.

181. The project documentation should include the restoration work after the construction of the bridge: the removal of the bed of the river banks, backfilled during the construction of supporting structures; cleaning of the river bed and the flood plain from cluttering their objects, extracting and hauling piles of scaffolding and temporary supports; dismantling of temporary facilities on the construction site and land reclamation, including borrow area and access roads.

The contractor shall submit a method statement or plan for the execution of bridge construction works including measures that will be undertaken to address adverse environmental impacts such as erosion of river embankment and siltation of watercourses that may result from such activities. The plan shall be submitted to the Construction Supervision and IPIG, which include: (i) installing of water diversion structures upslope for reducing gully erosion, (ii) installation of retention structures (e.g. shallow basins) during construction activities near river for capturing of sediments, and (iii) the watering of stockpiles during dry season to avoid wind erosion.

182. **Borrow Areas** - It is noted to open a new borrow pit inside Issyk-Kul Biosphere Reserve is not allowed. Nevertheless, when planning to open a new borrow site outside the reserve, the contractor, within the purview of this IEE, should have the extraction permit, approval of a development plan, including borrow pit restoration plan. The Contractor shall obtain all required permits for use of borrow pits and disposal areas from local authorities, get approval from regional departments of SAEPF under the Government of KR, prepare a “Borrow Pits Development and Restoration Plan” and submit all necessary documents to MOTR of KR to obtain a license to extract aggregate materials from the State Agency for Geology and Mineral Resources. These requirements do not apply to existing borrow areas or aggregated facilities. When using private borrow pit, all permits (licenses, approvals from local authorities, regional departments of SAEPF under the Government of KR, etc.) are responsibility of the owner of borrow pit which should be indicated in the agreements signed between the contractor and the borrow pit owner. The contractor will need to prepare a site development plan which must provide the following information:

- capacity and operation hours of a borrow pit;
- development and extraction sequence of borrow pit;
- technique and mechanisms for stripping and excavation operations;
- operation and time schedule for borrow pit development;
- extraction method and transport plan, including route(s);
- safety rules and hours of operation;
- expected quality of extracted materials;
- topsoil storage/protection and environment protection steps; and,
- rehabilitation of disturbed lands when site is decommissioned.
- calculation of mobile sources’ emission charge.

183. **Soil Management Plan** shall be prepared, detailing measures to be undertaken to minimize effects of wind and water erosion on stockpiles, measures to minimize loss of fertility of topsoil, timeframes, haul routes and disposal site. Excavation or cuts of soil materials along will require temporary or permanent areas for deposition. This should be done with proper arrangement with the land owner on which the excess soil will have to be deposited. Permanent spoil soil deposit areas should be coordinated with local officials and proper permit obtained accordingly. During site clearing and stripping, topsoil storage area should also be identified. Mostly the

roadside corridor is frequently used as temporary storage areas. These stockpile soil should be protected against erosion. This will be done by, for example, seeding the stockpiles with fast growing shallow root grasses. To ensure proper management, the contractor will submit a soil management checklist prior to commencing operation. This checklist will include a simple listing of measures for minimizing water and wind erosion losses. As long as topsoil stockpiles remain unused, the seeded grass cover will remain in place.

184. **Solid and Liquid Management Pla**n - For treatment of solid construction waste such as hacked concrete debris and liquid waste such as excavated mud, the Contractor shall establish solid and liquid wastes management plan covering provision of garbage bins, regular collection and disposal in a hygienic manner, as well as proposed disposal sites for various types of wastes (e.g., domestic waste, used tires, etc.) consistent with appropriate local and national regulations.

185. **Cultural & Historical Site Management Plan** shall be prepared. No vibration roller shall be employed at least within 22m from Archaeologically important objects. Recommendation of Archaeological Survey and Assessment Report and Proposed Plan for Section 1 (see Annex O) shall be followed.

186. During construction, the contractor must apply in writing to the MoCIT KR and local authorities' identifying the protection zones around these sites. Also, Contractor should employ techniques during construction works (vibration) with minimal or no impact to any cultural, historical or archeological structures along the road. Physical cordon around identified sites should be installed to minimize construction impact and alert workers/people from disturbing cultural and historical sites. Before starting the work, the Contractor together with the consultant will mark the guard zone (the boundaries of the protected area) by installing a belt guard and, if necessary, establish appropriate warning signs.

The Contractor should issue strict instructions to his workers against disturbance at this site. In case of any chance finds or suspected artifacts discovered during construction, the Contractor should immediately notify the Engineer (CSC) for further protective actions.

In accordance with the Law "On protection and use of historical and cultural heritage" if in the construction period cultural and historical monuments will found, Contractor must stop all construction works and report the findings to the local executive authorities or any other competent organization (Institute of History and Cultural Heritage, National Academy of Sciences; Department of History, Kyrgyz National University after Balasagyn), MoCIT KR.

187. **Fauna and Flora** – Contractor shall follow:

- A maximum fill up of the tree stem area of 30 cm can be accepted. Fill up material in the tree stem area has to be organic soil.
- A filling up of more than 30 cm will damage the tree. In this case cutting can't be prevented and a new tree is to be planted as a compensation measure at the respective location within the existing RoW.
- Species to be planted are walnuts, maple ash tree, elm tree, white poplars, white willow, white acacia.
- Plantings shall be conducted after technical works have been completed. Planting time shall be restricted to spring (March till April) and/or autumn (September till October).
- Implementation of a temporary vegetation protection fence during construction activities.
- Training of workers is required on the importance of the biosphere territory "Issyk-Kul", on prohibition and responsibility for poaching, preventive measures for biodiversity conservation in the given territory. Include in the monitoring plan monitoring of species that are on the verge of extinction

188. **Safety Plan** for workers and local people. The Contractor shall develop a Safety Management Plan including:

- **Traffic safety program** for especially around the sensitive receptors by installing necessary safety measures specified in the design or in the Technical Specifications to ensure that community and traffic safety issues during the construction phase of the Project, including incorporation of: (i) Safety barriers; (ii) Traffic signs; (iii) Road crossings; (iv) Speed bumps;

(v) Speed limits; and Flagman when necessary. Social impacts along the vicinity of the road during construction includes, such as impairment of the usual access, community health and safety concerns, plus socio-economic conflicts. If any traffic re-routing needs to be done, sufficient advisory and notification should be provided to the people and motorists. Dust impacts and noise nuisances should be minimized during construction. Protective barriers and fencing should be provided to prevent people and animals from loitering at the project site for safety purposes. During the construction phase, it may be inevitable that existing traffic will be disrupted and local accessibility will be impaired, which can cause problems with the local community. To mitigate this situation the Contractor should: (1) Submit a traffic management plan to local traffic authorities prior to mobilization; (2) Provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions; (3) Allow for adequate traffic flow around construction areas; (4) Provide adequate signalization, appropriate lighting, well-designed traffic safety signs, barriers and flag persons for traffic control; and (5) Provide temporary access where accessibility is temporarily restricted due to civil works.

- **Occupational Safety Program**. For safety protection of workers and adjacent communities, the following shall be provided: (i) Adequate health care facilities (including first aid facilities) within construction sites with a nurse shall be stationed while a doctor who shall visit regularly and when necessary.; (ii) Training of all construction workers in basic sanitation and health care issues, general health and safety matters, and on the specific hazards of their work; (iii) Personal protection equipment for workers, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection in accordance with KR legislation; (iv) Clean drinking water to all workers; (v) Adequate protection to the general public, including safety barriers and marking of hazardous areas; (vi) Safe access across the construction site to people whose settlements and access are temporarily severed by road construction; (vii) Adequate drainage throughout the camps so that stagnant water bodies and puddles do not form; (viii) Sanitary latrines and garbage bins in construction site, which will be cleared when reaching capacity by the contractors to prevent outbreak of diseases.
- During blasting, Contractor shall properly control the traffic so that no injury or death is caused.

189. **Maintenance of Access during Construction** – Construction of bridges and culverts over water necessitates detour roads to be temporarily arranged. In so doing, normal traffic will be impaired and cause access issues to motorists. In addition, these detour roads need to be maintained for connectivity and safety purposes. Traffic plan incorporating these detour roads should be formulated by the contractor and shall be included in Safety Management Plan.

190. **Asphalt, Concrete and Crushing Plant Pollution** -Material Processing Plants and Storage Facilities Plan shall be prepared.

During the selection of a site for bitumen plant, concrete plant, stone crusher equipment, which emit pollutants, noise and transmits vibrations, the contractor will need to comply with SanPiN 2.2.1/2.1.1 and SanPiN 2.2.1/2.1.1.006-03, and establish a specific buffer zone around any such facility. These facilities must also be proposed outside the core/ buffer/ transitional protection zones of the biosphere protected area. In the KR this is referred to as a sanitary-hygienic zone, and is a mandatory element of any facility that affects habitats and human health. The sanitary-protection zone (SPZ) separates the area of an industrial site from residential areas, landscape and recreation areas, parks, and health resorts with mandatory demarcation of boundaries by using specialized information signs.

The boundaries are as follows:
Class II – SPZ 500m.
- ✓ Production of asphalt-concrete at fixed plants.
- ✓ Production of asphalt-concrete at mobile plants.

Class III – SPZ 300m.
- ✓ Production of crushed stone, gravel and sand, milling of quartz sand.

Class III – SPZ 300m.
- ✓ Borrow pits of gravel, sand, and clay.
- ✓ Bitumen plants

Class IV – SPZ 100m.

- ✓ Concrete solution plants.

191. **Camp and Workshop Management Plan**. Garbage and sewage and solid and liquid waste from equipment maintenance can be serious pollutants and disease vectors. The contractor will therefore need to practice good worksite and construction camp management.

Where feasible, the contractor will arrange the temporary integration of waste collection from work sites into existing waste collection systems and disposal facilities of nearby communities. This shall be taken into consideration when deciding the place for the camp. The contractor will arrange for extra payment if community services are to be used.

It is required to provide an Environmental and Safety Officer (ESO), under which a Environmental Officer (EO) and a Safety Officer (SO) also be provided. Their roles are to provide environmental and safety training to the employees and surrounding residents according to the requirements of the individual work place. Prior to the commencement of works, the work site personnel shall be instructed about safety rules for the handling and storage of hazardous substances (fuel, oil, lubricants, bitumen, paint etc.) and also the cleaning of the equipment. In preparation of this the contractor shall establish a short list of materials to be used (by quality and quantity) and provide a rough concept explaining the training / briefing that shall be provided for the construction personnel. The contractor shall provide information to workers, encouraging changes in individual's personal behavior and encouraging the use of preventive measures. The goal of the information is to reduce the risk of HIV / STD transmission among construction workers, camp support staff and local communities.

Inspections by the CSC environmental specialist will take place monthly and any no compliance issues such as strewn garbage, open waste pits, oil soaked ground and unsanitary washing facilities for workers, the contractor will be subject to an immediate fine and a stop-work order will be issued if cleanup is not underway within 12 hours of detection. If the contractor does not act, the CSC will retain an outside firm to clean up the area and this amount will be deducted from the contract total.

In addition, the contractor is obliged to comply with ADB's requirements for providing "good" living conditions for its workers. Also, the contractor must strive to improve and maintain the living conditions of its employees and strive to adhere to the International Standards in the framework of its contract.

192. **Utilization of Waste Asphalt-Concrete Temporary Storage and Processing Areas** - Old asphalt pavement will be removed and be replaced in the new pavement. Storage or stockpile areas of old asphalt should be situated where they pose no risk of contamination to the environment. In coordination with local authorities, location of old asphalt stockpile areas will be identified, with a minimal distance of 500m from any settlement. Preferably, storage areas should be in state-owned land. If private lands will be used, a negotiated rent on the property should be established with the land owner. All temporary asphalt pavement storage and processing areas shall be agreed upon with the regional departments of SAEPF under the Government of KR. Old asphalt should be trucked away in blocks and stockpiles should be no higher than 2.5 m.

Using old asphalt – The hacked old asphalt waste shall be transferred to Local RMU of MoTR tentatively. Then the old asphalt is used to strengthen the surface of existing second road in the villages. The top coating of the shoulders with the addition of gravel-sand mixture with 15 cm thickness is recommended.

193. Disturbance of agricultural lands can occur when trucks and equipment roll over them during construction activities. During construction, it can occur that equipment and trucks may maneuver over agricultural lands and, in doing so, these areas may be excessively compacted and render the soil unfit for agriculture. The Contractor should prevent these unnecessary disturbances on agricultural lands.

194. When passing over bridge/culvert, axis load of vehicles shall be ensured, not to exceed endurable load of the structure.

2.2. Operations and Maintenance phase

195. After the Handing-Over to the Client of the given road section, a one-year defects liability period ensues, in which the Contractor will still be responsible in remedying any deficiency or flaws in the overall works. After which the Operation and Maintenance Phase follow, in which the Client takes over with full responsibility for the operations and maintenance of the road. Impacts on the environment shall be on the usage of the road by vehicular traffic and subsequent maintenance activities to retain the service level of the infrastructure.

196. The projected service life of the road is 15 years and over this operations period, the impacts related to traffic on the environment are rather viewed as cumulative on account of the functions of the road components and can be in conjunction with other activities. Time-wise these impacts can also be long-term as they may manifest after construction and continue to persist for the entire usage and operation of the road. The perceived impacts and corresponding mitigation measures during the operation of the road will be on:

197. **Air Quality**- After computations, the maximum traffic can be around 160 vehicles hourly in day time in 2034 caused by such number of vehicles are negligible as shown in Table 18. In future will come the elimination of older more polluting vehicles from the fleet, fewer stops and starts due to better road conditions and traffic management, better engine technology and vastly more fuel efficient vehicles. Further, KR will receive better refined fuels with lower emission factors per liter used.

198. **Road Safety-** A high graded road, properly signed, with good lane markings and careful intersection management, will allow the traffic to move more smoothly thus reducing the high emission due to frequent acceleration and deceleration. Road safety features such as, streetlights, traffic lights pedestrian crossings, livestock crossings and other visual means to reduce accidents will be installed along the road.

199. **Noise** - In operation period, level of noise and vibration impact shall depend on road traffic intensity, road pavement quality and distance to the receptors. Traffic noise estimated with driving velocity of even 60 km/h in the year 2034 is exceeding the allowable limit. However the increase is less than 3 dB from 2018 and the noise impact is considered as no significant.

200. **Vibration** at Operation Stage by vehicles is negligible and no mitigation measure is required.

201. **Soils and erosion control.** If the contractor properly implements the measures defined in the EMP for the construction period and CSC's environmental specialist completes a post-construction safeguards audit of to confirm all mitigative measures were implemented and remain operational, soils and erosion issues associated with the road should be negligible. Confirming that topsoil and planting were put in place as the work was being completed (not after the construction is completed) the tree planting was done and trees are healthy and being maintained will be essential.

202. **Culverts** need to be inspected to ensure that all debris and construction materials have been removed and any stream diversion structures have been completely removed. To that end, the CSC and IPIG will prepare a culvert inventory that will provide a photo of each culvert and its condition during each inspection, which should be annually and submitted to MoTR of KR. Two photos will be required, one at the upstream and a second at downstream end of each culvert.

    MoTR will assign that this work will be entrusted to the contractor during the one-year warranty period, after road becomes fully operational; and after that period, taken over by MoTR's maintenance unit.

203. **Ecological Environment**. The local ecosystem might have been slightly altered by the cutting of the trees and therefore the replanting and tree maintenance program, until the trees are at least 9-10 years old, will be observed to reestablishing the pre-cutting conditions of roadside shade during the summer and windbreaks during the winter. Estimated number of trees for cut is 30, the planned number of trees for planting is 60.

Given that trees not only provide shade in the summer and serve as windbreaks in the winter, but also recycle thousands of tons of CO2 during photosynthesis.

It is necessary to monitor and control of the planted trees, both during construction and during operation. Monitoring of flora and fauna is conducted by the General Directorate of Biosphere territory of Issyk-Kul in the framework of their activities.

204. **Livestock and Pedestrian Crossings**– Since the road section traverses residential areas, farmlands and pasture grounds, the need to provide pedestrian and livestock crossing becomes important. Category II Road allows design speed of 95 km/hour in outside settlement and 60 km/h in settlement area for vehicular traffic, such that crossing people (especially children) and livestock (sheep, cattle, horses, etc.) pose real danger. Also, on the road need to install the road sign indicating the places of transition of people and livestock. The crossing of people in the residential areas will be installed through every 200-250 m.

2.3 Climate Change Impacts on the Project Road

205. In the F/S IEE, a Climate Change Study of the Project Road was included as a separate sector. This study focused on the following impacts to the project road:

- River floods and water logging in spring, due to more intense rainfall. This will mainly affect lower altitude areas susceptible to flooding;
- Heat stress in the summer, especially at lower altitudes;
- Mudslides related to more intense rainfall in the spring at medium altitudes (and in a lesser degree also high altitudes);
- Flush floods in the summer especially at higher altitudes, related to higher temperatures together with the increase in winter, spring and autumn rainfall (snow at higher altitudes).
- Possible mitigation measures are just taken precaution and immediate announcement of disasters to the residents and drivers.

The study made, reference to the climate simulations done by the International Fund for Agricultural Development (IFAD) for Kyrgyzstan, indicated that the “Balykchy (Km 0) to kilometer - post 43 (Km 43)” located at an area with low or very low vulnerability risk as compared with the north of Chu Oblast and other high altitude areas. Moreover, as per IFAD, the vulnerabilities identified are mainly related to increased heat stress at the project sections with low altitudes and mudslides at medium altitudes. Very limited information on the occurrence of extreme rainfall was found, but with relation to emergency situations, there is a tendency of reduction of rainstorm frequencies.

The hazards related to flooding have been studied using UNEP’s Global Risk Data Platform which entails hazards modeling was developed by the World Meteorological Organization (WMO) and the United Nations Education and Scientific Cultural Organization (UNESCO). As per data in the Platform, the flood hazard will increase along major rivers in the Central Asia region, but Kyrgyzstan and the project area is less influenced by this than the neighboring countries. The project area is located in areas of low risk, whereas the risk increases at higher altitudes.

The values of seasonal temperature changes by year 2100 anticipate a greater increase of summer temperature in comparison to other seasons, and the minimum increase is predicted for the winter period. On the positive side, warmer winters due to climate change can alleviate the clearing snow; which would mean less maintenance cost during the winter months.

F. Analysis of Alternatives

206. In this section were considered two alternatives:

1. Zero option – the «Inaction»/ do nothing alternative
2. The road reconstruction project

1. Zero option – the «Inaction»/ do nothing alternative

207. Within the framework of ADB's SPS 2009, an important consideration the alternative "Zero option" is being devoted on. The alternative "Zero option" presents case scenario in which the project is not to be done at all. By comparative evaluation, it can be inferred whether the project is necessary at all or provide some insights on how to properly proceed should the project be fully implemented.

208. Atmospheric air. The existing road surface does not meet the requirements of III road category. In some places, there is no "cold asphalt" road pavement. Due to unevenness of the road, vehicle engines run unevenly by releasing large amount of exhaust gases. Dust formation is most likely to happen on places where there is gravel surface, which also affects atmosphere.

209. Noise and vibration. Noise and vibration are a major factor of concern people day and night. Lack of coverage of the road, spreading the sound waves at great distances from the road creating a high noise and vibration impact on the population at night and in the daytime. The most sensitive recipients are residents of nearby houses to the road and other private facilities.

210. Surface water. In places, where the road crosses channels and bridges, may observe destruction of given structures and erosion of banks. In case of accidental destruction of some culverts and erosion of banks, we may observe pollution of water body. Runoff from the road surface flows to channel and river by causing water bodies' pollution with oil products and oils. This impact will be expressed in possible soil contamination with oil products, oils and waste.

211. Soil. Impact on soil is expressed in soil disturbance due to destruction of roadbed and going of vehicles beyond the right of way on nearby areas. Erosion due to concentration of water flows by artificial structures, ditches and channels. Soil and water might be contaminated by oils, gasoline of vehicles.

212. Flora and fauna. Impact on flora and fauna will be negligible, as the road is existing road and has already caused anthropogenic impact.

213. LARP and social issues. Economic relocation and resettlement is not applicable. Social aspect is expressed in violation of communication routes of local residents, increase in time spent on the road to places of work and leisure. Poor traffic conditions for agricultural machinery, animal-drawn transport, cyclists and cattle driving. High accident risk might be created on the road and intersections with other roads. Moving vehicle causes vibration of buildings and structures. Dust pollution and gas contamination.

214. Safety. The road is not equipped with traffic indicators, signs, markings, which create prerequisites for accidents among population and vehicles crash. Violation of speed limits results in collisions and runs over people, animals and vehicles. There is no established road crossing places for people and cattle

215. If zero option is implemented, the negative side is increased noise and vibration, lack of proper road pavement, negative social aspect, and impossibility to develop the region's economy.

2. Alternative - the road reconstruction

216. This Alternative is considering the reconstruction existing road of the section Balykchy (Km 0) to kilometer - post 43 (Km 43). The Road section from Balykchy (Km 0) to kilometer - post 43 will be reconstructed and the total distance will be 43 km. Main specifications of the projected road are given in Section C the Project description.

217. During the pre-construction stage, reconstruction of the road will not have any environmental and social impacts. This period, the work will be associated with the design and proper planning of works, as well as informing the public and other stakeholders about the proposed work.

218. During the construction period, atmosphere air will be affected by vehicles, operation of road equipment and machinery, excavation and undermining of mountain areas' soil, sandy gravel, crushed stone and operation of asphalt mixing plant. The impact will be provided by pollutant emissions from the operation of machinery and mechanisms, the formation of dust.

219. The impact will be exerted on the water bodies (irrigation channels, Chu River) from operation of the machinery, construction camps, and possible contamination of water by oil and oil products, soil, residues of construction and household waste products.

220. Impact on soil and land resources expressed by extraction of soil, ground, temporary diversion of land, and contamination by oil products, construction and household waste, disturbance of topsoil by its misuse and stockpiling.

221. The impact on the historical and cultural heritage will be expressed in the physical impact (vibration and possible infringement of workers) to the cemetery and burial ground which located on the 35-50m from the road.

222. During the operation, the main impact will be on air, physical factors as noise and vibration will have an impact, especially in the settlement and industrial zone.

223. More detailed analysis of the alternatives of the environmental and social impacts is given in Section E the Environmental Impacts and Mitigation Measures.

224. Given that the reconstruction of the road will be carried out on the existing road and the environment has formed anthropogenic ecosystem, it can be concluded that the impact of the projected road on the environment will be insignificant, but in social terms the impact will be positive.

G. Information Disclosure, Consultation, and Participation

225. Formal and informal public consultations were done for the project during the study period. During the site visits some informal discussions were done with the villagers and some village heads as field information were being gathered. The IPIG organized a formal public consultation was arranged with the district heads to invite people of affected villages to present and discuss with them environmental and social issues relevant to the rehabilitation of the road.

1. Public Consultations and Participation

226. For Balykchy (Km 0) to kilometer-post 43 (Km 43), in accordance with ADB's Public Communications Policy (2011) and SPS (2009), Public Consultation meeting on the environmental aspects was undertaken on 17 March 2016 in Balykchy (Figure 18). This was organized by the IPIG-MoTR through official communication to the local leaders inviting stakeholders in the surrounding villages.

227. During the public consultation, the Consultant (Kocks Consult, GmbH), prepared PowerPoint presentation regarding the technical features of the project and explained the potential environmental and social impacts with corresponding mitigation measures. This event was organized by IPIG-MoTR representatives. The representatives of the MoTR-IPIG answered questions and clarify any issues that were raised. In addition, the participants also were provided a sheet of paper on which the can write their questions and comments. Printed hand-outs of the presentation were prepared and distributed to the people for their information and as a way of disseminating the environmental concerns of the project to the general public. Figure 18 is a photo of the public consultation.

Figure 18: Public Consultation in Balykchy (17 March 2016)

228. The questions raised verbally during the forum were responded right away. As mentioned above, the people who attended were provided with a sheet of paper on which to write their questions and comments on the project. The recorded questions and corresponding responses by the IPIG-MoTR were captured in a video with the transcript shown in Annexes C and D. The verbal and written comments and questions that were raised were compiled and presented as follows and in Table 28:

Table 28: Questions of Participants, 17.03.2016. PC Meeting Summary

Questions	Answers
Where will asphalt concrete mixing plant be located?	They will be located far from settlement areas. This issue will be known when the Contractor will be identified.
Type and place of origin of planting material	This issue will be identified on the next stage. Preliminary estimated it will be instead places existing trees and most of types are Populous alba (30%), Elm (70%), and deciduous shrubs Lohan in the villages.
Is the Contractor going to plant new trees instead of cut?	Yes, we have preliminary estimate.
Will the Contractor install lighting inside the Tash-Sarai village?	Electric lighting will be installed inside villages. However, make sure that you have specified that in your written requests so that designers could study it.
Will the Contractor repair at least 25 meters of secondary roads connected with the highway to be rehabilitated?	About 15-25 m of secondary roads inside villages will be asphalt coated.
Who will pay for removal of PTL poles and how private properties of rural people to be moved during the construction of road be compensated?	That matter has been provided for in the Project. Owners of structures to be removed because of road will be compensated. Specialists will identify the cost of the structure, the Government shall receive funds and distribute to owners of destroyed/removed structures.
Will street lighting be installed?	Actually, traffic lights shall be installed according to standards and number of people to cross the street. If there are few people, the Contractor shall rather arrange pedestrian crossing (zebra). As for places near schools, where children cross the street, the Contractor shall install traffic lights.

List of attendants from authorities, central government: and consultant

IPIG /MoTR: Asylbek Abdygulov safeguard specialist;

Ruslan Satybaldiev: Regional Project coordinator,

Kocks Consult: Sam Sapuay: International safeguard consultant;

Lola Shatirishvili, resettlement specialist

List of attendants from local government/ residents , together with their signatures is presented in Appendix C.

229. Comments/Recommendations:

- Contractor needs to arrange sidewalks on both sides of the Naryn highway including lighting, lay sleeve pipes to be used for utility purposes later.
- Asphalt concrete mixing plant should be arranged far from the territory of the “Issyk-Kul” Bio-sphere Zone.
- Contractor needs to rehabilitate the bridge over the channel feeding water to Tash-Sarai village without interrupting water supply process.
- We shall highly appreciate if you keep on providing information about the project implementation process.
- Removed poles of power transmission lines should be recovered.
- We ask you to repair 3 km road connecting the Orto-Tokoy Village with the road to be rehabilitated.
- We ask you to remove the rock on the way to Orto-Tokoy Village
- As we have neither schools, nor kindergartens, we please you to repair the road going to Orto-Tokoy Village from the highway to be rehabilitated.
- As Orto-Tokoy Village belongs to the Balykchy authority and is located 18 km away from Balykchy town, we please you to repair 3 km road connecting the Orto-Tokoy Village with the road to be rehabilitated.
- This is good project, I wish you every success in you work
- The Contractor needs to arrange elevated bridge for railway on the intersection of railway and highway to be rehabilitated. Install at least 4 traffic lights around that place
- Please provide for traffic lights within the city area.

230. Comments were minor with the following recommendations - the need for sidewalks, sleeve pipes, asphalt plant to be away from Bio-sphere zone, need for bridge rehabilitation, on using poles that will be removed because of road widening, repair of road to Orto-Tokoy, rock removal, fly-over bridge over the railway (or traffic lights) and additional traffic lights in the city (Balykchy). The questions on the other hand were regarding road dimensions, location of asphalt plant, planting materials to be used, refueling and repair of vehicles, replanting of trees to be cut down, planned repair for secondary roads, resettlement issues, installation of street lighting and road ditches

231. Several of the comments were already incorporated in this IEE/EMP such as concerns on damage to infrastructure and reconstruction of utilities. On the impact to infrastructure, provisions in the EMP were included to undertake good planning to enable infrastructure service not to be disrupted.

232. In order to inform a larger number of population of the villages along the road on the environmental and social issues of the project, IPIG/MoTR KR sent information letters with the results of the conclusions of IEEs to Rayon authorities, heads of village municipalities, and village elders for greater public awareness on possible types of environmental and social impacts during implementation of the road reconstruction project. This information letter is attached in Annex K.

233. In order to more effectively engage local population in the process of informing on social and environmental impacts of the project, additional public consultation will be required. It is necessary to hold a public consultation at the stage of detailed design for a representative stakeholder interaction.

234. The organization of public consultation is necessary to fix the participants, by registration of the participants of the sheet indicating your name, position, address and telephone number. Provide information for feedback to direct suggestions and comments.

2. Information Disclosure

235. As soon as the IEE will be approved by SAEPF and ADB endorses the IEE it is made available as information to the public, both in English and in Russian languages.

236. The procedure for public consultation in Kyrgyz Republic includes the following steps:

(ア) public notification on public discussions;
(イ) providing public access to the EIA documentation from the project initiator and / or in other accessible locations (local authorities, the territorial bodies of environmental protection), as well as disclosure of the EIA report on the website of the proponent (if website exists);
(ウ) the general public familiarizes with the EIA documentation;
(エ) in the case of public interest:

- Public notice on the date and place of the meeting to discuss the EIA documentation;
- Collection and analysis of comments and suggestions, summarizing the results of public discussion of the EIA documentation.

237. The Russian Version of the IEE will be available in the IPIG-MoTR office and copies shall be made available to the people through the Ayil Okmotu offices along the project road. The IEE shall also be disclosed to a wider audience via the ADB website and in KGZ at the MoTR website. During the project implementation, periodic environmental monitoring reports shall be submitted by Implementing/Executing Agencies and correspondingly also be uploaded in the ADB website.

238. Should additional information be required at any time about the project, the public may visit the IPIG-MoTR or interact with the future construction supervision consultant who will be selected for the project. On-site consultations will be held for clarifications and provision of necessary information to the public and the stakeholders on as need basis.

H. Grievance Redress Mechanism

1. Objectives

239. The Grievance Redress Mechanism (GRM) is a process through which the affected people need a trusted way to voice and resolve concerns about the project and the project also finds an effective way to address affected people's concerns. In this project, the grievance mechanism will be in place by which the affected people will be fully informed of their rights and procedures for addressing complaints whether verbally or in writing during consultation, survey, time of compensation and implementation of the project. Care will always be taken to prevent grievances rather than going through long redress process.

240. The GRM will cover issues related to social, environmental and other safeguard issues under ADB safeguard covenants and Kyrgyz Law.

2. Grievance Redress Group (GRG)

241. The GRG will be established for the duration of project implementation. The GRG is tasked with all activities needed to discuss a grievance, assess its validity, assess the scope of eventual impacts, decide eventual compensation needed and instruct/facilitate the functioning of the Grievance redress mechanism.

2.1. Functioning of the GRG within the Grievance Redress Mechanism

242. The Grievance redress mechanism (GRM) involves the following 2 stages appeals:

Stage 1, Local (Village) Level

- The grievances will first be lodged at the level of the complainant's village community. The complainant will report his case to the Local Point of Contact (LPC) The LPC will trigger the action of the Grievance Redress Group (GRG) which will assess the situation and seek a solution through consultation with complainants, local Roads Maintenance Unit (RMU) the oblast Ombudsman, and the selected AP representative.

Stage 2, Central Level

- In case within additional 15 days the grievance is still not resolved at local level the complainant will further raise the issue to MoTR's headquarters in Bishkek again with the support of the LPC, AP representatives, and the oblast Ombudsman. The GRG will decide on the eligibility and on the complaint case and prepare the resolution, subject to IPIG/MoTR consent.

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

244. For deliberations at the local level, the meetings will be held in the village of the complainant. For appeals at central level, the meetings will be carried out at in MoTR office in Bishkek with field trips of GRG members to the village of the complainant.

2.2. Composition of GRG

245. GRG will be established by the order of MoTR. The GRG is composed at different levels of appeal by the following individuals/officers.

Local level GRG

246. Local level GRG will be established at each Ayil-Okmotu along the project roads with the provision of members of composition as shown in Table 29:

Table 29: Composition of Local Level GRG

GRG Member	Position held
Head of Ayil-Okmotu	Chairman
Representative of RMU	Member
Female and Male APs	Members (2)
Local Point of Contact	Member
Ombudsman of the Oblast	Observer
Consultant	Invited Expert

Central level GRG

247. The central level GRG will be represented by 5-7 members of the composition as shown Table 30.

Table 30: Composition of Central Level GRG

GRG Member	Position held
Head of IPIG of MoTR	Chairman
Project Coordinator at IPIG	Member
IPIG safeguards unit representative	Member
Representative of the RMU	Member
Local Point of Contact	Liaison between Local & Central GRG
Ombudsman of the Oblast	Observer
Representatives of APs (Male & Female)	Additional Observers

At each level of appeal, the GRG will be assisted as needed by the professional capacity needed to solve each specific case. This will include among others:

- Representatives of State Rayon Administration
- Representatives of the Rayon Branch of the State Agency for Architecture and Construction
- State Registration Services of the Rayon
- Ministry of Agricultural
- State Agency for Environment and Forestry
- Ministry of State Property
- Ministry of Emergency
- Technical expertise from professional engineers, and Consultants with relevant experience in environmental safeguards.

2.3. Duties of GRG Members

Local Point of Contact

248. Once AP files a complaint, the LPC is to undertake and complete the following tasks:

- screen the complaint for eligibility and, if found eligible register it the Complaints Log;
- draft a complaint memo to be signed by the complainant, indicating the name of complainant, date and place the case of complaint occurred, apply the date and place of complaint submission, and attach supporting documents, as necessary;
- send the complaint memo to all members of GRG, agree the date of GRG meeting;
- request the rural administration authorities to organize the meeting;
- facilitate the GRG meeting by providing a storyline for the complaint and provide factual details and relevant documents obtained;
- communicate request and queries of the complaints to the members of GRG (on central level to GRG/IPIG/ADB);
- maintain the records of the meetings and communications between GRG and complainants
- ensure administrative and organizational support to GRG members;
- raise awareness of project stakeholders, including CBOs, NGOs AHs and local authorities on the GRM, it functions and objectives.
- liaise between local and central GRGs to convey the information of the case of complaint that was not resolved on local level and became the case to be reviewed on a Central Level.

Chairman of GRG / Head of Ayil-Okmotu

249. Once the GRG Chairman is informed about the meeting date and schedule he/she is responsible to:

- review the complaint(s) and supporting materials if any ahead of the GRG meeting;
- manage to obtain any additional information prior to GRG meeting date;
- involve relevant task expert if such need is obvious after review of the complaint(s);
- ensure members attendance and chair GRG meeting;
- ensure simple complaints (like notification of when construction starts or a copy of the entitlement brochure etc.) are handled /resolved at the local level during the meeting;
- ensure that records (of each meeting, communication between GRG and complainant(s)) is accurately recorder by assigned member (Meeting Secretary) and saved in the GRG files;
- convey requests and enquiries of the complainants to GRG members on Central Level if not resolved on Local Level.

RMU Representative

250. Once notified of a complaint and summoned by the LPC to a grievance meeting the RMU representative will:

- Review all relevant recording of complaints and submitted documents of proof;
- Participate to all grievance meetings, provide opinions and analysis, take minutes of the discussions (Secretary of the Meeting);
- Accompany eventual assessment/valuation specialists in the field;
- Ensure that claims from damages due to construction works are reviewed by the RMU and technical experts and assess the damages /losses incurred;
- Based on the position reports of GRG members and on his/her understanding of the case prepare the final grievance report and recommendations to be sent to complainant, other members of the GRG and if needed to IPIG as well. The summary report should determine, whether the case is:
  - ✓ solved without further action; or
  - ✓ solvable but requires compensation or other action; or
  - ✓ not resolved and requires pending actions, such as forwarding the complaint for review on the higher-Central Level, to the Court, or to investigation to prosecutor's office.
- If the complaint is considered valid and the needed compensation/action is to be approved by IPIG the case is forwarded to GRG on Central Level with the request to proceed the review and ensure execution of the redress action; and
- When the complaint remains unresolved by Local Level GRG, and a complainant offered to lodge claim on the Central Level agree to act so, RMU representative coordinates with LPC and GRG Chairman to assists the complainant in lodging the complaint at a higher appeal level;
- In parallel inform IPIG/MoTR and proceed with the organization of the central level appeal meeting.

Representatives of the APs

251. Two representatives of the APs, male and female persons from the affected community will participate in all GRG meetings to:

- act as the full right member of GRG;
- provide relevant information related to the submitted complaints; and
- provide other GRG members as relevant with a position note to be reflected in the final meeting report.

Invited Consultant /Field expert

252. Once notified of Meeting time and location the Consultant will:

- Review all relevant recording of complaints and submitted documents of proof;

- If feasible visit the place of complaint to visually observe the spot and be fully aware of important details to share with GRG members during the meeting;
- assist the GRG members to get into the insight of the complaint and assist them in finding feasible, reasonable, mutually agreeable and doable solutions.

IPIG Project Coordinator

253. Once notified that a complainant has lodged an appeal case at the Central level IPIG project coordinator will:

- contact the complainant(s) and draft a note with his/her understanding of the complaint;
- participate to the appeal meeting, provide opinions and analysis, take minutes of the discussions;
- if needed summon again assessment/valuation specialists and accompany them in the field;
- request the chairperson to organize meetings, as necessary;
- maintain communication between GRG and the complainants; and
- Complaint Register is kept with IPIG and a copy shared with the Consultant.
- Representatives of IPIG Safeguards Unit

254. Once notified that a complainant has lodged at central:

- participate to all grievance meetings, provide opinions and analysis;
- accompany eventual assessment/valuation specialists in the field, and
- provide other GRG members as relevant with a position note to be reflected in the final meeting report.

Ombudsman

255. Once notified of a complaint and a summoned by the LPC to a grievance meeting is submitted the Ombudsman will:

- monitor complaint handling process and ensure that decisions made by the GRP are equitable and objective;
- provide independent opinions and recommendations related to the decision made on the case by the GRP team;
- advise the complainant(s) on their rights and entitlements, as necessary;
- participate to all GRG meetings and site visits;
- participate in eventual assessment/valuation in the field; and
- prepare a position memo at the end of the meeting(s) and forward it to LPC/chairperson of the GRG.

GRG Chairperson/Head of IPIG of MoTR

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

- contact the complainant(s) and draft a note with his/her understanding of the complaint;
- trigger the GRG members through a letter of invitation;
- chair the GRG meetings and ensure that minutes of the meeting are shared with all relevant parties;
- review the content of each response prepared after deliberations to ensure accuracy as well as consistency of answers provided to the complainants;
- ensure the administrative and organizational support for GRG members to work; and
- support the decision made by the GRG and ensure that the follow-up actions are taken.

IPIG Project Coordinator

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

- contact the complainant(s) and draft a note with his/her understanding of the complaint;

- participate to the appeal meeting, provide opinions and analysis, take minutes of the discussions;
- if needed summon again assessment/valuation specialists and accompany them in the field;
- request the chairperson to organize meetings, as necessary;
- maintain communication between GRG and the complainants; and
- Complaint Register is kept with IPIG and a copy shared with the Consultant.

Representatives of IPIG Safeguards Unit

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

- prepare the chronology of events to understand sequence of developments prompting the complaint;
- provide environmental and resettlement opinion on impacts claimed by the claimant;
- examine large claims over USD$10,000 with financial expert at Ministry and involve a qualified valuator;
- request the chairperson to organize meetings, as necessary; and
- maintain communication between GRG and the complainants.

Technical Experts

259. Once summoned to provide expert advice for the assessment or valuation of an impact claimed by a complainant the relevant technical expert will carry out the needed investigations and prepare a report to be handed to the complainant and the other members of the GRG. The tasks will include:

- provision of relevant technical opinion for the case reviewed;
- carry out the needed investigations relevant to their expertise; and
- provide recommendation when the legal opinion from the relevant state agencies is necessary.

2.4. Grievance Resolution Process

260. The LPC of GRGs will be regularly available and accessible for APs to address concerns and grievances. He will assist the aggrieved APs in formally lodging their claims to the GRG. The complaints and grievances from the APs will be addressed through the process described in Table 31.

Table 31: Grievance Resolution Process

Steps	Action level	Process	Timeline
Step 1	Resolution	At initial stage, the LPC will give hearing to the aggrieved person and try to give acceptable solutions. If any aggrieved AP is not satisfied with the solutions, then the aggrieved AP will lodge grievances in written to the concerned local GRG within 3 days.	3 days
Step 2	GRG Resolution	After receiving written complaints of AP, the LFP will review and prepare a Case File for GRG hearing and resolution. A formal hearing will be held with the GRG at a date fixed by the LPC in consultation and the aggrieved APs. On the date of hearing, the aggrieved AP will appear before the GRG at the office of concerned Ayil-Okmotu and produce proof in support of his/her claim. The LPC will note down the statements of the complainant and document all proof. The decisions from majority of the members will be considered final from the GRG and will be issued by the LPC and signed by other members of the GRG. The case record will be updated and the decision will be communicated to the complainant AP by the LPC within 14 days of submission. If any aggrieved AP is not satisfied with the solutions, then the LPC will lodge grievances in written to the central GRG at MoTR with conclusion and supporting documents prepared at local level.	14 days
Step 3	Resolution of GRG Central	After receiving written complaints of AP, the GRG Chairperson of the central GRG will review and prepare a Case File for GRG hearing and resolution. A formal hearing will be held with the GRG at a date fixed by the GRG Chairperson and the aggrieved APs. GRG members will contact the complainant and visit his village. The IPIG Project Coordinator will note down the statements of the complainant and document all proof. The decisions from majority of the members will be considered final from the GRG and will be issued by the GRG Chairperson and signed by other members of the GRG. The case record will be updated and the decision will be communicated to the complainant AP by the IPIG Project Coordinator within 15 days of submission.	15 days
Step 4	Court of law	The court of law will be the last resort before the AP. Project Affected Persons can appeal to court should s/he disagrees with the decision of the Control Authority.	N/A

3. Additional Mechanisms Available for Grievance Redress

261. Any physical and legal person, any appellant can communicate his/her concern to the Court at any stage of grievance redress. The GRC will not restrict or influence the AP from applying to court for legal remedies.

262. If the complaint is found invalid, the GRG formulates a response and sends a written letter to the complainant, explaining the reasons of rejection. The complainant can appeal the decision of the local Court and bring the case to the ADB Accountability Mechanism. The project level GRG does not in any way impede APs access to the ADB Accountability Mechanism (AM8) or to the judicial or administrative remedies the Kyrgyz Republic.

263. The Information Pamphlet and Grievance Redress Form will carry the contact information for the Office of the Special Office Facilitator to be readily available once any AP may wish to register a complaint with the ADB AM.

[8] Link to access relevant web page: www.adb.org/site/accountability-mechanisn/contacts
Complaint Receiving Officer
Accountability Mechanism
Asian Development Bank
6 ADB Avenue, Mandaluyong City 1550
Metro Manila, Philippines
Tel: +632 632 4444 ext 70309
Fax: +632 636 2086 Email contact form

I. Environmental Management Plan (EMP)

1. EMP

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

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

266. The EMP consists of two tables. Table 32 summarizes the environmental mitigation measures, and Table 32 provides an overview of the environmental monitoring. At the end is a statement which includes the timeframes and responsibilities for carrying out the environmental monitoring.

Table 32: Environmental Management Plan

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					
General	Submittal of applications/ site specific management plans before commencement of work	Project impacts will be minimized	To submit General Site Specific Management Plan, which will present the method statement for construction, including following 13 annexes: (i) Dust Suppression Plan (ii) Blasting Works Management Plan (iii) Construction Noise Management Plan (iv) Vibration Management and Monitoring Plan (v) Surface Water Contamination Prevention Plan (vi) Borrow Pits Management Plan (vii) Batching Plant/ Cement Plant Management Plan. (viii) Soil Management Plant (ix) Solid and Liquid Waste Management Plan (x) Cultural & historical sites Management Plan (xi) Safety Management Plan (xii) Camp and Workshop Management Plan (xiii) Material Processing Plants/Equipment and Storage Facilities Plan SSEMP shall comply all standards from the general and toll roads WB Group EHS Guidelines	Contractor	CSC, SETI, IPIG of MOTR
Environmental Specialist of CSC	Supervising of Contractor's environmental activity and reporting to IPIG	To follow the EMP	Mandatory half year report on monitoring of the environment should be prepared and submitted to IPIG/MOTR. Data for this report will be collected by the results of the quarterly reports of environmental specialist of CSC. Once a year International environmental specialist will conduct the complex control	CSC/ Contractor	CSC/IPIG
Committee of Grievance Redressing	Establishment and organizing the CGR	Solve disputes immediately	Prompt dissolvent of disputes/issues/complains from the construction works, incorporating all requirement in the Bid Document.	CSC	CSC, SETI, IPIG/MORT
Method of statements	Construction of bridges, culverts, road etc.	Clarifying what are the possible risk/environmental impacts to be caused	Descript construction details such as sequences, material used, size, duration etc.	Contractor	CSC, SETI, IPIG of MOTR
Air Pollution	Operation of construction machinery	Air pollution due to exhausted gases emission from the	Sensitive receptor sites of Balykchy (km 00+000) and Tash-Saray (km 11 + 000) should be considered as areas of mitigation in terms of air quality, noise/vibration. To reduce emission levels of both of exhausted gases and noise in general, the contractor must implement the following	Contractor	CSC

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					
		operation of construction machinery	mitigating measures (i) keep construction equipment in good condition (ii) prevent idling of engines by shutting off machineries not in use for more than 3 minutes (iii) prohibit use of machinery or equipment that cause excessive smoke emissions (iv) utilize low- emission type machineries and (v) install tentative noise (air pollution) barrier, if necessary.		
		Dust rising by earth work and lorry running over unpaved road in sensitive area (km 0-3 industrial zone, km 11 Tash-Saray village)	Dust Suppression Plan shall be submitted to CSC. Spray water over the surface of unpaved road every 2 hours around sensitive receptors area when it is dry and wind is strong, based on the Site- Specific Dust Suppression Plan to be submitted before construction. Hauling truck shall be covered always. Material transport route shall be planned properly incorporating to Dust Suppression Plan. Estimates from the preliminary design for the section show those 668,000 cubic meters will be the cut volume and 135,600 cubic meters for fill volume for the road section. Truck traffic will considerably impact local roads as well as the communities they traverse. Haul routes should be planned with CSC in coordination with IPIG and local authorities, providing sufficient maintenance to minimize dust, noise generation and disturbance to residents by restricting the hauling time between 07:00 and 18:00.	Contractor	CSC, SETI, IPIG/MORT
	Blasting works	Air quality	Blasting Work Plan shall be prepared and approved by all agencies concerned. Blasting works will be conducted at the site from km 19+500 and km 41 (along the Chu River); the sites are in mountainous area. Type and time of blasting works should be agreed with General Directorate of Biosphere Reserve. The main measures are hydro-dust suppression and conduct of blasting works for breaking of rocks in small volumes stratified (top to bottom) horizontal blasting hole charges in small diameter with a preliminary pre-splitting along the contour of the explosive volume. The Contractor for explosives works must have a valid license and a passport of blasting works. Blasting works are conducted based on the application and situational plan, in coordination with local authorities and with SETI permission for works. For blasting activities, it is also necessary to develop a Blasting Works Management Plan. It is required to consider prevention of fragmentation of species during the blasting operations A mitigation measure for power line protection is an obligatory installation of shields.	Contractor	CSC; IPIG of MoTR
Noise	Asphalt breaking, earth filling, sub-base compaction, asphalt laying	Disturbance of adjacent settlements due to elevated noise and vibration levels. (km 0-3 industrial zone, km 11 Tash-Saray village)	Construction Noise Suppression Plan shall be submitted based on the Recommendation of Noise Assessment report for Section 1 in 2018. Good communication with affected communities is often the most effective way to manage potential construction noise effects. Therefore, the Contractor should keep local residents informed of the progress of the works, including when and where the noisiest activities will be taking place and how long they are expected to last. All noise complaints should be effectively recorded, investigated and addressed. Account should be taken of the needs of residents in choice of working hours and where possible these should be chosen to: • Avoid night time and weekend working;	Contractor	CSC; IPIG of MoTR,

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					
			• Avoid working near mosques during prayer time; and to • Carry out works near schools during holiday periods In addition, the Contractor should consider general good working practices including the following which are particularly relevant to road construction: • Modern, silenced and well-maintained plant and construction equipment should be used; • All vehicles and plant should be fitted with effective exhaust silencers which should be maintained in good and efficient working order. • Fitted acoustic covers should be kept in a good state of repair and should be kept closed when plant is in use. • vehicles should not wait or queue on the road with engines running and plant in intermittent use should be shut down when not in use or where this is impracticable, throttled down to a minimum. • If a site compound, or materials storage area is to be used, both it and any static plant within it should be sited as far as is practicable from noise sensitive buildings. • Where activities, including delivery of material to site, cannot take place during normal working hours they should be carried out as close to normal working hours as is reasonably practicable. • Concrete mixers should not be cleaned by hammering the drums. • When handling materials, care should be taken not to drop materials from excessive heights		
Vibration	Compaction	Structural damage/cosmetic damage	Vibration suppressing plan shall be submitted based on the recommendation of Vibration Assessment Report for Section 1in 2018. Following mode shall be chosen for vibration roller to prevent any damage to buildings: • Option 1 – No Vibration • Option 2 ✓ Areas with houses within a 9m corridor – use of rollers with no vibration ✓ Areas with houses between 9m and 22m corridor: o use of rollers with minimum vibration o use of ditches to reduce vibration at the houses o monitoring at the houses to ensure vibration at the houses does not go over 3mm/s. If vibration exceeds 3mm/s work to stop and continue with no vibration ✓ Areas with houses at a distance of more than 22m: o Use of high vibration	Contractor	CSC; IPIG of MoTR,

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					
			o use of ditches to reduce vibration at the houses o monitoring at the houses to ensure vibration at the houses does not go over 3mm/s. If vibration exceeds 3mm/s work to stop and continue with no vibration ✓ Areas with sensitive archaeological/ ancient monuments within a 22m corridor – use of rollers with no vibration. When areas with sensitive archaeological/ ancient monuments are over 22m and low vibration is used, monitor at the monuments and ensure vibration does not exceed 2mm/s • Option 3 ✓ Areas with houses within a 16m corridor – use of rollers with no vibration ✓ Areas with houses between 16m and 36m corridor : o use of rollers with minimum vibration o no ditches o monitoring at the houses to ensure vibration at the houses does not go over 3mm/s. If vibration exceeds 3mm/s work to stop and continue with no vibration ✓ Areas with houses at a distance of more than 36m: o use of high vibration o no ditches o monitoring at the houses to ensure vibration at the houses does not go over 3mm/s. If vibration exceeds 3mm/s work to stop and continue with no vibration Areas with sensitive archaeological/ ancient monuments within a 22m corridor – use of rollers with no vibration. When areas with sensitive archaeological/ ancient monuments are over 22m and low vibration is used, monitor at the monuments and ensure vibration does not exceed 2mm/s		
Surface Water	69 culverts and 3 bridges reconstruction at watercourses as: (i) (km 12.055) (ii) (Km 22.207) (iii)	Pollution form construction area runoff, and change in surface hydrology due to increased sediment load	Surface water Contamination Prevention Plan shall be submitted to CSC. To mitigate negative impacts on the waterways, the following must be implemented: (i) store stockpiles of topsoil and other such materials at a safe distance from surface waters; (ii) long term stockpiles must be covered with grass or other suitable coverings; (iii) create settlement ponds where construction activities are near natural waterways. Unsustainable construction practices such as improper handling and storage of construction materials (e.g., concrete, asphalt, lubricants, fuels, and solvents etc.) can pose risk of contaminating the waterways crossed by the project road. Embankments and construction materials like fill, sand and gravel can be washed out by rainwater into watercourses during downpours. Oil and grease from leaks in engines can also accumulate in surface waters and should be properly controlled. To prevent these, appropriate mitigation measures must be taken	Contractor	CSC, IPIG/MOTR

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					
	(Km 31.750)		such as (i) regular maintenance of all construction equipment, (ii) chemicals and oil must be properly stored into impermeable and bounded areas away from surface waters. Within the section, the critical spot is the Chu River. The Contractor should be extra careful in these spots as construction activities can directly contaminate the surface water and consequently affect the biological species in these areas. Contamination should be avoided and disturbance to biota be minimized. Water quality measurements should be done during actual periods of construction at these sites. During the construction of bridges, dimensions of construction site shall be the minimum necessary. It should be placed at levels that minimize flooding as much possible. The contractor shall submit a method statement or plan for the execution of bridge construction works including measures that will be undertaken to address adverse environmental impacts such as erosion of river embankment and siltation of watercourses that may result from such activities. The plan shall be submitted to the Construction Supervision and IPIG, which include: (i) installing of water diversion structures upslope for reducing gully erosion, (ii) installation of retention structures (e.g. shallow basins) during construction activities near river for capturing of sediments, and (iii) the watering of stockpiles during dry season to avoid wind erosion The discharge of polluted water, landfills, parking cars and the construction of temporary facilities shall be located not within the water protection zones (not less than 150m) on the banks of rivers. On construction sites should provide capacity for the collection of sewage and garbage. The roads within the water protection zones should include the collection of mud water from the roadway surface with its subsequent treatment or sewage to eliminate the pollution of water sources. The quality of discharges into water bodies must meet the established requirements. In the water protection zones of rivers. It prohibits contamination of the earth surface, including the garbage dump, waste production, as well as parking, cleaning and repair of motor vehicles and road construction machinery, fueling. All works in water protection zone must be carried out based of permission from local authorities. The project documentation should include the restoration work after the construction of the bridge: the removal of the bed of the river banks, backfilled during the construction of supporting structures; cleaning of the river bed and the flood plain from cluttering their objects, extracting and hauling piles of scaffolding and temporary supports; dismantling of temporary facilities on the construction site and land reclamation, including borrow area and access roads.		
	Blasting	Contamination of surface water	Blasting works will be conducted at the site from km 19+500 and km 41 (along the Chu River), the sites are in mountainous area. The main measures for preventions are mitigation measures for fragmentation of species during the blasting works, hydro-dust suppression and conduct of blasting works for breaking of rocks in small volumes stratified (top to bottom) horizontal blasting hole charges in small diameter with a preliminary pre-splitting along the contour of the explosive volume. The Contractor for explosives works must have a valid license and a passport of blasting works. Blasting works are conducted based on the application and situational plan, in coordination with	Contractor	CSC, IPIG/MOTR

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					
			local authorities and with SETI permission for works. For blasting activities, it is also necessary to develop a Blasting Works Management Plan. A mitigation measure for power line protection is an obligatory installation of shields. In order to prevent negative impacts from blasting works is necessary to protect water bodies with wooden boards (5m x 5m) mounted on poles. Used methods of drilling and blasting works such as the drilling short-hole method and theirs blast. Drilling small blast holes are prevented the explosion of a large expansion of the rock material. By scale such method is characterized as a small explosion and use wooden boards on these sites will be enough		
Borrow areas	Exploitation of material such as sand, gravel and clay,	Potential disturbance of landscape, infliction of harm for vegetation and damage of approach roads. Increasing of dust emission	Prior to the development of borrow pits, it is required to submit to CSC the Borrow Area Management Plan Opening up new borrow sites, is not allowed inside the Issy-Kul reserve and it is required careful environmental assessment and special permission, together with restoration plan including followings; · capacity and operation hours of a borrow pit; · development and extraction sequence of borrow pit; · technique and mechanisms for stripping and excavation of top soil; · operation and time schedule for borrow pit development; · extraction method and transport plan, including route(s); · safety rules and hours of operation; · expected quality of extracted materials; · topsoil storage/protection and environment protection steps; and, · rehabilitation of disturbed lands when site is decommissioned. · calculation of mobile sources' emission charge.	Contractor	CSC, IPIG/MOTR
Soil Management	Improper top soil preservation	Loss of top soil	Soil management Plan shall be submitted to CSC. Removing of top soil occurring within site clearing corridor. It shall be stored for reuse. Long-term stockpiles of topsoil will immediately be protected to prevent erosion or loss of fertility. For erosion protection, it will be sawn with a rapidly growing vegetation, e. g. grass Topsoil on the sections to be used as a stockpile for surplus construction material shall be removed and stockpiled to reuse them to cover these areas upon completion of works. In addition, a soil management plan shall be provided detailing measures to be undertaken to minimize effects of wind and water erosion on stockpiles, measures to minimize loss of fertility of top soil, timeframes, haul routes and disposal sites.	Contractor	CSC, IPIG/MOTR

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					
Solid and Liquid Wastes Management	Siltation of surface waters and/or impact on soils due to improper disposal of excess materials	Contamination of water and soil	Prevention of indiscriminate dumping of waste into river/open spaces Solid and liquid wastes generated during construction shall be properly treated as per SSEMP prepared. Any material including excess soil excavated, chemical, liquid waste, construction rubbishes shall not be dumped into river all time. Only the runoff water, after removal of muddy particles, can be released into river.	Contractor	CSC
Cultural and historical site	Cultural and historical sites protection.	Potential Construction works impacts on cultural and historical sites and monuments finding chance.	To prepare Cultural & Historic Site Management Plan considering: Recommendation of Archaeological Survey and Assessment Report and Proposed Plan for Section 1 in 2018 shall be followed (see Appendix O). In accordance with the Law of the Kyrgyz Republic on historical cultural heritage in the event of cultural monuments found, Contractor must stop all construction works and report the findings to the local executive authorities or any other competent organization (Institute of History and Cultural Heritage, National Academy of Sciences; Department of History, Kyrgyz National University after Balasagyn), MoCIT KR. Construction workers shall be strictly instructed that any disturbance of site is not allowed. Physical cordon around identified sites should be installed to minimize construction impact and alert workers/people from disturbing archaeological sites. Physical cordon around identified sites should be installed to minimize construction impact and alert workers/people from disturbing cultural and historical sites.	Contractor	CSC, IPIG of MoTR, MoCIT KR
Flora and fauna	Road alignment in areas of tree plantations. Embankment filling of the tree stem area.	Tree losses due to embankment fill.	A maximum fill up of the tree stem area of 30 cm can be accepted. Fill up material in the tree stem area has to be organic soil. A filling up of more than 30 cm will damage the tree. In this case cutting can't be prevented and a new tree is to be planted as a compensation measure at the respective location within the existing RoW. Species to be planted are walnuts, maple ash tree, elm tree, white poplars, white willow, white acacia. Plantings shall be conducted after technical works have been completed. Planting time shall be restricted to spring (March till April) and/or autumn (September till October). Quality of newly to be planted trees shall be 16 to 18 cm of stem circumference at least in 1,5 m height.	Contractor	CSC, SETI, IPIG of MoTR
	Bottom of embankment of designed road lying very close to tree rows	Potential damaging of trees during construction activities	Implementation of a temporary vegetation protection fence during construction activities.	Contractor	CSC, SETI, IPIG of MoTR

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					
	Environmental training	Prevent disturbance of habitat	Training of workers on the importance of the biosphere territory "Issyk-Kul", on prohibition and responsibility for poaching, preventive measures for biodiversity conservation in the given territory. Include in the monitoring plan monitoring of species that are on the verge of extinction	Contractor	CSC, IPIG of MoTR
	Road width expansion works	Loss of trees and bushes	Do not carry out the cutting of bushes in the river floodplain at km 12-14, the expansion to carry out to the mountains.	Contractor	CSC, IPIG of MoTR
		Impact to biodiversity	Together with the Specialist from General Directorate of Biosphere Reserve the pre-project monitoring of birds within the territory of project road	Contractor	CSC. IPIG / MOTR
		Impact to Biodiversity	In order to contribute to the fight against poaching, to establish additional signs for km29 with the designation of the beginning of the biosphere territory, and also within the Balykchy Section from km 0 to km 43, to establish signs of a ban on hunting (restriction for hunting to Capricorns and quails, etc.) are required. The design (content of the text) of informational signs, as well as the place of their installation, will be worked out at a later stage.	or	IPIG of MoTR
Safety	Traffic safety management	To improve traffic safety for pedestrians and vehicles	Traffic safety program for especially around the sensitive receptors by installing necessary safety measures specified in the design or in the Technical Specifications to ensure that community and traffic safety issues during the construction phase of the Project, including incorporation of: (i) Safety barriers; (ii) Traffic signs; (iii) Road crossings; (iv) Speed bumps, (v) Speed limits and (vi) Flagman when necessary. (vii) information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions	Contractor	CSC, IPIG of MoTR, MoCIT KR
	Occupational safety management	For safety protection of workers and adjacent communities	For occupational safety, following shall be provided: (i) Adequate health care facilities (including first aid facilities) within construction sites with a nurse shall be stationed while a doctor who shall visit regularly and when necessary.; (ii) Training of all construction workers in basic sanitation and health care issues, general health and safety matters, and on the specific hazards of their work; (iii) Personal protection equipment for workers, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection in accordance with KR legislation; (iv) Clean drinking water to all workers; (v) Adequate protection to the general public, including safety barriers and marking of hazardous areas;	Contractor	CSC, IPIG of MoTR, MoCIT KR

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					
			(vi) Safe access across the construction site to people whose settlements and access are temporarily severed by road construction; (vii) Adequate drainage throughout the camps so that stagnant water bodies and puddles do not form; (viii) Sanitary latrines and garbage bins in construction site, which will be cleared when reaching capacity by the contractors to prevent outbreak of diseases.		
	Maintenance of Access	Traffic congestion	Detour roads need to be maintained for connectivity and safety purposes. Traffic plan incorporating these detour roads should be formulated by the contractor and shall be included in Safety Management Plan	Contractor	CSC; IPIG of MoTR
	Blasting works	Safety problem	Blasting works will be conducted at the site from km 19+500 and km 41 (along the Chu River), the sites are in mountainous area. Contractor shall properly control the traffic so that no passenger/vehicle is involved in the blasting itself or rock falling. A mitigation measure for power line protection is an obligatory installation of shields.	Contractor	CSC; IPIG of MoTR
Asphalt, Concrete and Crushing Plant	Installation of Asphalt, concrete and crushing plants	Air pollution, noise, vibration and surface water contamination	Material processing Plants/Equipment and Storage Facilities Plan shall be prepared and implemented as per the plan after approval of the plan by CSC/IPIG During the selection of a site for bitumen plant, concrete plant, stone crusher equipment, which emit pollutants, noise and transmits vibrations, the contractor will need to comply with SanPiN 2.2.1/2.1.1 and SanPiN 2.2.1/2.1.1.006-03, and establish a specific buffer zone around any such facility. In the KR this is referred to as a sanitary-hygienic zone, and is a mandatory element of any facility that affects habitats and human health. The sanitary-protection zone (SPZ) separates the area of an industrial site from residential areas, landscape and recreation areas, parks, and health resorts with mandatory demarcation of boundaries by using specialized information signs.	Contractor	CSC; IPIG of MoTR
	Site selection. Operation of aggregate crusher	Increased dust emission and noise emission	Careful site selection of aggregate crusher in order not to interfere with any sensitive receptor. Distance to next settlement and residential houses at least 300 m downwind. Site selection for aggregate crusher has to be approved by the Safeguard Department in the IPIG of the MoTR.	Contractor	CSC, IPIG of MoTR
	Site selection. Operation of asphalt plant	Odor emission and safety risks	Asphalt plants shall be 500 m downwind from any settlements and residential houses and outside the core/ buffer/ transitional zones of the biosphere protected area. Provide spill and fire protection equipment and submit an emergency response plan (in case of spills, accidents, fires and the like) to the authority in responsibility prior to operation of the plant. Secure official approval for installation and operation of asphalt plants from MoTR.	Contractor	CSC, IPIG of MoTR

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					
		Water pollution due to spilled bitumen	Bitumen will not be allowed to enter either running or dry streambeds nor shall it be disposed of in ditches or small waste disposal sites prepared by the contractor. Bitumen storage and mixing areas must be protected against spills and all contaminated soil must be properly handled according to legal environmental requirements. Such storage areas must be contained so that any spills can be immediately contained and cleaned up.	Contractor	CSC, IPIG of MoTR
	Construction activities in close vicinity to existing infrastructure such as water supply pipes and other facilities, waste water discharge facilities, electricity lines etc.	Damage to infrastructures	Measures will be ensured in engineering designing to avoid any disturbance to the existing infrastructure. Prior to construction start the respective service agencies shall be informed about the construction work. Coordinate with respective agencies and provide prior information to the public in case of any required disruption in services during construction	Contractor	CSC; IPIG of MoTR
Camp and Workshop management	Construction of camp/workshop	Surface water contamination, disease transmission	The contractor shall submit documents for approval (short statement and site plan in appropriate scale) which indicate: Site location, surface area required and layout of the work camp. The layout plan shall also contain details of the proposed measures to address adverse environmental impacts resulting from its installation. Sewage management plan for provision of sanitary latrines and proper sewage collection and disposal system to prevent pollution of watercourses – discharge of wastewater into the surface water is prohibited and septic tanks to be located at least 100m from surface water. Drainage system to be designed with soakway to avoid contaminated road runoff to enter any surface water; Waste management plan covering provision of garbage tons, regular collection and disposal in a hygienic manner, as well as proposed disposal sites for various types of wastes (e.g., domestic waste, used tires, etc.) consistent with appropriate regulations; Description and layout of equipment maintenance areas and lubricant and fuel storage facilities including distance from water sources and irrigation facilities. Storage facilities for fuels and chemicals will be located away from watercourses. Such facilities will be bounded and provided with impermeable lining to contain spillage and prevent soil and water contamination. Prior to the commencement of works the site installations shall be inspected for approval. The selected site will not be on top of ground water area or near surface waters.	Contractor	CSC, IPIG of MoTR, local health units of the Ministry of Health
		Enhance the safety and health of workers	To provide an Environmental and Safety Officer (ESO), under which a Environmental Officer (EO) and a Safety Officer (SO) also be provided. Their roles are to provide environmental and safety training to the employees and surrounding residents according to the requirements of the individual	Contractor	CSC, IPIG of MoTR, local health units of

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					
			work place. Prior to the commencement of works, the work site personnel shall be instructed about safety rules for the handling and storage of hazardous substances (fuel, oil, lubricants, bitumen, paint etc.) and also the cleaning of the equipment. In preparation of this the contractor shall establish a short list of materials to be used (by quality and quantity) and provide a rough concept explaining the training / briefing that shall be provided for the construction personnel. The contractor shall provide information to workers, encouraging changes in individual's personal behavior and encouraging the use of preventive measures. The goal of the information is to reduce the risk of HIV / STD transmission among construction workers, camp support staff and local communities.		the Ministry of Health
Utilization of Wasted Asphalt	Removal of asphalt	Water/soil contamination	Old asphalt pavement will be removed and be replaced in the new pavement. Storage or stockpile areas of old asphalt should be situated where they pose no risk of contamination to the environment. In coordination with local authorities, location of old asphalt stockpile areas will be identified, with a minimal distance of 500m from any settlement. Preferably, storage areas should be in state-owned land. If private lands will be used, a negotiated rent on the property should be established with the land owner. All temporary asphalt pavement storage and processing areas shall be agreed upon with the regional departments of SAEPF under the Government of KR. Old asphalt should be trucked away in blocks and stockpiles should be no higher than 2.5 m. Using old asphalt – The hacked asphalt old asphalt waste shall be transferred to Local RMU of MoTR tentatively. Then the old asphalt is used to strengthen the surface of existing second road in the villages. The top coating of the shoulders with the addition of gravel-sand mixture with 15 cm thickness is recommended.	Contractor	CSC/IPIG
Other social issues	Irrigation water	Competition for water resources	Conduct consultation with local authorities to identify sources of water (for spraying and other construction requirements) that should not compete with the local population.	Contractor	G
	Farm land	Disturbance of farm land by passing of heavy equipment by mistaken	Equipment can move only in side predetermined area only. Taping and barrier fence shall be installed between working site and private land.	Contractor	CSC/IPIG
	Damage to road pavement, bridges and culverts	Overloading of heavyweight transport may damage the road pavement, bridges and culverts	Contractor should ensure that the weight of the loaded transport should not exceed the road specifications with control at weigh bridges. Contractor should control the checking the material transportation by controlling the traffic movement.	Contractor	Consultant (CSC)

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
OPERATION PHASE					
Air quality	Increase of traffic volume	Air pollution	Although no traffic air pollution is estimated until 2034, monitoring may be necessary if residents complain about air pollution.	RMU-10 of MoTR	MoTR, SETI
Noise	Increase of traffic volume	Noise nuisance	Limit driving speed to 60 km/h just around the settlements. To be enforced by traffic police. Monitoring may be necessary if residents complain about traffic noise. Based on the monitoring results and consultation with residents, mitigation measure such as installation of noise barrier shall be studied.	Traffic Police	MoTR
Soil and surface water	Increased traffic volumes and higher vehicle speeds	Increased risk of accidents with possible spills of harmful substances	Spill-contingency plan, contingency plan or emergency response plan is a set of procedures to be followed to minimize the effects of an abnormal event on the Project roads, such as a spill of oil, fuel or other substances that may harm agricultural land and drinking/irrigation water resources or have adverse effects on the natural balance of sensitive areas. Additional measures to mitigate risk of accidents and spill of harmful substances are speed control.	RMU-10 of MoTR	MoTR, SETI
	Damaged drainage or uncontrolled erosion.	Uncontrolled erosion.	Routine monitoring of drainage and erosion control at least twice a year.	RMU-10 of MoTR	MoTR, SETI
Fauna and Flora	Negligence of tree maintenance along the road	Loss of trees	Maintenance of newly planted trees	RMU-10 of MoTR	MoTR, SETI
	Poaching	Poaching of fauna/flora	Installation of signs not to poaching	RMU-10 of MoTR	MoTR, SETI
Safety	Increased traffic flow	increased pedestrian vs. vehicle accidents due to increment of traffic volume and higher speed as a result of improved road design	Integrate in the engineering design safety features such as speed control signs, proper road markings, streetlights, pedestrian crossing, livestock crossing and other visual means.	RMU-10 of MoTR, Traffic police service	MoTR
	Road crossing	Traffic accident for Livestock and Pedestrians	Need to install the road sign indicating the places of transition of people and livestock. The crossing of people in the residential areas will be installed through every 200-250 m.	RMU-10 of MoTR	MoTR, SETI
Climate Change	Daily activities	Water flood	Precaution and immediate announcement of disasters to residents/drivers	RMU-10 of MoTR	MoTR, SETI

284. Prior to construction works, the contractor shall provide a comprehensive general SSEMP covering the following aspects (as Annexure):

- Dust management which shall include schedule for spraying on hauling and access roads to construction site and details of the equipment to be used. The contractor shall pay a special attention to water spraying in settlements and at repair and construction sites.
- Layout of the work camp and details of the proposed measures to address adverse environmental impacts resulting from its installation
- Sewage management including provision of sanitary latrines and proper sewage collection and disposal system to prevent pollution of watercourses
  Waste management covering provision of garbage bins, regular collection and disposal in a hygienic manner, as well as proposed disposal sites for various types of wastes (e.g., domestic waste, used tires, etc.) consistent with appropriate regulations
- Description and layout of equipment maintenance areas and lubricant and fuel storage facilities including distance from water sources and irrigation facilities. Storage facilities for fuels and chemicals will be located away from watercourses. Such facilities will be bounded and provided with impermeable lining to contain spillage and prevent soil and water contamination
- Soil Management Plan detailing measures to be undertaken to minimize effects of wind and water erosion on stockpiles of topsoil and excess materials, measures to minimize loss of fertility of top soil, timeframes, haul routes and disposal sites for excess materials.
- Borrow Pits Material and Source Management and Reinstatement Management Plans
- Method statement or plan for the execution of bridge construction works including measures that will be undertaken to address adverse environmental impacts such as erosion of river embankment and siltation of watercourses that may result from such activities
- Blasting works management plan
- Cultural & historical sites Management Plan
- Emergency response plan (in case of spills, accidents, fires and the like) prior to operation of the asphalt plant

285. The SSEMP shall be submitted by the contractor for approval to the Construction Supervision Consultant.

2. Monitoring

2.1. Environmental Monitoring plan

286. Environmental monitoring is an important aspect of environmental management during construction and operation stages of the project to safeguard the protection of environment. During construction, environmental monitoring will ensure the protection of embankment from potential soil erosion; borrow pits restoration, quarry activities, location of work sites, material storages, asphalt plants, community relations, and safety provisions. During operation, air, noise, and surface water quality monitoring will be important parameter of the monitoring program. Environmental monitoring plan is presented in Table 33.

Table 33: Environmental Monitoring Plan

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored?	When is the parameter to be monitored? Frequency	Institutional responsibility
Construction stage					
Air quality deterioration	Dust, SO_2, NO_2	At sensitive receptors within settlement. (イ) Balykchy (km 00+000) – This is the start of the road section and with considerable number of people around. (ウ) Tash-Saray (km 11 + 000) – Residential areas near the road.	By means of suitable portable measurement device.	Just before construction start. and every 2 monthly basis	CSC
	Check certificate of vehicles and equipment	At asphalt and crushing plants.	Visual inspection	Unannounced inspections during construction works	CSC
	Are the truck loads covered or wetted; Compliance with SSEMP	Material transport route in front of sensitive receptors	Visual inspection	Unannounced inspections during work	CSC
Noise	Noise Level	At sensitive receptors within settlement. (エ) Balykchy (km 00+000) – This is the start of the road section and with considerable number of people around. (オ) Tash-Saray (km 11 + 000) – Residential areas near the road.	By means of portable noise measurement device	Just before construction start. and every 2 monthly	CSC
Vibration (when vibration will be part of construction)	Vibration levels	At sensitive receptors within settlement (i.e. houses and any structures)	Threshold not to exceed 3mm/s at the receptors (i.e. houses and structures. Threshold not to exceed 2mm/s at the archaeology sites/ assets	Throughout entire construction stage simultaneous with vibration occurring on the site	CSC
Water quality in surface waters (rivers)	Oil Products, pH, DO, TSS, Ec and Temperature	Upstream and downstream where the Project road crosses Flume (12 km + 500), km 10 near the Chu river and on the 40-41 km in the period of blasting works.	Measurement either directly in river water with a suitable measurement device or sample taking and measurement in a certified laboratory	Just before construction start. and every 2 monthly	CSC
	Contractor's compliance with his approved method statement	Bridges and Culverts, km 10 near Chu River	Visual inspection	Unannounced inspections during bridge and culvert works	CSC, SAEPF
	Prevention of spilling of oil and fuel	Equipment servicing and fuelling at Contractor's yard	Visual inspection	Unannounced inspections during construction	CSC control by IPIG of MoTR
Top soil preservation	Stockpiling and means of protection	Stock pile yard	Inspections's observation	Once a month	CSC control by IPIG of MoTR

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored?	When is the parameter to be monitored? Frequency	Institutional responsibility
Construction stage					
Physical damage of the Cultural sites (cemeteries)	Status of Cultural sites (cemeteries) Document the condition of the cemeteries and mausoleums before constructions works.	Cultural and historical sites: • 8 km, Sary-Bulun caravansary, RHS - 35 m from the road. • 11 +500 km, on the LHS is a cemetery – 50 m from the road.	Visual observation	Before construction start and during construction period	CSC
Fauna and Flora	Status of trees near the filling area	At respective tree locations.	Visual inspection	Monthly	CSC control by IPIG of MoTR
	Status of identified dangerous (EN) species (3 birds and one mammal accordance Table 14) as: <u>Birds (EN)</u> Brantaruficollis Falco cherrug Neophronpercnopterus Oxyuraleucocephala <u>Mammals (EN)</u> Cuonalpinus	Biosphere zone Issyk-Kul 00+000 km – 42 km	Invited biology specialist	After the first monitoring will be prepared monitoring plan with frequency study	CSC control by IPIG of MoTR
Worker's safety and health	Record of clinic with number of visitors/treatment done Official approval for worker's camp; Availability of appropriate personal protective equipment; Record of safety training to the staff	Job site and worker's camp	Inspection; interviews; Comparisons with the Contractor's method statement	Weekly site visits by the hired Health and safety expert. Unannounced inspections during construction and upon complaint.	CSC
Worker's education on AIDS and STD	Record (minutes of seminar, attendance list) and photos of attendances of training, awareness campaign of prevention of HIV/AID	Job site and worker's camp	To be determined by assigned Construction Supervision	After beginning of works and at appropriate intervals throughout construction	CSC, local health units of the Ministry of health
Asphalt plant	Possession of official approval or valid operation license	Asphalt plant	Visual Inspection	Before work begins	CSC
Borrow areas	Possession of official approval or valid operation license	Sand and gravel borrow pit and / or quarry	Visual Inspection	Before work begins	CSC control by IPIG of MoTR
	Water spraying			Monthly	

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored?	When is the parameter to be monitored? Frequency	Institutional responsibility
Operational stage					
Traffic noise	Equivalent Noise Level	Sensitive receptors	Handy type level meter	Throughout the year	Laboratory/CSC (1st 1 year only)
Traffic accident	Number of injury and death of animals	Along the new road	Interview to police	Once a Year	Regional Departments of State Road Administration (UAD, LUAD, and GDAD BO)

Issue	What parameter is to be monitored?	Where is the parameter to be monitored	How Is the parameter to be monitored?	When is the parameter to be monitored? Frequency	Institutional responsibility
Operational stage					
	Accidents that cause spills of harmful substances	Along the new road	Counting of accidents	Once a Year	MoTR jointly with Road police service of the KR Ministry of home affairs and KR Ministry of emergency situations
Damaged drainage or uncontrolled erosion	Leakages in drainage system and damages due to erosion	Location of culverts and drainage facilities	Visual inspection	Once a Year	Local MoTR departments
Fauna and Flora	Status of tree maintained	In locations of newly planted trees	Visual inspection	Once a Year	Local MoTR departments joint with local authorities
	Status of identified dangerous (EN) species (3 birds and one mammal accordance Table 11) Birds (EN) Falco cherrug, Neophronpercnopterus, Oxyuraleucocephala, Mammals (EN) Cuonalpinus	Biosphere zone Issyk-Kul 00+000 km – 42 km	Staff of the General Directorate Biosphere zone Issyk-Kul	Monitoring will be continued after construction stage	General Directorate Biosphere zone Issyk-Kul

2.2. Budget on Mitigation Measures

287. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal construction contract, so there will be no additional costs to be included in the EMP. Costs of design-related mitigation measures are included in the budgets for the civil works.

288. The primary impact that needs to be mitigated in the overall implementation of the project will be on the affected trees which were due to widening of the carriage way. These trees are mainly common trees such elm, poplar and black locust. The RAP has identified individual trees to be cut. However, in the vegetated areas, an estimate is presented based on accepted convention.

289. In order to have a higher degree of success for replacement of affected trees in the section, 2 saplings of the same or similar species is proposed to be planted. Accordingly, the estimated number of trees and cost for the affected trees to be to be substituted is shown as in Table 34.

Table 34: Number and Cost for Mitigation of Affected Trees

#	Item	unit	QTY	Remarks
1	Affected trees due to widening	each	30	Indicated in field inspection for Cutting
2	For 1:2 Ratio of Replacement	each	**60**	Estimated Trees to be Planted
3	Average cost of Replacement	Som	500	Cost of Sapling & Planting
	Total Cost	**Som**	**30,000**	**Budgetary Estimate**
	69 Som/ 1 USD	USD	435	Budgetary Estimate

2.3. Budget on Monitoring Activities

290. The estimated cost for the environmental management and monitoring on the consultancy for the entire project construction period of two (2) years and one month is shown in the Table 35 below. This will include fees and other associated cost for management and monitoring of the construction sites and affected areas in the project road. The Construction Supervision Consultant will be responsible for conducting periodic parametric measurements as a basis for taking measures to improve their activities and taking measures to implement them. The necessary budget for monitoring activities will be included in the contract of the consultant. Hence, a budget for periodic parametric measurements is hereby included in the Table 36 below.

Table 35: Budgetary Cost for Environmental Monitoring Specialists

Item	Quantity	Unit Cost	Total Cost
Implementation of EMP		US $	US $
International Environmental Specialist (IES)	4 months / 2 years, 1 month*	*15,400*	*69,300*
National Environmental Specialist (NES)	15 months/ 2 years, 1 month*	*2,750*	*41,250*
Others (travel, per diem, surveys/interviews, reporting, etc.)	LS	*22,000*	*22,000*
Total			*132,550*

* Period of construction work estimated 2 year and 1 year a technical survey (measurements 1 month a year) and physical engagement of Environmental Specialists can be only 7 month a year, without winter break period.

Table 36: Budgetary Cost for Environmental Monitoring Requirements

Item	Quantity	Unit Cost	Total Cost
Implementation of EMP		US $	US $
6 month a year x 2* point (air) x 2 (years) 1** month	26	150***	3,900
6 month a year x 6* point (water) x 2 (years) 1** month	78	100***	7,800
6 month a year x 2* point (noise - vibration) x 2 (years) 1** month	26	150***	3,900
Total			**$ 15,600**

* - the number of points and measurements may vary
** - 2 years a physical work and 1 year a technical survey (measurements 1 month a year)
** *- the cost of laboratory services may vary

Note: Budgets were prepared on May 2016

3. Mechanisms for implementation

3.1. Institutional Framework

291. The relevant institutional entities for the project include the KR's Ministry of Finance (MOF), Ministry of Transport and Road (the EA), Investment Projects Implementation Group (IPIG) under MoTR, the State Agency of Environment Protection and Forestry (SAEPF), the State Inspection on Ecological and Technical Safety under the Government of the Kyrgyz Republic (SIETS), the Department for Disease Prevention and State Sanitation and Epidemic Control of the Ministry of Health Protection of the Kyrgyz Republic.

292. MoTR is responsible for transport sector development and is the EA for the project. IPIG is working under MoTR and will carry out the responsibilities assigned to MoTR.

293. MOF is the responsible government body for coordination with ADB and other donors for foreign assistance.

294. SAEPF is a leading state environmental agency responsible for the environmental policy of the country and coordination of environmental activities of other state bodies. Its functions include:

- Development of environmental policy and its implementation;
- Carrying out a state environmental expertise;
- Issuance of environmental licenses;
- Environmental monitoring;
- Delivery of environment information services.

295. SIETS carries out its activity in accordance with the Law "On Procedure for inspection of business entities". SIETS exercises control over compliance in established order of:

- environmental legislation, set rules, limits and standards of environmental management, standards for emissions and discharges of pollutants and waste disposal in the environment;
- requirements of industrial safety in the construction, expansion, reconstruction, modernization, operation, conservation and liquidation of hazardous production facilities;
- requirements of land legislation;
- requirements for safe operation of equipment and facilities for storage and distribution of petrochemicals and gas, cranes;

- requirements of safe use rules in the construction, assembling and commissioning of electrical networks and electrical equipment.

296. The Department for Disease Prevention and State Sanitation and Epidemic Center (DDPSSEC) of the Ministry of Health supervises sanitary and epidemiological welfare of the population, safety of goods and products, environmental compartments and conditions, prevention of harmful impacts of environmental factors on human health. DDPSSEC establishes MPC of chemicals in the environment with regard to the human health safety.

297. The following measures will be taken by the Consultant and by IPIG to perform environmental compliance with the EMP and Monitoring Plan during Project implementation:

- The tender and contract documents will clearly set out the contractor's obligations to undertake environmental mitigation measures set out in the Environmental Management Plan.
- The recommended environmental mitigation costs are included as separate items in the Bills of Quantities. This will ensure that there is specific environmental mitigation budget which 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. There will be an identified extra payment in the contract to ensure measures are coasted and carried out.
- The contractor will recruit an environmental, health and safety manager, who will be responsible for implementing the contractors' environmental responsibilities. The manager will also be responsible for health and safety aspects of work sites. Before commencing physical construction, Contractor will prepare site-specific EMPs (SSEMPs), submit to Construction Supervision Consultant (CSC) and ABD for endorsement and IPIG for approval.
- CSC will conduct environmental monitoring and assist IPIG in implementing EMP and supervising the implementation of mitigation measures by the contractors.

3.2. Reporting Requirements

298. MoTR will monitor and measure the progress of implementation of the EMP. In this regard, semiannual monitoring reports during construction stage will be prepared by IPIG with assistance of Construction Supervision Consultant and then disclosed at ADB and IPIG/MoTR websites. This report is owned by MoTR. Contractor submits to CSC monthly reports and reports on compliance with mitigation measures and other corrective actions. CSC submits to IPIG quarterly reports containing a section on safeguard performance.

J. Conclusion and Recommendation

1. Conclusions

299. The better road design and condition of the pavement will decrease operating costs for all vehicle owners, helping to make vehicles last longer. Road safety measures will also be improved by providing new traffic signs, safety railings, and pedestrian and livestock crossings for the road.

300. Overall the project has significant advantages to the local people and companies operating in the country by providing better access to national and regional markets.

301. At the same time, this project has many work components that can potentially lead to long term, even chronic environmental impacts. These are associated with erosion, tree removal, damage to intersections and roadside access, unaddressed chronic and rising air pollution and noise conditions which are already excessive, inadequate management of large volumes of old asphalt pavement to be removed and inadequate repair and replacement 55 culverts and 3 bridge along the route. The IEE and its EMP have provided the steps necessary to avoid many of the construction period impacts, by developing good protocols and work programs for managing potential impacts, and will be implemented.

302. The following tasks, all discussed in detail in the IEE and the EMP material are considered the most important impacts which, if the EMP is followed, could be adequately mitigated.

303. During the preconstruction period the eight key tasks to be implemented by MoTR, IPIG and CSC will be:

1. Insertion of EMP mitigation and monitoring measures into contract specifications.
2. Preparation of a list of sections where topsoil conservation works will be required when rehabilitating the road.
3. Earthworks Haul Route framework, defining at least was vehicles cannot go.
4. Construction period access management and restoration steps, as a basis for use by the contractor, working with the traffic police.
5. Tree Inventory, identification of special groves, protection where possible, and cutting a replanting plan.
6. Inclusion in road design of public safety and public services features, namely:
   - Pedestrian crossings and traffic lights
   - Lighting signage and sidewalks
   - Bus stops
   - Livestock passes.
7. Provision of technical capacity building.

304. During the construction period CSC and the contractor(s) will need to:

1. Undertake Air Quality and noise measurement field-testing for the full three years and one operating year.
2. Contractor to manage all petroleum products and prevent spills, proper disposal.
3. Contractor to manage sewage and garbage at work sites at all time.
4. Provision of basic occupational health and safety items at work sites, including first aid, water, shade and proper gear including hats, shoes and face masks.
5. Maximize the reuse or redistribution of the old asphalt.
6. Undertake the tree planting and maintenance task as each construction area is vacated; i.e. do not wait until the end of the construction period.
7. Implement dust suppression program on all haul roads and at construction sites.
8. Understand and implement all regulations standards and obtain licenses for all borrow site operations and rehabilitation.
9. Enforce occupational health and safety as prescribed by law.
10. Inspect all culverts to be sure the re-installation does not lead to chronic downstream scour, and that any diversion and debris have been cleared.

305. During year 1 of the operating period the CSC and Contractor with input from the RMU will:

1. Make certain that all replanted trees are healthy and properly maintained and protected for the winter—this may require strengthen the RMU as there will be up to 60 trees to manage.
2. Prepare a photo record of all culverts, confirming proper placement and debris removal.
3. Continue the air quality and noise monitoring for the year.
4. Examine noise data collected and plan noise attenuation measures such as berms and barriers at sensitive sites.
5. Inspect decommissioned borrow areas to confirm rehabilitation and proper closure.
6. Monitor value of pedestrian and livestock crossing features, with a view to adjustments/improvement as needed.
7. At the end of each period the EMP specifies the completion of progress reports, which will be used to monitor compliance and shape the next stage.

2. Recommendations

306. The EMP will be followed carefully and required reporting completed in a timely fashion. MoTR recommends that, based on the noise testing during construction and the first operating year, noise suppression measures be implemented.

307. The tree management and maintenance function should be passed to local communities or RMD, until trees have reached 8+ years and do not need careful maintenance.

308. CSC and IPIG will deliver the training to all active project participants and concentrate giving sound advice to the contractor, especially on the preparation and implementation of the CEWP.

309. Shortly after the operating period starts, the CSC and contractor will conduct safeguards compliance check to be sure that all measures required of the contractor have been met.

310. This IEE is “living” document and if required, it will be updated taking into account all environmental requirements, and any significant changes will be discussed and agreed to with ADB.

ANNEXE-A: Outlining Tables of Project

Annex A1: Alignment Sheet

The result of the site visits by the international and local environmental specialists are summarized in an Alignment Sheet. This shows relevant environmental features which can be of concern during the implementation of the road. For the section “Balykchy (Km 0) to kilometer-post 43 (Km 43)”, the Alignment Sheet is shown below.

Alignment Sheet

№	Section	Description	Parameter	Comments
Section 1: Balykchy (0 km) – 43 km				
1.	0 km, Balykchy	Ring road with roads to Balykchy, and to Kochkor village (project road).	Dust, noise, vibration, SO_x, NO_x	Physical analysis and instrumental measurements The measurements of the abovementioned parameters are made along the project road via portable measuring tools
2.	1 km	Railroad crossing; and to the left - the gas station.		
3.	2 km	Two (2) trees may be cut down at RHS located 8.7 m from the center of the road.		To be verified with the design
4.	3 km	Along the right-hand side there is an electro-distribution station (ЗАО-ИОС).		
5.	3 km, 6 km	Old borrow pit was discovered on 3+500 LHS which can be used for the project. Old borrow pit and asphalt plant were located on 6+500 RHS, which also can be used for the project.		Potential Material source to be verified
6.	8 km	The road alignment comes close to the shore Chu River  Chu River	Analysis of the quality of water in the oil, turbidity	Physical and chemical analysis.
7.	8 km	 Sary-Bulun caravansary (N42.400664 E76.099044) - around 8 km from Balykchy in the direction of Kochkor. RHS, 35 m from the road. This is ruin of roadside inn discovered in 1971-1973 by Vinnik D.F. Detected by archaeological investigation.		Visual
8.	10 km, Chu River, Tash-Saray village	Chu River runs along the road. The area is characterized as deserted piedmont close to the discharge point of Chu River. This river is regulated by Orto-Tokoy Reservoir. Its water is used for irrigational purposes. Maximum water flow is 120 m^3/sec. During construction, it may become necessary to erect retaining walls along the riverbank close to the road. Vegetation such as are sandthorns, cattails and willows were found along the riverbank.	Dust, noise, vibration, SO_x, NO_x	Special measures to protect water quality

№	Section	Description	Parameter	Comments
9.	11 km Tash-Saray village	Chu river runs adjacent to the road.		Physical and chemical analysis.
		One (1) tree may be cut down at LHS located 8.4 m from the center of the road. On the left is a cemetery of approximately 50m.		To be verified with the design
	11 km +500	The road comes close to Chu River reinforced concrete works, needed reconstruction reinforcing walls.	Analysis of the quality of water in the oil, turbidity	
	11 km + 700	One (1) tree may be cut down at RHS located 8.0 m from the center of the road.		To be verified with the design
10.	12 km	Old gravel-sand borrow pit is discovered (LHS 12 km), which can be used in road reconstruction.		Potential Material source to be verified
		Along the road, a power 10 thousand kW line was found.		Potential Hazard
11.	12+055 km	Irrigation canal, 1.1 km long 	Analysis of the quality of water in the oil, turbidity	Physical and chemical analysis.
12.	12-14 km	The road narrows, due to mountain foothills too close to the road (LHS); these may have to be cut by drilling and jackhammer.		To be verified with the design
		One (1) tree may be cut down at LHS located 8.4 m from the center of the road.		To be verified with the design
13.	14-15 km	Wide area		Possibly no change
14.	16 km	One (1) tree may be cut down at RHS located 8.8 m from the center of the road.		To be verified with the design
15.	17 km	One (1) tree may be cut down at LHS located 7.6 m from the center of the road.		To be verified with the design
16.	19 km +500	Road narrows to 12m due to rock formation. Removal may be carried out by drilling and jackhammer		To be verified with the design
17.	20 km	20 trees to be cut down at both LHS & RHS		To be verified with the design
18.	23 km	Irrigation canal with no water in it. Old borrow pit with sandy-gravel ground, RHS		Need to be replacement
19.	24 km	One (1) tree may be cut down at RHS located 7.9 m from the center of the road.		To be verified with the design
20.	30 km	One (1) tree may be cut down at RHS located 7.7 m from the center of the road.		To be verified with the design
21.	31 km	One (1) tree may be cut down at RHS located 6.5 m from the center of the road.		To be verified with the design
22.	31+750	Ravine		Need to be replacement

№	Section	Description	Parameter	Comments
23.	33 km, Orto-Tokoy Reservoir	In 200 m away from the road, there is Orto-Tokoy Reservoir, water protection area is 200 m. The reservoir is a habitat of osman and trout.		May require special measures for water quality protection
24.	41 km	The road narrows between mountains, it may be necessary remove obstacles by drilling, blasting works and jackhammer.		To be verified with the design
25.	42 km +600	The upper water source of the Ortho-Tokoy Reservoir, from the bridge of the Bishkek-Naryn-Torugart.	Analysis of the quality of water in the oil, turbidity	Physical and chemical analysis.
	50 km, Semizbel village, Ukek tributary	*Ukek tributary meets Chu river, there is an old borrow pit and asphalt plant which can be used for next 10 km*		*Outside of the project area*

Annex A2: Main Earth Work Proposed

No.	Km from	Km to	Type of earth work	Side	Length, m	Maximum width, m	Maximum height/depth t, m
1	12.260	12.800	Cut	LHS	540	10	11
2	12,860	13,000	Fill	RHS	140	20	5
3	13,120	13,940	Cut	LHS	820	10	12
4	14,060	14,280	Fill	LHS	220	30	3
5	14.700	15,200	Fill	RHS—Full width	500	40	4
6	15,420	15,780	Fill	Full width	360	30	4
7	17,340	17,920	Fill	LHS	580	40	3
8	18,300	18,360	Fill	LHS	60	30	3
9	20,200	20,280	Cut	LHS	80	10	5
10	20,360	20,460	Fill	RHS	100	30	3
11	20,980	21,000	Cut	LHS	20	10	4
12	22,760	23,000	Fill	LHS	240	30	4
13	23,220	23,320	Fill	RHS	100	30	3
14	23,380	23,680	Fill	LHS	220	40	4
15	30,040	31,220	Fill	RHS	180	30	3
16	31,680	31,900	Fill	RHS	220	30	4
17	33,680	33,740	Fill	RHS	60	30	3
18	34,040	34,100	Fill	LHS	60	30	3
19	36,740	36.820	Fill	LHS	80	30	3
20	37,240	37,380	Fill	RHS	60	30	3

Annex A3: Outline of Culvert in Section 1

Culverts crossing the main road

№	location km +	opening/diam, m	kind of waterway	intersection angle	length, with portal walls, m	pitch of culverts	direction of waterway	requirements
1	2	3	4	5	6	7	8	9
1	0+284	concrete box culvert open.1.0x1.0	irrigator	90°	23.72	0.011	from right to the left	replacing of existing culvert
2	2+681 (on turnaround 0+200)	concrete box culvert open.0.5x0.5	irrigator	90°	19.27	0.005	from left to the right	new culvert
3	7+156	reinforced concrete pipe d=1.0	bypass	90°	17.98	0.005	from left to the right	replacing of existing culvert
4	8+159	reinforced concrete pipe d=1.0	bypass	90°	18.99	0.009	from left to the right	new culvert
5	8+550	reinforced concrete pipe d=1.0	bypass	90°	22.04	0.005	from left to the right	new culvert
6	11+543	concrete box culvert open.1.0x1.0	irrigator	90°	18.63	0.006	from left to the right	replacing of existing culvert
7	12+909	reinforced concrete pipe d=1.5	bypass	90°	27.13	0.092	from left to the right	replacing of existing culvert
8	13+160	reinforced concrete pipe d=1.5	bypass	90°	18.78	0.005	from left to the right	new culvert (in the inlet wet well)
9	13+763	reinforced concrete pipe d=1.0	bypass	90°	17.98	0.011	from left to the right	replacing of existing culvert
10	14+259	reinforced concrete pipe d=1.0	bypass	90°	22.04	0.018	from left to the right	replacing of existing culvert
11	15+427	reinforced concrete pipe d=1.0	bypass	85°	22.04	0.049	from right to the left	replacing of existing culvert
12	16+456	reinforced concrete pipe d=1.0	irrigator	86°	17.98	0.007	from right to the left	replacing of existing culvert
13	17+300	reinforced concrete pipe d=1.0	bypass	90°	17.98	0.006	from right to the left	new culvert
14	18+326	reinforced concrete pipe d=1.0	bypass	90°	22.04	0.017	from right to the left	replacing of existing culvert
15	18+585	reinforced concrete pipe d=1.0	irrigator	90°	21.03	0.015	from right to the left	new culvert
16	20+178	reinforced concrete pipe d=1.5	bypass	88°	24.08	0.005	from right to the left	replacing of existing culvert
17	20+390	reinforced concrete pipe d=1.5	bypass	88°	24.08	0.008	from right to the left	replacing of existing culvert
18	20+670	reinforced concrete pipe d=1.0	irrigator	90°	22.04	0.040	from right to the left	replacing of existing culvert
19	21+478	reinforced concrete pipe d=1.0	bypass	90°	22.04	0.012	from right to the left	replacing of existing culvert
20	22+255	concrete box culvert open. 6.0x3.0	bypass	87°	18.25	0.010	from right to the left	replacing of existing culvert
21	22+502	r. c. box culvert open. 3.0x2.5	irrigation canal	85°	21.30	0.005	from right to the left	replacing of existing culvert
22	22+575	r. c. box culvert open. 2.0x2.0	bypass	90°	23.34	0.013	from right to the left	replacing of existing culvert
23	23+423	reinforced concrete pipe d=1.0	bypass	85°	23.07	0.040	from left to the right	replacing of existing culvert
24	24+592	reinforced concrete pipe d=1.0	bypass	90°	18.99	0.064	from left to the right	new culvert
25	25+300	reinforced concrete pipe d=1.0	bypass	90°	17.98	0.007	from left to the right	new culvert
26	26+397	reinforced concrete pipe d=1.0	bypass	86°	22.04	0.022	from left to the right	replacing of existing culvert

№	location km +	opening/diam, m	kind of waterway	intersection angle	length, with portal walls, m	pitch of culverts	direction of waterway	requirements
1	2	3	4	5	6	7	8	9
27	26+819	reinforced concrete pipe d=1.5	bypass	90°	17.98	0.019	from left to the right	replacing of existing culvert
28	27+253	reinforced concrete pipe d=1.5	bypass	87°	18.99	0.029	from left to the right	replacing of existing culvert
29	28+200	reinforced concrete pipe d=1.0	bypass	90°	17.98	0.011	from left to the right	new culvert
30	29+530	reinforced concrete pipe d=1.0	bypass	85°	20.02	0.043	from left to the right	replacing of existing culvert
31	30+040	r. c. box culvert open. 2.0x2.0	bypass	86°	25.40	0.033	from left to the right	replacing of existing culvert
32	30+515	reinforced concrete pipe d=1.5	bypass	49°	29.17	0.039	from left to the right	replacing of existing culvert
33	30+685	reinforced concrete pipe d=1.0	bypass	86°	21.03	0.030	from left to the right	replacing of existing culvert
34	30+953	reinforced concrete pipe d=1.0	bypass	88°	17.98	0.027	from left to the right	replacing of existing culvert
35	31+340	reinforced concrete pipe d=1.0	bypass	88°	17.98	0.018	from left to the right	replacing of existing culvert
36	31+790	r. c. box culvert open. 4.0x2.5	bypass	90°	18.27	0.009	from left to the right	replacing of existing culvert
37	32+870	reinforced concrete pipe d=1.5	bypass	87°	18.99	0.038	from left to the right	replacing of existing culvert
38	33+805	reinforced concrete pipe d=1.5	bypass	86°	18.99	0.035	from left to the right	replacing of existing culvert
39	34+082	reinforced concrete pipe d=1.5	bypass	90°	23.07	0.054	from left to the right	replacing of existing culvert
40	34+309	reinforced concrete pipe d=1.5	bypass	88°	18.99	0.044	from left to the right	replacing of existing culvert
41	34+703	reinforced concrete pipe d=1.5	bypass	80°	22.04	0.064	from left to the right	replacing of existing culvert
42	34+892	reinforced concrete pipe d=1.5	bypass	90°	25.09	0.087	from left to the right	replacing of existing culvert
43	35+288	reinforced concrete pipe d=1.5	bypass	87°	21.03	0.050	from left to the right	replacing of existing culvert
44	35+469	reinforced concrete pipe d=1.5	bypass	78°	22.04	0.032	from left to the right	replacing of existing culvert
45	35+517	reinforced concrete pipe d=1.5	bypass	90°	24.08	0.037	from left to the right	replacing of existing culvert
46	36+148	reinforced concrete pipe d=1.0	bypass	90°	21.03	0.036	from left to the right	replacing of existing culvert
47	36+380	reinforced concrete pipe d=1.0	bypass	90°	18.99	0.030	from left to the right	replacing of existing culvert
48	36+584	reinforced concrete pipe d=1.0	bypass	87°	21.03	0.039	from left to the right	replacing of existing culvert
49	36+757	reinforced concrete pipe d=1.5	bypass	90°	23.07	0.034	from left to the right	replacing of existing culvert
50	37+161	reinforced concrete pipe d=1.5	bypass	83°	22.04	0.032	from left to the right	replacing of existing culvert
51	37+329	reinforced concrete pipe d=1.5	bypass	80°	27.03	0.026	from left to the right	replacing of existing culvert
52	37+761	reinforced concrete pipe d=1.5	bypass	81°	21.03	0.030	from left to the right	replacing of existing culvert
53	38+461	reinforced concrete pipe d=1.0	bypass	71°	22.04	0.043	from left to the right	replacing of existing culvert
54	38+688	reinforced concrete pipe d=1.0	bypass	90°	20.02	0.014	from left to the right	replacing of existing culvert

№	location	opening/diam, m	kind of waterway	intersection angle	length, with portal walls, m	pitch of culverts	direction of waterway	requirements
	km +							
1	2	3	4	5	6	7	8	9
55	38+878	reinforced concrete pipe d=1.5	bypass	90°	21.03	0.030	from left to the right	replacing of existing culvert
56	39+291	reinforced concrete pipe d=1.5	bypass	90°	17.98	0.024	from left to the right	replacing of existing culvert
57	39+410	reinforced concrete pipe d=1.0	bypass	90°	17.98	0.018	from left to the right	replacing of existing culvert
58	40+004	reinforced concrete pipe d=1.0	bypass	90°	18.99	0.005	from left to the right	new culvert
59	40+555	reinforced concrete pipe d=1.0	ravine	90°	17.98	0.010	from left to the right	new culvert
60	40+812	reinforced concrete pipe d=1.5	bypass	90°	21.03	0.085	from left to the right	replacing of existing culvert
61	41+069	reinforced concrete pipe d=1.5	bypass	90°	30.18	0.090	from left to the right	replacing of existing culvert
62	41+521	reinforced concrete pipe d=1.0	ravine	90°	20.00	0.022	from left to the right	replacing of existing culvert
63	42+888	reinforced concrete pipe d=1.0	ravine	90°	20.00	0.064	from left to the right	replacing of existing culvert

Culvert crossing the ramp

№	location			opening/diam, m.	kind of waterway	Intersection angle	length, (with headwalls), m	pitch of culverts	direction of waterway	requirements for repairing
	km +	km + on ramp								
1	2	3	4	5	6	7	8	9	10	11
1	0+234	0+017	to the left	concrete box culvert 0.5x0.5	bypass	90°	16.2	0.03	from left to the right	new culvert
2	0+293	0+023	to the left	concrete box culvert 0.5x0.5	bypass	82°	####	0.01	from left to the right	new culvert
3	0+426	0+026	to the left	concrete box culvert 0.5x0.5	bypass	88°	9.11	0.01	from left to the right	new culvert
4	0+526	0+029	to the left	concrete box culvert 0.5x0.5	bypass	90°	####	0.01	from left to the right	new culvert
5	0+590	0+031	to the left	reinforced concrete pipe d=1.0	bypass	76°	####	0.03	from left to the right	new culvert
6	5+330	0+023	to the left	concrete box culvert 0.5x0.5	bypass	90°	####	0.01	from right to the left	new culvert

Annex B - List of Local Attendees in the Public Consultation in Balykchy

17 Mar. 2016

Attendance sheet:

No.	Full name	Position	Place of residence / Telephone	Signature
1	Ustabaev J.K.		Kyzyl-Oi village / 0557 909073	/signed/
2	Duishonkan uulu		Kozhomkul village /0770 306589	/signed/
3	Otunchiev U.Sh.	Head of Suusamyr village authority	Suusamyr village /0551 156263	/signed/
4	Ashyr uulu Chyngyzbek	Electrician, SUES	Tunuk village, 0770 186788	/signed/
5	Takyrbasheva E.	Head of FEO, village authority	Suusamyr village /0773 439648	/signed/
6	Alymkulova R.	Cashier of village authority	Suusamyr village /0770 269951	/signed/
7	Asanaliev T.	Head of club of Suusamyr v/a	Suusamyr village /0773 201972	/signed/
8	Akylbekov T.	Farmer	Kyzyl-Oi village / 0552 109920	/signed/
9	Ismailov M.	Municipal property specialist	Suusamyr village /0772 678554	/signed/
10	Tazhybekov N.		Kyzyl-Oi village /0555 556637	/signed/
11	Ryspaev M.	Elder	Kyzyl-Oi village /0559 251257	/signed/
12	Kochorov Satybaldy	Inspector of MOS	Suusamyr village /0777 329499	/signed/
13	Kulserekov M.	Land specialist	Suusamyr village /0777 326824	/signed/
14	Murataliev B.		Kozhomkul village /0550 797918	/signed/

Список присутствующих

ФИО	Должность	Место проживания / телефон	Подпись
Кутманов Б.С.	Орто-Токой айыл башчысы	пос Орто-Токой 0772281004	[signature]
Борбаше Б.К.	ОП „Газомечк"	г. Балыкчы 0778391984	[signature]
Кененбаева А.П.	зав. отделом	г. Балыкчы, 0705317195	[signature]
Абдылдаев Б.	нач отд ГТС Орто-Токой	г Балыкчы 0772112003	[signature]
Мукамбетов С.Д.	гл.спец.м.архит г. Балыкчы	г.Балыкчы 0701711153	[signature]
Мадамова Б.Б.	гл. спец Архитектура	г. Балыкчы 0779302414	[signature]
Токтоналиев И.	Директор „Водоканал"	г Балыкчы 0772690380	[signature]
Шейшенов К	Зам. дир. Зеленхоз	г Балыкчы 0773621353	[signature]
Акиров А	частник	г Балыкчы 0552871771	[signature]
Ойтеков Т.С	нач. УОВ	п Орто Токой	[signature]
Ажибаев М	Балыкчы РЭС	г Балыкчы / 0773240894	[signature]

Annex C – Written Comments, Recommendations and Questions

1. Name: Bermet Madanova

Residential address: 25 Sultanov Street

Proposals concerning the road rehabilitation project:

Contractor needs to arrange sidewalks on both sides of the Naryn highway including lighting, lay sleeve pipes to be used for utility purposes later.

Questions related the road rehabilitation project:

As the road is going to be the road of Category (B) II, do we need to clear out whether 16 meters area on both sides of the road to keep it free?

2. Name: A.T. Kenenbaeva

Residential address: Balykchy town

Proposals concerning the road rehabilitation project:

Asphalt concrete mixing plant should be arranged far from the territory of the "Issyk-Kul" Biosphere Zone.

Questions related the road rehabilitation project:

Where will asphalt concrete mixing plant be located?

Type and place of origin of planting material

Where will vehicles be refueled and repaired?

Is the Contractor going to plant new trees instead of cut?

3. Name: B.S. Kutmanov

Residential address: Orto-Tokoy Village

Proposals concerning the road rehabilitation project:

Contractor needs to renew the bridge over the channel feeding water to Tash-Sarai village without interrupting water supply process.

We shall highly appreciate if you keep on providing information about the project implementation process.

Removed poles of power transmission lines should be recovered.

We ask you to repair 3 km road connecting the Orto-Tokoy Village with the road to be rehabilitated.

We ask you to remove the rock on the way to Orto-Tokoy Village

Questions related the road rehabilitation project:

Will the Contractor install lighting inside the Tash-Sarai Village?

Will the Contractor repair at least 25 meters of secondary roads connected with the highway to be rehabilitated?

4. Name: Ozubekova Tinatin

Residential address: Orto-Tokoy Village

Proposals concerning the road rehabilitation project:

As we have neither schools, nor kindergartens, we please you to repair the road going to Orto-Tokoy Village from the highway to be rehabilitated.

As Orto-Tokoy Village belongs to the Balykchy authority and is located 18 km away from Balykchy town, we please you to repair 3 km road connecting the Orto-Tokoy Village with the road to be rehabilitated.

Questions related the road rehabilitation project:

5. Name: K. Sheishenov

Residential address: 6 Vostochnaya Street, Balykchy

Proposals concerning the road rehabilitation project:

This is good project, I wish you every success in you work

Questions related the road rehabilitation project:

No questions

6. Name: Karypbai Borbashev

Residential address: “Tazalyk” Municipal Enterprise

Proposals concerning the road rehabilitation project:

The Contractor needs to arrange elevated bridge for railway on the intersection of railway and highway to be rehabilitated. Install at least 4 traffic lights around that place

Questions related the road rehabilitation project:

Who will pay for removal of PTL poles and how private properties of rural people to be moved during the construction of road be compensated?

Will street lighting be installed?

7. Name: S.D. Mukambetov

Residential address: 145 Alymkanov Street, Balykchy

Proposals concerning the road rehabilitation project:

Please provide for traffic lights within the city area.

Questions related the road rehabilitation project:

Does the project provide for ditches network within the city area?

Annex D – Transcript of the video recording in Balykchy

Mr. Ruslan, IPIG/MoTR:

Now the category of the road is the 3rd category. It will be transformed into the 2nd category. Width of the road, its shoulder will be changed. Those places, where stone falls happen, will be protected through construction of high concrete walls protecting the road from stone falls.

Here is Mr. Almaz, ecologist of the ADB and Mr. Sam, representative of KOCKS Company, who is preparing environmental report, Mr. Asylbek, environmental specialist of the MoTR and me, Mr. Ruslan Satylbaldiev, representative of the IPIG/MoTR.

We have come here to discuss environmental matters. This is Mr. Sam, environmental specialist of ADB, who will tell you about possible environmental impacts and ways to mitigate the same.

Now, please pay attention to the speech of Mr. Sam.

Mr. Sam's speech: 12:35 (first video ends)– second video 1:00

Representative of Orto-Tokoy v/a:

There is a rock on the way to Orto-Tokoy, will you remove it?

Mr. Asylbek, IPIG/MoTR:

We recommend that you should apply in written to the MoTR with your request through describing you concerns.

Mr. Asylbek, IPIG/MoTR:

It is a fact that the Project will start in a year. However, we do not know what time it will start, either in spring or in summer. So, take your time to tell us about your requests/concerns in written in order we would be able to include them into the Project.

Representative of Orto-Tokoy v/a:

There is an area close to Tash-Sarai village, where stone fall occurs frequently.

Mr. Ruslan, IPIG/MoTR:

Contractor will never perform blasting operations in regard to rocks/mountains, if they are located far from the road to be reconstructed.

Person wearing Kyrgyz national headwear (Karypbai Borbashev):

Where will the asphalt-mixing plant be located?

Mr. Ruslan, IPIG/MoTR:

We are currently conducting feasibility study during which we shall determine location of such plant. Nevertheless, they will be located far from settlement areas.

Person wearing Kyrgyz national headwear:

There is one asphalt-mixing plant near the Kok-Moinok area. You had better use that.

Mr. Ruslan, IPIG/MoTR:

That asphalt mixing plant belongs to Chinese Company. We currently do not know who the Contractor is. After tender results, the Contractor will be identified. If it is Chinese company, then of course they will use that asphalt mixing plant.

Mayor of Balykchy Mayor's Office:

How many lanes will be there?

Mr. Ruslan, IPIG/MoTR:

As the road will be the 2nd category road, there will be 2 lanes. The road is divided into 4 types. Lane width will be about 3.5 – 3.75 m, carriageway width – 7.00-7.50.

As the traffic in the Bishkek-Osh highway increased, the President of the Kyrgyz Republic Almazbek Sharshenovich instructed to divert traffic to other highways. Due to it, ADB is planning to reconstruct a highway from Balyckhy to Suusamyr/Too-Ashuu. ADB is currently conducting feasibility study.

Please, make sure that all your requests are done in written before preparation of documentation, otherwise it will too late to include any request into the project (irrigation pipes to cross the reconstructed road, traffic lights etc.).

Woman, representative of Orto-Tokoy Village Authority:

Orto-Tokoy Village belongs to the Balykchy authority and is located 18 km away from Balykchy town. As we have neither schools, nor kindergartens, our children come to Balykchy town to study. We please you to repair 3 km road connecting the Orto-Tokoy Village with the road to be rehabilitated.

Mr. Ruslan, IPIG/MoTR:

The project shall cover the road and road-related structures. As for the 3 km secondary road you are asking to rehabilitate, it is not included in the project. Nevertheless, if the Contractor saves money during reconstruction of that part of the road, he might help you to solve that issue. All the same, make sure that it is included in your protocols and written requests.

Traffic lights are part of the project. Make sure that you specify the place where it should be installed in your written requests. Actually, traffic lights shall be installed according to standards and number of people to cross the street. If there are few people, the Contractor shall rather arrange pedestrian crossing (zebra). As for places near schools, where children cross the street, the Contractor shall install traffic lights.

You have ring road over there; you may request the Contractor to install traffic lights there and on the place where people cross the street to reach the oil refinery and warehouses.

Mayor of Balykchy Mayor's Office:

Will the Contractor arrange for the sewage system?

Mr. Ruslan, IPIG/MoTR:

You may instruct the Clean Water Authority to provide schemes of sewage system's pipes to be laid under the road to the MoTR so the latter could be able to include it into the Project.

Mayor of Balykchy Mayor's Office is talking with people came from different villages:

In spite of whether sewage system is specified in the General Plan or not and we want it or do not want it, we will surely need it in near future. We shall make sure that sewage, irrigation and clean water system's pipes are provided for in the project. Therefore, we need to prepare details.

Karypbai Borbashev:

We have understood environmental matters and measures to mitigate negative impacts very good thanks to presentation. Thank you very much. We have experience with China Road Company, which removed, shifted and re-installed electric poles during construction of the road. My

question is who will cover expenses related with such activity during reconstruction of the road under consideration?

You were telling during presentation that if any house, shed or similar structure will be removed due to road, its owner would be compensated. I wonder whether the Contractor will compensate the entire cost of such structure.

Mr. Ruslan, IPIG/MoTR:

That matter has been provided for in the Project. Owners of structures to be removed because of road will be compensated. Specialists will identify the cost of the structure, the Government shall receive funds and distribute to owners of destroyed/removed structures.

We remember the case with Kyz-Kuyoo dwellers. They asked for compensation and when the Government came with compensation, they said that the Government calculated the cost according to prices of 2010. They requested the Government to calculate according to prices of 2011 as inflation took place within a year. When the Government came with compensation according to prices of 2011, dwellers said that they should be paid by 15 000 USD. At the end, the road was left without reconstruction.

Currently the feasibility study is being made. The study shall identify what kind of structure will removed, how much it costs, who is the owner of that structure, how many electric poles will be removed – everything will be identified and provided to the Contractor. Here I should underline that houses, fences, sheds – any private structures will be compensated from the Kyrgyzstan budget.

In addition, I would like to inform you that the Government adopted a Resolution, under which no land plot will be leased, sold or occupied by any structure within 32 m area away from the center of the road until the road has been completely reconstructed.

Karypbai Borbashev:

If you go westward from the ring road, you may notice that there is railway crossroad. It would be very good if you arranged elevated bridge for railway on the intersection of railway and highway to be rehabilitated.

Contractor must install a traffic light on the place close to the ring road and arrange for sidewalks.

What can you say about electric lighting?

Mr. Ruslan, IPIG/MoTR:

Good notice. Make sure that it is included in the minutes.

Electric lighting will be installed inside villages. However, make sure that you have specified that in your written requests so that designers could study it.

Representative of Tash-Sarai village:

There is irrigation channel in Tash-Sarai village used by people, to which water comes through the pipe laid under the road. How will you construct the road without interruption of water supply?

Mr. Ruslan, IPIG/MoTR:

The Contractor shall lay a new pipe near the existing one. When it is laid, it shall divert water to the new pipe and remove old one. So, water supply will not be interrupted.

Representative of Tash-Sarai village:

There is a house in Tash-Sarai village, which was built illegally. Will it be resettled?

Mr. Ruslan, IPIG/MoTR:

According to obtained information, no house will be removed in this section. There are specialists identifying houses/structures to be removed.

Representative of Tash-Sarai village:

Will the Contractor hire local people?

Mr. Ruslan, IPIG/MoTR:

Yes, of course. However, there is one fact to be taken into account; we do not know who will become a Contractor. If Chinese Company wins the tender, I am afraid that local people won't be hired, because you know that Chinese workers start working early in the morning and work till the very evening without rest. Our workers might not be able to withstand such condition.

Representative of Tash-Sarai village:

There are secondary roads inside villages. What section of such roads will be asphalt coated starting from the junction with the highway?

Mr. Ruslan, IPIG/MoTR:

About 15-25 m of secondary roads inside villages will be asphalt coated.

Karypbai Borbashev:

Where will you set pits?

Mr. Ruslan, IPIG/MoTR:

Currently feasibility study is being made, which shall identify all the pits along the road, identify whether they are private or public, whether their materials are useful or not.

Karypbai Borbashev:

After having excavated the pits, will you fill them back? What about debris, how will you remove it?

Mr. Ruslan, IPIG/MoTR:

All construction debris will be filled up and compacted as required.

Mr. Ruslan, IPIG/MoTR:

Address all your proposals/requests to the MoTR in written and underline that they are related to the Road Reconstruction Project.

I strongly hope that head of village authorities, mayors will render great assistance to us in our work.

Mayor of Balykchy Mayor's Office:

As for matters related to the town, I'll do my best to help you. As for village authorities, there are heads thereof, who I believe will help you as well.

Annex E – Results of laboratory analysis

1. Air quality

КЫРГЫЗ РЕСПУБЛИКАСЫНЫН ӨКМӨТҮНӨ КАРАШТУУ КУРЧАП ТУРГАН ЧӨЙРӨНҮ КОРГОО ЖАНА ТОКОЙ ЧАРБАСЫ БОЮНЧА МАМЛЕКЕТТИК АГЕНТТИКТИН ЭКОЛОГИЯЛЫК МОНИТОРИНГ БАШКАРМАЛЫГЫ

УПРАВЛЕНИЕ ЭКОЛОГИЧЕСКОГО МОНИТОРИНГА ГОСУДАРСТВЕННОГО АГЕНТСТВА ОХРАНЫ ОКРУЖАЮЩЕЙ СРЕДЫ И ЛЕСНОГО ХОЗЯЙСТВА ПРИ ПРАВИТЕЛЬСТВЕ КЫРГЫЗСКОЙ РЕСПУБЛИКИ

720005, г. Бишкек, ул. Байтик-Баатыра, 34 тел. (996-312) 54-07-65, факс: 54-07-66

ПРОТОКОЛ
АНАЛИЗА ПРОБ АТМОСФЕРНОГО ВОЗДУХА

№ 220-235

1. Наименование предприятия, организации (заявитель):
Иссык-Кульская, Нарынская, Чуйская области
Автодорога «Балыкчы – Кочкор – Жумгал - Суусамыр»

2. Место отбора проб:

220-Кольцевая г.Балыкчы(нач.уч.)	*228-с.Дыйкан(школа)*
221-с.Таш-Сарай (жил.дом)	*229-с.Байзак(маг.Адилет)*
222-с.Кок-Жар(маг.Рахат)	*230-с.Чаек (дом ветеранов)*
223-с.Чекилдек (маг.Ак-Жол)	*231-с.Кызыл-Жылдыз(спорт.компл.)*
224-с.Ак-Учук (мечеть)	*232-с.Кызыл-Ой (школа)*
225-с.Жумгал (школа)	*233-с.Кожомкул (школа)*
226- с.Куйручук(маг.Азамат)	*234-с.Суусамыр(мил.пункт)*
227-с.Туголсай (маг.Кутман)	*235-с.Тунук (школа)*

3. Цель отбора проб: *Определение концентрации загрязняющих веществ в атмосферном воздухе*

4. Кем отобраны пробы: *гл.спец. Райкеевой Р.Н., спец. Жаманаковой А.Н.*

5. Дата и время отбора проб: *30.11.- 02.12.2015г., с 10ч.00мин.-17ч.00мин.*

6. Характер отобранных проб: *разовый*

7. Метод анализа: *1. Руководство по контролю загрязнения атмосферы РД 52.04. 186-89*

8. Даты проведения испытаний: *04.12.- 10.12.2015г.*

КЫРГЫЗ РЕСПУБЛИКАСЫНЫН ӨКМӨТҮНӨ КАРАШТУУ КУРЧАП ТУРГАН ЧӨЙРӨНҮ КОРГОО ЖАНА ТОКОЙ ЧАРБАСЫ БОЮНЧА МАМЛЕКЕТТИК АГЕНТТИКТИН ЭКОЛОГИЯЛЫК МОНИТОРИНГ БАШКАРМАЛЫГЫ

УПРАВЛЕНИЕ ЭКОЛОГИЧЕСКОГО МОНИТОРИНГА ГОСУДАРСТВЕННОГО АГЕНТСТВА ОХРАНЫ ОКРУЖАЮЩЕЙ СРЕДЫ И ЛЕСНОГО ХОЗЯЙСТВА ПРИ ПРАВИТЕЛЬСТВЕ КЫРГЫЗСКОЙ РЕСПУБЛИКИ

720005, г. Бишкек, ул. Байтик Баатыра, 34 тел. (996-312) 54-07-65, факс: 54-07-66

ПАСПОРТ НА ПРОБУ

1. **Наименование, адрес объекта:** Иссык-Кульская, Нарынская Чуйская области автодорога „Балыкчы - Кочкор - Жумгал - Суусамыр"
2. **Место отбора проб:** 1. Кольцевая г. Балыкчы, 2. с. Таш-Сарай (напр. жил. домов), 3. с. Кок-Жар (маг. „Рахат"), 4. с. Чекилдек (маг. „Ак-Жол"), 5. с. Ак-Чук (мечеть), 6. с. Жумгал (школа), 7. с. Кубргуч (маг. „Азамат"), 8. с. Туголсай (маг. „Кутман"), 9. с. Дыйкан (школа), 10. с. Байзак (маг. „Адилет"), 11. с. Чаек (дом ветер.), 12. с. Кызыл-Жылдыз (спорт. площ.), 13. с. Кызыл-Ой (школа), 14. с. Кожомкул (школа), 15. с. Суусамыр (мед. пункт), 16. с. Тунук (школа).
3. **Цель отбора:** Определение концентрации загряз-х веществ в атмосф. воздухе
4. **Характер отобранных проб:** разовые
5. **Условия окружающей среды:** ясно, солнечно
6. **Условие отбора проб:**
7. **Дата отбора проб:** 30.11 - 02.12.2015г, с 10^{00} - 17^{00}
8. **Метод отбора проб:** *1.РД 52.04.186-89 "Руководство по контролю загрязнения атмосферы". 2.ГОСТ Р 50820-95 Оборудование газоочистное и пылеулавливающее. Методы определения запыленности газопылевых потоков.*

Представитель УЭМ Глав. спец. [подпись] Райкеева Р.Н.; спец. [подпись] Жаманакова А.Н.
(должность, фамилия)

Госинспектор
(должность, фамилия)

Представитель предприятия эколог компании КОСКВ [подпись] Атамашева Н.
(должность, фамилия)

1 стр из 1

Наимен-е ингред-в	Ед. изм.	Данные анализа по точкам												
		220	Прев. ПДК макс. раз.	221	Прев. ПДК макс. раз.	222	Прев. ПДК макс. раз.	223	Прев. ПДК макс. раз.	224	Прев. ПДК макс. раз.	225	Прев. ПДК макс. раз.	ПДК макс. раз.
Диоксид серы	*мг/м³*	*0,05± 0,006*	-	*<0,05*		*<0,05*	-	*<0,05*	-	*<0,05*	-	*<0,05*	-	**0,5**
Диоксид азота	*мг/м³*	*0,022± 0,004*	-	*0,027± 0,005*	-	*<0,02*	-	*0,023± 0,004*	-	*0,017± 0,003*	-	*0,018± 0,003*	-	**0,085**
Взв.вещ-ва (пыль)	*мг/м³*	*0,29± 0,07*	-	*<0,26*	-	*<0,26*	-	*0,28± 0,07*	-	*0,28± 0,07*	-	*<0,26*	-	**0,5**
Наимен-е ингред-в	**Ед. изм.**	**226**	**Прев. ПДК макс. раз.**	**227**	**Прев. ПДК макс. раз.**	**228**	**Прев. ПДК макс. раз.**	**229**	**Прев. ПДК макс. раз.**	**230**	**Прев. ПДК макс. раз.**	**231**	**Прев. ПДК макс. раз.**	**ПДК макс. раз.**
Диоксид серы	*мг/м³*	*<0,05*		*<0,05*	-	*<0,05*	-	*0,05± 0,006*	-	*<0,05*	-	*<0,05*	-	**0,5**
Диоксид азота	*мг/м³*	*<0,02*	-	*0,017± 0,003*	-	*0,029± 0,005*	-	*0,025± 0,005*	-	*0,015± 0,003*	-	*0,011± 0,002*	-	**0,085**
Взв.вещ-ва (пыль)	*мг/м³*	*0,28± 0,07*	-	*0,28± 0,07*	-	*<0,26*	-	*0,28± 0,07*	-	*0,28± 0,07*	-	*<0,26*	-	**0,5**

Наимен-е ингред-в	Ед. изм.	Данные анализа по точкам										
		232	Прев. ПДК макс. раз.	233	Прев. ПДК макс. раз.	234	Прев. ПДК макс. раз.	235	Прев. ПДК макс. раз.			ПДК макс. раз.
Диоксид серы	*мг/м³*	*0,03± 0,004*	-	*0,043± 0,005*	-	*0,04± 0,005*	-	*0,057± 0,007*	-			**0,5**
Диоксид азота	*мг/м³*	*0,021± 0,004*	-	*0,027± 0,005*	-	*0,031± 0,006*	-	*0,035± 0,006*	-			**0,085**
Взв.вещ-ва (пыль)	*мг/м³*	*<0,26*	-	*0,28± 0,07*	-	*<0,26*	-	*<0,26*	-			**0,5**

Главный специалист **Т. Садыкбеков**

Исполнитель **не несет ответственности**, если проба отобрано самим заказчиком
Перепечатка протокола без разрешения испытательной лаборатории **запрещена**
Протокол испытаний касается **только** образцов, подвергнутых испытаниям

**КЫРГЫЗ РЕСПУБЛИКАСЫНЫН ӨКМӨТҮНӨ КАРАШТУУ
КУРЧАП ТУРГАН ЧӨЙРӨНҮ КОРГОО ЖАНА ТОКОЙ ЧАРБАСЫ БОЮНЧА МАМЛЕКЕТТИК АГЕНТТИКТИН ЭКОЛОГИЯЛЫК МОНИТОРИНГ БАШКАРМАЛЫГЫ**

**УПРАВЛЕНИЕ ЭКОЛОГИЧЕСКОГО МОНИТОРИНГА
ГОСУДАРСТВЕННОГО АГЕНТСТВА ОХРАНЫ ОКРУЖАЮЩЕЙ СРЕДЫ И
ЛЕСНОГО ХОЗЯЙСТВА ПРИ ПРАВИТЕЛЬСТВЕ КЫРГЫЗСКОЙ РЕСПУБЛИКИ**

720005, г. Бишкек, ул. Байтик- Баатыра, 34 тел. (996-312) 54-07-65, факс: 54-07-66

05/178 от 03.12.2015г

Директору
KOCKS CONSULT GMBH
Карстен Гризе

Управление экологического мониторинга ГАООС и ЛХ при ПКР не может выдать результаты по окиси углерода (CO) в атмосферном воздухе по причине непригодности газоанализатора ПГА-200.

Справка о непригодности прибора ПГА-200 прилагается на 1 л.

Начальник **Б.Маматаиров**

2. Water quality

КЫРГЫЗ РЕСПУБЛИКАСЫНЫН ӨКМӨТҮНӨ КАРАШТУУ
КУРЧАП ТУРГАН ЧӨЙРӨНҮ КОРГОО ЖАНА ТОКОЙ ЧАРБАСЫ БОЮНЧА
МАМЛЕКЕТТИК АГЕНТТИКТИН ЭКОЛОГИЯЛЫК МОНИТОРИНГ БАШКАРМАЛЫГЫ

УПРАВЛЕНИЕ ЭКОЛОГИЧЕСКОГО МОНИТОРИНГА
ГОСУДАРСТВЕННОГО АГЕНТСТВА ОХРАНЫ ОКРУЖАЮЩЕЙ СРЕДЫ И
ЛЕСНОГО ХОЗЯЙСТВА ПРИ ПРАВИТЕЛЬСТВЕ КЫРГЫЗСКОЙ РЕСПУБЛИКИ

720005, г. Бишкек, ул. Байтик- Баатыра, 34 тел. (996-312) 54-07-65, факс: 54-07-66

Аттестат аккредитации
№ KG 417/КЦА.ИЛ.049
от 05. 04. 2013 г.
***-метод не аккредитован**

ПРОТОКОЛ
АНАЛИЗА ПРОБ ВОДЫ

№ 513-519

1. **Наименование предприятия, организации (заявитель);**
Иссык-кульская, Нарынская, Чуйская обл., автодорога Балыкчи-Кочкор-Жумгал- Суусамыр.

2. **Место отбора проб;**
513- р.Чу, с. Таш-Сарай (мост)
514-р.Чу, гидропост
515-р. Джоон-Арык, с.Кок-Жар(мост)
516-р.Жумгал, с. Чаек (мост)
517- р. Кокомерен, с. Арал (мост)
518- р. Кокомерен, с.Кызыл-Ой (мост)
519-р.Каракол, с. Кожомкул (мост)

3. **Цель отбора проб;** *Определение прозрачности, нефтепродуктов*

4. **Кем отобраны пробы;** *Спец.УЭМ Жаманаковой, Райкеевой*

5. **Дата и время отбора проб;** *30.11-02.12.2015 г., 10.00-17.00*

6. **Дата(ы) проведения испытаний;** *02.12.2015 г.*

КЫРГЫЗ РЕСПУБЛИКАСЫНЫН ӨКМӨТҮНӨ КАРАШТУУ КУРЧАП ТУРГАН ЧӨЙРӨНҮ КОРГОО ЖАНА ТОКОЙ ЧАРБАСЫ БОЮНЧА МАМЛЕКЕТТИК АГЕНТТИКТИН ЭКОЛОГИЯЛЫК МОНИТОРИНГ БАШКАРМАЛЫГЫ

УПРАВЛЕНИЕ ЭКОЛОГИЧЕСКОГО МОНИТОРИНГА ГОСУДАРСТВЕННОГО АГЕНТСТВА ОХРАНЫ ОКРУЖАЮЩЕЙ СРЕДЫ И ЛЕСНОГО ХОЗЯЙСТВА ПРИ ПРАВИТЕЛЬСТВЕ КЫРГЫЗСКОЙ РЕСПУБЛИКИ

720005, г. Бишкек, ул. Байтик Баатыра, 34 тел. (996-312) 54-07-65, факс: 54-07-66

ПАСПОРТ НА ПРОБУ
(ВОДА)

1. **Наименование, адрес объекта:** Иссык-Кульская, Нарынская, Чуйская области автодорога „Балыкчы – Кочкор – Ат-Башы – Сарыбулун"
2. **Место отбора проб:** 1. р. Чу, с. Таш-Сарай (мост), 2. р. Чу, гидропост, 3. р. Джоон-Арык, с. Кок-Жар (мост), 4. р. Ат-Башы, с. Чаек (мост), 5. р. Кокомерен, с. Арал (мост), 6. р. Кокомерен, за с. Кызыл-Ой (мост), 7. р. Каракол, за с. Боконбаево (мост)
3. **Цель отбора:**
4. **Характер отобранных проб:** розовый
5. **Условия окружающей среды** ясно, солнечно
6. **Дата отбора проб:** 30.11 – 02.12.2015г, с 10⁰⁰ – 17⁰⁰
7. **Метод отбора проб:** *ГОСТ Р 51592-2000 «Вода. Общие требования к отбору проб»; НВН 33-5.3.01-85 Инструкция по отбору проб для анализа сточных вод*

Представитель УЭМ Специалист Жаманакова А.А.
(должность, фамилия)

Госинспектор Асаналиева Н.
(должность, фамилия)

Представитель предприятия эколог компании КОСК S
(должность, фамилия)

Наименование ингредиентов	Ед. изм.	Данные анализа по точкам							ПДК		НД
		513	514	515	516	517	518	519	+	++	
Прозрачность*	См.	41	37	43	36	40	37	32			СЭВ ч.1 М. 1977
Нефтепродукты	мг/л	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	**0,05**	**0,3**	ПНД Ф 14.1:2:4.128-98

Главный специалист **С.В.Янова**

+Перечень рыбохозяйственных нормативов ПДК и ОБУВ вредных веществ для воды водных объектов, имеющих рыбохозяйственное значение. Контроль качества поверхностных вод, Госкомитет России по рыболовству, Москва 1999 г

++ГН 2.1.5.1315-03, ПДК химических веществ в воде водных объектов хозпитьевого и культбытового водопользовании, Минздрав России, Москва, 2003 г.

Исполнитель **не несет ответственности**, если проба отобрана самим заказчиком.
Перепечатка протокола без разрешения испытательной лаборатории **запрещена.**
Протокол испытаний касается **только** образцов, подвергнутых испытаниям.

3. Noise

These results were not quoted in this IEE.

Аттестат аккредитации Кыргызского центра аккредитации
№KG 41/КЦА .ИЛ.097 от 06.10.2010г.

Группа по контролю физических факторов Департамента госсанэпиднадзора
Министерства здравоохранения Кыргызской Республики

ПРОТОКОЛ ИЗМЕРЕНИЕ ШУМА
№_81_ от «_03_»__декабря__2015 г.

Юридическое лицо, индивидуальный предприниматель или физическое лицо, где производятся измерения **KOCKS проект АБР ТА 48401-002**

(наименование и юридический адрес)

Объект, где производятся измерения. **Альтернативия автодорога Север-Юг**
(наименование, фактический адрес)
Балыкчы-Кочкор-Чаек-Суусамыр ч-з суусамыр

Наименование средств измерений и сведения о государственной поверке:

Наименование средства измерения	Номер	Свидетельство о поверке		Поверено до
		номер	дата	
Октава 101А	№ 04А445	№592	16.03.2015г.	16.03.2016г.

1. Нормативная документация, в соответствии с которой проводились измерения

СН 2.2.4/2.1.8.562-96 «Шум на рабочих местах, в помещениях жилых, общественных зданий и на территории жилой застройки»

Источники физических факторов и их характеристики:
автомашины

общее количество страниц __3__: страница 1

These results were not quoted in this IEE.

Результаты измерений:

№	Место измерений	Характер шума						Уровни звукового давления в дБ в октавных полосах со среднеметрическими частотами в Гц										
		По спектру		По временным														
		Широкопол.	Тональный	постоянный	Колебл.	прерывистый	импульсный	31,5	63	125	250	500	1000	2000	4000	8000	Уровень звука (ДБ А)	
1	2	3	4		6	7	8	9	10	11	12	13	14	15	16	17	20	
1	Г. Балыкчы	+				+											43,1	Факт
																	70	ПДУ
																		прев
2	С. Таш-Сарай	+				+											40,2	факт
																	70	ПДУ
																		прев
3	С.Кок-Жар	+				+											57	факт
																	70	ПДУ
																		прев
4	С.Чекилдек	+				+											68,1	Факт.
																	70	ПДУ
																		прев
5	С.Ак-Учук	+				+											67,3	Факт.
																	70	ПДУ
																		прев
6	С.Жумгал	+				+											69	факт
																	70	ПДУ
																		прев
7	С.Куйручук	+				+											58	факт
																	70	ПДУ
																		прев
8	С.Туголсай	+				+											53	факт
																	70	ПДУ
																		прев
9	С.Дыйкан	+				+											42,7	Факт.
																	70	ПДУ
																		прев
10	С.Байзак	+				+											63,2	факт
																	70	ПДУ
																		прев
11	С.Чаек.	+				+											53	факт
																	70	ПДУ
																		прев
12	Конец с. Кызыл Жылдыз	+				+											55	факт
																	70	ПДУ
																		прев
13	с.Кызыл-Ой	+				+											52	факт
																	70	ПДУ
																		прев

общее количество страниц _3_: страница _2_

These results were not quoted in this IEE.

Результаты измерений:

№	Место измерений	Характер шума						Уровни звукового давления в дБ в октавных полосах со среднеметрическими частотами в Гц										
		По спектру		По временным														
		Широкопол.	Тональный	постоянный	Колебл.	прерывистый	импульсный	31,5	63	125	250	500	1000	2000	4000	8000	Уровень звука (ДБА)	
1	2	3	4		6	7	8	9	10	11	12	13	14	15	16	17	20	
14	С.Кожомкул	+				+											42	Факт
																	70	ПДУ
																		прев
15	С.Суусамыр	+				+											55	факт
																	70	ПДУ
																		прев
16	С.Тунук	+				+											54	Факт.
																	70	ПДУ
																		прев
		+				+												
		+				+												
		+				+												
		+				+												

Уполномоченный представитель объекта, присутствующий при проведении измерений:
фамилия, имя, отчество, должность_Асаналиева Н. Эколог проекта
подпись_____

	Должность	ФИО	Подпись
Измерения проводил(и)	Санитарный врач	Арзыкулов Ж.Т.	
Руководитель лаборатории:			

Протокол составляется в двух экземплярах, 1-й экземпляр выдается по месту требования, 2-й экземпляр остается в лаборатории.

Заключение По результатам измерений уровень шума вдоль дороги не превышает предельно-допустимого необнаружены.

Основание: СН 2.2.4/2.1.8.562-96 «Шум на рабочих местах, в помещениях жилых, общественных зданий и на территории жилой застройки»

Санитарный врач _____Арзыкулов Ж.Т.

общее количество страниц _3_: страница _3

4. Vibration

These results were not quoted in this IEE.

Аттестат аккредитации Кыргызского центра аккредитации
№KG 41/КЦА .ИЛ.097 от 06.10.2010г.

Группа по контролю физических факторов Департамента госсанэпиднадзора
Министерства здравоохранения Кыргызской Республики

ПРОТОКОЛ ИЗМЕРЕНИЕ ВИБРАЦИИ
№__82__ от «03 » декабря 2015 г.

Юридическое лицо, индивидуальный предприниматель или физическое лицо, где производятся измерения **KOCKS проект АБР ТА 48401-002**
(наименование и юридический адрес)

Объект, где производятся измерения **Альтернативня автодорога Север-Юг**
(наименование, фактический адрес)
Балыкчы-Кочкор-Чаек-Суусамыр ч-з суусамыр

Наименование средств измерений и сведения о государственной поверке:

Наименование средства измерения	Номер	Свидетельство о поверке		Поверено до
		номер	дата	
Октава 101в	№ 04А445	№ВА-06-05 7551	02.12.2014г.	02.12.2015г.

1. Нормативная документация, в соответствии с которой проводились измерения
СН 2.2.4/2.1.8.566-96 "Производственная вибрация, вибрация в помещениях жилых и общественных зданий

Источники физических факторов и их характеристики:
Грузовые автотранспортные средства и производственные оборудования завода

общее количество страниц __3__: страница 1

These results were not quoted in this IEE.

Результаты измерений:

№	Место измерений	Характер шума						Уровни звукового давления в дБ в октавных полосах со среднеметрическими частотами в Гц									Уровень звука (ДБА)	
		По спектру		По временным														
		Широкопол.	Тональный	Постоянный	Колебл.	прерывистый	импульсный			1,0	2,0	4,0	8,0	16,0	31,5	63		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	20	
1	Г. Балыкчы																92,4	Факт
																	108	ПДУ
																	-	прев
2	С. Таш-Сарай																91,7	Факт
																	108	ПДУ
																	-	прев
3	С.Кок-Жар																90	Факт
																	108	ПДУ
																	-	прев
4	С.Чекилдек																91,1	Факт
																	108	ПДУ
																	-	прев
5	С.Ак-Учук																91,2	Факт
																	108	ПДУ
																	-	прев
6	С.Жумгал																92	Факт
																	108	ПДУ
																	-	прев
7	С.Куйручук																91	Факт
																	108	ПДУ
																	-	прев
8	С.Туголсай																92,3	Факт
																	108	ПДУ
																	-	прев
9	С.Дыйкан																95	Факт
																	108	ПДУ
																	-	прев
10	С.Байзак																88	Факт
																	108	ПДУ
																	-	прев
11	С.Чаек.																90	Факт
																	108	ПДУ
																		прев
12	Конец с. Кызыл Жылдыз																87	Факт
																	108	ПДУ
																		прев
13	с.Кызыл-Ой																88	Факт
																	108	ПДУ
																		прев
14	С.Кожомкул																86	Факт
																	108	ПДУ
																		прев

бщее количество страниц _3_: страница _2 _

These results were not quoted in this IEE.

Результаты измерений:

№		Характер шума						Уровни звукового давления в дБ в октавных полосах со среднеметрическими частотами в Гц									Уровень звука (ДБА)	
		По спектру		По временным														
		Широкопол.	Тональный	Постоянный	Колебл.	прерывистый	импульсный			1,0	2,0	4,0	8,0	16,0	31,5	63		
1		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	20	
15	С.Суусамыр																92	Факт
																	108	ПДУ
																	-	прев
16	С.Тунук																91	Факт
																	108	ПДУ
																	-	прев

уполномоченный представитель объекта, присутствующий при проведении измерений:
фамилия, имя, отчество _____ должность **эколог** Кенжешева Н.А
подпись _____

	Должность	ФИО	Подпись
Измерения проводил(и)	Санитарный врач	Арзыкулов Ж.Т.	

Заключение: Согласно инструментальным замерам вибрация непостоянное, уровень вибрации по виброскорости на измеренных точках не превышает предельно-допустимого уровня.
Основание: Санитарные нормы СН 2.2.4/2.1.8.566-96 "Производственная вибрация, вибрация в помещениях жилых и общественных зданий

Санитарный врач _____ **Арзыкулов Ж.Т.**
общее количество страниц _3_: страница _3 _

Annex F: **Conclusion of the Ministry of Culture, Information and Tourism, KR**

These results were not quoted in this IEE.

КЫРГЫЗ РЕСПУБЛИКАСЫНЫН
МАДАНИЯТ, МААЛЫМАТ ЖАНА
ТУРИЗМ МИНИСТРЛИГИ

720040, Кыргыз Республикасы,
Бишкек ш., Пушкин көч. 78
ААК ЭСК Бишкек шаары, Бишкек филиалы
Э/эсеби № 12905223818110048
о/эсеби 202201121
ИНН 00807200410076 ОКПО 23540644
тел.+996 (312) 62-04 -82, факс 62-35-89
e-mail: mincult@mail.ru
web-site: http://www.mincult.gov.kg

МИНИСТЕРСТВО КУЛЬТУРЫ,
ИНФОРМАЦИИ И ТУРИЗМА
КЫРГЫЗСКОЙ РЕСПУБЛИКИ

720040, Кыргызская Республика,
г. Бишкек, ул. Пушкина, 78
Бишкекский филиал ОАО РСК
расчет № 12905223818110048
л/с 202201121
ИНН 00807200410076 ОКПО 23540644
тел.+996 (312) 62-04-82, факс 62-35-89
e-mail: mincult@mail.ru
web-site: http://www.mincult.gov.kg

«14» 04 2016 ж.
Чыгыш (исх.) № 04-3/1565
Киберилген (вх) №

Компании
KOCKS Consult GMBH

Koblenz,
Stegemannstr. 32/38
тел.: +49 261 1302-0

Министерство рассмотрев отчет «Археологического обследования на территории соединительных дорог – Альтернативная дорога Север-Юг, коридоры ЦАРЭС 1 и 3, общей протяженности 260 км на территориях Тонского района Иссык-Кульской области, Кочкорского и Жумгальского районов Нарынской области, Жайылского района Чуйской области Кыргызской Республики» выполненный Чаргыновым Т. - доцентом Кыргызского национального университета имени Ж. Баласагына, согласно Открытого листа формы № 3 и заключения комиссии от 25 апреля 2016 года образованного приказом Министерства культуры, информации и туризма Кыргызской Республики № 164 от 21 апреля 2016 года, сообщает следующее.

Заказчику согласно законодательства Кыргызской Республики в сфере историко-культурного наследия необходимо провести археологические раскопки и документирование «на снос» с привлечением специалистов-археологов на нижеследующих недвижимых объектах историко-культурного наследия, расположенных в зоне проектируемого строительства автодороги:

- могильник Куйручук 1 **(N41°58'41.0" E074°51'56.0")** (79-ый км. по обе стороны автодороги от Кочкора к Чаеку);

- могильник Кырчын 1 **(N41°52'24.2" E074°19'45.3")** (3,5 км. от поворота на право, мост через реку Кокомерен);

These results were not quoted in this IEE.

4" E074°19'20.3") (в 6-ти км. от поворота на право, мост через реку Кокомерен);

- могильник между селами Кырчын и Кызыл-Ой **(N41°54'46.8" E074°15'15.5")** (в 14-ти км. от поворота на право, мост через реку Кокомерен).

Также Заказчику обеспечить сохранность нижеследующих недвижимых объектов историко-культурного наследия с изменением маршрута проектируемого строительства автодороги в радиусе не менее 50 метров от могильника и организацией работ по разработке их охранных зон и представить на согласование. При не возможности исполнения вышеуказанных требований необходимо провести археологические раскопки и документирование «на снос» с привлечением специалистов-археологов, расположенных в зоне проектируемого строительства автодороги:

- объекты каменно-земляной насыпью **(N42.18314 E75.45456)** (27-ой км. автодороги от Кочкора к Чаеку);

- могильник **(N42°06'21.9" E075°12'00.5")** (44-ый км. автодороги от Кочкора к Чаеку (перевал Кызарт));

- могильник Кызарт **(N42°05'39.7" E 075°08'13.4")** (50-ый км. автодороги от Кочкора к Чаеку);

- могильник Куйручук **(N41.98436 E74.79124)** (86-ом км. автодороги от Кочкора к Чаеку);

- могильник **(N41°51'39.5" E074°20'00.4")** (в 2-х км. от поворота на право, мост через реку Кокомерен).

Заказчику разработать проект дороги в обход на тех территориях, где расположены и находятся под риском разрушения нижеследующие недвижимые объекты историко-культурного наследия (оседлого населения средневековья и этнографические погребально-поминальные сооружения) с привлечением представителей органов местного самоуправления и специалистов-археологов:

- Сары-Булунский караван-сарай **(N42.400664 E76.099044)** (8-ой км. от г. Балыкчы по направлению Кочкор);

- комплекс мавзолеев **(N41.97764 E74.91014)** (75-ый км. автодороги от Кочкора к Чаеку);

- комплекс мавзолеев **(N41.99129 E74.64144)** (100-м км. автодороги от Кочкора к Чаеку между селами Байзак и Дыйкан);

- **Кумбез Кожомкула** у въезда в село Кожомкул со стороны села Кызыл-Ой.

Кроме того, Заказчику организовать повторное археологическое обследование на наличие или отсутствие объектов историко-культурного наследия на отрезке автодороги от села Кожомкул до автодороги Бишкек-Ош.

В связи, с вышеизложенным с учетом выполнения вышеуказанных мероприятий будет рассмотрен вопрос проектируемого строительства «Соединительных дорог – Альтернативная дорога Север-Юг, коридоры

These results were not quoted in this IEE.

на территориях Тонского района Иссык-Кульской области, Кочкорского и Жумгальского районов Нарынской области, Жайылского района Чуйской области Кыргызской Республики».

Статс-секретарь Б. Секимов

Annex G: Letter from Department of Water Resources and Irrigation

КЫРГЫЗ
РЕСПУБЛИКАСЫНЫН
АЙЫЛ ЧАРБА ЖАНА
МЕЛИОРАЦИЯ МИНИСТРЛИГИ
Суу чарба жана мелиорация
департаменти

720055, Бишкек ш.,Токтоналиева көч, 4а,
Телефон: +(996 312) 549095,
факс: +(996 312) 549094

МИНИСТЕРСТВО
СЕЛЬСКОГО ХОЗЯЙСТВА
И МЕЛИОРАЦИИ
КЫРГЫЗСКОЙ РЕСПУБЛИКИ
Департамент водного хозяйства и
мелиорации

720055, г.Бишкек, ул. Токтоналиева 4 а,
Телефон: +(996 312) 549095,
факс: +(996 312) 549094

10.12.15 № 6-1824

Компания KOCKS CONSULT GMBH

Департамент водного хозяйства и мелиорации, рассмотрев Ваше обращение, сообщает следующее.

Максимальное наполнение Орто-Токойского водохранилища наблюдается в апреле, начале мая месяцах в объеме 470 млн. $м^3$. С началом вегетационных поливов водохранилище срабатывается до минимальных объемов около 40 млн. $м^3$ в зависимости от водности р.Чу. С середины октября по апрель следующего года производится накопление водохранилища. Ремонтные работы производятся в основном по телу плотины и на гидротехнических сооружениях, расположенных в теле плотины.

Согласно постановлению Правительства Кыргызской Республики от 07.07.1995 г. № 271 ширина водоохраной зоны для водохранилищ такого объема составляет 300 м.

Направляем в порядке информации.

Генеральный директор **К. Таштаналиев**

Исполнитель: А. Сулайманов
т.54-90-91

Annex H: Letter from General Directorate of Biosphere territory «Issyk-Kul»

КЫРГЫЗ РЕСПУБЛИКАСЫНЫН
ӨКМӨТҮНӨ КАРАШТУУ КУРЧАП
ТУРГАН ЧӨЙРӨНҮ КОРГОО ЖАНА
ТОКОЙ ЧАРБА
МАМЛЕКЕТТИК АГЕНТТИГИ

«ЫСЫК-КӨЛ»
БИОСФЕРАЛЫК АЙМАГЫНЫН
ГЕНЕРАЛДЫК ДИРЕКЦИЯСЫ

721900,Балыкчы ш. Нарынское шоссе кон.10
тел.-факс 7 04 01
biosfera.ik@rambler.ru
р/с 1290144132210036
Балыкчыдагы ОАО РСК
Банкынын филиалы
БИК (МФО) 129014
ОКПО 22766671
ИНН 0051220011090

ГОСУДАРСТВЕННОЕ АГЕНТСТВО
ОХРАНЫ ОКРУЖАЮЩЕЙ СРЕДЫ И
ЛЕСНОГО ХОЗЯЙСТВА ПРИ
ПРАВИТЕЛЬСТВЕ КЫРГЫЗСКОЙ
РЕСПУБЛИКИ

ГЕНЕРАЛЬНАЯ ДИРЕКЦИЯ
БИОСФЕРНОЙ ТЕРРИТОРИИ
«ЫСЫК-КӖЛЬ»

721900,г.Балыкчы,ул.Нарынское шоссе 10
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БИК (МФО) 129014
ОКПО 22766671
ИНН 0051220011090

24.12.2015 №01-23/394

Директору
KOCKS Consult GmbH
Карстен Гриз

Уважаемый Карстен Гриз,

Генеральная дирекция биосферной территории «Ысык-Кёль» поддерживает проект реабилитации дорог, способствующему сокращению бедности через обеспечение прямого транзита между Казахстаном и Таджикистаном, продвижение торговли, соединение отдаленных участков с региональными и государственными коридорами. Вместе с тем поясняет, что Биосферная территория "Ысык-Кель" - особо охраняемая природная территория, образованная постановлением Правительства Кыргызской Республики от 25 сентября 1998 года N 623 "О биосферной территории Ысык-Кель" в целях:

- сохранения, восстановления и использования естественных территорий с богатым природным и культурным наследием;
- поддержки долговременного, устойчивого экономического и социального развития территорий, в том числе рекреационного использования их с учетом сохранения и восстановления природных ресурсов;
- долгосрочного экологического контроля, мониторинга и экологических исследований, а также экологического просвещения и воспитания.

В соответствии с Законом Кыргызской Республики "О биосферных территориях в Кыргызской Республике" и согласно международным стандартам биосферная территория "Ысык-Кель" разделяется на зоны с различными режимами охраны и использования (ядра, буфера, переходной и санации). Полосы автотрасс входят в зону санации, требующих реабилитационных мероприятий.

От Вашей Компании требуется предоставить:

копию утвержденного проекта дороги,

положительное заключение Государственной экологической экспертизы,

заключение Территориального управления охраны окружающей среды по Иссык-Кульской области;

Все нормативно-правовые документы регулирующие деятельность Биосферной территории «Ысык-Кёль» высылаем на электронную почту Назгуль Асаналиевой.

С уважением,

Генеральный директор **М.Аманкулов**

FROM : FAX NO. : 15 Jul. 2016 2:31AM P1

ПРОТОКОЛ ВСТРЕЧИ
С ГЕНЕРАЛЬНОЙ ДИРЕКЦИЕЙ БИОСФЕРНОЙ ТЕРРИТОРИИ "ЫСЫК-КЁЛЬ»

Место проведения встречи: г.Балыкчи, ул.Нарынское шоссе 10, здание Генеральной дирекции биосферной территории "Ысык-Кёль"

Дата: 27 марта 2017 г.

Участники встречи:

Суйунбаев Эрлан -заместитель генерального директора Генеральной дирекции биосферной территории "Ысык-Кёль" при Государственном агентстве по охране окружающей среды и лесного хозяйства при Правительстве Кыргызской Республики

Кененбаева Анипа – заведующая отделом науки, экологического мониторинга и учета биологических ресурсов Генеральной дирекции биосферной территории "Ысык-Кёль" при Государственном агентстве по охране окружающей среды и лесного хозяйства при Правительстве Кыргызской Республики

Абдыгулов Асылбек – специалист по окружающей среде Группы реализации инвестиционных проектов Министерства транспорта и дорог Кыргызской Республики

Волкова Татьяна – специалист по окружающей среде ЭПТИСА/JOIC

Бабаджанова Малика – специалист по защитным мерам АБР (RETA8663)

Цель встречи: проверка данных по состоянию биологических ресурсов в пределах коридора проектного участка дороги Балыкчи (км 0-43), находящегося в зоне биосферной территории "Ысык-Кёль", возможного . воздействия проектных работ на редкие и исчезающие виды животных.

В ходе обсуждения состояния биологических ресурсов в зоне участка дороги Балыкчи (км0-43), реабилитация которого рассматривается в рамках проекта "Соединительная дорога коридоров 1 и 3 в рамках ЦАРЭС. Участок Балыкчи (0 км) до километрового поста (43 км)», со стороны представителей Генеральной дирекции биосферной территории "Ысык-Кёль" было подтверждено следующее:

1. Участок коридора Балыкчи находится, согласно зонированию биосферной территории "Ысык-Кёль", в зоне санации, т.е. в зоне, включающей антропогенно нарушенные территории, требующие регенерационные и рекультивационные меры (Положение о биосферной территории "Ысык-Кёль", утвержденное постановлением Правительства КР от 24 января 2000 года N 40, в редакции постановлений Правительства КР от 5 ноября 2002 года N 738, 28 июня 2005 года N 263, 19 сентября 2006 года N 682, 13 марта 2013 года N 131, 23 мая 2013 года N 279, раздел 3 «Территориальное устройство и зонирование»).
2. Территория проектного участка дороги, начиная со времени строительства в 70-х годах 20 века, находилась долгое время под антропогенным воздействием. Отдельных кордонов или станций наблюдения на этом участке не установлено в связи с отсутствием такой необходимости.
3. Редкие и исчезающие виды животных, включенные в систему IBAT и встречающиеся на биосферной территории (список прилагается в разделе J. ОВОС), именно в зоне участка Балыкчи практически не встречаются, поскольку они обитают в высокогорной местности.
4. В связи с этим, проведение реабилитационных работ на указанном проектном участке дороги не окажет потенциального негативного воздействия на имеющиеся

биологические ресурсы биосферной территории, в том числе и на краснокнижные виды животных, на виды животных, включенных в систему IBAT.

5. Рекомендовано, в качестве предупредительных смягчающих мер в рамках проекта и содействия борьбы с браконьерством, установить дополнительные знаки на км29 с обозначением начала биосферной территории, а также в пределах участка Балыкчи от км 0 до км 43, установить знаки запрета на охоту (на козерогов, кекликов и т.п.). Дизайн (содержание текста) информационных пано и аншлагов, а также место их установки будут проработаны на более позднем этапе.
6. Поддерживается предложение об информировании или проведении тренингов для рабочего персонала подрядчика, о значении биосферной территории "Ысык-Кёль", сохранении биоразнообразия, превентивных мерах по сохранению флоры и фауны данной территории в рамках Плана управления окружающей средой.
7. В целях получения более полной информации о подготавливаемом ОВОС в рамках данного проекта, проект ОВОС будет отправлен в дирекцию биосферной территории "Ысык-Кёль" для ознакомления и внесения предложений.
8. Выполнение, предлагаемого в ОВОС, Плана управления окружающей средой на должном уровне будет способствовать смягчению/предотвращению негативного воздействия реабилитационных строительных работ на биоразнообразие в зоне проектного участка Балыкчи от км 0 до км 43.

Подписано:

Со стороны Генеральной дирекции биосферной территории "Ысык-Кёль", при Государственном агентстве по охране окружающей среды и лесного хозяйства при Правительстве Кыргызской Республики:

Суйунбаев Эрлан _____
заместитель генерального директора

Кененбаева Анипа_____
заведующая отделом науки, экологического мониторинга и учета биологических ресурсов

Со стороны ГРИП:

Абдыгулов Асылбек_____
специалист по окружающей среде Группы реализации инвестиционных проектов Министерства транспорта и дорог Кыргызской Республики

Annex I: List of birds monitoring, General Directorate of Biosphere territory «Issyk-Kul»

Water birds of western Issyk-Kul area

Western Zone: following monitoring points are covered: Ak-Bulun, Ottuk, Ak-Olen Bay, Orto-Tokoy Water Reservoir, Balykchy bay, Toru-Aygyr.

	2016 winter	**2015 winter**	**2015 Spring**
Common kestrel	4	2	1
Eurasian sparrowhawk	2		
Northern goshawk			
Western marshharrier			
Henharrier	3	5	
Shikra			2
Buteo rufinus	6	4	2
Чил	8		
Pheasant	1	2	14
Eurasiancollareddove	6		5
Dove	400	100	
Rock dove			1400
Common wood pigeon			2
Little owl	1		2
Carrioncrow	22	101	12
Hoodedcrow			
Rook	540	15	19
Eurasian magpie	36	2	19
Western jackdaw	20	70	
Mynah	2		2
Commonreedbunting	1		
Sparrow	50		
Hornedlarks	150	440	
Crestedlark			1
Gray lark			7
Rufous-backedredstart	1		
Mistlethrush	3		1
Commonblackbird	4	1	1
Blackkite			10
Chukarpartridge			1
Collaredpratincole			2
Hoopoe			2
Tawnypipit			1
Wagtails			2
Daurianshrike			2
Cetti'swarbler		1	
Saxicola rubicola		2	
Oenanthe isabellina		5	
Chloris		8	
Panurus biarmicus	2	2	
Carduelis cannabina		2	
Emberiza calandra		3	

*Information was provided by Directorate of Biosphere reserve “Issyk-Kul”

Rare endangered species

BirdsName	Period		
	2016 winter	**2015 winter**	**2015 Spring**
Flamingo	-	-	-
White-tailed eagle	-	-	-
Golden eagle	-	-	-
Black kite	-	-	-
Shahin	-	-	-
Demoiselle Crane	-	-	-
Lesser kestrel	-	-	-
Black stork	-	-	-
Osprey	-	-	-
Ibisbill	-	-	-
Lammergeyer	-	-	-
Pallid harrier	-	-	-
Pallas's sandgrouse	-	-	-
Black-bellied sandgrouse	-	-	-
Vulture	-	-	-
Saker falcon	-	-	-
Short-toed Eagle	-	-	-

*Information was provided by Directorate of Biosphere reserve “Issyk-Kul”

Table 2

List of birds and mammals included to IBAT System, not included to Kyrgyz Republic’s Red Book, 2006

Водные птицы западного Иссык-Кульского района

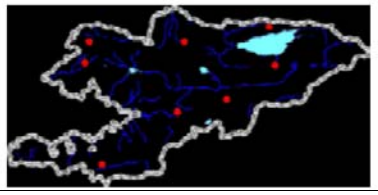
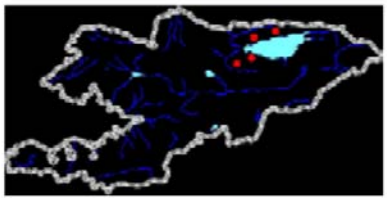
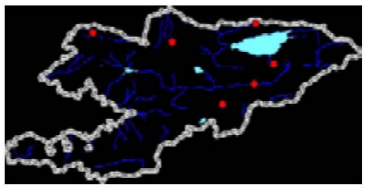
Западная зона: Охватываются следующие точки мониторинга:Ак-Булун, Оттук, залив Ак-Олен, Водохранилище Орто-Токой, Залив Балыкчы, Тору-Айгур.

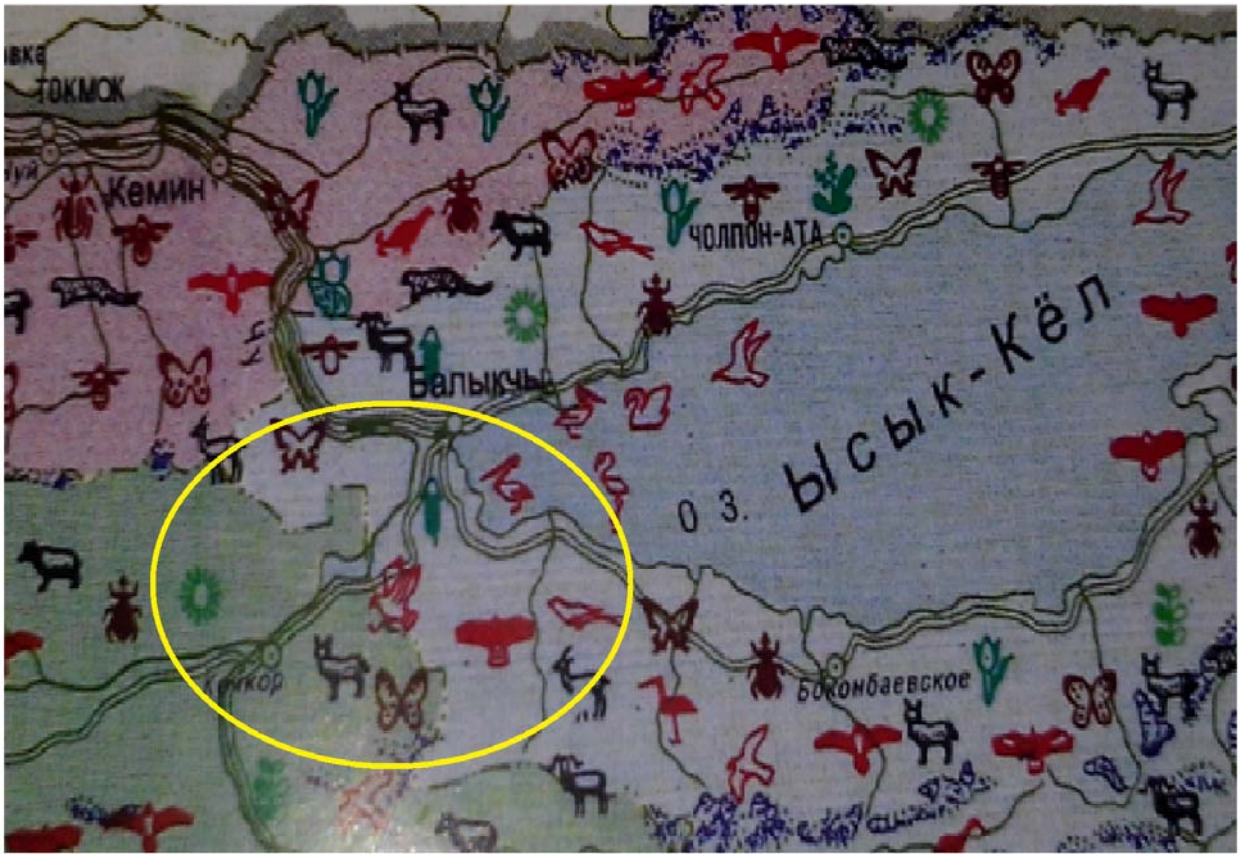
Name of birds	Winter 2015	Spring 2015	Winter 2016	Spring 2016	Winter 2017	Spring 2017
Birds						
Great snipe	-	-	-	-	-	-
Godwit	-	-	-	-	-	-
Curlew	-	-	-	-	-	-
Yellow-eyed dove	-	-	-	-	-	-
Red-breasted goose	-	-	-	-	-	-
Mammals						
Altay weasel	-	-	-	-	-	-

Annex J: List of species identified from desk study.

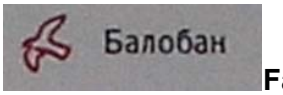
Table 1. List of species with habitat areas determined by biologists

Note: Red Dotson maps – habitat area of the species.

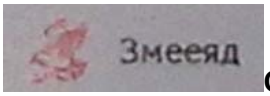
#	SPECIES	HABITATS
1	**AQUILA CHRYSAETOS (LINNAEUS)– БЕРКУТ** ***Habitat*** -Rocks arranged in the forest belt of mountains, in the subalpine and alpine areas [2].	*Aquila chrysaetos* (Linnaeus, 1758) 
2	**CIRCAETUS GALLICUS (J.F.GMELIN)- ЗМЕЕЯД** ***Habitats*** - dry foothills, desert mountains, in the walnut-fruit forests, at an altitude of 1500-2200 m above sea level. [66].	*Circaetus gallicus* (J.F. Gmelin, 1788) 
3	**SYRRHAPTES PARADOXUS (PALLAS) - САДЖА** It lives in the north-eastern part of the country. [3] Nesting occurs on the west coast of Issyk-Kul lake, valleys of At-Bashi and Naryn Rivers, it is also found in Kochkor Valley. In winter and autumn are often found in other regions of the country [92]. ***Habitats***-nesting sites are wide stony-gravelly plateau at an altitude of 1600-1900m. a. s. l., with pea bushes, Anabasis and thistles, and in some cases completely without shrubs. [3]	*Syrrhaptes paradoxus* (Pallas, 1773) 
4	**FALCO CHERRUG J.E. GRAY БАЛОБАН** ***Habitats***-Middle and upper mountain belt from 1300 to 3000 m. a. s. l. The low desert mountains and the dry foothills of the major mountain ranges, river canyons, larvae, tugai, floodplain forests, mixed spruce forests, rocks and cliffs.	*Falco cherrug* J.E. Gray, 1834 
5	**ACCIPITER BADIUS (J.F. GMELIN) - ТУРКЕСТАНСКИЙ ТЮВИК** ***Habitats***- the flat, low and medium mountaintractlandscape, lightly forested; savanna forest slopes, often in the cultural area [2, 15].	*Accipiter badius* (J.F. Gmelin, 1788) 



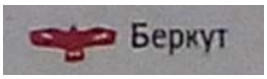
Source: AtlasKR, 1987



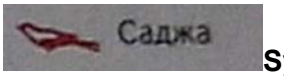
Falco cherrug J.E. Gray



Circaetusgallicus (J.F.Gmelin)

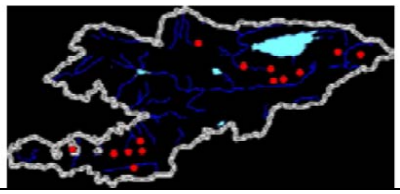
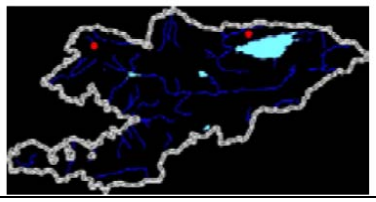
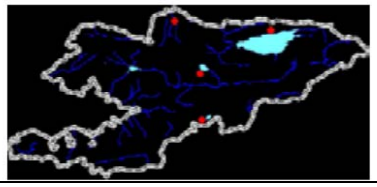
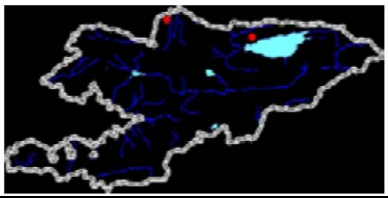
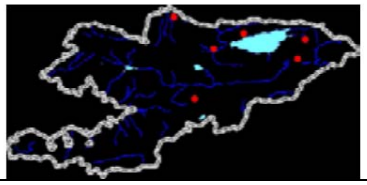


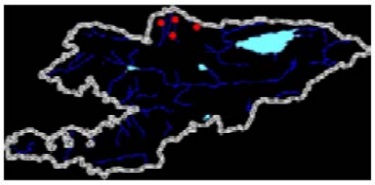
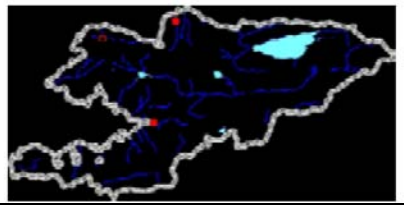
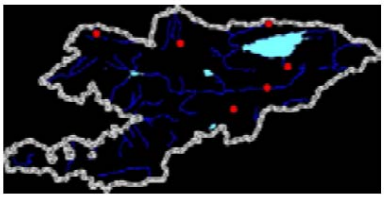
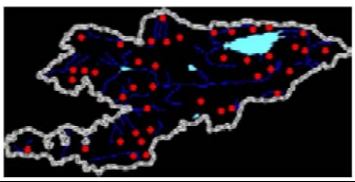
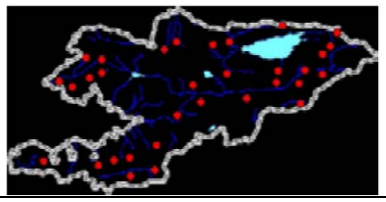
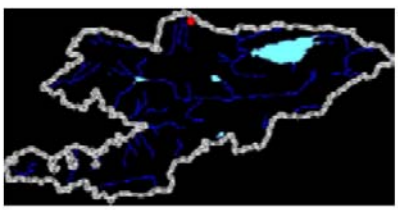
Aquila chrysaetos (Linnaeus)

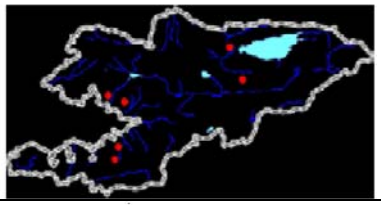
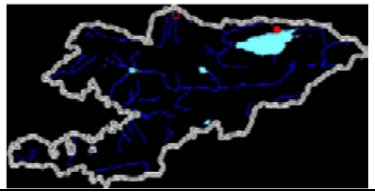
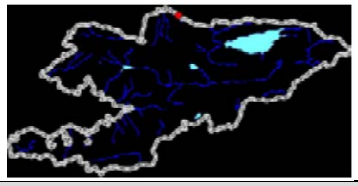
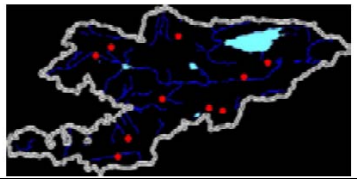


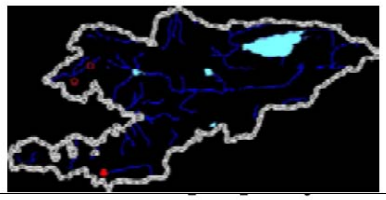
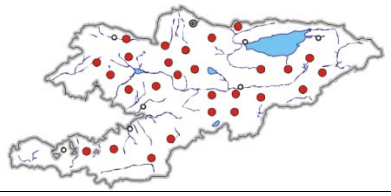
Syrrhaptesparadoxus (Pallas)

Table 2. Data based on the RED DATA BOOK of the KR, 2006 and the list of birds included in IBAT system

BIRDS		
1	**AEGYPIUS MONACHUS (LINNAEUS) - ЧЕРНЫЙ ГРИФ** ***Habitats***- the subalpine and alpine zones of the Tien Shan, in the habitat of wild cloven-hoofed animals and clusters of pets.	*Aegypius monachus* (Linnaeus, 1758) 
2	**AQUILAHELIACASAVIGNYМОГИЛЬНИК** ***Habitats***- foothill areas high in the mountains up to 2000 m. a. s. l. It adheres to areas with woody vegetation [66].	*Aquila heliaca* Savigny, 1809 
3	**AYTHYANYROCA (GULDENSTADT) - БЕЛОГЛАЗАЯЧЕРНЕТЬ** ***Habitats***-lakes, reservoirs and ponds with rich water vegetation and inhabited by small aquatic animals.	*Aythya nyroca* (Guldenstadt, 1770) 
4	**CHLAMYDOTISUNDULATA (JACQUIN, 1784) - ДРОФА-КРАСОТКА** In Kyrgyzstan, it was seen mainly in the Issyk-Kul lake basin [2]. ***Habitats***-Takyr desert and semi-desert, desert foothills of ridges, occasionally occurs in autumn and winter on the stubble fields, with grain crops.	*Chlamydotis undulata* (Jacquin, 1784) 
5	**CIRCUS MACROURUS (S.G. GMELIN) - СТЕПНОЙ ЛУНЬ** ***Habitats***- lowland and low and medium mountain outdoor station is not rare in the cultivated areas, rarely rises to the highlands.	*Circus macrourus* (S.G. Gmelin, 1771) 

BIRDS		
6	**AQUILACLANGAPALLAS - БОЛЬШОЙПОДОРЛИК** ***Habitats*** -lowland and low and medium mountain landscapes, keeping waterfowl habitats.	*Aquila clanga* Pallas, 1811 
7	**COLUMBAEVERSMANNIBONAPARTEБУРЫЙГОЛУБЬ** ***Habitats***- river bluffs on the low-mountain valleys. [2] Can nest in tree holes.	*Columba eversmanni* Bonaparte, 1856 
8	**БАЛОБАН - FALCO CHERRUG J.E. GRAY** ***Habitats*** -middle and upper mountain belt from 1300 to 3000 m. a. s. l. The low desert mountains and the dry foothills of the major mountain ranges, river canyons, larvae, tugai, floodplain forests, mixed spruce forests, rocks and cliffs.	*Falco cherrug* J.E. Gray, 1834 
9	**GYPAETUSBARBATUS (LINNAEUS) - БОРОДАЧ** ***Habitats***- high-and middle region of the Tien Shan mountain country and Pamir-Alai, adhering to the dissected relief, less plains inhabited by wild cloven-hoofed and place of transhumance.	*Gypaetus barbatus* (Linnaeus, 1758) 
10	**GYPS HIMALAYENSIS HUME ГИМАЛАЙСКИЙ ГРИФ** ***Habitats*** - the subalpine and alpine zones of the Tien Shan, in the habitat of wild cloven-hoofed animals and clusters of pets. It nests in areas with rocky outcrops.	*Gyps himalayensis* Hume, 1869 
11	**HALIAEETUSLEUCORYPHUS (PALLAS) - ОРЛАНДОЛГОХВОСТ** ***Habitats***-Reservoirs with thatched floodplains, flood plains with poplar-willow forests.	*Haliaeetus leucoryphus* (Pallas, 1771) 

BIRDS		
12	**<u>NEOPHRONPERCNOPTERUS</u> (LINNAEUS) - СТЕРВЯТНИК** ***Habitats***-mostly desert foothills and midlands with sharply dissected terrain. Rarely in the subalpine zone.	*Neophron percnopterus* (Linnaeus, 1758) 
13	**<u>OXYURALEUCOCEPHALA</u> (SCOPOLI) - САВКА** ***Habitats***-During migration can be stopped in the water bodies shores,overgrown with reeds, cattails.In recent years, it is commonly seen on water reservoirs.	*Oxyura leucocephala* (Scopoli, 1769) 
14	**<u>PELECANUS CRISPUS</u> BRUCH - КУДРЯВЫЙПЕЛИКАН** ***Habitats***-During the span rests on the natural and artificial ponds stocked with reeds, shrubs.	*Pelecanus crispus* Bruch, 1832 
15	**<u>TETRAXTETRAX</u>LINNAEUS - СТРЕПЕТ** Currently, cases of nesting in the country have not been confirmed. It is extremely rare in the bays of the Issyk-Kul Lake and water bodies of the Chu valley. ***Habitats***-Areas with virgin steppe with wormwood-ephemeral vegetation.	*Tetrax tetrax* Linnaeus, 1758 
FISHES		
16	**<u>CAPOETOBRAMAKUSCHAKEWITSCHI</u> (KESSEL)-ЧУЙСКАЯОСТРОЛУЧКА** ***Habitats***- River rapids and backwaters with gravel and sandy soil. From the lower reaches of Chu River to Bishkek [7, 10].	*Capoetobrama kuschakewitschi* (Kessel) 
MAMMALS		
17	**<u>CUON ALPINUS</u> (PALLAS) - КРАСНЫЙВОЛК** ***Habitats***- Steppe habitats alpine and subalpine zones, the upper part of the forest belt. Associated with the concentration of places of ungulates.	*Cuon alpinus* (Pallas, 1811) 

BIRDS		
18	**VORMELA PEREGUSNA GULDENSTAEDT- ПЕРЕВЯЗКА** ***Habitats*** - the steppes and semi-deserts. It is found in scrub along the river valleys.	*Vormela peregusna* Guldenstaedt, 1770 
19	**LUTRA LUTRA LINNAEUS- СРЕДНЕАЗИАТСКАЯВЫДРА** Previously lived in the basin waters of Issyk-Kul, Chatkal, Naryn and Alai Valley. At the present time - in the Alai Valley, the south-western part of the district Kyzyl-Suu. Perhaps it preserved in the basinsof Chatkal, Uzengu-Kuush rivers [3, 9]. ***Habitats***- the shores of rivers and lakes, rich in fish, with floodplain thickets of trees and shrubs, or fragments of rock.	*Lutra lutra* Linnaeus, 1758 
20	**OVIS AMMON LINNAEUS- ГОРНЫЙБАРАН** ***Habitats***- steppes on the flat areas of the mountains and intermountain valleys atany altitudes. But these species now for the most part remained in the highlands, where it is less plagued [47].	*Ovis ammon* Linnaeus, 1758 

Annex K. Information letter from MoTR

КЫРГЫЗ РЕСПУБЛИКАСЫНЫН
ТРАНСПОРТ ЖАНА ЖОЛДОР
МИНИСТРЛИГИ

720017, Бишкек ш., Исанов көч., 42
тел. +996 (312) 31-43-85, 31-43-13,
факс: +996 (312) 31-28-11
E-mail: mtk@mtk.gov.kg
http://www.mtk.kg

МИНИСТЕРСТВО ТРАНСПОРТА
И ДОРОГ
КЫРГЫЗСКОЙ РЕСПУБЛИКИ

720017, г. Бишкек, ул. Исанова, 42
тел. +996 (312) 31-43-85, 31-43-13,
факс: +996 (312) 31-28-11
E-mail: mtk@mtk.gov.kg
http://www.mtk.kg

№ 14-8/5879 «20» 07 2016 ж. (г.)

На №

КР Өкмөтүнүн Чүй облусундагы ыйгарым укуктуу өкүлчүлүгү

КР Өкмөтүнүн Нарын облусундагы ыйгарым укуктуу өкүлчүлүгү

КР Өкмөтүнүн Ысык-Көл облусундагы ыйгарым укуктуу өкүлчүлүгү

Жайыл районунун мамлекеттик райондук администрациясы

Кочкор районунун мамлекеттик райондук администрациясы

Жумгал районунун мамлекеттик райондук администрациясы

Балыкчы ш. мэриясы

Бишкек – Ош автожолун Бишкек-Нарын-Торугарт автожолу (Балыкчы ш. – Кочкор а. – Арал а. – Суусамыр а.) менен коридор аралык бириктирүүчү жолду реабилитациялоо долбооруна карата Техникалык-экономикалык негиздемени даярдоо үчүн Азия Өнүктүрүү Банкы тарабынан бөлүнгөн техникалык жардамды ишке ашыруунун алкагында, бул иштер үчүн Азия Өнүктүрүү Банкы тарабынан «KOCKS» консультациялык компаниясы тандалган.

Сунушталып жаткан долбоор Кыргыз Республикасынын региондорунун төмөндөгү социалдык-экономикалык көрсөткүчтөрүн жакшыртат:

- Түштүк региондордон Нарын жана Ысык-Көл облустарына адамдардын жана товарлардын жылуусунда жолго кеткен убакыттын кыскарышы;
- каттамды кыскартууга жана жакшы жол шарттарына байланыштуу транспорт чыгымдарын азайтуу;
- жергиликтүү жана эле аралык ташууларды жана кыймылдарды көбөйтүү;
- жергиликтүү жашоочулар үчүн кошумча киреше алып келүүчү мүмкүнчүлүктөрдүн пайда болушу.
- жаңы жумушчу орундарын түзүү;

- транспорт каражаттарынын (ТК) оң абалы/ пайдалануу чыгымдарын кыскартуу.

Техникалык-экономикалык негиздемени даярдоонун алкагында «KOCKS» консультациялык компаниясынын адистери тарабынан КР ТжКМ Инвестициялык долбоорлорду ишке ашыруу тобунун өкүлдөрү менен биргеликте "Курчап турган чөйрөгө таасирлерин баалоо отчетун" жана "Көчүрүү жана жерлерди алуу планын" даярдоо боюнча иштер аяктады.

Бул документтер менчик ээлеринин укуктарын коргоого, курчап турган чөйрөнү коргоого багытталган КР ченемдик-укуктук актыларына ылайык жана АӨБ Коргоо чаралары боюнча саясатынын талаптарын эске алуу менен даярдалды.

Азыркы убакта Техникалык-экономикалык негиздемени даярдоо боюнча иштер аяктап калды жана пландалган долбоордун таасирин тийиши мүмкүн, реабилитацияланууучу автожол участогунун жээгинде жашаган, жергиликтүү калктын арасында пландалган долбоорго байланыштуу маалыматты жайылтууга тиешелүү Азия Өнүктүрүү Банкынын талабын аткаруу керек.

Жогоруда берилгендердин негизинде, КР "КР мамлекеттик органдарынын жана жергиликтүү өз алдынча башкаруу органдарынын жүргүзүүсүндө турган маалыматтарга жетүү мүмкүндүгү жөнүндө" мыйзамынын талаптарын аткаруу, ошондой эле Азия Өнүктүрүү Банкынын Коргоо чаралары боюнча саясатынын талаптарын сактоо максатында, Сиздерден долбоордун мүмкүн болуучу таасири жөнүндө маалымдуулукту жогорулатуу максатында жергиликтүү калк арасында түшүндүрүү иштерин жүргүзүүнү өтүнөбүз. Бишкек – Ош автожолун Бишкек-Нарын-Торугарт автожолу менен коридор аралык бириктирүүчү жолду реабилитациялоо долбоору төмөндөгү калктуу пункттарды камтыйт:

Чүй облусунун Жайыл району:
- Кызыл-Ой а.,Кожомкул а., Суусамыр а., Тунук а., Суусамыр айыл аймагы.

Нарын облусунун Кочкор району:
-Көк-Жар а., Көк-Жар айыл аймагы;
- Чекилдек а., Семиз-Бел айыл аймагыа;
- Эпкин/Ак-Учук а., Чолпон айыл аймагы.

Нарын облусунун Жумгал району:
- Жумгал а., Жумгал айыл аймагы;
- Куйручук а., Куйручук айыл аймагы;
- Түгөл-Сай а., Түгөл-Сай айыл аймагы;
- Баш-Кууганды а., Кырчын а., Баш-Кууганды айыл аймагы;
- Байзак а., Байзак айыл аймагы;
- Чаек а., Чаек айыл аймагы;
- Кызыл-Жылдыз а., Кызыл-Жылдыз айыл аймагы.

Балыкчы ш., Ысык-Көл облусу:

Тиркеме: Долбоор жана долбоордун мүмкүн болуучу таасири жөнүндө маалымат - 5 бараkта.

Урматтоо менен,

Министр **З.Айдаров**

Аткар. Абдыгулов А. Тел. 31-43-56

Долбоор жана долбоордун мүмкүн болуучу таасири жөнүндө маалымат
(экологиялык жана социалдык маселелер).

Балыкчы ш., Таш-Сарай жана Орто-Токой айылдары.

Кочкор району:

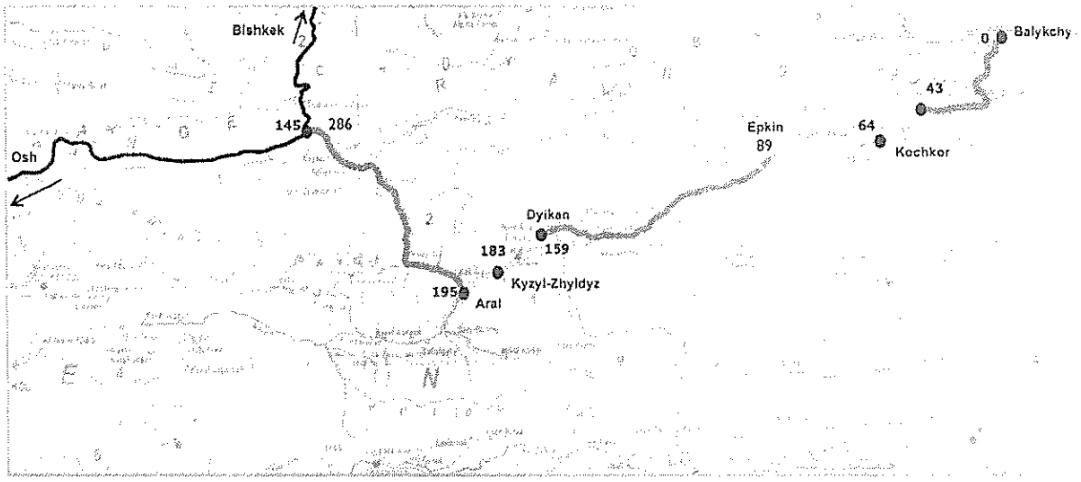
1. Көк-Жар а/а – Көк-Жар айылы
2. Семиз-Бел а/а – Чекилдек айылы
3. Чолпон а/а – Эпкин/Ак-Учук айылы

Жумгал району:

1. Жумгал а/а – Жумгал айылы
2. Куйручук а/а – Куйручук айылы
3. Түгөл-Сай а/а – Түгөл-Сай айылы
4. Баш-Кууганды а/а – Баш-Кууганды, Кырчын айылдары
5. Байзак а/а – Байзак айылы
6. Чаек а/а – Чаек, Ак-Татыр айылы
7. Кызыл-Жылдыз а/а – Кызыл-Жылдыз айылы

Жайыл району:

Суусамыр а/а – Кызыл-Ой, Кожомкул, Суусамыр, Тунук айылдары



Кыргыз Республикасынын Өкмөтү Азия өнүктүрүү банкына (АӨБ) БАРЭК алкагында 1 жана 3-коридорлорду бириктирүүчү жолду жакшыртуу боюнча долбоорго кийинки кредитти жана/же грантты аныктоо, иштеп чыгуу жана даярдоо өтүнүчү менен кайрылган. ТППП негизги жыйынтыгы донорлордун каржылоосу үчүн ылайыктуу техникалык-экономикалык негиздемени даярдоо болуп саналат.

ТППП 5 участокту камтыйт:

- Балыкчыдан (км) 43 километр белгисине чейин (км 0 - км 43), болжол менен 43 километр (км);
- Кочкордон Эпкин айылына чейин (км 64 – км 89), болжол менен 25 км;
- Эпкинден (89 км) Баш-Кууганды чейин [мурдагы Дыйкан] (159 км), болжол менен 70 км;

- Дыйкан айылынан тартып (159 км) Кызыл-Жылдыз айылына чейин (183 км), болжол менен 24 км, мында Чаек айылын жана Кызыл-Жылдыз айылынын бир бөлүгүн айланып өтүү үчүн айланма жолду куруу каралууда: жана
- Аралдан тартып (195 км) Төө-Ашуу ашуусуна чейин (286 км), болжол менен 91 км.

Долбоордун алкагында корголбогон компоненттердин тармактык көйгөйлөрү дагы чечилет. Өкмөт менен айрым деталдарда макулдашууга жетишүү талап кылынат, аларга төмөндөгүлөр кирет: (i) Кыргыз Республикасында жол активдерин башкаруунун натыйжалуулугун жогорулатуу, (ii) өкмөттүк транспорт секторундагы институционалдык реформалар менен колдоо, (iii) натыйжалуулукка негизделген тейлөөгө контракттарды жүргүзүү жана (iv) Кыргыз Республикасында жол коопсуздугун жогорулатуу.

Транспорт жана коммуникация министрлигине (ТжКМ) караштуу Инвестициялык долбоорлорду ишке ашыруу тобу (ИДИТ) курулуш баскычында ушул долбоор боюнча Аткаруучу орган (АО) катары чыгат. Мүмкүн болуучу финансылык жардамдын баштапкы бөлүгү катары, АӨБ бүтүндөй долбоор үчүн техникалык-экономикалык негиздемени жана болжолдуу долбоорду даярдоо үчүн «Кокс Консульт Гмбх», Германия, жалдады. Консультациялык кызмат көрсөтүүлөрдүн көлөмү баштапкы экологиялык изилдөөнү (БЭИ); жана социалдык талдоону жана жакырчылыкты талдоону жана 2009-жылдагы АӨБ Кепилдиктер саясаты жөнүндө билдирүүгө (КСБ) ылайык кесепеттерин баалоону камтыйт.

Сунушталып жаткан долбоор Кыргыз Республикасынын региондорунун томпдогу социалдык-экономикалык көрсөткүчтөрүн жакшыртат:

- Түштүк региондордон Нарын жана Ысык-Көл облустарына адамдардын жана товарлардын жылуусунда жолго кеткен убакыттын кыскарышы.
- Каттамды кыскартууга жана жакшы жол шарттарына байланыштуу транспорт чыгымдарын азайтуу.
- Жергиликтүү жана эле аралык ташууларды жана кыймылдарды көбөйтүү.
- Жергиликтүү жашоочулар үчүн кошумча киреше алып келүүчү мүмкүнчүлүктөрдүн пайда болушу.
- Жаңы жумушчу орундарын түзүү.
- Транспорт каражаттарынын (ТК) оң абалы/ Пайдалануу чыгымдарын кыскартуу.

Кыргыз Республикасынын мыйзамдарына ылайык курчап турган чөйрөгө таасирине баалоо жүргүзүү керек. ТЭН баскычында курчап турган чойрого таасирин баалоону изилдөө Техникалык-экономикалык негиздемеге (ТЭН) карата Курчап турган чойрого таасирин алдын ала баалоо (КЧТАБ) катары каралат жана КЧТБ отчету менен тариздслет.

АӨБ Коргоо Саясаты боюнча Жобосунун жиктемесине ылайык (2009) долбоор В [би] категориясына кирет жана курчап турган чөйрөгө таасирин толук баалоону (КЧТБ) талап кылбайт. АӨБ «В» категориясындагы долбоорлор үчүн саясатынын алкагында Баштапкы экологиялык баалоону (БЭБ) даярдоо керек.

Кыргыз Республикасынын мыйзамдарына ылайык долбоорду категорияларытыруу өткөрүлбөйт, бирок БЭБ жана КЧТАБ документтерин бирдей маанидеги катары карооо болот.

Экологиялык жана Социалдык Бааалоонун максаттары

- Ар кандай түз жана кыйыр экологиялык тобокелдиктердин деңгээлдерин аныктоо жана баалоо жана алар менен байланыштуу кесепеттерди жумшартуу боюнча сунуштар
- Долбоордун БЭБ/КЧТАБ даярдоо
- Жаратылышты коргоо иш-чараларынын планын (ЖКП) даярдоо.

Ушул БЭБ/КЧТАБ максаты сунушталып жаткан долбоордун курчап турган чөйрөгө, ден соолукка, коопсуздукка потенциалдуу таасирин баалоо жана социалдык таасирин баалоо болуп саналат. Экологиялык баалоо процессинде, курулуш иштеринин күтүлүп жаткан

көлөмүнө байланыштуу курчап турган чөйрөгө эч кандай олуттуу жагымсыз жана кайтарымсыз таасирлер белгиленген жок. БЭБ/КЧТАБ боюнча ушул документ өзүнө бүтүндөй долбоордук цикл аралыгында жүргүзүлө турган минималдаштырууга, кыскартууга жана жумшартууга (же жабыркаган тараптарга компенсация төлөп берүүгө) багытталган, кесепеттерди жумшартуу боюнча тийиштүү чаралар менен аныкталган потенциалдуу таасирлердин, алардын мүнөздөмөлөрүнүн, чоңдугунун, жайылуусунун жана узактыгынын, сезгич рецепторлордун жана козголгон топтордун негизиндеги Курчап турган чөйрөнү башкаруу планын (КЧБП) камтыйт.

Бардык участоктор үчүн БЭБ/КЧТАБ изилдөө болгон булактардын катарынан экинчи маалыматтын негизинде өткөрүлөт. Ошондой эле суунун, абанын сынамдарын алуу, ызы-чуунү жана вибрацияны өлчөө өткөрүлдү.

Долбоорду сүрөттөө

Төмөндө көрсөтүлгөн жол участоктору жолдун II техникалык категориясына чейин реконструкцияланат:

- Балыкчыдан (км) 43 километр белгисине чейин (км 0 - км 43), болжол менен 43 километр (км);
- Кочкордон Эпкин айылына чейин (км 64 – км 89), болжол менен 25 км;
- Эпкинден (89 км) Баш-Куугандыга чейин [мурдагы Дыйкан] (159 км), болжол менен 70 км;
- Дыйкан айылынан тартып (159 км) Кызыл-Жылдыз айылына чейин (183 км), болжол менен 24 км, мында Чаек айылын жана Кызыл-Жылдыз айылынын бир бөлүгүн айланып өтүү үчүн айланма жолду куруу каралууда.

Аралдан тартып (195 км) Төө-Ашуу ашуусуна чейинки (286 км), болжол менен 91 км, жол участогу жолдун III техникалык категориясына чейин реконструкцияланат.

Долбоорлорго жолдун участогу тууралуу кененирээк төмөндө берилген:

- Кыргызстандын мамлекеттик стандартына ылайык, долбоорлонгон жол участокторун II, III техникалык категорияга чейин реконструкциялоо.
- Көпүрөлөрдү жана суу өткөрүүчү түтүктөрдү калыбына келтирүү, ондоо жана/же алмаштыруу
- Каптал арыктарды жана башка дренаждык курулмаларды куруу.
- Тирегич дубалдарды жана зарыл болгондо дарыяларды коргоо боюнча чараларды камсыздоо
- Талаптагыдай жол белгилерин жана белги салууларды камсыздоо
- Коргоочу тосмолорду камсыздоо.

Жол Кыргызстандын геометрикалык долбоордук ченемдерине ылайык иштелип чыгышы керек жана ал болжолдонгон кызмат өтөө мөөнөтү аралыгында жол кыймылынан болгон жүктөмдү натыйжалуу көтөрүү үчүн туруктуу болушу керек. Жол өтмө бөлүктүн кендигинен (тилкелердин туурасынын суммасы) жана жол жээгинин кендигинен турган, кыймылдын эки тилкеси менен жол болот. Төмөндө кесилиш боюнча конструктивдүү элементтер берилген:

- II долбоордук жолу үчүн:
  - Тилкелердин саны: 2
  - Тилкенин кендиги: 3,5-3,75 м
  - Өтмө бөлүктүн кендиги: 7,00-7,50 м
  - Жолдун четинин кендиги: 3.25-3.75 м (анын ичинде 0.50-0.75 м салынган)

- Жолдун жалпы узундугу: 15.00 м

➢ III долбоордук жолу үчүн:

- Тилкелердин саны: 2
- Тилкенин кендиги: 3.5 м
- Отмө бөлүктүн кендиги: 7.00 м
- Жолдун четинин кендиги: 2.5 м (анын ичинде 0.50 м салынган)
- Жолдун жалпы узундугу: 12.00 м

Курчап турган чойрого күтүлгөн таасирлери жана жумшартуу боюнча чаралар

Таасирлери.

Жол долбоорунун таасиринин олуттуу бөлүгү түздөн-түз курулуш иштеринен келип чыгаары болжолдонууда, ал эми айрым таасирлер пайдалануу убагында пайда болот. Бул таасир кыймылдын интенсивдүүлүгүнүн жана транспорт каражаттарынын кыймылынын ылдамдыгынын жогорулашы менен шартталган жана газдардын чыгындыларынын деңгээлинин жогорулашына жана ызы-чуу таасирине, ошондой эле жөө жүрүүчүлөрдүн жана транспорт каражаттарынын катышуусу менен ЖТК потенциалдуу осүшүнө кирет. Мындан тышкары зыяндуу заттардын төгүлүшү менен байланыштуу өзгөчө кырдаалдардын жогорку тобокелдиги болот.

Таасирлердин төмөндөгүдөй түрлөрү аныкталган:

(i) ызы-чуу таасири, булгоочу заттардын абага чыгындылары, ошондой эле вибрация. бул Долбоордун жолго жакын калктуу пункттардын чегинде жана мектеп, оорукана, мечит ж.б. (мисалы: жолго жакын жайгашкан үй чарбалары; карьерлер, базарлар, маданий жана тарыхый баалуулуктар, чоң кесилиштер) сыяктуу, таасир этүүнүн сезгич реципиенттери жайгашкан жерлерде өзгөчө мааниге ээ;

(ii) сууларга жана дарыяларга таасири;

(iii) карьерлерде толуктагычтардын булактарын издөөнүн жыйынтыгындагы таасир;

(iv) топуракка жана өсүмдүктөргө таасири, анын ичинде участокторду тазалоо боюнча иштерден улам долбоордук жолдун жанындагы дарак көчөттөрго таасири;

(v) көпүрөлөрдү жана дренаждык курулмаларды реабилитациялоонун жыйынтыгындагы таасир;

(vi) асфальт өндүрүү (асфальт заводдору) жана толуктагычтарды майдалоо үчүн орнотмолордон болгон таасир;

(vii) подрядчынын жумушчу лагерлери тарабынан таасир. Мындан тышкары, таасирлер төмөндөгү топторго бөлүнгөн: долбоорлоо этабындагы таасир, куруу этабындагы таасир жана жумушчу этабындагы таасир.

Иш-чаралар.

Алдын ала долбоорлоонун жүрүшүндө жана долбоорлоо баскычында талаптагыдай пландоо/даярдоо аркылуу таасирлерден алыс болууга болот.

Таасирлерди жумшартуу боюнча чаралар төмөндөгүлөрдү камтыйт:

(i) эрозияга каршы иш-чараларды пайдалануу;

(ii) даректарды кыюудан алыс болуу үчүн, асиммертикалуу кенейтүү;

(iii) жумушчулар үчүн катуу нускамаларды берүү менен маданий жана тарыхый объекттерге кол салуунун алдын алуу

Annex L. Minutes Meeting with General Directorate of "Issyk-Kul" Biosphere Reserve

MINUTES OF MEETING
WITH GENERAL DEROCTORATE OF "ISSYK-KUL" BIOSPHERE RESERVE

Place: 10 Naryn str, Balykchy City, building of General Directorate of "Issyk-Kul" Biosphere Reserve.

Date: March 27, 2017.

Participants:

Erlan Suynbaev – Deputy Director of General Directorate of "Issyk-Kul" Biosphere Reserve under the State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic

Anyipa Kenenbaeva – Head of the Department of Science, Environmental Monitoring and Accounting of Biological Resources of the General Directorate of "Issyk-Kul" Biosphere Reserve under the State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic

Asylbek Abdygulov – Environmental Specialist of the Investment Projects Implementation Group under the Ministry of Transport and Roads of the Kyrgyz Republic

Tatiana Volkova – Environmental Specialist EPTISA/JOC

Malika Babadjanova – ADB Safeguard Specialist (RETA8663)

The purpose of the meeting: to check the status of biological resources within the corridor of Balykchy road section (km 0-43) in the area of "Issyk-Kul" biosphere territory, the possible impact of design work on rare and endangered species of animals.

During the discussion regarding the conditions of biological resources in the area of Balykchy road section (km0-43), the rehabilitation of which is being considered in the framework of CAREC Corridor 1 and 3 Connector Road Project Balykchy Section (0 km) to the kilometer post (43 km), the following was confirmed by the representatives of the General Directorate of "Issyk-Kul" Biosphere Reserve:

1. The section of Balykchy corridor is located, according to the zoning of the biosphere territory of "Issyk-Kul", in the sanitation zone, i.e. in the zone that includes anthropogenically disturbed territories that require regeneration and remediation measures (the Regulation on the Biosphere Territory "Issyk-Kul" approved by the Government of the Kyrgyz Republic on January 24, 2000 No. 40, as amended by the Government of the Kyrgyz Republic on November 5, 2002, No. 738, 28 June 2005 No. 263, September 19, 2006 N 682, March 13, 2013 N 131, May 23, 2013 N 279, section 3 "Territorial arrangement and zoning").
2. The territory of the project section of the road, since the time of construction in the 70s of the 20th century, has been under anthropogenic influence for a long time. Separate cordons or observation stations on this site are not installed due to the lack of such a need.
3. Rare and endangered species of animals included in the IBAT system and found on the biosphere territory (the list is attached in Section J, IEE), it is in the area of Balykchy Section that they practically do not occur, since they live in high-altitude areas.
4. In connection with this, carrying out of the rehabilitation works in the specified project section of the road will not have a potential negative impact on the available biological resources of the biosphere territory, including on the Red Book species of animals, on the species of animals included in the IBAT system.
5. It is recommended that, as precautionary mitigating measures within the project and to contribute to the fight against poaching, to establish additional signs for km29 with the designation of the beginning of the biosphere territory, and also within the Balykchy Section from

km 0 to km 43, to establish signs of a ban on hunting (restriction for hunting to capricons and quails, etc.). The design (content of the text) of informational signs, as well as the place of their installation, will be worked out at a later stage.

6. A proposal is supported to inform or conduct training for the Contractor's staff, the importance of the biosphere territory "Issyk-Kul", the conservation of biodiversity, preventive measures to conserve the flora and fauna of this territory within the framework of the Environmental Management Plan.
7. In order to obtain more complete information on IEE, which is under the preparation within the framework of this project, the draft IEE will be sent to the Directorate of "Issyk-Kul" Biosphere Reserve for acquaintance and making suggestions.
8. The implementation of the Environmental Management Plan proposed in the IEE at the proper level will help to mitigate / prevent the negative impact of construction works on biodiversity in Balykchy Section from km 0 to km 43.

Signed:

On behalf of General Directorate of “Issyk-Kul” Biosphere Reserve under the State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic:

Erlan Suynbaev _____
Deputy Director

Anyipa Kenenbaeva _____
Head of the Department of Science, Environmental Monitoring and Accounting

On behalf of IPIG:

Asylbek Abdygulov _____
Environmental Specialist of the Investment Projects Implementation Group under the Ministry of Transport and Roads of the Kyrgyz Republic

REHABILITATION AND UPGRADING OF ADDITIONAL FINANCE ROAD SECTION 1

JAPAN OVERSEAS CONSULTANTS LTD

CONSTRUCTION AND OPERATIONAL NOISE ASSESSMENT

FINAL REPORT

MAY 2018

CONTENTS

1. INTRODUCTION

Japan Overseas Consultants Co. (JOC) has been appointed by the Ministry of Transport and Roads (MOTR) to conduct engineering design and environmental assessment for the rehabilitation of three sections of the A367 road. These are shown in Figure 1 below and include:

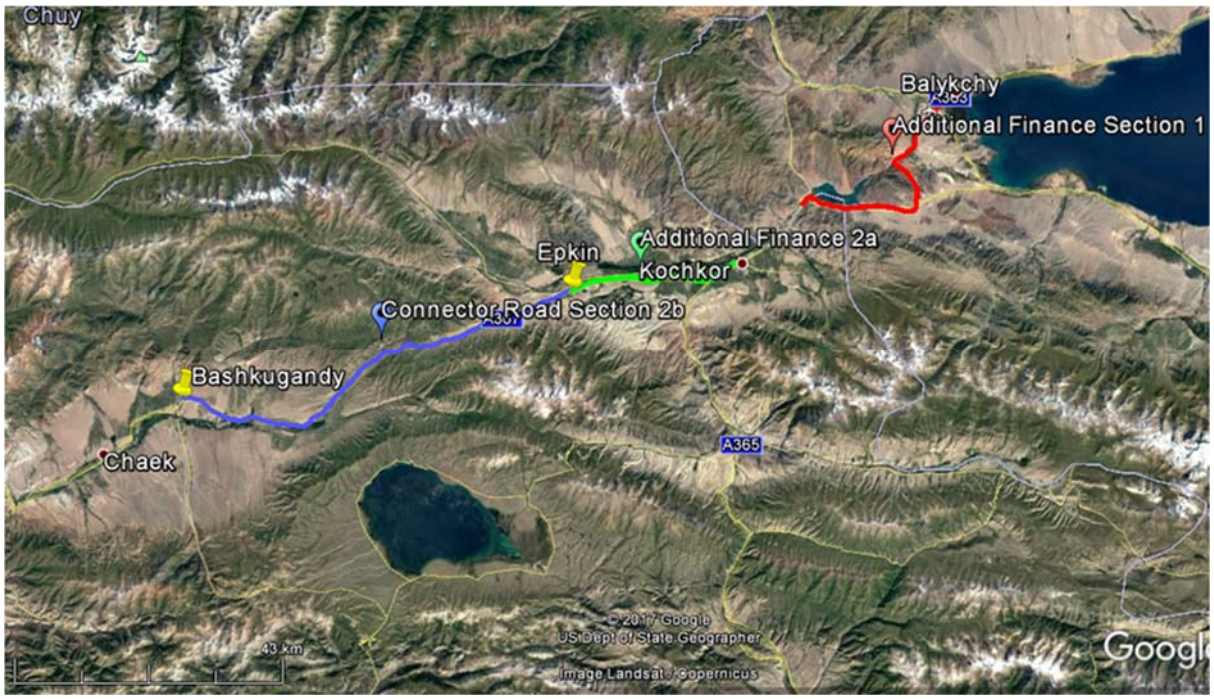
Section 1 which runs from the outskirts of Balykchy c.40km in a westerly direction, passing though the village of Tash Saray

Section 2A runs from Kochkor to Epkin c. 25km in a westerly direction through the villages of Kokjar, Chekildek, Cholpon and Akyuyk. This scheme and Section 1 are referred to as Additional Finance Roads.

Section 2B runs from Epkin c.70km to Bashkugandy passing through the villages of Jumgal, Kuiruchuk, and Tugot Say, ending just before the village of Dyikan. This Section of road is referred to as the connector road and finance is already in place for this scheme.

Initial Environmental Examinations (IEE) have been completed for each of the three road sections, however The Asian Development Bank (ADB), which is funding the rehabilitation, has requested that JOC should update the Examinations to include an assessment of the potential noise and vibration effects which might arise from construction and operation of the three sections of road. JOC has in turn, retained specialist noise and vibration engineers to carry out this work as set out in the Terms of Reference (ToR) [1]. This study addresses the potential noise effects, specifically for Section 1.

Figure 1. Location of Additional Finance Section 1



An initial site visit was made in December 2018 to identify potential noise sensitive receptors alongside the road. A report [2] was prepared setting out the findings of the visit, and an outline of the proposed scope of the study

The principal elements of the study are to:

- review existing noise monitoring data obtained at dwellings alongside the road and if necessary to carry out additional monitoring. A description of these measurements is set out in Section 2 of this report;

- calculate and assess the potential noise effects arising from rehabilitation or construction of the road, at dwellings and community facilities alongside the road. The calculation method used and details of the plant are described in Section 3 of this report, followed by an explanation of the assessment criteria used, the results of the assessment and potential means of mitigating these effects; and

- calculate and assess the potential noise effects arising from operation of the road as a result of the rehabilitation, both in the year of opening (2019), and for future operation of the road in the year 2034. The calculation method used and working assumptions are described in Section 4, followed by a description of the assessment criteria and results of the assessment, supported in the form of noise contour mapping in Appendix I.

A summary of the findings of the study is set out in Section 5.

The text within the report makes use of technical descriptions and these are described in the Glossary of Terms at the end of this report.

2. BASELINE NOISE LEVELS

In Section 1 the road runs through two populated areas with differing noise climates. The first is on the outskirts of Balykchy, which is a largely industrial area with the housing located to the east of the road. Noise levels at buildings alongside the road will be dominated by road traffic noise, however, further away from the road there is likely to be a contribution from industrial and commercial activities.

The second is the village of Tash Saray in which most of the houses lie at a distance of c.50-120m from the road, with c. 5 to the south of the village lying more closely to the road. Baseline noise levels at all these dwellings are dominated by road traffic noise, however at distances further away from the road, traffic on local access roads and day to day activities at dwellings will contribute to overall noise levels.

An initial baseline noise survey was carried out in 2015, however, it appeared that these measurements had been made either in the absence of normal road traffic movements or at a considerable distance from the road. In addition, there was no supporting documentation and it was therefore deemed necessary to carry out additional monitoring as part of this study. Noise monitoring was carried out by JOC in May 2018, using equipment and methodology in compliance with the procedures set out in ISO 1996-2 2017. Short term monitoring comprised two non-contiguous one hour measurements at each chosen site. In addition, monitoring over a 24hr period was carried out at a site in Balykchy. The results of the short term and 24hr monitoring are shown in Tables 1a and 1b overleaf.

In Balykchy the two short term monitoring sites were located on the boundary of housing areas 45 to 80m to the east of the road and as expected, results show measured levels higher than calculated road traffic noise levels, partly as result of the contribution of noise from activity on the nearby industrial estates, but also due to increased traffic flow on the road itself. The results of the 24 hour monitoring at the side of the road in Balykchy are summarised in Table 1b.

To the south of the village of Tash Saray, noise levels at the Mosque, 24m from the road, are dominated by road traffic noise levels and thus provide a good opportunity to the validate modelling assumptions. The measured values were corrected for the difference between actual and modelled road traffic counts, and the freefield/façade correction of +3dB. The corrected result of c.52dB gave good agreement with calculated road traffic noise levels giving confidence in the accuracy of noise modelling on this section of the road.

Rec No.	Distance to road	Location	Date	Start time	$L_{Aeq,1hr}$	Model Output (dB)
2	24	Mosque, Tash Saray	1/5/18 1/5/18	08:07:36 11:18:36	43.2 47.8	52.8
8	45	Nr. Housing estate Balachy	6/5/18 7/5/18	10:43:56 10:25:15	57.2 54.3	45.2
11	80	Nr. Housing estate Balachy	6/5/18 7/5/18	12:00:01 09:19:01	51.9 50.7	41.7
14	90	House Tash Saray village	6/5/18 7/5/18	14:16:01 08:05:12	54.1 41.5	42.4

Table 1a. Results of Short term noise monitoring, Section 1

	Day 07:00-19:00	Eve 19:00-23:00	Night 23:00-07:00
Measured noise level (dB)	61.6	59.9	54.6

Table 1b. Results of 24hr monitoring noise monitoring, Balykchy, Section 1

3. CONSTRUCTION NOISE: CALCULATION AND ASSESSMENT

3.1 Calculation of Construction Noise

Noise levels from road construction have been calculated using the method set out in Part 1 of the British Standard BS 5228: 2009 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' [3]. The procedures defined in the Standard are +incorporated in the NoiseMap 5.2 computer software which has been used in this study. This is an Internationally recognised software package used for calculation of noise from transportation systems and construction noise and is used in the UK and world-wide.

The method takes into account factors including the sound power level and usage (percentage 'on-time') of construction plant, and the attenuation of noise with distance (including ground absorption) and as a result of screening provided by local topographical features. The Standard BS5228 also contains a schedule of noise source terms for construction plant from which the sound power levels used in this study have been taken.

Noise calculations have been made at specific locations, termed 'receptors', placed at the façade of buildings. The results of these calculations represent noise levels both at those buildings and groups of nearby buildings at a similar distance from the road.

Daytime construction noise levels have been calculated to give the average level ($L_{Aeq,12hr}$) over the working period, and in order to give a worst-case assessment, noise levels have been calculated for activities taking place at the nearest position on the road to each receptor. It has been assumed that construction would be continuous over the working day.

Assumptions: Construction Noise Calculations

It has been assumed in the calculations that the rehabilitation of the road would comprise the following principal activities carried out during normal daytime working:

Stage 1. Removal of earth on shoulders of widened sections/excavation and concreting (where applicable) of ditches

Stage 2. Breaking up of existing road, loading spoil onto trucks and moving off site

Stage 3. Laying new subgrade and vibratory compaction (where applicable)

Stage 4. Laying new asphalt with paving machine

Stage 5. Vibro piling of the river embankment (at Tash Saray).

A schedule of sound power levels for construction plant, and percentage on times for the construction activities is set out in Table 2 overleaf.

Mapping

Digital mapping of the existing and proposed road schemes has been supplied by JOC. Whilst the mapping is accurate, in places there is limited detail of topographical features away from the road, which limits the accuracy of noise calculations and also the spatial scope of the assessment. In Section 1A a very limited number of buildings are shown on the mapping and therefore in order to make the assessment meaningful, noise sensitive receptors have been added using the aerial photography in Google Earth to determine their position.

	Activity	Description	LWL (dB)	% on time
1	ground preparation	40T dumper truck	107	50
		40T dumper truck	107	50
		21t excavator	106	90
		D4 bulldozer	106	50
		Concrete Mixer truck	103	20
2	Asphalt breaking	21t excavator	106	90
		21t excavator	106	90
		40T dumper truck	107	50
		front end loader	111	90
		40T dumper truck	107	50
3	sub base/ preparation	40T dumper truck	107	30
		18T vibration roller	107	50
		D4 bulldozer	106	50
		grader	111	30
		40T dumper truck	107	30
4	Asphalt laying	18T vibration roller	107	50
		Road Pavement Laying Machine	103	50
5	piling embankment	vibro piling rig	128	80
		Delivery Lorry	98	20
		Crane (assume 50 tonne)	95	20

Table 2. Plant Sound Power Levels and Usage

3.2 Assessment of Construction Noise

The Kyrgyz National Noise Standards are set out in Table 3. These take the form of design aims or noise limits, which are not sufficient for use in process of environmental impact assessment where the effect of change in noise levels need to be considered. In addition, the absolute noise levels provided in the Table do not provide specific internal noise levels for the community facilities identified within this study including for example shops or mosques.

Description of Activity / Category	**$L_{Aeq,T}$**	**$L_{Amax,F}$**
Areas immediately adjacent to hospitals and sanatoriums	Day 45 Night 35	Day 60 Night 50
Areas immediately adjacent to dwellings, polyclinics, dispensaries, rest homes, holiday hotels, libraries, schools, etc.	Day 55 Night 45	Day 70 Night 60
Areas immediately adjacent to hotels and dormitories	Day 60 Night 50	Day 75 Night 65
Recreational areas in hospitals and sanatoriums	35	50
Rest areas at the territories of micro-districts and building estates, rest houses, sanatoriums, schools, homes for the aged, etc.	45	60

Table 3: Kyrgyz Noise Standards

The International Finance Corporation (IFC) Guidelines [4] are set out in Table 4 below. These are again in the form of design aims, which it states have been taken from WHO Guidelines and which should not be exceeded. The levels of 55dB and 45dB for day and night time for dwellings are identical to those included in the Kyrgyz Standards, however they are levels below which there are no demonstrable effects of noise on health, and not levels at which there would be considered to be significant noise impacts. The level of 70dB for industrial and commercial premises is not appropriate as an environmental noise standard and is based on a WHO hearing damage criterion.

Receptor	**Noise Level Guidelines $L_{Aeq,1hr}$ (dBA)**	
	Daytime (07:00 - 22:00)	**Night time (22:00 - 07:00)**
Residential; institutional; educational	55	45
Industrial; commercial	70	70

Table 4: IFC Noise Guidelines

The IFC guidelines also state that noise increases should not exceed 3dB, but do not distinguish between the assessment of temporary effects e.g. construction activities, and permanent effects e.g. changes in road traffic noise. However, in order to remain compliant with IFC Guidelines a noise change of 3dB is used to identify a significant construction noise impact, which is then rated using the semantic descriptors in Table 5 below.

Noise change (dB)	Description of Impact	Effect
Increase of 0.1-2.9 dB	Negligible	No Effect
Increase of 3.0-9.9 dB	Low	Negative Effect
Increase of 10.0-14.9 dB	Moderate	
Increase of 15 dB or more	Major	

Table 5. Semantic Description of Construction Noise Impact

The Guidelines also recommend that WHO Guidelines (1999) should be referred to for indoor noise levels, however these do not specify noise levels for the particular building uses which are required in this study, for example shops, offices or places of worship. Therefore, in this study reference has been made to the British Standard BS 8233 2014 [5] and relevant internal noise criteria from the Standard are set out in column 2 of Table 6. These are for the most part equivalent to the noise levels in the Kyrgyz Standards.

It is generally assumed that for transient short-term noise, i.e. noise from construction activities, occupants of buildings will close windows and doors or use other areas within buildings whilst the activity is being carried out. Typically for a single glazed window, there will be a reduction of 25dB between external and internal noise levels when windows are closed and thus external noise criteria for specific building types can be derived from the internal noise criteria and these are included in column 3 of Table 6.

Many of the dwellings considered in this study have walls constructed from adobe which has a slightly lower sound reduction index (R_w=43dB) in comparison to a typical brick-built wall (R_w=48). However, it is still sufficiently high that internal noise levels resulting from external environmental noise will be dominated by sound transmission through the windows (single glazed R_w=28dB) rather than the wall. Thus, the figures in Table 6 apply equally to buildings constructed from adobe.

Receptor	Noise Level $L_{Aeq,T}$ (dBA)	
	Internal	External
School Classroom	40	65
Shop	55	80
Cafe	45	70
Office/ Village Administration Building	50	75
Mosque	35	60

Table 6: Internal and External Construction Noise Levels for Community Facilities

Summary of Construction Noise Assessment Criteria

In summary, the criteria by which construction noise has been assessed are as follows:

Dwellings

A significant noise impact has been identified where there is an increase in day time noise level of 3dB or more and the terms in Table 5 have been used to describe the noise impact.

Compliance with the noise limits set out in the IFC Guideline daytime noise levels in Table 4 will also be addressed.

Community Facilities

A significant noise impact has been identified where there is an increase in noise levels of 3dB or more and/or internal noise levels exceed those set out in Table 6.

3.3 Results of Construction Noise Assessment

The results of construction noise calculations are presented in Table 7 overleaf. The first column gives the receptor number (abbr. 'rec.') followed by, in column 2, the type of receptor e.g. shop or house (hse.), and in column 3, the floor number within the building. The location of the receptor number within the village is shown on the noise contour mapping in Appendix I which should be referred to in conjunction with the Table.

Column 4 shows the daytime baseline noise levels $L_{Aeq,12hr}$ (dB) for 2018 taken from the road traffic noise calculations. This level is used to calculate the noise increases for the five construction activities presented in the Table.

Details of construction noise effects are set out below for noise sensitive receptors alongside the road where it passes through the outskirts of Balykchy and the village of Tash Saray.

The levels of baseline (existing ambient) noise in each village are compared with IFC Guidelines, and for non-residential properties internal noise levels are compared with the relevant criterion for each building. This is followed by the discussion of construction noise impacts.

Balykchy

Baseline Noise Levels

On the outskirts of Balykchy existing road traffic noise levels at houses alongside the road are below the levels set out in the IFC Guidelines for the daytime period.

Construction Noise Effects

The majority of the houses on the outskirts of Balykchy (recs. 8 & 11) are set back from the road and though there will be major noise impacts, with windows closed, internal levels will be well below the threshold at which speech interference would occur. This includes potential residential areas within the Base (rec. 13). Noise levels at recs. 8 & 11will exceed IFC Guidelines by up to 15dB. There will be a major noise impact at the nearest dwelling (rec. 6) and noise levels will exceed the IFC Guideline by up to 18dB.

At the office building (rec. 10) with windows closed, internal noise levels will exceed internal noise criteria for office working when road construction is being carried out directly outside the building. Similarly, internal noise levels inside the shops and café (recs. 3,4 & 5) will also exceed internal noise criteria when work is being carried out directly outside.

Rec. No.	Location	Floor	Baseline Noise $L_{Aeq,12hr\ (dB}$	Activity Construction Noise Levels and Noise Increase									
				Preparation		Asphalt Breaking		Sub-base and base		Asphalt Laying		Embankment Piling	
				$L_{Aeq,12hr\ (dB)}$	Δ dB	$L_{Aeq,12hr\ (dB)}$	Δ dB	$L_{Aeq,12hr\ (dB)}$	Δ dB	$L_{Aeq,12hr\ (dB)}$	Δ dB	$L_{Aeq,12hr\ (dB}$	Δ dB
1	House Tash Saray	1	54.5	79.1	24.4	82.4	27.7	79.3	24.6	74.2	19.5	89.7	35.0
2	Mosque-Tash Saray	1	52.8	74.9	21.9	78.2	25.2	75.0	22.0	69.9	16.9	89.0	36.0
3	Shop	1	56.8	80.9	23.8	84.2	27.1	81.1	24.0	76.0	18.9	n/a	n/a
4	Shop	1	52.3	76.8	24.3	80.1	27.6	76.9	24.4	71.8	19.3	n/a	n/a
5	Cafe	1	54.0	75.2	20.9	78.5	24.2	75.4	21.1	70.3	16.0	n/a	n/a
6	Residential Block	1	47.2	65.7	18.3	69.0	21.6	65.9	18.5	60.8	13.4	n/a	n/a
6	Residential Block	2	51.1	69.5	18.2	72.8	21.5	69.6	18.3	64.5	13.2	n/a	n/a
7	Shop	1	55.5	79.6	23.9	82.9	27.2	79.8	24.1	74.7	19.0	n/a	n/a
8	Boundary of housing	1	45.2	66.1	20.7	69.4	24.0	66.3	20.9	61.2	15.8	n/a	n/a
9	Petrol Station	1	53.5	76.3	22.6	79.6	25.9	76.5	22.8	71.4	17.7	n/a	n/a
10	Offices	1	49.4	71.4	21.8	74.7	25.1	71.5	21.9	66.5	16.9	n/a	n/a
10	Offices	2	54.5	76.0	21.3	79.2	24.5	76.1	21.4	71.0	16.3	n/a	n/a
10	Offices	3	55.5	76.0	20.3	79.3	23.6	76.1	20.4	71.0	15.3	n/a	n/a
11	boundary of housing	1	41.7	60.4	18.5	63.7	21.8	60.6	18.7	55.5	13.6	n/a	n/a
12	Petrol Station	1	56.0	79.6	23.4	82.9	26.7	79.8	23.6	74.7	18.5	n/a	n/a
13	Base Offices/Accom	1	40.2	58.8	18.4	62.1	21.7	59.0	18.6	53.9	13.5	n/a	n/a
13	Base Offices/Accom	2	41.9	59.0	16.9	62.3	20.2	59.2	17.1	54.1	12.0	n/a	n/a
14	House-Tash Saray	1	42.4	57.1	14.5	60.3	17.7	57.2	14.6	52.1	9.5	77.3	34.7
15	House-Tash Saray	1	48.0	68.5	20.3	71.8	23.6	68.7	20.5	63.6	15.4	73.8	25.6

Table 7: Results of Construction Noise Calculations

Tash Saray

Baseline Noise Levels

In Tash Saray existing road traffic noise levels at the houses closest to the road to the south of the village (rec. 1) are equal to the levels set out in the IFC Guidelines during the daytime. Internal noise levels at the Mosque (rec.2) already exceed the internal noise criterion for a place of worship by c.3dB.

Construction Noise Effects

Construction of the road will give rise to major noise impacts at dwellings in Tash Saray. At the nearest house to the road (rec.1) internal noise levels resulting from construction may cause speech interference, particularly during the piling of the river embankment retaining wall and will exceed the IFC Guideline by up to c.35dB.

The use of the Mosque may also be impaired during working on the road immediately adjacent and during piling, however it may be possible to mitigate this effect by arranging work breaks to coincide with prayer times. However, in the other sections of the village, which lie between c.50-120m from the road, internal noise levels arising from the works are unlikely to interfere with normal activities.

Mitigation of Construction Noise

Noise effects arising from construction of road schemes are transient and it is not normal practice to provide mitigation in the form of barriers.

Good communication with affected communities is often the most effective way to manage potential construction noise effects. Therefore, the Contractor should keep local residents informed of the progress of the works, including when and where the noisiest activities will be taking place and how long they are expected to last. All noise complaints should be effectively recorded, investigated and addressed. Account should be taken of the needs of residents in choice of working hours and where possible these should be chosen to:

- Avoid night time and weekend working;
- Avoid working near mosques during prayer time; and to
- Carry out works near schools during holiday periods

In addition, the Contractor should consider general good working practices including the following which are particularly relevant to road construction:

- Modern, silenced and well-maintained plant and construction equipment should be used;
- All vehicles and plant should be fitted with effective exhaust silencers which should be maintained in good and efficient working order.
- Fitted acoustic covers should be kept in a good state of repair and should be kept closed when plant is in use.
- vehicles should not wait or queue on the road with engines running and plant in intermittent use should be shut down when not in use or where this is impracticable, throttled down to a minimum.
- If a site compound, or materials storage area is to be used, both it and any static plant within it should be sited as far as is practicable from noise sensitive buildings.
- Where activities, including delivery of material to site, cannot take place during normal working hours they should be carried out as close to normal working hours as is reasonably practicable.
- Concrete mixers should not be cleaned by hammering the drums.
- When handling materials, care should be taken not to drop materials from excessive heights.

4. OPERATIONAL NOISE: CALCULATION AND ASSESSMENT

4.1 Calculation of Road Traffic Noise

Road traffic noise levels from the existing and rehabilitated road have been calculated using the Noisemap 5.2 computer model incorporating the method set out in the 'Calculation of Road Traffic Noise' (CRTN) [6]. This method takes into account factors including the speed and number of vehicles, the traffic mix (i.e. the percentage of heavy goods vehicles), the distance between the road and dwellings, and local topographical features.

Road traffic noise at dwellings and community facilities within the villages have been calculated for both the year of opening (2019), both with and without the scheme, and for fifteen years after opening (2034), again, both with and without the scheme. This will enable the assessment of both short and long-term effects arising from the scheme, and follows procedure set out in the UK Design Manual for Roads and Bridges [7].

Assumptions: Road traffic noise calculations

Road traffic flows

The following road traffic data have been provided by JOC:

a. Road traffic counts for section 1 giving a breakdown of hourly road traffic flows by vehicle type
b. 24-hour 2 way forecast road traffic flows for 2015 by vehicle type, taking into account diverted traffic. This has been assumed to be the baseline road traffic condition (as confirmed by JOC [8]).
c. Forecast increase in traffic flows

The intensification in road traffic resulting from the scheme itself is predicted to be negligible, giving rise to a noise increase of c.0.04 dB in the year of opening. Day and night time road flows for the years 2018, 2019 and 2034 are set out in Table 8 below and were derived from these data in the following manner:

2018 baseline. Traffic flow (b) plus intensification (c) (2015-2018). Hourly breakdown of vehicle type taken from (a) but adjusted to take into account additional diverted traffic flows (b).

2019 with and without scheme. Traffic flow (b) plus intensification (c) (2015-2019). Hourly breakdown of vehicle type taken from (a) but adjusted to take into account additional diverted traffic flows (b).

2034 with scheme. 2019 traffic flows plus 15 years intensification (c)

Road traffic speeds were also supplied by JOC and assumed to be 95kph outside the settlement areas and 60kph through the village of Tash Saray and through the outskirts of Balykchy.

Scenario	Day		Evening		Night	
	Total no.	%HGV	Total no.	%HGV	Total no.	%HGV
2018 Baseline flows	950	11	232	16	163	16
2019 1 pre & post	999	11	244	16	172	16
2034 flows 1	1832	11	448	16	315	16

Table 8. Road Traffic Flows

Mapping

Digital mapping of the existing and proposed road schemes has been supplied by JOC. Whilst the mapping is accurate, in places there is limited detail of topographical features away from the road, which limits the accuracy of noise calculations and also the spatial scope of the assessment. Barrier effects beyond the first row of houses have been ignored.

In Section 1 a very limited number of buildings are shown on the mapping and therefore in order to make the assessment meaningful, noise sensitive receptors have been added using the aerial photography in Google Earth to determine their position.

Noise contour mapping has also been prepared which has enabled the spatial extent of noise changes to be estimated and, again using aerial photography, allowed the estimation of the number of dwellings which will experience a significant noise change arising from the scheme.

4.2 Assessment of Operational Noise

The Kyrgyz National Noise Standards and IFC Guidelines have been discussed in detail in Section 3.2 and hence only specific comments relating to road traffic noise will be included in this Section.

The assessment of community response to change in road traffic noise will be assessed by considering the change in noise levels ($L_{Aeq,T}$) during the day and night time periods. In agreement with IFC Guidelines, a noise change of 3dB is used to identify a significant operational noise impact, which is then rated using the semantic descriptors in Table 9 below.

In addition, a significant risk of sleep disturbance will be identified for residents of dwellings at which night time road traffic noise levels are greater than or equal to 55 dB $L_{Aeq,8hr}$ (2300-0700) (outdoors). This is the Interim Target set out in the WHO Night Noise Guidelines for Europe [9] and is based on the assessment of internal noise levels with windows assumed to be open.

The assessment will also take into account the IFC day and night time residential limits set out earlier in Table 4. In the case of non-residential buildings, the internal noise criteria proposed in Section 3 will be used. However, for permanent noise effects, i.e. road traffic noise from the scheme, windows should be assumed to be open. Typically, for single glazed windows, there will be a reduction of 15dB between external and internal noise levels when windows are open. External noise criteria for specific building types can therefore be derived for operational noise and these are included in Table 10.

Noise change (dB)	Description of Impact	Effect
Decrease of 3 dB or more	Significant decrease	Positive Effect
Increase of 0.1-2.9 dB	Negligible	No Effect
Increase of 3.0-4.9 dB	Minor	Negative Effect
Increase of 5.0-9.9 dB	Moderate	
Increase of 10 dB or more	Major	

Table 9. Semantic Description of Long Term Road Traffic Noise Impact

Receptor	**Noise Level $L_{Aeq,T}$ (dBA)**	
	Internal	**External** (windows open)
School Classroom	40	55
Shop	55	70
Cafe	45	60
Village Administration Building	50	65
Mosque	35	50

Table 10: Internal and External Noise Levels for Community Facilities

Summary of Operational Noise Assessment Criteria

In summary, the criteria by which operational noise have been assessed are as follows:

Dwellings

A significant noise impact has been identified where there is an increase in day or night time noise level of 3dB or more and the terms in Table 5 have been used to describe the noise impact.

In addition, a significant noise impact associated with sleep disturbance at residential receptors has been identified where there will be an increase in $L_{Aeq,8hr}$ of greater than or equal to 1dB and night time road traffic noise levels are greater than or equal to 55 dB $L_{pAeq,8hr}$.

Compliance with the noise limits set out in the IFC Guideline day and night time noise levels in Table 4 will also be addressed.

Community Facilities

A significant noise impact has been identified where there is an increase in noise levels of 3dB or more and/or internal noise levels exceed those set out in Table 10.

4.3 Results of Operational Noise Assessment

The results of operational noise calculations are presented in Table 11 overleaf. The left hand side of the Table is in a similar format to the construction noise results Table, with the first column giving the receptor number followed by, in column 2, the type of receptor e.g. shop or house (hse.) and in column 3, the floor number within the building. The location of the receptor number within the village is shown on the noise contour mapping in Appendix I which should be referred to in conjunction with the Tables.

Day and night time noise levels and changes in road traffic noise level are presented for the short term (Post Scheme 2019) and long term (Post Scheme 2034) assessments, and are presented to an accuracy of 0.1 dB

The noise contour maps give an estimate of the spatial extent of the daytime long-term noise change from the year 2019 without the scheme to 2034. The estimate is based on the assumption that there is no additional screening beyond that provided by the first row of houses, as marked on mapping, and that the existing ambient noise levels without traffic on the road i.e. noise generated during the daytime by traffic on local roads and daily activities at dwellings is 45dB $L_{Aeq,12hr}$ in Balykchy and 35dB $L_{Aeq,12hr}$ in Tash Saray. Note: the grid shown on the maps is at 500m spacing.

Details of operational noise effects are set out below for noise sensitive receptors alongside the road where is passes through the outskirts of Balykchy and the village of Tash Saray.

The levels of baseline (existing ambient) noise are compared with IFC Guidelines, and for non-residential properties internal noise levels are compared with the relevant criterion for each building. This is followed by the discussion of operational noise impacts.

Rec. No.	Location	Floor	Noise Level (dB) Baseline		Noise Level (dB) Pre Scheme		Noise Level (dB) Post Scheme		Noise change (dB) Post-pre scheme		Noise Level (dB) Post Scheme		Noise change (dB) relative to 2019		Noise Level (dB) using 40kph		Noise change (dB) using 40kph	
			$L_{Aeq,12hr}$ 2018	$L_{Aeq,8hr}$ 2018	$L_{Aeq,12hr}$ 2019	$L_{Aeq,8hr}$ 2019	$L_{Aeq,12hr}$ 2019	$L_{Aeq,8hr}$ 2019	Δ dB 2019	Δ dB 2019	$L_{Aeq,12hr}$ 2034	$L_{Aeq,8hr}$ 2034	Δ dB 2034	Δ dB 2034	$L_{Aeq,12hr}$ 2034	$L_{Aeq,8hr}$ 2034	Δ dB 2034	Δ dB 2034
			Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
1	House Tash Saray	1	54.5	50.2	54.7	50.5	55.3	51.0	0.6	0.5	57.4	53.1	2.7	2.6	56.4	52.1	1.7	1.6
2	Mosque-Tash Saray	1	52.8	48.5	53.0	48.8	53.3	49.1	0.3	0.3	55.7	51.4	2.7	2.6	54.7	50.4	1.7	1.6
3	Shop-Balykchy	1	56.8	52.6	57.1	52.8	56.9	52.6	-0.2	-0.2	59.4	55.1	2.3	2.3	58.4	54.1	1.3	1.3
4	Shop-Balykchy	1	52.3	48.0	52.5	48.2	52.3	48.1	-0.2	-0.1	54.9	50.6	2.4	2.4	53.9	49.6	1.4	1.4
5	Cafe	1	54.0	49.8	54.3	50.0	54.1	49.8	-0.2	-0.2	56.6	52.3	2.3	2.3	55.6	51.3	1.3	1.3
6	Residential Block	1	47.2	42.9	47.4	43.2	47.3	43.0	-0.1	-0.2	49.9	45.6	2.5	2.4	48.9	44.6	1.5	1.4
6	Residential Block	2	51.1	46.8	51.3	47.1	50.9	46.7	-0.4	-0.4	53.6	49.4	2.3	2.3	52.7	48.4	1.4	1.3
7	Shop	1	55.5	51.2	55.7	51.4	55.5	51.2	-0.2	-0.2	58.1	53.8	2.4	2.4	57.1	52.8	1.4	1.4
8	Boundary of estate	1	45.2	41.0	45.4	41.2	45.4	41.1	0.0	-0.1	48.0	43.8	2.6	2.6	47.1	42.8	1.7	1.6
9	Petrol Station	1	53.5	49.2	53.7	49.4	53.4	49.1	-0.3	-0.3	56.0	51.7	2.3	2.3	55.0	50.7	1.3	1.3
10	Offices	1	49.4	45.1	49.6	45.3	49.4	45.2	-0.2	-0.1	52.1	47.8	2.5	2.5	51.1	46.8	1.5	1.5
10	Offices	2	54.5	50.2	54.7	50.5	54.5	50.2	-0.2	-0.3	57.1	52.9	2.4	2.4	56.1	51.9	1.4	1.4
10	Offices	3	55.5	51.2	55.7	51.5	55.5	51.2	-0.2	-0.3	58.0	53.8	2.3	2.3	57.0	52.8	1.3	1.3
11	boundary of state	1	41.7	37.5	41.9	37.7	41.9	37.6	0.0	-0.1	44.5	40.2	2.6	2.5	43.5	39.3	1.6	1.6
12	Petrol Station	1	56.0	51.7	56.2	51.9	56.0	51.7	-0.2	-0.2	58.5	54.3	2.3	2.4	57.5	53.3	1.3	1.4
13	Base Offices/Accom	1	40.2	35.9	40.4	36.1	40.3	36.1	-0.1	0.0	43.0	38.7	2.6	2.6	42.0	37.7	1.6	1.6
13	Base Offices/Accom	2	41.9	37.6	42.1	37.8	42.0	37.8	-0.1	0.0	44.7	40.4	2.6	2.6	43.7	39.4	1.6	1.6
14	House-Tash Saray	1	42.4	38.1	42.6	38.4	42.7	38.4	0.1	0.0	45.3	41.0	2.7	2.6	44.3	40.0	1.7	1.6
15	House-Tash Saray	1	48.0	43.8	48.2	44.0	47.8	43.5	-0.4	-0.5	50.9	46.6	2.7	2.6	49.9	45.6	1.7	1.6

Table 11: Results of Operational Noise Calculations

Balykchy

Baseline Noise Levels

On the outskirts of Balykchy existing road traffic noise levels at houses alongside the road are below the levels set out in the IFC Guidelines for day and night time periods, with the exception of rec. 6, where they are c. 3dB above the prescribed night time levels on the upper floor. Internal noise levels at non-residential properties including the shops, café and offices are also below internal noise criteria appropriate for their usage.

Operational Noise Effects

Short term operational effects (2019)

The change in road traffic noise arising from the widening of the road from 2 to 4 lanes through the outskirts of the town will be less than 1dB and a negligible noise impact.

Long term operational effects (2034)

The intensification of road traffic, which is largely independent of the scheme, forecast to occur in the 15 year period following opening of the scheme, combined with the effect of the road widening will give rise to increases in road traffic noise of c. 2.3-2.6 dB at receptors alongside the road during both day and night time periods, which would be a negligible noise impact.

The estimated extent of the daytime noise increase is illustrated in Appendix I, Figures A1-A3.

Noise levels in the two shops, café and offices alongside the road would continue to meet their respective internal noise criterion.

Tash Saray

Baseline Noise Levels

In Tash Saray existing road traffic noise levels at the houses closest to the road, to the south of the village (rec. 1), are equal to the IFC Guidelines during the day and exceed the night time level by c.5dB. Internal noise levels at the Mosque (rec.2) already exceed the internal noise criterion for a place of worship by c.3dB.

Operational Noise Effects

Short term operational effects (2019)

The rehabilitation of the road (which will remain as a 2 lane road where it passes by the river adjacent to the Mosque) through the village will give rise to an increase in noise levels of up to c.0.6 dB which would be considered to be a negligible noise impact.

Long term operational effects (2034)

The intensification of road traffic, which is largely independent of the scheme, forecast to occur in the 15 year period following opening of the scheme, will give rise to an increase in road traffic noise of 2.6-2.7dB. This would be a negligible noise impact. The estimated extent of the daytime noise increase is illustrated in Appendix I, Figures A4.

Internal noise levels within the Mosque would remain above the internal noise criterion for a place of worship.

5. SUMMARY

An assessment has been carried out of potential noise effects arising from the rehabilitation and operation of a section of the A367 road. This Section of road, referred to as Section 1, runs from the outskirts of Balakchy c.40km in a westerly direction, passing through the village of Tash Saray.

Noise levels from road construction have been calculated using the procedures contained in the British Standard BS 5228: 2009 'Code of Practice for Noise and Vibration Control on Construction and Open Sites', as embodied in the NoiseMap 5.2 computer software which has been used in this study.

The same modelling software has been used to calculate road traffic noise levels from the existing and refurbished road at dwellings and community facilities, based on the method set out in the UK Calculation of Road Traffic Noise. Noise levels have been calculated for both the year of opening (2019), both with and without the scheme, and for the year fifteen years after opening (2034) allowing both short and long term effects arising from the scheme to be assessed.

The Krygyz National Noise Standards and IFC Noise Guidelines were reviewed and appropriate noise assessment criteria taking into account these standards were adopted.

A baseline noise monitoring survey was carried out in 2018. The results of road traffic noise calculations showed that 2019 baseline noise levels already exceed IFC guideline values at dwellings alongside the road.

The results of construction noise assessment indicated that there will be major daytime noise impacts at dwellings and community facilities alongside the road. There is no practicable means of mitigation of these noise impacts and this is considered to be an unavoidable consequence of construction of the scheme.

The results of road traffic noise assessments at Balykchy show that in 2019 the noise change resulting from the widening of the road from 2 to 4 lanes through the outskirts of the town will be less than 1dB and a negligible noise impact.

The intensification of road traffic, which is largely independent of the scheme, forecast to occur in the 15 year period following opening of the scheme, combined with the effect of the road widening, will give rise to increases in road traffic noise of between c.2.3-2.6 dB at receptors alongside the road during both day and night time periods. This would be a negligible noise impact and noise levels in the shops, café and offices alongside the road would continue to meet relevant internal noise criteria.

At the village of Tash Saray, the rehabilitation of the road in the year 2019, which will remain as a 2 lane road, will give rise to an increase in noise levels of c.0.6 dB. This would be considered to be a negligible noise impact.

The intensification of road traffic, which is largely independent of the scheme, forecast to occur in the 15 year period following opening of the scheme, will give rise to a noise increase of c.2.7 dB during both day and night time periods. This would be a negligible noise impact.

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GLOSSARY OF TERMS: NOISE UNITS AND INDICES

Noise can be defined as 'unwanted sound'. Sound is a fluctuation of air pressure and can be detected by the human ear when it occurs between 20 and 20,000 times per second. This is referred to as the frequency of the sound and is measured in Hertz (Hz). The ear is not equally sensitive to sound over the whole of this range and therefore when measuring sound this effect is allowed for by applying a frequency weighting, referred to as the A weighting, to the measured signal.

The loudness of the sound is dependent on the magnitude of the pressure fluctuation. The human ear has an approximately logarithmic response to this and therefore the sound pressure level (SPL) is expressed using logarithmic unit, the decibel, written (dB (A)), where the 'A' indicates that the sound has been A weighted.

Noise outdoors from industry and transportation is generally referred to as environmental noise and a typical feature is its continual change in level. In order to describe and take account of community response to this varying noise level additional noise indices are used. The most commonly used of these is the equivalent continuous 'A' weighted sound pressure level, ($L_{Aeq,T}$), which is defined as the steady sound pressure level which has the same energy as a varying noise level measured over a period (T). It takes account of both the number and level of noise events and is generally referred to as the ambient noise level. This index is used within this report for the description of construction and road traffic noise levels.

Statistical noise indices are also used to describe the noise environment, principally the L_{A10} and L_{A90}. The L_{A10} is the level of sound exceeded for 10% of the measurement period and is commonly used in the measurement of road traffic noise. The L_{A90} is the level of sound exceeded for 90 percent of the measurement period, and is referred to as the background noise level, as noise rarely drops below this level. A further index that is useful particularly for the description of night time noise events, such as the pass-by noise level of a train, is the maximum sound A weighted pressure level $L_{Amax,F}$. The 'F' denotes that the level has been measured using a fast averaging time (125 ms), which reflects the sensitivity of the human ear to rapidly varying noise events.

There are a number of simple rules of thumb that can be applied to noise. For example, a 10dB increase in noise level is equivalent to a subjective doubling in noise level. When two sources of the same sound pressure level are added together, the resultant sound pressure is approximately 3dB(A) higher than the individual sounds. Individuals can typically detect changes in environmental noise levels when the change is greater than 1-3dB.

Environmental noise levels are measured using a sound level meter, usually connected via a cable to a microphone mounted on a tripod or A Frame. When the microphone is positioned at the building façade, noise levels are referred to as 'façade' measurements, as distinct from those measured away from reflecting surfaces, which are referred to as 'free field'. Façade levels are generally taken to be 2.5dB higher than the equivalent free field measurement as a result of the effect of reflected noise from the building façade

APPENDIX I

NOISE CONTOUR MAPPING

Figure A1. Noise Contour Plot: Long Term Daytime Noise Change (yr. 2034-2019) and Receptor Locations: Balykchy

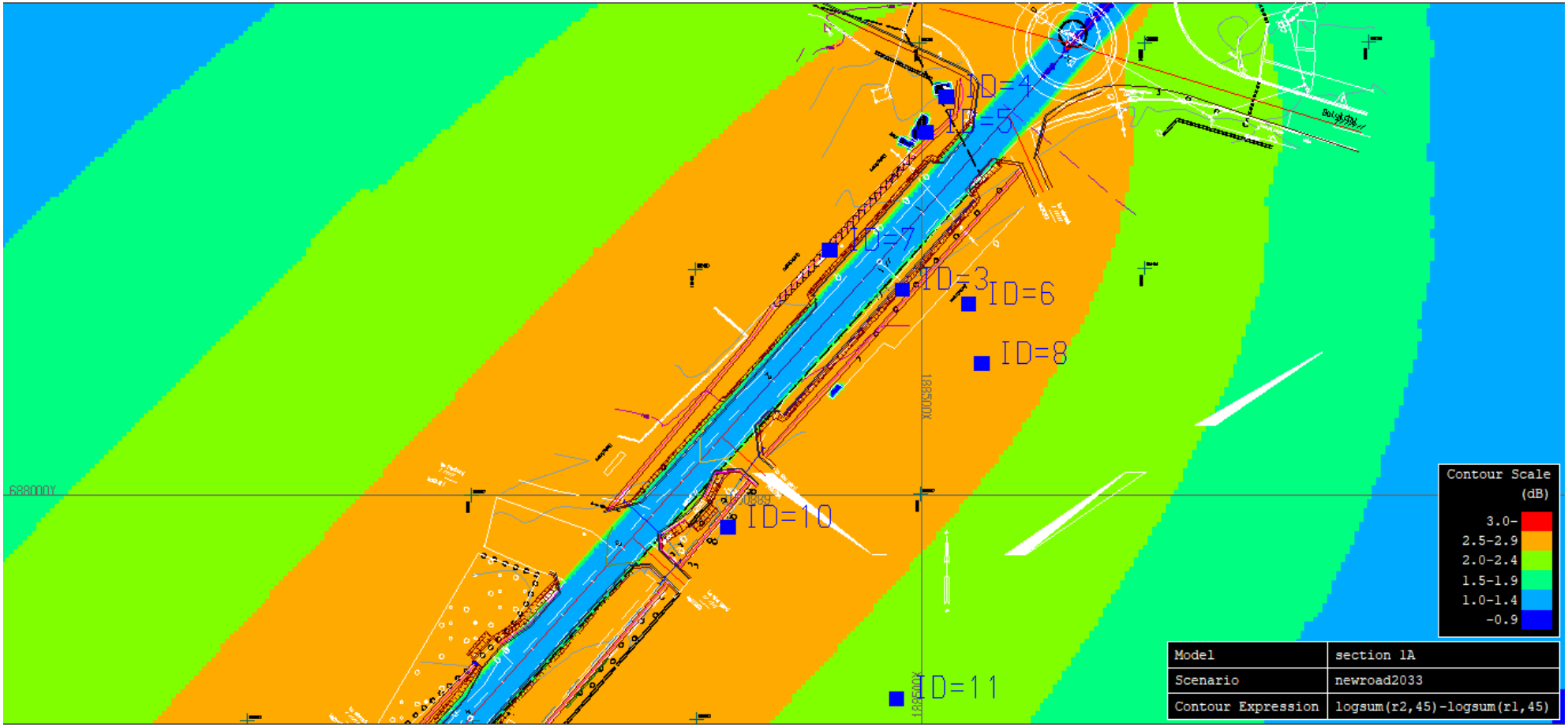


Figure A2. Noise Contour Plot: Long Term Daytime Noise Change (yr. 2034-2019) and Receptor Locations: Balykchy (cont.)

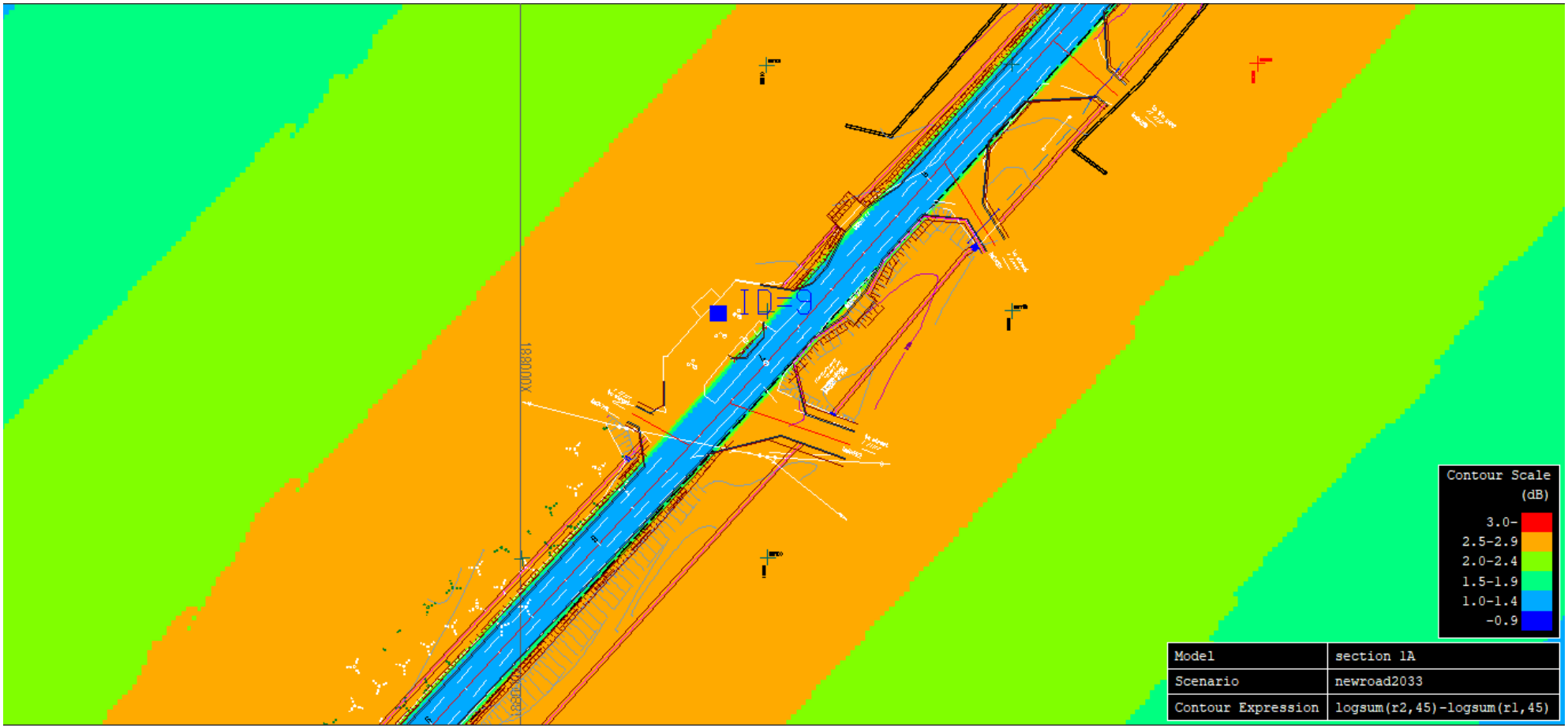


Figure A3. Noise Contour Plot: Long Term Daytime Noise Change (yr. 2034-2019) and Receptor Locations: Balykchy (cont.)

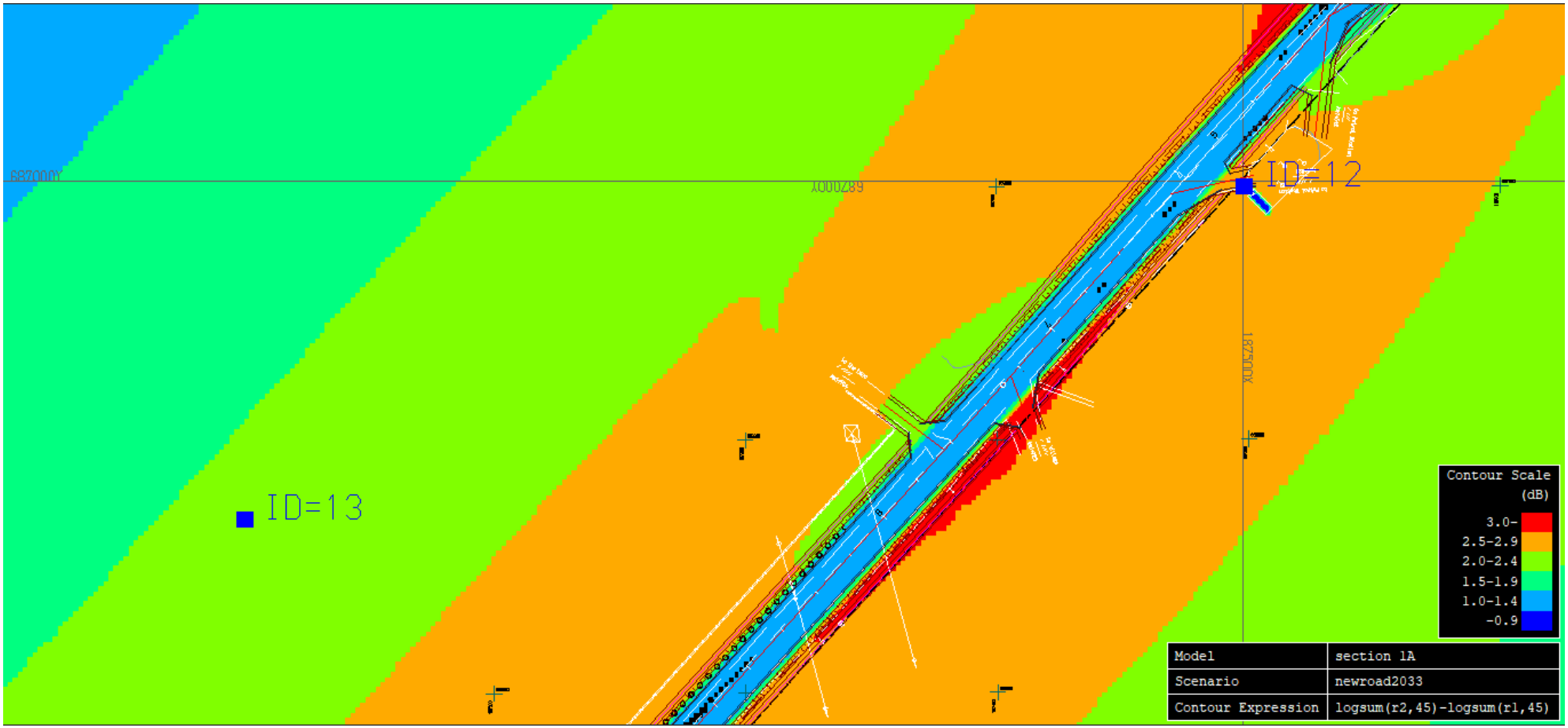
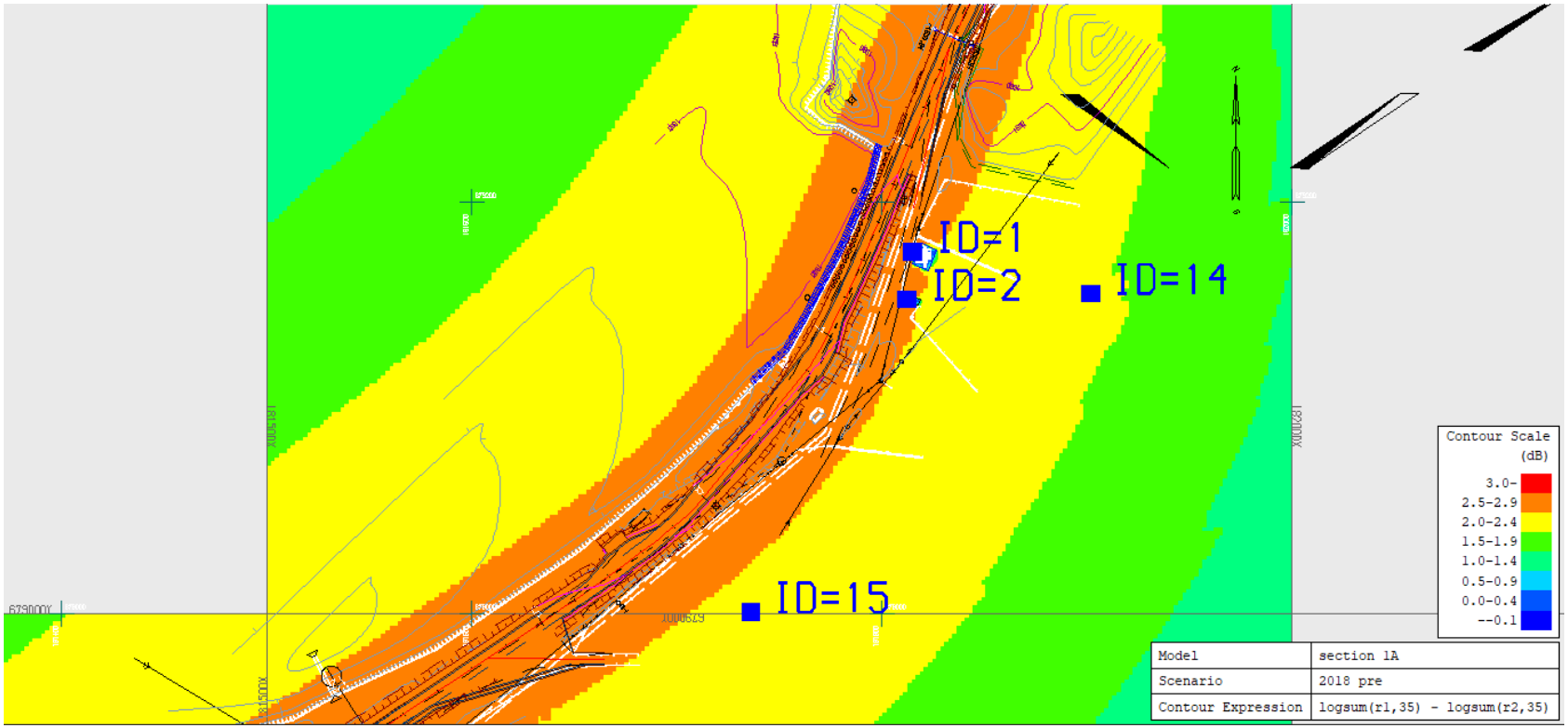


Figure A4. Noise Contour Plot: Long Term Daytime Noise Change (yr. 2034-2019) and Receptor Locations: Tash Saray



VIBRATION ASSESSMENT

REHABILITATION AND UPGRADING OF ADDITIONAL FINANCE AND CONNECTOR ROADS

JAPAN OVERSEAS CONSULTANTS LTD

DRAFT REPORT

MARCH 2018

CONTENTS

1. INTRODUCTION

Japan Overseas Consultants Co. (JOC) has been appointed by the Ministry of Transport and Roads (MOTR) to conduct engineering design and environmental assessment for the rehabilitation of three sections of the A367 road. These include:

Section 1 which runs from the outskirts of Balykchy c.40km in a westerly direction, passing though the village of Tash Saray

Section 2a runs from Kochkor to Epkin c. 25km in a westerly direction through the villages of Kokjar, Chekildek, Cholpon and Akyuyk. This scheme and Section 1 are referred to as Additional Finance Roads.

Section 2b runs from Epkin c.70km to Bashkugandy passing through the villages of Jumgal, Kuiruchuk, and Tugot Say, ending just before the village of Dyikan. This Section of road is referred to as the connector road and finance is already in place for this scheme.

Initial Environmental Examinations (IEE) have been completed for each of the three road sections, however The Asian Development Bank (ADB) which is funding the rehabilitation, has requested that JOC should update the Examinations to include an assessment of the potential noise and vibration effects which might arise from construction and operation of the three sections of road. This study addresses the potential vibration effects. JOC has in turn, retained specialist noise and vibration engineers to carry out a study to determine the potential effect of the vibration on nearby houses and potential means of mitigation to reduce the risk of damage.

Although the Terms of Reference (ToR) [1] suggest that an operational vibration assessment be carried out, this is considered unnecessary. Specifically, the UK Design Manual for Roads and Bridges [2] states that peak particle velocities (ppv's) in the structure of buildings close to heavily trafficked roads rarely exceed 2 mm/s and typically are below 1 mm/s. Normal use of a building such as closing doors, walking on suspended wooden floors and operating domestic appliances can generate similar levels of vibration to those from road traffic. Based on this statement, vibration arising from future operation of the road would be unlikely to give rise to cosmetic or structural damage, and therefore this has not been included in the study.

It follows that the that the preparation of a vibration baseline for the project area is also unnecessary because the existing vibration baseline alongside the road is dominated by vibration from road traffic. This is typically an order of magnitude lower that the levels that will result from the use of road construction plant i.e rollers, excavators etc and therefore should not affect the assessment of construction vibration.

The ToR also include a requirement to carry out site measurements on which to base construction vibration calculations. This cannot be expedited at present as construction operations have not started on these road sections and there is no plant in situ to use as a vibration source. In addition, current ground conditions may not be typical of the prevailing conditions during the construction period.

Therefore it is proposed to defer any vibration monitoring until the construction begins and at this stage to make use of existing measured data and calculation methods. The principal elements of the present study are to:

- review existing methods for calculation of vibration from ground preparation and compaction. An accepted method for vibrating rollers is described in Section 2;
- review the lithology at villages alongside the road in Section 1, 2a and 2b and compare with those at the locations where construction vibration measurements were made on the Bishkek-Kara Balta road. If these lithologies are sufficiently similar then the calculation methodology currently being derived from the Bishkek-Kara Balta measurements will be sufficiently robust to inform the IEE as required by ADB. Should there be significant differences in the lithologies it may be possible to quantify these differences using site data for construction vibration which are in the public domain;
- set vibration damage threshold levels for low, medium, high risk building classes (as determined by the Project Proponent) and for fragile ancient monuments based on recognised International Standards. These are set out in Tabular form in Section 3;
- review and select appropriate criteria for the assessment of human response to vibration from construction activities. These are also set out in Section 3;
- review the effectiveness of potential methods of mitigation of ground borne vibration from vibratory compaction. The findings of the review are set out in Section 4;
- compare the results of vibration monitoring carried out as part of an earlier study with predictions made using the selected vibration model and if necessary to revise the prediction method to fit measured vibration data, taking into account, where possible, differences in geology. Section 5 includes graphs showing this comparison;
- calculate for normal operation of the roller the distance from the edges of the new road to each vibration damage (cosmetic) contour for low, medium and high risk building classes. The results of this are given in Section 5;
- re-calculate these distances taking into account the effectiveness of potential mitigation including for example use of low roller vibration settings. These results are also included in Section 5.
- plot (JOC CAD team) cosmetic and minor structural vibration damage threshold contours for high risk buildings on mapping of the scheme thus enabling buildings exceeding the respective thresholds to be identified.

2. CALCULATION OF CONSTRUCTION VIBRATION

Calculation of Vibration from Ground Compaction using Vibratory Roller

A review was carried out of available calculation methods, firstly those specifically aimed at calculation of vibration from ground compaction using vibratory rollers, and secondly more general methods for calculation propagation of vibration in varying lithologies.

The most comprehensive method found was that set out by Hiller and Crabb [3] who derived an empirical relationship for the calculation of vibration from ground compaction based on an extensive measurement programme carried out by the UK Transport Research Laboratory (TRL). They found that for vibration from normal compaction passes the following empirical relationship could be used:

$$V_{res} = k_s n^{0.5}[A/(x+w)]^{1.5}$$

where:

V_{res} is the resultant level of vibration
k_s = 75, with a 50 per cent probability of the vibration level being exceeded;
k_s = 143, with a 33 per cent probability of the vibration level being exceeded;
k_s = 276, with a 5 per cent probability of the vibration level being exceeded;
n is the number of vibrating drums;
A is the nominal amplitude of the vibrating roller (mm);
x is the distance along the ground surface from the roller (m); and
w is the width of the vibrating drum (m).

The results obtained using this calculation method are compared with measured vibration levels in Section 5. For the purposes of this study it has been assumed that the roller used would have similar operating characteristics to the one on which measurements were made in [18]. The details of this plant are given in the Appendix.

Levels of vibration during normal operation of the roller, both freefield (see Terminology) and measured on the foundation, were found to be dominated by the vertical (z) component (see Terminology), and thus in this study only the vertical components have been considered

Effect of Soil Conditions

A geological survey was carried out along the length of the road between Kochor and Dyikan [14] which showed the lithologies to comprise:

light sill clayey soil, hard-semi hard consistency with included gravel/pebbles up to 10%;
Gravel sand , Gruss soil (weathered granite) sandy loam aggregate;
Gravel soil with sandy loam aggregate;
Pebble soils with sandy and loam sandy aggregate; and
Crushed rock soil with loamy aggregate

These soil conditions differ from those present at Petrovka village where the measurements were carried out, and hence it was concluded that the calculation method derived from those results could not be used in the present study. The review of calculation methods indicated that there is no robust numerical method of taking into account the effect of the difference in lithology on the propagation of ground borne vibration. The propagation term used in the TRL is empirical but based on measured data from sites with differing lithology. In practice some of the houses alongside the road e.g in Jumgal are so close to the widened sections that construction related vibration damage was considered to be highly likely and the uncertainty arising from differing soil types was unlikely to affect the results at these dwellings.

Effect of Height of Water Table

A saturated soil may facilitate the propagation of vibration [11] in comparison with the unsaturated condition. However for construction operations such as ground preparation and excavation the bulk of the energy (c.67%) will propagate via surface waves, known as Rayleigh waves (see Terminology). The magnitude of the surface wave is largely unaffected by changes in the height of the ground water level, provided it remains sufficiently below the surface (relative to the wavelength). In the geological survey [14] it was reported that groundwater was not observed in the trial pits (c.2m deep) or open boreholes during excavations and drilling. Therefore the groundwater was not expected to occur close to the road surface and wave propagation should not be affected.

Frozen soil

Freezing of the soil may affect vibration propagation by reducing internal damping.

Building Coupling Loss

The building coupling loss is defined as the ratio between free-field vibration levels and those measured on the building foundation. For a lightly built structure with limited foundations, this would normally be approximately 1, which was confirmed by the results of vibration monitoring reported in [18]. For a typical brick built structure on a concrete foundation it would be approximately 0.5. i.e. the level of vibration on the foundation would be approximately half that measured free-field outside the building at the same distance from the source of vibration.

The predominance of buildings which are well coupled to the ground i.e adobe construction with shallow foundations in the villages adjacent to the road increases the risk of vibration related damage during the rehabilitation of the road. The limited attenuation of ground-borne vibration as it enters the building means the level of structural vibration is already roughly double the level that would be found on an equivalent brick built building (on concrete foundations). This is compounded by the fragile nature of the adobe clay/adobe construction, resulting in buildings that are much more vulnerable to vibration damage.

This vulnerability was borne out by results of structural surveys carried out by the State Institute of Anti-Seismic Construction and Engineering [15] on some of the adobe buildings alongside the Bishek Kara Balta road after the vibratory rolling of the road widening, also found evidence of fresh cracks in building facades.

3. ASSESSMENT OF VIBRATION

Vibration Related Building Damage Criteria

International Guidelines and Standards present criteria for vibration related building damage in the form of threshold levels of vibration (peak particle velocity), as either a value or range of values.

Key factors in determine these levels are as follows:

- the nature of the building including its construction, its condition, and whether is of historic importance;
- the likely extent of damage i.e. cosmetic, minor structural or major structural; and
- whether the source of vibration is continuous or a single event and the dominant frequency (Hz)

A useful review of some of the Standards, largely of US origin, is presented in the Caltrans Guidance Manual [8], and this has been used as the basis of their own guideline values. On the whole these seem sensible, though they only set a threshold for cosmetic damage, do not specify a frequency range over which these limits apply, and appear to be overly conservative for industrial and framed buildings in comparison with European Standards.

Additional useful guidance is presented in the British and German Standards [6,7] both of which include a means of taking account of the variation of vibration damage threshold with frequency. In general, the threshold level at which vibration damage will occur increases with frequency. In common with the Caltrans guidance, both Standards differentiate between continuous and discrete vibration sources, with the threshold levels for continuous vibration being roughly half the equivalent level for single event vibration. Using both the Caltrans and BS definitions, vibrating rollers are classified as continuous sources of vibration.

The British Standard 7385 Pt 1 offers a means of qualitatively assessing the sensitivity of the building taking into account structure, condition and soil but does not provide a means of taking these factors into account in determining vibration damage threshold levels.

The British and German standards also offer guidance on the vibration levels at which the onset of minor structural damage might occur with these being roughly a factor of two higher than those for cosmetic damage. The definitions of cosmetic and minor structural damage set out in BS 7385 in are as follows:

> Cosmetic. The formation of hairline cracks on drywall surfaces or the growth of existing cracks in plaster or drywall surfaces; in addition, the formation of hairline cracks in mortar joints of brick/concrete block construction
>
> Minor Structural. The formation of large cracks or loosening and falling of plaster or drywall surfaces, or cracks through bricks/concrete blocks

The criteria which will be used in this study are a combination of the recommendations of the Standards and Guidelines thought most relevant and are set out in Table 2 below. Unless stated otherwise, they apply to the onset of cosmetic damage resulting from a continuous vibration source operating at a minimum

frequency of 20Hz. Three classes of building are included as set out in the ToR, equivalent to low, medium and high risk of vibration damage. A description of the classes was originally intended to be supplied by the Project Proponent, however in the absence of guidance, reference has been made to International Standards and Guidelines, taking into account the type of building seen alongside the road. The majority of these buildings fall into the High Risk Class as they are of adobe/clay construction, which are referred to by the Institute as belonging to Class 9.5 in SNiP 22-01-98KR and are highly vulnerable.

However in the current study this Class is also considered to comprise two sub-classes, A with shallow footings (<1m), and B with concrete foundation/footings. Whilst the latter are likely to be less sensitive to ground borne vibration damage there is insufficient data in the literature on which to base a separate threshold for cosmetic damage and both must be classed as fragile buildings.

Human Response to Vibration: criteria

The British Standard BS 5228 sets out guideline values in terms of peak particle velocity for human response to construction works and these are shown out in Table 3 below. Column three includes semantic descriptors of the scale of vibration impact which are equivalent to those commonly used in the assessment of construction vibration.

The overall results of the assessment are to be presented in the form of building vibration damage contours hence the human response to vibration must be considered in relation to these contours.

Building Vibration Damage Risk Level	Building Description	Cosmetic Damage Threshold ppv (mm/s)	Source Reference for Criteria	Assumed Building Coupling Loss
	Extremely fragile historic buildings, ruins, ancient monuments	2	Caltrans/BART	n/a
High Risk A	Fragile buildings of clay construction with shallow (<1m) rubble footings	3	Caltrans	1
High Risk B	Fragile buildings of clay construction with concrete foundations/footings	3	Caltrans	0.5
Medium Risk	Residential brick built on concrete foundations/footings and light commercial	10	BS 7385/DIN 4150	0.5
Low Risk	Heavy commercial, industrial and framed buildings	25	BS 7385/DIN 4150	0.5

Table 1. Building Vibration Damage Assessment Criteria

Vibration Level ppv (mms^{-1})	Description of Effect	Description of Impact
<0.3	Vibration unlikely to be perceptible	Negligible
0.3 to 1.0	Increasing likelihood of perceptible vibration in residential	Minor
1.0 to 10	Increasing likelihood of perceptible vibration in residential environments but can be tolerated at the lower end of the scale if prior warning and explanation has been given to residents	Moderate
>10	Vibration is likely to be intolerable for any more than a brief exposure to a level of $10mms^{-1}$	Major

Table 2. BS 5228 Vibration Assessment Criteria

4. MITIGATION OF VIBRATION

Roller Vibration Setting

The calculation procedure described in Section 2 and the results of field measurements show that there is a clear reduction in vibration resulting from the use of a lower vibration level on the roller, though more passes of the roller may be required to achieve the same level of ground compaction. In theory, it may also be possible to achieve some mitigation by increasing the operating frequency of the roller as the threshold of building damage generally increases with frequency between 20 and 50Hz, as described in BS 7385 and DIN 4150. However it is not clear whether the frequency relationships in these Standards can be applied robustly to the building classes under consideration in this study.

It has recently been confirmed that on sections of the road adjacent to high risk buildings ground compaction can be carried out using a roller with no vibration. This would provide the most effective form of mitigation and would eliminate cosmetic damage resulting from vibration in the high risk buildings (within the measurement range).

A practical step which can be taken to mitigate vibration effects is to ensure that roller start up and shut down is carried out away from vibration sensitive properties as transient vibration levels during start up and shut down will generally exceed levels for steady state operation. Use of vibratory rollers directly atop the underlying soil adjacent to dwellings should also be avoided if possible. If compaction of the soil is required this should be done using a sheep foot type roller or a non-vibratory roller as suggested by the contractor (see below).

Use of Alternative Compaction Equipment

It has been suggested by contractors working on another scheme that sufficient compaction of the sidewalk sub-base and the sides of embankment can be achieved using a rubber tyre roller as shown in Appendix II. Selection of an alternative lower vibration roller would still offer a means of providing additional mitigation.

Trench

It has been proposed by the Contractor that the depth of the drainage channel proposed to run alongside extensive sections of the road could be temporarily increased during the construction of the road. This would enable it to function as a trench providing vibration isolation to properties alongside the road from operation of the roller.

The results of experimental work examining the effectiveness of trenches agree that the degree of attenuation which can be achieved is a function of the depth of the trench in relation to the incident Rayleigh wavelength. The depth of the is sometimes expressed in these studies as a fraction of wavelength, thus in order to determine the depth an effective trench of it necessary to calculate the wavelength in the local soil conditions along the road. Assuming that the Rayleigh wave speed in the soil (of the type prevalent adjacent to the road) is about c. 140m/s and the main frequency of concern to be c. 20Hz, this would give a wavelength of c.7m.

Richart [4] reports studies showing that reductions of 75- 50% were readily achievable with a trench at depth of 0.6 times Rayleigh length wavelength, which for the current study would be 4.2m. The studies showed that the highest levels of attenuation were

achieved close to the trench, and that the screened area extended to a distance of at least ten wavelengths from the trench.

Barkan [13] suggested that the depth should not be less than 0.3 times the wavelength i.e. 2.1m, whilst in [12] Thompson reports experimental results showing a vibration reduction in the order of 10dB (c.65%) at frequencies of 16Hz and above using a trench of 3.5m in depth.

The Institute carried out some initial tests [17] in which they measured the degree of attenuation of vibration (acceleration) from the roller which could be achieved using trench depths of 1.5 and 2.0 at a distance of c.6m from the trench. With a depth of 1.5m they reported reduced levels of vibration of between 2-4 times the level without the trench.

Taking into account the review of the work above, it has been assumed in the calculations that it would be possible to achieve an attenuation in levels of ground-borne vibration of the order of c. 50% using a trench alongside the road. The depth of the trench would be likely to be between c.1.5-3m. However this assumption would need to be confirmed by carrying out some additional vibration measurements prior to resuming construction works.

Human Response

Adverse human response to construction vibration can be mitigated by good communication between the contractor and local residents. If occupiers of dwellings are informed prior to the works of their nature, duration and potential vibration effects, then adverse response will be less. Generally the main concern relating to construction vibration is of damage to property and if this is not likely to occur, the point should be made strongly to residents.

5. RESULTS

Vibratory Compaction

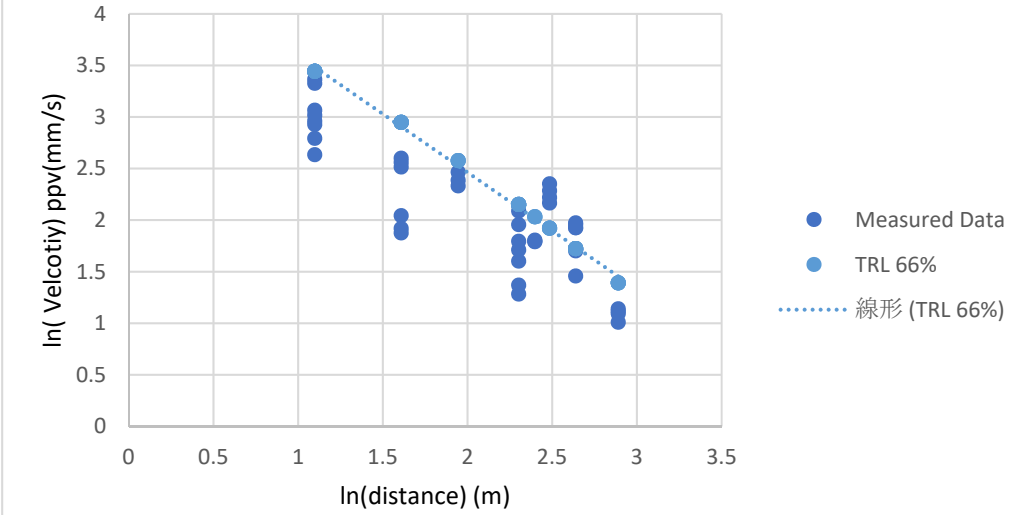
Figures 1 and 2 show the variation of measured vibration taken from [18] with distance from the roller, for high and low vibration roller operating modes respectively. A feature of these data is the low rate of attenuation with distance compared with measurements previously reported [3],[17]. This is considered to be a result of the ground conditions in Petrovka alongside the Bishkek-Kara Balta Road.

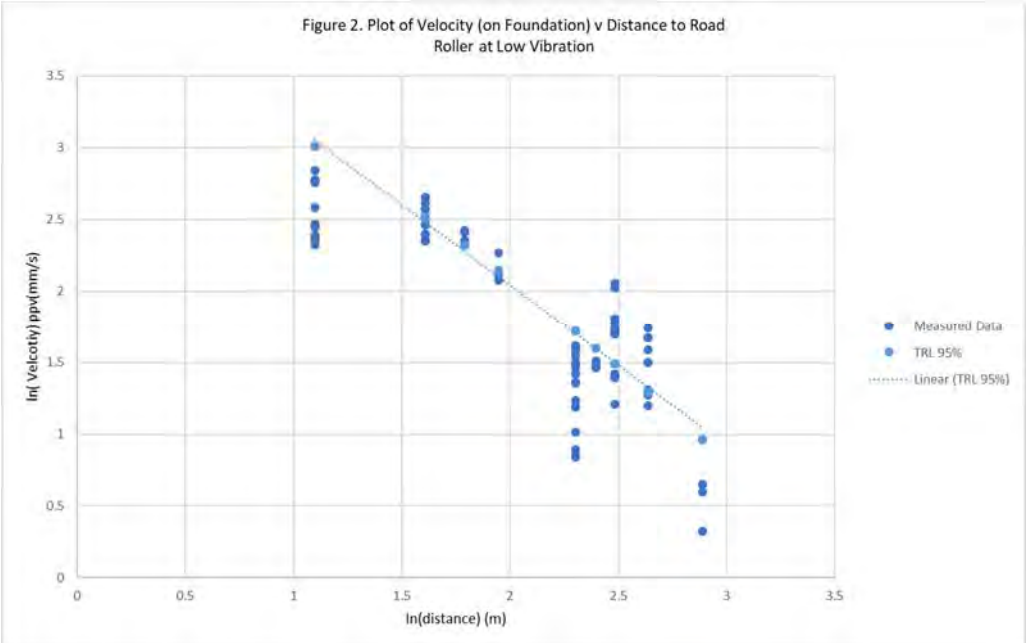
There is no reason to expect this low rate of attenuation to occur to at the villages in the current study (Kochor and Dyikan) and as discussed earlier the relationships derived using these data should not be used to predict levels of vibration.

However those measurements made closer to the roller are likely to be less affected by propagation effects. Therefore the approach taken in this study has been to use the TRL prediction methodology described in Section 2, and to select the prediction level which gave the best agreement with the upper bound of the measured data close to the roller.

For the roller operating in high vibration modes it was found that the TRL 66% prediction level gave best agreement with the closest measured data, whilst for the low vibration mode the 95% prediction level was a better fit. An explanation of these terms is given in Terminology. The comparison with measured vibration levels is shown on Figures 1 and 2. These prediction levels were therefore used to determine the vibration damage contour distances to buildings.

Figure 1. Plot of Velocity (on Foundation) v Distance to Road Roller at High Vibration





Vibration Damage Contour Distances

Vibration damage contour distances are set out below in diagrammatic form (Figures 3-6) for both high and low vibration levels of the roller. These are the distances from the road beyond which the risk of vibration damage (cosmetic or minor structural) reduces below 5% (for 95% prediction level), or 33% (for the 66% prediction level).

Whilst these are included for building classes at high, medium and low risk of vibration damage, the discussion in each section is restricted to the high risk building class i.e. clay/adobe construction as these constitute the majority of the buildings in the villages through which the road passes.

Predicted levels are also given assuming the use of an over excavated drainage channel to provide vibration mitigation.

A summary of the contour distances specifically for high risk buildings is provided in Table 3.

<u>High vibration mode</u>

Cosmetic Damage (TRL 66% prediction level)

Using the TRL 66% prediction level taken from Figure 1 and criteria taken from Table 2, the distance to the vibration damage (cosmetic) contour for high risk buildings is predicted to be 22m as shown in Figure 3 below. In areas where an over excavated drainage channel can be used as a trench it is predicted that this contour distance could be reduced to 13m for high risk buildings.

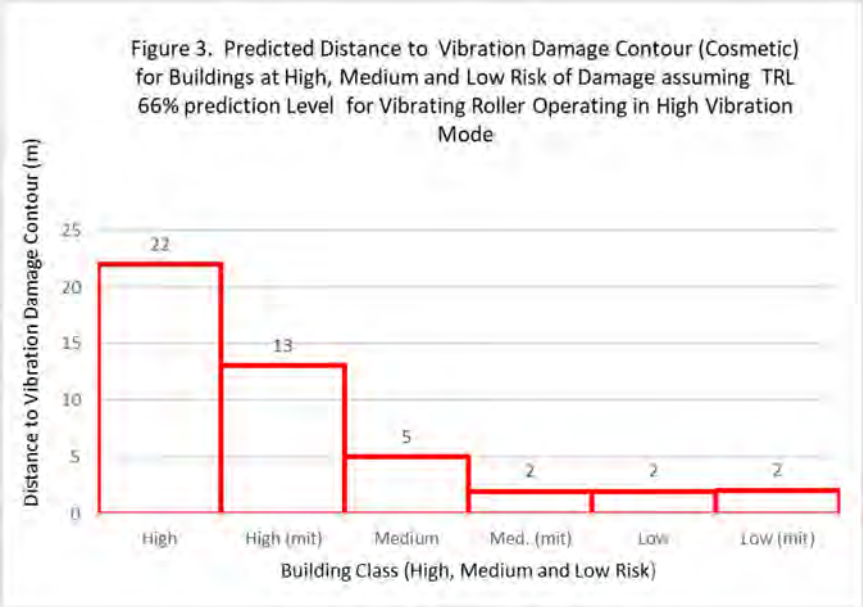
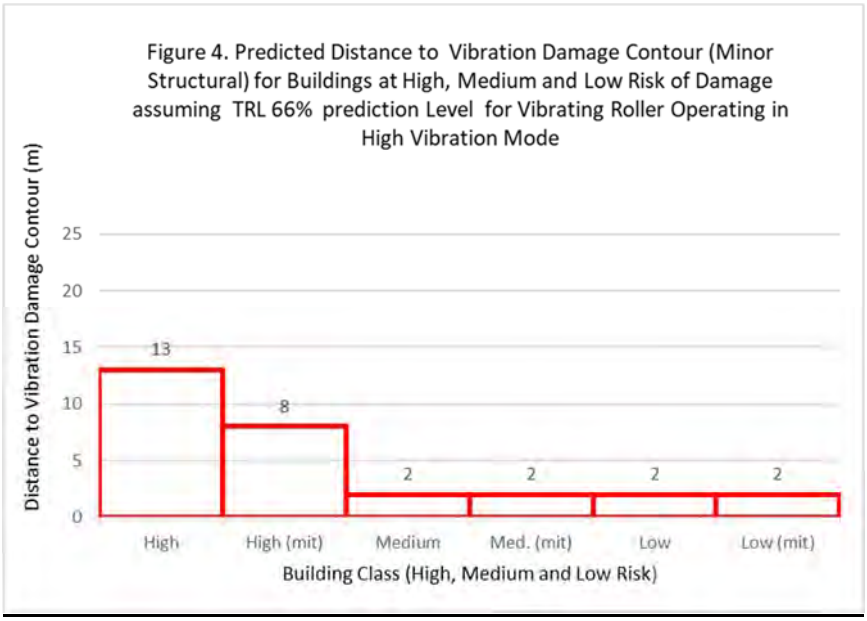


Figure 3. Predicted Distance to Vibration Damage Contour (Cosmetic) for Buildings at High, Medium and Low Risk of Damage assuming TRL 66% prediction Level for Vibrating Roller Operating in High Vibration Mode

Minor Structural Damage (TRL 66% prediction level)

Using the TRL 66% prediction level as the basis of prediction of minor structural damage the distance to the vibration damage contour would be 13m (see Figure 4 below) which would reduce to 8m, taking into account the addition of mitigation in the form of an over excavated drainage channel.



Roller Low vibration mode

Cosmetic Damage (TRL 95% prediction level)

Using the TRL 95% prediction level taken from Figure 2 the distance to the vibration damage (cosmetic) contour for high risk buildings is predicted to be 16 m as shown in Figure 5 below. In areas where an over excavated drainage channel can be used as a trench it is predicted that this contour distance could be reduced to 9m.

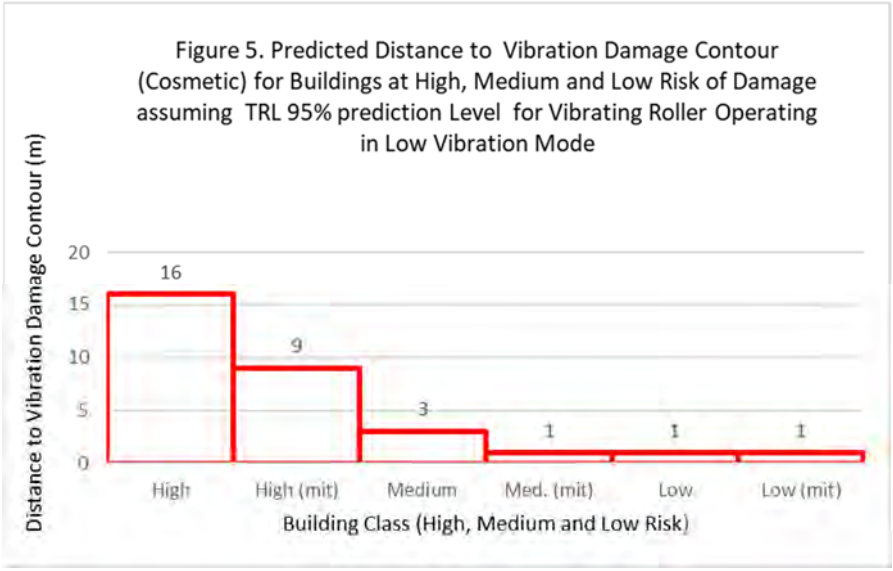


Figure 5. Predicted Distance to Vibration Damage Contour (Cosmetic) for Buildings at High, Medium and Low Risk of Damage assuming TRL 95% prediction Level for Vibrating Roller Operating in Low Vibration Mode

Minor Structural Damage (TRL 95% prediction level)

Using the 95% prediction level as the basis of calculation of the vibration damage (minor structural) contour distance would give a distance of 9m to the vibration damage contour as shown in Figure 6 below. The addition of mitigation in the form of an over excavated drainage channel would reduce the vibration damage (minor structural) contour distance to 5m.

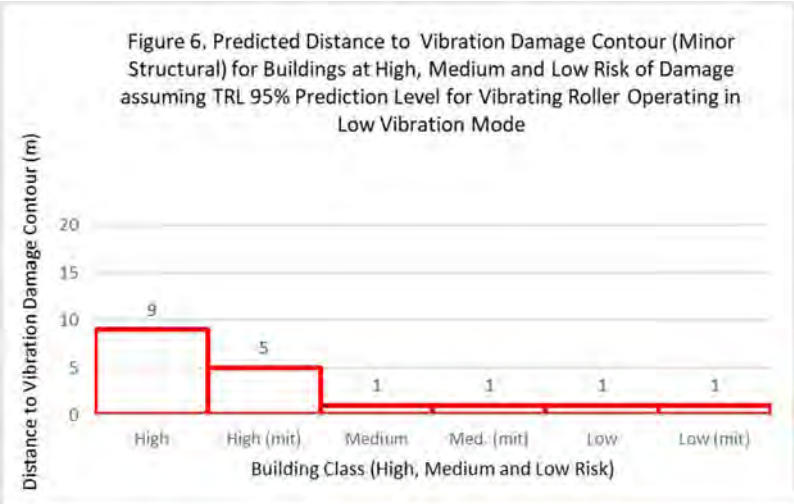


Figure 6. Predicted Distance to Vibration Damage Contour (Minor Structural) for Buildings at High, Medium and Low Risk of Damage assuming TRL 95% Prediction Level for Vibrating Roller Operating in Low Vibration Mode

Summary of Vibration Damage Contour Distances for Operation of Vibrating Roller: High Risk Buildings

Table 3 below summarises the predicted vibration damage contour distances for cosmetic and minor structural damage to high risk building for high and low vibration settings of the roller. Predicted contour distances are also included taking account of the use of a trench.

Roller Vibration Setting	**Mitigation Option**	**Vibration Damage Contour Distance (m)**	
		Cosmetic Damage	**Minor Structural**
High	No mitigation	22	13
Low		16	9
High	With Trench	13	8
Low		9	5

Table 3. Vibration Damage Contour Distances for High Risk Buildings

Plotting of Vibration Damage Contour Distances

The final stage of this study (to be completed) has involved the JOC CAD team plotting vibration damage threshold contours on mapping of the scheme thus enabling buildings exceeding the respective thresholds to be identified. The Plans which are presented in Appendix II are based on the contour distances set out in Table 3. The Plans:

- only show contours for high risk buildings, as they are much more likely to suffer building damage and also because housing is mainly constructed from adobe and in practice it may be difficult to carry out selective rolling of the road (i.e. high/low vibration in an area of mixed building type;
- only show contours for low vibration operation of the roller as high vibration operation is impracticable in residential areas within the villages;
- show the effect of mitigation provided by a trench where this is practicable; and
- show contours for both cosmetic damage and minor structural damage.

In the preparation of the Plans, the contour distances have been taken from the outermost construction point assuming that ground preparation of the sidewalk and embankment will be carried out using a vibratory roller.

Roller No Vibration Mode

It has recently been confirmed that it is possible to carry out ground compaction without vibration on sections of the road adjacent to high risk buildings. Measurements were made using the no vibration mode at two locations to verify levels of vibration and results indicated that vibration levels made at distances of 3-5m were less than a third of the threshold level at which a risk of cosmetic damage would be identified at a high risk class building i.e adobe/clay construction.

Vibration from Operation of Excavator

The measured vibration velocities (ppv) during excavation of a section road sub base were presented in [17]. The distance of the nearest measurement from the road was c. 7m which is not sufficiently close to the road to allow the measurement to be combined with a typical propagation term to give a robust alternative means of determining vibration damage contour distances. Therefore as a worst case the expression derived in [18] by fitting of a linear regression to the measured (transformed) was used, which gave the distance to the high risk building class contour (3mm/s) of c.5m This result indicates that where excavation e.g. of drainage channels, is carried out at distances any less than c.5m from a high risk building there may be a risk of cosmetic damage. The equivalent distance in order to reduce risk of minor structural damage would be c.2m.

Fragile Ancient Monuments

Assuming a low vibration setting, the 2mm/s vibration damage contour, (i.e the threshold of potential damage to ancient monuments, for example graves constructed of adobe) would be 22m from the edge of the road. This could be reduced to c.13m through use of a trench, should that be practicable. The use of the excavator at distances closer than c.9m may also give rise to damage.

Additional Vibration Monitoring

Vibration damage contour distances have been presented above for operation of a vibrating roller and for operation of an excavator. Whilst these results are considered sufficiently robust for the purposes of updating the IEE as required by the ToR, it is recommended that once construction plant are on site, some preliminary vibration measurements should be made. The results can be used to check the accuracy of calculations, and if necessary offer additional guidance on construction practices.

6. CONCLUSIONS

A study has been made of construction vibration at dwellings alongside the Additional Finance and Connector roads in order to determine the potential effect of the vibration on nearby houses and potential means of mitigation to reduce the risk of damage.

A review has also been made of existing methods for calculation of vibration from ground preparation and compaction and results compared to existing vibration monitoring data obtained during a previous study.

Vibration damage threshold levels for low, medium and high risk building classes have been set, based on recognised International Standards.

The effectiveness of potential methods of mitigation of ground borne vibration from vibratory compaction have been examined including the use of low vibration operation of the roller and the use of trenches, formed by over excavation of proposed drainage channels. It was concluded that both these options offered significant levels of mitigation, though further measurements would be needed prior to construction to confirm the effectiveness of a trench in the local geological conditions.

The vibration model developed by TRL has been used to predict vibration damage contours (cosmetic) for low, medium and high risk building classes for high and low vibration roller operating modes. These are the distances from the road beyond which the risk of vibration damage (cosmetic) reduces below 5% (for 95% prediction level), or 33% (for the 66% prediction level). The contour distances were set out in diagrammatic form for each of these modes and prediction levels.

For the high vibration operating mode, the predicted distance to the vibration damage contour for cosmetic damage to high risk buildings would be 22m. The addition of mitigation in the form of an over excavated drainage channel i.e. a trench, would reduce the vibration damage (cosmetic) contour distance to 13m.

In the case of the low vibration operating mode, the predicted distance of to the vibration damage contour for cosmetic damage to high risk buildings would be 16m. This would reduce to 9m, taking into account the use of a trench as mitigation.

An alternative approach to the assessment was also considered based on the premise that risk of cosmetic damage may an unavoidable consequence of the construction of the road and to instead set a threshold level at which minor structural damage might occur. This would be approximately double the threshold for cosmetic damage, and for high risk buildings would be 6mm/s.

For high vibration mode the predicted distance to the minor structural damage contour for high risk buildings would be 13 m, reducing to 8m with the provision of mitigation. For low vibration mode the predicted distance to the minor structural damage contour for high risk buildings would be 9m, reducing to 5m with the provision of mitigation.

The distance to the vibration damage contours was also calculated for fragile ancient monuments, for example graves constructed of adobe. Assuming low vibration operation of the roller, the 2mm/s contour, (i.e the threshold of potential damage) would be c.22m from the edge of the road. This could be reduced to c.13m through use of a trench, should that be practicable.

Predicted levels of vibration arising from operation of an excavator have also been presented. The results indicated that the distance to the high risk building class vibration damage contour (cosmetic damage) was c.5m. i.e where excavation e.g. of drainage channels, is carried out at distances any less than c.5m from a high risk building there may be a risk of cosmetic damage.

The vibration damage contour distances presented in the study for operation of a vibrating roller and for operation of an excavator are considered sufficiently robust for the purposes of updating the IEE. However it is recommended that once construction plant are on site, some additional vibration measurements should be made and the results used to check the accuracy of calculations, and if necessary offer additional guidance on construction practices.

In the final stage of the study (to be completed) the JOC CAD team have plotted vibration damage threshold contours on mapping of the scheme produce Plans which illustrate the risk of cosmetic and minor structural damage to high risk buildings alongside the road. These are presented in Appendix II.

Terminology

Rayleigh Wave

A type of wave, discovered by Lord Rayleigh in 1885, that can propagate on the surface of the ground. The motion of the wave, also known as an R-wave, is confined to a zone near the surface and consists of horizontal and vertical components that attenuate rapidly with depth.

Peak Particle Velocity (ppv)

This measure of velocity is used to describe vibration in the ground and in structures in terms of the motion of a particle (i.e., a point in or on the ground or structure) and is the zero-to-peak amplitude of velocity of the particle. It is generally accepted as the most appropriate descriptor for evaluating the potential for building damage. However it can also be used to assess human response to vibration from construction. It is normally measured on three orthogonal axes which, for example at a point near a road would be, transverse (x), longitudinal (y) and vertical (z). Often vibration levels will dominated by the vertical component of velocity however in multi-storey buildings, transverse vibration , resulting from rocking of the building may be important.

Free-field Vibration Level

This is the level of vibration measured on the ground using a geophone mounted on a slab, stake or embedded in the ground. It is generally higher than the equivalent level of vibration that would be measured on a building foundation.

The 95% prediction interval is the interval centred about the vibration levels calculated using the derived expression, within which there is a probability of 95% that the vibration data will occur. The upper boundary (or upper bound) of this interval is referred to as the 95% prediction level and there is a 5% probability that vibration levels will lie outside the interval.

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APPENDIX I. DETAILS OF VIBRATING ROLLER

Model: Shandong Engineering Machinery SEM 520

All-wheel hydraulic drive,

Working weight :20000kg.

Load on the front drum: 13500kg.

Linear load 612 N/cm

Max. speed 10 km/h

Vibration frequency (min/max) 28/33

Amplitude of vibrations (max/min) 1,86/0,93 mm

Vibration strength (max/min) 370/255 kN

Diameter of the drum :1600 mm.

Width of the drum: 2130 mm.

XCMG XP303K Pneumatic Tyred Road Roller

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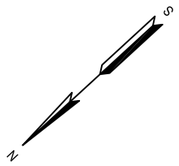
Scale/Масштаб 1:1000



Karakol
Каракол

Borderline when cosmetic damages are caused by High Vibration Roller
Borderline when cosmetic damages are caused by Low Vibration Roller

Containers
vulcanization
1
2
0
Containers
Containers
Cafe
Hospital
Borderline when cosmetic damages are caused by Low Vibration Roller
Borderline when cosmetic damages are caused by High Vibration Roller

Balykchy c.
г.Балыкчы
shop
Hospital
shop
shop
Bishkek
Bishkek

Figure S1-1: Boderlines indicating the limit of Cosmotic Damages depending on the Vibration Mode

Cosmatic Damage with low Vibration Roller

Cosmatic Damage with high Vibration Roller

				CAREC Corridors 1 and 3 Connector Road Section 1 (Balykchy - Kochkor, km 0 - km 43)		
Team Leader	H. R. Luck					
Deputy TL	S. Borbuev			Пути Соединения Коридоров ЦАРЭС 1 и 3 Участок 1 (Балыкчы - Кочкор, км 0 - км 43)		
Highway Engineer	T. Ashymbekov					
				Plan КМ 62+760 - КМ 63+000	Stage / стадия	Page / лист	Pages / листов
					DD/ДП	2.1	52
Рук. группы	Х. Р. Лак			План трассы КМ 62+760 - КМ 63+000	Japan Overseas Consultants Co., Ltd in association with ПИИ "Кыргыздортранспроект"	
Зам. РГ.	Борбуев С.					
Инженер-дорожник	Ашымбеков Т.					

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Иссык-Кульская область. Тонский район.
Scale/Масштаб 1:1000

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г.Балыкчы

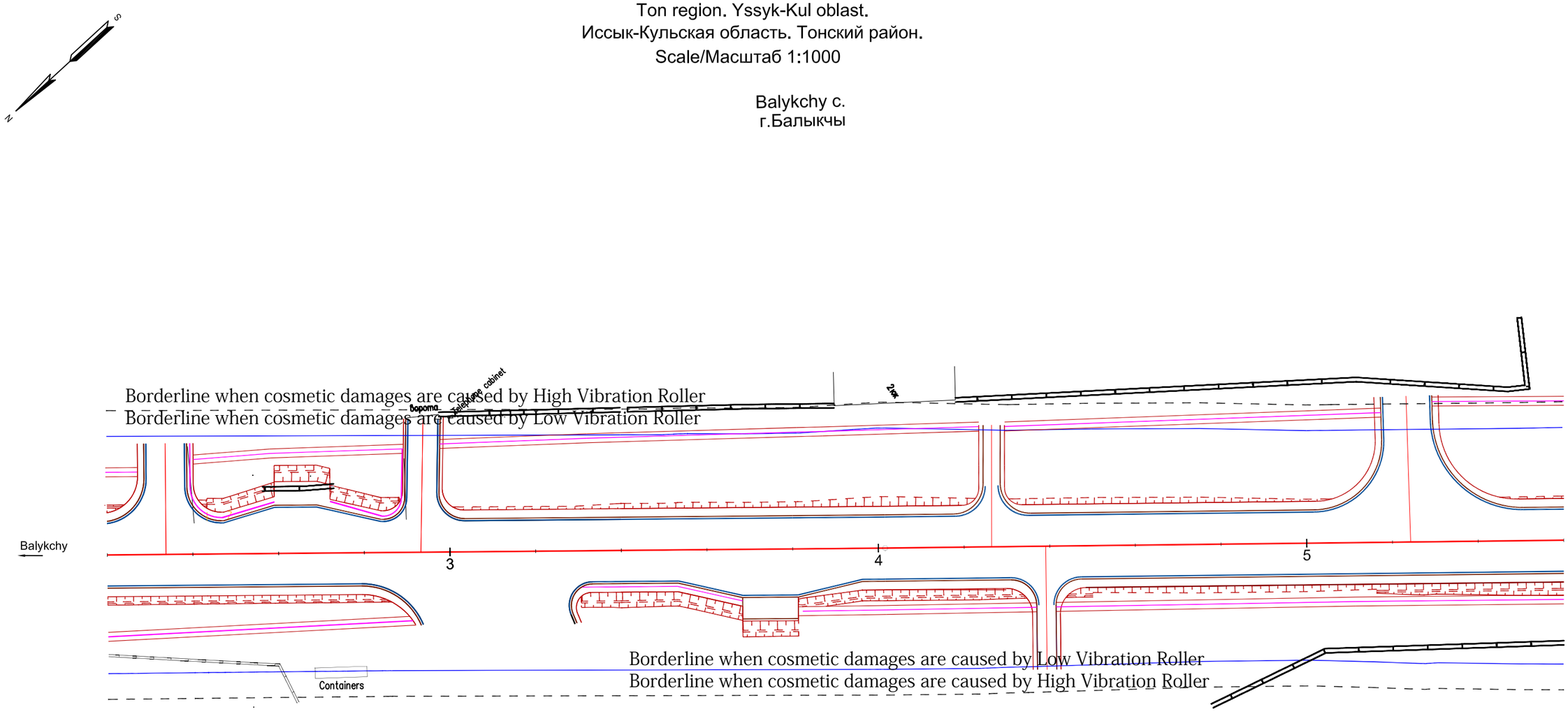

Figure S1-2: Boderlines indicating the limit of Cosmotic Damages depending on the Vibration Mode

Cosmatic Damage with low Vibration Roller

Cosmatic Damage with high Vibration Roller

				CAREC Corridors 1 and 3 Connector Road Section 1 (Balykchy - Kochkor, km 0 - km 43)		
Team Leader	H. R. Luck					
Deputy TL	S. Borbuev			Пути Соединения Коридоров ЦАРЭС 1 и 3 Участок 1 (Балыкчы - Кочкор, км 0 - км 43)		
Highway Engineer	T. Ashymbekov					
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					Pages / листов	52
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Зам. РГ.	Борбуев С.					
Инженер-дорожник	Ашымбеков Т.					

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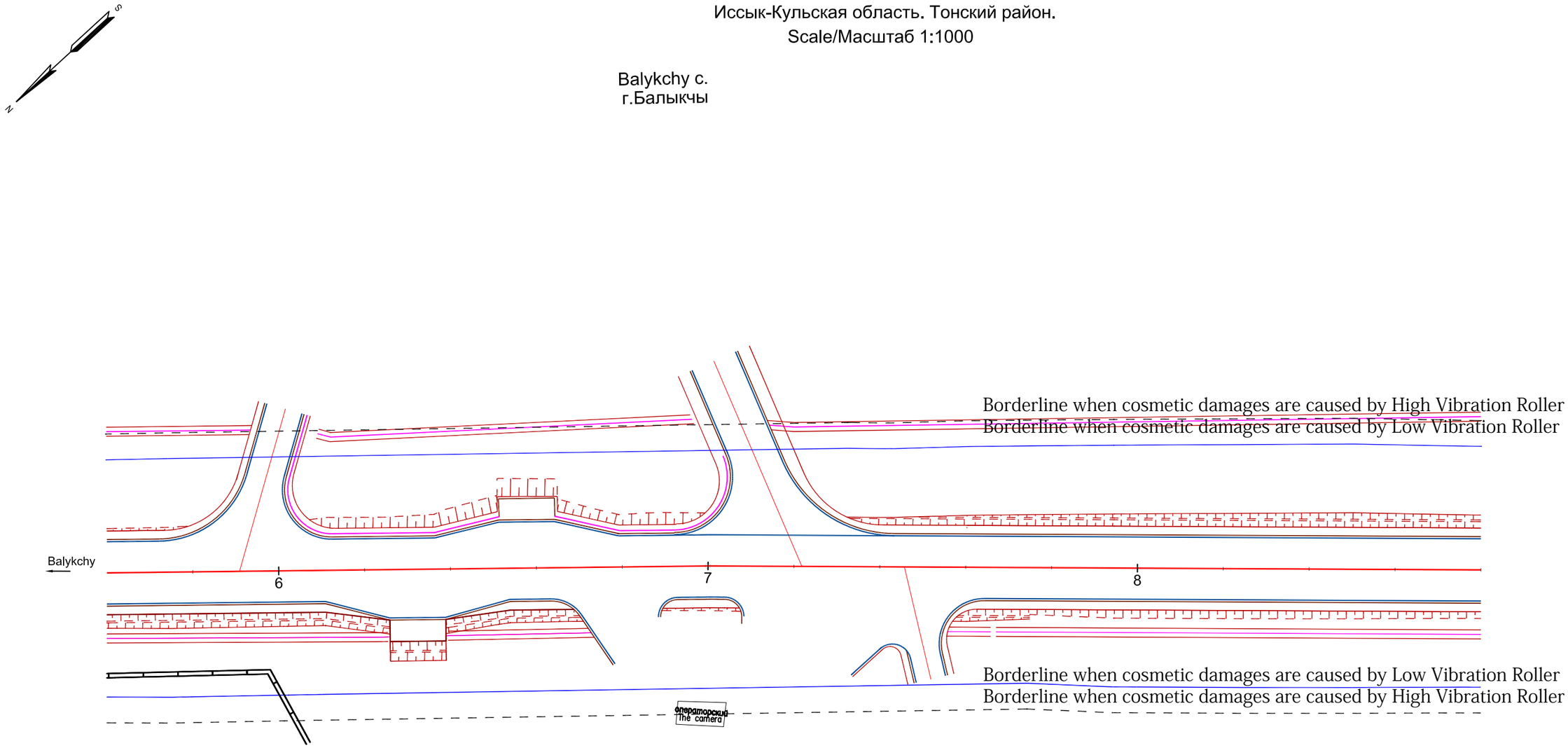

Figure S1-3: Boderlines indicating the limit of Cosmotic Damages depending on the Vibration Mode

Cosmatic Damage with low Vibration Roller

Cosmatic Damage with high Vibration Roller

				CAREC Corridors 1 and 3 Connector Road Section 1 (Balykchy - Kochkor, km 0 - km 43)			
Team Leader	H. R. Luck			Пути Соединения Коридоров ЦАРЭС 1 и 3 Участок 1 (Балыкчы - Кочкор, км 0 - км 43)			
Deputy TL	S. Borbuev						
Highway Engineer	T. Ashymbekov			Plan КМ 0+560 - КМ 0+880	Stage	Page	Pages
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					DD/ДП	2.3	52
Рук. группы	Х. Р. Лак			План трассы КМ 0+560 - КМ 0+880	Japan Overseas Consultants Co., Ltd in association with ПИИ "Кыргыздортранспроект"		
Зам. РГ.	Борбуев С.						
Инженер-дорожник	Ашымбеков Т.						

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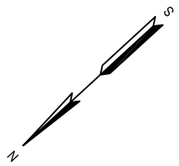

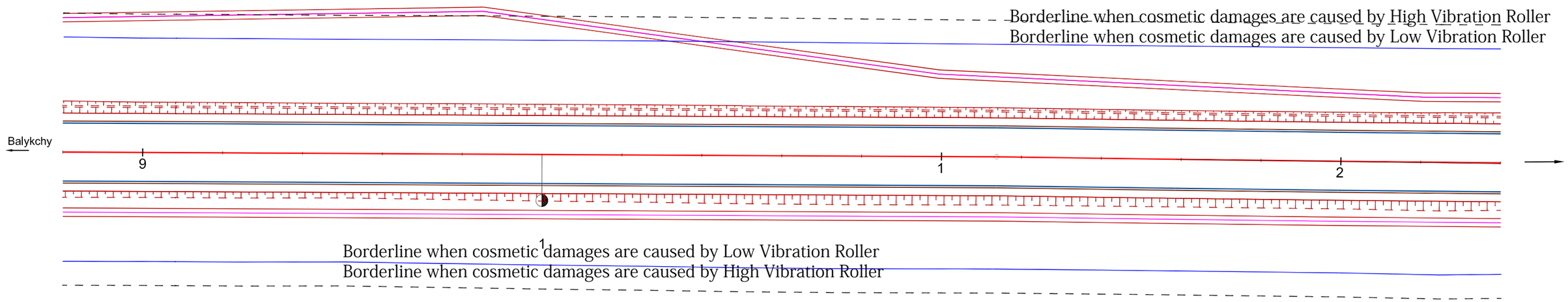

Figure S1-4: Boderlines indicating the limit of Cosmotic Damages depending on the Vibration Mode

Cosmatic Damage with low Vibration Roller

Cosmatic Damage with high Vibration Roller

				CAREC Corridors 1 and 3 Connector Road Section 1 (Balykchy - Kochkor, km 0 - km 43)	
Team Leader	H. R. Luck				
Deputy TL	S. Borbuev			Пути Соединения Коридоров ЦАРЭС 1 и 3 Участок 1 (Балыкчы - Кочкор, км 0 - км 43)	
Highway Engineer	T. Ashymbekov				
				Plan КМ 0+880 - КМ 1+240	Stage / стадия: DD/ДП; Page / лист: 2.4; Pages / листов: 52
Рук. группы	Х. Р. Лак			План трассы КМ 0+880 - КМ 1+240	Japan Overseas Consultants Co., Ltd in association with ПИИ "Кыргыздортранспроект"
Зам. РГ.	Борбуев С.				
Инженер-дорожник	Ашымбеков Т.				

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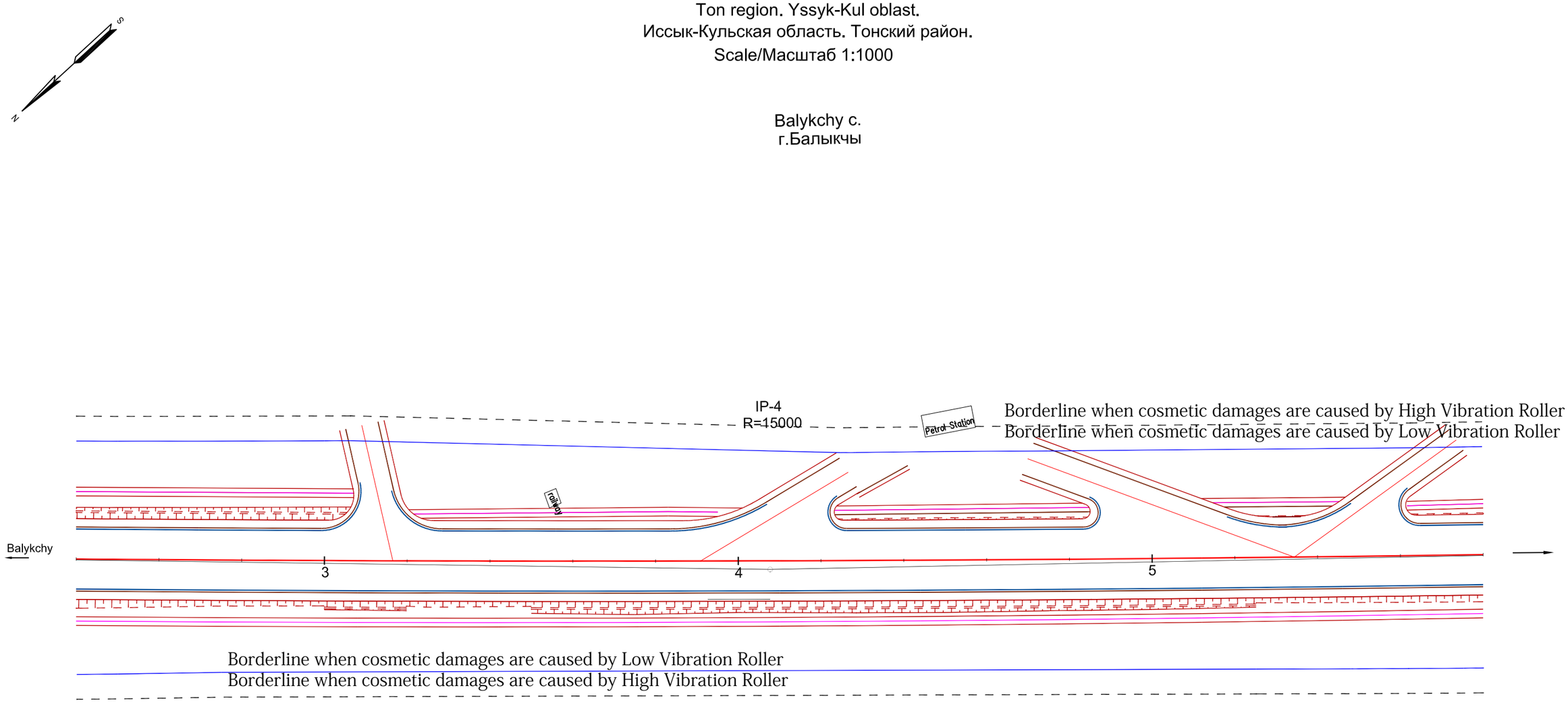

Figure S1-5: Boderlines indicating the limit of Cosmotic Damages depending on the Vibration Mode

Cosmatic Damage with low Vibration Roller

Cosmatic Damage with high Vibration Roller

				CAREC Corridors 1 and 3 Connector Road Section 1 (Balykchy - Kochkor, km 0 - km 43)			
Team Leader	H. R. Luck						
Deputy TL	S. Borbuev			Пути Соединения Коридоров ЦАРЭС 1 и 3 Участок 1 (Балыкчы - Кочкор, км 0 - км 43)			
Highway Engineer	T. Ashymbekov						
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Рук. группы	Х. Р. Лак			План трассы КМ 1+240 - КМ 1+580	Japan Overseas Consultants Co., Ltd in association with ПИИ "Кыргыздортранспроект"		
Зам. РГ.	Борбуев С.						
Инженер-дорожник	Ашымбеков Т.						

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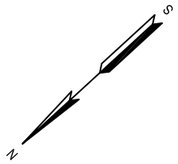


Balykchy c.
г.Балыкчы

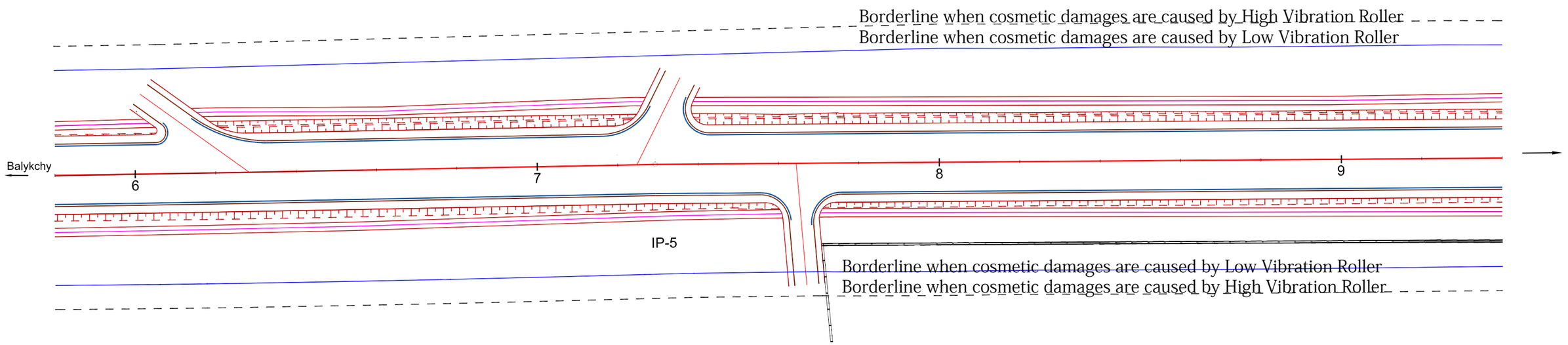


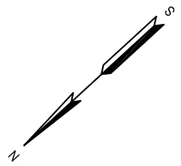
Figure S1-6: Boderlines indicating the limit of Cosmotic Damages depending on the Vibration Mode

Cosmatic Damage with low Vibration Roller

Cosmatic Damage with high Vibration Roller

				CAREC Corridors 1 and 3 Connector Road Section 1 (Balykchy - Kochkor, km 0 - km 43)			
Team Leader	H. R. Luck			Пути Соединения Коридоров ЦАРЭС 1 и 3 Участок 1 (Балыкчы - Кочкор, км 0 - км 43)			
Deputy TL	S. Borbuev			Plan КМ 1+580 - КМ 1+940	Stage	Page	Pages
Highway Engineer	T. Ashymbekov				стадия	лист	листов
					DD/ДП	2.6	52
Рук. группы	Х. Р. Лак			План трассы КМ 1+580 - КМ 1+940	Japan Overseas Consultants Co., Ltd in association with ПИИ "Кыргыздортранспроект"		
Зам. РГ.	Борбуев С.						
Инженер-дорожник	Ашымбеков Т.						

Ton region. Yssyk-Kul oblast.
Иссык-Кульская область. Тонский район.
Scale/Масштаб 1:1000



Balykchy c.
г.Балыкчы

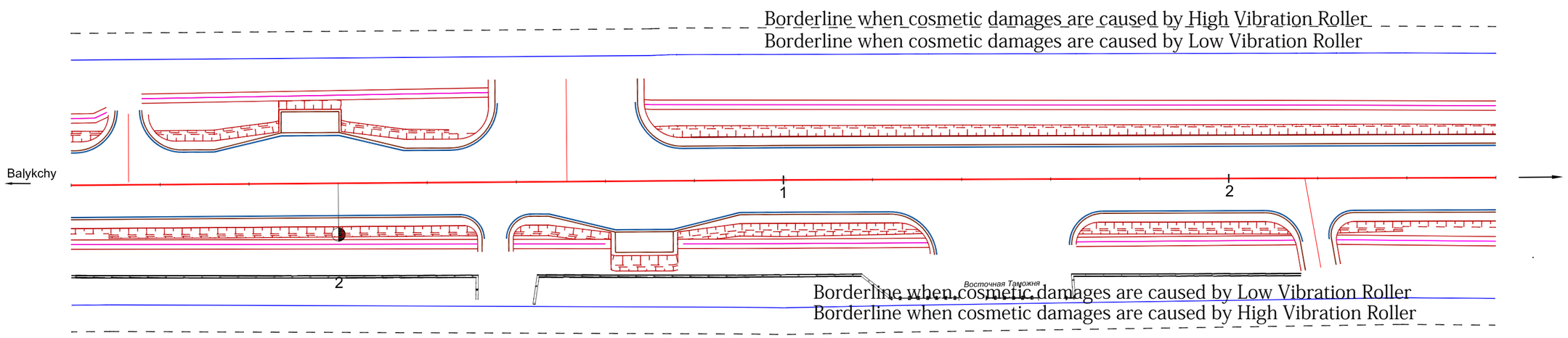


Figure S1-7: Boderlines indicating the limit of Cosmotic Damages depending on the Vibration Mode

Cosmatic Damage with low Vibration Roller

Cosmatic Damage with high Vibration Roller

				CAREC Corridors 1 and 3 Connector Road Section 1 (Balykchy - Kochkor, km 0 - km 43)		
Team Leader	H. R. Luck					
Deputy TL	S. Borbuev			Пути Соединения Коридоров ЦАРЭС 1 и 3 Участок 1 (Балыкчы - Кочкор, км 0 - км 43)		
Highway Engineer	T. Ashymbekov					
				Plan КМ 1+940 - КМ 2+260	Stage / стадия	Page / лист: 2.7	Pages / листов: 52
					DD/ДП		
Рук. группы	Х. Р. Лак			План трассы КМ 1+940 - КМ 2+260	Japan Overseas Consultants Co., Ltd in association with ПИИ "Кыргыздортранспроект"	
Зам. РГ.	Борбуев С.					
Инженер-дорожник	Ашымбеков Т.					

Ton region. Yssyk-Kul oblast.
Иссык-Кульская область. Тонский район.
Scale/Масштаб 1:2000

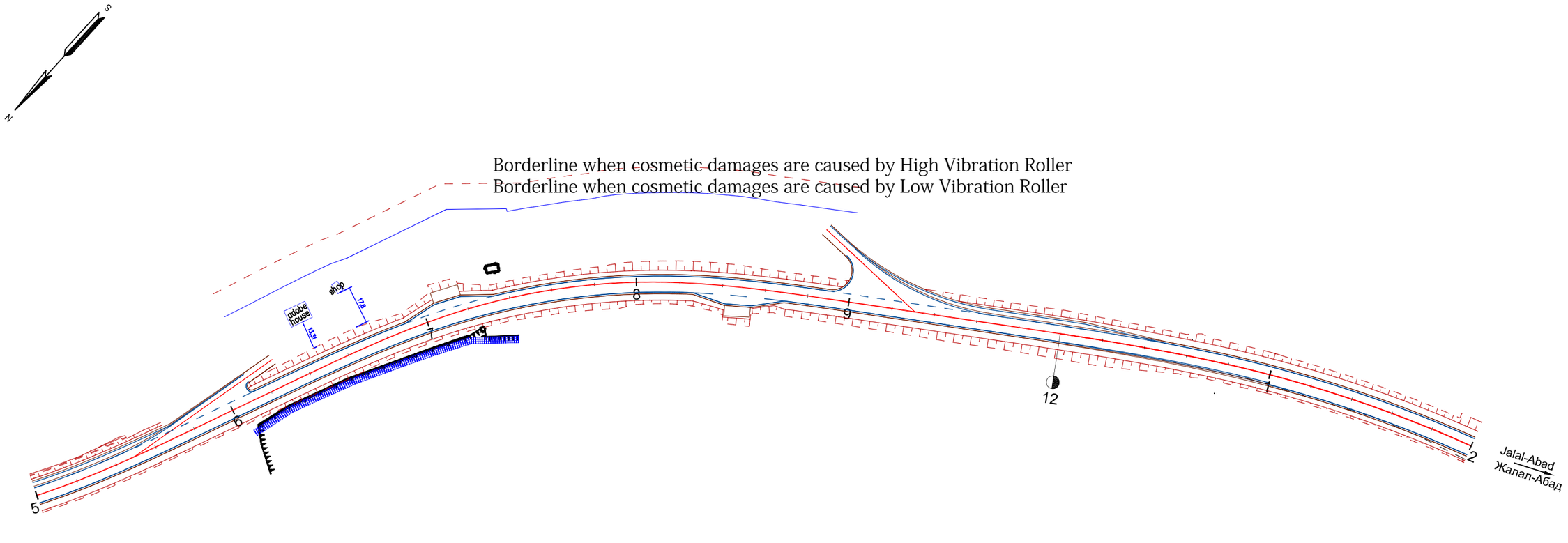


Figure S1-8: Boderlines indicating the limit of Cosmotic Damages depending on the Vibration Mode

Cosmatic Damage with low Vibration Roller

Cosmatic Damage with high Vibration Roller

				CAREC Corridors 1 and 3 Connector Road Section 1 (Balykchy - Kochkor, km 0 - km 43)		
Team Leader	H. R. Luck					
Deputy TL	S. Borbuev			Пути Соединения Коридоров ЦАРЭС 1 и 3 Участок 1 (Балыкчы - Кочкор, км 0 - км 43)		
Highway Engineer	T. Ashymbekov					
				Plan КМ 11+500 - КМ 12+200	Stage / стадия	Page / лист	Pages / листов
					DD/ДП	2.17	52
Рук. группы	Х. Р. Лак			План трассы КМ 11+500 - КМ 12+200	Japan Overseas Consultants Co., Ltd in association with ПИИ "Кыргыздортранспроект"		
Зам. РГ.	Борбуев С.						
Инженер-дорожник	Ашымбеков Т.						

Client:
Japan Overseas Consultants Co. Ltd Bishkek
Performer:
A. Abdykanova

APPROVED

Ministry of Culture, Information and Tourism of the Kyrgyz Republic

#_____

«___»_____ 2018 г.

Archaeological Survey and Assessment Report and Proposed Plan, Section 1

ARCHEOLOGICAL EXPERTISE

according to the results of archaeological reconnaissance carried out in Section 1 of the alternative North-South Road (CAREC Corridors 1 and 3 Connector Road) between Balykchy and Kochkor over a length of 43 km.

Bishkek – 2018

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CONTENTS

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1. ANNOTATION

This report contains the results of archaeological reconnaissance work done in Section 1 of the Alternative North-South Road (CAREC Corridors 1 and 3 Connector Road) in the of Balykchy-Kochkor stretch over ae length of 43 km. The study was done in order to determine the presence or absence of monuments of historical and cultural significance in the immediate vicinity of the existing road (within at least 50 metres) and the drawing up of a plan for protection zones around the discovered monuments.

As a result of the archaeological reconnaissance, such historical and cultural heritage sites as Sary-Bulun Northern I and Southern II, Bronze Age settlements, ethnographic time galleries, burial grounds from the early Iron Age (i.e. the Saks-Usun) period, medieval graves, as well as artifacts in the form of ceramics found on the surface. Of these, the settlements in Sary-Bulun North and South, the individual Saks burial mounds Orto-Tokoy 2, Orto-Tokoy 3 and Orto-Tokoy 4 are located within distances of 50 metres from the proposed road reconstruction zone.

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2. INTRODUCTION

The purpose of this work was to conduct an archaeological study of Section 1 of Balykchy-Kochkor road for a length of 43 km, in view of the proposed reconstruction of the Alternative North-South Road, by means of archaeological examination of the site to establish the presence or absence of archeological monuments/objects of historical and cultural heritage.

The archaeological survey was a result of a request by Japan Overseas Consultants Co. Ltd. in Bishkek.

For the survey the Section 1 of the road (CAREC Corridors 1 and 3), between Balykchy and Kochkor was studied over a total length of 43 km - the area is shown in Figure 1 below.

To ascertain the presence or absence of objects of historical and cultural heritage in the territory of the sections of the contours, a visual inspection of the ground adjacent to the existing road was carried out using handheld GPS instruments to fix the location of any objects with photo documentation of items discovered.

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3. HISTORY OF ARCHEOLOGICAL SURVEYS

Archaeological surveys in the Issyk-Kul basin were started in the middle of the 19th century. Issyk-Kul Lake as a historical and archaeological site of Kyrgyzstan, is mentioned in the publications of the pre-October period: an index of pre-revolutionary literature by Z.L. Amitina-Shapiro contain over 200 titles of books, articles, newspaper notes about Issyk-Kul, most of which are related to monuments of antiquity (Amitina-Shapiro, 1958). The first surviving message about the buried monuments of Issyk-Kul belongs to the Tatar merchant Isaev, who visited the lake in the 1920s. He later informed Ch. Valikhanov about the city ruins he saw in the zone of the Tyup Gulf (Valikhanov, 1951). In an anonymous article written in 1851, there are reports of two pieces of copper thrown onto the shore of Issyk-Kul by the waves of the lake.

The famous traveler P. P. Semenov-Tyan-Shansky during his stay in Tien-Shan in 1856-1857, tried to find in Issyk-Kul the Armenian Christian monastery, designated on a Catalan map.

A systematic scientific study of the archaeological monuments of the region was possible only in the Soviet era. Particular mention should be made of the researches of P.P. Ivanov (1926-1927), the works of Semirechenskaya (1940) and the Tien-Shan (1949) archaeological expeditions headed by A.N. Bernshtam. Also the Issyk-Kul detachment of the Institute of History of the Academy of Sciences of the Kirghiz SSR (1959-1962) and the Issyk-Kul Historical and Archaeological Expedition (1972) under the leadership of D. F. Vinnik. Later work was done by the Paleolithic Detachment of the Institute of History of the Academy of Sciences of the Kirghiz SSR, led by V.A. Ranov and M.B. Yunusaliev and researches of the Institute of History staff in the Ton and Tosor river basin (on the southern coast of the Issyk-Kul lake) in connection with the construction in 1971 of the Tort-Kul reservoir and the reconnaissance trip of a special group of historians and archaeologists in the fall of 1973.

In the post-Soviet period, joint archaeological expeditions were conducted in the region on the monument to the era of the Paleolithic Tosor on the southern shore of the lake (Derevyanko and others, 2000). The workshop of the Middle Paleolithic Age of Ak-Olon was opened near the village of the same name in the Ton district (Derevyanko and others, 2002).

In 2002, works on the conservation of petroglyphs in Cholpon-Ata, which in the end turned out to be not entirely successful, were carried out. The rock paintings of Oronok were recorded and studied (Akmatov, 2008). Archaeologist D. Luzhansky

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in cooperation with seismologists in some 2015-2016 exploratory work was carried out on the main fortifications in the region and their mapping was detailed (Korzhenkov et al., 2016).

The closest known archaeological monuments to the proposed site of the road reconstruction work are kept in the workshop of the Middle Paleolithic Ak-Olon (7 km to the west) of the Boz-Barmak and Salamat-Bulak Stone Age (14 km to the south-west), dating from the Domostier period (see Yunusaliev 1977 Derevyanko et al., 2002). The exact location of the last two is not currently defined.

4. 2018 SURVEY METHODOLOGY

In the course of the archaeological reconnaissance, methods of visual inspection of the territory were used. Zigzag routes were laid out to cover the largest possible area with GPS fixation of the route, the outlines of the sites of identified objects, as well as other features of the relief. Photographic records were taken and inspections made of relevant information material in the form of maps, books and articles devoted to the previous archaeological studies of the area.

5. RESULTS OF 2018 ARCHEOLOGICAL RECONNAISSANCE

Section 1 of Balykchy-Kochkor road begins at the roundabout in Balykchy City and ends at the bend in the road in the direction of Kochkor-Bishkek through the Kubaky Pass. To the south, the road divides into two, one branch goes to the east along the southern coast of Issyk-Kul, the second (part of the study site) to the south to the Torugart pass. Both branches of the existing road coincide with some of the ancient caravan routes of the Great Silk Road.

At **7,800 meters from the beginning of** Section 1 on the west side of the road, the ruins of the medieval **settlement called Sary Bulun Northern 2** were found (Fig. 2). The location of this monument was also indicated in the previous archaeological report on the corridor (Chargynov, 2016). The settlement is located on the right of the road above the floodplain of the Chu River. A little further along the road on the eastern side and about 300 meters of the road is located the second settlement of **Sary-Bulun Southern 1**. Both settlements were studied by archaeologist D.F. Vinnik in 1977-1978. According to field reports, the northern settlement was excavated completely and the southern one partially (Vinnik, 1977, 1978). The layout of the settlements is similar both to the pottery and the coinage found as they are thought to be dated from the Karakhanid time (X-XII centuries AD) (Amanbaeva, 2013).

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According to the results of present archaeological excavations, the settlement Sary-Bulun Northern 2 is rectangular in plan, oriented to the sides of the world with a length of external adobe walls of 29 to 33 meters. The entrance to the site was in the center of the southern wall. In the central part was a large yard measuring 12.5 by 14 meters. The walls were kept to a height of 1.3-1.6 meters; the thickness at the base of the walls was 2.2 meters and was gradually sloped. Inside the settlement were excavated 22 rooms, 3 corridors and a courtyard. Archaeologists have discovered remains of stoves used for the smelting of iron ore. Most of the premises, especially the central courtyard, were filled with both ash and slag materials. Archaeologist D.F. Vinnik interpreted this as being «like a metallurgical center for the smelting of iron" (Vinnik, 1978).

Judging by the architecture initially, the structure was a caravan saray and later it was used as a workshop of a metallurgical center (Korzhenkov, 2016).

At this time, part of the surviving walls of the settlement after the archaeological excavations from the southern and western sides was destroyed by a bulldozer. The central courtyard was found to be littered with slag during excavations. In the north-western corner and along the perimeter, traces of dumps in the form of a shaft up to 1-1.5 meters in height were noted. The walls of the premises were preserved at a height of 0.8-1 meters. Artifacts on the surface were not detected.

The general coordinates of the settlement were recorded to be as follows: 42°24'2.59"N 76° 5'56.13"E (Fig. 3-5).

The settlement of Sary-Bulun Southern I was partially explored by the archaeologist D.F. Vinnik. According to the studies, the settlement was in the form of a square, with sides 40 meters and oriented to the sides of the world. The maximum height of the surviving walls reached 1.5 meters. The entrance was located in the center of the western wall. A courtyard occupied the central part of the settlement. D.F. Vinnik identified 15 premises, of which 7 are located along the eastern wall, during the excavations (Vinnik, 1978). Later the settlement was partially destroyed during the construction of the existing road. At the moment only fragments of buildings in the eastern part of the settlement have been preserved. In the south-western corner of the northern room is now a monument to a man who died as a result of a road accident. Lifting material was not detected (Korzhenkov, 2016). Judging by the description, the excavated sites of the eastern part of the settlement have been preserved. Settlement as the previous one is dated to the Karakhanid time (X-XII centuries) and is defined as a settlement of

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metallurgists. The general coordinates of the settlement are as follows: 42°23'52.41"C 76° 5'58.60"B.

The remains of the buildings are fixed on 8,100 meters from the beginning of Section 1, on the east side of the road. The part of the building was damaged by laying the optic cable from 25 to 30 meters from the road. The remaining section of the road was leveled. Prior to the construction works at the site, between the remains and the road (30 meters) it is required to conduct the field excavation works by test pitting for revealing the presence or absence of historical layer/layers (Fig. 6-12).

Graves and the cemetery of ethnographic time (18th-19th centuries), a medieval settlement. A bronze-age village in the Tash-Saray locality was recorded in Section 1 at 10,800 meters from the beginning of the road. The sites are located on the east side of the existing road. The earlier graves overgrew modern cemeteries. The graves are located about 40 meters from the existing road. The cemetery itself stands on a loose stack of deposited materials, some of which was used to build the graves for economic reasons. Some preserved graves and other ruins are located at about 50 meters from the road. Of these, the main interest is the grave built in the form of a tower and coated with white plaster. In the area of the cemetery, fragments of ceramics were found, which suggests that once a medieval settlement functioned there, but was later destroyed, apparently by the later construction of more graves using local materials again for economic reasons. In the stratigraphic sections of the soils, no traces of the cultural layer were noted. The general coordinates of the cemetery are as follows: 42°22'29.86"N 76° 5'18.53"E (Fig. 13-15).

The Bronze Age camp is located to the southeast of the cemetery, 150 meters east of the road, is a typical tash-koroo structure, 18 meters in diameter. On the western side, the tash-koroo is protected by a hill that hides it from the road. On the territory of the monument was found a fragment of ceramics. General coordinates: 42°22'27.31"N 76° 5'17.15"E (Fig. 16).

Archaeological complex Orto-Tokoy 1 was discovered in the Orto-Tokoy valley on the south side of the reservoir at about 33,000 - 34,000 meters from the beginning of the road**.** The complex consists of 4 villages dating from the Bronze Age (I-II millennium BC) having a complex structure, the burial ground of the Saks (VIII-III centuries BC), burial mounds of the era of the great migration of peoples (Usun, Hunnish time, III BC), later medieval graves and a small boulder with petroglyphs also from the Bronze Age. Of these, 5 Saks burial mounds and 2 medieval graves are located to the south of the road. The other remaining

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monuments are 2 mounds from the era of the great migration of peoples, 10 Saks burial mounds, the boulder with petroglyphs form the Bronze Age which are located north of the road. 2 medieval graves and 1 Bronze Age village are located closest to the road at 75 meters; the remaining objects are located at a distance of 100 to 400 meters from the road (Figure 17-23).

Coordinates of detected monuments are as follows:

1) 42°17'44.62"N 75°58'50.73"E. Bronze Age settlement, consisting of five stone sections of rounded outlines. The height of the folded stones is about 0.40 m. The dimensions of the sides of the large rectangular courtyard are about 17-18 meters.
2) 42°17'39.93"N 75°58'29.69"E. Bronze Age settlement, as rounded outline in the form of tash-koroo, height of the boulders is 0.20 m. diameter. The sides of the courtyard are also 18 meters.
3) 42°17'44.21"N 75°58'19.65"E. Bronze Age settlement, consisting of six sub-rectangular rooms. The height of the boulders is 0.40 m. The dimensions are approximately 40 by 30 meters.
4) 42°17'43.49"N 75°58'13.80"E. Bronze Age settlement, consisting of two rounded rooms. The height of the boulders is 0.30-0.40 m. The sides of the larger room are 17 meters.
5) 42°17'40.36"N 75°58'42.86"E. A small boulder with petroglyphs showing images of two mountain goats and two bulls, dating from the Bronze Age.
6) 42°17'46.03"N 75°58'38.73"E. The mound of the era of the great migration of peoples (Usun, Hunnish time, III BC) is square in shape with sides of about 4 meters.
7) 42°17'47.12"N 75°58'38.45"E. The mound dating from the era of the great migration of peoples (Usun, Hunnish time, III BC) is square in shape with sides of 4 meters.
8) Sakian barrows of round shape with dimensions from 3 to 7 meters in length in the form of a rocky-earth embankment. The mound height is from 0.40 to 1 meter. Barrows are located on the north side of the road (10 burial mounds) and on the south side of the road (5 burial mounds) -a total of only 15 mounds. Perhaps there are more. To determine more details, a more detailed study is needed.
    1. 42°17'41.44"N 75°58'45.96"E;
    2. 42°17'47.16"N 75°58'40.42"E;
    3. 42°17'47.25"N 75°58'41.00"E;
    4. 42°17'46.88"N 75°58'41.05"E;

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5. 42°17'48.53"N 75°58'37.60"E;
6. 42°17'49.27"N 75°58'37.39"E;
7. 42°17'40.58"N 75°58'22.71"E;
8. 42°17'41.77"N 75°58'17.08"E;
9. 42°17'42.53"N 75°58'16.83"E;
10. 42°17'42.87"N 75°58'16.66"E.
11. 42°17'31.60"N 75°58'46.95"E;
12. 42°17'30.03"N 75°58'46.30"E;
13. 42°17'32.52"N 75°58'38.58"E;
14. 42°17'33.84"N 75°58'38.11"E;
15. 42°17'32.59"N 75°58'33.06"E.

9) 42°17'34.29"N 75°58'27.92"E2 medieval graves of an oval shape, with a stone embankment up to 0.30 m in height. Dimensions 2 by 1 meter.

The burial ground of Orto-Tokoy 2 is located at 34,800 – 34,900 meters from the beginning of the road and from the south side of the road. The burial ground consists of 6 barrows of round shape with a diameter of up to 7 meters and a stone-earth embankment with a height of 0.5 meters. The mounds are located in a chain from north-east to south-west. Preliminary conclusion is that they date from the Saks time (VIII-III centuries BC). **The first mound is located 30 meters from the existing road but appears to have been destroyed during the laying of a fiber-optic cable** (the cable is located directly over the mound) (Fig. 26-29).

The coordinates of the mounds are as follows:

1. 42°17'30.71"N 75°57'27.57"E (30 m from the road);
2. 42°17'29.76"N 75°57'27.23"E (60 m from the road);
3. 42°17'28.05"N 75°57'25.82"E (120 m from the road);
4. 42°17'22.37"N 75°57'20.65"E (130 m from the road);
5. 42°17'27.76"N 75°57'25.72"E (330 m from the road);
6. 42°17'22.20"N 75°57'20.53"E (335 m from the road).

The burial ground of Orto-Tokoy 3 is located 35,500 – 36,400 meters from the beginning of the road and on the south side of the road. The cemetery consists of 29 barrows of rounded size with diameters of from 5 to 10 meters. There are rock and earth mounds of up to 0.5 meters in height. Mounds are located close together in small groups. Two burial mounds appear to have been partially destroyed by the excavation of a ditch line. Preliminary estimates suggest it is dated to the Saks time (VIII-III centuries BC) (Fig.24-29).

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The coordinates of the mounds are as follows:

1. 42°17'41.58"N 75°56'36.64"E (58 m from the road);
2. 42°17'42.29"N 75°56'34.40"E (52 m from the road);
3. 42°17'41.99"N 75°56'34.40"E (61 m from the road);
4. 42°17'42.03"N 75°56'30.77"E (63 m from the road);
5. 42°17'40.66"N 75°56'32.83"E (110 m from the road);
6. 42°17'40.06"N 75°56'31.80"E (120 m from the road);
7. 42°17'39.61"N 75°56'32.08"E (130-140 m from the road);
8. 42°17'39.61"N 75°56'32.08"E (130-140 m from the road);
9. 42°17'39.61"N 75°56'32.08"E (130-140 m from the road);
10. 42°17'38.71"N 75°56'32.15"E (160 m from the road);
11. 42°17'38.23"N 75°56'32.03"E (180 m from the road);
12. 42°17'37.12"N 75°56'33.22"E (210 m from the road);
13. 42°17'36.65"N 75°56'33.50"E (230 m from the road);
14. 42°17'35.57"N 75°56'35.86"E (250 m from the road);
15. 42°17'35.17"N 75°56'35.79"E (260 m from the road);
16. 42°17'40.95"N 75°56'41.47"E (45 m from the road);
17. 42°17'40.79"N 75°56'41.57"E (50 m from the road);
18. 42°17'40.59"N 75°56'41.63"E (55 m from the road, partially damaged by a ditch);
19. 42°17'40.07"N 75°56'41.70"E (70 m from the road);
20. 42°17'39.82"N 75°56'41.80"E (77 m from the road);
21. 42°17'39.75"N 75°56'42.16"E (76 m from the road);
22. 42°17'39.63"N 75°56'42.36"E (77 m from the road);
23. 42°17'36.91"N 75°56'48.82"E (115 m from the road);
24. 42°17'37.05"N 75°56'53.54"E (75 m from the road, partially damaged by a ditch);
25. 42°17'35.99"N 75°56'53.45"E (112 m from the road);
26. 42°17'36.01"N 75°56'58.07"E (75 m from the road);
27. 42°17'29.81"N 75°56'49.48"E (320 m from the road);
28. 42°17'29.12"N 75°56'48.04"E (345 m from the road);
29. 42°17'26.64"N 75°56'43.10"E (450 m from the road).

Coordinates of the petroglyph: 42°17'37.55"N 75°56'53.66"E. The boulder is located 60 meters north of the road behind the dam. The petroglyphs present images of 2 mountain goats and 2 bulls. Two sides of the boulder were used as panels - on one side images of 2 bulls and 1 mountain goat are fixed, on the second side there is just 1 mountain goat (Fig.24).

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It should also be noted that on the same site on the north side of the road and behind the dam at a distance of 90 to 180 meters from the road according to Google Earth objects that could be burial mounds from the same time period were found. They are particularly concentrated in the area of 36,300 – 36,600 meters from the beginning of the road (Fig.31).

In the section 36,400-37,300 meters from the beginning of the road on the north side, there are 4 small-sized quarries created during the construction of the dam, which starts about 50 meters north of the road at a section of 31,000 meters from the beginning of the road.

Further on in the area 37,700 – 38,200 meters from the beginning of the road on both sides of the road, Google Earth shows objects that could be mounds. On the north side they are located beyond the dam line at a distance of between 80-230 meters from the road. On the south side beyond the moat line, mounds appear to be about 150 meters from the road (Fig.31-35).

Further in the area 38,700 – 39,100 meters from the beginning of the road Google Earth shows on the north side about 100-150 meters from the road, the site of a quarry. The 5 objects there could also be mounds (Fig.36).

The burial ground of Ortho-Tokoy 4 is located between 39,100 – 39,450 meters from the beginning of the road. On the south side of the road the site contains five mounds of round shape with a diameter of up to 7 meters. Rock and earth mounds are up to 0.5 meters in height. Preliminary estimates suggest they date from the Saks time (VIII-III centuries BC). The territory is polluted with modern day garbage, which has been scattered all over the hollow to the foot of the mountains. Apparently, a landfill is located nearby but it is not properly equipped to cover or treat the refuse (Figures 36-39).

The coordinates of the mounds are as follows:

1. 42°18'6.36"N 75°54'27.25"E (50 m from the road);
2. 42°18'5.48"N 75°54'26.22"E (80 m from the road);
3. 42°17'58.46"N 75°54'27.02"E (250 m from the road);
4. 42°17'58.09"N 75°54'26.94"E (255 m from the road);
5. 42°17'57.77"N 75°54'26.78"E (270 m from the road);
6. 42°17'59.85"N 75°54'33.90"E (120 m from the road).

Further, in the section of the site from 39,400 – 39,600 meters from the beginning of the road on the north side of the road behind the dam and at a

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distance of about 120-180 meters form the road, Google Earth shows objects that be mounds.

Since monuments located at a distance of more than 50 meters from the road fall into zones of regulated construction and a protected landscape, a single action plan for them (procedures, proposals and measures for the protection and monitoring of objects of historical and cultural heritage during the construction of the road) will be presented in a comprehensive manner for Sections 1, 2A and 2B as a separate appendix.

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11. CONCLUSIONS

March 26, 2018.

Thes conclusions of the archaeological examination were compiled by A. Abdykanova according to the terms of the contract for archaeological expertise from March 30, 2018, commissioned by Japan Overseas Consultants Co. Ltd, in Bishkek (hereinafter referred to as the Client).

Archaeological examination (hereinafter - Expertise) was carried out on the basis of the:

- Law of the Kyrgyz Republic No. 91 of 26.07.1999 "On protection and use of historical and cultural heritage";
- Law of the Kyrgyz Republic No. 65 of 20.03.2015 "On Amendments and Additions to the Law" On Protection and Use of Historical and Cultural Heritage ";
- The Land Code of the Kyrgyz Republic of 02.06.1999, No. 45;
- Instruction on the organization of protection zones for immovable objects of the historical and cultural heritage of the Kyrgyz Republic dated July 27, 2015.

Basis for the Examination:

Use of the land.

Purpose of the work:

Determination of the presence or absence of objects of historical and cultural heritage in the area of the proposed road reconstruction and the development of modifications needed to protect identified objects of historical and cultural heritage.

Area of examination:

Section 1, Alternative South-North Road (CAREC Corridors 1 and 3), Balykchy-Kochkor, total length – 43km.

Methodology:

Expertise was carried out on the basis of information received from the Client, according to the methodology of archaeological expertise. This consisted of preliminary work to research archival and bibliographic data, analysis of Google Earth satellite imagery, reviews of topographic maps, GPS coordinates to fix the location of objects found, photo records and general visual inspection of the immediately surrounding terrain for objects of historical and cultural heritage.

Conclusion:

As a result of the study of Section 1 of the construction of an Alternative North-South Road (CAREC Corridors 1 and 3 Connector Road), Balykchy-Kochkor over a length of 43 km, the following monuments and other traces were revealed in the

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territory of the Ton District of Issyk-Kul Oblast and the Kochkor District of Naryn Oblast in terms of historical and cultural heritage:

A) Objects of Historical and Cultural Heritage (monuments of archaeology) located at a distance of less than 50 meters from the shoulder of the existing road:

1. Settlement Sary Bulun Northern II (X-XII centuries., Caravan-saray, iron smelting workshop**),** 7,800 meters from the beginning of the road, is located 40 meters west of the road;
2. Settlement Sary-Bulun Southern I (X-XII centuries., Settlement of metallurgists), 8,000 – 8,100 from the beginning of road, visible parts of the settlement is located in 30 meters to the east from road;
3. Graves and a cemetery (18-19th centuries, covered by a modern cemetery), a medieval settlement (destroyed during the construction of the graves) and a village of the Bronze Age (I-II millennium BC), at 10,800 meters from the beginning of the road. The complex is located 30 meters east of the road (modern graves). The graves themselves are located 50 meters east of the road. The Bronze Age settlement is located outside the cemetery at an elevation 150 meters east of the road. The safety of the wells is satisfactory, the safety of the cemetery dating from ethnographic time is in 'emergency' condition;
4. One of the burial mounds (No. 1) of the burial ground of Orto-Tokoy 2 (the Saks period of VIII-III centuries BC) at 37,200 meters from the beginning of the road is located 30 meters to the south of the road, destroyed during the laying the fiber optic cable. In general, the burial ground consists of 7 burial mounds, located in a chain from the northeast to the south-west. Diameter of mounds from 5 to 7 meters with heights from 0,40-0,60 meters, constructed from of rock-earth materials. The safety of the barrows is satisfactory.
5. One of the burial mounds (No. 16) of the burial ground of Orto-Tokoy 3 (Saks period VIII-III centuries BC) at 36,000 – 36,500 meters from the beginning of the road, is located 45 meters to the south of the road. The burial ground itself consists of 29 mounds. In addition to the barrow No. 16, burial mounds No. 17-18 are located at a distance of 50 and 55 meters to the south of the road;
6. One of the burial mounds (No. 1) of the Ortho-Tokoy burial ground 4 (the Saks period of VIII-III centuries BC) at 39,100 – 39,450 meters from the beginning of the road, on the south side of the road. The burial ground itself consists of five mounds.

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Also, there were found other objects of historical and cultural heritage:

B) Objects of Historical and Cultural Heritage (monuments of archaeology) located at a distance of more than 50 meters from the shoulder of the existing road:

1. Archaeological complex Orto-Tokoy 1, consisting of 4 settlements of the Bronze Age (I-II millennium BC), burial mounds (15 burial mounds) of the Saks time (VIII-III centuries BC), burial mounds (2 mounds) era of the great migration of peoples (Usun, Hunnish time, III BC), petroglyph of the Bronze Age and late medieval graves. The complex is located on both sides of the road. Some facilities are located 75 meters from the side of the road. The complex is located on a section of 33,000 – 34,000 meters from the beginning of the road;

2. The burial ground of Orto-Tokoy 2, consisting of 6 mounds of Saks time (VIII-III centuries BC). One of the mounds near the road (30 meters south of the road) was destroyed during the laying of a fiber optic cable. The barrows are round in shape. The diameters of the mounds are from 5 to 7 meters, the heights of the mounds up to 1 meter. The burial ground is located on a site 34,800 – 34,900 meters from the beginning of the road;

3. The burial ground of Ortho-Tokoy 3, is located on the site 35,500 – 36,400 meters from the beginning of the road and on the south side of the road. The cemetery consists of 29 mounds of rounded size with diameters from 5 to 10 meters. The rock and earth mounds are up to 0.5 meters in height. Mounds are located closely together in small complexes. Two of the burial mounds are partially destroyed by a ditch line.

4. The burial ground of Ortho-Tokoi 4 is located on the site 39,100 – 39,450 meters from the beginning of the road, on the south side of the road and consists of five mounds of round shape with a diameter of up to 7 meters. The rock and earth mounds are up to 0.5 meters in height. The territory is polluted with garbage, which has scattered over the hollow to the foot of the mountains. Apparently, a landfill is located nearby, which is not properly equipped or maintained.

Recommendations:

1. To create a protection zone of the Sary-Bulun Northern 2, it is necessary to shift the construction of a new road 5-15 meters to the west in the section 7,400 – 7,900 meters from the beginning of the road (from the road sign ‘turn left’). As a result of the shift, the object will receive a protection zone

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of 30 meters, which will create a buffer for the construction work. Construction, compaction and other works causing a vibration in this area, **should be prohibited.**

2. For creation the protection zone for **Sary-Bulun Southern 1** prior to the construction works at the site, between the remains and the road (30 meters) it is required to conduct the **field excavation works by test pitting for revealing the presence or absence of historical layer/layers and also actual remained borders of the monument.** As per the results of the archaeological study it is required to create the protection zone of the settlement. Design axis of the channel should be changed considering the borders of monument's protection zone. Remains of the settlement is located at 8,000 – 8,100 meters from the beginning of the road.
3. It is required to create the **protection zone** for **archaeological complex Orto-Tokoy 1**, taking into account the distance of 50 meters from each separate object of historical and cultural heritage.
4. For creation the protection zone for Sary-Bulun Southern 1 it is necessary to create a protection zone for the burial ground of Orto-Tokoy 2, destroyed by cable laying using a mound. The right of way zone allocation for the construction is 33-32 meters in this area but should be reduced to 23 meters. The implementation of the project to adjust the channel carrying the fiber optic cable line should be supervised by an archaeologist.
5. It is necessary to create a protection zone for the burial ground of Orto-Tokoy 3, including the partially destroyed mounds affected by the moat line. The right of way zone allocated for the construction is 33-32 meters in this area but should be reduced to 23 meters. The layout of the channel in this area needs to be changed taking into account the protection zone needs for the cemetery. The work on the channel should be conducted under the supervision of a specialist archaeologist.
6. It is necessary to create a **protection zone** for the burial mound **Orto-Tokoy 4**. The right of way zone allocated for the construction is 33-32 meters in this area but should be reduced to 23 meters. The layout of the channel in this area needs to be changed taking into account the protection zone needs for the cemetery. The implementation of the channel project should be conducted under the supervision of a specialist archaeologist.
7. **It is necessary to take measures against the company Kyrgyztelecom in connection with the destroyed and partially destroyed objects in the form of the settlement of Sary-Bulun Southern 1, and t burial mound of Orto-Tokoy 2;**

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8. **It is necessary to take appropriate measures with regard to the administration of the Semizbel Aiyl District of Kochkor district of Naryn Oblast for pollution of the historical and cultural landscape of the burial mound of Orto-Tokoy 4;**
9. **In the section of 32,000-40,000 meters from the beginning of the road to the outside of the deflection zone in 30-33 meters in the form of identifying other possible archaeological sites on the map using Google Earth on both sides of the road without detailed archaeological reconnaissance, is unacceptable.**
10. During the construction and other works and / or development of the land of Section 1 of construction of the alternative North-South Road (CAREC Corridors 1 and 3 Connector Road), Balykchy-Kochkor over a length of 43 km, in the territory of the Ton District of Issyk-Kul Oblast and the Kochkor District in Naryn Oblast, it is necessary to exercise vigilance and caution during the road reconstruction work. In cases of finding any artifacts, bones (human) and other signs or materials of cultural interest, it will be necessary to stop all construction work and to report the findings to local executive bodies, departments that are responsible for the protection of cultural heritage and/or experts in archaeology;
11. When developing the adjacent zones from the territory of Section 1 of the construction of an alternative North-South Road (CAREC Corridors 1 and 3 Connector Road), Balikchy-Kochkor with a length of 43 km, in the Ton District of the Issyk-Kul Oblast and in the Kochkor District of the Naryn Oblast, it will be necessary to conduct additional archaeological examinations for the presence of monuments of historical and cultural heritage.

Performer: **A. Abdykanova**

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APPENDIX

Fig. 1. Section 1 (CAREC 1 and 3), Balykchy-Kochkor, total length 43 km (highlighted with green line)

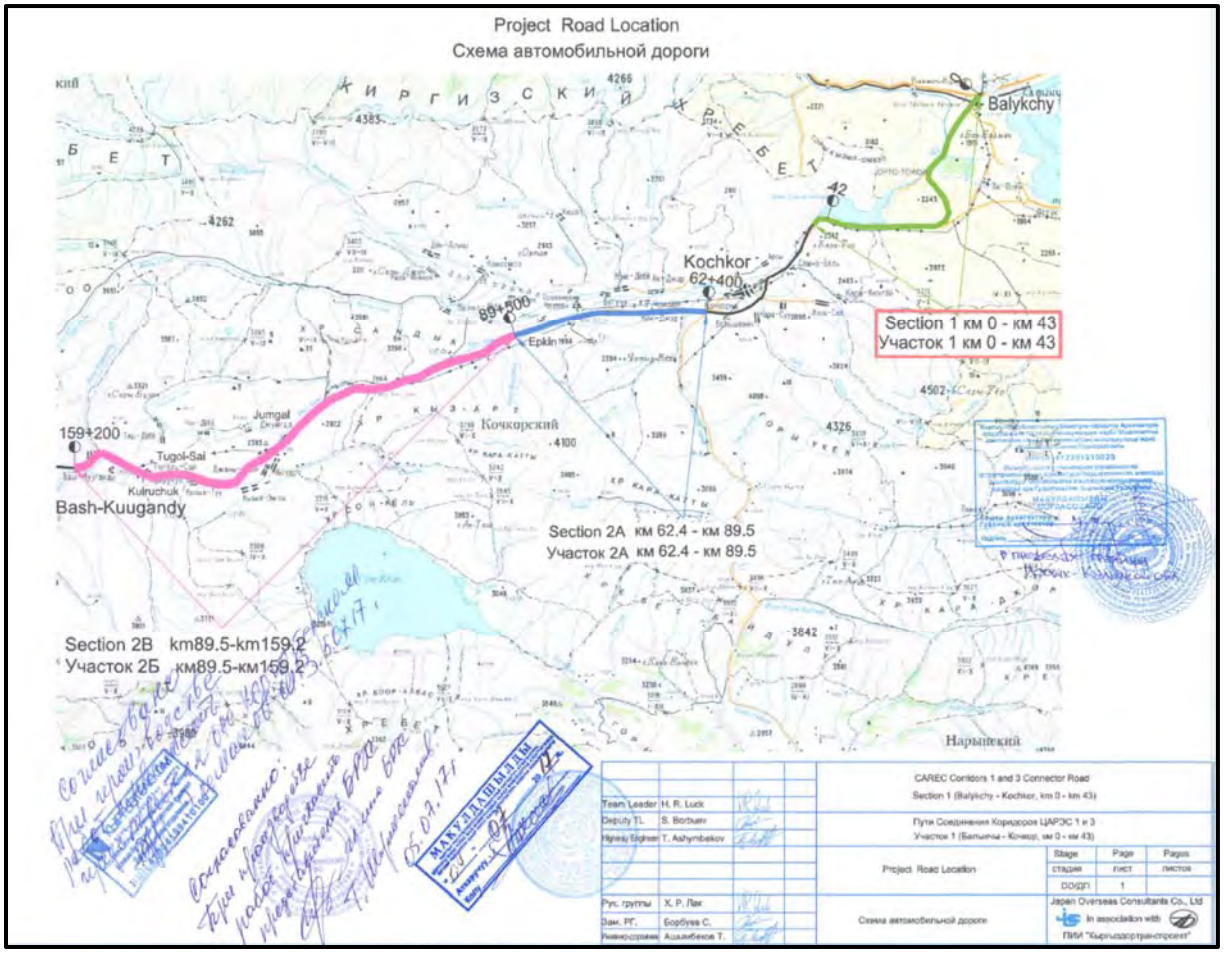

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Fig. 2. Map of the location of the settlements Sary Bulun Northern 2 and Sary-Bulun Southern 1 (The red color indicates the border of the settlement, green borders mark the protection zone, which is 30 meters, blue marked the line of the road, which should be shifted in the east direction by 5-15 meters on the site 7,400 – 7,900 meters from the beginning of the road).

Fig.3. Settlement plan of Sary-Bulun Northern II by K.T. Tabaldiev (2010) and A.M. Korjenkov (2016).

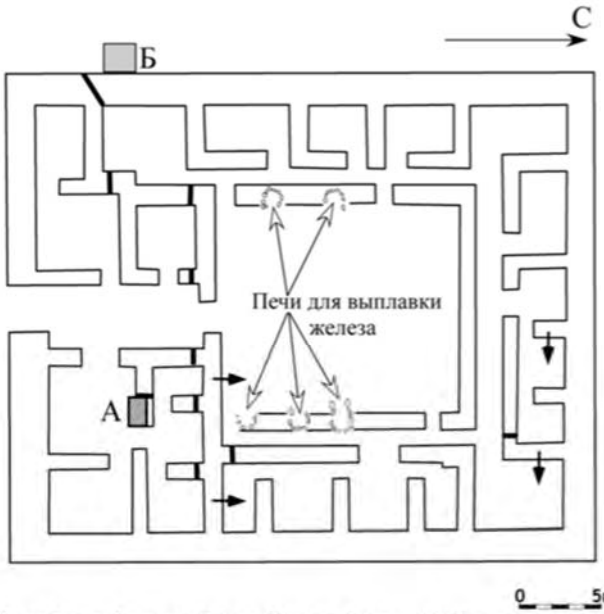

Рис. 2. План поселения Сары-Булун Северное (II) по [Кыргыз-Турк..., 2010] с изменениями и дополнениями. Черные жирные отрезки означают трещины через всю стену, стрелки показывают направление наклона и выгибания стен. А – смещение целого фрагмента стены к югу, Б – обрушение фрагментов стены на запад

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Fig. 4. Sary-Bulun Northern, view from north-west

Fig. 5. Section 1 (0-43km) at 7,400-8,800 m from the beginning (upper scheme)

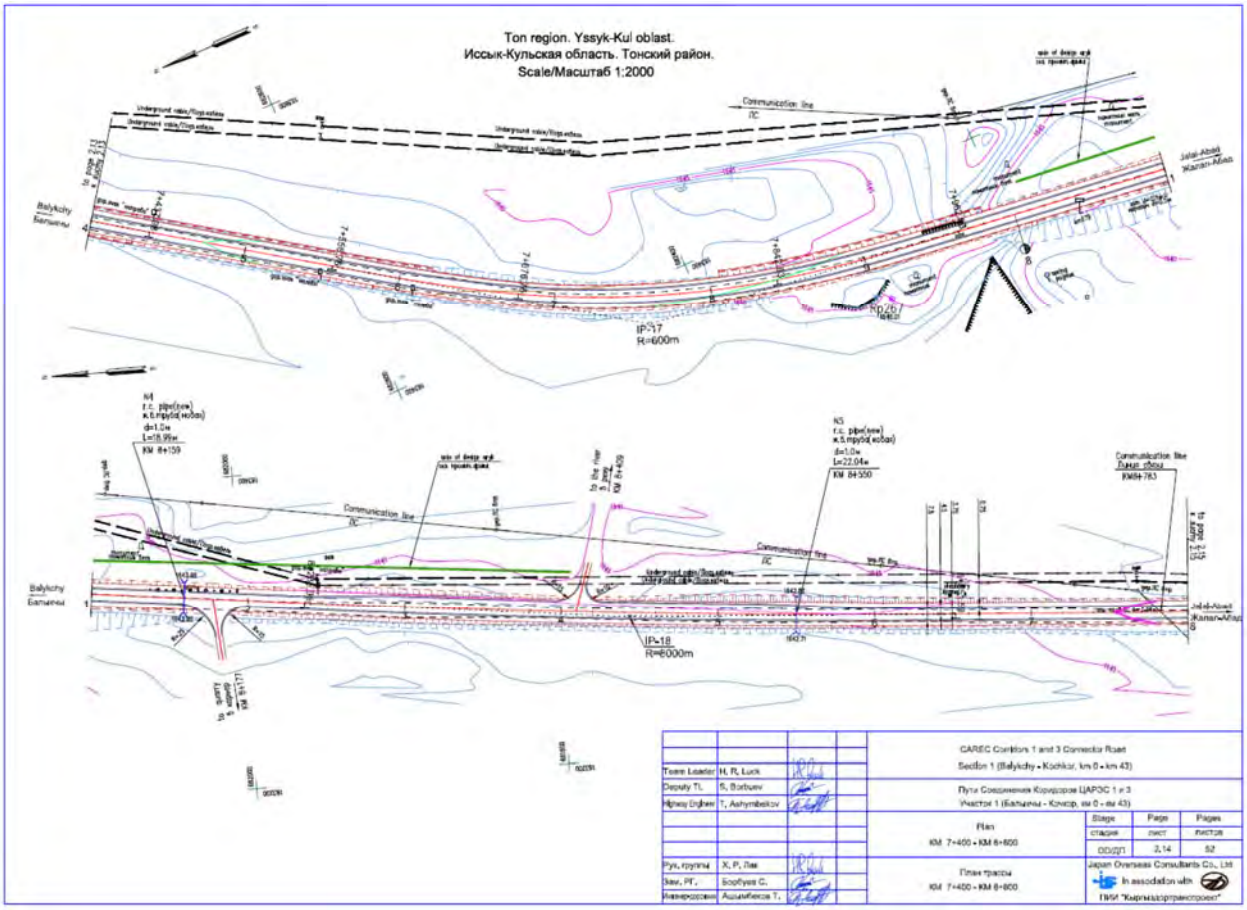

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Fig.6. Location map of Sary-Bulun Southern 1 settlement

Fig.7. Sary-Bulun Northern 2 (upper) and Sary-Bulun Southern 1 (lower) (photo by Lujanskyi)

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Fig.8. Sary-Bulun Southern 1, view from above, directions of northern and eastern walls (photo by Lujanskyi)

Fig.9. Sary-Bulun Southern 1, view from the road

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Fig.10. Sary-Bulun Southern 1, remains of northern wall

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Fig.11. Sary-Bulun Southern 1, damaged part by laying the optic cable, view from north-east

Fig.12. Section 1 (km0-43) 8,000-8,100m from the beginning of the road (upper scheme)

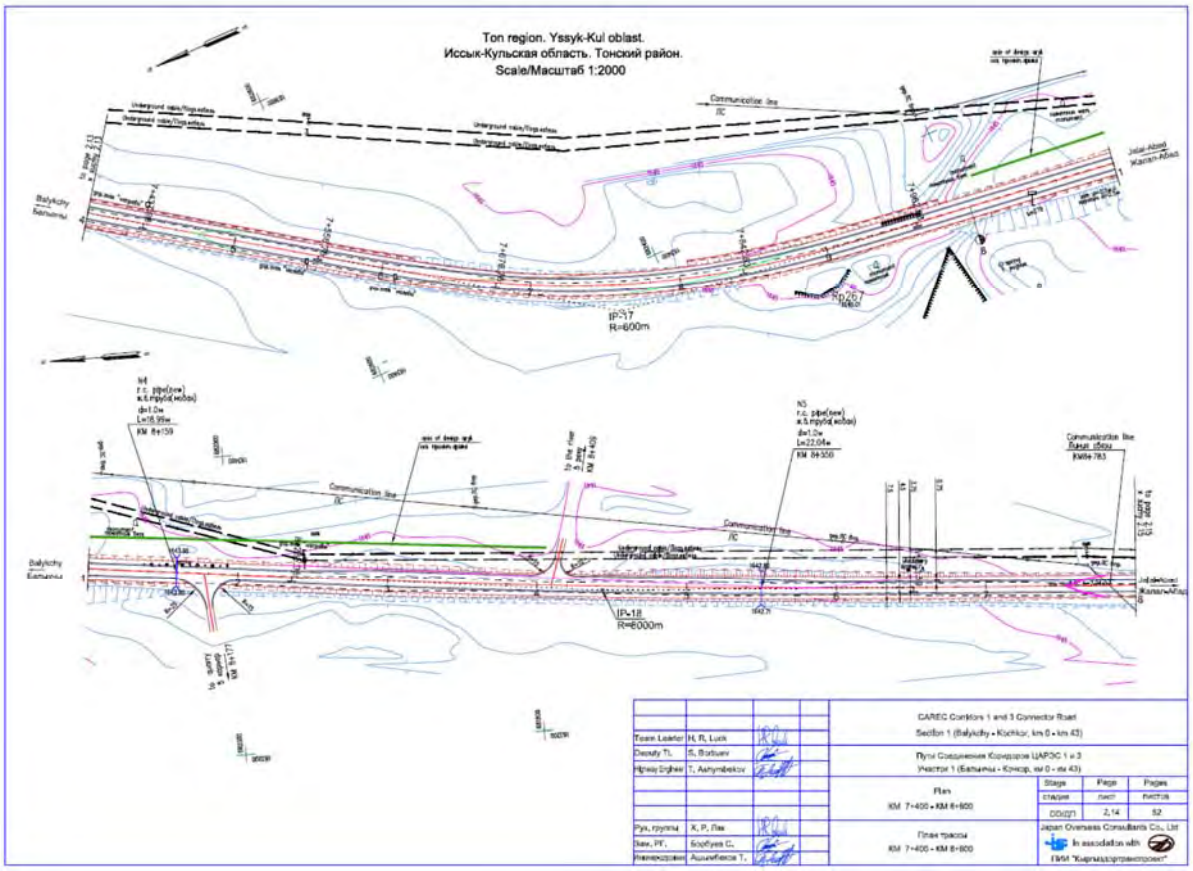

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Fig.12. The map of the location of a complex of graves and cemeteries of an ethnographic settlement, a medieval settlement, a modern cemetery and a village of the Bronze Age

Fig.13. Section 1 (0-43km) at 10,200-11,500m from the beginning (upper scheme)

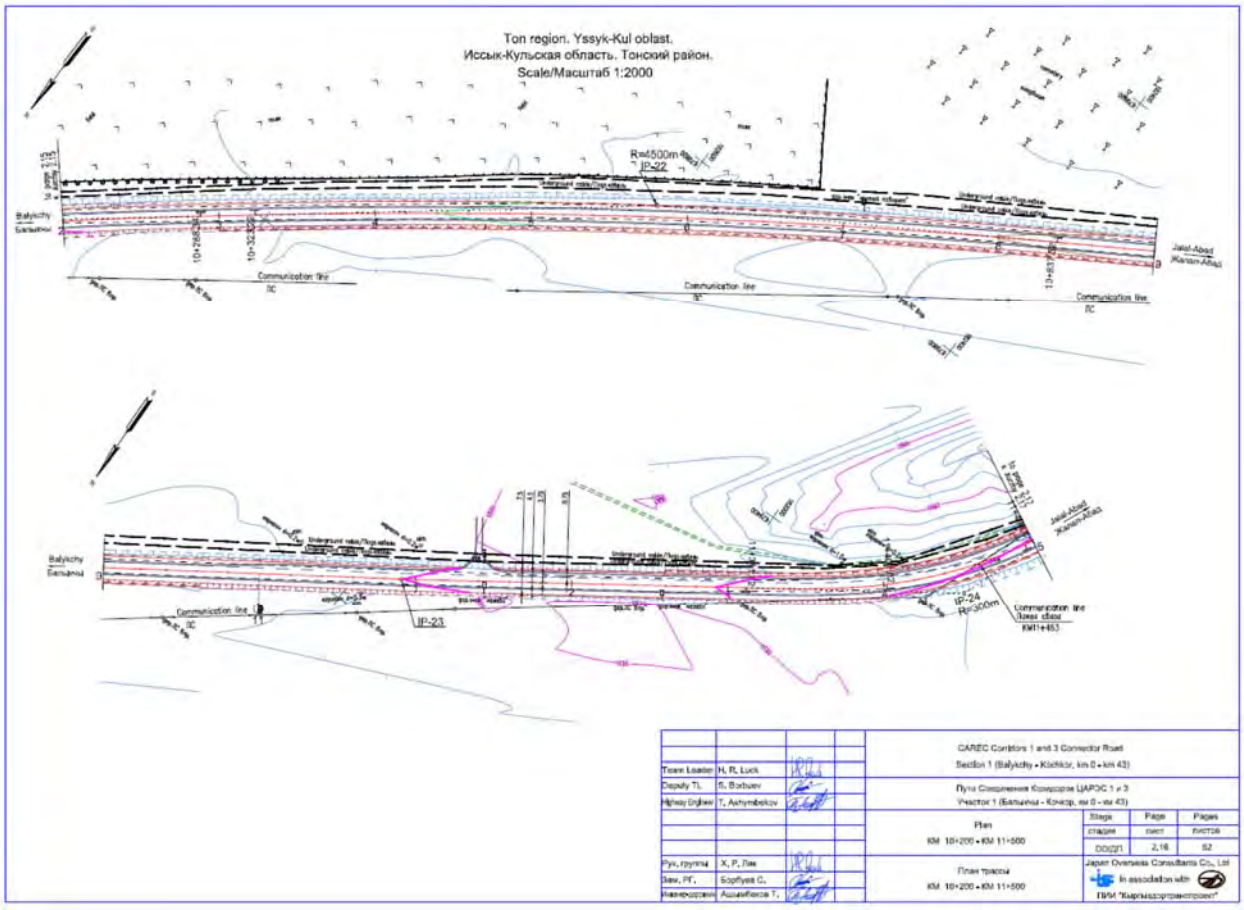

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Fig.14. Complex of graves and cemeteries of ethnographic settlement, medieval settlement, modern cemetery, view from the east

Fig.15. Fragment of ceramics found in the territory of the cemetery

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Fig.16. Settlement in the Bronze Age (tash-koroo), view from the west

Fig.17. Map of archeological complex Orto-Tokoy 1.

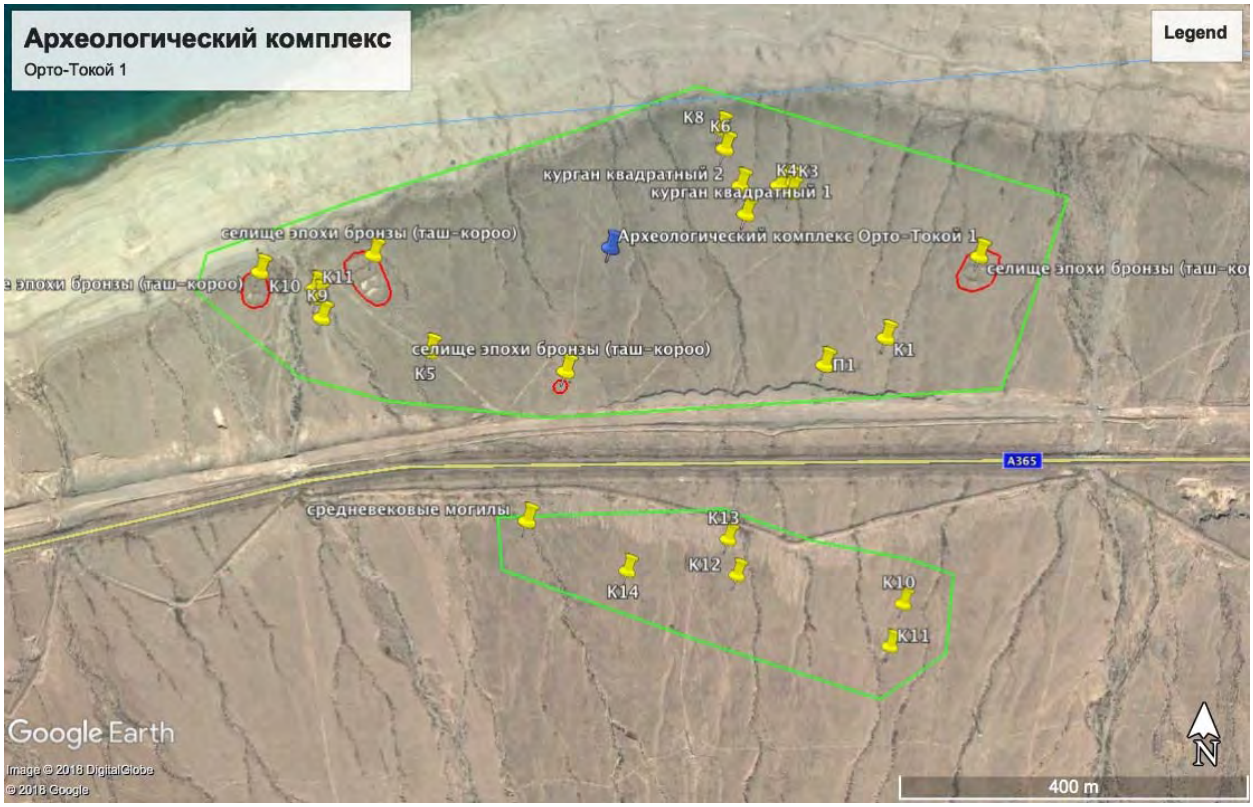

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Fig.18. Section 1 (0-43km) at 33,100-3,800 m from the beginning of the road

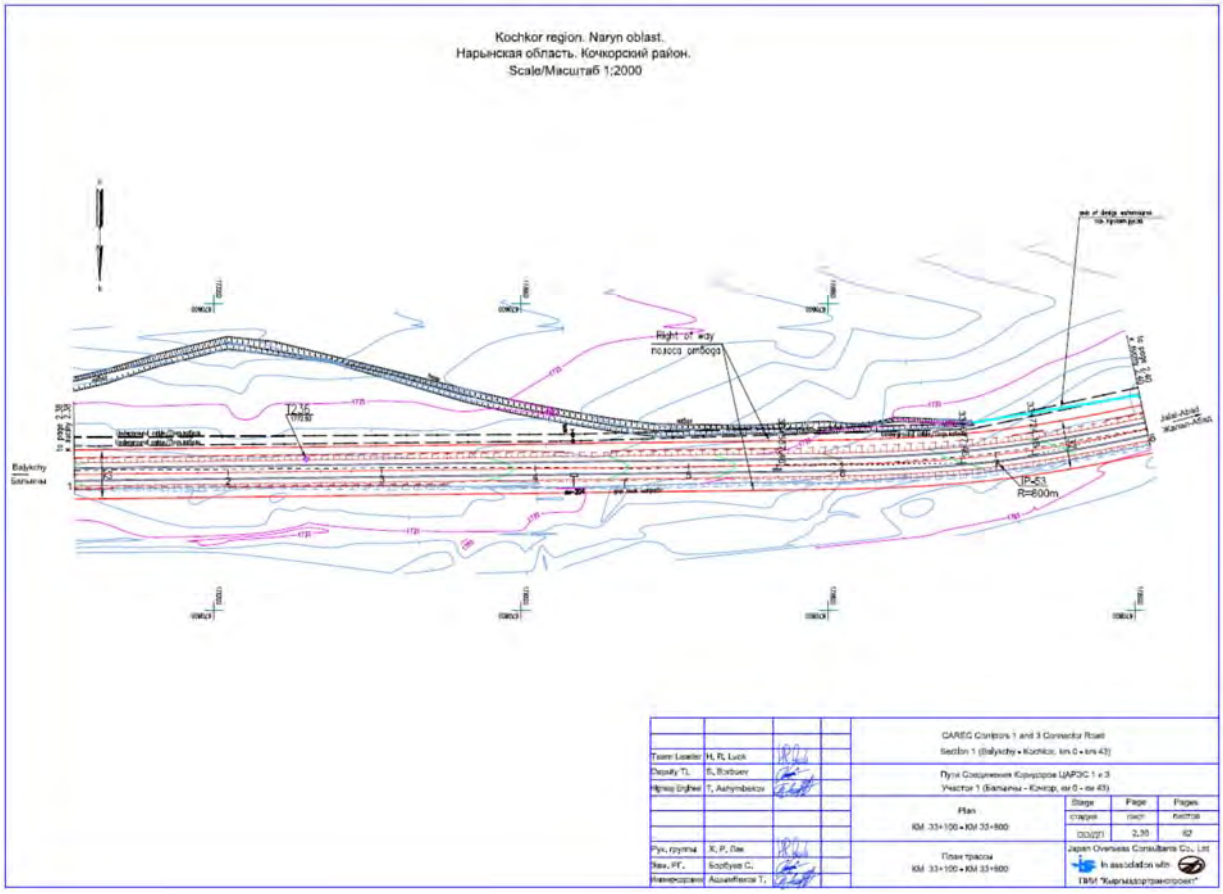

Fig.19. Section 1 (0-43km) at 33,800-34,500 m from the beginning of the road

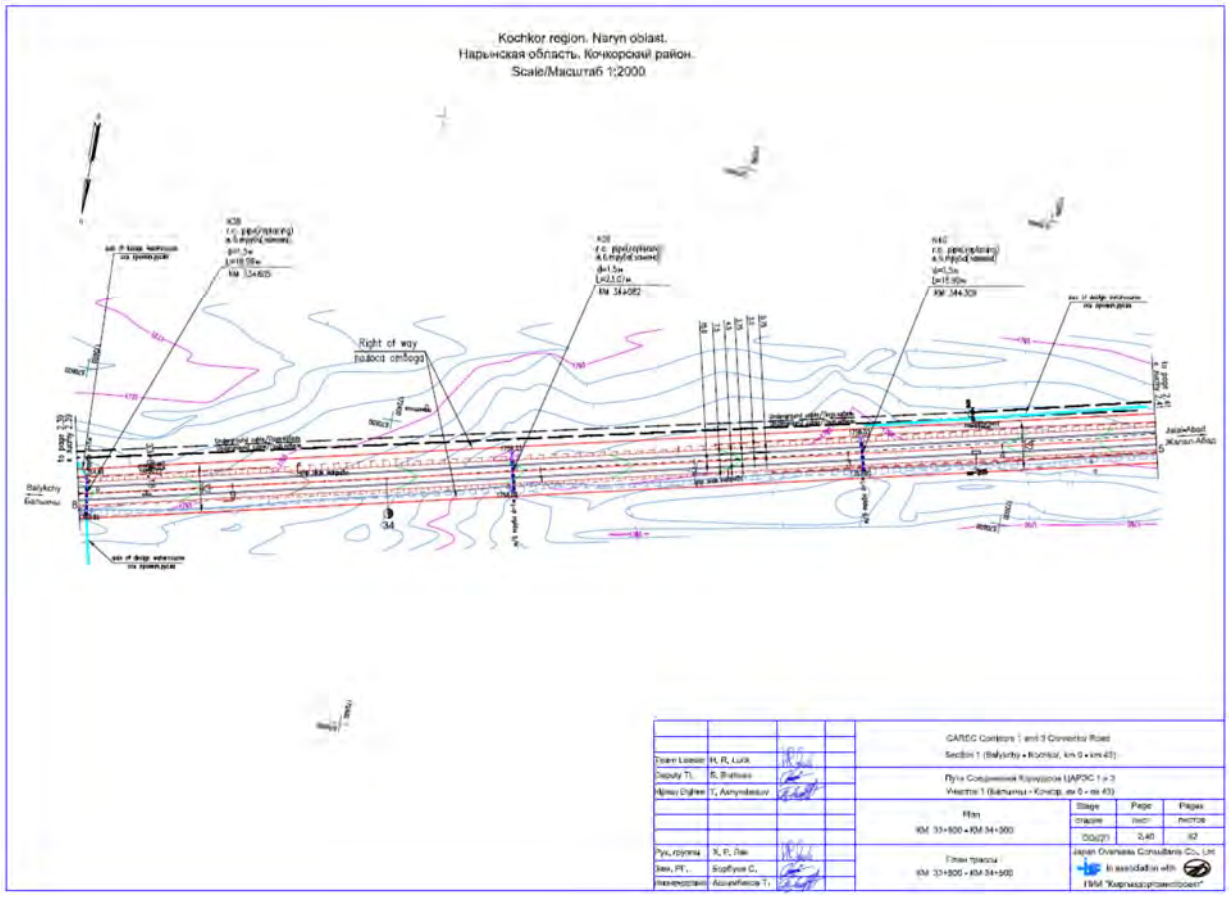

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Fig.20. Bronze Age settlement, view from south

Fig.21. Bronze Age settlement, view from west

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Fig.22. Mound square type (4 by 4m) with shape boulders, view from south-west

Fig.23. Saks time mound, view from north-east

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Fig.24. Bronze Age petroglyph, view from east

Fig.25. Medieval graves, view from the south

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Fig.26. Orto-Tokoy 2 cemetery location map

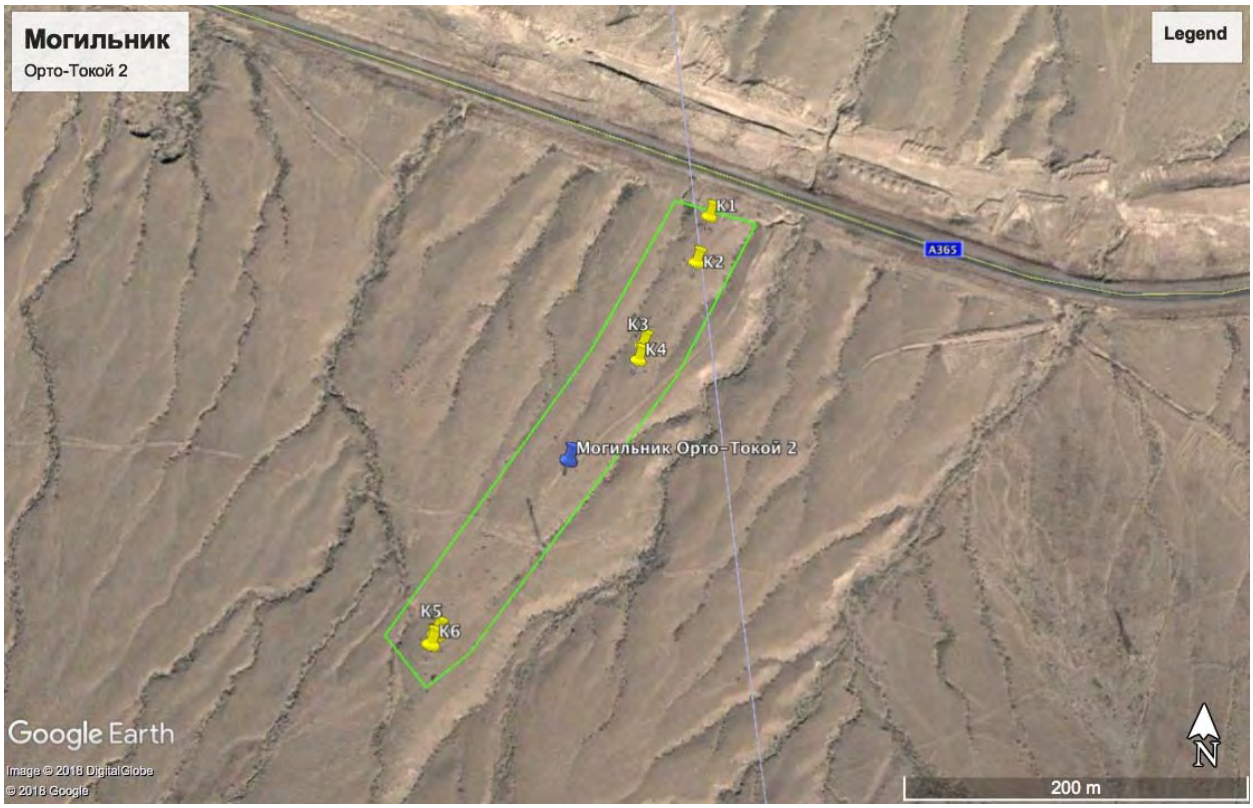

Fig.27. Section 1 (0-43km) at 34,500-35,200m from the beginning of the road

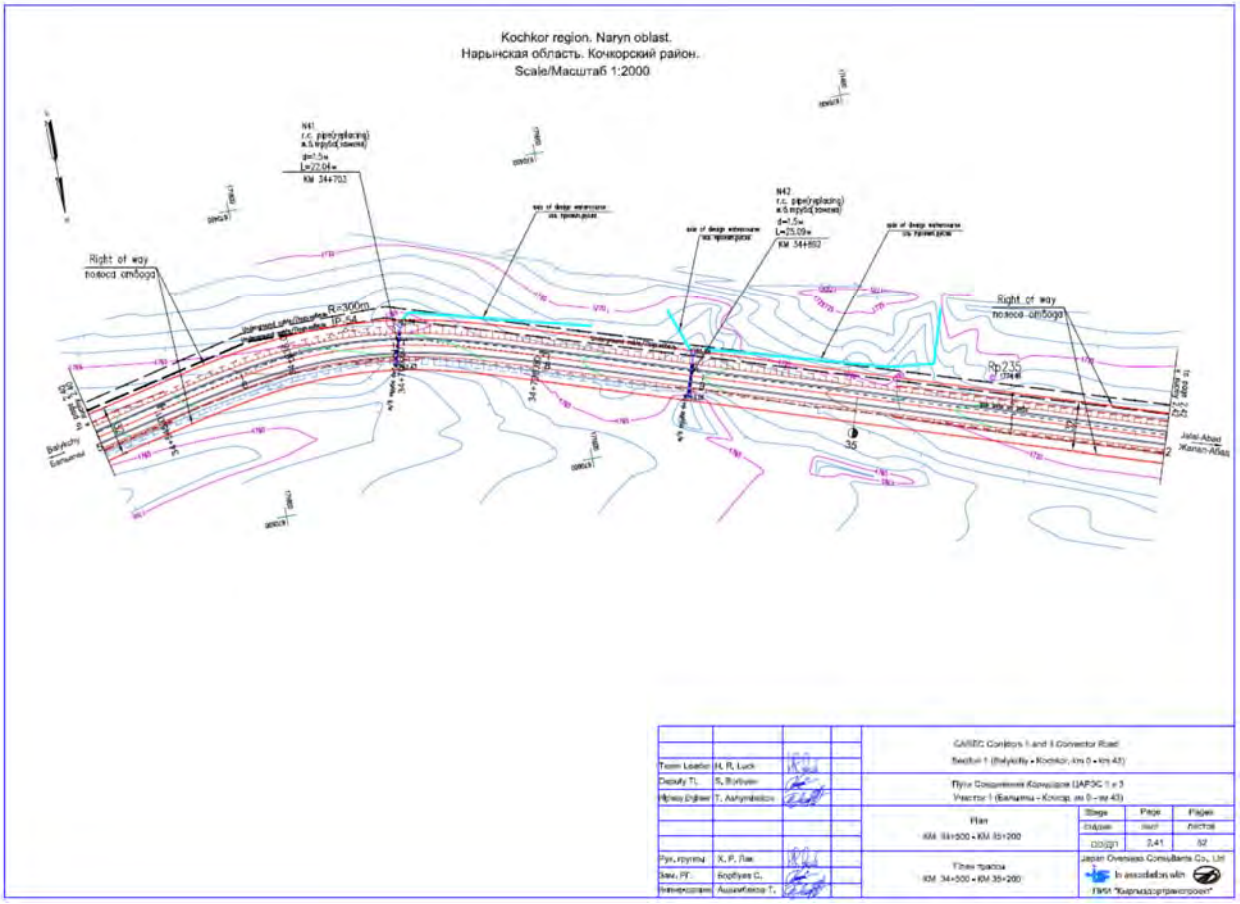

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Fig.28. Damaged mound #1, by laying of an optic cable

Fig.29. Cemetery mounds of Orto-Tokoy 2, view from south

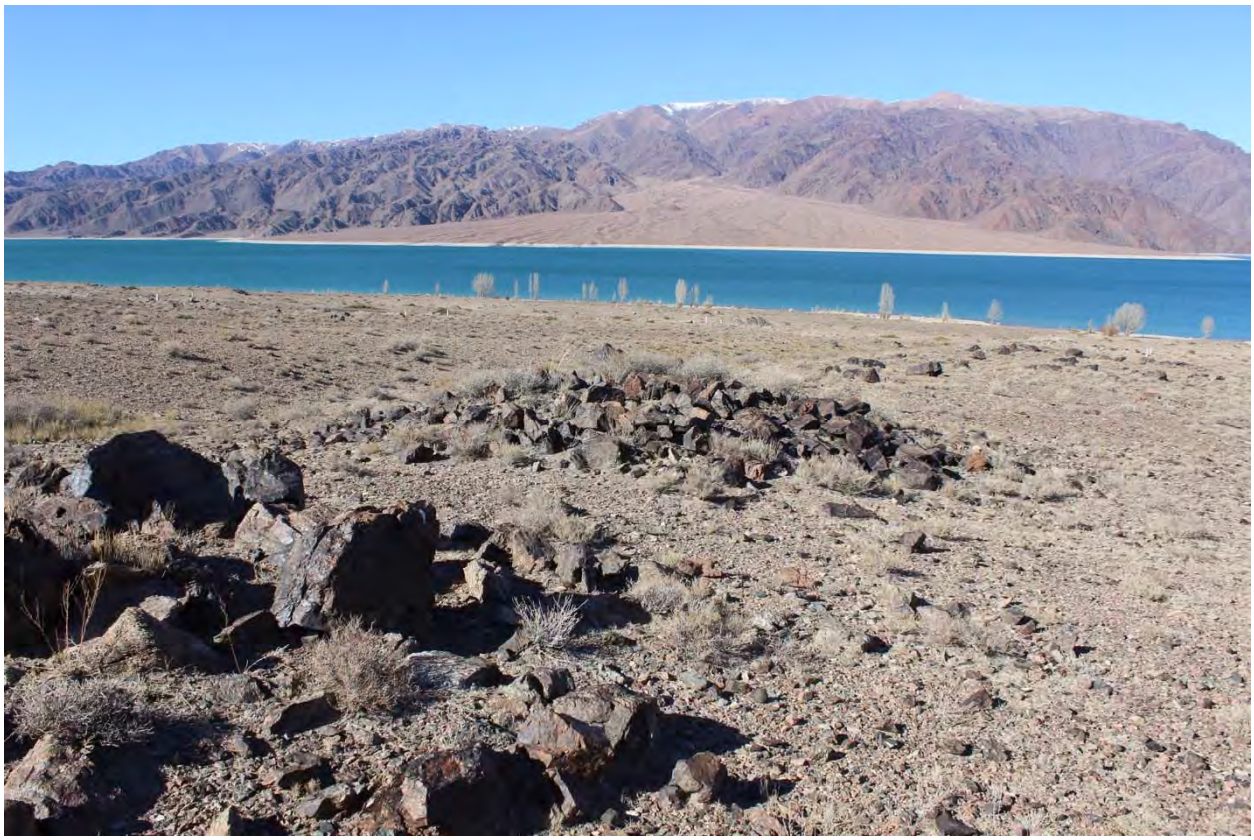

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Fig.30. Map of the location of the burial ground of Orto-Tokoy 3

Fig.31. Section 1 (0-43km) at 35,200-35,900m from the beginning of the road

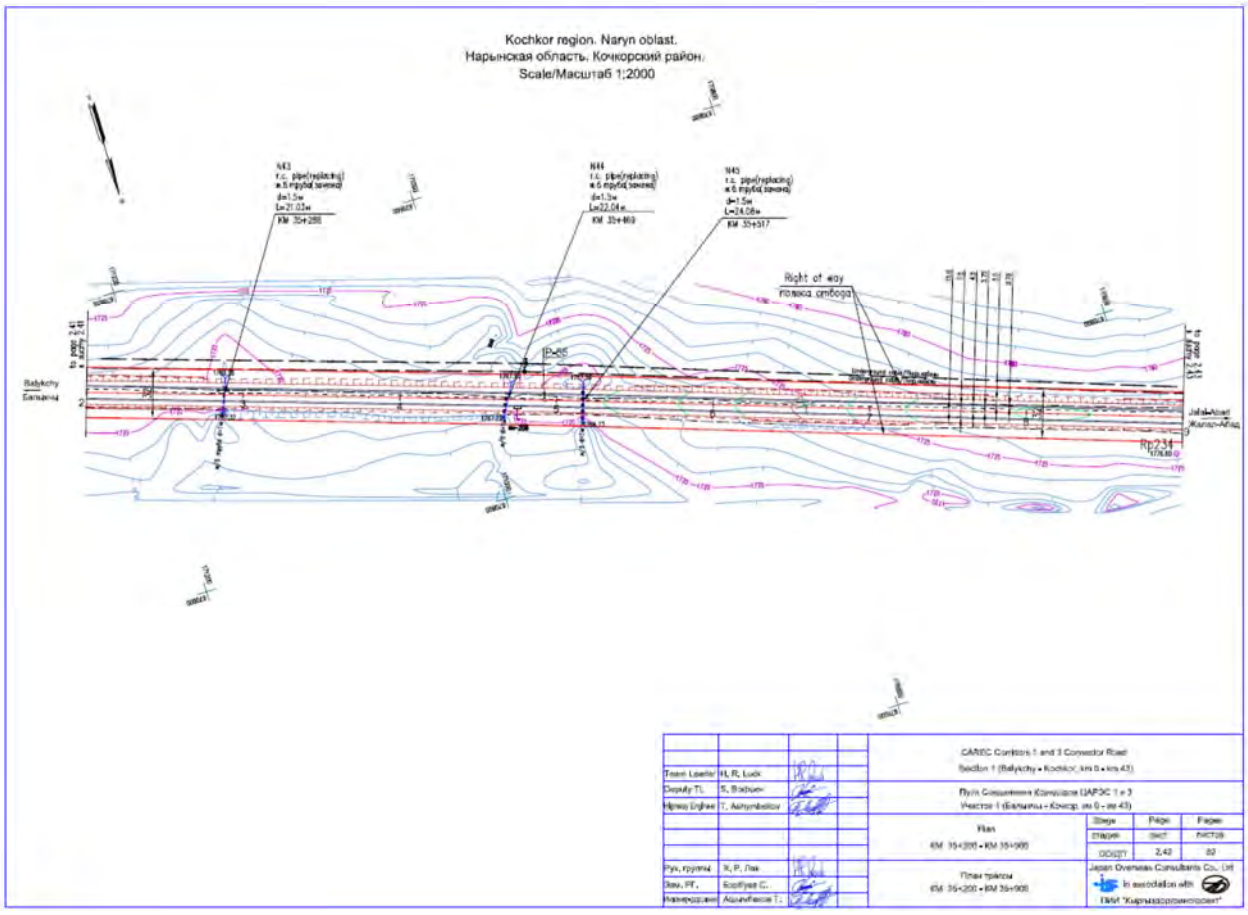

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Fig.32. Section 1 (0-43km) at 35,900-36,600 m from the beginning of the road

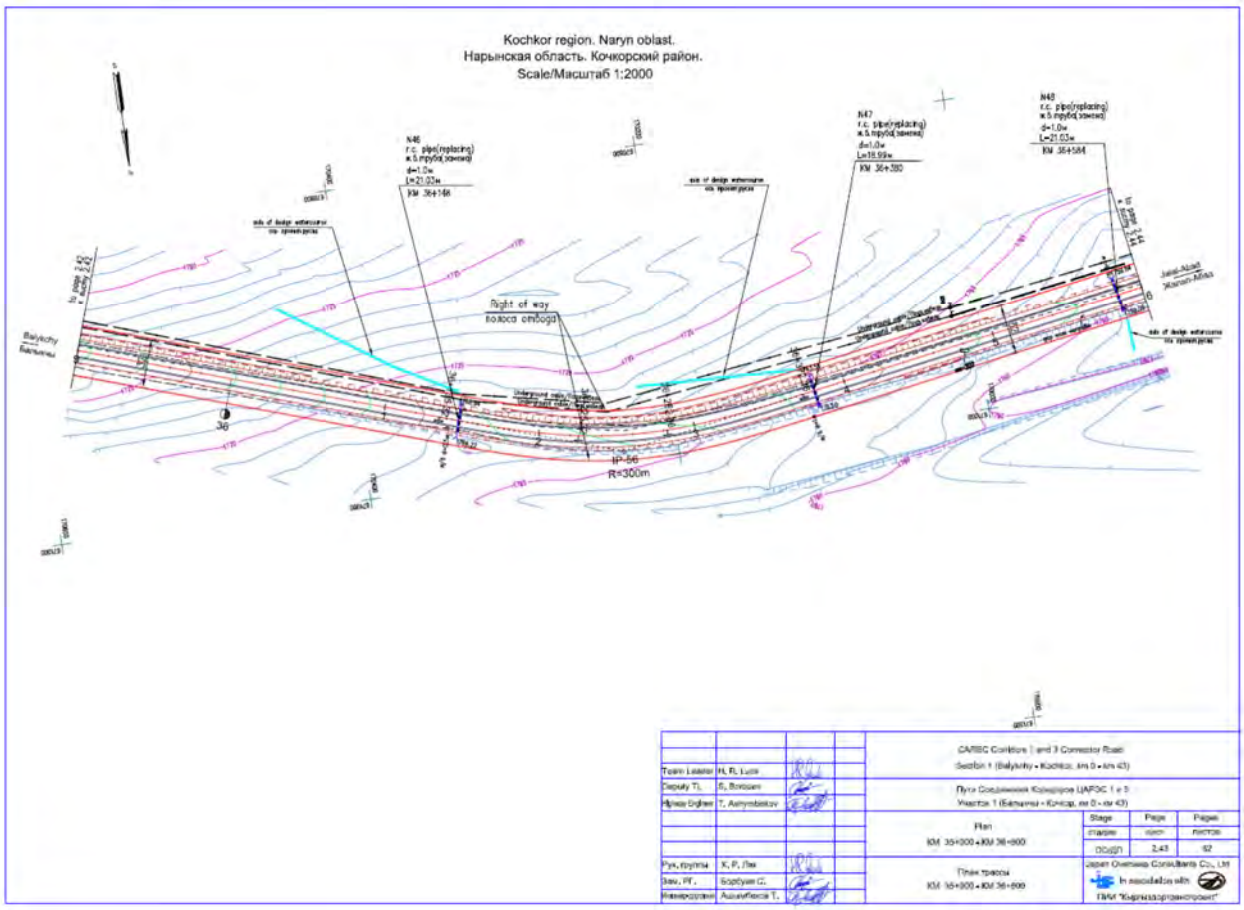

Fig.33. Orto-Tokoy 3 cemetery mounds, view from south

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Fig.34. Petroglyph in the territory of the burial ground of Orto-Tokoy 3, view from the east

Fig.35. Damaged mound (№18) of Orto-Tokoy 3 cemetery, view from east

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Fig.36. Orto-Tokoy 4 cemetery location map

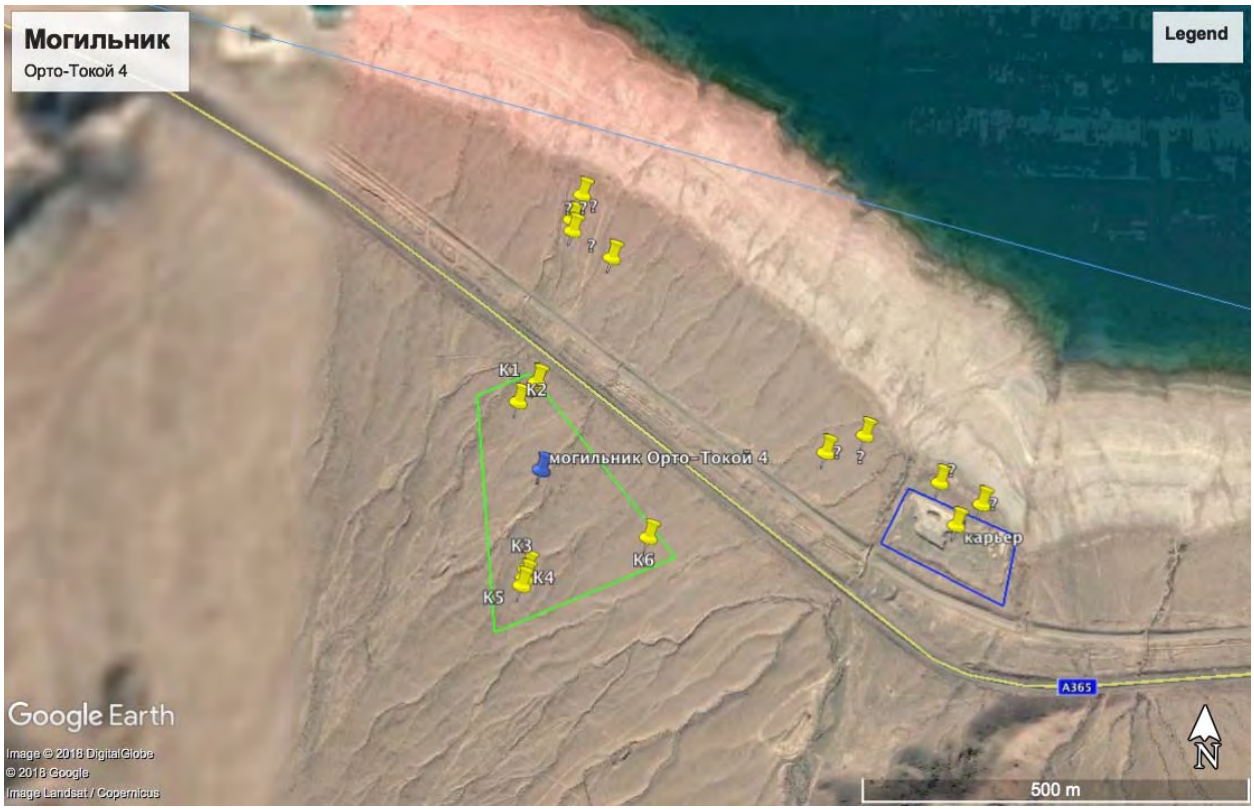

Fig.37. Mounds of the Orto-Tokoy 4 cemetery, view from east

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Fig.38. Mounds of Ort-Tokoy 4 cemetery, scattered debris, view from east

Fig.39. The tract where Orto-Tokoy 4 is located, scattered debris, view from the north

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Plan of archaeological management of objects of historical and cultural heritage "CAREC 1 and 3 Connector Road Project, Section 1, Balykchy-Kochkor, 0-43km"

Prepared by: Aida Abdykanova, Archaeologist

Contents

Introduction

In this "Plan for the protection of historical and cultural heritage sites within the CAREC 1 and 3 Connector Road Project, Balykchy-Kochkor km 0 - km 43" (hereinafter referred to as the "Plan" and the "Project"), procedures are established to execution of the Company and its Contractor (hereinafter "Company" and "Contractor") of the obligations for the protection of historical and cultural heritage sites that are susceptible to potential impact during construction and other works.

Objects of historical and cultural heritage (hereinafter referred to as "OHCH") within this Plan, means archaeological and paleontological monuments of historical and/or cultural significance objects/structures/artifacts, as well as objects and places of religious/spiritual significance.

This Plan is designed to ensure the fulfillment of obligations by the Contractor in accordance with the legislation of the Kyrgyz Republic with respect to OHCH. The Ministry of Culture, Information and Tourism of the Kyrgyz Republic (hereinafter referred to as MCIT KR) is responsible for observing the laws of the Kyrgyz Republic concerning the protection of OHCH. The Company/Contractor coordinates the actions specified in this Plan with the authorized department of the MCIT of the Kyrgyz Republic.

The Plan ensures the safety of OHCH in the course of the project. It establishes procedures aimed at avoiding the impact of the road on this site and related to construction activities to OHCH, to the extent that it is possible. These procedures covers the protection of OHCH in the course of construction works and actions to be taken for OHCH, which are located in close proximity to the road and other Project objects, as well as in the event of the possible detection of previously unknown OHCH.

The Plan describes the following activities related to actions with reference to archaeological and historical monuments:

- mandatory notification procedures and data transfer protocols;

- actions in relation to OHCH in case of emergencies;

- monitoring of OHCH during the construction works.

The representative of the Company (hereinafter referred to as the "Coordinator") shall coordinate the implementation of this Plan throughout the Project.

Legislative framework

All activities related to OHCH are carried out in accordance with the legislative acts and regulations of the Kyrgyz Republic. The legislative framework includes:

- Law of the Kyrgyz Republic No. 91 of 26.07.1999 "On protection and use of historical and cultural heritage";

- The Land Code of the Kyrgyz Republic of 02.06.1999, No. 45;

- Instruction on the organization of protection zones for immovable objects of the historical and cultural heritage of the Kyrgyz Republic dated July 27, 2015.

The Company/Contractor must accept all obligations to the public authorities of the Kyrgyz Republic regarding the use and protection of OHCH. The Company/Contractor is obliged to follow the legislation, inform its employees and ensure its implementation.

In accordance with the Law of the Kyrgyz Republic No. 91 of 26.07.1999 "On protection and use of historical and cultural heritage" all OHCHs are exclusive state property and are under its protection. Archaeological sites discovered during the

archaeological reconnaissance of Section 1 belong to OHCH of local significance, and also fall into the category "identified" OHCH. At the same time, "All kinds of archaeological monuments have historical and cultural and scientific value and the status of monuments of history and culture" (Article 6.).

According to Article 31 of the Law, individuals and legal entities that carry out economic and other activities in the territory where OHCH are located or found are obliged to comply with the regime for the use of this territory, established by law. The main idea of these norms with regard to OHCH is their protection from any potential harm. According to Article 39, for violation of this Law, officials, individuals and legal entities bear criminal, administrative and other legal responsibility. Persons who harmed OHCH are obliged to reimburse the cost of measures necessary to preserve it, which does not exempt those persons from administrative and criminal liability provided for such actions.

According to Article 84 of the Land Code of the Kyrgyz Republic, the land on which OHCH are located falls under the category of "Specially Protected Natural Territories".

Each OHCH must have its own protection zone at least 50 meters from the boundaries of the monument. Also, monuments should have a buffer zone in the form of a regulation zone for buildings and areas of the historical landscape.

Previous surveys

During the preparation stage of the Project in 2016, the archaeological survey was carried for Section 1 (Chargynov T., 2016). As a result of the survey, in the immediate vicinity of the site, one archaeological site of local significance was discovered: the settlement of Sary Bulun Northern 2.

In 2018, prior to the start of the construction works, a repeated archaeological examination of the site along the road was carried out, where it is planned to be reconstructed. During archaeological reconnaissance, 7 complexes of OHCH, mostly archaeological monuments, dating from the Bronze Age to the Ethnographic Age, were discovered on the stretch of the right-of-way and in close vicinity to the raod. These include the settlements, burial mounds, petroglyphs and mausoleums.

Procedures for the protection of OHCH

During the implementation of the project, OHCH will be exposed to a direct and potential danger. Any activity related to the disturbance of top soil, including clearing from vegetation, planning and development of soil, digging trenches, leveling the surface, the passage of heavy equipment can damage archaeological monuments.

To ensure the safety of OHCH located in the zone of direct or indirect impact of the works the following actions are proposed:

- establishment of protection zones detected OHCH according to the legislation before the start of works with the establishment of information boards/signs;

- conducting the archaeological test pitting works for specific OHCH;

- periodic visual monitoring of OHCH for the whole period of works;

- application of the procedures described in this Plan throughout the entire period of works.

Establishment of protection zones is carried out on the basis of the results of archaeological expertise, confirmed by the conclusion of MCIT KR and through the scientific and design organization under the MCIT KR - "Kyrgyzrestoration". The established protection zones are approved by MCIT KR. Information boards/signs to be

installed at identified protection zones near OHCH. Archaeological expertise is carried out by a specialist archaeologist, who is hired by the Company as an expert.

Archaeological test pitting works are carried out on the basis of the results of archaeological expertise, confirmed by the conclusion of MCIT KR. Test pitting works are carried out by a specialist archaeologist. The results of archaeological excavation works and further recommendations in the form of a scientific report are agreed with the Company/Contractor and to be submitted to MCIT KR for consideration.

Monitoring should cover OHCH located near the right-of-way to verify the boundaries of the OHCH protection zone for security purposes and for the presence of information boards/signs. Initial monitoring of OHCH should be carried out during construction at the sites where OHCH are located. Secondary monitoring is carried out after completion of work. Secondary monitoring to be carried out by the Coordinator and specialist archaeologist.

The procedure for conducting work at the sites where OHCH is located is as follows:

1) The Project Personnel and the Contractor should be aware that vehicles, especially heavy equipment, should be avoided entering the OHCH protection zone. It can cause irreparable damage;

2) The works are restricted at the territory of OHCH protection zone, this can lead to a permanent loss of the OHCH;

3) In areas where OHCH are located closer than 30 meters from the right-of-way, the right-of-way to be narrowed from 32-33 meters to 20-23 meters. In this case, the right-of-way will be separated from the OHCH protection zone by concrete blocks. Any work that causes vibration in these areas is prohibited;

4) In case of project drainage and other additional facilities are located in the OHCH protection zone, they must be changed.

The procedure applicable when detecting potential OHCH (random finds)

The contractor must be familiar with the procedures before commencing work. The procedure are as follows:

1) Suspend any work related to the disturbance of the top soil, including surface clearing, digging trenches, etc., within a radius of 100 m from the detected object;

2) Within 24 hours, notify the Coordinator, which in turn should notify the specialist archaeologist and the MCIT KR ;

3) Mark the location of the object in order to ensure its safety and not conduct any construction works on the territory of the detected object before the arrival of the Coordinator;

4) Information about the detection of the object must be registered using the approved document (Appendix 1);

5) Earthworks outside the radius of 100 meters can be resumed subject after a survey by a specialist archaeologist, and in consultation with the MCIT KR, after they decide that the resumption of work will not have a negative impact on potentially important facilities. The coordinator must continue to supervise earthworks in the area. Full resumption of work is possible after taking all the required measures for the protection, preservation or rescue of the detected object under the supervision of the Coordinator on the basis of the report and recommendations of the archaeologist and the conclusion of the MCIT KR.

Procedures of protection of OHCH during emergencies. In case of emergencies, the actions for the protection of OHCH are as follows:

1) The officer responsible for this site should, in the shortest possible time after receiving information about the emergency, notify the Coordinator about the nature and exact location of the emergency situation, as well as the measures to be taken to eliminate it;

2) The coordinator provides information on the presence or absence of OHCH in the zone of direct or indirect impact of an emergency;

3) In case of OHCH is located in the emergency zone, the Coordinator involves an archaeologist, who proposes and discusses with the members of the emergency management team their recommendations for protecting this OHCH. The coordinated measures are included in the "Operational Emergency Plan";

4) In the event of a threat of damage or accidental damage to OHCH, the Coordinator involves an archaeologist and provides the information to MCIT KR;

5) The coordinator and the archaeologist carry out control over the emergency response, after which the archaeologist examines and documents the current status of OHCH and reports to the MCIT KR;

6) In case of damage of OHCH, as a result of an emergency or work on its elimination, special measures should be developed and implemented to minimize the damage (for example, surface collections of artifacts, archaeological excavations, installation of warning signs, restoration works, etc.) compliance with the special "OHCH restoration plan";

7) Archaeologist should develop and submit to the Company "OHCH restoration plan" within 5 working days from the moment of emergency occurrence. The Contractor reviews and coordinates this plan within 5 days from the date of its submission by an archaeologist. The "OHCH restoration plan" should be approved by the MCIT KR. The Contractor must pay the costs for implementation of the plan;

8) In case of damage to the archaeological site, archaeological excavations may be required. An archaeologist will coordinate the scope of work and excavate in accordance with the Regulations on the Archaeological Field Committee, the Procedure for Archaeological Field Research and Report Scientific Documentation of the National Science Academy of the KR. The contractor incurs financial expenses for excavation, processing of the received material and preparation of the final report. The report to be submitted to MCIT KR;

9) If any findings are made during or after the emergency response by a person, this person must ensure that the findings are kept in a safe place until the handing-over given to the Coordinator or archaeologist. Archaeologist is responsible for accurate collection of findings, collection and registration of necessary data, as well as the maintenance of artifacts intact and safe and their transfer to the state museum.

Responsibilities

The Company/Contractor is responsible for the safety of all OHCH located in the area of direct or indirect impact of the work under the Project. In case of damage to the cultural object due to the fault of the Company's employees and Contractor, or for other reasons related to the Project's work, the Company/Contractor undertakes to carry out restoration works on this site or financing such works.

The Company/Contractor shall not be liable for damage to OHCH located in the zone of direct or indirect impact of works under the Project that occurred as a result of actions of a third party not related to the Project activities (for example, local residents), but can provide voluntary assistance in carrying out the necessary restoration works.

Proposal for the protection of OHCH

Priority of OHCH, subject to protection during the construction of the road, is determined on the basis of the following criteria: the location of the monument to the right-of-way, the size of the monument, historical value.

Proposals for the protection of OHCH discovered during the archaeological examination in Section 1 are set in the Table. It lists OHCH located in the zone of direct and indirect influence of the Project activities and requires certain protective measures. The table includes the name and a brief description of the OHCH and the recommendation of an archaeologist for protection and further monitoring. This information can be specified and supplemented as necessary.

Table. Proposal for the protection of OHCH, detected during the archaeological survey of Section 1.

#	Name and brief description on OHCH (1 and 2 are separate objects, 3-7 are OHCH complexes)	Coordinates/Section of the road	Distance from the road	Additional design measures	Protection measures
1	Sary-Bulun Northern 2, Karakhanid time settlement (X-XII)	42°24'2.59"N 76° 5'56.13"E At km 7+740 - 7+840	35-40m from southern side	Narrow the right-of-way within the shoulder from 32m to 22m. Divide the right-of-way and borders of the protection zone with concrete slabs 100 meters long.	Ensure the creation of protection zone for 30m from the borders of OHCH, do not carry out works causing vibration.
2	Sary-Bulun Southern 1, Karakhanid time settlement (X-XII)	42°23'52.41"N 76° 5'58.60"E. At km8+000 - 8+100	Visually determined wall is located in 30m to the east of the road.	Measures will be given as per the results of the test pitting.	Carry out archaeological test pitting in order to determine the boundaries of the OHCH by archaeologist
3	Burial mounds and cemeteries of Ethnographic Period, covered with recent graveyards, settlement of Bronze Period	42°22'29.86"N 76° 5'18.53"E	50m to east of the road	Ensure the monitoring during the construction of the road. Existing road is located within the zone of regulated construction. Company and the Contractor should be aware about their locations on work map.	
4	Archaeological complex Orto-Tokoy 1, burial mound of Saks Period (VIII-III BC), burial mound	Coordinates of detected monuments are as follows: 1) 42°17'44.62"N	From 75 and further on both sides of the road	Ensure the monitoring during the construction of the road. Existing road is located within the	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH).

	of Khunn Period, (II BC - II), settlement of Bronze Period (3000-4000), petroglyph of Bronze Period	75°58'50.73"E. Bronze Age settlement, consisting of five stone sections of rounded outlines. The height of the folded stones is about 0.40 m. The dimensions of the sides of the large rectangular courtyard are about 17-18 meters. 2) 42°17'39.93"N 75°58'29.69"E. Bronze Age settlement, as rounded outline in the form of tash-koroo, height of the boulders is 0.20 m. diameter. The sides of the courtyard are also 18 meters. 3) 42°17'44.21"N 75°58'19.65"E. Bronze Age settlement, consisting of six sub-rectangular rooms. The height of the boulders is 0.40 m. The dimensions are approximately 40 by 30 meters. 4) 42°17'43.49"N 75°58'13.80"E. Bronze Age settlement, consisting of two rounded rooms. The height of the boulders is 0.30-0.40 m. The sides of the larger room are 17 meters. 5) 42°17'40.36"N 75°58'42.86"E. A small boulder with petroglyphs showing images of		zone of regulated construction. Location zone of the OHCH should be fenced and provided with informational signs. Company and the Contractor should be aware about their locations on work map.	The complex should also enter to the zone of a single historical and cultural landscape of Orto-Tokoy reservoir. OHCH are located on both sides of the road. The risk of finding random findings during construction is high. Conduct monitoring during the road construction.

		two mountain goats and two bulls, dating from the Bronze Age. 6) 42°17'46.03"N 75°58'38.73"E. The mound of the era of the great migration of peoples (Usun, Hunnish time, III BC) is square in shape with sides of about 4 meters. 7) 42°17'47.12"N 75°58'38.45"E. The mound dating from the era of the great migration of peoples (Usun, Hunnish time, III BC) is square in shape with sides of 4 meters. 8) Sakian barrows of round shape with dimensions from 3 to 7 meters in length in the form of a rocky-earth embankment. The mound height is from 0.40 to 1 meter. Barrows are located on the north side of the road (10 burial mounds) and on the south side of the road (5 burial mounds) -a total of only 15 mounds. Perhaps there are more. To determine more details, a more detailed study is needed. 42°17'41.44"N 75°58'45.96"E; 42°17'47.16"N 75°58'40.42"E; 42°17'47.25"N 75°58'41.00"E; 42°17'46.88"N			

		75°58'41.05"E; 42°17'48.53"N 75°58'37.60"E; 42°17'49.27"N 75°58'37.39"E; 42°17'40.58"N 75°58'22.71"E; 42°17'41.77"N 75°58'17.08"E; 42°17'42.53"N 75°58'16.83"E; 42°17'42.87"N 75°58'16.66"E. 42°17'31.60"N 75°58'46.95"E; 42°17'30.03"N 75°58'46.30"E; 42°17'32.52"N 75°58'38.58"E; 42°17'33.84"N 75°58'38.11"E; 42°17'32.59"N 75°58'33.06"E. 9) 42°17'34.29"N 75°58'27.92"E2 medieval graves of an oval shape, with a stone embankment up to 0.30 m in height. Dimensions 2 by 1 meter. At km 33+000 – 34+000			
5	Burial mound of Saks Period (VIII-III BC) Orto-Tokoy 2, consist of 7 mounds.	The coordinates of the mounds are as follows: 1. 42°17'30.71"N 75°57'27.57"E (30 m from the road); 2. 42°17'29.76"N 75°57'27.23"E (60 m from the road); 3. 42°17'28.05"N 75°57'25.82"E (120 m from the road); 4. 42°17'22.37"N 75°57'20.65"E (130 m from the road); 5. 42°17'27.76"N	30m to south of the road	Design of the drainage should be changed in accordance with the borders of the protection zone. Conduct monitoring during the road construction. Location zone of the OHCH should be fenced and provided with informational signs. Company and the Contractor should be aware about their locations on work	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH). Burial mound should also enter to the zone of a single historical and cultural landscape of Orto-Tokoy reservoir. **Burial mound #1 (30 meters to south of the road) damaged by laying the optic cable.** Existing road is

		75°57'25.72"E (330 m from the road); 6. 42°17'22.20"N 75°57'20.53"E (335 m from the road). At km 34+ 800 – 34+900		map.	located within the zone of regulated construction.
6	Burial mound of Saks Period (VIII-III BC) Orto-Tokoy 3, consists of 29 mounds. Near the mounds there is a boulder with petroglyph.	The coordinates of the mounds are as follows: 1. 42°17'41.58"N 75°56'36.64"E (58 m from the road); 2. 42°17'42.29"N 75°56'34.40"E (52 m from the road); 3. 42°17'41.99"N 75°56'34.40"E (61 m from the road); 4. 42°17'42.03"N 75°56'30.77"E (63 m from the road); 5. 42°17'40.66"N 75°56'32.83"E (110 m from the road); 6. 42°17'40.06"N 75°56'31.80"E (120 m from the road); 7. 42°17'39.61"N 75°56'32.08"E (130-140 m from the road); 8. 42°17'39.61"N 75°56'32.08"E (130-140 m from the road); 9. 42°17'39.61"N 75°56'32.08"E (130-140 m from the road); 10. 42°17'38.71"N 75°56'32.15"E (160 m from the road); 11. 42°17'38.23"N 75°56'32.03"E (180 m from the road);	45m to south of the road	Narrow the right-of-way from 32m to 22m within the shoulder. Mound #16 is located within 45 meters to south of the road, Mounds # 1,2,17,18 in 50 and 58 meters. Right-of-way is to be narrowed from 32-33 to 23 meters. Design of the drainage should be changed in accordance with the borders of the protection zone. Conduct monitoring during the road construction. Existing road is located within the zone of regulated construction. Location zone of the OHCH should be fenced and provided with informational signs. Company and the Contractor should be aware about their locations on work map.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH). From road side within 45m since the OHCH is located within 45m. Burial mound should also enter to the zone of a single historical and cultural landscape of Orto-Tokoy reservoir. On the northern side of the road (on a Google Earth) there is potential OHCH.

		12. 42°17'37.12"N 75°56'33.22"E (210 m from the road); 13. 42°17'36.65"N 75°56'33.50"E (230 m from the road); 14. 42°17'35.57"N 75°56'35.86"E (250 m from the road); 15. 42°17'35.17"N 75°56'35.79"E (260 m from the road); 16. 42°17'40.95"N 75°56'41.47"E (45 m from the road); 17. 42°17'40.79"N 75°56'41.57"E (50 m from the road); 18. 42°17'40.59"N 75°56'41.63"E (55 m from the road, partially damaged by a ditch); 19. 42°17'40.07"N 75°56'41.70"E (70 m from the road); 20. 42°17'39.82"N 75°56'41.80"E (77 m from the road); 21. 42°17'39.75"N 75°56'42.16"E (76 m from the road); 22. 42°17'39.63"N 75°56'42.36"E (77 m from the road); 23. 42°17'36.91"N 75°56'48.82"E (115 m from the road); 24. 42°17'37.05"N 75°56'53.54"E (75 m from the road, partially damaged by a ditch); 25. 42°17'35.99"N 75°56'53.45"E (112 m from the road); 26. 42°17'36.01"N			

		75°56'58.07"E (75 m from the road); 27. 42°17'29.81"N 75°56'49.48"E (320 m from the road); 28. 42°17'29.12"N 75°56'48.04"E (345 m from the road); 29. 42°17'26.64"N 75°56'43.10"E (450 m from the road). At km 35+500 - 36+400			
7	Burial mound of Saks Period (VIII-III BC) Orto-Tokoy 4, consists of 5 mounds.	The coordinates of the mounds are as follows: 1. 42°18'6.36"N 75°54'27.25"E (50 m from the road); 2. 42°18'5.48"N 75°54'26.22"E (80 m from the road); 3. 42°17'58.46"N 75°54'27.02"E (250 m from the road); 4. 42°17'58.09"N 75°54'26.94"E (255 m from the road); 5. 42°17'57.77"N 75°54'26.78"E (270 m from the road); 6. 42°17'59.85"N 75°54'33.90"E (120 m from the road). At km 39+100 - 39+450	50m to south of the road	Narrow the right-of-way from 32m to 22m at the location of Mound #1 (50m). Design of the drainage should be changed in accordance with the borders of the protection zone. Conduct monitoring during the road construction. Existing road is located within the zone of regulated construction. Location zone of the OHCH should be fenced and provided with informational signs. Company and the Contractor should be aware about their locations on work map.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH). Burial mound should also enter to the zone of a single historical and cultural landscape of Orto-Tokoy reservoir. On the northern side of the road (on a Google Earth) there is potential OHCH.

For all discovered OHCH in the area of the Orto-Tokoy reservoir, it is necessary to create a single zone of historical and cultural landscape. So in addition to the detected OHCH, located along the road at a distance of 50-100 meters, the map of the Google Earth program records other potential OHCH, which are located further.

Protection measures

Main protection measures of archaeological monuments are:

1) The designation of the boundaries of the protection zone along its perimeter, from the side adjacent to the right-of-way (according to the belt-and-pillar principle) install on strong posts the information/warning signs: "Monument of Archeology. The border of protection zone. It is protected by the law of the Kyrgyz Republic. Earthworks and entry of vehicles are prohibited!";

2) Constant archaeological monitoring in areas of "heightened sensitivity of cultural objects", where objects are located close to the right-of-way (less than 50 meters) and where there is a risk of finding random OHCH;

3) Conducting an additional survey when changing the road alignment, design of drainage and other objects.

In case of damage, dilapidation, theft or other circumstances that led to the inoperability or lack of information/warning signs, the Company/Contractor to restore them.

The duration of the preservation of the proposed measures for the protection of OHCH is designed for the construction period of the Project. If necessary, the nature of the protection measures can be adjusted. In the event that new OHCH are identified, the table will be updated.