Initial Environmental Examination

Project Number: 48401-007
June 2018

KGZ: CAREC Corridors 1 and 3 Connector Road Project (Section “Epkin [Km 89] to Bashkugandy [formerly Dyikan] [Km 159]”)

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 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

ABBREVIATIONS

A-2B		Achaeological Survey and Assessment Report and Proposed Planfor Section 2B
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	-	Left Hand Side
Ls	-	Lump Sum
M2	-	Square Meter
M3	-	Cubic Meter
Max.	-	Maximum
MESD	-	Ministry of Economic and Sustainable Department
Min.	-	Minimum
MOF	-	Ministry of Finance

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-2B		Noise Modelling and Assessment Report for Section 2B
NES	-	National Environmental Specialist
NGO	-	Non-Governmental Organization
No.	-	Number
NO2	-	Nitrogen Dioxide
OHCH	-	Objects of Historical and Cultural Heritage
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	-	Right Hand Side
ROW	-	Right-of-Way
RP	-	Resettlement Plan
SA	-	Social Assessment
SAEPF	-	State Agency on Environment Protection and Forestry
SER	-	State Environmental Review
SO2	-	Sulfur Dioxide
SPS	-	Safeguard Policy Statement
SSEMP	-	Site Specific Environmental Management Plan
TA	-	Technical Assistance
TS	-	Technical Survey
TMP	-	Traffic Management Plan
TOR	-	Terms of Reference
TPH	-	Petroleum Hydrocarbon
TSP	-	Total Suspended Particulates
UNFCC	-	United Nations Framework Convention on Climate Change
V-2B	-	Vibration Modelling and Assessment Report for Section 2B
WHSP	-	Worker's Health and Safety Plan

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A. Executive Summary

1. This report is the Initial Environmental Examination (IEE) report for Section 2B. As part of the project, the following studies and additional reports have been prepared:

- Noise Modelling and Assessment Report for Section 2B (Annex H);
- Vibration Modelling and Assessment Report Section 2B (Annex I); and
- Archaeological Survey and Assessment Report and Proposed Plan Section 2B (Annex J).

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 rehabilitation of CAREC Corridors 1 and 3 Connector Road. The main outcome of the PPTA is to prepare a feasibility study suitable for donors financing. The Section «Epkin (Km 89) to Bashkugandy (km 159)" will be financed by ADB. The proposed Project will improve the following socioeconomic indicators of the regions of the Kyrgyz Republic:

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

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

5. The purpose of this IEE is to finalize, as Detailed Design Stage, the IEE Report already presented at Feasibility Design Stage and to obtain the environmental license from SAEPF. This IEE re-assesses potential environmental, health, safety and social impacts of the proposed road project, and proposes mitigation measures, more deeply than previous IEE wherever possible. This IEE document includes an updated Environmental Management Plan (EMP) based on the additionally identified potential impacts, their characteristics, magnitude, distribution, and duration, sensitive receptors and affected groups with corresponding mitigation measures designed to minimize, reduce and mitigate (or compensate the affected parties), to be implemented for the entire project cycle.

6. This IEE study for Section "Epkin (Km 89) to Bashkugandy (km 159)" is being conducted based on review of previous IEE report, additionally covered by site reconnaissance, environmental monitoring (noise) and numerical analysis. The first public consultation as Feasibility Study Stage was done and was attended by residents of the communities mentioned as well as those from surrounding villages.

Policy, Legal, and Administrative Framework

7. 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. The environmental assessment in 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 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 State Environmental Review (SER). After which the project may be approved, rejected or send for re-examination.

8. 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.

Description of the Project

9. The project road Section Epkin (Km 89) to Bashkugandy (km 159) is a 70-km east to west highway. Generally, this Section follows the existing alignment up to Bashkugandy (km 159). The entire of this section is within Naryn Oblast and it traverses small western part of Kochkor District (Kochkor, as the capital); while the most part is in Jumgal District (Chaek as the capital).

   The details of the proposed road Section project are:

   (i) Rehabilitate and pave the project road to Technical Category II from Epkin (Km 89) to Bashkugandy (km 159) according to Kyrgyzstan National Standard with Geometrical and Structural Requirements with design speed of 95 km/hr design speed outside the settlement areas and 60 km/h within the villages.
   (ii) Rehabilitation, repair and/or replacement of bridges and culverts.
   (iii) Construction of side drains and other drainage structures.
   (iv) Provision of retaining walls and river protection measures, where necessary.
   (v) Provision of adequate road signing and marking. (vi) Provision of safety barriers.

10. 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:

   (i) Number of lanes: 2
   (ii) Lane width: 3.5–3.75 m
   (iii) Carriageway width: 7.00–7.50 m

(iv) Width of shoulder: 3.25–3.75 m (of which 0.50–0.75 m is paved)
(v) Total road width: 15.00 m

Description of the Environment

11. The road 70 km from Epkin (km 89) to Bashkugandy (km 159) runs over Kochkor valley through Kyzart mountain pass (2664m) to Jumgal depression. The Section proceeds westward to Bashkugandy village passing through a number of settlements interspersed by agricultural fields with a 2-line configuration of carriageway.

12. These western parts of Kochkor District are vast tracts of agricultural lands devoted to farming and animal stock-raising. The road climbs to around 2,600 m which seem to be the highest point at Kyzart Pass after which it descends to Jumgal District. The high portion appears to be the boundary between Kochkor and Jumgal Districts, and also the delineation of the watersheds for the Chui and Jumgal Rivers. This high point on the road seems to be the saddle point between mountain ranges the run parallel east to west of Naryn Oblast. The terrain is characterized as undulating and mountainous and covered with grasses suitable for grazing.

Environmental Impacts and Mitigation Measures

13. Most of the anticipated environmental impacts of the proposed road project are likely to be resulting directly from construction activities and certain impacts occur in operation stage as well.

14. The impacts during construction include (i) noise and vibration impacts, emission of pollutants to air and vibration, which is especially of high significance within the settlements alongside the project road and where sensitive receptors are located such as schools, hospitals mosques or other, e.g. households located near the road and others like quarries, bazaar (ii) impacts on water courses and rivers (iii) impacts on historical and archaeological sites (iv) impacts from aggregate sourcing at borrow sites; (v) impacts on soil and vegetation, inclusive tree plantations alongside the project road due to site clearance activities; (vi) impacts from bridge and drainage facilities rehabilitation; (vii) impacts from asphalt plant and aggregate crushers and (viii) impacts from contractor's working camps.

15. Impacts in operation stage are, due to increased traffic volume and vehicle speed resulting in elevated levels of gaseous and noise emissions, and potentially increased pedestrian vs. vehicle accidents or spills of harmful substances.

16. Impacts have been identified in to design phase and mitigation measures shall be taken in construction and operation phases respectively.

17. 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.

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

Analysis of Alternatives

19. Two alternatives were considered in this Initial Environmental Examination (IEE):

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

The “Zero option” alternative scenario will mean 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. The second Alternative is considering the road reconstruction in the section Epkin (Km 89) 0to Bashkugandy (km 159).

The conclusion of alternative analysis is that,

- if zero option is implemented, the benefit will be less traffic density and few road accidents.
- The negative side is increased noise and vibration, lack of proper road pavement, negative social aspect, and impossibility to develop the region’s economy.
- Thus, the benefit of implementing project is much larger than that without project.

Consultation, Participation, and Information Disclosure

20. In accordance with ADB’s Public Communications Policy (2011) and SPS (2009), the first Public Consultation meeting for this section on the environmental aspects was undertaken on 18 March 2016 in the village hall in Bashkugandy. During the said 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 with the assistance of PPTA consultants. At this instance, 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.

21. The IEE also was disclosed to a wider audience via the ADB website. During the projec 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

22. 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.

23. 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

24. 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 (EMoP), is also updated 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.
Supplementary Plans will also be drawn up by the Contractor for specific situations to ensure a focused action on any problem that might arise.

25. Operational framework of the EMP involves the national agencies (IPIG-MOTR & SAEPF), ADB Safeguard Specialists, Construction Supervision Consultant, Contractor, with the local governments and recognizing roles of NGO's and people's organization at the project site.

26. 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 12 annexes prior to commencing operations:

(i) Dust Suppression Plan
(ii) Construction Noise Management Suppression Plan
(iii) Vibration Management and Monitoring Plan
(iv) Blasting Management 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.

27. 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 breach.

28. Monitoring and reporting. During construction, monitoring shall be done by CSC. Based on this 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 to local authorities.

Conclusions and Recommendations

29. The IEE/EMP-EMoP, 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).

30. Adequate public consultations were done in introducing the project as well as presentation of environmental and community impacts and the stakeholder concerns were incorporated into the IEE. The IEE will be disclosed to the public and can be viewed on ADB websites after implementation of 2nd Public Consultation in this DD Stage.

31. Upon assessment of the impacts in this IEE process, 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.

32. Mitigation measures have been developed for consideration 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.

33. 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; the 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. Purpose and Context of the Report

34. 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:

(i) Balykchi (Km 0) to kilometer-post 43 (Km 43), approximately 43 kilometers (km);
(ii) Kochkor (Km 64) to Epkin (Km 89), approximately 25 km;
(iii) Epkin (Km 89) to Bashkugandy (km 159), approximately 70 km;
(iv) Bashkugandy (km 159) to Kyzyl-Zhyldyz (km 183), approximately 24km, where Bypass Road is being envisioned to avoid the village of Chaek and part of KyzylZyldyz; and
(v) Aral (Km 195) to Too-Ashuu (km 286), approximately 91 km.

The Section Epkin (Km 89) to Bashkugandy (km 159) will be financed by ADB.

35. 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 Investment Project Implementation Group (IPIG) within the Ministry Transport and Road (MoTR) 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.

36. 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 and managing impact mitigations, preparing environmental assessment reports, disclosing information and undertaking consultation establishing a grievance mechanism, and monitoring and reporting. The IEE document had included such articular 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.

37. This IEE document includes an Environmental Management Plan (EMP) that is the updated version of EMPs as had been presented previously, that covers, based on the identified potential impacts, their characteristics, magnitude, distribution, and duration, sensitive receptors and affected groups. The EMP is more quantitative, than the previous one, 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

38. This IEE Report is for the Section «Epkin (Km 89) to Bashkugandy (km 159)", which has a distance of around 70 km. This road section shall be rehabilitated into Category II road. This Report has been prepared basically based on the previous IEE Report which was approved by ADB on July 2016. 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.

39. The first Public Consultations meeting on the environmental aspects for Epkin (km 89) to Bashkugandy (km 159), in accordance with Kyrgyz legislation on public access to the information and ADB's Public Communications Policy (2011) and SPS (2009), was undertaken on 18 March2016 in Bashkugandy Village Administration Office. This was organized by the IPIG-MOTR through official communication to the local leaders inviting stakeholders in the surrounding villages.

3. Environmental protection legislation of Kyrgyz Republic

40. Environmental impact of the Epkin (km 89) to Bashkugandy (km 159) Road Rehabilitation Project is regulated by a number of environmental legislative acts of the Kyrgyz Republic. The Relevant elements of the environmental legislation of the Kyrgyz Republic are shown in Table 1 below.

Table 1: National Environmental Legislations

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 O Environmental Protectio	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, 6 № 8	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;
N	**Legislation**	**Number & Year of adoption**	**Purpose/content**
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		
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 loosing 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 «O transfer (transformation) of la d»	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 «O 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 Change	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 environmental issues.	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.

41. 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

42. 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.

43. 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.

44. 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 impact are assigned to one of the following four categories:

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.

45. Environmental Management Plan: An Environmental Management Plan (EMP) which addresses the potential impacts and risks identified by the environmental assessment shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks.

46. 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:

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

47. The Section Epkin (km 89) to Bashkugandy (km 159) 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.

48. 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 non-governmental organizations (NGOs) if possible. The consultation 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. Any compensation related grievance redress issues will be resolved according to the Program's Resettlement Framework. A single Grievance Redress Mechanism (GRM) shall be set up to tackle both environmental and social issues for the project.

5. Permitting Processes in the Kyrgyz Republic

49. 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.

50. 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.

51. 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.

52. Environmental assessment in Kyrgyzstan is founded on two subsystems: (i) OVOS (the Russian acronym for "Assessment of Environmental Impacts"), and (ii) Ecological Expertise (State Environmental Review, SER). 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 produces the EIA documents which will be subjected for further reviews.

53. 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 State Environmental Review (SER). After which the project will be approved, rejected or send for reexamination.

54. 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 are 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 expertise objects.

55. Public Consultation had been held for the IEE during Feasibility Stage.The outputs of the public consultation are incorporated in the Public Environmental Review (PER) which can be done both stage of the OVOS or also initiated in parallel to the SER. The SER duration

depends on the complexity of the project, but should not exceed 3 months after submission of all the OVOS documents for the SER by the Project Proponent.

6. Environmental Standards

56. The following environmental standards are applied to the Project. International standards were also presented here with for comparison with Kyrgyz standards; subsequently the more stringent standards shall be used as monitoring requirements.

Air quality

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

Table 2: Maximum Permissible Concentrations of Harmful Substances

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	-	1 year
	-	0.025	-	24 hours
$PM_{2.5}$ (Reference only and not monitored)	-	0.02	-	1 year
	-	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

58. 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

59. 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

60. 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 cm	Not less than 1,0 meters/depth
Oil Products	0,3 mg/L	not visible in the form of a film
Dissolved Oxygen (DO)	-	-
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 lif

C. Description of the Project

1. Need for the Project

61. Since Kyrgyzstan is a mountainous, landlocked country, regional commerce depends heavily on road transport, which dominates the Kyrgyz transport system and heavily dependent on road transport. Railway/On water transport network is very limited to region while air transport is not feasible for mass transport. As mentioned in Country Partnership Strategy with ADB,1 the road infrastructure has been routinely affected by climate-induced extreme events, including extreme temperatures, landslides, and mudslides. It is for this reason that further investment will be needed in the rehabilitation and maintenance of the road infrastructure.

62. The proposed project will help link the southern regions of Osh, Batken, and Jalal-Abad with the northern regions of Naryn, Issyk-Kul, Chui, 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 trade.

2. General information on Project Facility

63. This Section's starting point designated as Km 89, after Epkink village within Kochkor District. Generally, this Section follows the existing alignment up to Bashkugandy (km 159). The entire of this section is within Naryn Oblast and it traverses small western part of Kochkor District (Kochkor, as the capital); while the most part is in Jumgal District (Chaek as the capital).

64. These western parts of Kochkor Districts are vast tracts of agricultural lands devoted to farming and animal stock-raising. The road climbs to around 2,600 m which seem to be the highest point at Kyzart Pass after which it descends to Jumgal District. The high portion appears to be the boundary between Kochkor and Jumbal Districts, and also the delineation of the watersheds for the Chui and Jumgal Rivers. This high point on the road seems to be the saddle point between mountain ranges the run parallel east to west of Naryn Oblast. The terrain is characterized as undulating and mountainous and covered with grasses suitable for grazing.

65. 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
Naryn	Kochkor (Western Part)		Epkin	Km 89–Km 159
	Jumgal		Jumgal	
			Kuyruchuk	
			Tugol Sai	
			Bashkugandy	

Source: The Consultant.

66. The map of the project road is shown in Figure 1.

1 Country Partnership Strategy: Kyrgyz Republic, 2013–2017 ADB, 2014.

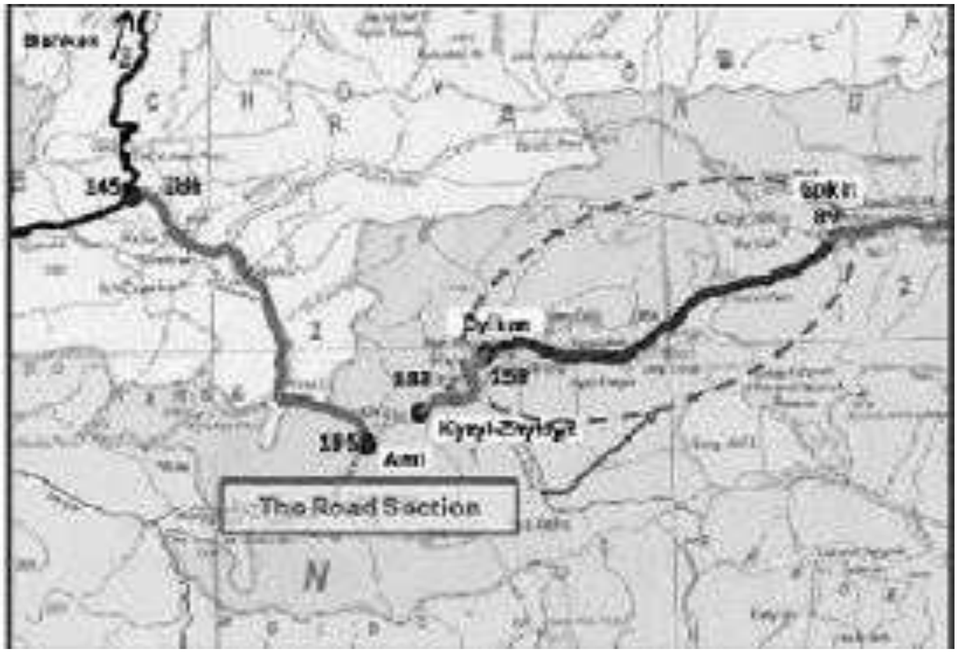

Figure 1: Location Map of the Road Section.

67. Engineering-geological conditions of subgrade construction on the North-South Alternative road on the section between Epkin and Bashkugandy are favorable. Baseline with a length of 70 km is laid mainly on the existing roadbed with gravel envelope, in some spaces with asphalt coat. Coating is asphalt, mainly with a thickness of 5–6 cm, rarely 9– 10 cm. Base of road pavement and is constructed from gravel, pebble and crushed-stone soils with sandy-loam, sandy fillers.

68. The road is in poor condition, the surface is bumpy with numerous patches, covered with frequent transverse and longitudinal cracks, often with crack network. The road goes along the Jumgal River and crosses Tugol-Sai river as well as other many feed and irrigation ditches and low places.

3. Type and Technical Road Category of the Project

69. The Section "Epkin (Km 89) to Bashkugandy (km 159)" will be upgraded to Technical Road Category II consisting of (i) pavement works – replacement and/or construction of new pavement structure; (ii) bridge construction/repair – mostly repairs of bridge decks; (iii) culverts and drainage works – replacement of old culverts and improvement of existing ones with installation of side ditches; (iv) road curvature improvements – for improved drivability and safety, curvatures and gradients will be improve, especially at existing narrow curves; (v) carriage way widening – in a number of spots the road width will be widened to allow for safe two-way traffic, and pedestrian access; (vi) slope cuts – due to necessary widening and safety;

(vii) slope stabilization – cuts will be stabilized by structural works; and (viii) installation of road furniture – necessary safety features and furniture shall be installed at strategic locations along the road. The envisioned service life of the pavement based traffic load forecast is set at 15 years, with the normal routine and periodic maintenance.

4. Details of the Project

4.1 Road Cross section

70. The road is to be designed according to Kyrgyzstan geometric design standard, and accordingly, it shall be sufficient to carry the traffic loading efficiently and with the vehicles from the opposite directions can pass safely. 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:

(i) Number of lanes: 2

(ii) Lane width: 3.5–3.75 m

(iii) Carriageway width: 7.00–7.50 m

(iv) Width of shoulder: 3.25–3.75 m (of which 0.50–0.75 m is paved)

(v) Total road width: 15.00 m

71. 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	282,800
Excavation to spoil of unsuitable and surplus material, common soil	m^3	576,400
Excavation to spoil of unsuitable and surplus material, rocky ground	m^3	84,500
Formation of embankment, common material from cut	m^3	300,200
Provision of Subgrade, selected material	m^3	128,800

Locations, type (cut or fill) and scale (length, width, depth/height) of earthwork are summarized in Annex A2.

72. Typical pictures of sections Technical Category Ⅱ Road (Types 1-6) are shown in Figure 2 while those of ‘Types 7-11) are indicated in Figure 3.

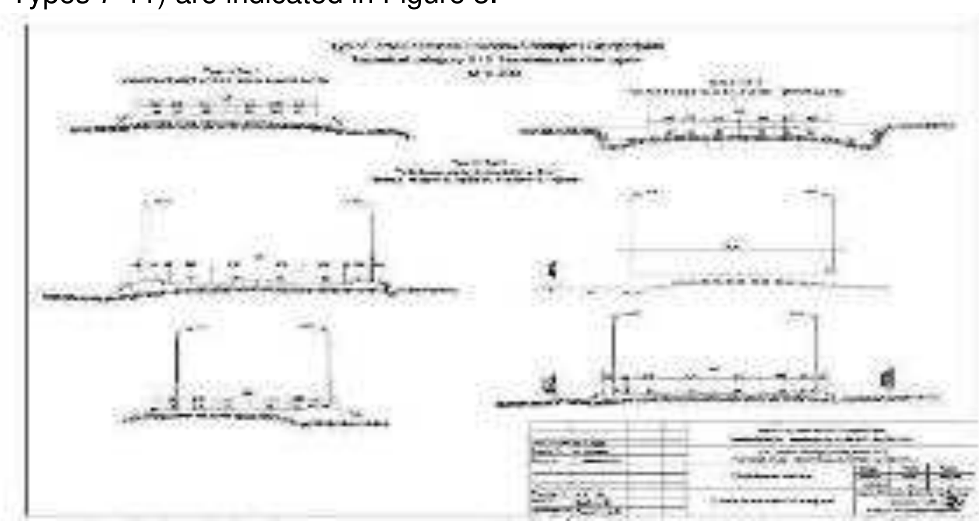

Figure 2: Technical Category II Road (Type 1-6).

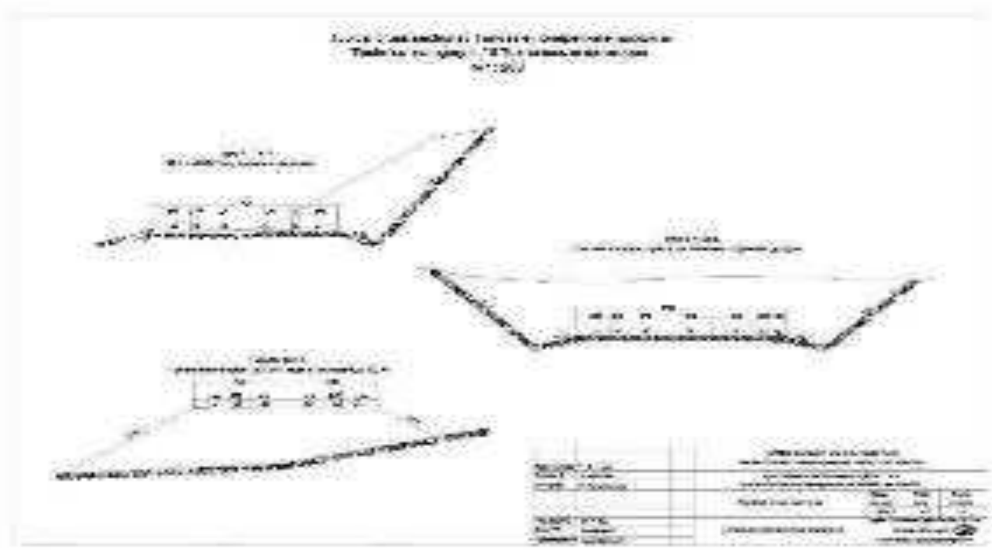

Figure 3: Technical Category II Road (Type 7-11).

4.2 Bridges and Culverts

73. There is one bridge along this section of the project road as shown in the Table 11 below.

Table 11: Bridge in the Section

No.	Bridge Location	Name of crossing watercourse	Span Scheme	Bridge length, m	Design bridge width, m	Proposed Rehabilitation Measure
1	148+874	Tugol-Say river	2x12,0	30,15	8+2x0.875	148+874

74. In addition, there are minor water crossings that may be repaired or reconstructed into box/pipe culverts. Estimate is 101 culverts in 2B Section and all of them are to be upgraded. Details of these culverts are summarized in Annex A3 Furthermore, there is a road crossing, underground water pipe is located at 149 km+955.

4.3 Powerlines

75. Very often, overhead powerlines are running along the road and sometimes crosses the road. Locations these powerlines are summarized in Annex A4.

5. Temporary Ancillary Facilities

5.1 Material Sources and Cut and Fill

76. Considerable volume of materials will be obtained from borrow areas and will be used for construction of road embankments and bridge approaches. Several potential borrow areas are quite apparent in the general vicinity. During the construction, Contractor has to conduct his own investigation for material presence and determine the potential borrow pit locations, which may be used for the construction. The materials need to be approved by the construction supervision engineer prior to using them for the project.

77. 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 territorial departments of SAEPF are obtained and proper operational and management measures be instituted to

minimize impacts to the general environment. On the other hand, if Contractor is planning the new borrow pit, he needs to obey all required procedures, stipulated by the regulations of the KR, specifically Contractor should get all required approval documents for the site allocation for borrow bits or spoils from the local authorities, confirm with the territorial Environment Protection and Forestry departments under the Government of the Kyrgyz Republic, work out the “Development and reclamation plan for the borrow pits” and submit all required documents to MOTR for getting the license for borrow pits development from the State Committee on Industry, Energetics and subsoil of the KR. Those actions are not required during the using the existing borrow pits. In case of using the private borrow pits, all approval documentation (licenses, confirmation with the local authorities, SAEPF under the Government of the KR, etc.) are the responsibility of the borrow pit owner, which needs to be indicated in the agreement between Contractor and Owner.

78. During the field investigations by the material specialist, suitable construction materials were located and inspected. However, near the road section, no suitable materials were found. During to construction period, the contractor should perform his own material survey and process the corresponding permits for the operation of material sources.

5.2 Construction materials

79. Table 12 provides a list of possible sites for borrow areas. Reuse of cut material is recommended.

Table 12: Possible Borrow Areas

No.	Kilo post	Description	Availability	Photo
1	94	Old borrow pit with sandy gravel material Potential material source to be verified	Yes	
2	108	There is a rock deposit with sandy gravel ground which can be use.	Yes	
3	111	There is an old borrow pit with sandy gravel material (RHS)	Yes	
4	112.8	Slope deposits	Yes	
5	111.9	Slope deposits	Yes	
6	122	There is an old borrow pit with sandy gravels, 125m away from the road	Yes	
7	141.3	Old quarry with loamy soil 150m away from road (RHS)	Yes	

Source: JOC

5.3 Asphalt and Cement Batching Plants

80. When selecting the site for installation of the asphalt plant, the choice of site for the installation of asphalt and stone crushing equipment, which are sources of emissions, noise and vibration, the Contractor should be guided by a number of environmental protection points, according to SanPiN 2.2.1 / 2.1.1 and 2.2 SanPiN. 1 / 2.1.1.006-03 and organize special buffer zones around such objects. In KR, such

a zone called the sanitary protection zone, which is an indispensable element of any object that is the source of the impact on the environment and health.

81. These objects should be placed at an appropriate distance from houses (at least 500m), as well as water (at least 50 m), to avoid contamination of water. Given the fact that the project road runs through the countryside, there is enough space for the construction of these plants. The Contractor shall obtain the necessary permits, conduct all the necessary negotiations with the land owners are properly used and to restore areas of the territory after the completion of the project.

5.4 Construction Camp

82. Selection of the necessary land for the construction of the camp is the prerogative of the Contractor, as well as negotiate directly with landowners and obtaining the necessary approvals for its facilities. For the organization of construction camps are free sites, and the Contractor may choose the appropriate area for their 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 unless treated in compliance to local effluent standards. Solid waste collection and disposal should be planned properly. Liquid waste discharge into water is prohibited. Area for parking and maintenance of construction machinery and equipment must also be equipped accordingly. Designated placement of Contractor's camps and placing the production base will determined by Contractor in the period of mobilization. It will be up to the Contractor and his responsibility to select the land parcels required.

6. Alternatives

83. Two alternatives were considered in this IEE:

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

The "Zero option" alternative scenario will mean that the road stays "as is", in which no rehabilitation works. 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.

The second Alternative is considering the road reconstruction for the Category II which will be on the existing road in the section Epkin (Km 89) to Bashkugandy (km 159), 70 km. According to the Kocks' Interim Report, Kocks will present the results of economic analysis in their final report quantitatively.

7. Traffic Volume

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

Table 13: Traffic Volume Counted and Predicted (2015)

Section	Name of the section	Vehicle Type	Car	Light Bus/ Van	Medim Bus	Large Bus	Light Truck Pick Up	Mediu Truck 2-axle	Heavy Truck 3-axle	Truck trailer	Truck Semi trailer	Total
2B	Dyikan 159km- KyzylZhyldyz 183km	Counting result	827	30	81	2	66	38	63	43	37	1187
		Day/Month Factor (Wednesday/August) = 0.814										
		AADT	673	24	66	2	54	31	51	35	30	966

Data Source: Kocks' Interim 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 2,434 cars. Comparing this value with Road Classifications for Kyrgyz Republic, it shows that Category II road will be sufficient to service the future traffic

8. Proposed Schedule for Implementation

86. 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 around middle of 2018.

D. Description of the Environment

1. Topography, Geology, and Soils

87. The road section «Epkin (Km 89) to Bashkugandy (km 159)", starts west of Epkin village which is part of the Kochkor District. This area is part of the Kochkor valley which is described as a cavity with a base altitude 1800¬2500 m, length of 80 km, and a width of 20 km. The general area can be considered as steppe environs with fragments of forests and meadows. Near the road, agriculture and animal herding are the main activities.

88. Around 20-25 km west of the section's starting point; the road ascends at its highest point at Kyzart Pass with an elevation of around 2600 meters. Its highest point, the Kyzart Ridge has a maximum height of 4400 meters (average height of 3800 m), length of 30 km, and maximum width of 16 km. At this point the basins divide into Kochkor River basin in the east and Jumgal River basin in the west. The general terrain at both sides of the road is mountainous and mainly grasses which mostly found in spring and summer. Shrub vegetation's (Barberry (Berberis spp), Wild Rose (Rosa spp), Buckthorn (Hippophae rhamnoides), Caragana spp and others) can be found along the creeks that drains into the main Kochkor and Jumgal rivers.

At around km 128, the road descends into the Jumgal valley - altitude valley bottom basin 15002600 m^2, length of 80 km within the bottom, within the maximum width of the bottom 25 km –and enters the Jumgal village and proceeds along the valley floor up to Bashkugandi (elevation 1850m). The roadside terrain is mainly grassland devoted to animal grazing. Local vegetation is sparse, however in some parts of the road are lined with trees (mainly poplars, elms and black locust).

2. Climate

89. Much of the Naryn regions are ridges. The climate is continental; winter is cold and long. The-lowest absolute temperature gets as low as - 45°C (below zero). The summers are short and cool. There are several climatic zones in the area: (i) at the height of 1400--1600m above sea level - desert, semi desert; (ii) 1600--1800m, 1800--2000m – steppe; (iii) 2500--4000m subalpine and alpine zone;(iv) above 4000m zone of eternal snows.

90. The average temperature in January is - 15°C. The absolute minimum temperature (- 50°C) was registered on the territory of Ak-Sai valley. In the area of the lake Chater-Kël, valleys: the Ak-Sai, Arpa, in the upper reaches of the Naryn, in the basins Son-kul have cold winters, warm summers short. During the day characterized by abrupt changes in temperature may be freezing even in the summer months. Average annual precipitation on the plains is 200-300 mm in the mountains a little more. The period of heavy rainfall in the second half of spring and the first half of summer, when the fall of 30 to 60% of annual precipitation. In the valleys of the amount of precipitation increases from west to east. The snow cover is in the valley of the up to 40 cm, in the mountainous area of up to 80 cm. In Kochkor valley because of strong winds snowfall are rare, and cover is unstable.

3. Hydrology, Water Resources, and Water Quality

91. Naryn region has more than 5,000 rivers and streams. Highland ridges of the perennial glaciers that give rise to many rivers that go far beyond the region. Glaciers are located at an altitude of 4000 m. The total area of glaciers is about 500 km2. Most glaciers are located on the ridges of Kakshaal. The largest is the Ak-Sai Ai-Tal Ortho-Tash. Also in the region, there are numerous alpine lakes and the biggest of them are Son-Kol and Chatyr -Kol.

92. Within the Naryn region flows the longest river of the country - the Naryn River, which supplies seven hydroelectric power plants. Naryn River is providing a huge flow of water that significantly affects the economic activity not only in Kyrgyzstan, but also Uzbekistan, Kazakhstan and Tajikistan. It flows within the ranges of 10-14 cu.km. The most important tributaries of the Naryn River: Small Naryn (407 m^3 / s), On - Archa (160 m^3 / s), Dzhergetal (65.4 m^3 / s), Kok -Gert (Kazhyrty) (64.5 m^3 / s). The Syr-Darya River within Naryn forms the second largest river in Central Asia - the Syr Darya.

93. The eastern watershed before the Kyzart pass forms the catchment that drains into Orto- Tokoi Reservoir via Kochkor River. The main rivers in this area are ZhanyAryk River that joins Koch-Kor River at Km 67. The Kochkor River is a river in Kochkor District of Naryn oblast. It is formed by confluence of Karakol and Seok rivers. The river is 45 kilometers (28mi) long, the basin area 2,590 square kilometers (1,000 sqmi), and the average annual discharge 12.6 cubic meters per second (440cuft/s). Chu River is formed by the confluence of Kochkor River and Zhany-Aryk River near village Kok-Jar.

4. Ecological Resources in Project Area

94. Naryn oblast is considered rich in flora and fauna. Some of the species that thrive are relict Tien Shan blue spruce, herbs: buckthorn, ephedra, zverovoy, yarrow, valerian, wild rose and manyo thers. In the area, there are reserves: Naryn and

Karatal-Zhapyryk reserves, hunting re-serves: Kochkor, At-Bashy, Ugut etc. The planned section of road is out of the lands of specially protected natural territories.

4.1 Flora

95. Territory of the Epkin - Bashkugandy section refers to arable irrigated land on the site of steppes and deserts. According to geo-botanical subdivision, the territory refers to inner Tien Shan province.

96. Range of vegetation types. Desert: thorn cushion plant, sod-grass steppes, tall grass meadow, cryophilic cushion plant, swamps, spruce forests, leafy summer green forests, deciduous shrubs and juniper stands. Great area is occupied by primitive plant aggregation with sparse vegetation. Type of belts - deserted - steppe with fragments of forests and meadows.

97. Dominant vegetation is: Sympegmaregeli, Silver willow (Salix acutifolia), Sea buckthorn (Hippophaerhamnoides), Geranium regelii, Geranium himalayense, Kalidiumcuspidatum, Reaumuriasoongorica, Acantholimonalatavicum, Artemisia tianschanica, Stipacaucasica, Festucasulcate,Phlomisoreophila, Carexstenocarpa. Out of medicinal plants, there grow Begger's rose, loose rose, Ural licorice.

4.2 Fauna

98. The territory of the project area is desert and semi-desert. By geographical zoning, the territory refers to inner Tien Shan and midland. Representative species of the given territory are:

a. Reptiles: desert lidless skink, lizard, arrow-snake, copperhead;
b. Birds: little owl, mongolian plover, short-toed lark, tawny pipit, common chats, black redstart, rocky nuthatch, desert mongolian finch, roodyshelduck (in reservoirs), bearded partridge, chukar partridge (in open habitats), turtle dove, black-bellied sandgrouse flies;
c. Animals: great horseshoe bat, sharp-eared owl-moth, tolai hare, sand eel, steppe polecat, stone marten, gray marmot, muskrat (in reservoirs);
d. Fish: Suusamyr scaly osman, Marina, trout, snakehead.

5. Endogenous and Exogenous Processes

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

100. **Mudflow hazard**. Mudflow of storm origin may take place in Bashkugandy and Zhany- Aryk rural districts by threatening homes, bridges, roads and channels. Mudflow may take place once in two or more years on the major part of the area's mountainous territory. Mudflows of storm origin may happen within April-September, most likely within May–July as shown in Table 14

Table 14: Forecast of Possible Activation of Mudflows and Floods

№	Rural district	River	Settlement	Facilities that might be affected
2	Bashkugandy	Mudflows, right bank, Bashkugandy River	Bashkugandy village	houses, homestead lands
27	Zhany-Aryk	Mudflows	-	Kok-Jar, Shybak canals

Source: MES KR website, 2015.

101. **Flooding.** Areas with high levels of groundwater are confined to lower terraces of Jumgal, river' valleys as shown in Table 15.

Table 15: Forecast of Possible Development of Flooding Processes

№	Rural district	Settlement	Flooding reasons	Recommended safety measures
45	Zhany-Aryk	Kyzart village	High ground water level	Construction of collector drainage network.
		Zhany-Aryk (northern part)	High ground water level, collector Drainage network silted.	Clean-up, rehabilitation and onstruction of collector drainage network
50	Kuiruchuk	Kuiruchuk village	High ground water level	Regulation of irrigation, follow-up survey
53	Tugol-Sai	Tugol-Sai village	High ground water level	Conduct of geo-engineering survey
66	Cholpon	Epkin village	High ground water level	Construction of collector drainage network

Source: MES KR website, 2015.

6. Socioeconomic Information

102. **Kyrgyz Republic** - a sparsely populated country. Its population is more than six million people (2015), of which nearly one-third lives in urban areas and two-thirds in rural areas.

Kyrgyzstan is a mountainous country with dominant agricultural sector. Cotton, tobacco, wool, and meat are the main agricultural products, although only tobacco and cotton are exported in considerable quantity. The industrial exports include gold, mercury, uranium, natural gas, and electricity. Kyrgyzstan's economy is heavily dependent on two major items: (i) on gold exports - mainly from output at the Kumtor gold mine; and (ii) on remittances from Kyrgyzstani migrant workers primarily in Russia.

According to preliminary estimates of the National Statistical Committee of the Kyrgyz Republic, economic growth amounted to 103.5% in the country by the end of 2015, the gross domestic product (hereinafter - GDP) was formed in the amount of 423.6 billion soms. The GDP deflator was at the level of 102.2%. Excluding enterprises developing the Kumtor real GDP growth amounted to 104.5%, a similar figure was 105.0% in 2014. Economic growth is provided by almost all economic sectors, except industry, which is estimated positive contribution in agriculture 0.9 percent, construction - 1.1 percentage points, the service sector - 1.7 percentage points. The negative contribution to GDP made manufacturing industry of 0.7 percentage points.

The Social Development Policy, as before, focused primarily on the full implementation of guaranteed social obligations of the state, to raise living standards and improve the situation of socially vulnerable categories of citizens.

The overall goal of the state strategy of development of the country is to increase the level and quality citizens life through sustainable economic growth, the creation of conditions for full employment, high and stable income, the availability of a wide range of social services, maintaining high standards of living in a supportive environment for health.

One of the main priorities of the development of society in the Kyrgyz Republic is education. In recent years, as a result of the measures taken for the conservation of

the infrastructure and the financial settlement of the activities of preschool institutions, their number increased from 691 in 2010 to 1062 - in 2014, and the number of children in pre-school institutions compared to 2010 increased 1.8 times in 2014. It amounted to 152.2 thousand. At the same time, despite the steady increase in the number of children under the age of 7 years, attending pre-school educational institutions, their share is still low, and now stands at 19.5 percent on average in the country. The number of day schools rose from 2,197 in 2010 to 2205 in 2014, and the number of secondary vocational schools for this period increased by 5.7 percent.

Held in the Republic health care reform in the framework of the program of state guarantees will reduce the financial burden for the population and improve accessibility to health services for vulnerable groups. In 2014 network of medical institutions was represented by 65 family medicine centers, as part of which 579 work groups of family doctors.The most important indicator of the state of the living standards of the population and the labor market is the salary. In 2014 the average monthly nominal wage increased in comparison with 8.3 per cent the previous year and amounted to 12 285 som. Size of real wages in 2014 compared to 2010 increased by 1.3 times, with an increase in the average nominal wage in this period is almost 1.7 times.

6.1 Regional Information

103. Naryn Oblast is situated in the southeast of Kyrgyzstan is bordered on the east by the Issyk-Kul, in the north - Chui, in the west - Jalal-Abad and Osh provinces in the south - with China. The region consists of 5 districts (Ak-Talaa, Al-Bashy, Jumgal, Kochkor and Naryn). Naryn City is the administrative center of the region and the largest city in the Inner Tien Shan. Its total land area is 45.2 thousand square kilometers, accounting for 1/4 of the territory of Kyrgyzstan, and with 249.1 thousand people, which is 5.2% of the country's population.

In the past years, the Regional Gross Domestic Product (RGDP) of Naryn oblast averages around 274.9 million or 6,709 Soms per capita. The composition of RGDP by sector is as follows: industrial sector 114.6 million Soms per year; retail sector 30.6 million Soms; services sector 38.6 million Soms; and construction and assembling works 91.1 million Soms.

The Oblast's main imports include industrial chemicals, metals and machinery, while the exports are comprised of livestock, livestock products including hides, minerals, textiles and textile products. The main livelihood in Naryn Oblast is engaging in animal husbandry or agriculture. Private farms cover less than 5% of the utilized land area of the Oblast, with significant overgrazing in many places as distant pastures are not accessible due to poor road networks. In 2015, in comparison with the year 2014 on the area:

- the volume of industrial production amounted to 100.8%
- Gross output of agriculture, forestry and fishery products totaled 104.4% - Average monthly wage per employee in 2015 amounted to 12,874 Soms (in 2014 was 11 013 Soms).

6.2 Local Information

104. The Section - «Epkin (Km 89) to Bashkugandy (km 159)" - of the project road passes mostly through the several villages of Jumgal Rayon. Basic social infrastructures are

available inthese villages, such as drinking water, and electricity. For heating purposes, local people use charcoal and firewood. All of the villages have schools, with kindergartens in large villages.

105. Village Medical Points are found in every village and in rayon centers there are hospitals. Transport infrastructure is the main road with an asphalt surface (cold asphalt) and dirt roads. The bulk of the population is engaged in agricultural activities and livestock. The main products are wheat, potatoes, barley, meat, milk, wool, eggs.

7. Cultural and Archaeological Resources

106. There are several objects of cultural and historical significance in the project area. One notable item though is the presence of burial sites and cemeteries along the road. It is important that the road design and consequently the construction will ensure that impacts will be avoided or minimized.

107. In March 2016 and April 2018, archaeological investigations were performed by a local archaeologist historical and cultural heritage sites and objects in the vicinity of the project within the territories of Ton district of Issyk-Kul, and Kochkor and Jumgal district of Naryn oblast in accordance with the Technical instructions and norms of the method of archaeological investigations1.

108. Based on the examination, following Objects of Historical and Cultural Heritage (OHCH) were confirmed:

1. At km 91+100 - 91+600 Burial mound Ak-Chiy (OHCH #1) of Saks Period (VIIIIII BC) within 220m to south of the road and Burial mound Ak-Chiy 2(OHCH #2)
2. At km 92+400 - 92+800 90-100 meters to north of the road and Burial mound Ak-Chiy 3 (OHCH complex #3) in 100m to south of the road;
3. At km 93+700 - 93+840 complex Ak-Chiy 4 (OHCH complex #4), consisting of remains of mausoleums, mounds of Saks time and Medevial period, located within 50m to the north of the road;
4. At km 97+300 - 97+500 burial mound Uzun-Bulak (OHCH complex #5). The complex is located on the north side of the road and consists of 10 fences of the Bronze Age. Fence # 10 is located in 19 meters north of the road. Also, near the fence, a fragment of ceramics was found in 20 meters to the north of the road;
5. At km 98+450 - 98+600 complex Uzun-Bulak 2 (OHCH complex #6), consisting of burial mound of Bronze Age, fences and tash-koroo, located at a distance of 90m to the north of the road;
6. At km 105+500 - 105+760 was identified the burial mound Kyrk-Kyz (OHCH complex #7). 20m north of the road
7. at km 105+850 - 105+950 was detected the next burial mound Kyrk-Kyz 2 (OHCH complex #8). 25m north of the road,
8. at km 106+000 - 106+130 was detected the burial mound Kyrk-Kyz 3 (OHCH complex #9). 20-50m north of the road
9. At km 136+000 - 136+900 was identified the complex Altyn-Aryk 1, 2 and 3 (OHCH complexes #10, 11 and 12), 4m north of the road in the nearest (Figure 4)

10. At km 138+700 - 138+800 complex Altyn-Aryk 4 (OHCH complex #13), consists of burial mound of Saks Time and tortkul (fortification) at a distance of 70m and more to north of the road;

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

11. At km 139+500 - 139+850 was identified the complex Altyn-Aryk 5 (OHCH complex #14), 7m north of the road
12. At km 140+100 - 141+050 was identified the burial mound Kuiruchuk 1 and 2 (OHCH # 15 and 16), 16m north of the road in the nearest,
13. At km 145+400 - 145+600, Kuiruchuk 3 (OHCH #17) and Kuyruchuk 4 and 5 (OHCH #18 and 19), 13m north of the road in the nearest.
14. At km 146+550 - 147+900 Burial mound Tugol-Say 1 (OHCH complex #20), Tugol-Say 2 (OHCH complex #21) and Tugol-Say 3 (OHCH complex #22) aksUsun period (VIII century BC - II centuries AD), located at a distance from 20m and more, but located on the hill of second terrace of Jumgal River (there is no direct impact due to the construction of the road, subject to restriction of road widening);
15. At the same section within the floodplain of Jumgal River there is a settlement Tugol-Say (OHCH #23) and two tortkuls (fortifications) (OHCH #24 and 25) at a distance of 500 meter to south of the road;
16. At km 151+600 - 151+750 burial mound Tugol-Say 4 (OHCH complex #26) at a distance of 320 meters to north of the road and Tugol-Say 5 (OHCH complex #27) at a distance of 260m to south of the road;
17. At km 152+950 - 153+000 found two mausoleums and cemetery of Ethnographic Period (XVII-XIX) (OHCH # 28), 12m south of the road.
18. At km 153+100 - 153+200 burial mound Tugol-Say 6 (OHCH #29) Saks time, located at a distance of more than 50m to south of the road;
19. At km 154+400 - 154+600 burial mound Tugol-Say 7 (OHCH # 30) Saks time, located at a distance of more than 50m to south of the road.

Figure 4: Objeck Historical and Culural Heritage - Aryk 1

109. Based on the results of the research, a report has been prepared, the Archaeological Assessment Report for Section 2B, which contains protection measures (presented as part of Annex J and was sent to the Ministry of Culture, Information and Tourism

of the Kyrgyz Republic (MoCIT KR) for opinion. This object of historical and cultural heritage is the object of study and protection of MoCIT KR. Therefore, all questions related to the establishment of protection zones, procedures, management plans should be coordinated with MoCIT KR and local government.

110. To prevent damage to the existing objects/ sites of cultural heritage a Protection Plan has been prepared, which is also included as part of Annex J. 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.

111. In accordance with the Law of the Kyrgyz Republic on historical cultural heritage (art. 32, 33) 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), and in MoCIT KR.

8. Sensitive Receptors

112. 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, but are not limited to, hospitals, schools, bazaars, mosques/churches, convalescent facilities and cultural, historical or archeological sites. Such facilities along the project road section as referred to the alignment sheet are:

(i) Jumgal village (km129+400) – near the school along the road, LHS;
(ii) accumulating reservoir of drinking water from the water catchment devices for ubsequent transportation to customers. Kuyruchuk (141 km + 800m
(iii) Kuyruchuk village (km144+000) – near the Azamat shop, RHS;
(iv) Tugol Say village (km151+000) – near the shop of Kutman, LHS
(v) Bashkugandy village (km 159+000) – near the school adjacent to the road, RHS
(vi) River Tugol-Say, bridge location (km 149+600); (vii)Pond for irrigation (km 140+600);
(vii) Irrigation channel (km 141+800);
(viii) Objects of Historical and Cultural Heritage (OHCH)
 1) At km 91+100 - 91+600, Burial mound Ak-Chiy (OHCH #1) and Burial mound Ak-Chiy 2(OHCH #2)
 2) At km 92+400 - 92+800, 90-100 meters to north of the road and Burial mound Ak-Chiy 3 (OHCH complex #3)
 3) At km 93+700 - 93+840, complex Ak-Chiy 4 (OHCH complex #4), 4) At km 97+300 - 97+500, burial mound Uzun-Bulak (OHCH complex #5).
 5) At km 98+450 - 98+600, complex Uzun-Bulak 2 (OHCH complex #6), consisting of burial mound of Bronze Age, fences and tash-koroo, located at a distance of 90m to the north of the road;
 6) At km 105+500 - 105+760 was identified the burial mound Kyrk-Kyz (OHCH complex #7).

7) At km 105+850 - 105+950 was detected the next burial mound KyrkKyz 2 (OHCH complex #8).

8) at km 106+000 - 106+130 was detected the burial mound Kyrk-Kyz 3 (OHCH complex #9).

9) At km 136+000 - 136+900 was identified the complex Altyn-Aryk 1, 2 and 3 (OHCH complexes #10, 11 and 12), 4m north of the road in the nearest,

10) At km 138+700 - 138+800 complex Altyn-Aryk 4 (OHCH complex #13),

11) At km 139+500 - 139+850 was identified the complex Altyn-Aryk 5 (OHCH complex #14),

12) At km 140+100 - 141+050 was identified the burial mound Kuiruchuk 1 and 2 (OHCH # 15 and 16),

13) At km 145+400 - 145+600, Kuiruchuk 3 (OHCH #17) and Kuyruchuk 4 and 5 (OHCH #18 and 19),

14) At km 146+550 - 147+900 Burial mound Tugol-Say 1 (OHCH complex #20), Tugol-Say 2 (OHCH complex #21) and Tugol-Say 3 (OHCH complex #22)

15) At the same section within the floodplain of Jumgal River there is a settlement Tugol-Say (OHCH #23) and two tortkuls (fortifications) (OHCH #24 and 25)

16) At km 151+600 - 151+750 burial mound Tugol-Say 4 (OHCH complex #26) and Tugol-Say 5 (OHCH complex #27)

17) At km 152+950 - 153+000 found two mausoleums and cemetery of Ethnographic Period (XVII-XIX) (OHCH # 28),

18) At km 153+100 - 153+200 burial mound Tugol-Say 6 (OHCH #29)

19) At km 154+400 - 154+600 burial mound Tugol-Say 7 (OHCH # 30)

(ix) Cemeteries:

20) 131 km Cemeteries on the both sides (RHS - 3 m, LHS – 3,5 m from the road).

21) 132 km Cemetery on the LHS located around road 20-30m from the road

22) 138 km Complex mausoleums - Clay mounds both sides. Located close to the road (3 - 3,5 m) on the RHS and approximately 100 meters to the LHS.

23) 141 km +300 Cemetery on the left side (LHS) of the road, 10-15 m from the road.

24) 152 +300 km Cemeteries on the both sides for Tugol-Say village. The distance between the boundaries of the two cemeteries, 25m; width of the existing road 13.4m. From the border of the cemetery (RHS) to the road 3 m; opposite side (LHS) 3-5 m.

25) 153 km -155 km Cemetery (RHS) on a hill 20-50 m away from the road.

26) 158 – 160 km Cemetery on the (LHS), around 6 m from the road.

113. 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 class hours and treatment period and traffic safety may be concern with hazards to children as they walk or commute to and from schools.

9. Baseline Measurements

114. Baseline measurements in water quality, air quality and noise/vibration were obtained in selected spots. Water quality measurements were obtained where construction will 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 Kyrgyz standards; subsequently the more stringent standards shall be used as monitoring requirements.

115. 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 in the previous IEE. In this version, noises were monitored by JOC additionally at several points close to the settlements.

9.1 Water Quality Measurements

116. During a meeting with ADB for baseline data in water quality, it was decided that measurements would be done for the most relevant parameters: Turbidity and Total Petroleum Hydrocarbons (TPH). Therefore, the contracted laboratory was instructed to obtain the measurement in bodies of water adjacent to or being crossed by the project road. Within the section Epkin (Km 89) to Bashkugandy (km 159), water body crossing the road is Tugol-Say River. The results of such water quality testing are shown in Table 16. Turbidity does not satisfy EC legislation while oil content is within Kyrgyz Standard. In subsequent phases, need to conduct water quality measurement in this point designated for monitoring purposes.

- River Tugol-Say, bridge location (km 148+874);
- Pond for irrigation (km 140+600);
- Irrigation channel (km 141+800);

Table 16: Water Quality Measurement Parameters the Section

N Locations	Km in	Turbidity cm	TPH, mg/l
Maximum Permissible Concentrations (MPC)			
			Oil mg/l
According to national requarements		**Not less than 0.2 m**	**0.3**
According to EC legislation		**Not less than 1,0 meters/depth**	**Not visible in the form of a film**
Tugol-Say river, Bridge(148+874)		36	<0.05

9.2 Air Quality Measurements

117. Measurement results will serve as reference values for monitoring during the construction phase. Air quality was measured at 4 points along the road, which were identified as areas sensitive to air pollution due to the proximity of schools, street markets and other special facilities

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

119. Most of roads are located along foothill and mountain areas with the perimeter surrounded by mountain ranges. The height of the terrain within 2,000 – 3,700 m above sea level. Within the territory dominated by wetlands are dotted with sparse vegetation.

120. The only source of dust, noise and vibration is road transport. 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, SO2, and NO2. 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 17.

Table 17: Air Quality Measurement Results

No.	Measurement Point Locations	Chainage, km	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 (WHO standards))			0.02	0.02	0.04
	Jumgal School	128	<0.26	<0.05	0.18±0.003
	Kuirchuk Shop	142-143	0.28±0.07	<0.05	<0.02
	Tugol Say	149-150	0.28±0.07	<0.05	0.017±0.003

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

As shown in above, dust does not meet IFC standard. SO_2 meets KG standard but it is not clear if it clear the IFC standard since the detectable limit of equipment used was 0.05 mg/m^3, which was higher than IFC stadard of 0.02mg/m^3.NO_2 was always within the aceepted limit in IFC.

9.2 Noise Measurements

121. In Section 2B, baseline noise levels at dwellings in the villages alongside the road are dominated by road traffic noise but progressively further away from the road traffic on local 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 18 and 19 below.

The results of the short term monitoring, when corrected from freefield to façade (+3dB) show good agreement with calculated road traffic noise levels, though the results of the 24 hour monitoring show calculated day and night time road traffic noise levels to be higher than measured levels.

Table 18: Results of Short term noise monitoring, Section 2B

Rec No	Distanceto road	Location	Date	$L_{Aeq,\ 1hr}$ (dB)	ModelOutput (dB)
27a	100	Jumgal	05/05/2018	54.1	n/a
			05/05/2018	57.8	
37	26	Kuiruchuk	05/05/2018	62.2	56.9
			05/05/2018	61.0	
47	33	Tugol Say	05/05/2018	54.4	56.9
			05/05/2018	53.0	
			05/05/2018	51.3	

Table 19. Results of 24hr monitoring noise monitoring. Section 2B Dwelling in Jumgal, eceptor ID No. 27, Distance to road, c. 13m

	Day 07:00-19:00	Eve 19:00-23:00	Night 23:00-07:00
Measured noise level (dB) (corr to fac.)	61.3	58.1	55.8
Calculated road traffic noise level (dB)	59.0	n/a	56.2

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

9.4 Vibration Measurements

122. The results of vibration measurement done in 2015 was not quoted since the results seemed to be unrealisticly high, such as 90 dB far beyound the acceptable standard of 40-50 dB in spite of small numbers of cars were running. In addition, it was not confirmed that measurement was done as per most strict standard as per ADB, without detailed information of equipment and manner of measurement. Anyway, no baseline measurement was required since the vibration caused by the traffic in the present or future will not be the issue

E. Environmental Impacts and Mitigation Measures

1. Impacts in the Project Phases

123. For the Section Epkin (Km 89) to Bashkugandy (km 159), 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.

124. The environmental impacts and mitigation measures presented in the IEE Report were based on the results of the conducted field surveys. The section Epkin (Km 89) to Bashkugandy (km 159), will entail upgrading of road along its existing alignment. Due to the fact that the project includes the rehabilitation of the existing road, and within the Project area of influence there are no protected areas, it is expected that the emergence of the environmental impact is mainly due to the construction stage. The most serious effect is the result of construction works during the construction phase. The most serious effect refers to the human environment, in particular, it is associated with noise exposure, pollutant emissions and vibrations within the intersected settlements, especially in those places where the project road passes close to sensitive receptors effects, such as schools, hospitals, mosques, market, historical and archaeological sites or others. It is anticipated that main impact categories will be due to the following activities: (i) construction works within or close to settlements result in noise, vibration impacts, emission of pollutants to air and vibration which is especially of concern when the Project road comes close to sensitive receptors, (ii) site clearance activities result in loss of top soil and vegetation structures, (iii) aggregate sourcing, crushing of aggregates and asphalt plant operation may have severe impacts in case of unsuitable site selection or management. Additional impacts refer to (iv impacts from bridge rehabilitation/construction, (v) potential impacts on surface waters and potential impacts on natural habitats and biodiversity. In this IEE, prediction of air pollution, noise and vibration was attempted for 2017,2020 and 2030 respectively

Sensitive noise receptors along the project road are:

(i) Jumgal village (km129+400) – near the school along the road, LHS;
(ii) Kuruchuk village (km144+000) – near the Azamat shop, RHS;
(iii) Tulgo Say village (km151+000) – near the shop of Kutman, LHS
(iv) Bashkugandy village (km 159+000) – near the school adjacent to the road, RHS (v) Complex of mausoleums (km 138) – RHS, LHS. (vi) Cemeteries and mausoleum.

On territories of villages, sensitive recipients are hospitals, schools, gardens and historical & archaeological structures adjacent to the road. The main impacts from reconstruction of the road are described below.

Air pollution

125. During construction concentration of toxic substances in air depends on a type of automobile engines (carburetor, diesel), on engine power, traffic density and possibility of distribution of these substances in air. Concentration of harmful products in the air decreases as the distance from the carriageway grows and it depends on wind speed and direction and on value of incoming solar radiation. As is same for the case of noise and vibration basically. Upon the start of reconstruction of the road, air might be polluted by exhaust emissions of construction equipment and dust. Both factors will be of short duration and will have minimal impact on people (excluding builders, who must wear protective masks)

126. Construction machines and machinery are sources of emission of pollutants during construction: exhaust gases (CO, NOx, SOx, etc.) coming from trucks, construction machinery; dust generated due to vehicular traffic, operation of equipment, upon excavation and welding.

127. During the construction, those equipment and machinery emit the following pollutants into air:

- Carbon Monoxide;
- Hydrocarbons;
- Nitrogen Dioxide;
- Soot;
- Sulfur Dioxide;
- Inorganic Dust L Benzopyrene

128. Dust will be generated due to vehicular traffic, operation of equipment, upon excavation and welding. To determine hazard category of the facility, it is necessary to estimate the hazard category in accordance with the KR Law "General technical regulations to ensure environmental safety in the Kyrgyz Republic".

While studying and considering similar construction work during reconstruction of roads, hazard category of the facility was determined as II, III.
The II hazard category requires calculation of pollutants' dispersion in ambient air to determine dispersion distance and maximum ground level concentration of harmful substances. For the category III, hazards defined by calculation of emissions mass are design values and used as maximum permissible emissions. Short-term impact is expected.

129. Air pollution along the road, 6m away from the road centerline was predicted during operations and construction respectively as in Table 20.

Table 20: Prediction of Air Pollution along Project Road

Year	Stage	Monitored or predicted	Hourly traffic no./hour, day time	Traveling speed km/h	NO_2 μg/m³	Dust μg/m³	SO_2 μg/m³
		IFC Standard			40	-	20
		National Environmental standard			85	500	500
2016	Before construction	Monitored	-	-	(20-30)	(280) <280	(<50)
		Predicted	157	60	30.0		50.2
2018	During construction	Predicted	173	60	125.9	<289	-
	After construction	Predicted	173	95	33.0	<280	50.2
2034	After construction	Predicted	426	95	41.7	<280	50.5

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

Prediction was made based on the monitored figures in 2016. NO_2 is considered to be out of acceptable limit of 40 μg/m³ by IFC during operation in 2034. During construction it is 125μ g/m³, far beyond acceptable upper limit of 40μg/m³. Detecting limit of SO_2 is 50μg/m³ and it is not know if this SO_2 clears the IC standard of 20μg/m³. However, the ambient air

concentration of SO_2 emitted from vehicle is calculated usually as less than 5µg/m^3 and, at least, there is no SO_2 pollution from vehicles in the future. Higher values are due to high background (coal burning) assumed.

130. Dust is generated by unpaved road mostly and the portion emitted from vehicles is negligible to this 280 µg/m^3. Therefore, dust concentration will be reduced even if vehicle number increase after paved in the future.

131. "Falling dust" generated by earth work and lorry passing along unpaved road at the location 6 away from car lane edge is 7 ton/km ^{2} and prevention measure is required.

132. 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.

133. Concentration of NO_2 during construction is an issue as stated earlier. NO_2 during construction was estimated vs distance from road, taking into account of equipment, trucks and public traffic, using safety side assumption, and plotted versus distance from the edge of car lane as Figure 5. As shown, upto 30m from the road, receptors may suffer higher concentration of NO_2 during construction.

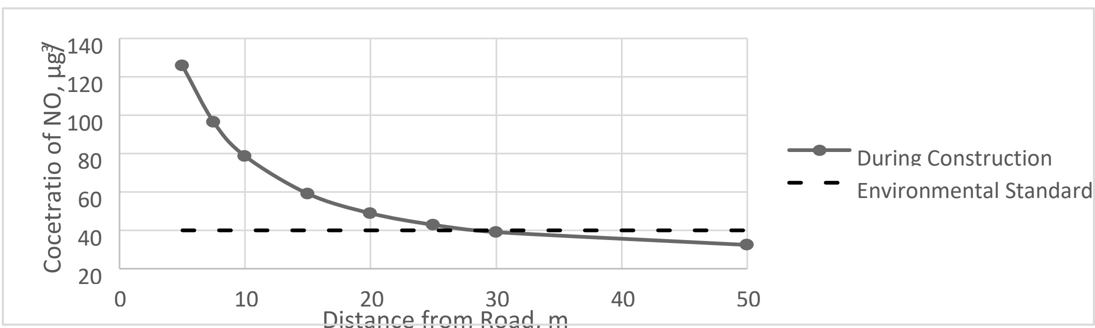

Figure 5: Simulation of NO2 concentration during Construction

The NO_2 pollution in 2034 is predicted depending on the vehicle speeds as Figure 6.

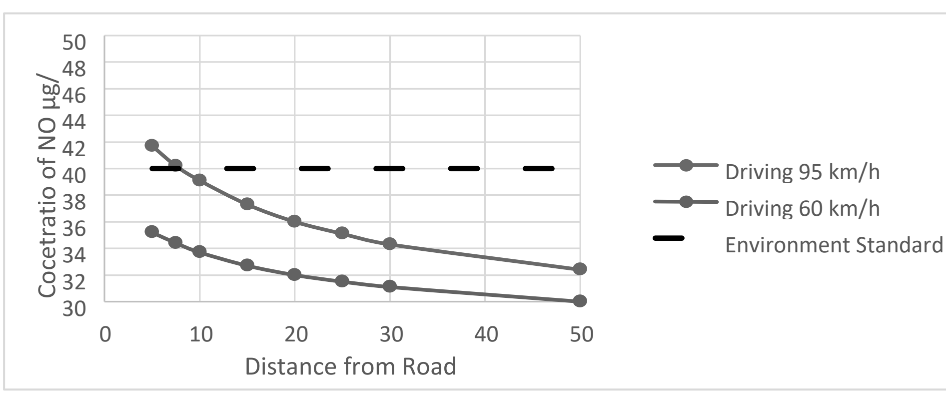

Figure 6: Simulation of NO_2 concentration after Operation 2034

As shown above, residents, closely located less than 7.5m from the road will suffer higher NO_2 pollution than standard when the vehicles drive at 95 km/h while it is acceptable range if they run 60 km/h. Driving speed shall be limited to less than 60km/h near the settlement.

Construction Noise

134. 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 H.

135. The results of construction noise calculations are presented in Table 21 overleaf. The first column gives the receptor number (abbr.'rec') followed by, in column 2, the village name or type of receptor e.g. shop or house (hse.). The location of the receptor number within the village is shown on the noise contour mapping in Appendix H of Noise Modelling and Assessment Report for Section 2B which should be referred to in conjunction with the Tables.

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Table 21: Results of Construction Noise Calculations

Rec No.	Location	Baseline Noise, 2018	Activity Construction Noise Levels and Noise Increase							
			Preparation		Asphalt Breaking		Sub-base and base		Asphalt Laying	
		$L_{Aeq,12hr}$ (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
23	Jumgal Hse	60.3	78.6	18.3	81.9	21.6	78.8	18.5	73.7	13.4
24	School	62.8	80.3	17.5	83.6	20.8	80.5	17.7	75.4	12.6
25	Admin	56.3	70.0	13.7	73.2	16.9	70.1	13.8	65.0	8.7
26	Shop	64.1	79.5	15.4	82.8	18.7	79.7	15.6	74.6	10.5
27	Jumgal Hse	59.0	74.8	15.8	78.1	19.1	74.9	15.9	69.8	10.8
28	Shop	66.9	86.0	19.1	89.3	22.4	86.1	19.2	81.0	14.1
29	Mosque	58.4	73.1	14.7	76.4	18.0	73.2	14.8	68.1	9.7
30	Jumgal Hse	60.5	74.6	14.1	77.9	17.4	74.7	14.2	69.6	9.1
31	Jumgal Hse	64.1	83.8	19.7	87.1	23.0	84.0	19.9	78.9	14.8
32	Shop	65.1	84.1	19.0	87.3	22.2	84.2	19.1	79.1	14.0
33	Jumgal Hse	60.7	74.3	13.6	77.5	16.8	74.4	13.7	69.3	8.6
34	Jumgal Hse	62.2	79.9	17.7	83.2	21.0	80.0	17.8	75.0	12.8
35	Jumgal Hse	59.1	76.9	17.8	80.2	21.1	77.0	17.9	72.0	12.9
36	Jumgal Hse	62.4	80.0	17.6	83.3	20.9	80.2	17.8	75.1	12.7
37	Kuiruchuk Hse	56.9	71.5	14.6	74.8	17.9	71.7	14.8	66.6	9.7
38	Kuiruchuk Hse	60.0	74.3	14.3	77.6	17.6	74.5	14.5	69.4	9.4
39	Kuiruchuk Hse	58.7	76.4	17.7	79.7	21.0	76.6	17.9	71.5	12.8
40	Shop/bus stop	65.7	86.1	20.4	89.4	23.7	86.2	20.5	81.2	15.5
41	Shop	57.4	73.3	15.9	76.6	19.2	73.4	16.0	68.4	11.0
42	Kuiruchuk Hse	58.0	75.6	17.6	78.9	20.9	75.8	17.8	70.7	12.7
43	Cafe (lay by)	62.3	82.6	20.3	85.8	23.5	82.7	20.4	77.6	15.3
44	Cafe (lay by)	57.7	75.1	17.4	78.4	20.7	75.3	17.6	70.2	12.5
45	Tugol Say Hse	63.3	82.4	19.1	85.7	22.4	82.5	19.2	77.5	14.2
46	Shop	60.8	77.0	16.2	80.3	19.5	77.2	16.4	72.1	11.3
47	Tugol Say Hse	54.2	71.5	17.3	74.8	20.6	71.7	17.5	66.6	12.4
48	Tugol Say Hse	57.4	74.4	17.0	77.7	20.3	74.5	17.1	69.4	12.0

49	Mosque	58.5	70.5	12.0	73.8	15.3	70.6	12.1	65.5	7.0
50	Tugol Say Hse	59.3	77.8	18.5	81.1	21.8	78.0	18.7	72.9	13.6
51	Tugol Say Hse	57.6	71.1	13.5	74.4	16.8	71.3	13.7	66.2	8.6
52	Shop	56.6	71.7	15.1	75.0	18.4	71.8	15.2	66.7	10.1
53	Tugol Say Hse	55.8	75.0	19.2	78.3	22.5	75.1	19.3	70.0	14.2

The first column gives the receptor number (abbr.'rec') followed by, in column 2, the village name or type of receptor e.g. shop or house (hse.). 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.

The construction noise tables then give in column 3 the daytime baseline noise levels LAeq,12hr(dB) taken from the road traffic noise calculations. This level is used to calculate the noise increase for the four construction activities presented in the Table.

Details of construction noise effects are set out below for each of the villages in Section 2B including Jumgal, Kuiruchuk and Tugol Say

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

Jumgal

Baseline Noise Levels

In the village of Jumgal existing ambient noise levels at houses alongside the road already exceed levels set out in the IFC Guidelines by up to 9 dB during the daytime.

Internal noise levels in the Mosque exceed the internal noise criterion for a place of worship by c.8dB with windows open, however internal noise levels within the other community facilities all fall within recommended internal noise criteria.

Construction Noise Effects

In Jumgal there will be major noise impacts when construction activities are close by to dwellings and noise levels will be sufficiently high that speech interference effects may occur at houses directly alongside the road.

At the Administration building, with windows closed, internal noise levels will still meet noise criterion for office working. However, at the school internal noise levels will exceed recommended levels for classrooms by up to c.18dB and if possible working outside the school should be limited to holiday periods. Similarly, the use of the Mosque may also be impaired during working on the road immediately adjacent, however it may be possible to mitigate this effect by arranging work breaks to coincide with prayer times.

The shops in Jumgal are close to the road and internal noise levels during construction may cause problems with speech interference when work is taking place directly outside. It may be possible to erect temporary hoardings immediately outside the buildings to provide noise mitigation during construction works.

Kuiruchk

Baseline Noise Levels

In Kuiruchuk existing ambient noise levels at houses alongside the road already exceed levels set out in the IFC Guidelines by up to 5dB during the daytime. Construction Noise Effects

Construction of the road will give rise to major noise impacts at dwellings in Kuiruchuk, however houses are further away from the road than those in Jumgal and internal noise levels will be correspondingly lower. Thus, the likelihood of interference with activities, such as speech interference effects, is much reduced.

Lay-by

At the location of the lay-by on the road between Kuiruchuk and Tugol Say the road would remain as a two lane road. Community facilities at the lay-by include two cafés to the north of the road.

Baseline Noise Levels

Existing internal noise levels in the first café (rec.44) are below internal noise criterion however in the second internal levels of c. 47dB marginally exceed the criterion.

Construction Noise Effects

Construction activities on the road adjacent to the cafes will give rise to speech interference when work is taking place directly outside the buildings, with internal levels exceeding the internal noise criterion by up to 15dB.

Tugol Say

Baseline Noise Levels

In Tugol Say existing ambient noise levels at houses alongside the road already exceed levels set out in the IFC Guidelines by up to 7dB during the daytime.

Noise levels in the Mosque which is c.30m from the road will also exceed the internal noise criterion for a place of worship.

Construction Noise Effects

Construction of the road will give rise to major noise impacts at houses in Tugol Say and may also cause speech interference effects when activities are directly adjacent to individual houses. The use of the Mosque may also be impaired during working on the road immediately adjacent, however it may be possible to mitigate this effect by arranging work breaks to coincide with prayer times.

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 impacts. 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.

50 L 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

Operational Noise

The results of operational noise calculations are presented in Table 22.

Table 22: Results of Operational Noise alculations

Rec. No.	Location	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	
		$L_{Aeq,12hr}$	$L_{Aeq,8hr}$	$L_{Aeq,12hr}$	$L_{Aeq,8hr}$	$L_{Aeq,12hr}$	$L_{Aeq,8hr}$	Δ dB	Δ dB	$L_{Aeq,12hr}$	$L_{Aeq,8hr}$	Δ dB	Δ dB	$L_{Aeq,12hr}$	$L_{Aeq,8hr}$	Δ dB	Δ dB
		2018	2018	2019	2019	2019	2019	2019	2019	2034	2034	2034	2034	2034	2034	2034	2034
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
1	Kokjar Admin	57.4	54.4	57.7	54.7	57.5	54.5	-0.2	-0.2	60.1	57.1	2.4	2.4	59.2	56.1	1.5	1.4
3	Kokjar Hse	55.8	52.8	56.0	53.0	55.6	52.6	-0.4	-0.4	58.2	55.2	2.2	2.2	57.3	54.3	1.3	1.3
4	Kokjar Hse	55.3	52.3	55.5	52.5	55.8	52.8	0.3	0.3	58.5	55.5	3.0	3.0	57.5	54.5	2.0	2.0
5	Kokjar Hse	59.7	56.7	59.9	56.9	59.8	56.8	-0.1	-0.1	62.5	59.4	2.6	2.5	61.5	58.5	1.6	1.6
6	Kokjar Hse	54.7	51.7	54.9	51.9	54.4	51.4	-0.5	-0.5	57.1	54.1	2.2	2.2	56.1	53.1	1.2	1.2
7	Chekildek Hse	58.1	55.1	58.3	55.3	58.3	55.3	0.0	0.0	60.9	57.9	2.6	2.6	59.9	56.9	1.6	1.6
8	Chekildek Hse	59.8	56.8	60.1	57.1	59.9	56.9	-0.2	-0.2	62.5	59.5	2.4	2.4	61.5	58.5	1.4	1.4
9	Chekildek Hse	58.6	55.6	58.8	55.8	58.7	55.7	-0.1	-0.1	61.3	58.3	2.5	2.5	60.3	57.3	1.5	1.5
10	Chekildek Hse	57.5	54.5	57.7	54.7	57.8	54.8	0.1	0.1	60.4	57.4	2.7	2.7	59.5	56.5	1.8	1.8
11	Chekildek Hse	62.2	59.2	62.4	59.4	62.3	59.3	-0.1	-0.1	64.9	61.9	2.5	2.5	63.9	60.9	1.5	1.5
12	Chekildek Hse	59.8	56.8	60.1	57.0	59.9	56.9	-0.2	-0.1	62.5	59.5	2.4	2.5	61.5	58.5	1.4	1.5
13	Chekildek Hse	59.2	56.2	59.4	56.4	59.4	56.4	0.0	0.0	62.1	59.1	2.7	2.7	61.1	58.1	1.7	1.7
14	Cholpon Shop	64.8	61.8	65.0	62.0	64.7	61.7	-0.3	-0.3	67.3	64.3	2.3	2.3	66.4	63.4	1.4	1.4
15	Cholpon Cafe	62.1	59.1	62.4	59.4	62.2	59.2	-0.2	-0.2	64.8	61.8	2.4	2.4	63.9	60.9	1.5	1.5
16	Ak Uchuk Hse	57.7	54.7	58.0	55.0	58.0	55.0	0.0	0.0	60.6	57.6	2.6	2.6	59.7	56.7	1.7	1.7
17	Ak Uchuk Hse	61.1	58.1	61.3	58.3	60.9	57.9	-0.4	-0.4	63.5	60.5	2.2	2.2	62.5	59.5	1.2	1.2
18	Ak Uchuk Hse	60.1	57.1	60.3	57.3	60.3	57.3	0.0	0.0	62.9	59.9	2.6	2.6	61.9	58.9	1.6	1.6
19	Ak Uchuk Hse	60.2	57.2	60.4	57.4	60.3	57.3	-0.1	-0.1	62.9	59.9	2.5	2.5	61.9	58.9	1.5	1.5
20	Ak Uchuk Hse	61.8	58.8	62.0	59.0	61.9	58.9	-0.1	-0.1	64.6	61.6	2.6	2.6	63.6	60.6	1.6	1.6
21	Mosque	58.1	55.1	58.3	55.3	58.3	55.3	0.0	0.0	60.9	57.9	2.6	2.6	60.0	57.0	1.7	1.7
22	Ak Uchuk Hse	58.5	55.5	58.7	55.7	58.7	55.7	0.0	0.0	61.3	58.3	2.6	2.6	60.3	57.3	1.6	1.6

The left hand side of the Tables 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 village name or type of receptor e.g. shop or house (hse.). The location of the receptor number within the village is shown on the noise contour mapping in Appendix I of Noise Assessment Report for Section 2B in 2018 (N-2B) 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 short term effects (Post Scheme 2019) and long term (Post Scheme 2034) noise effects, 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 level without traffic on the road i.e. noise generated during the daytime by traffic on local roads and daily activities at dwellings is 40dB. This figure is typical of daytime noise levels in a rural village with few local traffic movements and is below the lowest level measured in the initial baseline survey of this Section. Note: the grid shown on the maps is at 500m spacing.

Further mapping is provided in Appendix 1 of N-2B, Figures A5-A8 of N-2B, illustrating the zones, coloured in red, in which occupants of buildings may experience increased risk of sleep disturbance, resulting from operation of the scheme in 2034.

Figure A9 (N-2B) gives an example of the zone in which dwellings which were previously below the IFC guidelines during the day time period (55dB LAeq,T) would exceed this level in 2034. Figure A10 (N-2B) shows an example of the equivalent zone for the night time period. It can be seen that the zone during the daytime period is small and hence this is not discussed in detail, however the night time zone is larger and hence the number of affected dwellings within the zone are reported for each village, based on the identification of dwellings in aerial photography (Google Earth).

A detailed discussion of the results of the operational noise assessment is given below for each of the villages in Section 2A including Kokjar, Chekildek, Cholpon and Ak Uchuk. The level of day and night time baseline noise levels in each village are compared with IFC Guidelines, and for non-residential properties internal noise levels (with windows open) are compared with the relevant criterion for each building. This is followed by a discussion of operational noise impacts, including short and long-term effects, and potential options for mitigation.

Jumgal

Baseline Noise Levels

In Jumgal existing road traffic noise levels at houses alongside the road already exceed levels set out in the IFC Guidelines by up to 9dB during the daytime and 16dB during the night time. Internal noise levels in the Mosque and school already exceed the internal noise criterion for a place of worship by c.3dB and 8dB respectively, however internal noise levels within the administration building fall within recommended internal noise criteria.

Operational Noise Effects

Short term operational effects (2019)

The widening of the road from 2 to 4 lanes through the village will give rise to a change in noise levels at dwellings of between -0.6 dB to +0.0dB which is 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 noise increases of between 2.0-2.6 dB during both day and night time periods., which would be a negligible noise impact.

The extent of the daytime noise changes is illustrated in Appendix I, Figure A1 of Noise Modelling and Assessment Report for Section 2B in 2018 (N-2B).

Internal noise levels within the village Administration (rec.1) building would continue to meet the internal noise criterion for office areas, whilst those in the school and Mosque will continue to exceed the relevant criteria.

Kuiruchuk

Baseline Noise Levels

In Kuiruchuk existing road traffic noise levels at houses alongside the road already exceed levels set out in the IFC Guidelines by up to 5dB during the daytime and 12dB during the night time.

Operational Noise Effects

Short term operational effects (2019)

The widening of the road from 2 to 4 lanes through the village will give rise to a change in noise levels at dwellings of c. 0.1dB which is 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 noise increase of between 2.4-2.6 dB which would be a negligible noise impact. The extent of the daytime noise change is illustrated in Appendix I, Figures A3 and A4.

Lay by

At the location of the lay-by on the road between Kuiruchuk and Tugol Say the road would remain as a two lane road. Community facilities at the lay-by include two cafés to the north of the road

Baseline Noise Levels

Existing internal noise levels in the first café (rec.44) are below internal noise criterion however in the second internal levels of c. 47dB will marginally exceed the criterion.

Operational Noise Effects

Short term operational effects (2019)

The widening of the road from 2 to 4 lanes through the village will give rise to a change in noise levels of between - 0.3dB to -0.2 dB which is 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 of c.2.5 dB at the cafes and petrol station, and internal noise levels within both cafes would now exceed recommended internal noise levels, assuming windows open.

Tugol Say

Baseline Noise Levels

In Tugol Say existing road traffic noise levels at houses alongside the road already exceed levels set out in the IFC Guidelines by up to 8dB during the daytime and up to 15dB during the night time period. Internal noise levels in the Mosque (assuming windows open), which is c.30m from the road will also exceed internal noise criterion for a place of worship by c. 8dB.

Operational Noise Effects

Short term operational effects (2019)

The widening of the road from 2 to 4 lanes through the village will give rise to a change in noise levels of between - 0.2dB to +0.1dB which is 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 of between c.2.5-2.7 dB, i.e. a negligible noise impact, during both day and night time periods. The extent of the noise change during the daytime is illustrated in Appendix I, Figure A6.

Internal noise levels inside the Mosque, with windows open will continue to exceed internal noise design criteria for a place of worship.

Prediction of Construction Vibration

136. Table 23 is estimated for the damages to buildongs.

Table 23: Minimum Distance of Rollers to Sensitive Houses not to cause Damages

Unit: meter

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 24.

Table 24: Type of Damage Structures Suffer by High Vibration Rollers

	Kilo post	Side	Disstance from Road, m	Object	Damage predicted
1	127+030	RHS	18.02	Odobe house	Cosmetic damage
2	127+165	RHS	9.15	Odobe house	Minor structural damage
3	127+165	RHS	0	Kiosk	Minor structural damage
4	127+225	RHS	1.57	Kiosk	Minor structural damage
5	127+250	RHS	7.55	Odobe house	Minor structural damage
6	127+320	LHS	0.55	Odobe house	Minor cosmetic damage
7	127+335	LHS	9.16	Odobe house	Cosmetic damage
8	127+340	RHS	18.02	Odobe house	Cosmetic damage
9	127+365	RHS	7.08	Foundation	-
10	127+375	RHS	7.52	Brick house	Minor structural damage
11	127+385	RHS	13.05	Odobe house	Cosmetic damage
12	127+390	LHS	0.63-5.06	Framed Sarai	-
13	127+415	RHS	3.92	Sarai	Minor structural damage
14	127+425	RHS	2.37	Odobe house	Minor structural damage
15	127+435	RHS	2.83	Sarai	Minor structural damage
16	127+455	LHS	6.44	Warehouse	Minor structural damage
17	127+490	LHS	10.60	Odobe house	Minor structural damage
18	127+520	LHS	12.86	Odobe house	Minor structural damage
19	127+535	LHS	4.01	Odobe house	Minor structural damage
20	127+555	RHS	4.67	Odobe house	Minor structural damage

21	127+5565	LHS	14.46	Odobe house	Cosmetic damage
22	127+595	RHS	0.40	Odobe house	Minor structural damage
23	127+600	RHS	0.0	Odobe shop	Cosmetic damage
24	127+605	LHS	7.08	Container	-
25	127+635	RHS	17.27	Mosque	Cosmetic damage
26	127+645	LHS	5.1	Odobe House	Minor structural damage
27	127+665	LHS	3.88	Sarai	Minor structural damage
28	127+675	RHS	10.7	Odobe house	Minor structural damage
29	127+695	LHS	0.55	Brick house	Minor cosmetic damage
30	127+750	LHS	0	Foundation	-
31	127+755	RHS	1.58	Foundation	-
32	127+800	RHS	2.54	Odobe house	Minor structural damage
33	127+835	RHS	4.12	Odbe house	Minor structural damage
34	128+060	LHS	12.61	Odobe house	Minor structural damage
35	128+065	LHS	1.28	Odobe shop	Minor structural damage
36	128+110	RHS	3.63	Sarai	Minor structural damage
37	128+120	LHS	9.79	Odobe house	Minor structural damage
38	128+140	RHS	2.23	Sarai	Minor structural damage
39	128+145	RHS	10.35	Warehouse	Minor structural damage
40	128+170	LHS	16.52	Odobe house	Cosmetic damage
41	128+205	RHS	7.00	Odobe house	Minor structural damage
42	128+206	RHS	5.55	Sarai	Minor structural damage
43	128+210	LHS	4.67	Sarai	Minor structural damage
44	128+212	LHS	15.60	Odobe house	Cosmetic damage
45	128+225	LHS	12.75	Odobe house	Minor structural damage
46	128+240	LHS	7.24	Odobe house	Minor structural damage
47	128+285	LHS	6.07	Odobe sop	Minor structural damage
48	128+325	RHS	1.70	Odobe house	Minor structural damage
49	128+345	RHS	2.81	Odobe house	Minor structural damage
50	128+385	RHS	2.23	Odobe house	Minor structural damage
51	128+505	RHS	5.44	Brick house	Minor structural damage
52	128+540	RHS	6.55	Odobe house	Minor structural damage
53	128+575	RHS	6.07	Foundation	-
54	128+585	LHS	2.46	Sarai	Minor structural damage
55	128+590	RHS	5.98	Foundation	-
56	128+600	LHS	2.61	Odobe house	Minor structural damage
57	128+630	RHS	1.93	Warehouse	Minor structural damage
58	128+635	LHS	5.78	Odobe house	Minor structural damage
59	128+640	RHS	1.53	Warehouse	Minor structural damage
60	128+650	RHS	5.34	Odobe shop	Minor structural damage
61	128+660	LHS	0	Sarai	Minor structural damage
62	128+670	RHS	1.14	Sarai	Minor structural damage
63	128+675	LHS	7.04	Odobe house	Minor structural damage
64	128+685	RHS	5.41	Odobe house	Minor structural damage
65	128+695	LHS	5.18	Odobe house	Minor structural damage
66	128+700	RHS	8.85	Sarai	Minor structural damage
	Kilo post	Side	Disstance from Road, m	Object	Damage predicted
67	128+715	LHS	7.40	Odobe house	Minor structural damage
68	128+720	RHS	15.88	Brick house	Minor structural damage
69	128+725	RHS	17.2	Brick house	Cosmetic damage
70	128+745	LHS	11.68	Odobe house	Minor structural damage
71	128+755	LHS	11.75	Odobe house	Minor structural damage
72	128+950	RHS	2.09	Odobe house	Minor structural damage
73	128+980	RHS	2.98	Odobe house	Minor structural damage
74	129+404	RHS	3.81	Odobe house	Minor structural damage
75	129+080	RHS	5.73	Odobe house	Minor structural damage
76	141+055	LHS	2.52	Odobe house	Minor structural damage
77	141+060	LHS	5.40	Odobe house	Minor structural damage
78	141+240	LHS	18.94	Odobe house	Cosmetic damage
79	141+585	LHS	14.88	Odobe house	Cosmetic damage
80	141+775	LHS	19.62	Odobe house	Cosmetic damage
81	141+820	LHS	17.82	Odobe shop	Cosmetic damage
82	142+200	RHS	9.95	Odobe house	Minor structural damage

83	142+300	RHS	19.88	Odobe house	Cosmetic damage
84	142+400	RHS	18.82	Odobe house	Cosmetic damage
85	142+465	RHS	18.54	Odobe house	Cosmetic damage
86	142+005	RHS	15.45	Brick house	Cosmetic damage
87	143+000	RHS	7.67	Odobe shop	Minor structural damage
88	143+005	RHS	5.57	Odobe shop	Minor structural damage
89	143+010	RHS	5.79	Container	-
90	143+030	RHS	4.50	Odobe shop	Minor structural damage
91	143+035	LHS	2.0	Foundation	Minor structural damage
92	143+040	RHS	0	Bus stop	Minor structural damage
93	143+060	RHS	2.74	Odobe shop	Minor structural damage
94	143+075	LHS	2.0	Warehouse	Minor structural damage
95	143+095	RHS	4.4	Odobe house	Minor structural damage
96	143+510	RHS	20.12	Odobe house	Cosmetic damage
97	146+530	RHS	1.74	Odobe café	Minor structural damage
98	146+565	RHS	2.60	Odobe café	Minor structural damage
99	146+610	RHS	5.36	Odobe café	Minor structural damage
100	149+060	RHS	6.40	Odobe house	Minor structural damage
101	149+360	RHS	5.19	Kiosk	Minor structural damage
102	149+395	LHS	12.5	Odobe shop	Minor structural damage
103	149+420	LHS	8.72	Odobe house	Minor structural damage
104	149+720	LHS	14.66	Odobe house	Cosmetic damage
105	159+760	RHS	14.0	Mosque	Cosmetic damage
106	149+790	RHS	3	Container	-
107	149+800	RHS	5.91	Odobe shop	Minor structural damage
108	149+830	RHS	4.45	Odobe shop	Minor structural damage
109	149+855	RHS	0	Repair shop	Minor structural damage
110	149+970	LHS	21.8	Odobe house	Cosmetic damage

79 objects are to suffer minor structural damages while 22 objects face cosmetic damage by the use of high vibration rollers during construction.

Prediction of Operation Vibration

137. No vibration damage is predicted after operation by passing vehicles **Blasting**

138. Blasting is planned to remove relatively fresh rock mass from the hill along road. The total volume is estimated as 128,660m3 at the chainage km 113.This blasting work causes a serious noise, vibration and dust pollution around.

Surface Water Quality

139. During construction period, surface waters may be polluted due to discharging of production and domestic wastewater, flowing of chemical and mechanical pollutants from the road into water. Some pollution of surface water may result from spills of fuel and lubricants from equipment and containers to streams by washing. It may also be polluted during construction and reconstruction of bridges.
Out of common pollutants of water bodies, the biggest concern may cause penetration oil productions into water. First signs as individual colored spots appear already when upon spilling of 4 ml/m. Maximum permissible concentration for oil and oil products is 0.1 mg/l - 0.3 mg/l (according to Kyrgyz standards). To prevent contamination of surface and groundwater, it is necessary to provide mitigation measures, which will be described in the Environmental Management Plan (EMP).

140. During the construction period, water bodies will be affected upon repair, widening 1 bridge Tugol-Sai watercourse (149 км+600) and 113 culverts will be replaced. This impact will be expressed in possible contamination by soil, remaining parts of pipes, concrete headwalls, oil products, oils and by debris. During operation period surface water will not be polluted, except for extraordinary emergencies.

Contamination and Erosion of Embankment

141. During the construction period, asset of work processes associated with construction of roadbed usually causes the greatest damage to environment. Soil contamination is first observed on lands temporarily used as borrow pit, construction site as well as on the road being reconstructed. Soil might be also contaminated by installation and operation of asphalt concrete mixing plant. Soil is mainly contaminated due to precipitation of solid and fine silt fractions of particles to pavement from air. Such particles are brought by car wheels from roads and driveways with unimproved pavement, partial loss of transported loose goods, tire and pavement abrasion, as well as by toxic components of exhaust gases of cars.

142. Soil might be contaminated by oil product coming from construction equipment. It is assumed that this effect will be minimal and take place only within the roadside. Such impact might be reduced, if machinery is maintained in good condition by proper disposing of used oil.

143. Most of soil embankment shall be slightly eroded in the roadside due to road reconstruction, since major work is executed on the existing road with protective works in the drainage system. During the construction period, impact will be expressed in the form of loss of topsoil in areas adjacent to the road, garbage, spills of oil products and oils.

144. During the operation period, the soil will be contaminated by engines exhaust emissions containing lead compounds. When the engines of vehicles in the air with gaseous components enter the aerosol and fines, including the lead compound and carbon (soot) make up the bulk. The greatest danger to the environment is lead compounds formed during operation of the combustion engine. It is well known that the risk of accumulation of lead compounds in the soil due to the availability of its plants and the transition on the links in the food chain of animals, birds and humans. These compounds accumulate in the soil at a depth of arable layer or depth filtration rainfall

High Embankment Filling and High Slope Cutting

145. Large embankment filling, higher than 10m and wider than 40m, is schedule for short- cut road construction in mountainous area around km 110 as shown in Annex A2. As for slope cutting,15m high slope cutting is proposed for the enlargement existing road or to improve the linearity of road alignment in several locations. Possibility of landslide, collapse, circle slipping ofthese slopes are in concern.

Impact of Reconstruction of Culverts

146. Upgrading of existing culvert is one of the scope of the project. There are 101 small road crossing culverts as summarized in Annex A3. Their roles are quite important to ensure the local irrigation system for agricultural land and drainage system in the settlements area. Due to recent increase of demand from agricultural area, the importance of these drainage system has been increased. It is necessary to upgrading the capacities of these drainage system to meet the today's demand. However, to replace/upgrade these outdated culverts, many debris of concrete/metal wastes can be generated at demolishing them. Treatment of these debris is an environmental issue.

Impact to Existing Powerline/Pylons

147. Powerlines are running along and, sometimes crossing the road overhead as summarized in Annex A4. It was noted that some pylons are located in the road rehabilitated range inside the ROW, and have to be moved out. Even if outside of ROW, some pylons that are erected on the hill, where the foot of the hill is designed to be cut carelessly for road enlargement,

then the stability of remained slope are risked to collapse, together with pylons on the remained slope.

Groundwater Contamination

148. Groundwater is vulnerable to the oil pollution. Gasoline/diesel can percolate through soil into groundwater more easily than water if oil has been leak on the ground surface. Once groundwater has been polluted by gasoline for example, gasoline persists there almost very long time and, for the worse, the contaminated plume expands to the direction of groundwater flow. Simulation of expansion of the contamination plumes presented in Figure 9 as per ASTM E1735 Standard Guide for Risk-based Corrective Action at Petroleum Released Site.

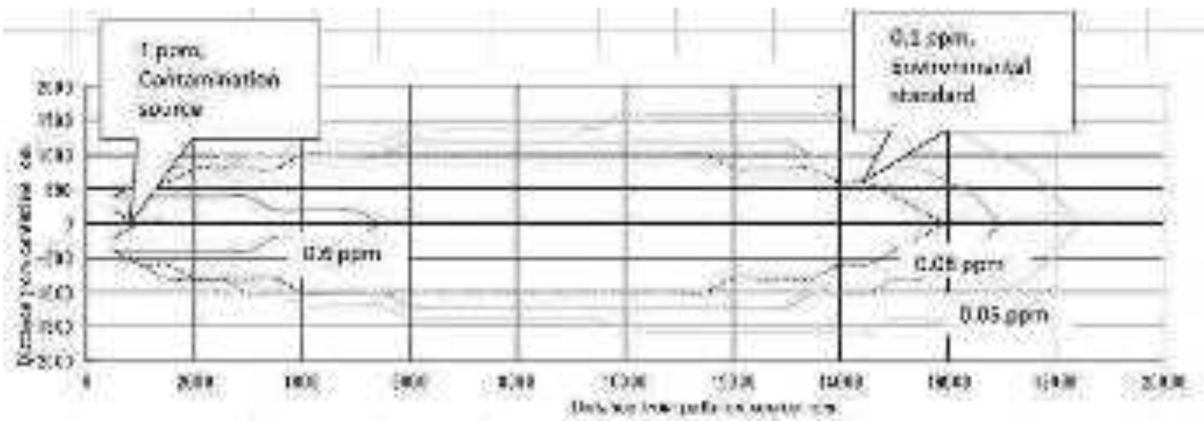

Figure 9: Simulation of Gasoline Contaminated Plumes in Groundwater

Above was simulated assuming groundwater has been contaminated as 1 ppm only spilled location and groundwater flows 0.5m/day after 1 year of contamination. As shown in the figure, although the groundwater at the source of contamination is 1 ppm only, contamination plume of groundwater, greater than 0.1 ppm of KR standard, expands as far as 150m from the source. In another word, hand pump well water cannot be use for drinking until 150m from the source at least. Again, it is emphasized that, although the contamination of groundwater as 1ppm (1cc gasoline per 1m3 water) seems nothing, the influence is disastrous. Any percolation of gasoline into ground shall be prevented first of all.

Flora and Fauna

149. During the construction period, reconstruction of road may cause insignificant impact on flora and fauna due to accident going of construction machinery beyond the construction site. There might be observed the following factors as well:

a. Factors that prevent natural migration of species to temporary and permanent habitats, exchange of gene pool, reproduction, etc. They are road construction elements - slopes, embankments, excavation, grade, fence and roadbed.

b. Anxiety factors that frighten animals and violate their habitat are noise, vibration, light from the traffic flow. As we know animal's reaction to disturbance factor may differ according to species. Collision with oncoming traffic can cause death of fauna representatives on roads. All these factors lead to decrease in number of populations.

150. Given that the r o a d had existed for a long time before reconstruction, established way of wildlife habitation in adjacent territory, we can assume little additional impact on flora and fauna, which will be caused by road reconstruction. Within the alignment, there are

considerable trees that will be affected. In the preliminary assessment, the estimated number of trees to be affected is 100. Impact on flora and fauna will be minor during operation period.

Social environment

151. During construction, although the most dangerous type of transport pollution is emission of exhaust gases into air and other types of energy loss: noise, vibration, electromagnetic radiation, they are mostly mitigatable. When mitigation activities are properly carried out, this negative impact will be reduced. Impact of construction process will last for relatively short time, though there may occur accidents due to the poor state of the road. In general, the effect on the social environment of the road reconstruction project will only be positive. During construction period, there will be created many jobs, particularly for local residents, who can participate in reconstruction of the road. Construction of the road shall radically improve movement conditions, travel time on the road and increase road safety. This, in turn, shall result in improvement of social situation of population in the project area. During operation period, despite existing negative impacts of the road on the human habitat, flora and fauna, the road has well-defined value in socioeconomic development of society and livelihoods of population. With improvement of transport - operating characteristics of the road due to its rehabilitation, the quality of services to public will be significantly improved. During operation period, the given impact will not take place.

Cultural and historical sites

152. During construction, the impact to cultural sites will be in the form of physical abuse and vibration exposure. Physical disturbance of these sites by construction workers. During construction, the impact to the following objects below. 1) Objects of Historical and Cultural Heritage (OHCH)

- ✓ At km 91+100 - 91+600, Burial mound Ak-Chiy (OHCH #1) and Burial mound AkChiy 2(OHCH #2)
- ✓ At km 92+400 - 92+800, 90-100 meters to north of the road and Burial mound AkChiy 3 (OHCH complex #3)
- ✓ At km 93+700 - 93+840, complex Ak-Chiy 4 (OHCH complex #4),
- ✓ At km 97+300 - 97+500, burial mound Uzun-Bulak (OHCH complex #5).
- ✓ At km 98+450 - 98+600, complex Uzun-Bulak 2 (OHCH complex #6), consisting of burial mound of Bronze Age, fences and tash-koroo, located at a distance of 90m to the north of the road;
- ✓ At km 105+500 - 105+760 was identified the burial mound Kyrk-Kyz (OHCH complex #7).
- ✓ At km 105+850 - 105+950 was detected the next burial mound Kyrk-Kyz 2 (OHCH complex #8).
- ✓ at km 106+000 - 106+130 was detected the burial mound Kyrk-Kyz 3 (OHCH complex #9).
- ✓ At km 136+000 - 136+900 was identified the complex Altyn-Aryk 1, 2 and 3 (OHCH complexes #10, 11 and 12), 4m north of the road in the nearest,
- ✓ At km 138+700 - 138+800 complex Altyn-Aryk 4 (OHCH complex #13),
- ✓ At km 139+500 - 139+850 was identified the complex Altyn-Aryk 5 (OHCH complex #14),
- ✓ At km 140+100 - 141+050 was identified the burial mound Kuiruchuk 1 and 2 (OHCH # 15 and 16),
- ✓ At km 145+400 - 145+600, Kuiruchuk 3 (OHCH #17) and Kuyruchuk 4 and 5 (OHCH #18 and 19),

- ✓ At km 146+550 - 147+900 Burial mound Tugol-Say 1 (OHCH complex #20), TugolSay 2 (OHCH complex #21) and Tugol-Say 3 (OHCH complex #22)
- ✓ At the same section within the floodplain of Jumgal River there is a settlement Tugol-Say (OHCH #23) and two tortkuls (fortifications) (OHCH #24 and 25)
- ✓ At km 151+600 - 151+750 burial mound Tugol-Say 4 (OHCH complex #26) and Tugol-Say 5 (OHCH complex #27)
- ✓ At km 152+950 - 153+000 found two mausoleums and cemetery of Ethnographic Period (XVII-XIX) (OHCH # 28),
- ✓ At km 153+100 - 153+200 burial mound Tugol-Say 6 (OHCH #29)
- ✓ At km 154+400 - 154+600 burial mound Tugol-Say 7 (OHCH # 30)

2) Cemeteries

- ✓ At km 131 Cemeteries on the both sides (RHS - 3 m, LHS – 3,5 m from the road).
- ✓ At km132 Cemetery on the LHS located around road 20-30m from the road
- ✓ At km138 Complex mausoleums - Clay mounds both sides. Located close to the road (3 - 3,5 m) on the RHS and approximately 100 meters to the LHS.
- ✓ At km 141 +300 Cemetery on the left side (LHS) of the road, 10-15 m from the road.
- ✓ At 152 +300 Cemeteries on the both sides for Tugol-Say village. The distance between the boundaries of the two cemeteries, 25m; width of the existing road 13.4m. From the border of the cemetery (RHS) to the road 3 m; opposite side (LHS) 3-5 m.
- ✓ At km 153 -155 Cemetery (RHS) on a hill 20-50 m away from the road. ✓ At km 158 – 160 Cemetery on the (LHS), around 6 m from the road.

Traffic Safety

153. During construction period, construction and road building machinery shall influence on traffic resulting in impeded movement, possible crowding of cars and machinery, violation of traffic rules and possible emergencies. In order to prevent such situations, we need to provide for mitigation measures to regulate traffic.

During operation period, the impact by traffic will be minimal due to arrangement of road signs and markings.

Construction camps

154. During construction period, construction camps will be established outside the territory of villages. Works schedule will be controlled in camp sites. There may be formed of solid domestic waste, bad housekeeping, soil contamination may take place, local flora and fauna might be impacted on the territory and thereby cause concern of local population. The Environmental Management Plan includes measures focused on mitigation of such impact. During operation period, this issue is not considered.

2. Mitigation measures

2.1 Construction Phase

155. 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.

156. Under the guidance of CSC, the contractor will have to submit site-specific Environmental Management Plans (SSEMP) for the following prior to commencing operations: (i) SSEMP in the sensitive sites such as main residential and commercial areas, cultural and historical sites

including cemeteries, riverbanks or other waterways; (ii) layout of the work camp with sewage management and waste management plan; (iii) sitting and description asphalt and crushing plants, equipment maintenance and storage facilities; (iv) spoil soil management plan; (v) borrow site management including restoration; and (vi) method statement for bridge reconstruction works. The SSEMPs shall be endorsed by the construction supervision consultant before submission to IPIG for approval. The SSEMP shall then be updated from time-to-time to incorporate any changes in the field conditions while construction will be in progress.

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

(i) Dust Suppression Plan
(ii) Construction Noise Management Suppression Plan
(iii) Vibration Management and Monitoring Plan
(iv) Blasting Management 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

Method Statement of **Construction** – 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,

The typical construction process will entail, first 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.

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.

The succeeding stages would entail 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.

The succeeding steps will involve 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, onto 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 if found to be suitable. 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.

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 formworks, 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.

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

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

160. For the Section Epkin (Km 89) to Bashkugandy (km 159), the primary relevant issues consist of air and noise emissions, proper management of earthworks, waste materials and contractor good-housekeeping practices associated with fuel and lubricant management, work camp waste disposal, and occupation health and safety practices for the contractor's workforce. The following is a discussion of highlights of the details provided in the EMP.

161. **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 stockpiles, dust from haul roads and construction activities, as well as aggregate crushers, but will be temporary and local. Good communication with locals is unavoidable.
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.

162. **Material Transport Route –** Estimates from the preliminary design for the section show that 943,700 cubic meters will be the cut volume and 429,000 cubic meters for fill volume for the road section. Truck traffic will considerably impact local roads as well as the communities they traverse. CSC in coordination with IPIG and local administrations determines the haul routes with sufficient maintenance to minimize dust, noise generation and disturbance to residents by restricting the hauling time between 07:00 and 18:00. During the field investigations by the material specialist, suitable construction materials were located and inspected. Table 9 represents the possible borrow areas for this road for Section 2B.

163. **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 of Noise Assessment Report for Section 2B in 2018 (see Annex H 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.

164. **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 2B is presented as part of Annex I.

Damges caused by vibration roller includes (1) minor structural damege 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 in Table 25. 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 25: 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: ○ use of rollers with minimum vibration ○ use of ditches to reduce vibration at the houses ○ 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: ○ Use of high vibration ○ use of ditches to reduce vibration at the houses ○ 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	▯ Areas with houses within a 16m corridor – use of rollers with no vibration ▯ Areas with houses between 16m and 36m corridor : ○ use of rollers with minimum vibration ○ no ditches ○ 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: ○ use of high vibration ○ no ditches ○ 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
exceed 2mm/s	

165. **Blasting** – Blasting causes serious environmental impacts such as noise, vibration, dust, etc. The contractor shall prepare the blasting work application as per KR regulation and, after approved the authorities, implement blasting work strictly in accordance with the application.

166. **Surface water** – Several types of waterways are found to be crossed by the project road. These are either man-made such as irrigation canals and flood control ditches, as well as naturally occurring rivers. These waterways will become receptors of potential negative environmental impacts such as pollution from construction area runoff, and change in surface hydrology due to increased sediment load. Total quantity of culverts will be 101, and 1 bridge on Tugol-Say watercourse. In order 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 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 (not less than 75 m).

Within the section, the spot are Tugol-Say River and streams crossing the road. The Contractor should be extra careful in this spot as construction activities can directly contaminate the surface water and consequently affect the biological species in this area. Contamination should be avoided and disturbance to biota be minimized. Water quality measurements should be done during actual periods of construction at these sites.

167. **Bridge-** During the construction of bridges construction site dimensions shall be the minimum necessary. Construction site should be placed at levels that exclude them flooding. The discharge of polluted water, landfills, parking cars and the construction of temporary facilities within the water protection zones on the river banks. Construction sites should provide capacity for the collection of sewage and garbage. Discussion with controllers and users of river is required before construction.

In the water protection zones (not less than 75 m) of rivers it prohibits contamination of the earth surface, including the garbage dump, waste generation, as well as parking, cleaning and repair of motor vehicles and road construction machinery, fueling. It is prohibited extraction of local building materials in the water protection zones without permits of environmental authorities. The project documentation should include the restoration work after the bridge construction: 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 of the 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

Culvert- The environmental impacts associated with this work can be minimized if culverts are rebuilt properly, i.e., properly sized and with the correct slope and downstream erosion/scour protection measures applied. If possible culvert work should take place during the dry season, since otherwise temporary bypasses will be necessary. However, a number of culverts convey irrigation water, which flows, based on a prescribed irrigation schedule. Contractors will need to liaise closely with farmers to establish times when work can take place and not harm crop development. Nearly all structures will be concrete box culverts, precast, with each section set in place and sealed with a special commercially available gasket/sealant material.

168. **Borrow Areas** – When planning to open a new borrow site, the contractor, within the purview of this IEE, should have the extraction permit, approval of a development plan, and later on approval of 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.

169. **Soil Management Plan -** Excavation or cuts of soil materials along will require temporary or permanent areas for deposition. This should be done with proper arrangement with the landowner 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. Soil Management Plan 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.

170. **Solid and Liquid Management Plan** - 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.

171. **High Embankment Filling and High Slope Cutting** – Construction of these shall be implemented completely as per SSEMP with such as, erosion/scouring prevention system (drains and gabions if necessary), top soil over slope surface, steps for maintenance, full layer compaction (in case of embankment).

172. **Powerline/Pylons** – They shall be relocated backward as per predetermined by SSEMP.

173. **Cultural & Historical Site Management Plan** shall be prepared. Recommendation of Archaeological Survey and Assessment Report and Proposed Plan for Section 2B (see Annex J) shall be followed.

No vibration roller shall be employed at least within 22m from Archaeologically important objects. During construction the contractor must apply in writing to the local authorities in defining the protection zones around these 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. Physical cordon around identified sites should be installed to minimize construction impact and alert workers/people from disturbing archaeological sites.

The cemeteries are located in 2-3 meters from the road right of way (Figures 9 and 10). According to the design of the road, widening of the road section will have no impact on these objects, on the issue of resettlement or land acquisition. The expansion of the road is planned within the existing right of way and will be held on the opposite site from cemetery.

Measures to mitigate the impact on the cultural monuments, necessary to;

- To follow all the recommendations in Annex J: Archaeological Survey and Assessment Report and Proposed Plan for Section 2B in 2018
- To follow all the recommendations in Annex I, Vibration Modelling and Assessment Report for Section 2B in 2018
- To inform the local authorities on the construction works around these sites.
- Local authorities carry out the control and monitoring of these areas, during the construction works.
- To assign an expert on traffic management, to prevent causing of physical damage by the machines and mechanisms to the cultural objects.
- To conduct outreach to workers on the strict prohibition of physical destruction, desecration and pollution data objects.
- To post warning signs and information signs for the workers.
- Dust suppression works.
- All road equipment must be used within the territory allotted for construction site.

The Contractor should strictly instruct its workers on disturbance of these sites. In accordance with the Law of the Kyrgyz Republic on historical cultural heritage, in the event of cultural monuments found, all construction works must be stopped 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) and MoCIT KR.

174. **Traffic Safety** for Workers and Local People, especially around the sensitive receptors - The Contractor shall install necessary safety measures specified in the design or in the Technical Specifications to ensure that community and traffic safety issues shall be responded to during the construction phase of the Project, including incorporation of: (i) Safety barriers; (ii) Traffic signs; (iii) Road crossings; (iv) Speed bumps; and (v) Speed limits. Social impacts along the vicinity of the road during construction, 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 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.

175. **Occupational Health and Safety**. For health and safety protection of workers and adjacent communities, the following shall be provided: (i) Adequate health care facilities (including first aid facilities) within construction sites; (ii) Training of all construction workers in basic sanitation and health care issues, general health and safety matters, and on the specific hazards of their work; (iii) Personal protection equipment for workers, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection in accordance with 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.

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.

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

176. **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. These detour roads need to be maintained for connectivity and safety purposes. Traffic plan incorporating these detour roads should be formulated by the contractor. During the design stage, the designers should also anticipate the need for detour and to include this issue as part of the work requirements. Adequate local assessment and consultation should be done to avoid this social issue during the actual construction.

177. **Asphalt, Concrete and Crushing Plant Pollution** - 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 /2.1.1.006-03, 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. 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 L Class IV – SPZ 100m.
  - ✓ Concrete solution plants.

178. **Camp and Workshop Management -** 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. Inspections by the CSC environmental specialist will take place monthly and any 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 clean up 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.

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. Basically, 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

179. The contractor shall hire a qualified health and safety expert who will provide safety training to the staff according to the requirements of the individual work place. Prior to the commencement of works, the work site personnel shall be instructed about safety rules for the handling and storage of hazardous substances (fuel, oil, lubricants, bitumen, paint etc.) and 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.

180. **Fauna and Flora** – Contrator shall follow:

- A maximum compaction of the soil on a tree stern, for more than 30cm, can damage the tree. Fill up material in the tree stem area has to be organic soil.
- 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 road.
- 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). Qualit
- Installation of a temporary vegetation protection fence during construction activities is required.

181. **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 have to maneuver over agricultural lands and in so doing introduce compaction to these areas and render the soil unfit for agriculture. The Contractor should prevent these unnecessary disturbances on agricultural lands.

182. **Existing infrastructures** - Construction activities in close vicinity to existing infrastructure such as water supply pipes and other facilities, waste water discharge facilities, electricity lines, etc. may give damages to them, or directly destroy existing pavement, bridge, power line system.

183. **Unmanaged Utilization of Waste Asphalt-ConcreteTemporary 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 of KR under the Government of KR. Old asphalt should be trucked away in blocks and stockpiles should be no higher than 2.5 m.

There are two ways of using old asphalt:

- The transfer of old asphalt to Local RMU of MoTR for upfilling of secondary roads;
- Use the old asphalt to strengthen the top coating of the road shoulders by adding the gravel-sand mixture with 15cm thickness.

2.2. Operations and Maintenance Phase

184. After the Handing-Over to the Client, 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.

185. 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:

a. Traffic safety to the communities – traffic safety signage, signals, speed regulators, grade separation crossings, etc. should be installed. Enforcement of safe traffic speed should be heightened to instill discipline on motorists. Biodiversity – areas which can be habitats of flora and fauna should be protected by the national and local government from public intrusion. Instructional signs should be installed and enforcement of regulations should be strengthened.

b. Water quality – spills from vehicles should not reach the bodies of water to avoid water contamination. Petroleum and chemical discharges from vehicles should be prevented by designating stops at safe distance from any existing waterways.

c. Air quality – the good air quality can be maintained by vehicles running in good condition to minimize emission levels. The authorities should discourage usage of outmoded vehicles with high emissions. Trees should be planted to act as carbon sinks to vehicular emissions.

d. Noise – since the traffic noise levels is estimated higher than acceptable international level (58 dB) for residents and sensitive receptors, driving speed of vehicles shall be limited to 40km/h in the maximum only when they are passing through settlements. The noise can be further minimized by proper maintenance of vehicles. In addition, sensitive receptors can be shielded from noise by planting buffer trees along the alignment. **Air Quality and Noise**

186. 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 2, 434 cars. Comparing this value with Road Classifications for Kyrgyz Republic, it shows that Category II road will be sufficient to service the future traffic.

187. After computations the maximum traffic can be around 5,114 vehicles per day time (12 hours), with this growth, 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 enginde technology and vastly more fuel efficient vehicles. Further, KR will receive better refined fuels with lower emission factors per liter used. The air quality in the project corridor was presented in Table 14 and estimate as normal. Future prediction also is presented in Figure 6. Conditions can be improved by enforcement of annual inspections, especially for the small and large buses and trucks, which contribute most of the emissions. Secondly the required use of catalytic converters and other pollution abatement devices needs to enacted into law and enforced. Having studied and considered various similar calculations to determine pollutant emissions by various traffic densities during the operation, we can conclude that the maximum ground-level concentrations of pollutants at a distance of 3 m to 5 m from the road shall not exceed the maximum permissible concentration if vehicles keep the speed limit of 60km/h near the settlement..

188. **Vibration** at Operation Stage is negligible and no mitigation measure is required.

189. **Soils and erosion contro**l- 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. On the engineering site inspection of the culverts will be critical since their placement at too steep an invert slope will result in serious and chronic downstream (exit) scouring. To avoid this invert slope should be at the same grade as the natural waterbody and a concrete pads or preferably energy dissipation installation such as large rocks and rock gabions, installed.

Slopes of high embankment or cut shall be inspected in rainy season if there are gulley erosion, sign of landslide, collapse or slipping regardless of the scale. If such sign is noted, immediate repair wok shall be implemented not to make the situation worse.

190. Further, 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 this work will be assigned 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.

191. Ecological Environment**-** The only ecological issue that could arise during the operating period is a failure to properly maintain the large tree plantations, and also the noise attenuation berms (if these are to be built) landscaping. The local ecosystem will be significantly 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 critical to reestablishing the pre-cutting conditions of roadside shade during the summer and windbreaks during the winter. The roadside forest, admittedly planted many decades ago, is the only mature tree assemblage within many km of the alignment. It is home to many thousands of creatures, mostly insects and birds and is an open forest-track ecosystem. It has a microclimate and huge benefits for people living under them or benefiting from their shade and shelter. Therefore, as stated many time in this IEE, cutting should be minimized to the greatest extent possible by using innovative designs that build the trees into the road structure.

192. 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 a l lo ws design speed of 95 km/hour in outside settlement (60 km/hour in settlement) 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 signs 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. Road safety features such as, streetlights, livestock crossings and other visual means to reduce accidents will be installed along the road.

3 Climate Change Impacts on the Project Road

193. Climate Change Study of the Project Road was included as a separate sector. This study focused on the following impacts to the project road:

a River floods and water logging in spring, due to more intense rainfall. This will mainly affect lower altitudes and areas susceptible to flooding;

b Heat stress in the summer, especially at lower altitudes;

c Mudslides related to more intense rainfall in the spring at medium altitudes (and in a lesser degree also high altitudes);

d 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).

194. The study made reference to the climate simulations done by the International Fund for Agricultural Development (IFAD) for Kyrgyzstan in which it indicated that the “Section «Epkin (Km 89) to Bashkugandy (km 159)” located at an area with low or very low vulnerability risk as compared with the north of Chuy Oblast and other high altitude areas. Moreover, as per IFAD the vulnerabilities identified are mainly related to increased heat stress at the project areas 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 rainstorms.

195. 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.

196. 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

197. Two alternatives were considered in this section:

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

1. Zero Option

198. 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.

199. 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 larger amount of exhaust gases than paved road. Dust formation is most likely to happen on places where there is gravel surface, which also affects atmosphere.

200. Noise and vibration. Noise is a major factor of concern people day and night, since lack of road coverage spreads the sound waves at great distances from the road and creates a high noise and vibration impact to the population, while vibration is predicted as within the acceptable range always according to the result of monitoring. The most sensitive recipients are residents of nearby houses to the road, schools, kindergartens, hospitals, private facilities and cultural sites.

201. Surface water. In places, where the road crosses channels and bridges, we can 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. This Section has a river Tugol-Say.

202. 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 attack of water flows by artificial structures, ditches and channels. Soil and water might be contaminated by spill oils, gasoline of vehicles.

High Embankment and High Cut Slope –No earth work is done with low safety factor of collapse/landslide. Linearity of road also be kept as present poor condition.

203. Rehabilitation of Culverts – Continued to be as present poor condition. However, no debris is generated.

204. Powerlines/Pylons - No powerline/pylons are affected.Groundwater – are exposed to risk of contamination by the spill-oil of broken cars by traffic accident which risk may be reduced after project.

205. Groundwater – are exposed to risk of contamination by the spill-oil of broken cars by traffic accident which risk may be reduced after project.

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

207. LARP and social issues. Economic relocation and resettlement is not applicable. Social aspect is expressed in affecting 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.

208. 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

209. If zero option is implemented, the benefit will be less traffic density and few road accidents. The negative side is increased noise and vibration, lack of proper road pavement, negative social aspect, and impossibility to develop the region's economy

210. 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 project

211. This Alternative is considering the reconstruction existing road of the section Epkin (Km89) to Bashkugandy (km 159).

212. The Road section from Epkin (km 89) to Bashkuugandy (km 159) will be reconstructed and the total distance will be 70 km. Main specifications of the projected road are given in Section C the Project description.

213. During the construction period, air quality will be affected by vehicles, operation of road equipment and machinery, excavation works in 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 and formation of dust. The impact will be exerted on the water bodies (irrigation channels, Tugol-Sai 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. The 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, as well as disturbance of topsoil by its misuse and stockpiling. The impact on the historical and cultural heritage will be expressed in the physical impact (possible disturbance of construction workers) to the cemeteries and burial grounds located in the vicinity of the road.

During the operation, the main impact will be on air, physical factors as noise will have an impact, especially in the settlements. More detailed analysis of the alternatives of the environmental and social impacts is given in Section E. Environmental Impacts and Mitigation Measures.

Given that the reconstruction of the road will be carried out on the existing road and the environment has already 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

214. 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

215. For Epkin (Km 89) to Bashkugandy) (km 159), in accordance with ADB's Public Communications Policy (2011) and SPS (2009), Public Consultation meeting on the environmental aspects was undertaken on 18 March 2016 in Bashkugandy Village Office (see Photo below). This was organized by the IPIG-MOTR through official communication to the local leaders inviting stakeholders in the surrounding villages. As recorded there were 18 residents from the villages (see attendance sheet in Annex B) through which the road section will traverse.

216. 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 with PPTA Consultants assistance. 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 8 is a photo of the public consultation.

Figure 8: Public Consultation in Bashkugandy (18 March 2016)

217. 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 Annex C. The verbal and written comments and questions that were raised were compiled and presented as follows and in Table 26:

218. Comments/Recommendations were made:

(i) Traffic Safety:
(ii) Possibility of bypassing the villages/schools (iii) Need to provide roundabout crossings (iv) Additional Infrastructure:
(v) Need for irrigation ditch crossing the roads
(vi) For Contractor transfer old removed structures/pipes to the village authority

(vii) Need for water supply pipes
(viii) Improvement of bridges
(ix) Underpass connection between markets
(x) Need for street lighting and sidewalks along the road (xi) Economic impact:
(xii) Need to connect market to road
(xiii) Environmental Concern: (xiv)
Protection of cemetery structures
(xv) Relocation and Compensation:
(xvi) To check property boundaries

Table 26: Summary Table on Public Consultation for Epkin–Bashkugandy

Data	Place	Participants	Questions	Answers	Note
March 18, 2016	Bashkugandy Village Administration	IPIG /MOTR Asylbek Abdygulov Safeguard specialist RuslanSatybaldiev Regional Project coordinator Kocks Consult Sam Sapuay International safeguard consultant Lola Shatirishvili, Resettlement specialist	Sidewalks along the project road	In the project design it is considered inclusion sidewalks in the residential area	-
			Construction standards in swampy areas	In accordance with national legislation on road construction	-
			Timing of Construction	3 year and 1 technical guarantee	-
			Usage of recovered pipe culverts	Transferred to Local RMU- 24 of MOTR	IEE

List of attendants is shown in Annex B

219. Generally, the comments were minor with the following recommendations – possibility of bypass route, provision of roundabout crossings, irrigation ditches, water supply pipes, improvement of bridges, underpass connection between markets, street lighting, protection of cemetery structures, and confirmation of property boundaries with road corridor. The questions on the other hand were on construction standards on swampy areas, provision of sidewalks, timing of construction, and usage of recovered pipe culverts.

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.

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 with the district heads to and invited people of affected villages for presentation and discussion with them environmental and social issues relevant to the rehabilitation of the road.

220. During the field works unofficial meetings were carried out by team of environmental specialists with the local population about the planned project and its possible impact on the environment. Public consultation on social issues were conducted earlier and the public were given information leaflets on Kyrgyz and Russian languages, also was presented presentation and carried out survey. During the public consultation on environmental issues was noted on a good awareness of the planned activity, but it was also noted that the local population is more interested in social issues, and only few questions were on environmental impact.

Reconstruction of the road is planned on the existing road alignment and related with its expansion. The existing road is anthropogenic ecosystem and has already impacted on the environment. As defined in the IEE the impacts have the same type of effects on the entire road. However, this section has the sensitive areas, such as historical and cultural sites (cemeteries and burial grounds).

221. The organization of public consultations conducted by IPIG, Ministry of Transport, together with environmental specialists of KOCKS. To the public consultation were invited stakeholders from 4 villages along the road. On the result of the meeting, it became clear that most of the attending people were representatives of various governments and municipal structures and they were directed by local authorities. Following the meeting, representatives of the IPIG, Ministry of Transport have talked with representatives of the local administration about the composition of the participants in the public consultations and after that explanations were received. Local authorities decided that this work is on preliminary stage (feasibility study). During the detailed design stage environmental and social impacts will be more specific and Design Consultant will invite residents and other stakeholders. In this stage, for getting information on environmental issues, representatives of the structures and the elders of villages have been sent, who subsequently may inform awareness among concerned residents.

222. 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 detailed design stage for a representative stakeholder interaction. Carried out one meeting does not reflect the full understanding and awareness of the local population. Public consultation should involve all interested parties, including residents of settlements, which may be affected, or in some way can be subjected to the effects of the proposed activity. The route of the road passes through the villages and the reconstruction of the road and increasing the intensity of the movement, which can affect both positively and negatively on the people living in this area. In this regard, and according to the legislation of the Kyrgyz Republic, public discussion should involve all stakeholders, to identify their opinion, to give advice and suggestions on the proposed activity.

223. 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 G. Also for more effective engagement with stakeholders, it is necessary to conduct public consultations in every village along the 70 km road.

The organization of public consultation is necessary to register participants, by indicating name, position, address and telephone number. Provide information for feedback to direct suggestions and comments.

Main representatives: Deputy of Village Council, Land specialist, Retiree, Head of Kuiruchuk v/a, Member of court of aldermen, Jumgal v/a, Court of Jumgal village, Architect of Jumgal region, Bash-Kuugandy v/a, Tugol-Sai v/a, Executive Secretary of Tugol-Sai v/a, Regional administration, Tugol-Sai residents. List of participants in Annex B.

2. Information Disclosure

224. ADB endorses the IEE it is made available as information to the public, both in English and in Russian languages.

225. The procedure for public hearings in Kyrgyz Republic includes the following steps:

a. Public notification on public discussions;
b. 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);
c. The general public familiarizes with the EIA documentation;
d. In case of public interest:
e. Public notice on the date and place of the meeting to discuss the EIA documentation;
f. Collection and analysis of comments and suggestions, summarizing the results of public discussion of the EIA documentation.

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. During the project implementation, periodic environmental monitoring reports shall be submitted by Implementing/Executing Agencies and correspondingly also be uploaded in the ADB website.

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

226. 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.

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

2. Grievance Redress Group (RG)

228. 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

229. 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.

230. 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.

231. 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

232. 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**

233. Local level GRG will be established at each Ayil-Okmotu along the project roads with the provision of members of following composition in Table 27:

Table 27: 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

234. The central level GRG will be represented by 5-7 members of the following composition in Table 28.

Table 28: 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

235. 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:

(i) Representatives of State Rayon Administration
(ii) Representatives of the Rayon Branch of the State Agency for Architecture and Construction

(iii) State Registration Services of the Rayon
(iv) Ministry of Agricultural
(v) State Agency for Environment and Forestry
(vi) Ministry of State Property
(vii) Ministry of Emergency
(viii) Technical expertise from professional engineers, and Consultants with relevant experience in environmental safeguards.

2.3 Duties of GRG Members

Local Point of Contac

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

(i) screen the complaint for eligibility and, if found eligible register it the Complaints Log;
(ii) 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;
(iii) send the complaint memo to all members of GRG, agree the date of GRG meeting;
(iv) request the rural administration authorities to organize the meeting;
(v) facilitate the GRG meeting by providing a storyline for the complaint and provide factual details and relevant documents obtained;
(vi) communicate request and queries of the complaints to the members of GRG (on central level to GRG/IPIG/ADB);
(vii) maintain the records of the meetings and communications between GRG and complainants
(viii) ensure administrative and organizational support to GRG members;
(ix) 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**

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

(i) review the complaint(s) and supporting materials if any ahead of the GRG meeting;
(ii) manage to obtain any additional information prior to GRG meeting date;
(iii) involve relevant task expert if such need is obvious after review of the complaint(s);
(iv) ensure members attendance and chair GRG meeting;
(v) 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;
(vi) 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;
(vii) convey requests and enquiries of the complainants to GRG members on Central Level if not resolved on Local Level.

RMU Representative

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

(i) Review all relevant recording of complaints and submitted documents of proof;
(ii) Participate to all grievance meetings, provide opinions and analysis, take minutes of the discussions (Secretary of the Meeting);
(iii) Accompany eventual assessment/valuation specialists in the field;
(iv) Ensure that claims from damages due to construction works are reviewed by the RMU and technical experts and assess the damages /losses incurred;
(v) 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:
   a. solved without further action; or
   b. solvable but requires compensation or other action; or
   c. not resolved and requires pending actions, such as forwarding the complaint for review on the Higher-Central Level, to the Court,
   d. or to investigation to prosecutor's office.
(vi) 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
(vii) 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;
(viii) In parallel inform IPIG/MOTR and proceed with the organization of the central level appeal meeting.

Representatives of the APs

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

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

Invited Consultant /Field expert

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

(i) Review all relevant recording of complaints and submitted documents of proof;
(ii) 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;
(iii) 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

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

(i) contact the complainant(s) and draft a note with his/her understanding of the complaint;
(ii) participate to the appeal meeting, provide opinions and analysis, take minutes of the discussions;

(iii) if needed summon again assessment/valuation specialists and accompany them in the field;
(iv) request the chairperson to organize meetings, as necessary;
(v) maintain communication between GRG and the complainants; and
(vi) Complaint Register is kept with IPIG and a copy shared with the Consultant.

Representatives of IPIG Safeguards Unit

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

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

Ombudsman

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

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

GRG Chairperson/Head of IPIG of MOTR

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

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

IPIG Project Coordinator

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

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

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

Rpresentatives of IPIG Safeguards Unit

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

(i) prepare the chronology of events to understand sequence of developments prompting the complaint;
(ii) provide environmental and resettlement opinion on impacts claimed by the c laimant;
(iii) examine large claims over USD$10,000 with financial expert at Ministry and involve a qualified evaluator;
(iv) request the chairperson to organize meetings, as necessary; and (v) maintain communication between GRG and the complainants.

Technical Experts

247. 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:

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

2.4 Grievance Resolution Process

248. 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 29.

Table 29: Grievance Resolution Process Steps

Step	Action level	Process	Timelin
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 RG 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	Resolutio n 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

249. 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.

250. 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 (AM5) or to the judicial or administrative remedies the Kyrgyz Republic.

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

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

1. EMP

252. The EMP in IEE of Feasibility Design Stage also was upgraded in this IEE. 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.

253. 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.

254. The EMP consists of two tables. Table 19 summarizes the environmental mitigation measures, and Table 20 provides an overview of the environmental monitoring.

Table 30: 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) Construction Noise Management Suppression Plan (iii) Vibration Management and Monitoring Plan (iv) Blasting Management 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	GRM to be mandatory implemented in this project, where affected people can be fully informed about the rights and procedures of grievance redress mechanism, during consultation, survey, date of compensation and project implementation 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,	Clarifying what are the possible risk/environmental	Descript construction details such as sequences, material used, size, duration etc.	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					
	culverts, road etc.	impacts to be caused			
Air Pollution	Operation of construction machinery	Air pollution due to exhausted gases emission from the operation of construction machinery	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 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.	Contractor	CSC
		Dust rising by earth work and lorry running over unpaved road in sensitive area Sensitive recepters as; (i)Jumgal village (km129+400) – near the school along the road, LHS; (iii)Kuyruchuk village (km144+000) – near the Azamat shop, RHS; (iv)Tugol Say village (km151+000) – near the shop of Kutman, LHS (v)Bashkugandy village (km 159+000) – near the school adjacent to the road, RHS	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

Noise	Asphalt breaking, earth filling, sub-base compaction, asphalt laying	Disturbance of adjacent settlements due to elevated noise levels. Sensitive receptors as; (i)Jumgal village (km129+400) – near the school along the road, LHS; (iii)Kuyruchuk village (km144+000) – near the	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; • Avoid working near mosques during prayer time; and to • Carry out works near schools during holiday periods	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					
		Azamat shop, RHS; (iv)Tugol Say village (km151+000) – near the shop of Kutman, LHS (v)Bashkugandy village (km 159+000) – near the school adjacent to the road, RHS	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 2B in 2018. Following mode shall be chose 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: ○ use of rollers with minimum vibration ○ use of ditches to reduce vibration at the houses ○ 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: ○ Use of high vibration ○ use of ditches to reduce vibration at the houses ○ 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	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					
			✓ Areas with houses within a 16m corridor – use of rollers with no vibration ✓ Areas with houses between 16m and 36m corridor : ○ use of rollers with minimum vibration ○ no ditches ○ 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: ○ use of high vibration ○ no ditches ○ 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		

Blasting works	Blasting of hard rocks	Blasting is planned to remove relatively fresh rock mass from the hill along road. The total volume is estimated as 128,660m3 at the chainage km 113.This blasting work causes a serious noise, vibration and dust pollution around.	Blasting Work Plan shall be prepared and approved by all agencies concerned. Blasting works will be conducted at the site from km 113 ; 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.		
Surface Water	102 culverts and 1 bridge reconstruction at water course Tugol-Say (148+874)	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. 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	Contractor	CSC, IPIG/MOTR

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					

			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 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. 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. 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 113 and 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	Contractor	CSC, IPIG/MOTR

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	

Component				Implement	Monitor
CONSTRUCTION PHASE					
			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. 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 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 territorial departments of SAEPF are obtained and proper operational and management measures be instituted to minimize impacts to the general environment. On the other hand, should the Contractor open a new borrow site, government permits are also required and borrow pit management plan will be developed as SSEMP. 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.	Contractor	CSC, IPIG/MOTR

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
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CONSTRUCTION PHASE					
			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.		
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
High embankment and high cut slope	Highembankment filling and deep cut	Land slide, failure and collapse of slops	As per SSEMP including, erosion/scouring prevention system (drains and gabions if necessary), top soil over slope surface, steps for maintenance, full layer compaction (in case of embankment).	Contractor	CSC

Cultural and historical site	Cultural and historical sites protection.	Potential Construction works impacts on cultural and historical sites and monuments finding chance, amd cemeteries as: - 131 km on the both sides (RHS - 3 m, LHS – 3,5 m from the road). - 132 km on the LHS located around road 2030m from the road - 138 km both sides, 3 - 3,5 m on the RHS and approximately 100 meters to the LHS. - 141 km +300 LHS, 10-15 m from the road. - 152 +300 km s on the	To prepare Cultural & Historic Site Management Plan considering: Recommendation of Archaeological Survey and Assessment Report and Proposed Plan for Section 2B in 2018 shall be followed (see Annex J). Specify the following as a requirement for the Contractor Objects of historical and cultural heritage are the objects of study and protection of the Ministry of Culture and Tourism of the Kyrgyz Republic (MCT of KR). 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. 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 archaeological sites The cemeteries are in 2-3 meters from the road right of way. According to the design of the road, widening of the road section will have no impact on these objects, on the issue of resettlement or land acquisition. The expansion of the road is planned within the existing	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					

		both sides, 3 m; opposite side (LHS) 3-5 m. - 153 km -155 km RHS on a hill 20-50 m away from the road. - 158 – 160 km on the LHS, around 6 m from the road.	right of way and will be held on the opposite site from cemeteries. Measures to mitigate the impact on the cultural monuments (cemetery): • During the work, it is necessary to inform the local authorities on the construction works around these sites. • It is necessary that local authorities carried out the control and monitoring of these areas, during the construction works. • To protect these cultural sites, it is necessary to arrange physical barriers (fencing). • During the construction works, it is necessary to assign an expert on traffic management, to prevent causing of physical damage by the machines and mechanisms to the cultural objects. • It is necessary to conduct outreach to workers on the strict prohibition of physical destruction, desecration and pollution data objects. • It is necessary to post warning signs and information signs for the workers. • Limiting the operation of machines and mechanisms, which create high levels of noise and vibration. • Dust suppression works. • All road equipment must be used within the territory allotted for construction site.		
	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		
Safety and Health	Occupational safety management	For health and 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		

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION

Area/ Component	Activity	Potential Impact	Mitigation measures	Institutional Responsibility	
				Implement	Monitor
CONSTRUCTION PHASE					
			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.		
Maintenance of Access during Construction	Construction of bridges/culvert	Interference of public traffic	Detour shall be constructed and be properly maintained.	Contractor	Maintenance of Access during Construction
	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
Safety and Health	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 regularily 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;	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					
			(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.		
	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 Km 113, 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

Camp, operation and construction sites	Installation 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; Waste management plan covering 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; 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. 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	Camp, operation and construction sites

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					
		Enhance the safety and health of workers	To provide an Environmental and Safety Officer (ESO), under which an 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 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.	Contractor	

	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 sanitaryprotection 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
		Odor emission and safety risks	Asphalt plants shall be 500 m downwind from any settlements and residential houses. Provide spill and fire protection equipment and submit an emergency response plan (in case of spills, accidents, fires and the like) to the authority in responsibility prior to operation of the plant. Secure official approval for installation and operation of asphalt plants from MoTR.	Contractor	CSC, IPIG of MoTR
Asphalt, Concrete and Crushing Plant	Site selection. Operation of asphalt plant	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

MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/ Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
				Implement	**Monitor**
CONSTRUCTION PHASE					

	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
	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
	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
		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
Fauna and Flora	Road width expansion works	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
MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	

Component				Implement	Monitor
CONSTRUCTION PHASE					
Disturbance of Farm Land	Construction activity near farm land	Farm land soil compaction due to operation of heavy equipment	Confine operation of heavy equipment within the corridor that is necessary for the road construction to avoid soil compaction and agricultural used land close to the road.	Contractor	
Existing infrastructures	Construction activities in close vicinity to existing infrastructure such as water supply pipes and other facilities, waste water discharge facilities, electricity lines, etc. or directly destroy existing pavement, bridge, power line system and culverts	Damage to infrastructure, supply cuts of infrastructure services.	Measures will be ensured 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	infrastructures
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

				Implement	Monitor
ɅITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION					
Area/Component	**Activity**	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	

OPERATION PHASE					
Air quality	Increase of traffic volume	Air pollution	Although no traffic air pollution is estimated until 2034, Some residents will suffer higher NO_2 pollution than standard when the vehicles drive at 95 km/h while it is acceptable range if they run 60 km/h. Driving speed shall be limited to less than 60km/h near the settlement.	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.	RMU-10 of MoTR	MoTR, SETI
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
Flora/Trees	Tree maintenance along the road	Loss of trees	Maintenance of newly planted trees	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 with Livestock	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

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

a. 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.
b. Layout of the work camp and details of the proposed measures to address adverse environmental impacts resulting from its installation
c. Sewage management including provision of sanitary latrines and proper sewage collection and disposal system to prevent pollution of watercourses
d. 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
e. 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
f. Embankment 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.
g. Emergency response plan (in case of spills, accidents, fires and the like) prior to operation of the asphalt plant
h. 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
i. Cultural and historical Management plan

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

2. Monitoring

2.1. Monitoring plan

256. 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 shown in Table 31. All the monitoring during construction phase shall be implemented by CSC while it shall be made by the institution mentioned in the table.

Table 31: The 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	Dust, SO_2, NO_2	Sentive receptors within following settlement. (i) Jumgal village (km129+400) – near the school along the road, LHS; (ii) Kuruchuk village (km144+000) – near the Azamat shop, RHS; (iii) Tulgo Say village (km151+000) – near the shop of Kutman, LHS (iv) Bashkugandy village (km 159+000) – near the school adjacent to the road, RHS	By means of suitable portable measurement devices for all parameters and visual inspection for dust only	Just before construction start. and every 2 monthls 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 Supervision spot checks	Unannounced inspections during work	CSC
Noise	Noise Level	Sentive receptors within following settlement. (i) Jumgal village (km129+400) – near the school along the road, LHS; (ii) Kuruchuk village (km144+000) – near the Azamat shop, RHS; (iii) Tulgo Say village (km151+000) – near the shop of Kutman, LHS (iv) Bashkugandy village (km 159+000) – near the school adjacent to the road, RHS	By means of portable noise / vibration measurement device	Second round of baseline monitoring measurements to be conducted before construction start. Than a monthly basis during construction stage.	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 and no vibration within 22m from archaeological sites	Throughout entire construction stage simultaneous with vibration occurring on the site	CSC

Water quality in surface waters (rivers)	Oil products, Turbidity, pH, DO, TSS, Ec and Temperature	Upstream and downstream where the Project road crosses the main watercourse Tugol-Say (148+874).	Measurement either directly in river water with a suitable measurement device or sample taking and measurement in a	Second round of baseline monitoring measurements to be conducted before	CSC

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					
			certified laboratory	construction start. Than on a monthly basis during construction stage	
	Appearance of river water and contractor's activities as per SSEMP	Bridges and Culverts 1 bridge and 102 culverts	Visual inspection	Unannounced inspections during bridge and culvert works	CSC, SAEPF
Groundwater(at equipment servicing and fueling	Prevention of spilling of oil and fuel	Contractor's yard	Inspections; observations	Unannounced inspections during construction	CSC control by IPIG of MoTR
Borrow areas	Possession of official approval or valid operation license	Sand and gravel borrow pit and / or quarry	Inspection	Before work begins	CSC control by IPIG of MoTR
Top soil preservation	Stockpiling and means of protection	Stock pile yard/ Job site	Inspections's observation	Once a month	CSC control by IPIG of MoTR
Physical damage of the Cultural sites (cemeteries)	Appearance of cu sites including cemeteries	Objects of Historical and Cultural Heritage (OHCH) as shown in Archaeological Survey and Assessment Report in Annex J and cemeteries as: - 131 km on the both sides (RHS - 3 m, LHS – 3,5 m from the road). - 132 km on the LHS located around road 20-30m from the road - 138 km both sides, 3 - 3,5 m on the RHS and approximately 100 meters to the LHS. - 141 km +300 LHS, 10-15 m from the road. - 152 +300 km s on the both sides, 3 m; opposite side (LHS) 3-5 m. - 153 km -155 km RHS on a hill 20-50 m away from the road. - 158 – 160 km on the LHS, around 6 m from the road.	Visual observation	Visual observation before construction start and in construction period where the cemeteries are indicated (in the km). Document the condition of the cemeteries and mausoleums before constructions works.	CSC

Worker's safety and health	Official approval letter for worker's camp; Visual check of availability of appropriate personal protective equipment; Evidences of safety training to the staff according to the requirements of the individual work place	Job site and worker's camp	Inspection; interviews; comparisons with the Contractor's method statement	Weekly site visits by the hired Health and safety expert. Unannounced inspections during construction and upon complaint.	CSC
Worker's education	Evidence/record/ photo of education	To be determined by assigned Construction Supervision	Visual inspection of record/attendance of	After beginning of works and at	CSC, local health units
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					
on AIDS and STD			CSC to the education	appropriate intervals throughout construction	of the Ministry of health
Asphalt plant	Possession of official approval or valid operation license	Asphalt plant	Inspection	Before work begins	CSC
Potential tree losses	Status of trees. Thickness of fill at the root of trees	At respective tree locations.	Inspections; observation. An embankment fill of up to 30 cm at the bottom of the tree stem area can be accepted. A filling up of more than 30 cm will damage the tree and cutting will be necessary.	During construction phase.	CSC control by IPIG of MoTR
Material transport Asphalt	Are the truck loads covered or wetted; Compliance with the Contractor's method statement (restricted working hours; haul routes) dust suppression methods where required	Job site / haul routes	Supervision	Unannounced inspections during work	CSC
Sand and gravel		Job site / haul routes	Supervision	Unannounced inspections during work	CSC
Exhausted gas from Asphalt plant and Machinery	If exhaust fumes, dust are visible or not	At site	Regular check of certificate/maintenance record of vehicles /equipment /plant Measurement of concentrations if necessary	Unannounced inspections during construction works	CSC

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

Operation Stage					
Traffic noise	Equivalent Noise Level	Sensitive receptors	Handy type level meter	Once a year and when requested	Local MoTR department
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,
	Road crossing livestock animals	Along the new road	Keep records of accidents. large mammals are identified, appropriate protective measures shall be elaborated (e.g. reflectors / local fencing, warning signs,	Throughout the Year	Regional Departments of State Road Admini-stration (UAD, LUAD, and GDAD BO)
			speed reductions etc.)		
Traffic Accident	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
Drainage damage	Leakages in drainage system and damages due	Culverts and drainage acilities	Site visit	Throughout the Year	home Local MOTR departments
Tree maintenance along the road	Appearance	In locations of newly planted trees	Site visit	Throughout the Year	Local MOTR departments joint with local authorities

2.2. Budget on Mitigation Measures

257. 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.

258. 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 carriageway. 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.

259. 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 below Table 32.

Table 32: Number and Cost for Mitigation of Affected Trees

#	Item	unit	QTY	Remarks

1	Affected trees due to widening	each	100	Indicated in field inspection for Cutting
2	For 1:2 Ratio of Replacement	Each	200	Estimated Trees to be Planted
3	Average cost of Replacement	Som	750	Cost of Sapling & Planting
	Total Cost	Som	165,000	Budgetary Estimate
	69 Som/ 1 USD	US	$2,391.9	Budgetary Estimate

2.3. Budget on Monitoring Activities

260. The estimated cost for the environmental management and monitoring on the consultancy for the entire project construction period of three (3) years is shown in the Table 21 below. This will include fees and other associated cost for management and monitoring of the construction sites and affected areas in the project road. In addition, the main Contractor shall undertake periodic parametric measurements as basis for action to improve their performance on the implementation of measures. Hence, a budget for periodic parametric measurements is hereby included in the Tables 33 and 34 below.

Table 33: Budgetary Cost for Environmental Monitoring Specialists

Item	Quantity	Unit Cost	Total Cost
Implementation of EMP		US $	US $
International Environmental Specialist (IES)	6 months / 3 years, 12 days fourth year	15,400	100,100
National Environmental Specialist (NES)	21months/3 years, 12 days fourth year	2,750	59,125
Others (travel, per diem, surveys/interviews, reporting, etc.)	LS	22,000	22,000
Total			181,225

Table 24: Budgetary Cost for Environmental Monitoring Requirements

Item	Quantity	Unit Cost	Total Cost
Implementation of EMP		US $	US $
Periodic Parametric Measurements	78		11,440
6 months a year x 4* point (air) x 3 (years) 1** month	76	165	12,540
6 months a year x 2* point (water) x 3 (years) 1** month	38	110	4,180
6 months a year x 4* point (noise - vibration) x 3 (years) 1** month	76	165	12,540
Total			40,700

* - the number of points and measurements may vary

** - 3 years a physical work and 1 year a technical survey (measurements 1 month a year)

3. Mechanisms for implementation

3.1. Institutional Framework

261. The relevant institutional entities for the project include the KR's Ministry of Finance (MOF), Ministry of Transport and Communication (MOTR), 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.

262. MOTR is responsible for transport sector development and is the Executing Agency (EA) for the project. IPIG is working under MOTR and will carry out the responsibilities assigned to MOTR. MOF is the responsible government body for coordination with ADB and other donors for foreign assistance.

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

264. 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:

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

265. 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:

a. environmental legislation, set rules, limits and standards of environmental management, standards for emissions and discharges of pollutants and waste disposal in the environment;
b. requirements of industrial safety in the construction, expansion, reconstruction, modernization, operation, conservation and liquidation of hazardous production facilities; c. requirements of land legislation;
d. requirements for safe operation of equipment and facilities for storage and distribution of petrochemicals and gas, cranes;
e. requirements of safe use rules in the construction, assembling and commissioningof electrical networks and electrical equipment.

266. 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.

267. 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:

a. 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.

b. 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 costed and carried out.
c. 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 (SEMPs), submit to Construction Supervision Consultant (CSC) for endorsement and IPIG for approval.
d. 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

268. 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 the Construction Supervision Consultant and submitted to MOTR within 1 month after the reporting period and then disclosed at ADB and MOTR websites. 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. Conclusions and Recommendations

1. Conclusions

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

The proposed Env ironmental Management and Monitoring Plans in this IEE will ensure that the good quality for surface water, air and noise in the general area is maintained, primarily during the construction phase. The focus of the assessment is to avoid (especially during design phase), reduce (during construction) and mitigate or compensate (also during construction) the impacts to physical and/or social environment. Adequate public consultations were done in introducing the project as well as presentation of environmental and community impacts and the stakeholder concerns were incorporated into the IEE. The IEE will be disclosed to the public and can be viewed on ADB websites. As per the Kyrgyz Law, the proposed project will require permits from the government regulatory agencies: The Environmental Permit will be processed by the IPIG with the State Agency on Environment Protection and Forestry after the IEE is cleared with the ADB.

2. Findings and Recommendations

269. The environmental impacts of the Project Road have been assessed and described in the previous sections of this document. Potential negative impacts were identified in relation to design, location, construction and operation of the improved road. Mitigation measures have been developed 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.

270. As per assessment in this IEE, the proposed Road Project is unlikely to cause significant nvironmental impacts because:

a. The proposed project activities are focused on the improvement and reconstruction of the road restricting the works along the Right-of-Way with the main intent to improve the quality of life and quality of environment of the impacted districts;
b. The potential negative impacts associated with the design, construction and operation of the proposed Project activities will be temporary, and localized in extent and can be mitigated to acceptable levels;
c. Sources of materials can be adequately investigated at the project sites and the projected excess cut materials will be sufficient to cover for the fill requirements. The materials can be stockpiled and stabilized in nearby areas without posing environmental issue, however subject to permission by legitimate owners;
d. There will be no Project activities that will involve permanent or temporary loss of income and/or livelihood but rather redound to possible improvement of household earnings due to possible employment of local people in the construction;
e. The institutional framework has been developed to specify the procedural requirements and responsibilities to ensure environmentally sustainable implementation, i.e. involving IPIG (Client), CSC and Contractor; and
f. All construction and operation activities will be monitored and reported by IPIG (by employing CSC) in accordance with the Environmental Monitoring Plan.

To ensure environmental and social safeguards, the IEE presents the following recommendations:

g. The EMP will be followed carefully and required reporting completed in a timely fashion.
h. The tree management and maintenance function should be passed to local
i. communities or RMD, until trees have reached 8+ years and do not need careful maintenance.
j. 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.
k. 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.
l. 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.

271. It is important that the Contractor and his Subcontractor that successful implementation entails not only p r o v i s i o n of the infrastructure but also preservation of the environment within the framework of Sustainable Development.

Annexes: Outline 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 Epkin (Km 89) to Bashkugandy (km 159), the Alignment Sheet is shown below.

Alignment Sheet Information

№	Section	Description	Paramet	Comments
Section: «Epkin (Km 89) to Bashkugandy (km 159)”				
1	91 km	Five (5) trees may have to be cut down (LHS/RHS)		To be verified with the design
2	103 km	Small settlement	Noise	Within allowable range
3	94 km	Old borrow pit with sandy-gravel material (RHS)		Potential Material source to be verified
4	99 km	Two (2) trees may have to be cut down		To be verified with the design
5	101 km	There is an old borrow pit with sandygravel material (RHS).		Potential Material source to be verified
6		This borrow pit is roosted by wild pigeons seemingly for all year around. This area is a habitat of European hare, foxes, snakes, harvest mice, chukars, ravens, magpies. There are wolves and lynxes in the mountains. From 101 to 111 km there are swamplands and water outcrops on the sides		Special measures for habitat protection
7	103 km	Small settlement	Noise	Within allowable range
8	107 km	The road up to Kyzart Pass is unpaved. On the left there is a Jumgal cattle market which is working 1-2 days a week. Cars raise dust on the road.		Dust control measures to be more intensive here
9	108 km	There is a rock deposit with sandygravel ground which can be used as a borrow pit.		Potential Material source to be verified
10	111 km	There is an old borrow pit with sandygravel materials (RHS)		Potential Material source to be verified
11	114 – 116 km	The road narrows between the mountains; therefore, blasting works may have to be done. The area is generally rocky.		To be verified with the design
12	113 km, Kyzart Pass	Kyzart pass. There are small tributary rivers along the road.		Measures to protect water quality will be needed
13	122 km	There is an old borrow pit with sandygravel ground (LHS) in 125 m away from		Potential Material source to be verified
14	124 km	Eighteen (18) trees to cut down in the general area		To be verified with the design
15	128 km +700, Jumgal village	Jumgal village has a local health post, school, mosque and club. There are 11 grades in school and around 400 students. Drinking water is obtained from rivers and springs. Irrigational network is going through the village; the water source of which is		Possible extra measures for social impacts/ concerns

№	Section	Description	Paramet	Comments
		Section: «Epkin (Km 89) to Bashkugandy (km 159)”		
16	129 km +200 129 km + 400	Location of administrative building, a mosque (RHS) School, shop (LHS). Sensitive receptor.  	Dust, Noise, Vibration, SO2 NOx CO	Physical analysis and instrumental measurements Possible extra measures for social impacts/ concerns
17	131 km	On the both sides of the road there are cemeteries of Jumgal village. The first part of the cemetery starts at the LHS -3.5 m, and ends on the RHS - 3  .0 m. The width of the roadway is 12 m. The distance from the road to the boundary cemetery is 7.9 m.		To be verified with the design Special measures should be in place to protect structures
18	132 km	Cemetery on the LHS for Jany-Aryk village located around road 20-30m from the road. Jany-Aryk village itself is 2km away from the road, LHS.		Special measures should be SSEMP to protect structures Potential Material source to be verified
19	138 km	Possible existence of historical/ old cemetery Clay mounds were found. Located close to the road (3 -3,5 m) on the right (RHS) and approximately 100		Special measures should be SSEMP to protect structures
20	138 km + 800	Around 50 m from the road (LHS) - reservoir and gate to regulate water to Jumgal River		Special measures to protect water quality
21	139 km, Kuyruchuk village	Village Kuyruchuk located at a great distance from the road and the track does not pass.		
22	140 km +700	One (1) tree may be cut down at RHS located 8.2 m from the center of the road		To be verified with the design
23	140 km +900	Around 15 trees may be cut down at LHS located 4.8 m from the center of the road		To be verified with the design
24	141 – 142 km	Around 20 trees may be cut down at RHS located 5.5 m from the center of the road		To be verified with the design
25	141 km +300	Cemetery on the left side (LHS) of the road, 10- 15 m.		Special measures should be SSEMP to protect structures
26		Old quarry loamy soil (RHS) 150 meters from the road		Potential Material source to be verified
27	141 – 142 km	Around 50 trees to cut down in the area. Kuyruchuk village is far away from the road.		To be verified with the design

28	148 km	Adjacent to the road: Shop "Azamat", 2 cafes and a source "Kuyruchuk Bulagy". Sensitive Receptor.	Dust, Noise, Vibration, SO2 NOx CO	Physical analysis and instrumental measurements

№	Section	Description	Paramet	Comments
		Section: «Epkin (Km 89) to Bashkugandy (km 159)”		
				
29	148+874, Bridge through river TugolSay.	Bridge through river Tugol-Say. 	Warter guality measurem aents	Water quality protection measures will be needed
30	149-150 km, Tugol-Say village	Tugol-Say village has a health post, school and a mosque. Sensitive receptor. 	Dust, Noise, Vibration, SO2 NOx CO	Physical analysis and instrumental measurements Possible extra measures for social impacts/concerns
32	151 km	Shop "Kutman» (LHS). Sensitive Receptor.		
32	151 km + 300	Mosque, 2 shops (RHS). Sensitive receptor.		
33	152 +300 km	Cemeteries on the both sides for Tugol-Say village. The distance between the boundaries of the two cemeteries, 25m; width of the existing road 13.4m. From the border of the		Special construction techniques to utilize and measures should be SSEMP to protect
34	153 km -155 km	There is a cemetery (RHS) on a hill 20-50 m away from the road.		Special measures should be SSEMP to protect structures
35	157 km	One (1) tree may be cut down at RHS located 6.7 m from the center of the road; while 3 small trees on LHS; additional 9 more in the area may be affected.		To be verified with the design
36	158 – 160 km	Cemetery on the LHS, around 6 m from the road, 2 trees to cut down.		Special measures should be SSEMP to protect structures To be verified with the

Annex A2: Earth Work Proposed

No.	Km from	Km to	Type of earth work	Side	Length, m	Maximum width, m	Maximum height, m

1	89.080	89.160	Cut	RHS	80	10	3
2	98.460	98.780	Cut	Both sides	320	4	1
3	107.100	107.400	Cut	RHS	300	18	5
4	110.540	110.680	Cut	RHS	140	10	3
5	110.680	110.950	Fill	Short cut	270	50	12
6	111.360	111.700	Cut	Both sides	340	40	10
7	112.450	112.750	Fill	Full width of road	300	30	3
8	112.720	112.960	Cut	RHS	240	25	8
9	113.060	113.140	Cut	RHS	80	15	11
10	113.300	113.460	Cut	RHS	160	20	5
11	113.580	113.820	Cut	RHS	240	20	8
12	114.160	114.220	Cut	RHS	60	30	10
13	114.600	115.360	Cut	RHS	760	30	12
14	115.520	116.960	Cut	RHS	1440	30	10
15	117.280	117.540	Cut	RHS	260	30	13
16	117.700	117.940	Cut	RHS	240	4	1
17	118.520	119.440	Cut	Both sides	920	50	15
18	119.860	119.960	Cut	RHS	100	10	5
19	120.660	121.300	Cut	LHS	640	15	5
20	122.400	123.400	Fill	LHS	1000	10	3
21	147.400	148.000	Cut	RHS	600	10	5
22	151.000	151.220	Cut	RHS	220	10	5
23	152.400	152.820	Cut	RHS	420	40	10
24	155.440	155.640	Cut	Both sides	200	15	5
25	157.160	157.540	Cut	RHS	380	40	6

Annex A3: Outline of Culverts in Section 2B

	Kilo post	opening/ diam, m	kind of waterway	intersection angle	length, with portal walls, m	Gradient of culverts	direction of waterway	requirements for repairing
1	2	3	4	5	6	7	8	9
38	89+069	r.c.pipe	1		14.00	- / - / 6 / -	- / - / 1 / -	-
39	91+858	r.c.pipe	1,5x2		11.00	- / - / 9 / -	- / - / 1 / -	-
40	93+290	Concrete box culvert	1x1		10.00	- / - / 5 / -	- / - / 1 / -	-
41	94+839	Concrete box culvert	0,75x0,75		8.00	- / - / 4 / -	- / - / 1 / -	-
42	96+032	r.c.pipe						
43	97+242	Concrete box culvert	0,75x0,75		9.00	- / - / 5 / -	- / - / 1 / -	-
44	97+920	r.c.pipe	1		12.00	- / - / 5 / -	- / - / 1 / -	-
45	98+835	r.c.pipe	1		17.00	- / - / 7 / -	- / - / 1 / -	-
46	100+589	r.c.pipe	1		13.00	- / - / 6 / -	- / - / 1 / -	-
47	1021+50	r.c. pipe	1.00		11.10	- / 5 / - / -	- / - / 1 / -	-
48	1028+43	Concrete box culvert	0.5x0.5		11.20	- / - / 6 / -	- / - / 1 / -	-
49	1039+13	r.c. pipe	0.75		10.70	- / - / 6 / -	- / - / 1 / -	-
50	1041+22	Concrete box culvert	0.8x0.8		12.50	- / - / - / 11	- / - / - / 1	-
51	1056+39	r.c. pipe	1.00		13.20	- / - / 6 / -	- / - / 1 / -	-
52	1063+47	r.c. pipe	1.25		13.20	- / - / 8 / -	- / - / 1 / -	-
53	1068+09	r.c. box culvert	3.0x2.5		19.40	- / - / 15 / -	- / - / 1 / -	-
54	1074+56	Concrete box culvert	1.0x1.0		13.40	- / - / - / 15	- / - / - / 1	-
55	1090+64	r.c. pipe	0.75		14.30	- / - / 19 / -	- / - / 1 / -	-
56	1093+63	Concrete box culvert	0.75x0.75		12.20	- / - / 14 / -	- / - / 1 / -	-
57	1106+92	r.c. pipe		1.5				
58	1127+03	r.c. pipe	0.75		15.50	- / - / 20 / -	- / - / 1 / -	-
59	1135+39	Concrete box culvert	0.75x0.75		13.20	- / - / 20 / -	- / - / 1 / -	-
60	1141+40	Concrete box culvert	0.75x0.75		12.20	- / - / 6 / -	- / - / 1 / -	-
61	1149+46	Concrete box culvert	0.75x0.75		12.00	- / - / - / 6	- / - / - / 1	-
62	1176+97	r.c. pipe	1.25		10.20	6 / - / - / -	- / 1 / - / -	-
63	1179+86	r.c. pipe	0.75		11.00	5 / - / - / -	- / 1 / - / -	-
64	1197+35	r.c. pipe	2x1.5		16.40	- / 30 / - / -	- / - / 2 / -	-
65	1201+86	r.c. pipe	0.75		16.50	- / 5 / - / -	- / - / 1 / -	- / - / 14 / -
66	1209+23	r.c. pipe	1.50		12.30	8 / - / - / -	- / 1 / - / -	-

	Kilo post	opening/ diam, m	kind of waterway	intersection angle	length, with portal walls, m	Gradient of culverts	direction of waterway	requirements for repairing
67	1216+30	r.c. pipe	1.0		13.25	- / 5 / - / -	- / - / 1 / -	-
68	1235+18	r.c. box culvert	2x3.0x2.5		12.20	- / 4 / - / -	- / - / 1 / -	-
69	1236+29	Concrete box culvert	1.0x1.0		12.00	4 / - / - / -	- / 1 / - / -	-
70	1250+59	r.c. pipe	1.0		12.30	- / 8 / - / -	- / - / 1 / -	-
71	1263+81	r.c. pipe	0.75		12.70	- / 4 / - / -	- / - / 1 / -	-
72	1267+48	Concrete box culvert	0.8x0.8		12.50	- / 4 / - / -	- / - / 1 / -	-
73	1270+20	Concrete box culvert	0.8x0.8		12.40	- / 4 / - / -	- / 1 / - / -	-
74	1273+74	r.c. pipe	1.25		12.20	- / 5 / - / -	- / 1 / - / -	-
1	2	3	4	5	6	7	8	9
75	1274+64	r.c. pipe	1.0		15.90	- / 6 / - / -	- / - / 1 / -	-
76	1276+57	Concrete box culvert	0.75x0.75		12.50	- / 4 / - / -	- / - / 1 / -	-
77	1280+34	Concrete box culvert	0.75x0.75		12.40	- / - / 4 / -	- / - / 1 / -	-
78	1284+49	r.c. pipe	1.25		12.20	- / 5 / - / -	- / 1 / - / -	-
79	1287+34	r.c. pipe	0.75		13.30	- / 4 / - / -	- / - / 1 / -	-
80	1291+78	r.c. pipe	1.0		9.10	4 / - / - / -	- / 1 / - / -	-
81	1295+57	Concrete box culvert	0.8x0.8		9.20	- / 3 / - / -	- / - / 1 / -	-
82	1298+59	r.c. pipe	1.0		12.20	3 / - / - / -	- / 1 / - / -	-
83	1305+39	r.c. pipe	1.25		16.30	6 / - / - / -	- / 1 / - / -	-
84	1307+68	r.c. pipe	1.0		13.20	5 / - / - / -	- / 1 / - / -	-
85	1308+72	r.c. pipe	1.0		15.30	6 / - / - / -	- / 1 / - / -	-
86	1313+26	r.c. pipe	0.75		15.13	14 / - / - / -	- / 1 / - / -	- / 21 / - / -
87	1313+42	r.c. pipe	1.00		13.55	- / 7 / - / -	- / - / 1 / -	-
88	1315+74	Concrete box culvert	0.5x0.5		10.20	5 / - / - / -	- / 1 / - / -	-
89	1317+81	r.c. pipe	1.00		13.20	7 / - / - / -	- / 1 / - / -	-
90	1319+31	r.c. pipe	1.25		15.30	6 / - / - / -	- / 1 / - / -	-
91	1320+00	r.c. pipe	1.25		16.30	7 / - / - / -	- / 1 / - / -	-
92	1328+88	r.c. pipe	1.00		11.15	5 / - / - / -	- / 1 / - / -	-
93	1339+86	r.c. pipe	1.00		17.60	8 / - / - / -	- / 1 / - / -	-
94	1361+36	r.c. pipe	1.00		12.20	- / 5 / - / -	- / - / 1 / -	-

95	1370+54	r.c. pipe	1.00		12.30	- / 4 / - / -	- / - / 1 / -	-
96	1376+60	r.c. pipe	1.00		13.20	- / 14 / - / -	- / - / 1 / -	- / - / 25 / -
97	1376+66	r.c. pipe	0.75		10.40	- / 4 / - / -	- / - / 1 / -	-
98	1379+55	r.c. pipe	1.00		13.20	- / 7 / - / -	- / - / 1 / -	-
99	1384+04	r.c. pipe	1.00		13.15	- / 6 / - / -	- / - / 1 / -	-
100	1393+29	r.c. pipe	1.00		12.20	4 / - / - / -	- / 1 / - / -	-
101	1409+34	r.c. pipe	1.00		15.50	7 / - / - / -	- / 1 / - / -	-
102	1411+05	r.c. pipe	0.75		9.30	- / 3 / - / -	- / - / 1 / -	-
103	1420+48	r.c. pipe		1.50				
104	1427+64	r.c. pipe		1.00				
105	1429+46	met.box culvert	2x0.25		10.00	- / 3 / - / -	-	-
106	1431+40	r.c. pipe	0.75		10.20	- / 5 / - / -	-	-
107	1440+59	r.c. pipe	0.75		9.40	- / 4 / - / -	- / - / 1 / -	-
108	1441+80	r.c. pipe		1.00				
109	1449+90	met. Pipe	1.00		10.00	- / 2 / - / -	- / - / 1 / -	-
110	1456+25	r.c. pipe	0.50		14.50	- / 6 / - / -	- / 1 / - / -	-
111	1457+76	r.c. pipe	0.75		21.30	- / 10 / - / -	- / 1 / - / -	-
112	1464+67	r.c. pipe	0.75		9.50	- / 5 / - / -	-	-
113	1466+36	r.c. pipe	1.00		17.50	- / 8 / - / -	- / 1 / - / -	-

	Kilo post	opening/ diam, m	kind of waterway	intersection angle	length, with portal walls, m	Gradient of culverts	direction of waterway	requirements for repairing
1	2	3	4	5	6	7	8	9
114	1481+86	Concrete box culvert	0.75x0.75		9.50	- / 7 / - / -	- / 1 / - / -	-
115	1484+61	Concrete box culvert	0.75x0.75		10.55	- / 8 / - / -	- / 1 / - / -	-
116	1490+39	met pipe	0.50		22.00	- / 5 / - / -	- / 1 / - / -	-
117	1492+69	r.c. pipe	0.50		10.20	- / 5 / - / -	- / 1 / - / -	-
118	1497+35	asbestos pipe	0.35		9.10	- / 2 / - / -	-	- / - / 3 / -
119	1500+00	r.c. pipe	0.50		9.00	- / 4 / - / -	- / - / 1 / -	-
120	1501+75	r.c. pipe	1.00		3.00	- / 9 / - / -	- / - / 1 / -	-
121		Concrete box culvert	1.0x1.0		10.50			
122	1504+14	r.c. piped=1.0	1.00		16.40	7 / - / - / -	- / 1 / - / -	-
123	1506+99	Concrete box culvert	1.0x1.0		9.30	7 / - / - / -	- / 1 / - / -	-

124	1513+37	r.c. pipe	1.00		30.00	14 / - / - / -	- / 1 / - / -	-
125	1518+60	r.c. pipe		1.00				
126	1522+47	r.c. pipe	1.25		13.20	6 / - / - / -	- / 1 / - / -	-
127	1528+81	r.c. pipe	1.50		19.40	9 / - / - / -	- / 1 / - / -	-
128	1531+35	r.c. pipe	0.75		15.30	7 / - / - / -	- / 1 / - / -	-
129	1531+99	r.c. pipe	1.25		9.12	12 / - / - / -	- / 1 / - / -	-
130		r.c. pipe	1.00		16.58			
131	1533+52	r.c. pipe	0.75		22.00	10 / - / - / -	- / 1 / - / -	-
132	1535+28	r.c. pipe	0.75		13.20	6 / - / - / -	- / 1 / - / -	-
133	1538+04	r.c. pipe	1.00		12.40	5 / - / - / -	- / 1 / - / -	-
134	1547+19	r.c. pipe	1.00		18.50	8 / - / - / -	- / 1 / - / -	-
135	1549+11	Concrete box culvert	0.75x0.75		11.20	8 / - / - / -	- / 1 / - / -	-
136	1553+90	Concrete box culvert	1.0x1.0		13.40	10 / - / - / -	- / 1 / - / -	-
137	1575+95	r.c. pipe	1.00		19.80	7 / - / - / -	- / 1 / - / -	-
138	1581+14	r.c. pipe	1.00		15.40	6 / - / - / -	- / 1 / - / -	-
139	1586+27	r.c. pipe	1.00		13.20	5 / - / - / -	- / 1 / - / -	-
140	1589+07	Concrete box culvert	1.0x1.0		13.50	4 / - / - / -	- / 1 / - / -	-

Annex A4: Location of Powerlines

No.	km	
1	89.3-103.3	LHS
2	103.3	Overhead
3	105.4-106.2	RHS
4	108.2 - 109.6	RHS
5	136.5 -142.475	LHS
6	137.1	Overhead
7	141.9	Overhead
8	142.475	Overhead
9	142.475 -142.030	Overhead
10	142.03	Overhead
11	142.99	Overhead
12	145.505	Overhead
13	145.505 - 146.139	LHS
14	146.139	Overhead
15	146.139 - 146.549	RHS
16	146.549	Overhead
17	146.549 - 147.2	LHS
18	148.188	Overhead
19		LHS
20	149.402	Overhead
21	149.55 - 150.4	RHS
22	150.33	Overhead
23	150.330 - 150.415	RHS
24	158.95 - 159.2	LHS

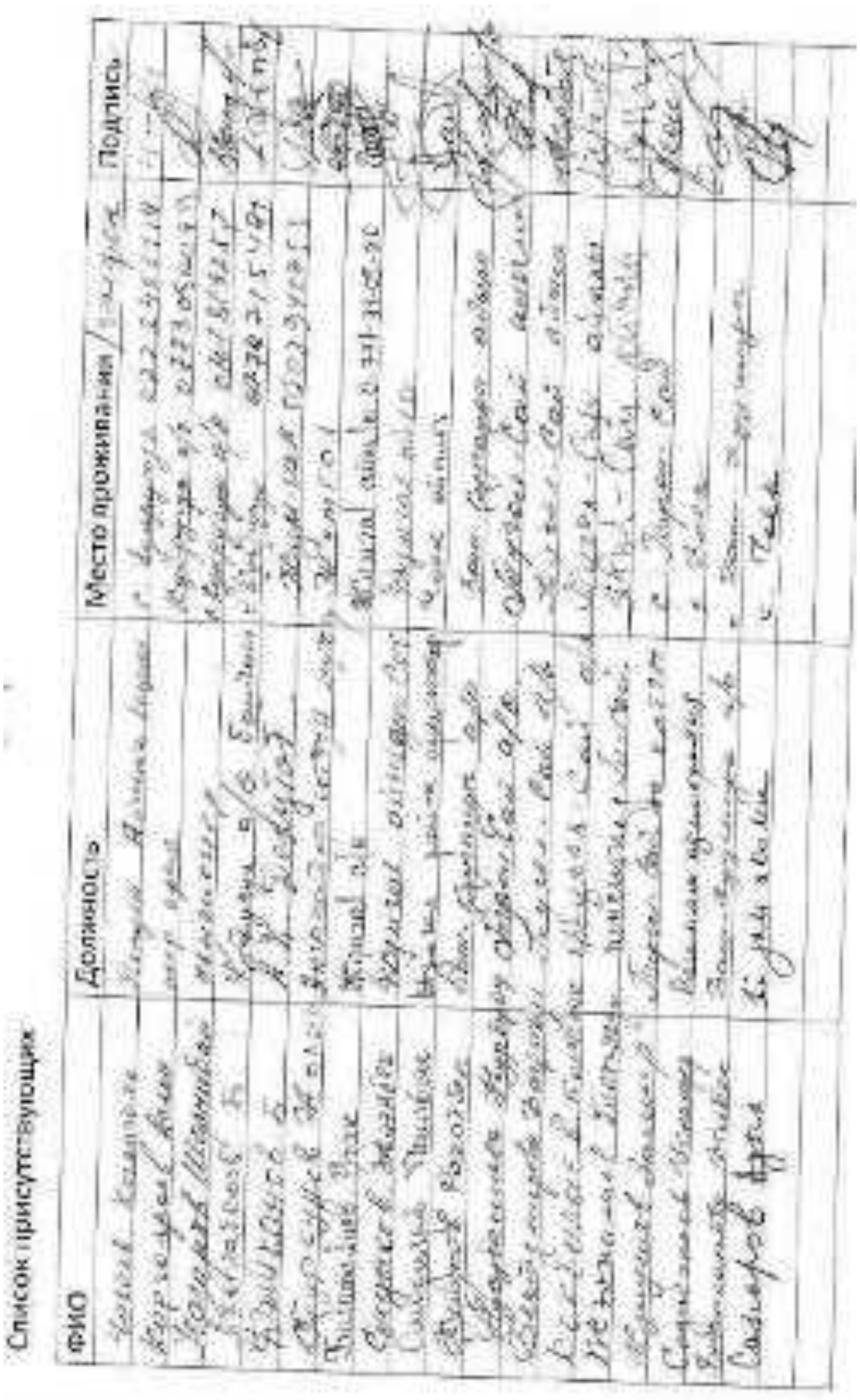
Annex B - List of Attendees in the Public Consultation in Bashkugandy

18 Mar. 2016

Attendance Sheet

No.	Full name	Position	Place of residence /	Signature
1	Chokoev	Deputy of Village	Kuiruchuk village	/signed/
2	Korgoldaev A.	Land specialist	Kuiruchuk v/a	/signed/
3	Nazarov	Retiree	Kuiruchuk v/a	/signed/
4	Abylabekov B.	Head of Kuiruchuk v/a	Kuiruchuk village	/signed/
5	Dyikanov B.	A.K Deputy	Jumgal /0708940053	/signed/

6	Tursunov Jalil	Member of court of	Jumgal village	/signed/
7	Bolotaliev Uzak	Jumgal v/a	Jumgal village	/signed/
8	Sydykov Jeenbek	Court of Jumgal village	Jumgal village	/signed/
9	Smodiyarov	Architect of Jumgal	Chaek village	/signed/
10	Jumukov	Bash-Kuugandy v/a	Bashkugandy village	/signed/
11	Nusubalieva	Tugol-Sai v/a	Tugol-Sai village	/signed/
12	Bektemirova	Tugol-Sai v/a	Tugol-Sai village	/signed/
13	Kokbalaev	Tugol-Sai v/a	Tugol-Sai village	/signed/
14	Jeenaliev	Retiree	Tugol-Sai village	/signed/
15	Junushov Zamir	Executive Secretary of Tugol- Sai v/a	Tugol-Sai village	/signed/
16	Sadybakasov	Regional	Chaek village	/signed/
17	Botokanova Jibek	Bash-Kuugandy v/a	Bashkugandy village	/signed/
18	Saparov Adyl	First deputy of head of	Chaek village	/signed/



Список присутствующих

ФИО	Должность	Место проживания / телефон	Подпись

Annex C – Written Comments, Recommendations and Questions

Name: Sharypbai Nazarov
Residential address: Kuiruchuk village authority
Proposals concerning the road rehabilitation project:
Please build a ditch along the shoulder of the road, which will be needed for watering agricultural land plots.
Questions related the road rehabilitation project:

Name: Kylychbek
Residential address: Kuiruchuk village
Proposals concerning the road rehabilitation project:
Build ditches along the road inside the village.
Provide for opportunities of connecting two markets.
Transfer old removed structures to the village authority.
Lay sleeve pipes for drinking water to be used by new rural communities Questions related the road rehabilitation project:
Are there standards for prevention of road collapse in swampy areas?

Name: Nurbubu Turdalieva
Residential address: Tugol-Sai village authority
Proposals concerning the road rehabilitation project:
It would be good not to destroy cemeteries along the road to avoid discontent of local people.
It would be good if the road went around the village.
Questions related the road rehabilitation project:
Will the Contractor arrange for sidewalks?
Is it possible to build a road on swampy area?

Name: Bektemirova Baktygul
Residential address: Tugol-Sai village authority
Proposals concerning the road rehabilitation project:
Expand the road; build eight bridges, one big bridge and seven small bridges on Tugol-Sai and Epkin road.
Questions related the road rehabilitation project:
When will the construction be started?

Name: Aslanbek
Residential address: Kuiruchuk village, Zhumgal region
Proposals concerning the road rehabilitation project:
Please lay two pipes for drinking water on two places.
Please connect two markets through an underpass.
Questions related the road rehabilitation project:
Will the Contractor turnover concrete pipe culverts, old pipes to the village authority and use the same for improving roads inside the village?

Name: Zheenbek Sadykov
Residential address: 11 Rysbaev Sydyk Street, Zhumgal village
Proposals concerning the road rehabilitation project:
As the road inside the village is located close to the school, we request you to change the route of the road, for example towards Chet-Bulak.
Questions related the road rehabilitation project:
Name: Tursunov Jalil
Residential address: Zhumgal village authority
Proposals concerning the road rehabilitation project:
Please check if my house is located very close to the road. Please arrange for subway or install a traffic light in front of the school.

Questions related the road rehabilitation project:

Name: Saparov Adyl
Residential address: Baizak village
Proposals concerning the road rehabilitation project:
Please install lighting lamps inside the village.
Turn over old removed concrete pipe to the village authority. Questions related the road rehabilitation project:

Name: Zamir Zhumushov
Residential address: Tugol-Sai village
Proposals concerning the road rehabilitation project:
Tugol-Sai – Epkin section of the Bash-Kuugandy – Kyzart road will cross the farmlands; so please provide for roundabouts. It would good if the Contractor built five bridges within the Tugol- Sai – Epkin section.
Questions related the road rehabilitation project:

Annex D – Transcript of the video recording: in Bashkuugandy, Kochkor District

Mr. Ruslan, IPIG/MOTR:
As I said, heads of village authorities should take measures to provide the list of utilities to be laid under the road to the MOTR as soon as possible. Specialists shall soon start preparing detailed project design. If you submit your proposals/requests before the start of detailed project, specialists shall identify whether it is possible to meet your requirements or not. It would be good if you have submitted your proposals/requests before April 15.

Local specialist with scale map /plan (architect):
I am holding in my hand a scale map/general plan, where every utilities and places thereof are specified in detail. We need to cooperate closely with heads of each village authority and do our best to include utilities that we need into the project, even if it is a reserve pipe for future needs. Did you understand what these people said? If we fail to submit our proposals/requests before deadline, everything will be done at the expense of our village authorities. To avoid it, we need to start working on it right now.

Local resident:
My house is between the standpipe and road. If the width of the road becomes 15 m, then my house will be destroyed, am I right?

Local specialist with scale map/plan (architect):
You have heard that specialists were working right now. They will identify whether a house/structure will be removed or not. In any case, owners of structures to be removed will be compensated. For example, I am afraid that my warehouse will be removed. Do not think that 16 m width will be coated with asphalt; there will be a shoulder uncoated with asphalt. So vehicles will not be moving close to your structure.

Mr. Ruslan, IPIG/MOTR:
You need to check that against the map. If your fence is on the road, then it will be removed. Otherwise, your fence shall stay where it is. Actually, specialists shall consider whether it is possible to expand the road to opposite side, where there is no any structure. During detailed design, specialists shall take topographic mapping and identify how many electric poles should be shifted. The same is about standpipes. If water supply pipes are under the asphalt-coated part of the road, then they will be shifted. If they are under shoulder or far from it, they will remain in their places.

Local resident:
Last summer I was cultivating my potato. A car parked close to my land and American person with translator got off the car. They asked me if I was local resident. When I said yes, they asked if there was pipe of clean water. I showed them the place where it was. Then they asked about the road to be reconstructed. I answered that the road would be reconstructed and I did not know about its dimensions. They told that they built clean water supply system and they would be controlling it.

Mr. Ruslan, IPIG/MOTR:
That was just a provocation. You know that many years have passed since this road was built. We need to find out if that was licensed or not.

Head of Bashkuugandy village authority:
Every village authority has its land specialist, architect, pasture specialist, etc. They need to cooperate closely and discuss the village's needs concerning utilities.

Local resident:
Thank you very much for your efforts. You are improving our life through improving the road. I am the elder of the Jumgal village. Since I heard that the road would be reconstructed I did not know whom I should apply to. The road shall pass near the school. The school is two-story building. You said that heavy machines would be operating during construction of the road. Is it possible to provide for bypass? We old people know where the bypass road could be arranged and can show the place. Bypass road should start from Chet-Bulak and end with Kyzart.

Mr. Ruslan, IPIG/MOTR:
Does that road cross arable lands? We need to study its soil composition and many factors. However, you may write down your request. I would like to underline that we shall reconstruct the old, existing road. We will not build a new road. You need to understand it as related to financing. Transformation of road will require much time, bureaucracy issues will arise etc. Contractor will reconstruct road according to standards inside villages. The same standards were applied during construction of the road in the city. Therefore, there is no need to worry about it. In no way shall the Contractor damage public structures, he carries out construction operations according to standards and with due care.

Head of Bashkuugandy village authority:
We already applied concerning a bypass road. Specialists came, examined that road you were telling about and drew a conclusion that it was unsuitable. Mr. Ruslan you should be honest, you are asking us to write down our proposals despite the content thereof. If you are not able to fulfill them, you should not say so. You should be straight and tell that the old/existing road will be reconstructed and no bypass is allowed. (Addressing to local residents) If we, local residents, request to arrange for a bypass road, transformation process will take 6 months-1 year at least and we will lose 2-3 years as a result. Donors' specialists came and examined all possible bypass roads, conducted physical analyses and concluded that they were unsuitable. In addition, they told that if reconstruction of old road required for instance 900 000 000 USD, constructing additional bypass roads would require 3 times as much. Therefore, they refused to build bypass roads.

Local residents are discussing:
Mr. Ruslan told to write down your request concerning the bypass road just to be polite. In fact, no by pass road will be arranged. We need to tell so to our people.

Local resident:
My question is whether our Bashkugandy village will be covered by the project. You were telling that the road would be reconstructed to Bashkugandy village.

Translator:
We were telling that the section 2 would end in Bashkugandy village. However, there are sections 3 and 4 and Bashkugandy village road will surely be reconstructed.

Mr. Ruslan, IPIG/MOTR:

Do not be confused. We divided the road into sections just for the reason that one donor cannot finance all sections. There might be 4 different donors, or might be 3, which will finance by one or two sections of the road. Bashkugandy is surely included into the project. Currently specialists are identifying how many structures will be removed in your village. I hope that financing matters will have been solved by the end of the President's period of service and our President is also making great efforts in that direction.
Last time I asked to provide your proposals in written. Unfortunately, the MOTR has not received any proposal/request by now. I currently do not know how many pipes should be laid and how many traffic lights should be installed in your village. Once again, I repeat make sure that you have submitted your written proposals by April 15, so we could be able to include them into detail design. As for underpasses, please decide at first, which is better for you – traffic light or underpass; and then include it into your official request. I would like to note that underpass eventually turn into toilets, for example those in the city. Therefore, you need to decide about it.

Local resident (woman):
Thank you for your coming. We understood your purpose; you are trying to help us. We, local residents, try to include our little requests into your project as usual. (Addressing to local people) We need to sit down and prepare a list of our proposals within two days instead of doing the same until April 15. You may be concerned about cemeteries, I am sure builders are smart people; if they need to expand the road they will do it to opposite side, where there is no structure. The same is about the school you were telling. If you keep on quarrelling, you will lose time and make donors to lose their time. Stop doing so and calm down.
(Addressing to local translator) Please say great thanks to our guest for his assistance in reconstruction of the road.

Head of Bashkuugandy village authority:
We have been looking forward for reconstruction of Jumgal's road. Thanks God, it is about to be reconstructed. Therefore, all residents, we need to support this process by correct explaining it to our villagers. Heads of each village authorities, please support the resettlement/removal process through your land specialists, accompany donors' specialists and explain everything to owners of structures to be removed/shifted to speed up the reconstruction process.

Annex E – Results of laboratory analysis

a) **Air quality**

КЫРГЫЗ РЕСПУБЛИКАСЫНЫН ӨКМӨТҮНӨ КАРАШТУУ КУРЧАП ТУРГАН ЧӨЙРӨНҮ КОРГОО
ЖАНА ТОКОЙ ЧАРБАСЫ БОЮНЧА МАМЛЕКЕТТИК АГЕНТТИГИНИН
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) 54-67-65, факс: [illegible]

ПРОТОКОЛ
АНАЛИЗА ПРОБ АТМОСФЕРНОГО ВОЗДУХА

№ 220-235

1. Наименование предприятия, организации (заявитель):
[illegible]
Автодорога «[illegible]»

2. Место отбора проб:
220-[illegible] *228-[illegible]*
221-[illegible] *229-[illegible]*
222-[illegible] *230-[illegible]*
223-[illegible] *231-[illegible]*
224-[illegible] *232-[illegible]*
225-[illegible] *233-[illegible]*
226-[illegible] *234-[illegible]*
227-[illegible] *235-[illegible]*

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

4. Кем отобраны пробы: *[illegible]*

5. Дата и время отбора проб: *30.11 - 02.12.2015г., с 09ч 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.*

Стр.1 из [illegible]

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

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

[illegible], г. Бишкек, ул. [illegible] 24 тел. (996 312) [illegible], факс [illegible]

ПАСПОРТ НА ПРОБУ

1. Наименование, адрес объекта: [illegible]
2. Места отбора проб: [illegible]
3. Цель отбора: [illegible]
4. Характер отобранных проб: разовый
5. Условия окружающей среды: [illegible]
6. Условие отбора проб:
7. Дата отбора проб: [illegible]
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 [illegible]
(должность, фамилия)

Госинспектор
(должность, фамилия)

Представитель предприятия [illegible]
(должность, фамилия)

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

720033, г. Бишкек, ул. [illegible], 34 тел. [illegible], факс [illegible]

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 оксиду углерода (CO) в атмосферном воздухе по причине непригодности газоанализатора ГГА-200.

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

Начальник Б.Маматкаров

b) **Water quality**

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

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

720005, г. Бишкек, ул. [illegible] тел. (996 312) 54-47-46, факс: 54-[illegible]

Аттестат аккредитации
№ KG 417/КЦА.ИЛ.049
от 05. 06. 2013 г.
[illegible]

ПРОТОКОЛ
АНАЛИЗА ПРОБ ВОДЫ

№ 513-519

1. **Наименование предприятия, организации (заказчика):** [illegible]

2. **Место отбора проб:**
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

3. **Цель отбора проб:** [illegible]

4. **Кем отобраны пробы:** [illegible]

5. **Дата и время отбора проб:** 30.11-02.12.2015 г. [illegible]

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

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

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

[illegible] [illegible]

ПАСПОРТ НА ПРОБУ
(ВОДА)

1. Наименование, адрес объекта: [illegible]
2. Место отбора проб: [illegible]
3. Цель отбора:
4. Характер отобранных проб: [illegible]
5. Условия окружающей среды: [illegible]
6. Дата отбора проб: [illegible]
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

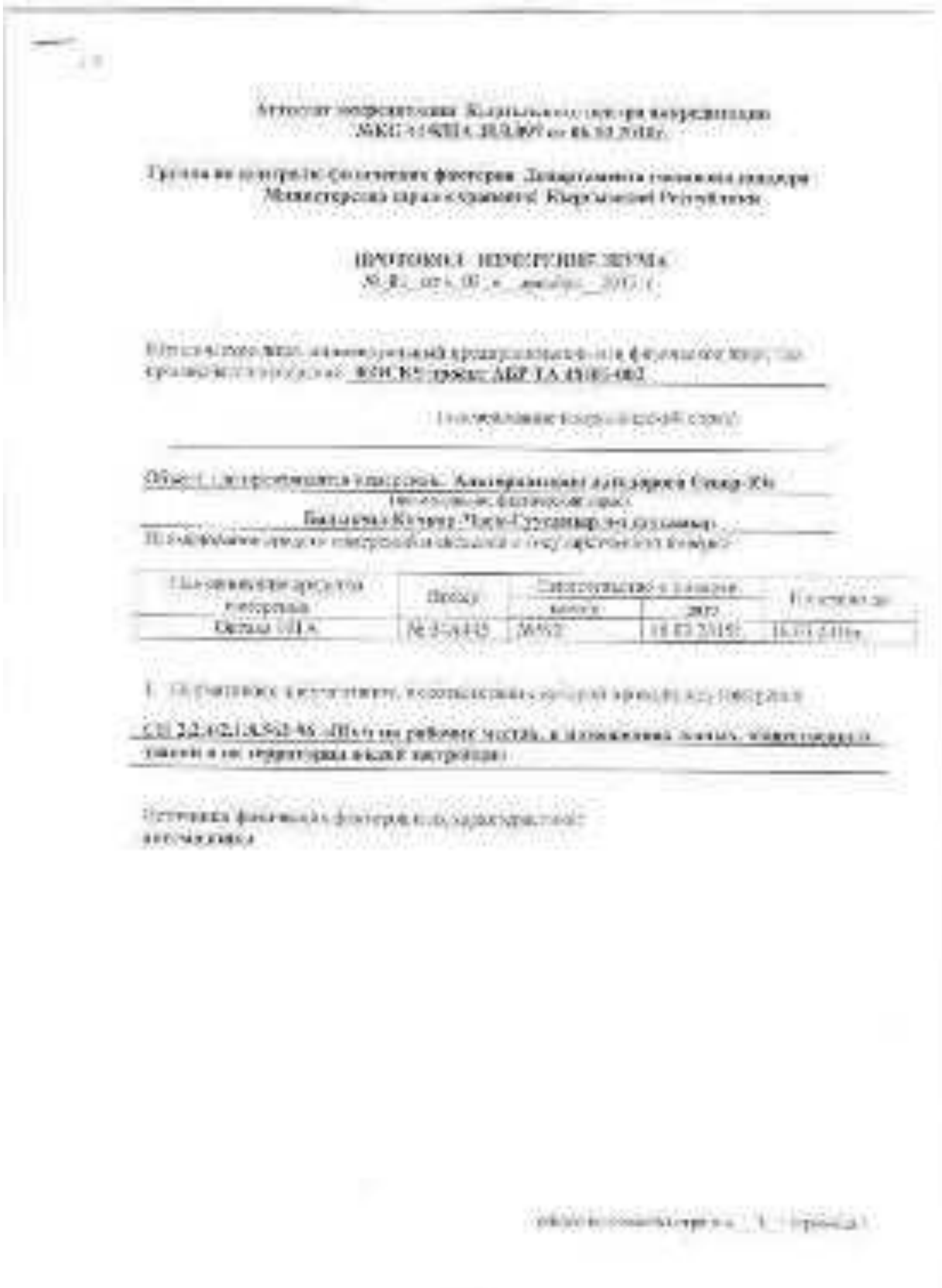
Представитель УЭМ [illegible]
(должность, фамилия)
Госинспектор
(должность, фамилия)
Представитель предприятия [illegible] 22.11.08.2020 [illegible]
(должность, фамилия)

Наименование показателя	Ед. изм.	Данные анализа из точки							ПДК		НД
		314	314	315	316	317	318	319	+	—	
Прозрачность*	см	[illegible]	37	42	36	26	37	33			[illegible]
[illegible]	мг/л	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Главный специалист С.В.Янова

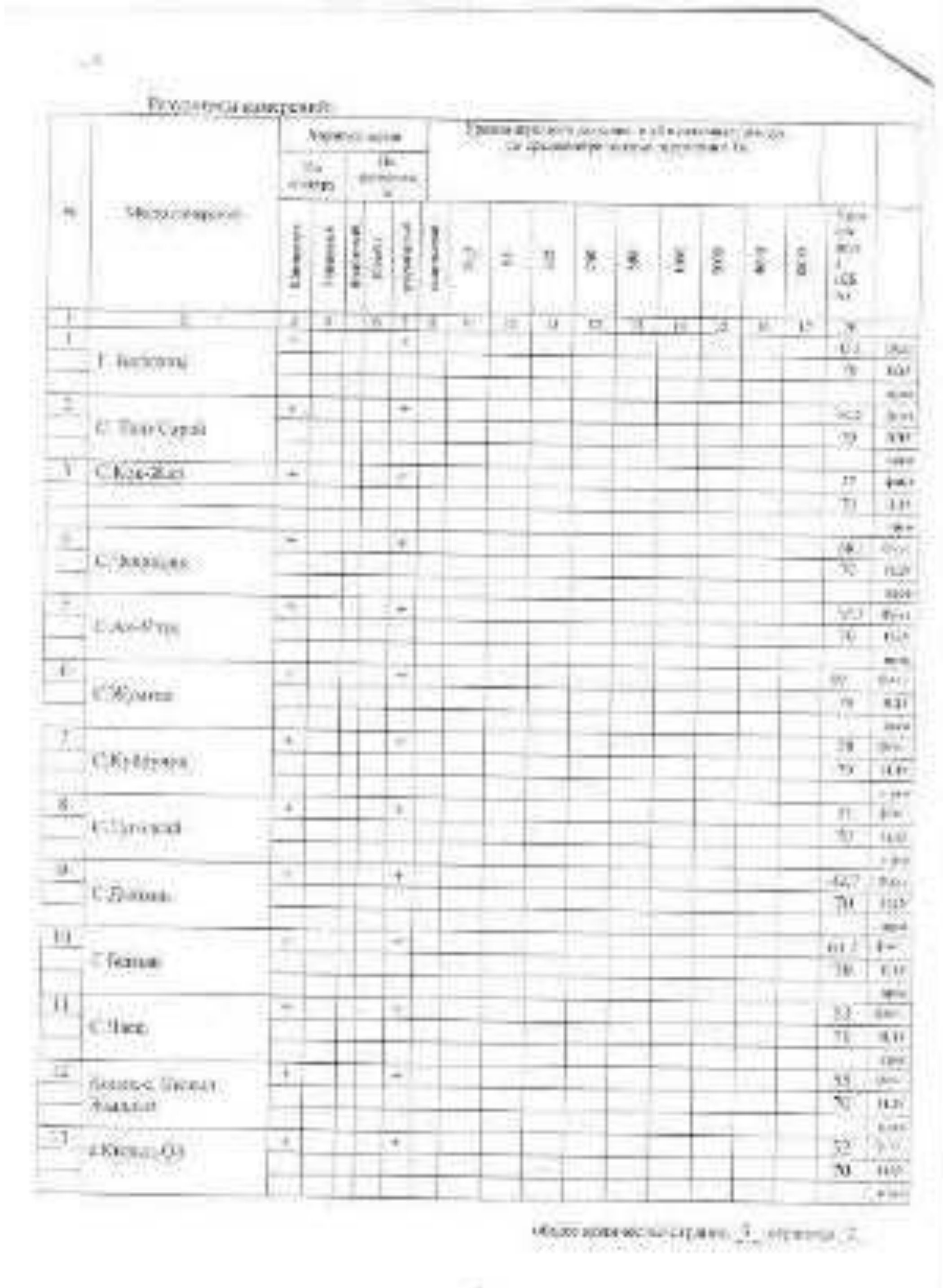
[illegible]

c) **Noise**

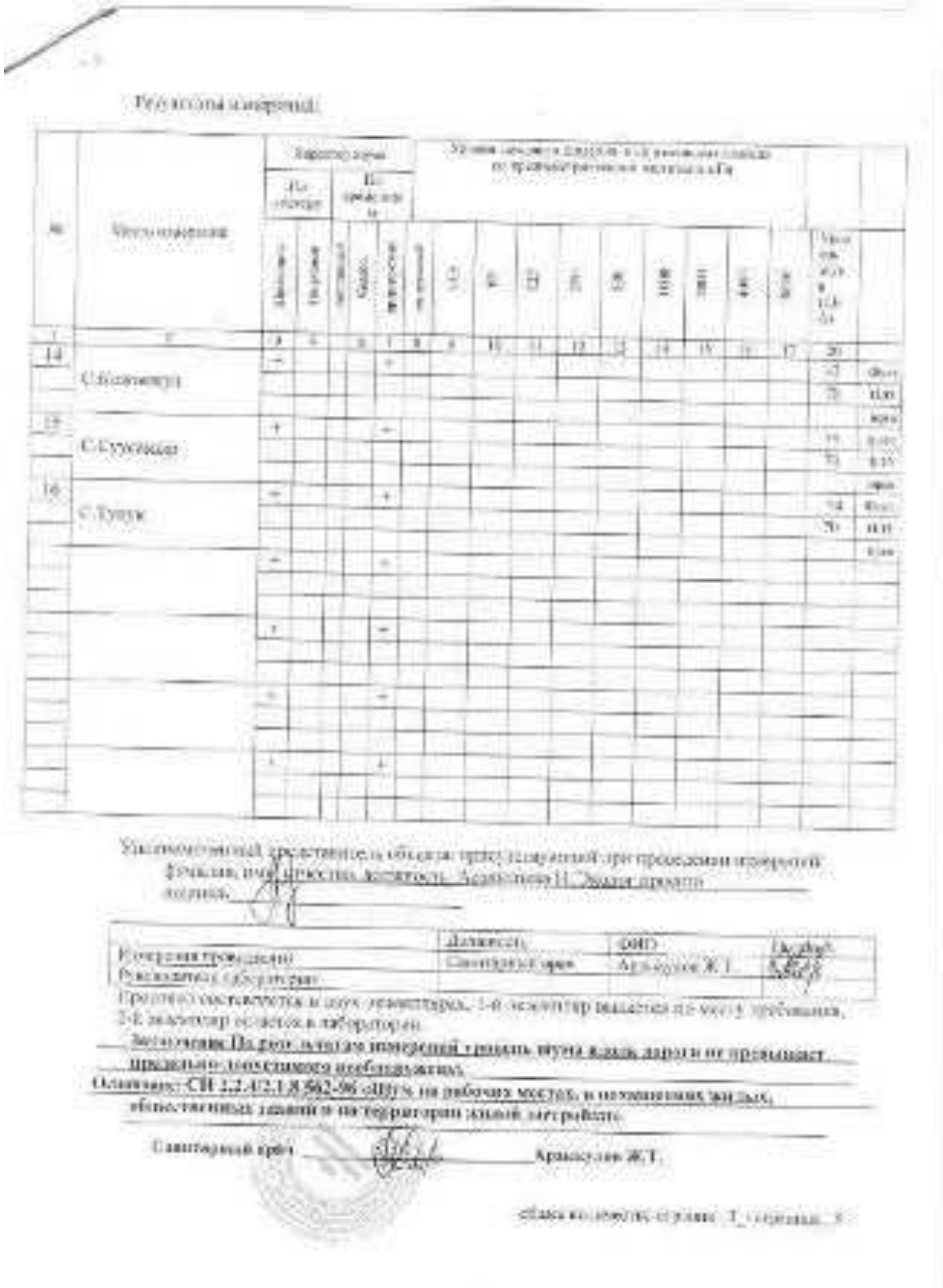


These results were not quoted in this IEE.

These results were not quoted in this IEE.



These results were not quoted in this IEE.


Результаты измерений:

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

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 ______ Арзикулов Ж.Т.

d) **Vibration**

These results were not quoted in this IEE.

Аттестат аккредитации Кыргызского центра аккредитации
№KG 41/КЦА .П.1.097 от 06.10.2016г.

Группа по контролю физических факторов Департамента госсанэпиднадзора
Министерства здравоохранения Кыргызской Республики

ПРОТОКОЛ ИЗМЕРЕНИЯ ВИБРАЦИИ
№ _87_ от «03» декабря 201[illegible] г.

Юридическое лицо, индивидуальный предприниматель или физическое лицо, где проводились измерения: KOCKS проект АБР ТА-8840 002
(наименование и юридический адрес)

Объект, где проводились измерения: Альтернативная автодорога Север-Юг
(наименование, фактический адрес)
Балыкчы-Кочкор-Чаек-Суусамыр 4-й участок

Наименование средств измерений и сведения о государственной поверке:

Наименование средства измерения	Номер	Свидетельство о поверке		Поверено до
		номер	дата	
Октава 101А	№ 06А647	KGA-06-01-7591	02.12.2014	02.12.2015

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 характеристика:
Грузовые автотранспортные средства и строительно-дорожное оборудование [illegible]

(Общее количество страниц _3_ страница 1)

These results were not quoted in this IEE.

Результаты измерений:

№	Место измерений	Характер шума: по спектру		по временным				Уровни звукового давления в дБ в октавных полосах со среднегеометрическими частотами в Гц									Уровень звука	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	[illegible]																92,4 103	[illegible]
2	[illegible]																91,7 102	[illegible]
3	[illegible]																90 106	[illegible]
4	[illegible]																[illegible] 101	[illegible]
5	[illegible]																[illegible] 105	[illegible]
6	[illegible]																[illegible] 105	[illegible]
7	[illegible]																[illegible] 104	[illegible]
8	[illegible]																[illegible] 108	[illegible]
9	[illegible]																[illegible] 106	[illegible]
10	[illegible]																88 104	[illegible]
11	[illegible]																[illegible] 108	[illegible]
12	[illegible]																87 108	[illegible]
13	[illegible]																85 105	[illegible]
14	[illegible]																90 104	[illegible]

Общее количество страниц _3_, страница _2_

These results were not quoted in this IEE.

Результаты измерений:

[illegible]

	Должность	ФИО	Подпись
[illegible]	Санитарный врач	[illegible]	[illegible]

Заключение: [illegible]

Основание: Санитарные нормы СН 2.2.4/2.1.8.566-96 "Производственная вибрация, вибрация в помещениях жилых и общественных зданий

Санитарный врач ________________ [illegible]

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

These results were not quoted in this IEE.

КЫРГЫЗ РЕСПУБЛИКАСЫНЫН МАДАНИЯТ, МААЛЫМАТ ЖАНА ТУРИЗМ МИНИСТРЛИГИ

МИНИСТЕРСТВО КУЛЬТУРЫ, ИНФОРМАЦИИ И ТУРИЗМА КЫРГЫЗСКОЙ РЕСПУБЛИКИ

«24» 04 2016 г.

Чыгыш (исх.) № 14-3/1065

Кабыл алуу (вх.) №

Компания
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°10'45.3")** (3,5 км. от поворота на право, мост через реку Кокомерен).

These results were not quoted in this IEE.

- могильник Кырчын 2 **(N41°52'59.4" E074°19'20.3")** (в 6-ом 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-ом 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);

- Кумбоз 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.

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».

Статс-секретарь **Б. Сеитов**

Annex G: Information letter from MOTR

КЫРГЫЗ РЕСПУБЛИКАСЫНЫН
ТРАНСПОРТ ЖАНА ЖОЛДОР
МИНИСТРЛИГИ

[illegible]

МИНИСТЕРСТВО ТРАНСПОРТА
И ДОРОГ
КЫРГЫЗСКОЙ РЕСПУБЛИКИ

[illegible]

№ 11-3/5279 «30» 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 [illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

- [illegible] КР [illegible] жана [illegible].

Техникалык [illegible] «ТОСКЗ» консультациялык [illegible] КР ТжКМ [illegible] долбоорлорду ишке ашыруу тобунун [illegible] "[illegible]" жана "Көчүрүү жана жерлерди алуу планы" [illegible] иштеп чыкты.

Бул документтер менен [illegible] КР [illegible] жана АӨБ Коргоо чаралары боюнча саясатынын [illegible].

Жогорку [illegible] долбоорго байланыштуу [illegible] Азия Өнүктүрүү Банкынын талабын аткаруу керек.

Жогоруда белгиленгендердин негизинде, КР "[illegible]" [illegible] Азия Өнүктүрүү Банкынын Коргоо чаралары боюнча саясатынын талаптарын [illegible] Бишкек – Ош жолундагы Бишкек-Нарын-Торугарт [illegible] жүргүзүлүүчү [illegible]:

<u>Чүй облусунун Жайыл району:</u>
- Кызыл-Ой а.,[illegible] а., [illegible] а., [illegible] айыл аймагы.

<u>Нарын облусунун Кочкор району:</u>
- Кок-Жар а., Кок-Жар айыл аймагы;
- [illegible] а., [illegible] айыл аймагы;
- [illegible] а., [illegible] айыл аймагы.

<u>Нарын облусунун Жумгал району:</u>
- Жумгал а., Жумгал айыл аймагы;
- Куйручук а., Куйручук айыл аймагы;
- Түгөл-Сай а., Түгөл-Сай айыл аймагы;
- Баш-Кууганды а., [illegible] а., Баш-Куугандыайыл аймагы;
- Байзак а., Байзак айыл аймагы;
- [illegible] а., Чаек айыл аймагы;
- Кызыл-Жылдыз а., Кызыл-Жылдыз айыл аймагы

[illegible]

Тиркеме: [illegible] жана [illegible] 5 барактa.

Урматтоо менен,

Министр [illegible] Б.Айдаров

[illegible]

1-тиркеме

[illegible]
([illegible])

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-Куугандо а/а – Баш-Куугандо, 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

Карта: Республиканын Өнүктүрүү Азия өнүктүрүү банкынын (АӨБ) КАРЕК [illegible] 3-коридорунун [illegible] [illegible]
ТПП 3 участогу камтыйт:

* Балыкчыдан (км) [illegible] километр [illegible] чейин [illegible], болжол менен [illegible] жер;
* Кочкордон [illegible] чейин [illegible], болжол менен 25 жер;
* Эпкинден 189 км Баш-Куугандого чейин [illegible] болжол менен 70 жер;

- Дыйкан айылынан тартып (159 км) Кызыл-Жылдыз айылына чейин (183 км) [illegible] менен 24 км, мында Чеек айылынан тартып Кызыл-Жылдыз айылына чейин бир бөлүгүн айланып өтүү үчүн [illegible] жолду куруу каралууда; жана
- Арсланбап тарабын (195 км) Таш-Арык ашуусуна чейин (286 км) бөлүгү менен 91 км.

Долбоордун алкагында каралбаган компоненттерди тартуунун мейкиндиги жана чечилет. Өкмөт менен айрым деталдарды макулдашууга жетишүү үчүн талкуулар жүргүзүлүп келет: (i) Кыргыз Республикасынын жол активдерин башкаруунун натыйжалуулугун жогорулатуу, (ii) өкмөттүн транспорт секторундагы институционалдык реформалар менен колдоо, (iii) натыйжалуулукка негизделген келишим контрактарды жүргүзүү жана (iv) Кыргыз Республикасынын жол коопсуздугун жогорулатуу.

Транспорт жана коммуникация министрлигинин (ТжКМ) алдындагы Инвестициялык долбоорлорду ишке ашыруу тобу (ИДИТ) куруучу бөлүмчө катары ушул долбоор боюнча Аткаруучу орган (АО) катары чыгат. Мурунку болуучу финансылык жардамдын баштапкы бөлүгү катары, АӨБ бүтүндөй долбоор үчүн техникалык-экономикалык негиздемени жана баткоодуу долбоорду даярдоо үчүн «Кок Консульт Гмбх», Германия, жеке Консультациялык кызмат көрсөтүүчүлөрдүн калоону баштапкы экологиялык баалоону (БЭА); жана социалдык талдоону жана жакырчылыкты талдоону жана 2005-жылдагы АӨБ Коопсуздук саясаты жөнүндө билдирүүгө (КСБ) ылайык документтерин баалоону камтыйт.

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

- Түштүк региондордон Нарын жана Ысык-Көл облустарына шаарларына жана товарлардын жеткирүүсүндө кеткен жеткен убакыттын кыскарышы.
- Киргизди кыскартууга жана жакын жол шаштарына байланыштуу транспорт чыгымдарын азайтуу.
- Жергиликтүү шаарлар арасындагы ташуулардын жана кызматтардын көбөйүүсү.
- Жергиликтүү жамааттар үчүн жолдорду кароо жана жеңүүнүн мүмкүнчүлүктөрдүн пайда болушу.
- Жаңы жумушчу орундарын түзүү.
- Транспорт каражаттарынын (ТК) өз жүгүн [illegible] чыгымдарын кыскартуу.

Кыргыз Республикасынын мыйзамдарына ылайык курчап турган чөйрөгө таасирине баалоо жүргүзүү керек. ТЭН баскычында курчап турган чөйрөгө таасирин баалоону лайкдоо Техникалык-экономикалык негиздеме (ТЭН) курчап турган чөйрөгө таасирин алдын ала баалоо (КЧТАБ) катары каралат жана КЧТБ [illegible] менен иштелет.

АӨБ Коргоо Саясаты боюнча Жоболорунун эскертмесине ылайык (2009) долбоор В (Ба) категориясына кирет жана курчап турган чөйрөгө таасирин толук баалоону (КЧТБ) талап кылбайт. АӨБ «Б» категориясындагы долбоорлор үчүн саясаттын алкагында Баштапкы экологиялык баалоону (БЭБ) даярдоо керек.

Кыргыз Республикасынын мыйзамдарынын, ылайык, [illegible] [illegible] өткөрүлөөрүн, бирок БЭБ жана КЧТАБ документтерин бирдей мааниде саналып каралат болот.

Экологиялык жана Социалдык Баалоонун максаттары

- Ар кандай түз жана кыйыр экологиялык таасирлерден келип чыгуучу аныктоо жана баалоо жана аларды байланыштуу көйгөйлөрдү чечүүгө багытталган чаралар.
- Долбоордук БЭБ/КЧТАБ даярдоо.
- Жаратылышты коргоо иш-чараларынын пландары (ЖКИП) даярдоо.

Ушул БЭБ/КЧТАБ максаты сунушталып жаткан долбоордун курчап турган чөйрөгө [illegible] мүмкүн, потенциалдуу таасирин баалоо жана социалдык маанисин баалоо [illegible] [illegible] [illegible] [illegible] [illegible] жатат

кайсы[illegible] байланыштуу курчап турган чөйрөгө эч кандай олуттуу жагымсыз [illegible] кайтарылгыс таасирлер белгиленген жок. БЭБКЧТАБ боюнча ушул документ жөнүндө бүтүндөй долбоордук цикл ичинде жүргүзүлө турган [illegible] чыгаруунун жана жумшартуунун (же майыптарга) [illegible] компенсация [illegible] багытталган, пестициддерди [illegible] боюнча тийиштүү чаралар менен [illegible] [illegible], [illegible] [illegible] [illegible] жана уязвимдуулугу, сезгич рецепторлордун жана [illegible] [illegible] [illegible] Курчап турган чөйрөнү башкаруу планы (КЧБП) камтыйт.

Бардык участоктор үчүн БЭБКЧТАБ [illegible] боюнча [illegible] [illegible] [illegible] [illegible]. Ошондой эле [illegible] [illegible] [illegible] [illegible] [illegible] жана вибрацияны [illegible] [illegible].

Долбоордун сүрөттөлүшү

Төмөндө көрсөтүлгөн жол участоктору жолдун II техникалык категориясына чейин реконструкцияланат:

- [illegible] (км) 43 километр [illegible] 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 Дайкан] (159 км), болжол менен 70 км;
- Дайкан 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.

Арадан тартып (195 км) Ене-Ассуу ашуусуна чейинки (286 км), болжол менен 91 км, жол участогу жолдун III техникалык категориясына чейин реконструкцияланат.

Долбоорлорго жолдун участогу тууралуу маалымат төмөндө берилген:

- Кыргызстандагы [illegible] [illegible] [illegible], [illegible] жол участокторун II, III техникалык категорияга чейин реконструкциялоо
- Каналдардын жана суу өткөргүч түтүктөрдүн калыбына келтирүү, [illegible] [illegible] алмаштыруу
- Көпүрөлөрдү жана башка [illegible] курулмаларды куруу;
- Тирөөч дубалдардын жана [illegible] болгондо [illegible] [illegible] боюнча [illegible] [illegible]
- [illegible] жол белгилерин жана [illegible] [illegible] [illegible]
- Коргоочу [illegible] [illegible].

Жол Кыргызстандагы геометриялык долбоордук ченемдерине ылайык [illegible] [illegible] керек жана ал болжолдонгон [illegible] [illegible] аралыгында жол кыймылынын [illegible] [illegible] [illegible] көтөрүү үчүн [illegible] болушу керек. Жол [illegible] [illegible] [illegible] (тилкелердин [illegible] [illegible]) жана жол [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] менен жол болот. Төмөндө [illegible] боюнча конструктивдүү элементтер берилген:

- Долбоордук жол үчүн:
  - Тилкелердин саны: 2
  - Тилкенин кеңдиги: 3,5-3,75 м
  - Өтүү бөлүгүнүн кеңдиги: 7,00-7,50 м
  - Жолдун үстүнкү кеңдиги: 3,25-3,75 м (жээк [illegible] 0,50-0,75 м салынган)

- [illegible] 15.00 м

- [illegible]
- [illegible] 3
- [illegible] 3,5 м
- [illegible] 7.00 м
- [illegible] 2.5 м [illegible]
- [illegible] 12.50 м

[illegible]

Таасирлери.

[illegible]

REHABILITATION AND UPGRADING OF CONNECTOR ROAD SECTION 2B

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 in the Kyrgyz Republic. 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 update the IEE's 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 for Section 2B.

Figure 1. Location of Additional Finance Section 2B

An initial site visit was made in December 2017 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, 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.

Throughout the report use is made of technical descriptions and these are described in the Glossary of Terms which is set out at the end of the report.

2. BASELINE NOISE LEVELS

In Section 2B, baseline noise levels at dwellings in the villages alongside the road are dominated by road traffic noise, but progressively further away from the road traffic on local 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. Short term monitoring comprised two noncontiguous 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 1a and 1b below.

The results of the 24 hour monitoring, when corrected from freefield to façade (+3dB) show good agreement with day and night time calculated road traffic noise levels. The results of the short term monitoring also show good agreement at rec. 47, Tugol Say, however at rec. 37, measured levels are higher than calculated road traffic noise levels.

Rec No.	Distance to road	Location	Date	$L_{Aeq, 1hr}$ (dB)	Model Output (dB)
27a		Jumgal	05/05/2018 05/05/2018	54.1 57.8	n/a
37	6	Kuiruchuk	05/05/2018 05/05/2018	62.2 61.0	56.9
47		Tugol Say	05/05/2018 05/05/2018 05/05/2018	54.4 53.0 51.3	54.2

Table 1a. Results of Short term noise monitoring Section 2B

	Day 07:00-19:00	Eve 19:00-23:00	Night 23:00-07:00
Measured noise level (dB) (corr to fac.)	61.3	58.1	55.8
Calculated road traffic noise level (dB)	59.0	n/a	56.2

Table 1b. Results of 24hr monitoring noise monitoring. Section 2B Dwelling in Jumgal, Receptor ID No. 27, Distance to road, c. 13m

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 account of 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. In order to give a worst-case assessment, noise levels have been calculated at the nearest position on the road to each receptor and 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 move off site

Stage 3. Laying new subgrade and vibratory compaction (where applicable)

Stage 4. Laying new asphalt with paving machine

A schedule of sound power levels for construction plant, and percentage on times for the construction activities is set out in Table 2 overleaf.

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 once away from the road, and only those houses nearest to the road are marked. This has limited the accuracy of noise calculations and also the spatial scope of the assessment. Barrier effects beyond the first row of houses have been ignored and it is has not been possible to carry out noise calculations at buildings further away from the road as their location is not shown on the mapping.

Stage	Activity	Plant Description	L_{wA} (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

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 for environmental impact assessment where the effects 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 c.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 levels 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 or night 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 village name or type of receptor e.g. shop or house (hse.). 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.

The construction noise tables then give in column 3 the daytime baseline noise levels $L_{Aeq,12hr(dB)}$ taken from the road traffic noise calculations. This level is used to calculate the noise increase for the four construction activities presented in the Table.

Details of construction noise effects are set out below for each of the villages in Section 2b including Jumgal, Kuiruchuk and Tugol Say

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

Rec. No.	Location	Baseline Noise 2018	Activity Construction Noise Levels and Noise Increase							
			Preparation		**Asphalt Breaking**		**Sub-base and base**		**Asphalt Laying**	
		$L_{Aeq,12hr\ (dB)}$	$L_{Aeq,12hr\ (dB)}$	Δ dB	$L_{Aeq,12hr\ (dB)}$	Δ dB	$L_{Aeq,12hr\ (dB)}$	Δ dB	$L_{Aeq,12hr\ (dB)}$	Δ dB
23	Jumgal Hse	60.3	78.6	18.3	81.9	21.6	78.8	18.5	73.7	13.4
24	School	62.8	80.3	17.5	83.6	20.8	80.5	17.7	75.4	12.6
25	Admin	56.3	70.0	13.7	73.2	16.9	70.1	13.8	65.0	8.7
26	Shop	64.1	79.5	15.4	82.8	18.7	79.7	15.6	74.6	10.5
27	Jumgal Hse	59.0	74.8	15.8	78.1	19.1	74.9	15.9	69.8	10.8
28	Shop	66.9	86.0	19.1	89.3	22.4	86.1	19.2	81.0	14.1
29	Mosque	58.4	73.1	14.7	76.4	18.0	73.2	14.8	68.1	9.7
30	Jumgal Hse	60.5	74.6	14.1	77.9	17.4	74.7	14.2	69.6	9.1
31	Jumgal Hse	64.1	83.8	19.7	87.1	23.0	84.0	19.9	78.9	14.8
32	Shop	65.1	84.1	19.0	87.3	22.2	84.2	19.1	79.1	14.0
33	Jumgal Hse	60.7	74.3	13.6	77.5	16.8	74.4	13.7	69.3	8.6
34	Jumgal Hse	62.2	79.9	17.7	83.2	21.0	80.0	17.8	75.0	12.8
35	Jumgal Hse	59.1	76.9	17.8	80.2	21.1	77.0	17.9	72.0	12.9
36	Jumgal Hse	62.4	80.0	17.6	83.3	20.9	80.2	17.8	75.1	12.7
37	Kuiruchuk Hse	56.9	71.5	14.6	74.8	17.9	71.7	14.8	66.6	9.7
38	Kuiruchuk Hse	60.0	74.3	14.3	77.6	17.6	74.5	14.5	69.4	9.4
39	Kuiruchuk Hse	58.7	76.4	17.7	79.7	21.0	76.6	17.9	71.5	12.8
40	Shop/bus stop	65.7	86.1	20.4	89.4	23.7	86.2	20.5	81.2	15.5
41	Shop	57.4	73.3	15.9	76.6	19.2	73.4	16.0	68.4	11.0
42	Kuiruchuk Hse	58.0	75.6	17.6	78.9	20.9	75.8	17.8	70.7	12.7
43	Cafe (lay by)	62.3	82.6	20.3	85.8	23.5	82.7	20.4	77.6	15.3
44	Cafe (lay by)	57.7	75.1	17.4	78.4	20.7	75.3	17.6	70.2	12.5
45	Tugol Say Hse	63.3	82.4	19.1	85.7	22.4	82.5	19.2	77.5	14.2

46	Shop	60.8	77.0	16.2	80.3	19.5	77.2	16.4	72.1	11.3
47	Tugol Say Hse	54.2	71.5	17.3	74.8	20.6	71.7	17.5	66.6	12.4
48	Tugol Say Hse	57.4	74.4	17.0	77.7	20.3	74.5	17.1	69.4	12.0
49	Mosque	58.5	70.5	12.0	73.8	15.3	70.6	12.1	65.5	7.0
Rec. No.	**Location**	**Baseline Noise 2018**	**Activity Construction Noise Levels and Noise Increase**							
			Preparation		**Asphalt Breaking**		**Sub-base and base**		**Asphalt Laying**	
		$L_{Aeq,12hr\ (dB)}$	**$L_{Aeq,12hr\ (dB)}$**	Δ dB	**$L_{Aeq,12hr\ (dB)}$**	Δ dB	**$L_{Aeq,12hr\ (dB)}$**	Δ dB	**$L_{Aeq,12hr\ (dB)}$**	Δ dB
50	Tugol Say Hse	59.3	77.8	18.5	81.1	21.8	78.0	18.7	72.9	13.6
51	Tugol Say Hse	57.6	71.1	13.5	74.4	16.8	71.3	13.7	66.2	8.6
52	Shop	56.6	71.7	15.1	75.0	18.4	71.8	15.2	66.7	10.1
53	Tugol Say Hse	55.8	75.0	19.2	78.3	22.5	75.1	19.3	70.0	14.2

Table 7: Results of Construction Noise Calculations

Jumgal

Baseline Noise Levels

In the village of Jumgal existing ambient noise levels at houses alongside the road already exceed levels set out in the IFC Guidelines by up to 9 dB during the daytime.

Internal noise levels in the Mosque exceed the internal noise criterion for a place of worship by c.8dB with windows open, however internal noise levels within the other community facilities all fall within recommended internal noise criteria.

Construction Noise Effects

In Jumgal there will be major noise impacts when construction activities are close by to dwellings and noise levels will be sufficiently high that speech interference effects may occur at houses directly alongside the road.

At the Administration building, with windows closed, internal noise levels will still meet noise criterion for office working. However, at the school internal noise levels will exceed recommended levels for classrooms by up to c.18dB and if possible working outside the school should be limited to holiday periods. Similarly, the use of the Mosque may also be impaired during working on the road immediately adjacent, however it may be possible to mitigate this effect by arranging work breaks to coincide with prayer times.

The shops in Jumgal are close to the road and internal noise levels during construction may cause problems with speech interference when work is taking place directly outside. It may be possible to erect temporary hoardings immediately outside the buildings to provide noise mitigation during construction works.

Kuiruchuk

Baseline Noise Levels

In Kuiruchuk existing ambient noise levels at houses alongside the road already exceed levels set out in the IFC Guidelines by up to 5dB during the daytime.

Construction Noise Effects

Construction of the road will give rise to major noise impacts at dwellings in Kuiruchuk, however houses are further away from the road than those in Jumgal and internal noise levels will be correspondingly lower. Thus, the likelihood of interference with activities, such as speech interference effects, is much reduced.

Lay-by

At the location of the lay-by on the road between Kuiruchuk and Tugol Say the road would remain as a two lane road. Community facilities at the lay-by include two cafés to the north of the road.

Baseline Noise Levels

Existing internal noise levels in the first café (rec.44) are below internal noise criterion however in the second internal levels of c. 47dB marginally exceed the criterion.

Construction Noise Effects

Construction activities on the road adjacent to the cafes will give rise to speech interference when work is taking place directly outside the buildings, with internal levels exceeding the internal noise criterion by up to 15dB.

Tugol Say

Baseline Noise Levels

In Tugol Say existing ambient noise levels at houses alongside the road already exceed levels set out in the IFC Guidelines by up to 7dB during the daytime.

Noise levels in the Mosque which is c.30m from the road will also exceed the internal noise criterion for a place of worship.

Construction Noise Effects

Construction of the road will give rise to major noise impacts at houses in Tugol Say and may also cause speech interference effects when activities are directly adjacent to individual houses. The use of the Mosque may also be impaired during working on the road immediately adjacent, however it may be possible to mitigate this effect by arranging work breaks to coincide with prayer times.

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 impacts. 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 the procedure set out in the UK Design Manual for Roads and Bridges [7].

Assumptions: Road traffic noise calculations

<u>Road traffic flows</u>

The following road traffic data have been provided by JOC:

a. Road traffic counts for section 2b 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

Road traffic speeds were also supplied by JOC and assumed to be 95kph outside the settlement areas and 60kph within the villages.

Scenario	**Day**		**Evening**		**Night**	
	Total no.	**%HGV**	**Total no.**	**%HGV**	**Total no.**	**%HGV**
2018 Baseline flows	2078	17	689	27	402	39
2019 pre and post 2B	2187	17	725	27	424	39

2034 flows 2B	5114	17	1329	27	778	39

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 once away from the road, and only the nearest houses to the road are marked. This 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 and it has not been possible to carry out noise calculations at buildings further away from the road as their location is not shown on the mapping. This has to some extent been remedied by the use of noise contour mapping which has enabled the extent of noise changes to be determined and hence, by referring to aerial photography in Google Earth, to estimate 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 hrs) (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 c.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 9 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 $L_{Aeq,8hr}$.

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

Preamble

The results of operational noise calculations are presented in Table 11 overleaf. The left hand side of the Tables 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 village name or type of receptor e.g. shop or house (hse.). 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 short term effects (Post Scheme 2019) and long term (Post Scheme 2034) noise effects, 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 level without traffic on the road i.e. noise generated during the daytime by traffic on local roads and daily activities at dwellings is 40dB. This figure is typical of daytime noise levels in a rural village with few local traffic movements and is below the lowest level measured in the initial baseline survey of this Section. Note: the grid shown on the maps is at 500m spacing.

Further mapping is provided in Appendix 1, Figures A5-A8, illustrating the zones, coloured in red, in which occupants of buildings may experience increased risk of sleep disturbance, resulting from operation of the scheme in 2034. This is due to the effect of intensification of road traffic not related to the scheme and is not therefore an impact of the scheme.

Figure A9 gives an example of the zone in which dwellings which were previously below the IFC guidelines during the day time period (55dB $L_{Aeq,T}$) would exceed this level in 2034. Figure A10 shows an example of the equivalent zone for the night time period. Again, these effects results from intensification of road traffic not related to the scheme and are therefore an impacts of the scheme.

A detailed discussion of the results of the operational noise assessment is given below for each of the villages in Section 2B including Kokjar, Chekildek, Cholpon and Ak yuyk. The level of day and night time baseline noise levels in each village are compared with IFC Guidelines, and for non-residential properties internal noise levels (with windows open) are compared with the relevant criterion for each building. This is followed by a discussion of operational noise impacts, including short and long-term effects, and potential options for mitigation.

Rec. No.	Location	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 2018		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
23	Jumgal Hse	60.3	57.5	60.5	57.7	60.0	57.2	-0.5	-0.5	62.6	59.8	2.1	2.1	61.6	58.8	1.1	1.1
24	School	62.8	59.9	63.0	60.2	62.4	59.6	-0.6	-0.6	65.0	62.2	2.0	2.0	64.0	61.2	1.0	1.0
25	Admin	56.3	53.4	56.5	53.7	56.1	53.3	-0.4	-0.4	58.7	55.9	2.2	2.2	57.8	54.9	1.3	1.2
26	Shop	64.1	61.3	64.3	61.5	62.9	60.1	-1.4	-1.4	65.6	62.7	1.3	1.2	64.6	61.8	0.3	0.3
27	Jumgal Hse	59	56.2	59.2	56.4	59.2	56.4	0.0	0.0	61.8	59.0	2.6	2.6	60.8	58.0	1.6	1.6
28	Shop	66.9	64.1	67.1	64.3	64.7	61.9	-2.4	-2.4	67.4	64.5	0.3	0.2	66.4	63.6	-0.7	-0.7
29	Mosque	58.4	55.6	58.6	55.8	58.1	55.2	-0.5	-0.6	60.7	57.9	2.1	2.1	59.7	56.9	1.1	1.1
30	Jumgal Hse	60.5	57.7	60.7	57.9	60.2	57.4	-0.5	-0.5	62.9	60.1	2.2	2.2	61.9	59.1	1.2	1.2
31	Jumgal Hse	64.1	61.3	64.3	61.5	63.7	60.8	-0.6	-0.7	66.3	63.5	2.0	2.0	65.3	62.5	1.0	1.0
32	Shop	65.1	62.3	65.3	62.5	64.2	61.4	-1.1	-1.1	66.9	64.0	1.6	1.5	65.9	63.0	0.6	0.5
33	Jumgal Hse	60.7	57.9	61.0	58.1	60.6	57.8	-0.4	-0.3	63.3	60.5	2.3	2.4	62.3	59.5	1.3	1.4
34	Jumgal Hse	62.2	59.3	62.4	59.6	61.8	59.0	-0.6	-0.6	64.4	61.6	2.0	2.0	63.4	60.6	1.0	1.0
35	Jumgal Hse	59.1	56.2	59.3	56.5	59.0	56.2	-0.3	-0.3	61.6	58.8	2.3	2.3	60.7	57.8	1.4	1.3
36	Jumgal Hse	62.4	59.6	62.6	59.8	62.0	59.1	-0.6	-0.7	64.6	61.8	2.0	2.0	63.6	60.8	1.0	1.0
37	Kuiruchuk Hse	56.9	54.1	57.1	54.3	57.1	54.3	0.0	0.0	59.7	56.9	2.6	2.6	58.8	55.9	1.7	1.6
38	Kuiruchuk Hse	60	57.2	60.3	57.4	60.2	57.4	-0.1	0.0	62.8	60.0	2.5	2.6	61.8	59.0	1.5	1.6
39	Kuiruchuk Hse	58.7	55.8	58.9	56.1	58.8	56.0	-0.1	-0.1	61.5	58.6	2.6	2.5	60.5	57.6	1.6	1.5
40	Shop/bus stop	65.7	62.9	66.0	63.1	64.8	62.0	-1.2	-1.1	67.5	64.7	1.5	1.6	66.5	63.7	0.5	0.6
41	Shop	57.4	54.6	57.7	54.8	57.6	54.8	-0.1	0.0	60.2	57.4	2.5	2.6	59.3	56.4	1.6	1.6
42	Kuiruchuk Hse	58	55.2	58.3	55.4	58.2	55.4	-0.1	0.0	60.9	58.1	2.6	2.7	59.9	57.1	1.6	1.7

43	Cafe (lay by)	62.3	59.5	62.5	59.7	62.3	59.5	-0.2	-0.2	65.0	62.2	2.5	2.5	64.0	61.2	1.5	1.5
44	Cafe (lay by)	57.7	54.9	57.9	55.1	57.9	55.1	0.0	0.0	60.5	57.7	2.6	2.6	59.5	56.7	1.6	1.6
45	Tugol Say Hse	63.3	60.5	63.5	60.7	63.4	60.6	-0.1	-0.1	66.0	63.2	2.5	2.5	65.1	62.2	1.6	1.5
46	Shop	60.8	58	61.0	58.2	60.8	58.0	-0.2	-0.2	63.5	60.6	2.5	2.4	62.5	59.7	1.5	1.5
Rec. No.	**Location**	**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 2018**		**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**
47	Tugol Say Hse	54.2	51.3	54.4	51.6	54.3	51.5	-0.1	-0.1	57.0	54.2	2.6	2.6	56.0	53.2	1.6	1.6
48	Tugol Say Hse	57.4	54.6	57.6	54.8	57.6	54.8	0.0	0.0	60.3	57.5	2.7	2.7	59.3	56.5	1.7	1.7
49	Mosque	58.5	55.6	58.7	55.9	58.6	55.8	-0.1	-0.1	61.3	58.4	2.6	2.5	60.3	57.4	1.6	1.5
50	Tugol Say Hse	59.3	56.5	59.5	56.7	59.5	56.7	0.0	0.0	62.2	59.3	2.7	2.6	61.2	58.3	1.7	1.6
51	Tugol Say Hse	57.6	54.8	57.9	55.0	57.9	55.0	0.0	0.0	60.5	57.7	2.6	2.7	59.5	56.7	1.6	1.7
52	Shop	56.6	53.8	56.8	54.0	56.8	54.0	0.0	0.0	59.4	56.6	2.6	2.6	58.4	55.6	1.6	1.6
53	Tugol Say Hse	55.8	52.9	56.0	53.2	56.0	53.2	0.0	0.0	58.6	55.8	2.6	2.6	57.6	54.8	1.6	1.6

Table 11: Results of Operational Noise Calculations

Jumgal

Baseline Noise Levels

In Jumgal existing road traffic noise levels at houses alongside the road already exceed levels set out in the IFC Guidelines by up to 9dB during the daytime and 16dB during the night time. Internal noise levels in the Mosque and school already exceed the internal noise criterion for a place of worship by c.3dB and 8dB respectively, however internal noise levels within the administration building fall within recommended internal noise criteria.

Operational Noise Effects

Short term operational effects (2019)

The widening of the road from 2 to 4 lanes through the village will give rise to a change in noise levels at dwellings of between -0.6 dB to +0.0dB which is 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 noise increases of between 2.0-2.6 dB during both day and night time periods., which would be a negligible noise impact.

The extent of the daytime noise changes is illustrated in Appendix I, Figure A1.

Internal noise levels within the village Administration (rec.1) building would continue to meet the internal noise criterion for office areas, whilst those in the school and Mosque will continue to exceed the relevant criteria.

Kuiruchuk

Baseline Noise Levels

In Kuiruchuk existing road traffic noise levels at houses alongside the road already exceed levels set out in the IFC Guidelines by up to 5dB during the daytime and 12dB during the night time.

Operational Noise Effects

Short term operational effects (2019)

The widening of the road from 2 to 4 lanes through the village will give rise to a change in noise levels at dwellings of c. 0.1dB which is 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 noise increase of between 2.4-2.6 dB which would be a negligible

noise impact. The extent of the daytime noise change is illustrated in Appendix I, Figures A3 and A4.

Lay by

At the location of the lay-by on the road between Kuiruchuk and Tugol Say the road would remain as a two lane road. Community facilities at the lay-by include two cafés to the north of the road

Baseline Noise Levels

Existing internal noise levels in the first café (rec.44) are below internal noise criterion however in the second internal levels of c. 47dB will marginally exceed the criterion.

Operational Noise Effects

Short term operational effects (2019)

The widening of the road from 2 to 4 lanes through the village will give rise to a change in noise levels of between - 0.3dB to -0.2 dB which is 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 of c.2.5 dB at the cafes and petrol station, and internal noise levels within both cafes would now exceed recommended internal noise levels, assuming windows open.

Tugol Say

Baseline Noise Levels

In Tugol Say existing road traffic noise levels at houses alongside the road already exceed levels set out in the IFC Guidelines by up to 8dB during the daytime and up to 15dB during the night time period. Internal noise levels in the Mosque (assuming windows open), which is c.30m from the road will also exceed internal noise criterion for a place of worship by c. 8dB.

Operational Noise Effects

Short term operational effects (2019)

The widening of the road from 2 to 4 lanes through the village will give rise to a change in noise levels of between - 0.2dB to +0.1dB which is 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 of between c.2.5-2.7 dB, i.e. a negligible noise impact, during both day and night time periods. The extent of the noise change during the daytime is illustrated in Appendix I, Figure A6.

Internal noise levels inside the Mosque, with windows open will continue to exceed internal noise design criteria 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 of the A367 road. The stretch of road, referred to as 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.

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 rehabilitated/upgraded road at dwellings and community facilities within the villages, 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), again, both with and without the scheme, allowing both short and long term effects arising from the scheme to be assessed.

The Kyrgyz National Noise Standards and IFC Noise Guidelines were reviewed and appropriate noise assessment criteria taking into account these standards were adopted.

A noise survey was carried out in 2018 and the results of this and the road traffic noise calculations showed that 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, however these are transient effects and occur only when construction is taking place nearby. This is considered to be an unavoidable consequence of construction of the scheme.

The results of road traffic noise assessments show that in 2019 the widening of the road from 2 to 4 lanes through the villages will give rise to changes in noise levels of between 0.4and +0.3 dB during the day and night time periods, which is 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 (negligible) will give rise to increased noise levels at dwellings and community facilities alongside the road during both day and night time periods. However, these would be considered to a negligible impact. The extent of the area over which these noise increases would occur has been illustrated using noise contour mapping.

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1. Terms of Reference. Kyrgyz Republic – CAREC – Interconnector and Additional Finance Roads. Phase 2. Noise and Vibration Modelling
2. Kyrgyz Republic – CAREC – Interconnector and Additional Finance Roads. Phase 1. Site Visit Report. Scope of Noise and Vibration Study. January 2018

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4. Environmental, Health, and Safety (EHS) Guidelines. Environmental Noise Management. International Finance Corporation. World Bank Group. April 30 2017
5. BS 8233 (2014) Sound Insulation and Noise Reduction for Buildings- Code of Practice
6. Calculation of Road Traffic Noise, Department of Transport, 1988
7. Design Manual for Roads and Bridges
8. Email from JOC. Road traffic flows. 4 Jan 2018
9. Night Noise Guidelines (NNGL) for Europe. WHO. 2007

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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: Jumgal

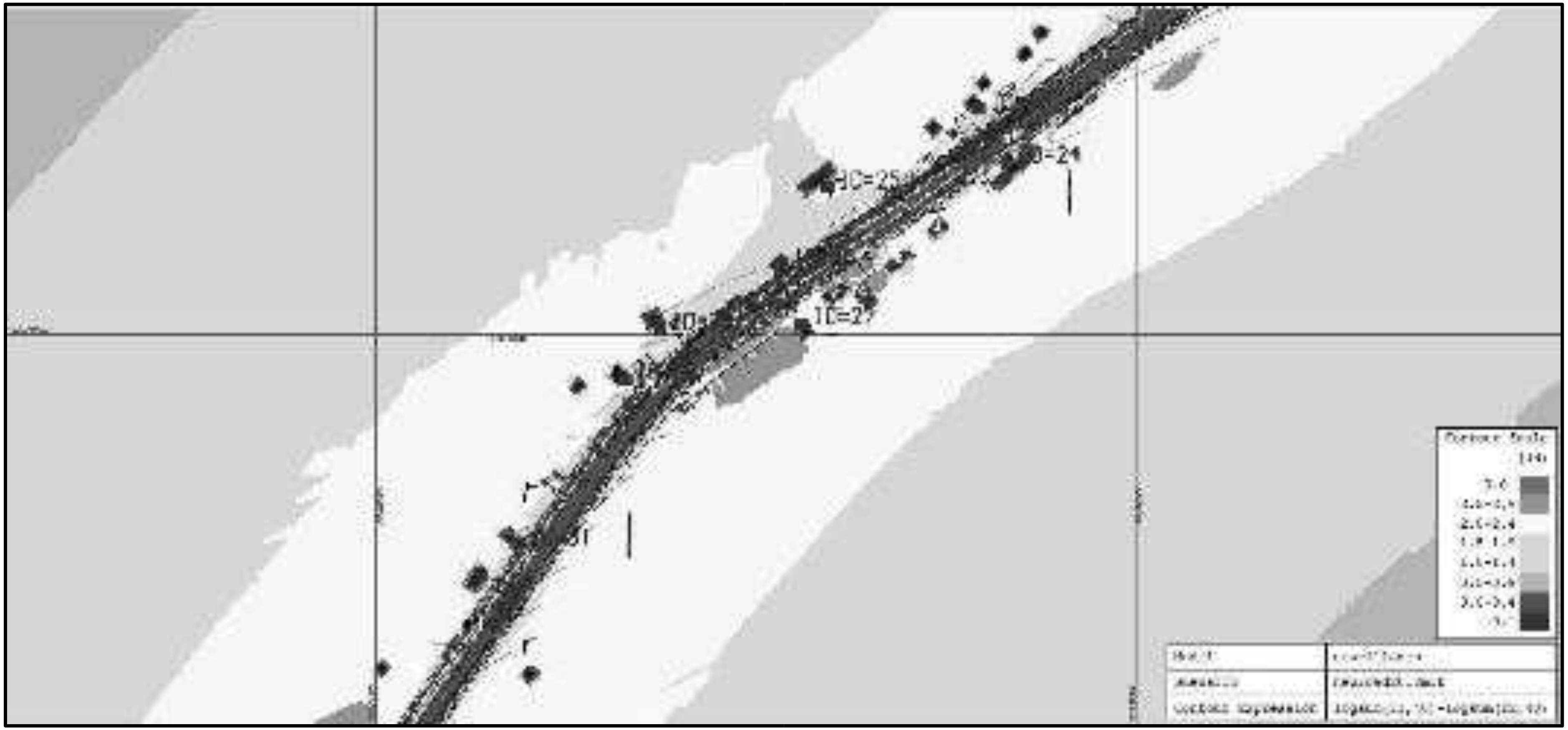

Figure A2. Noise Contour Plot: Long Term Daytime Noise Change (yr. 2034-2019) and Receptor Locations: Jumgal

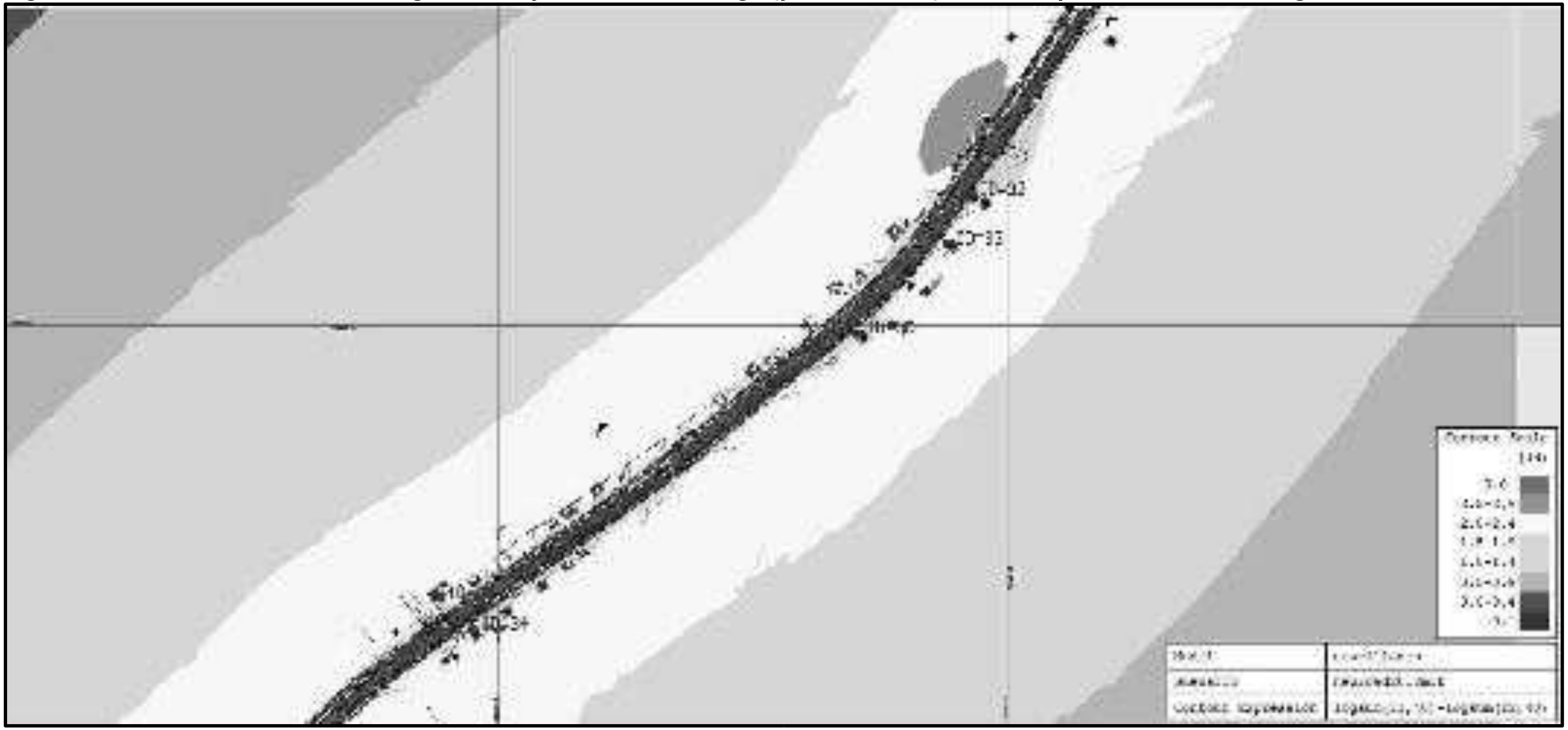

Figure A3. Noise Contour Plot: Long Term Daytime Noise Change (yr. 2034-2019) and Receptor Locations: Kuiruchuk

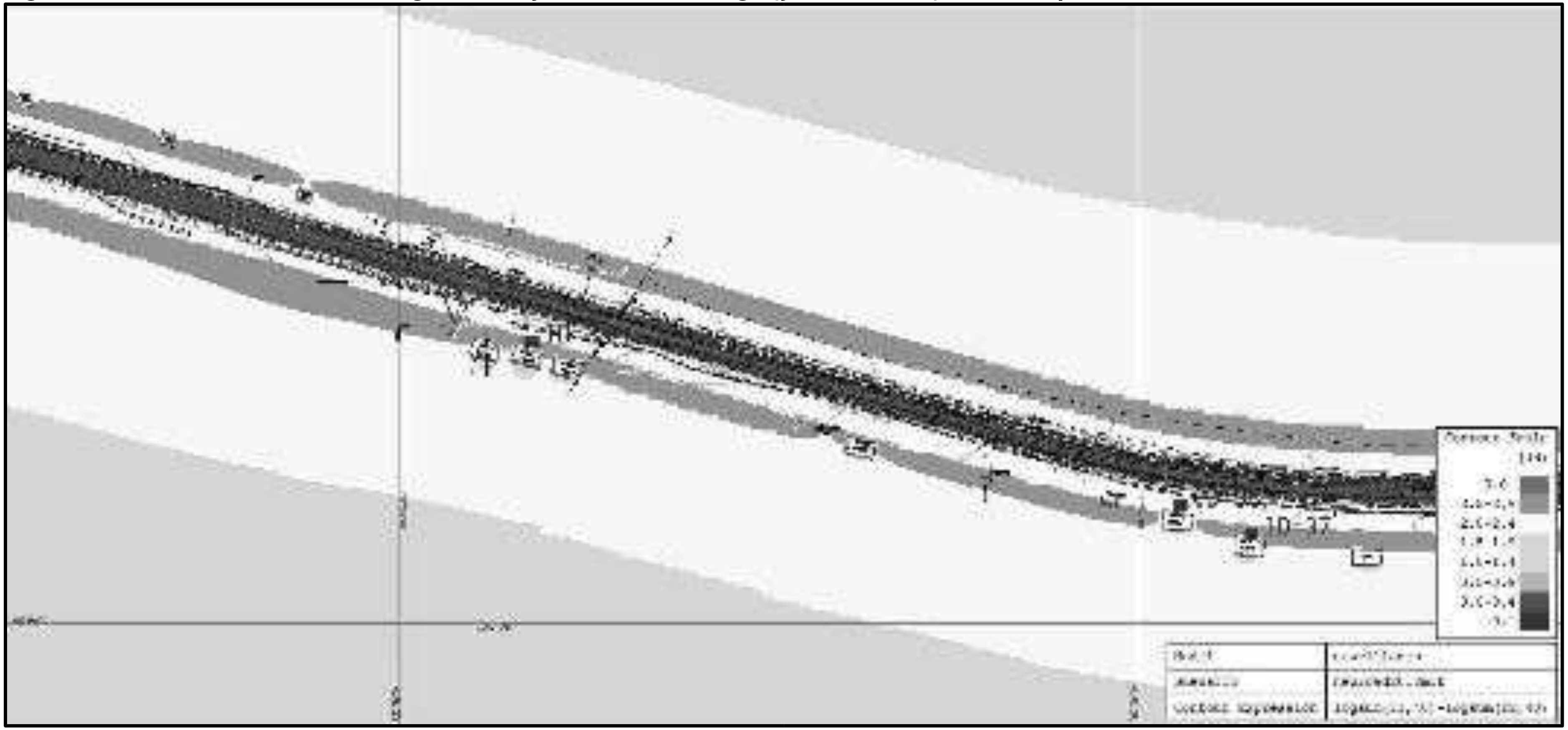

Figure A4. Noise Contour Plot: Long Term Daytime Noise Change (yr. 2034-2019) and Receptor Locations: Kuiruchuk

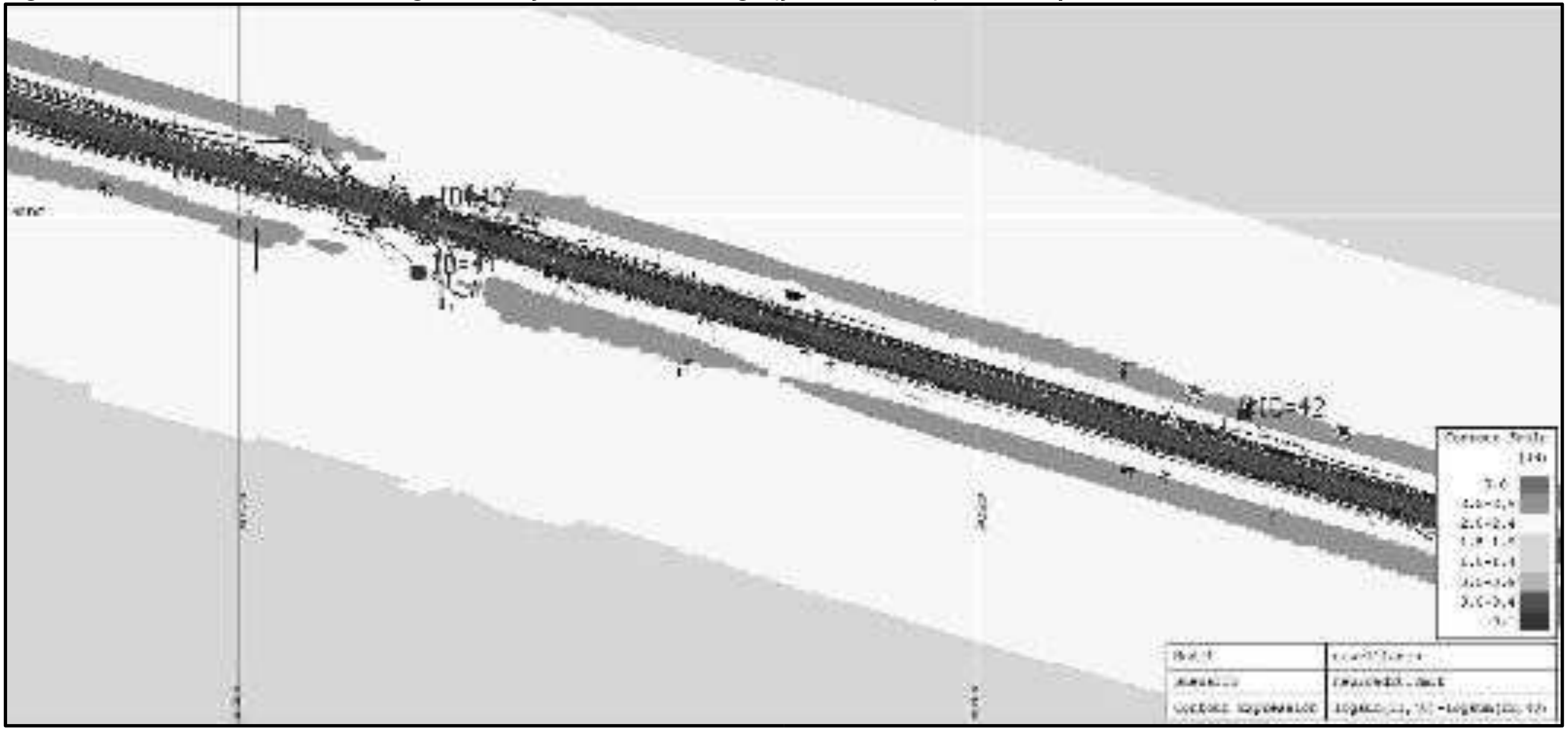

Figure A5. Noise Contour Plot: Long Term Daytime Noise Change (yr. 2034-2019) and Receptor Locations: Lay by

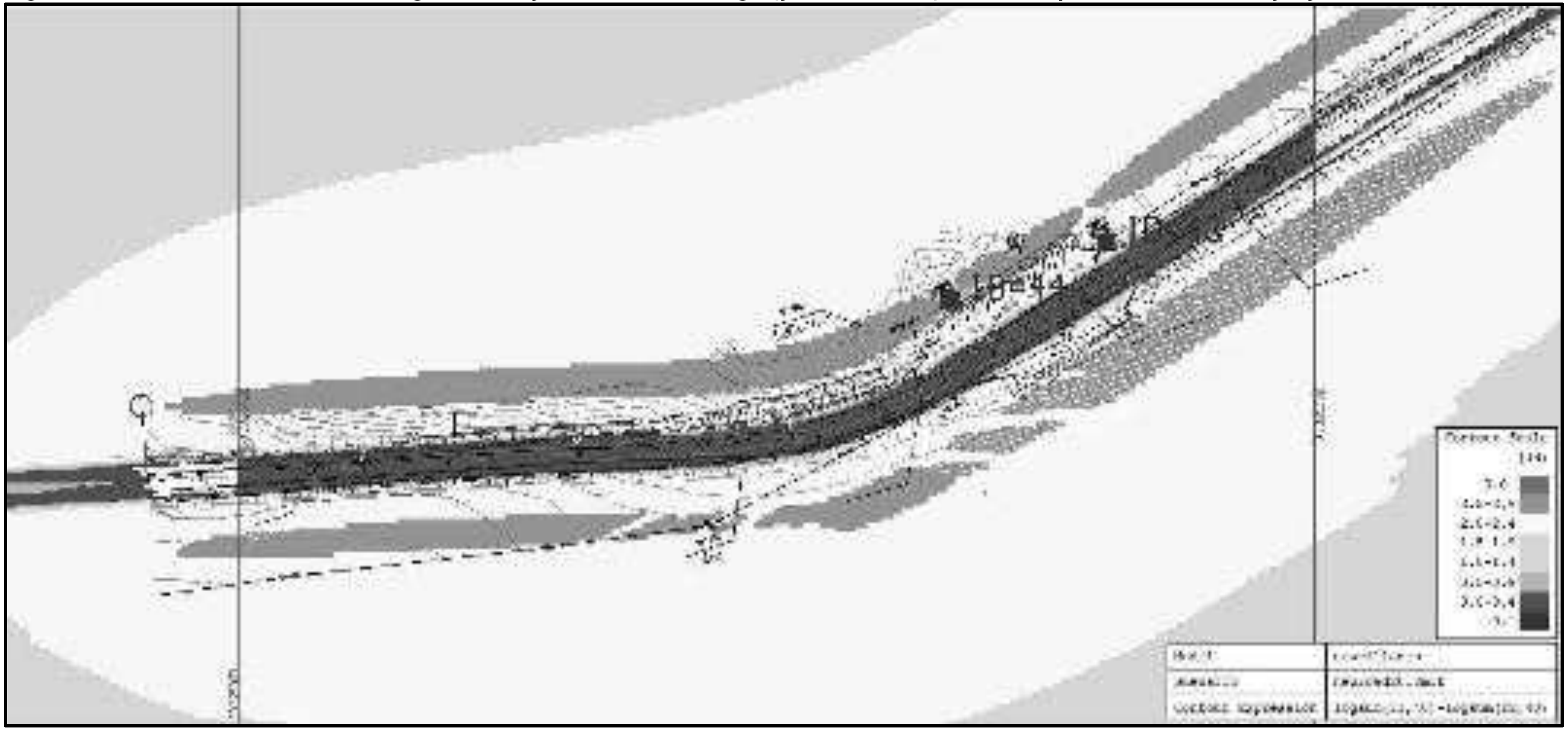

Figure A6. Noise Contour Plot: Long Term Daytime Noise Change (yr. 2034-2019) and Receptor Locations: Tugol Say

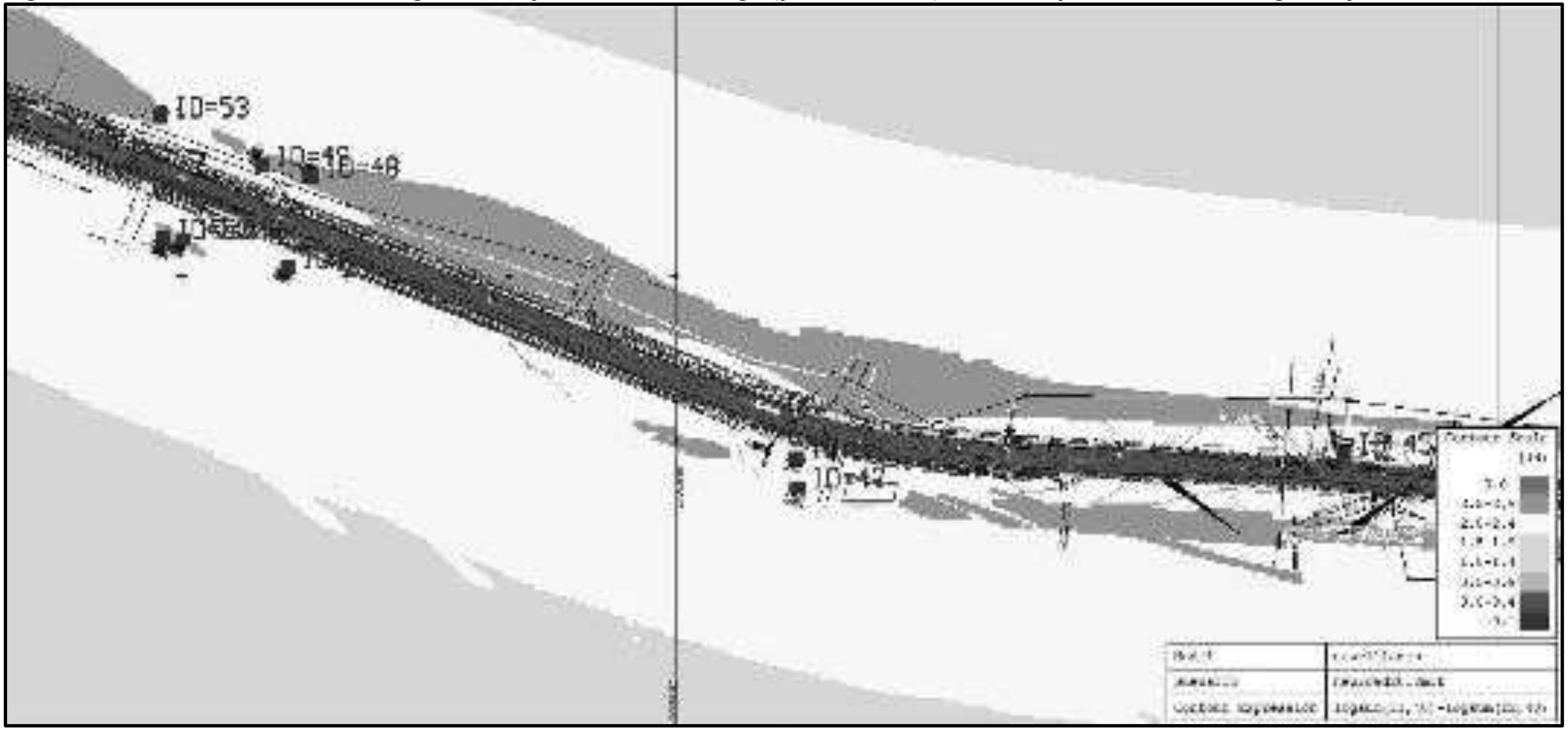

Figure A7. Zone (in red) of Increased Risk of Sleep Disturbance (yr. 2034-2019) : Jumgal

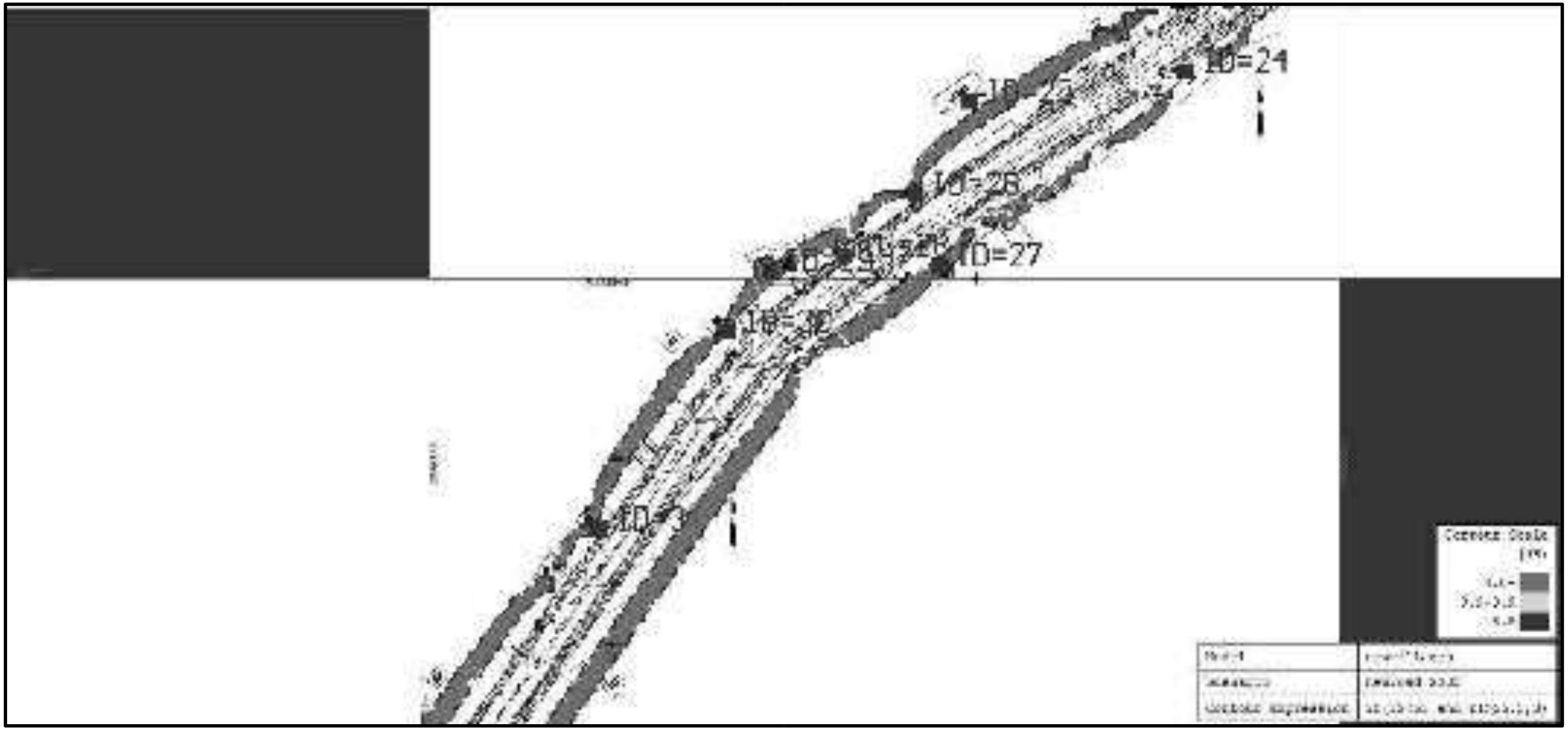
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Figure A8. Zone (in red) of Increased Risk of Sleep Disturbance yr. 2034-2019) : Jumgal (cont.)

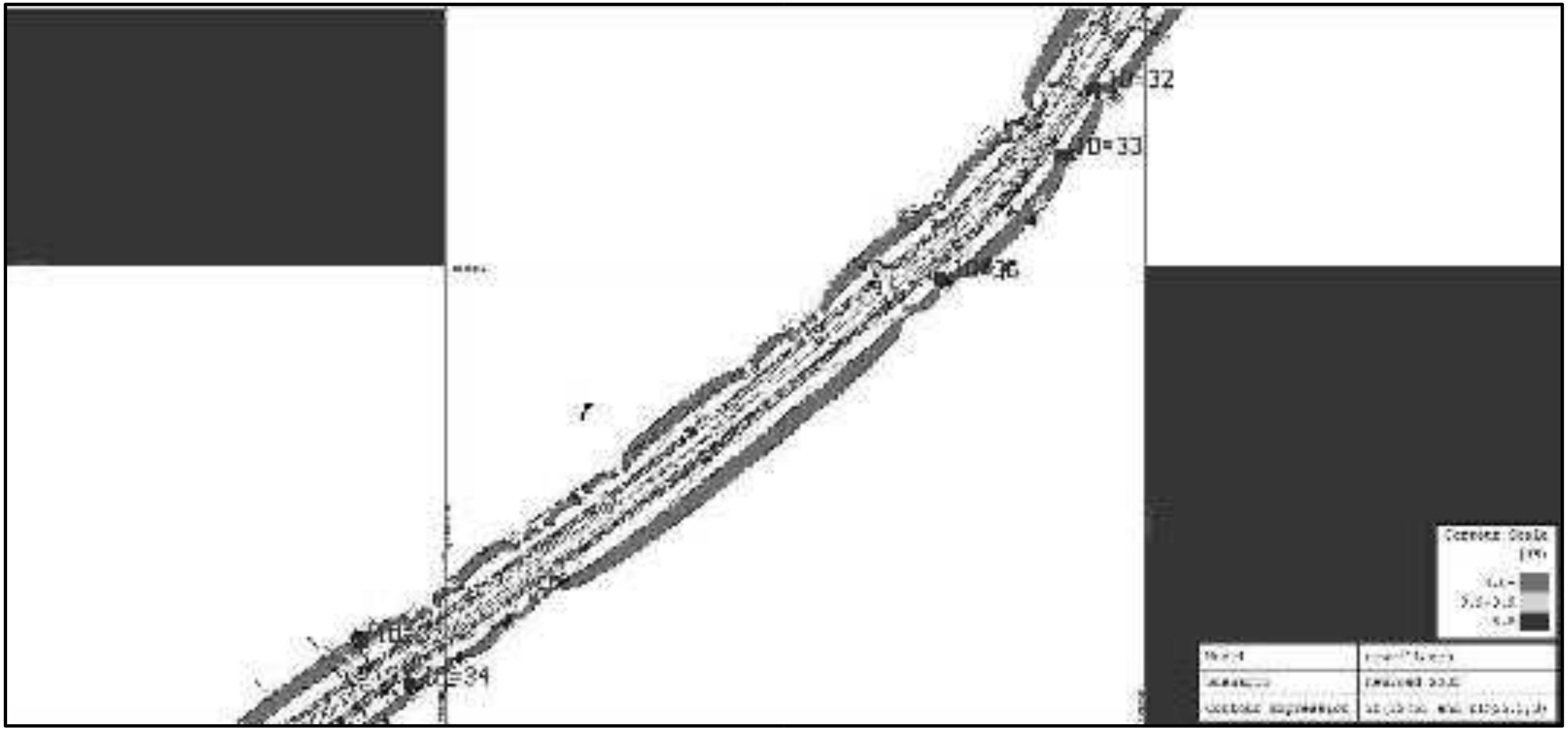


Figure A9. Zone (in red) of Increased Risk of Sleep Disturbance yr. 2034-2019): Kuiruchuk

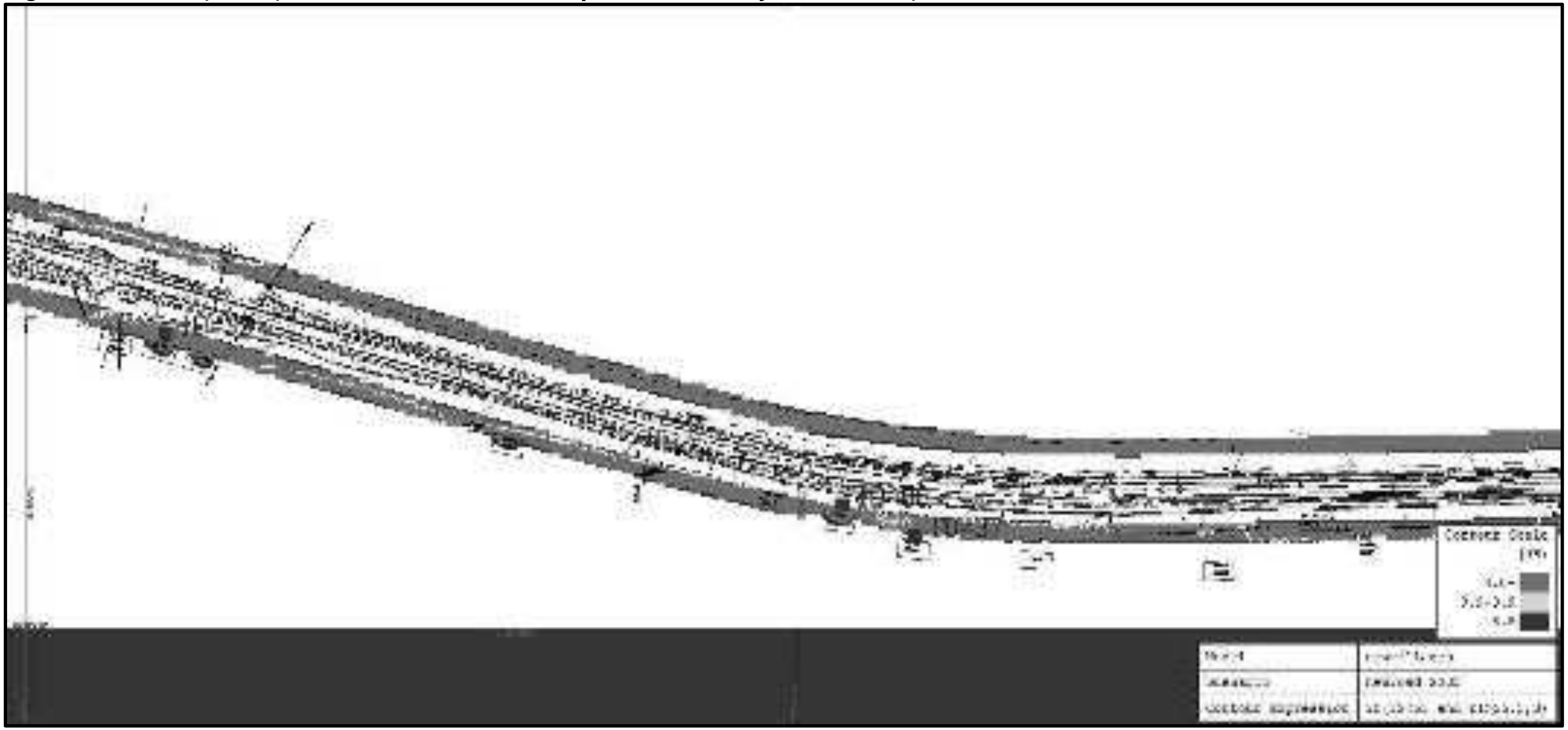


Figure A10. Zone (in red) of Increased Risk of Sleep Disturbance yr. 2034-2019): Kuiruchuk (cont.)

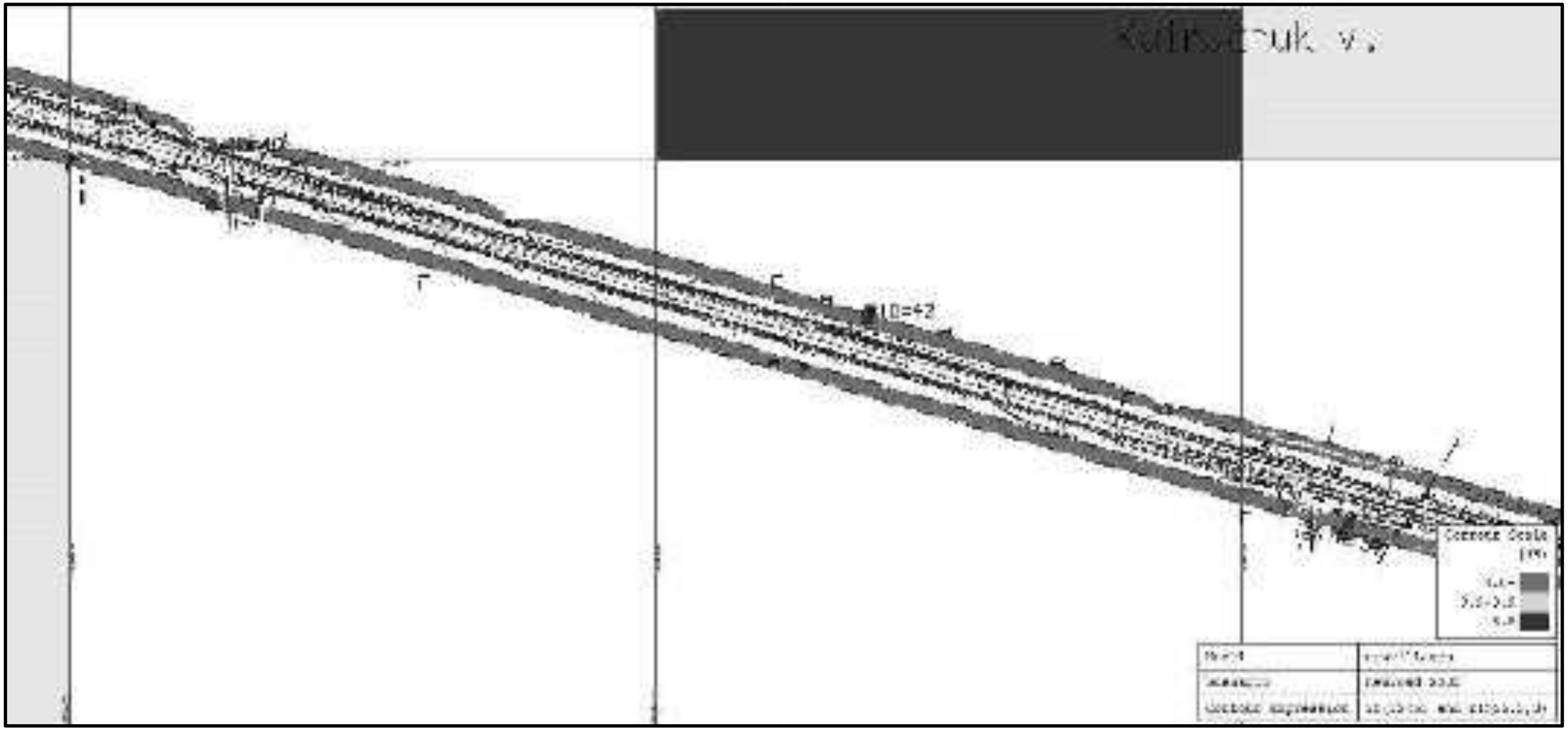


Figure A11. Zone (in red) of Increased Risk of Sleep Disturbance (yr. 2034-2019): Tugol Say

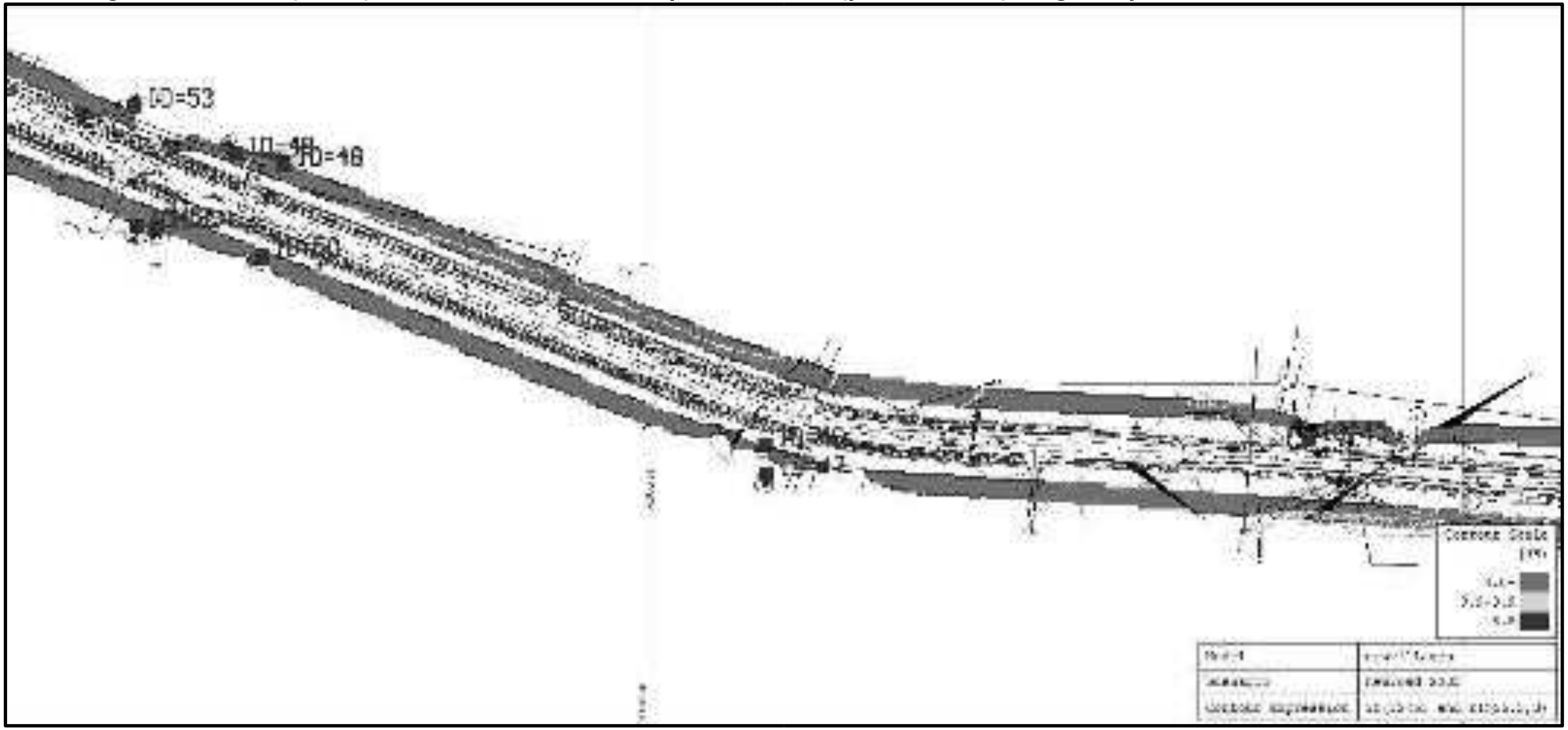
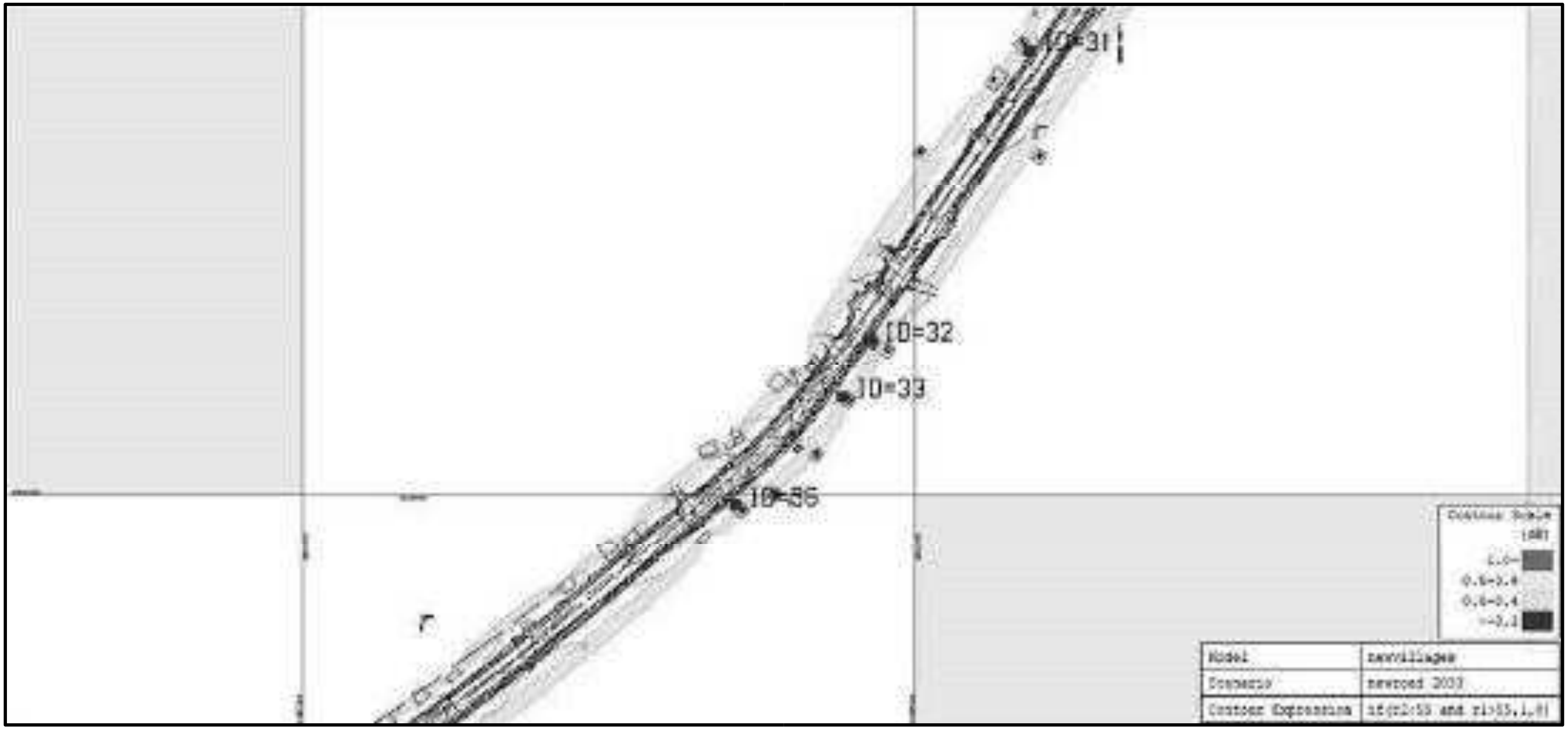


Figure A12. Zone (in green) in which Dwellings will exceed IFC Daytime Criteria as result of increase road traffic : Jumgal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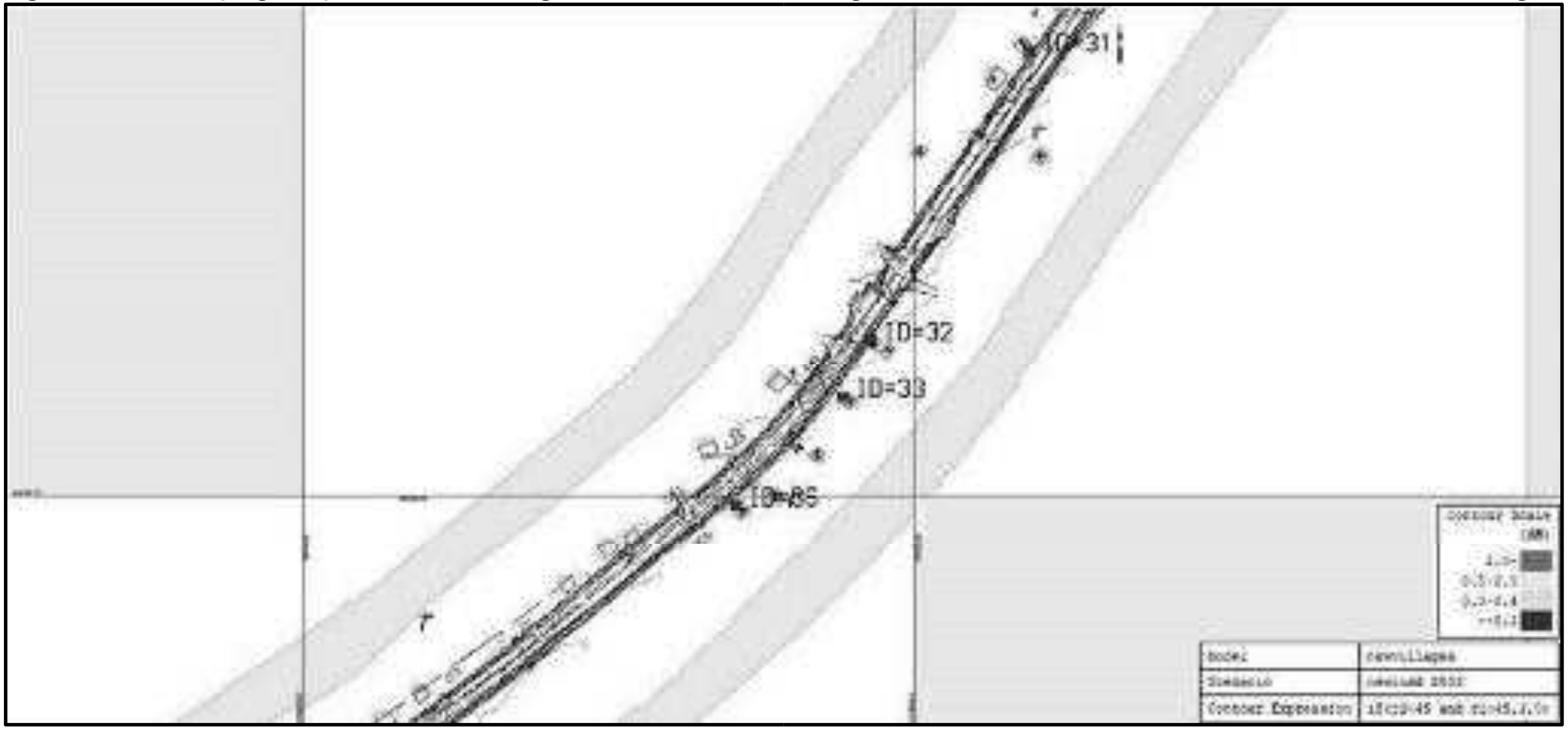
Model
newvillages
newroad 2003

Figure A13. Zone (in green) in which Dwellings will now exceed IFC Night time Criteria as result of increase road traffic : Jumgal



VIBRATION ASSESSMENT

REHABILITATION AND UPGRADING OF CONNNECTOR ROAD SECTION 2B

JAPAN OVERSEAS CONSULTANTS LTD

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 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's) have been completed for each of the three road sections, however The Asian Development Bank (ADB) which is providing finance for the rehabilitation, has requested that JOC shall update the IEE's 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 during the construction period for road Section 2B.

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 activities have not started on these road sections and there is no plant in-situ to use as a vibration source.

Therefore, it is proposed to defer any vibration monitoring until the construction begins and at this stage to make use of existing calculation methods and relevant measured data. 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;
- identify the lithology over which the road in Section 2B runs, and compare with the lithologies in other studies in which vibration levels from rollers have been reported;
- 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;
- 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.

Technical terms relating to vibration are used throughout the report and to assist the reader these are explained in Terminology, following Section 6.

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 of 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 measured on the ground k_s = 75, with a 50% probability of the vibration level being exceeded; k_s = 143, with a 33% probability of the vibration level being exceeded; k_s

= 276, with a 5% 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).

Note: In this study the statistical term 'prediction level' is used. The 33% probability given by the expression above is the upper bound of the 66% prediction level, and similarly the 5% probability is the upper bound of the 95% prediction level.

In this study the TRL method will be used to calculate vibration from vibratory compaction. A discussion of the assumptions made in the calculations, and the factors affecting the accuracy of those calculations is set out below.

Plant Data

For the purposes of this study it has been assumed that the roller used will have the operating characteristics of the SEM 520, manufactured by Shandong Engineering Machinery as described in Appendix I. This plant was chosen as it is typical of a large vibrating roller used in road construction schemes, has both high and low vibration operating mode and can also operate with no vibration. In addition, measured vibration data is available for this plant, which can give some confidence in the accuracy of the model as will be described later. It is also almost identical in design to one of the plant types which were used as the basis of the TRL model, i.e. the Ingersoll Rand SD-150D. The accuracy of the vibration calculations is dependent on the accuracy of manufacturers specified nominal amplitude of vibration of the roller, both high and low vibration operating modes.

Effect of Lithology

The transfer of vibration from the roller into the ground and its propagation away from the road will be affected by the stiffness of the sub base over which the roller is passing and the lithology. The empirical model developed by TRL takes into account these factors, however they are specific to the site at which the measurements on which the model is based were made. When applying the results to another site some consideration must be given to the differences in lithology and the effect this may have on the accuracy of calculations.

The measurements on which the TRL model is based were made on sub bases of hoggin and London clay, and the lithology comprised 'made ground', consisting of sands and gravels, over sands which become progressively firmer with depth.

The geological survey carried out along the length of the road between Balychy and Dyikan [5] showed the lithology in Section 2 to vary between gravelly sand, with the inclusion of gravel and pebbles and sandy loam. Though there is some question as to the variation of the depth of soil, it is considered that these lithologies are sufficiently similar to that the TRL model could be applied with a good level of confidence for the calculation of vibration levels at sites alongside Section 2B of the road.

Whilst there are no robust empirical or numerical methods of correcting for the changes in the lithology, there are some general guidelines. For example, it has been found soils have a characteristic frequency (see Table 1.) which if it were to coincide

with the operating frequency of the roller (c.25Hz) can give rise to higher levels of vibration than might otherwise occur. It can be seen from Table 1 that the stiffer the soil type the higher the characteristic frequency, and lower the likelihood of this occurring.

Material	Frequency (Hz)
Very soft silts and clays	5-20
Soft clays and loose sands	10-25
Compact sands and gravels and stiff clays	15 - 40
Weak rocks	30 - 80
Strong rocks	>50

Table 1. Characteristic frequencies for soils and rocks

Effect of Height of Water Table

Bachman [6] suggests that a saturated soil may facilitate the propagation of vibration 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 therefore largely unaffected by changes in the height of the ground water level, provided it remains sufficiently below the surface (relative to the wavelength). The geological survey [5] made no mention of a high water table and taking to account the nature of the terrain this is not an issue for the rehabilitation of the road.

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 whilst 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 populated areas 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.

Levels of vibration during normal operation of the roller, both free-field (see Terminology) and measured on the foundation, are generally dominated by the vertical (z) component (see Terminology), and thus in this study only the vertical components have been considered

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.

Some key factors which 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 [7], 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 [8,9] 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 BS ISO 4866:2010 [10] 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 [8] 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, belonging to Class 9.5 in the Kyrgyz Standard SNiP 2201-98KR and are regarded as 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 [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 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 2. 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 3. BS 5228 Vibration Assessment Criteria for Human Perception

4. MITIGATION OF VIBRATION Roller Vibration Setting

The calculation procedure described in Section 2 indicates that there is a clear reduction in vibration resulting from the use of a lower vibration setting 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.

JOC have 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 in non-vibratory mode or a non-vibratory roller.

Use of Alternative Compaction Equipment

Alternative means of compaction of the sidewalk sub-base and the sides of embankment could be adopted such as using a non-vibratory rubber tyre roller as shown in Appendix I. Selection of an alternative lower vibration roller by the contractor would also offer a means of providing additional mitigation.

Trench

The design of the Additional Finance Roads incorporates a drainage channel proposed to run alongside extensive sections of the road. The depth of the channel 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, and JOC consider that this solution can be suggested to the Contractor carrying out the works.

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 trench 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 [13] reports studies showing that reductions of 50-75% were readily achievable using a trench with a depth of 0.6 times Rayleigh wavelength, which for the current study would be c.4m. 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 [14] suggested that the depth should not be less than 0.3 times the wavelength i.e. 2.1m, whilst in [15] 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.

Some work has also been carried out by the Kyrgz State Agency of Anti-Seismic Construction and Engineering Design Institute [16]. The degree of attenuation of vibration (acceleration) from a roller (with identical characteristics to that described in the Appendix) was measured at a distance of c.6m from the trench using trench depths of 1.5m and 2.0m. 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 will need to be confirmed by carrying out some additional vibration measurements prior to commencement of construction within populated areas.

Limitation of Design to Two Lanes

The limitation of the rehabilitation of the road within populated areas to two lanes rather than the proposed four lane configuration would provide mitigation in two ways. Firstly, there would be no requirement for ground improvement works (excavation or rolling) on the soil between the existing road and dwellings, which causes high levels of vibration in comparison to operation of the roller on the road formation. Secondly, the limiting of the widening will move the construction operations c. 7.5m further away from the housing hence providing a greater degree of attenuation of vibration with distance, resulting in lower levels at nearby dwellings.

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 of their nature, duration and potential vibration effects prior to the works, 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, then this point should be made clear to residents.

5. RESULTS Vibratory Compaction

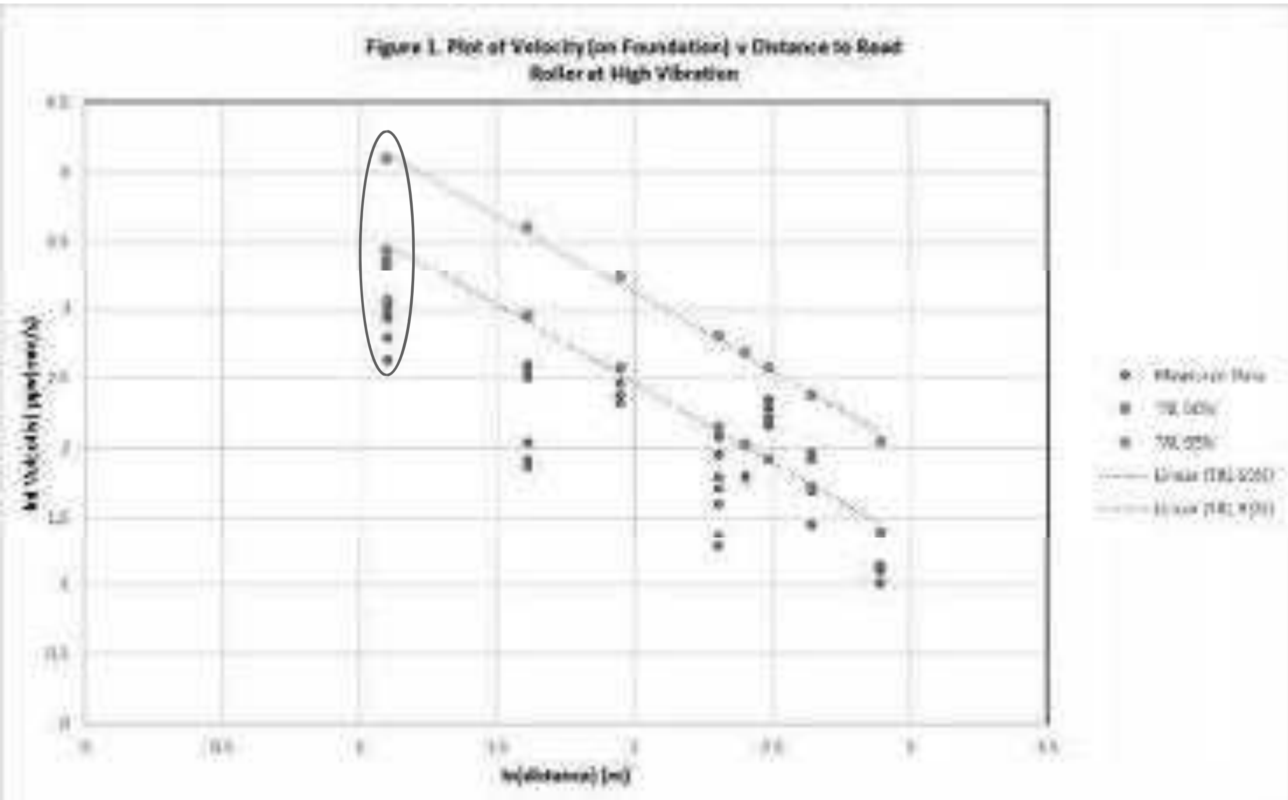
Figure 1 shows the variation in level of vibration with distance calculated using the TRL method described in Section 2, for both 95% and 66% prediction levels (an explanation of these terms is given in Terminology), based on the manufacturer's specification for the SEM 520 road roller described in Appendix I. Figure 2 shows the variation of vibration with distance for the same roller operating in low vibration mode.

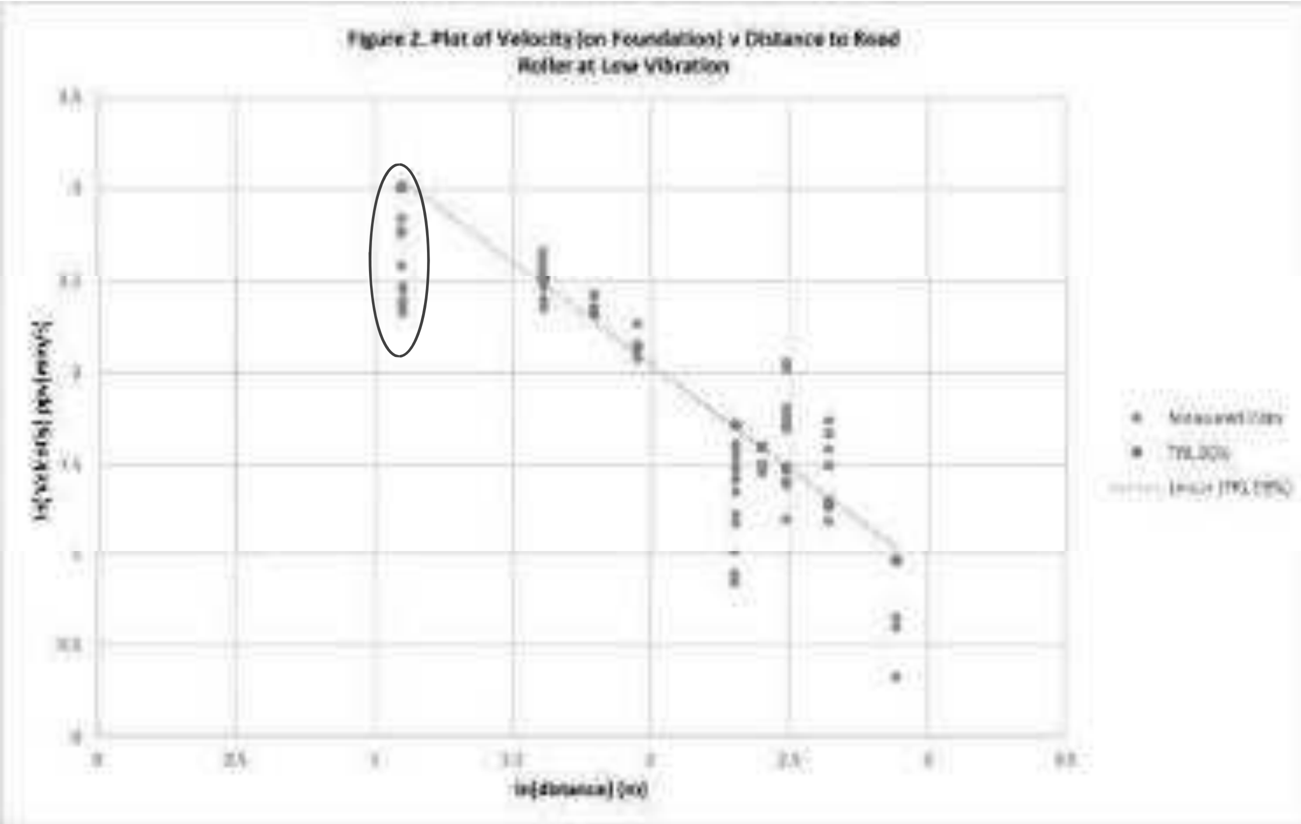
In order to give confidence in modelling of vibration it is good practice to compare, whenever possible, the calculated values with measured data. In this case vibration data is available from a previous project, measured during operation of the same model of roller i.e. an SEM 520.

The measured data for high and low vibration setting have been plotted on Figures 1 and 2 respectively. The data most relevant for comparison are those measured closest to the plant where the effects of variation in propagation at the measurement location are minimised, and on both Figures these data have been encircled.

For the roller operating in high vibration mode Figure 1 shows that the TRL 66% prediction level gave best agreement with the measured data, whilst for the low vibration mode the TRL 95% prediction level gives better agreement. The most likely cause of this discrepancy is that the TRL prediction method is over estimating levels of vibration at the higher roller setting. However, though highly unlikely, there is a possibility that the plant from which the measured data were obtained was not performing to the manufacturers specification. Therefore, in order to eliminate this factor, even though it is likely to overestimate the levels of vibration, the TRL 95% prediction level for high vibration mode is included in the assessment as well as the TRL 66% prediction level. In the case of the low vibration setting, only the TRL 95% prediction level has been considered.

Using these prediction levels, the TRL method has been used to calculate the distance between the road (on which rolling is being carried out) and the position at which buildings of the three vibration damage categories (high, low & medium) would be at risk of cosmetic or structural damage resulting from operation of the roller. The results are presented in the form of vibration damage contour distances, which are set out in detail overleaf.





Vibration Damage Contour Distances

Vibration damage contour distances are set out below in diagrammatic form (Figures 3-8) 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.

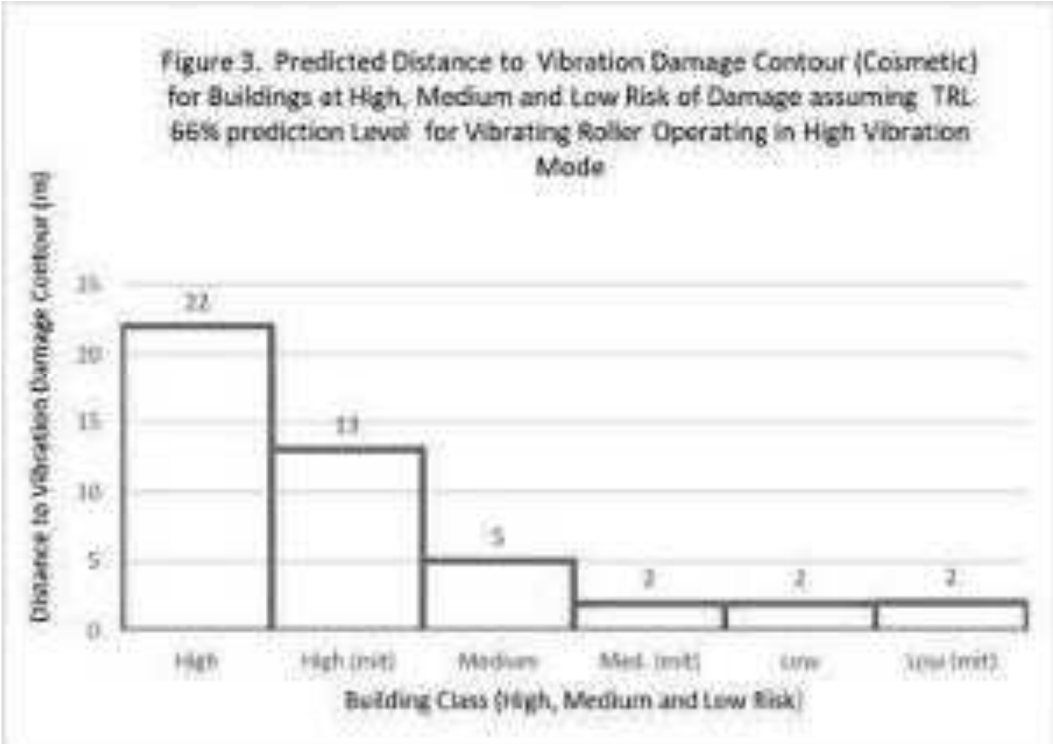
Predicted levels are also given assuming the use of an over excavated drainage channel to provide vibration mitigation.

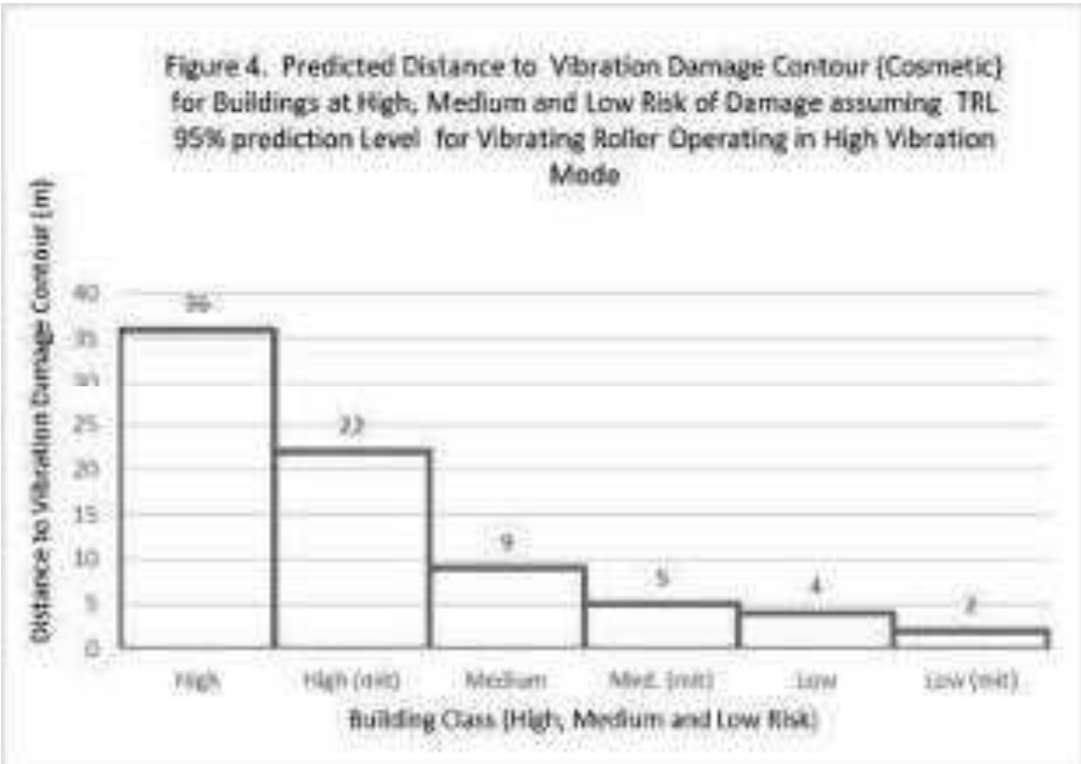
A summary of the contour distances specifically for high risk buildings is provided in Table 3.

<u>High vibration mode</u>

Cosmetic Damage (TRL 66% & 95% prediction levels)

Using the TRL vibration prediction level taken from Figure 1, and criterion taken from Table 2, the distance to the vibration damage (cosmetic) contour for high risk buildings is predicted to be 22m and 36m for the 66% and 95% prediction levels respectively, as shown in Figures 3 and 4 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, assuming the 66% prediction level, or 22m in the case of the 95% prediction level.

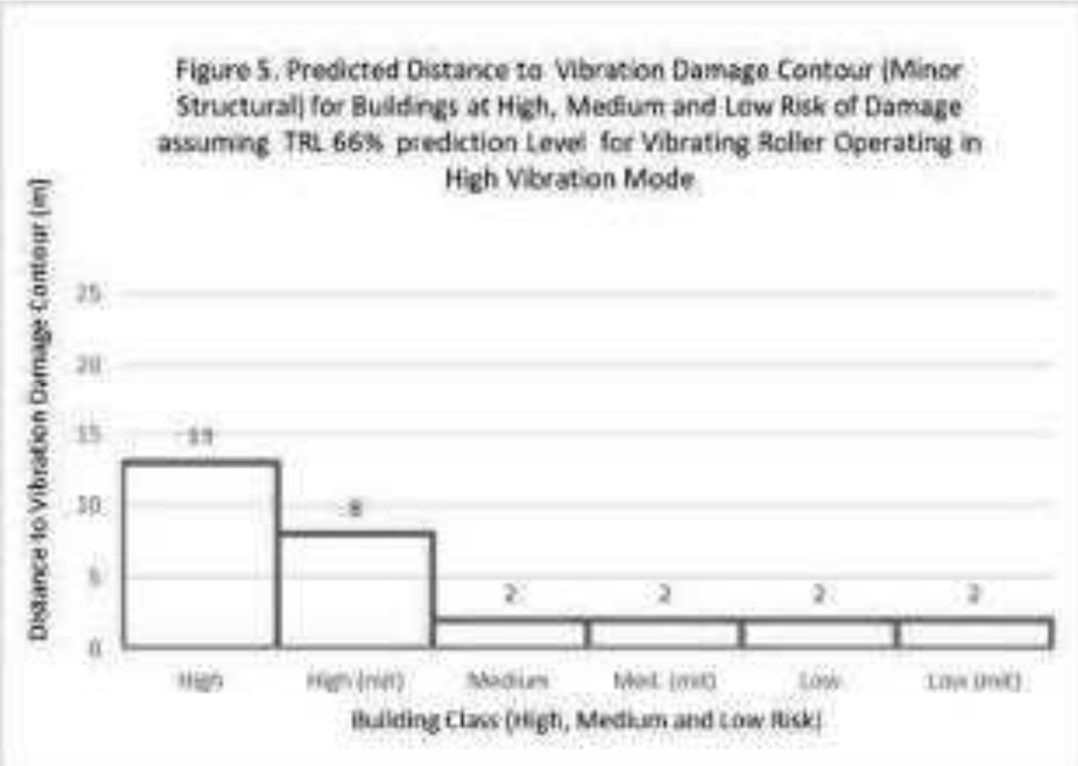




Minor Structural Damage (TRL 66% & 95% prediction levels)

Using the TRL 66% prediction level to identify risk of minor structural damage the distance to the vibration damage contour for high risk buildings would be 13m (see Figure 5 below) which would reduce to 8m, taking into account the addition of mitigation in the form of an over excavated drainage channel.

Taking the TRL 95% prediction level as the basis of prediction of minor structural damage the distance to the vibration damage contour for high risk buildings would be 22m (see Figure 6 below) which would reduce to 13m, taking into account the addition of mitigation in the form of an over excavated drainage channel.



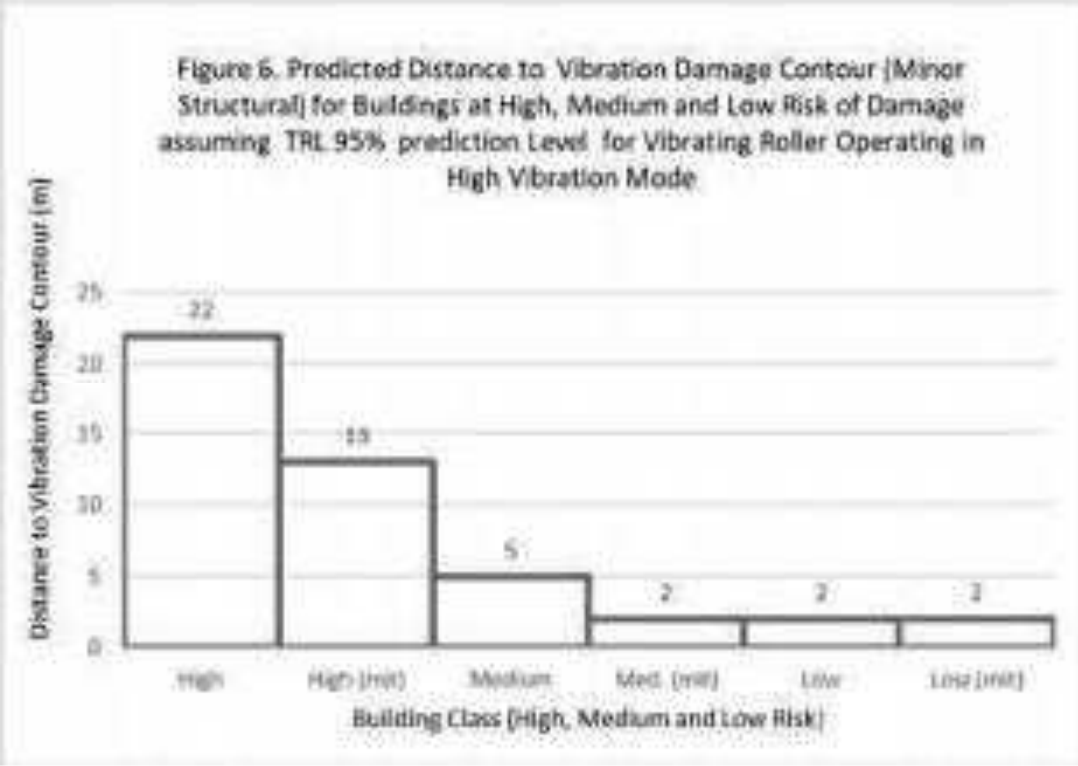


Figure 6. Predicted Distance to Vibration Damage Contour (Minor Structural) for Buildings at High, Medium and Low Risk of Damage assuming TRL 95% prediction Level for Vibrating Roller Operating in High Vibration Mode

<u>Roller Low vibration mode</u>

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 7 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.

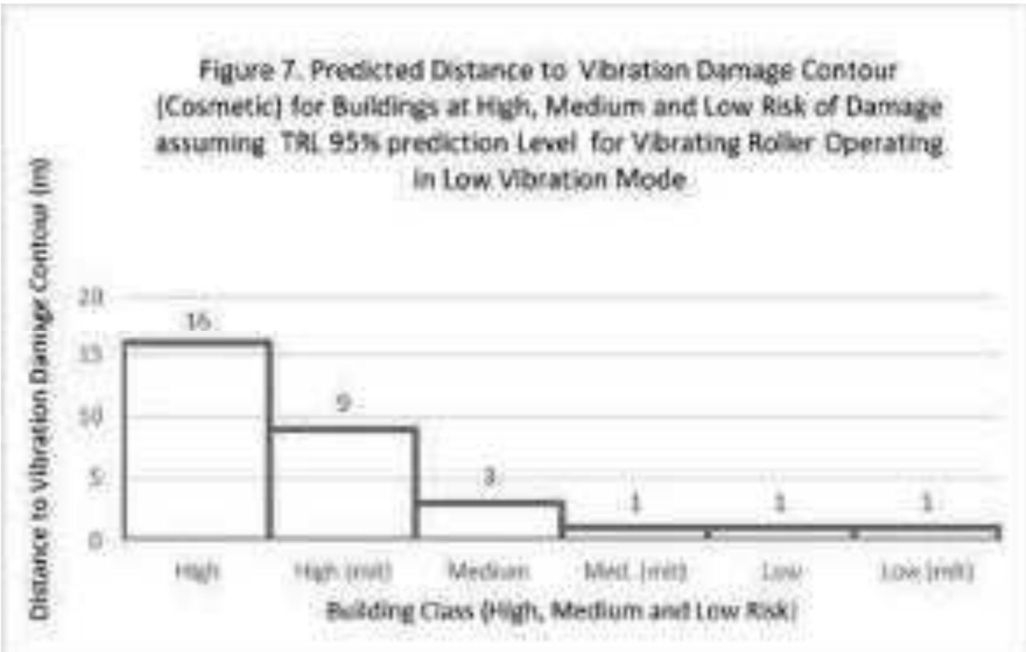
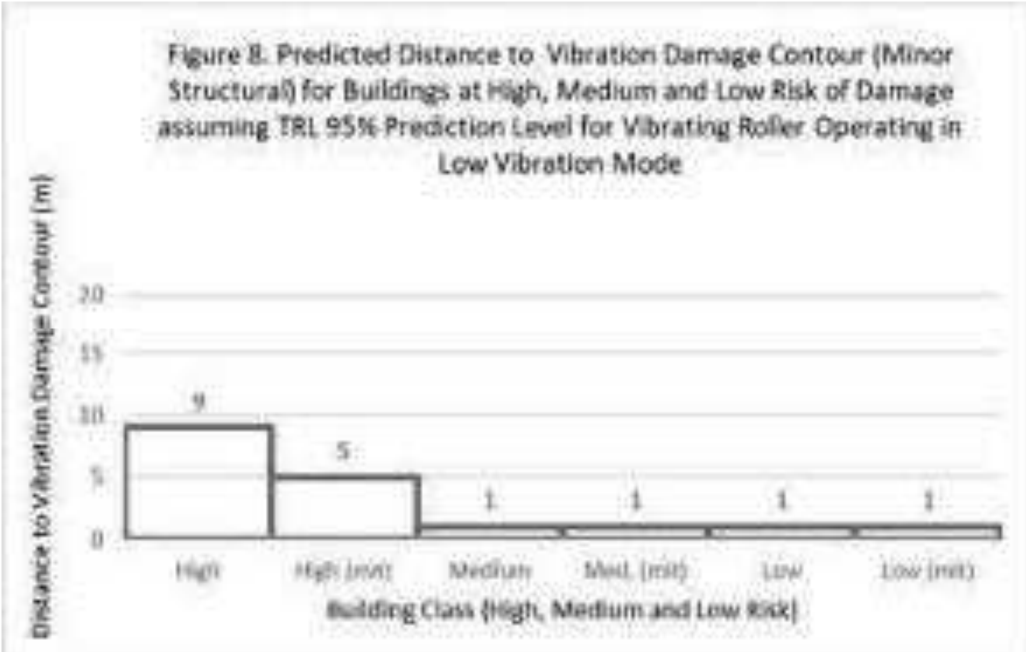


Figure 7. Predicted Distance to Vibration Damage Contour (Cosmetic) for Buildings at High, Medium and Low Risk of Damage assuming TRL 95% prediction Level for Vibrating Roller Operating in Low Vibration Mode

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 (for high risk buildings) would give a distance of 9m to the vibration damage contour as shown in Figure 8 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.



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 66% prediction level	**Cosmetic Damage** 95% prediction level	**Minor Structural** 95% prediction level
High	No mitigation	22	36	22
Low		n/a	16	9
High	With Trench	13	22	13
Low		n/a	9	5

Table 4. Vibration Damage Contour Distances for High Risk Buildings

Plotting of Vibration Damage Contour Distances

For the final stage of this study the JOC CAD team have plotted 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 L 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

JOC have confirmed that it is possible to carry out ground compaction without vibration on sections of the road adjacent to high risk buildings. In a previous study, measurements were made of the road roller described in Appendix 1 operating in 'no vibration' mode over a prepared sub-base. The results indicated that vibration levels at distances of 3-5m from the roller 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. These measurements were made on a lithology on which higher levels of vibration would be expected in comparison with that prevalent on Section 2B of the road, and hence the application of these findings is a worst case.

Vibration from Operation of Excavator

In a previous study, ground borne vibration velocities (ppv) were measured during operation of an excavator digging out a section of road sub base. The assessment of the results gave the distance to the high risk building class contour (3mm/s) of c.5m This 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 roller vibration setting, the 2mm/s vibration damage contour, (i.e. the threshold of potential damage to ancient monuments, for example mausoleums 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 Calculations and Monitoring

Vibration damage contour distances have been presented above for operation of a vibrating roller and for operation of an excavator. These results are considered sufficiently robust for the purposes of updating the IEE as required by the ToR. However they are based on the use of a specific design of roller, and the future contractor must ensure that the vibration levels of the plant selected for use do not exceed those of the SEM 520. This can be verified initially through calculation, but once plant are on site, some preliminary vibration measurements should be made to validate the calculations and ensure predicted levels will not be exceeded.

It is also advisable to carry out vibration monitoring (including the provision of vibration threshold exceedance alarms) on selected dwellings during construction. This would limit the possibility of structural damage to buildings and provide a means of monitoring contractor working practices.

6. CONCLUSIONS

A study has been made of construction vibration at dwellings alongside Section 2B of the Connector Road in order to determine the potential effect of the vibration on nearby houses and potential means of mitigation to reduce the risk of damage.

The principal source of vibration is the operation of vibratory rollers during ground preparation, and a review has therefore been made of existing methods for calculation of vibration from ground preparation and compaction. Of these the TRL model was chosen to offer the best available methodology.

Buildings of the types found alongside the road have been classified, according to their sensitivity to vibration damage, with the categories including low, medium and high risk buildings. The high risk buildings are those constructed from adobe. Vibration damage criteria for each category 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 calculate the variation of vibration with distance from the road, resulting from the operation of a typical large road roller (SEM 520). The method is based on a statistical approach and provides output in the form of vibration prediction levels, with for example the 95% prediction level being the level at which there is a 5% probability of the vibration level being exceeded. Following normal

good practice, the calculated vibration levels were compared to measured vibration data, obtained during a previous study, for the same model of road roller. For high vibration setting good agreement was found between the TRL 66% prediction level and the measured data, however for the low vibration setting, the TRL 95% prediction level gave better agreement.

The TRL method was then used to calculate the distance between the roller and the position at which buildings of the three vibration damage categories (high, low & medium) would be at risk of cosmetic or structural damage resulting from operation of the roller. The results are presented in the form of vibration damage contour distances, which were set out in diagrammatic form for each of these roller operating modes and vibration prediction levels.

For the high vibration operating mode, the distance to the vibration damage contour for cosmetic damage to high risk buildings, assuming the TRL 95% prediction level, would be 36m. 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 22m. The distance to the vibration damage contour for minor structural damage to high risk buildings, assuming the TRL 95% prediction level would be 22m. This would reduce to 13m, taking into account the use of a trench as mitigation.

In the case of the low vibration operating mode, the distance to the vibration damage contour for cosmetic damage to high risk buildings, assuming the TRL 95% prediction levels, would be 16m. This would reduce to 9m, taking into account the use of a trench as mitigation. The distance to the vibration damage contour for minor structural damage to high risk buildings, assuming the TRL 95% prediction level would be 9m. This would reduce to 5m, taking into account the use of a trench as 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. For example where excavation 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 they are based on the use of a specific design of roller, and the future contractor must ensure that the vibration levels of the plant selected for use do not exceed those of the SEM 520. This can be verified initially through calculation, but once plant are on site, some preliminary vibration measurements should be made to validate the calculations and ensure predicted levels will not be exceeded.

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 multistorey 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

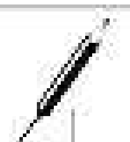
Amplitude of vibrations (max/min) 1,86/0,93 mm

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:[illegible]

Team Leader	H. R. Luck	
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Руководитель	Х. Р. Лак	
Зам. РГ	Барфилд С.	
Инж.-гидролог	Аман[illegible] Т.	

B [illegible] 89+500 [illegible] +200

[illegible] (ADB) [illegible]

[illegible] 89+200 [illegible] 2+200

Stage	Ratio	Pages
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[illegible]	2:1	[illegible]

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Jumgal region, Naryn
Нарынская область, Жумга
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Team Leader	H. R. Luck	
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Зам. РГ	Борбуев С.	
Инженер-гидролог	Аманбаева Т.	

Stage	Ratio	Pages
Стадия	Лист	Листов
Design	2/3	60

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Jumgal region. Naryn
Нарынская область. Жумгал
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Зам. РГ	Барфуев С.	
Инж.-дорожник	Анварбеков Т.	

Stage	Page	Pages
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[illegible]	[illegible]	[illegible]

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Нарынская область, Жумгал
Scale/Масштаб 1:2

Team Leader	H. R. Luck
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Highway Engineer	[illegible]
Рук. группы	[illegible]
Зам. РГ	Барбаев С.
Инженер-дорожник	[illegible]

Км 80+000 - км 10 + 200

Stage	Page	Pages
Стадия	Лист	Листов
DD/ДП	2.31	60

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Team Leader	H. R. Lock	
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Highway Engineer	[illegible]	
Рук. группы	А. Р. Лок	
Зам. РГ.	Барбаев С.	
Инженер-дорожник	[illegible]	

Stage	Page	Pages
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ПРОЕКТ	2 . 42	60

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[illegible] region, Naryn [illegible]

Нарынская область, Жумгал [illegible]

Scale/Масштаб 1:2[illegible]

Jumgal region. Naryn
Нарынская область. Жумгал
Scale/Масштаб 1:2

Team Leader H. R. Luck

Deputy TL S. Borbuev

Highway Engineer [illegible]

Рук. группы [illegible]

Зам. РГ Борбуев С.

Инженер-дорожник [illegible]

Stage	Reg.	Page
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[illegible]	[illegible]	[illegible]

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Нарынская область, Жумгал
Scale/Масштаб 1:

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Нарынская область, Жумгальский район
Scale/Масштаб 1:1000

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[illegible]	[illegible]	[illegible]

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Naryn region. Naryn
Нарынская область. Жуван
Scale/Масштаб 1:20

Stage	Pg	Pages
Стадия	Лист	Листов
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Jumgal region, Naryn
Нарынская область, Жумгал
Scale/Масштаб 1:2

Stage	Pa	Pages

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Jumgal region, Naryn [illegible]
Нарынская область, Жумгал [illegible]
Scale/Масштаб 1: [illegible]

Team Leader	H. R. Luck	
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Руководитель	H. R. Luck	
Зам. РГ	Борбуев С.	
Инженер-дорожник	Асанакунова Т.	

Sect [illegible] 2 [illegible] Bishkek-Osh km 89+500 - km [illegible] +200

[illegible]

Stage	Page	Pages
Стадия	Лист	Листов
Design	25	50

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Jumgal region, Naryn
Нарынская область, Жумгал
Scale/Масштаб 1:

Team Leader	H. R. Luck	
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Зам. РГ	Барбулов С.	
Инж.-дорожник	Ашимбеков Т.	

Stage	Page	Pages
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[illegible]	[illegible]	[illegible]

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Team Leader	H. R. Luck	
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Зам. РГ	Бор[illegible] С.	
Инж.-дорожник	[illegible] Т.	

Section 2 ... km 89+600 - km 1[illegible]+200

Stage		Pages
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Jumgal region, Naryn [illegible]

Нарынская область, Жумгал[illegible]

Scale/Масштаб 1:[illegible]

Client:
Japan Overseas Consultants Co. Ltd Bishkek
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APPROVED

Ministry of Culture, Information and Tourism of the Kyrgyz Republic

#___________________________

«___»___________________ 2018

ARCHAEOLOGICAL EXPERTISE

of Section 2B of the Alternative North-South Road (CAREC Corridors 1 and 3 Connector Road), Epkin-Bahkuugandy, km 89+500 to km 159+200.

Bishkek – 2018

CONTENTS

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Signature _________________

1. ANNOTATION

This report contains the results of archaeological reconnaissance work done in Section 2B of the Alternative North-South Road (CAREC Corridors 1 and 3 Connector Road), Epkin-Bashkuugandy, from km 89+500 to km 159+200 (Fig. 1), 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 meters) and the drawing up of a protection zones for the discovered monuments.

As a result of the archaeological reconnaissance, such historical and cultural heritage sites as ethnographical period burial mound (XVIII-XIX), burial mound of Bronze age, early Iron Age (Saks period VIII-III BC), Saks-Usun and Hun periods, as well as artifacts in the form of ceramics found on the surface.

Signature ________________

2. INTRODUCTION

The purpose of this work was to conduct an archaeological study of Section 2B, Epkin-Bashkuugandy, from km 89+500 to km 159+200 in view of the proposed reconstruction of the Alternative North-South Road (CAREC 1 and 3 Connector Road) in the territory of Jumgal Rayon of Naryn Oblast, by means of archaeological examination of the site to establish the presence or absence of archeological monuments / objects of historical and cultural heritage (OHCH).

The archaeological survey was a result of a request by Japan Overseas Consultants Co. Ltd. in Bishkek.

To ascertain the presence or absence of objects of historical and cultural heritage in the territory of the sections of the contours, a visual walking tour 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 discovered items.

3. HISTORY OF ARCHEOLOGICAL SURVEYS

As per the State list, on the territory of Jumgal Rayon of Naryn Oblast there are 7 historical and cultural heritage objects of the state significance under the numbers 302-308 (Resolution 2015).

The complex of Kyrk-Choro mausoleums dating XVIII-XIX centuries, scattered throughout the valley is also included in the state list of historical and cultural heritage sites, and within this report is noted as part of the archeological complex of Altyn-Aryk.

According to the previous archaeological report of T. Chargynov, only 10 archaeological monuments in the form of burial mounds and gumbeses (mausoleums) were recorded on this section of the road.

But according to coordinates N42°05’39.7” E 075°08’13.4”, given by T. Chargynov in the previous archaeological report (Chargynov, 2016) at km 50 of Kochkor-Chaek Road, indicated by him as the Kyzart burial mound, discovered and investigated by A.N. Bernshtam in 1944-49 burial mounds or other OHCH is not fixed. Visual inspection of the locality did not reveal any OHCH in this area. In the course of this study, the Kyzart burial mound was also not recorded. Presumably the mound is located on the other site at the following coordinates: 42° 5'45.92"N 75° 6'9.12"E. According to the plan of the burial mound made by A.N. Bernshtam, burial ground is located on the north-west side of the road approximately within 50 and more meters (Bernshtam, 1952, p. 64) (Fig. 2).

In the valley of Jumgal River, in the floodplain of the river, there were recorded: settlement Tugol-Say, settlement of Tugol-Say 2 and 2 tortkuls (forts and fortifications), on the first terrace other 6 mounds were revealed.

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 2B of Epkin-Bashkuugandy Road starts at the end of Epkin village and ends at the beginning of village Bashkuugandy.

4.

At km **91+100 - 91+600** first OHCH was detected. **Burial mound Ak-Chiy (OHCH #1)** of Saks Period (VIII-III BC), within 220m to south of the road on the

top of the hill. Mound consists of 10 burial mounds with diameter 10-12 meters and with the embankment to 1 meter. General coordinates of the mound: 42° 9'12.62"N 75°21'48.25"E. In management plan this site is under **OHCH #1.** (Fig.3-4).

At km **92+400 - 92+800** were detected secons and third OHCH complexes. **Burial mound Ak-Chiy 2 (OHCH complex #2)** two burial mounds were identified within 90-100 meters to north of the road, which belong to Saks Period (VIII-III BC). Both mounds were leveled due to agricultural works, from the stone embankement little is left. Remained diameter is about 10 meters. They are visually seen due to chia bush. General coordinates are as follows:

#1 42° 9'6.64"N 75°21'6.35"E (in 90m)

#2 42° 9'1.54"N 75°20'54.77"E (in 100m) (Fig.5-7).

Burial mound Ak-Chiy 3 (OHCH complex #3) is located to south of the road and consists of 5-6 large, circled shaped mounds with stone-soil embankment. The height of the embankment is to 1m, diameter: 14-15 meters. Mounds are located on the hill. Besides the burial mounds there is present-day cemetery. Complex is located within 100m to south of the road (Fig.8).

Coordinates of some mounds are as follows:

#1 42° 8'56.08"N 75°21'8.29"E

#2 42° 8'54.78"N 75°21'8.26"E

#3 42° 8'51.76"N 75°21'3.68"E

At km **93+700 - 93+840** detected the next **complex Ak-Chiy 4 (OHCH complex #4)**. To the north of the road in 50 meters were found the ruins of the gumbeze (mausoleum), late Medieval or Ethnographic time grave and three burial mounds of the Saks time (VIII-III BC). Mounds of the Saks time with a low soil embankment up to 0.10 cm; in diameter 5-6 meters, are located closer to the ruins of the gumbeze from the south-west side (Fig. 9-13).

Coordinates are as follows:

#1 42° 8'34.35"N 75°20'1.63"E

#2 42° 8'34.26"N 75°20'1.28"E

#3 42° 8'33.81"N 75°20'1.01"E

Further, eight late Medieval or Ethnographic times graves with soil embankment up to 1 meter, diameters of 1.5-2 meters were detected. Some graves are protected by stone pitching, but were already collapsed; holes were also

identified at the location. The mounds are located to north of the road at a distance of 100 meters (Figure 18-19). Coordinates are as follows:

#1 42°11'38.84"N 75°31'44.20"E;

#2 42°11'39.67"N 75°31'45.92"E; #3

42°11'39.67"N 75°31'45.92"E.

At km **97+300 - 97+500** was detected **burial mound Uzun-Bulak (OHCH complex #5).** The complex is located on the north side of the road and consists of 10 fences of the Bronze Age. The buildings are small in size, round and rectangular in shape, 1.5-2 meters in diameter, without a fill; in most cases, a mound up to 0.10-0.20 cm in height in the center. There are also fences measuring 1 by 1.5 meters, without a fill, 2 narrow fences with dimensions of 1.5 to 0.50 cm. Preliminarily, the fences refer to the Bronze Age (about 3000-3500 years ago). The bulk of the fences are located at a distance of 50 meters or more from the road. One fence #10 is located in 19 meters north of the road. Also, near the fence, a fragment of ceramics was found (Fig. 14).

Coordinates of the fences are as follows:

#1 42° 8'6.86"N 75°17'52.48"E

#2 42° 8'6.73"N 75°17'53.42"E

#3 42° 8'7.13"N 75°17'54.59"E

#4 42° 8'7.33"N 75°17'53.79"E

#5 42° 8'8.43"N 75°17'53.93"E

#6 42° 8'8.88"N 75°17'53.88"E

#7 42° 8'7.99"N 75°17'52.17"E

#8 42° 8'8.89"N 75°17'52.73"E

#9 42° 8'8.75"N 75°17'52.01"E

#10 42° 8'4.62"N 75°17'47.59"E (in 19 meters from the road)

The coordinates of the found ceramics is: 42° 8'4.79"N 75°17'47.99"E. Fragment of the ceramics were found in 20 meters to north of the road.

At km **98+450 - 98+600** was detected the **complex Uzun-Bulak 2 (OHCH complex #6).** The complex is located on the north side of the road at 90 meters from the road, along a meandering ravine. The complex consists of the Bronze Age burial mounds (possibly a transitional period from the Bronze Age to the Iron Age), fencing and tash-koro (stone circle pitching). Mounds are mostly round in shape, with a

diameter of 3 to 5 meters, have an annular compaction, without a fill, with stone pitching. Coordinates are as follows:

#1 42° 7'57.63"N 75°17'1.70"E

#2 42° 7'59.42"N 75°17'1.73"E

#3 42° 7'59.56"N 75°17'1.54"E

#4 42° 7'59.73"N 75°17'1.73"E

#5 42° 8'0.59"N 75°17'0.32"E

#6 42° 8'0.48"N 75°17'0.06"E

#7 42° 8'0.72"N 75°16'59.97"E

#8 42° 8'1.52"N 75°16'59.26"E

#9 42° 8'1.71"N 75°16'59.24"E

#10 42° 7'58.41"N 75°16'59.09"E

Fences are square shaped with 7 to 7 meters. Coordinates of the fence: 42° 7'57.35"N 75°17'4.30"E. Also dated by Bronze Age period.

Tash-koroo is the remains of Bronze Age or medieval time settlement, with diameter 3 meters. Located below in the floodplain of the ravine. Coordinates of the object: 42° 8'0.18"N 75°17'0.52"E.

At km **105+500 - 105+760** was identified the burial mound **Kyrk-Kyz (OHCH complex #7).** The complex is tentatively dated to the Bronze Age and the transition period from the Bronze Age to the Early Iron Age, located to the north of the road at a distance of 20 and further meters on the terrace of the Kyzart River. In total, there are 20 objects in the form of enclosures of round and sub-rectangular shape. The masonry is circular, in the center there is also a stone pitching, without a fill (Fig.22-26). **Object #1 is the largest (diameter is 14 meters) and is located in 20 meters to north of the road. Partially destroyed by the installation of a power line pylon.** Coordinates: 42° 6'26.61"N 75°12'23.12"E.

Coordinates of other objects are as follows:

#2 42° 6'27.33"N 75°12'22.66"E

#3 42° 6'28.12"N 75°12'23.67"E

#4 42° 6'28.45"N 75°12'23.26"E

#5 42° 6'28.46"N 75°12'24.22"E

#6 42° 6'28.52"N 75°12'23.97"E

#7 42° 6'28.81"N 75°12'24.04"E

#8 42° 6'29.09"N 75°12'24.15"E

#9 42° 6'29.23"N 75°12'23.58"E

#10 42° 6'29.40"N 75°12'24.31"E

#11 42° 6'29.52"N 75°12'24.56"E #12

42° 6'29.77"N 75°12'24.18"E

#13 42° 6'29.77"N 75°12'24.18"E

#14 42° 6'30.03"N 75°12'24.28"E

#15 42° 6'30.21"N 75°12'24.19"E

#16 42° 6'29.95"N 75°12'24.65"E

#17 42° 6'30.04"N 75°12'25.16"E

#18 42° 6'30.23"N 75°12'25.80"E

#19 42° 6'30.62"N 75°12'25.56"E

#20 42° 6'30.70"N 75°12'25.30"E

#21 42° 6'26.62"N 75°12'14.54"E

#22 42° 6'26.08"N 75°12'14.22"E

Further at km **105+850 - 105+950** was detected the next **burial mound Kyrk-Kyz 2 (OHCH complex #8).** The burial mound is also located to the north of the road at a distance of 25 meters. The complex consists of 18 objects, commemorative fences and mounds of round shape with an earth embankment. Mounds are with a diameter of up to 3 meters, a fill height is about 0.20 cm (Fig. 27). The coordinates of the objects are as follows:

#1 42° 6'22.82"N 75°12'7.47"E (25 meters to north of the road)

#2 42° 6'23.66"N 75°12'6.85"E (50 meters to north of the road)

#3 42° 6'23.85"N 75°12'6.75"E

#4 42° 6'24.05"N 75°12'6.72"E

#5 42° 6'24.35"N 75°12'6.93"E

#6 42° 6'23.88"N 75°12'7.28"E

#7 42° 6'24.33"N 75°12'7.31"E

#8 42° 6'24.33"N 75°12'7.31"E

#9 42° 6'24.03"N 75°12'7.41"E

#10 42° 6'23.88"N 75°12'7.58"E

#11 42° 6'24.03"N 75°12'7.82"E

#12-13 42° 6'24.13"N 75°12'7.91"E

#14 42° 6'24.38"N 75°12'8.62"E

315 42° 6'24.16"N 75°12'8.96"E

#16 42° 6'24.50"N 75°12'9.48"E

#17 42° 6'23.99"N 75°12'9.46"E

#18 42° 6'24.36"N 75°12'10.04"E

Further at km **106+000 - 106+130** was detected the **burial mound Kyrk-Kyz 3 (OHCH complex #9).** The Saks time burial mound is also located north of the road in 30 and further meters from the road and consists of 9 mounds. Mounds are round shaped with a diameter of up to 7 meters, with a stone-soil embankment up to 0.20 cm (Fig.28-29). In the report of T. Chargynov, the monument was marked as a burial mound located at km 44 of Kochkor – Chaek Road. The coordinates of the mounds are as follows:

#1 42° 6'21.67"N 75°12'2.65"E (25 meters to north of the road)

#2 42° 6'21.92"N 75°12'2.15"E (38 meters to north of the road)

#3 42° 6'22.24"N 75°12'2.47"E (46 meters to north of the road) #4

42° 6'22.46"N 75°12'2.52"E

#5 42° 6'22.07"N 75°12'1.66"E (47 meters to north of the road)

#6 42° 6'21.95"N 75°12'0.30"E

#7 42° 6'22.82"N 75°12'1.29"E

#8 42° 6'22.83"N 75°12'2.21"E

#9 42° 6'23.24"N 75°12'2.40"E

At km **136+000 - 136+900** was identified the **complex Altyn-Aryk 1, 2 and 3 (OHCH complexes #10, 11 and 12).** The complex is located on both sides of the road and represents a royal burial site of Saks time (VIII-III BC). Circled mounds, diameter up to 20-30 meters, embankments is up to 2-2.5 meters in height. The mounds are located compactly. In total, about 46 mounds were identified. Also some mounds are observed on the other side of the Jumgal River. Almost on each mound, gumbezes (mausoleums) were built or a complex of gumbezes of Ethnographic time (XVII-XIX centuries.) (Fig.30-37). The coordinates of the mounds are as follows:

#1 41°58'41.50"N 74°54'42.21"E (4 meters to north of the road)

#2 41°58'42.26"N 74°54'36.74"E

#3 41°58'42.25"N 74°54'35.74"E

#4 41°58'41.68"N 74°54'35.23"E

#5 41°58'42.23"N 74°54'34.91"E

#6 41°58'41.46"N 74°54'34.50"E

#7 41°58'41.48"N 74°54'33.12"E

#8 41°58'40.91"N 74°54'34.01"E

#9 41°58'40.94"N 74°54'34.46"E

#10 41°58'40.43"N 74°54'34.58"E

#11 41°58'40.42"N 74°54'33.17"E

#12 41°58'39.79"N 74°54'33.49"E

#13 41°58'39.35"N 74°54'32.84"E

#14 41°58'38.87"N 74°54'32.17"E

#15 41°58'42.41"N 41°58'42.41"N

#16 41°58'42.15"N 74°54'37.77"E

#17 41°58'39.94"N 74°54'39.84"E (close to the road to north)

#18 41°58'40.30"N 74°54'39.99"E (5 meters to north of the road)

#19 41°58'39.20"N 74°54'36.31"E (20 meters to north of the road) #20 41°58'35.63"N 74°54'34.00"E (10 to south of the road)

#21 41°58'37.53"N 74°54'33.97"E (15 meters to north of the road) #22 41°58'37.26"N 74°54'32.96"E (20 meters to north of the road)

#23 41°58'37.00"N 74°54'32.23"E (20 meters to north of the road)

#24 41°58'36.68"N 74°54'31.34"E (26 meters to north of the road) #25 41°58'36.20"N 74°54'30.46"E (20 meters to north of the road)

#26 41°58'35.59"N 74°54'30.02"E (14 meters to north of the road)

#27 41°58'34.45"N 74°54'30.99"E (14 meters to south of the road) #28 41°58'33.98"N 74°54'30.32"E (17 meters to south of the road)

#29 41°58'33.48"N 74°54'28.81"E (18 meters to south of the road) #30 41°58'33.13"N 74°54'23.34"E (4 meters to north of the road) #31 41°58'32.86"N 74°54'22.42"E (close to the road to north)

#32 41°58'32.80"N 74°54'20.29"E (6 meters to north of the road)

#33 41°58'31.18"N 74°54'19.62"E (16 meters to south of the group)

#34 41°58'36.33"N 74°54'32.97"E (close to the road to north)

#35 41°58'35.94"N 74°54'31.86"E (close to the road to north)

#36 41°58'32.12"N 74°54'24.92"E (16 meters to south of the road) #37 41°58'31.61"N 74°54'26.96"E (53 meters to south of the road)

#38 41°58'31.15"N 74°54'25.56"E (48 meters to south of the road)

#39 41°58'30.63"N 74°54'24.00"E (52 meters to south of the road)

#40 41°58'29.83"N 74°54'25.11"E (86 meters to south of the road)

#41 41°58'30.52"N 74°54'23.28"E (48 meters to south of the road)

#42 41°58'29.85"N 74°54'23.16"E (67 meters to south of the road) #43 41°58'28.31"N 74°54'21.95"E (97 meters to south of the road)

#44 41°58'29.38"N 74°54'20.10"E (67 meters to south of the road)

#45 41°58'28.80"N 74°54'19.52"E (86 meters to south of the road)

$46 41°58'40.72"N 74°54'40.43"E (9 meters to north of the road)

In addition to burial mounds and mausoleums, **10 other mausoleums are located along the road, located at a distance of up to 50 meters from the road**. Thus, the complex of gumbezes is part of the **Kyrk-Choro mausoleum complex**, which is registered in the State list of OHCH under number 308.

The complex also includes the burial mounds of the Saks time of **Altyn-Aryk 2 and 3**. Altyn-Aryk 2 consists of 6 mounds of round shape with a diameter of up to 10 meters with an embankment up to 0.40 cm high and is located on the third terrace of the Jumgal River to the north of the road at a distance of 220 meters from the road (Fig.38). Altyn-Aryk 3 consists of 17 mounds of round shape with diameters from 6 to 10 meters with an embankment up to 0.30-0.40 cm and is located on the 2nd and 3rd terraces of the Jumgal River to north of the road within 300 meters from the road (Fig. 39).

Further, at km **138+700 - 138+800** was detected the **complex Altyn-Aryk 4 (OHCH complex #13)**, which consists of 4 burial mounds of Saks time, almost entirely leveled by agricultural works and a small tortkul (fort or fortification) with sides 20 by 20 meters. The mounds are located at a distance of 70 meters and further and are noted only for the more saturated color of the vegetation and the remains of the soil embankment, the detectable diameter of the mounds is from 3 to 5 meters (Fig.40-43). The coordinates of the mounds are as follows:

#1 41°58'38.76"N 74°52'56.02"E

#2 41°58'37.68"N 74°52'54.13"E

#3 41°58'40.30"N 74°52'55.48"E

#4 41°58'40.18"N 74°52'55.09"E

Tortkul is oriented by walls from NW to SE, around the walls are the remains of the moat. The height of the walls at the moment is about 1 meter; the width of the walls is about 2 meters. In the southeast corner there are visible remains of the extension building/structure. The coordinates of the tortkul is as follows: 41°58'39.31"N 74°52'54.47"E. Tortkul is located in 107 meters to north of the road.

At km **139+500 - 139+850** was identified the **complex Altyn-Aryk 5 (OHCH complex #14)**, which consists of 4 visually detectable mounds. Mound #1 is located in 7 meters to north of the road. The rest go by in a chain form from the south side of the road and are on the territory of a chronologically mixed cemetery (present-day and ethnographic time), which is fenced. The mounds have a round shape, an embankment height is up to 1 meter. The diameter of the mounds is up to 26 meters (Fig.44-46). The coordinates of the mounds are as follows:

#1 41°58'38.42"N 74°52'22.07"E (7 meters to north of the road)

#2 41°58'36.81"N 74°52'20.77"E (11 meters to south of the road)

#3 41°58'35.36"N 74°52'20.14"E (55 meters to south of the road)

#4 41°58'34.27"N 74°52'19.82"E

At km **140+100 - 141+050** was identified the **burial mound Kuiruchuk 1 and 2 (OHCH # 15 and 16).** Both monuments are included in the state list of historical and cultural heritage sites under the number 303 (Resolution, 2002).

Burial mound #1 (OHCH #15) is identified in T. Chargynov’s report. The burial mound of the Saks time (VIII-III BC) crosses the road in the form of a chain of 14 mounds in the north-south direction. Mounds of two types, the first large with a diameter of up to 20 meters, embankment height is up to 1 meter, are lined with a chain form, the second not large, up to 5 meters in diameter with the height of the rock-soil embankment to 0.30-0.40 cm, having an accompanying character and localized circled big mounds, along the chain of mounds there is a country road, which partially leveled some of them (Fig. 47-50). The coordinates of the mounds are as follows:

#1 41°58'42.63"N 74°51'29.66"E (16 meters to north of the road)

#2 41°58'42.88"N 74°51'30.40"E (26 meters to north of the road)

#3 41°58'43.03"N 74°51'30.25"E (27 meters to north of the road)

#4 41°58'43.41"N 74°51'29.93"E (38 meters to north of the road)

#5 41°58'43.69"N 74°51'29.35"E (49 meters to north of the road)

#6 41°58'43.53"N 74°51'30.43"E (38 meters to north of the road)

#7 41°58'44.57"N 74°51'30.86"E #8

41°58'46.33"N 74°51'31.32"E #9

41°58'47.01"N 74°51'31.48"E

#10 41°58'47.82"N 74°51'31.69"E

#11 41°58'49.03"N 74°51'32.17"E

#12 41°58'42.81"N 74°51'26.82"E (19 meters to north of the road)

#13 41°58'42.04"N 74°51'37.60"E (10 meters to south of the road)

#14 41°58'40.61"N 74°51'37.61"E (9 meters to south of the road)

Burial mound Kuiruchuk 2 (OHCH #16) also located along the road in 360 meter to east of Kuiruchuk 1 burial mound. The burial mound is also dated to the Saks time (VIII-III BC), crosses the road in the form of a chain of 17 mounds in the north-south direction. Mounds of two types, the first large with a diameter of up to 30 meters, embankment height is up to 1 meter, are lined in a chain form, the second not large up to 5 meters in diameter with the height of the rock-soil embankment to 0.30-0.40 cm, having an accompanying character and localized around the big mounds. 6 burial mounds are marked on the south side of the road, the rest on the north side (Fig.51-53). The coordinates of the mounds are as follows:

#1 41°58'38.64"N 74°51'55.82"E (24 meters to south of the road) #2

41°58'38.16"N 74°51'55.64"E (41 meters to south of the road) #3

41°58'38.15"N 74°51'54.40"E (43 meters to south of the road) #4

41°58'38.53"N 74°51'54.27"E (35 meters to south of the road) #5

41°58'38.42"N 74°51'53.98"E (37 meters to south of the road) #6

41°58'38.21"N 74°51'53.90"E (45 meters to south of the road)

#7 41°58'41.00"N 74°51'55.89"E (23 meters to north of the road)

#8 41°58'40.71"N 74°51'55.45"E (17 meters to north of the road)

#9 41°58'40.67"N 74°51'55.95"E (20 meters to north of the road)

#10 41°58'40.61"N 74°51'56.17"E (18 meters to north of the road)

#11 41°58'40.79"N 74°51'56.40"E (22 meters to north of the road)

#12 41°58'40.66"N 74°51'56.79"E (19 meters to north of the road)

#13 41°58'40.96"N 74°51'56.53"E (31 meters to north of the road)

#14 41°58'42.01"N 74°51'55.94"E

#15 41°58'43.01"N 74°51'56.38"E #16

41°58'45.36"N 74°51'56.38"E

#17 41°58'46.49"N 74°51'57.18"E

At km **145+400 - 145+600** after Kuiruchuk village, along the road **in 13 meters to south of the road** detected one large mound of Saks Period (VIII-III BC), with diameter to 30 meters, height to 2 meter, the fill is stone-soil, densely overgrown with vegetation, shrub and chia. 150 meters to the east of the mound there are the remains of a cemetery of Ethnographic time, which could have been placed on ancient burial mounds, a modern cemetery is further to the east. Complex is named as **Kuiruchuk 3 (OHCH #17)** (Fig.54-56). Coordinates: **41°59'18.12"N 74°48'6.50"E (13 meters to south of the road)**. Coordinates of the remains of Ethnographic time: **41°59'22.26"N 74°48'19.27"E (47 meters to north of the road).** Further to the northeast and northwest at 370 meters from the road are detected the burial mounds of the supposedly Hunn time (II century BC - II AD) **Kuyruchuk 4 and 5 (OHCH #18 and 19).**

At km **146+550 - 146+900** was found **burial mound Tugol-Say 1**. At km **147+100 - 147+250** was found **burial mound Tugol-Say 2, and at km 147+500 - 147+900 Burial mound Tugol-Say 3.**

Burial mounds Tugol-Say 1, 2 and 3 (OHCH # 20, 21 and 22) are predated by the Saks-Usun period (VIII century BC - II centuries AD), are located along the road from the north side at a distance of 20 meters and further on the elevation of the second terrace of the Jumgal River (9-10 meters higher from the road surface). The general coordinates of the burial mounds are as follows: TugolSay 1: 41°59'4.52"N

74°47'21.29"E; Tugol-Say 2: 41°59'2.67"N 74°47'5.73"E and Tugol-Say 3: 41°59'2.04"N 74°46'48.31"E (Fig.57-59).

In the floodplain of the Jumgal River in 500 m and further to the south of the road were detected: **Tugol-Say Settlement (OHCH #23)** and **two tortkuls (fort, fortification) (OHCH #24 and 25).** Coordinates of the settlement: 41°58'38.68"N 74°46'37.45"E. Coordinates of tortkuls: #1 41°58'31.50"N 74°47'10.35"E and #2 41°58'46.97"N 74°45'38.92"E (Fig.60).

At km **151+600 - 151+750** were found **burial mounds Tugol-Say 4 and 5 (OHCH #26 and 27)** the Saks-Usun period (VIII century BC - II centuries AD). **Tugol-Say 4** is located in 320 meters to north of the road, **Tugol-Say 5** at 260 meters to the south of the road. The general coordinates of the burial mounds are as follows: Tugol-Say 4 41°59'58.42"N 74°43'31.67"E; Tugol-Say 5 41°59'43.64"N 74°43'13.50"E (Fig. 61).

At km **152+950 - 153+000** found **two mausoleums and cemetery of Ethnographic Period (XVII-XIX) (OHCH # 28)** (Fig.62). Coordinates of the mausoleums are as follows:

#1 41°59'54.41"N 74°43'13.65"E (12 meters to south of the road) #2

41°59'53.89"N 74°43'13.72"E (25 meters to south of the road)

At km **153+100 - 153+200** was detected **burial mound Tugol-Say 6 (OHCH #29)** Saks time (VIII-III BC), which consists of 2 burial mounds with a rock mound, with a diameter of up to 10 meters, a mound height is 0.30-0.40 cm and is located further than 50 meters from to the south of the road. The coordinates of the mounds are as follows:

#1 41°59'57.44"N 74°43'5.19"E

#2 41°59'54.73"N 74°43'5.34"E

At km **154+400 - 154+600** was found **burial mound Tugol-Say 7 (OHCH # 30)** Saks time (VIII-III BC). The burial mound consists of 3 mounds with a stone embankment, with a diameter of up to 12 meters, a mound height is 0.30-0.40 cm and is located further than 50 meters to the south of the road (Fig.63). The coordinates of the mounds are as follows:

#1 42° 0'1.79"N 74°42'54.37"E #2

42° 0'3.73"N 74°42'53.48"E

#3 42° 0'4.11"N 74°42'54.04"E

Based on the results of archaeological reconnaissance, visual inspection of the adjacent territories to the Section 2B of Epkin-Bashkuugandy Road revealed 30 archeological complexes (OHCH complexes) that fall into security zones, zones of regulated development and a protected landscape. **10 OHCH complexes – UzunBulak, Kyrk-Kyz, Kyrk-Kyz 2, Kyrk-Kyz 3, Altyn-Aryk, Altyn-Aryk 5, Kuiruchuk 1, Kuiruchuk 2, Kuiruchuk 3, two mausolems of ethnographic time** are located at the distance of less than 50 meters from the road.

Management Plan of OHCH (procedures, proposals and measures for the protection and monitoring of objects of historical and cultural heritage during the construction of the road) presented as a separate appendix.

CONCLUSIONS

May 24, 2018.

These 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:

Road reconstruction.

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 2B, Alternative South-North Road (CAREC Corridors 1 and 3), Epkin-Bashkuugandy, km 89+500 to km 159+200.

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 2B, Alternative South-North Road (CAREC Corridors 1 and 3), Epkin-Bashkuugandy, km 89+500 to km 159+200, the following monuments and other traces were revealed in the territory of the Jumgal Rayon 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. At km **97+300 - 97+500 burial mound Uzun-Bulak (OHCH complex #5).** The complex is located on the north side of the road and consists of 10 fences of the Bronze Age. Fence # 10 is located in **19 meters** north of the road. Also, near the fence, a **fragment of ceramics was found** in **20 meters** to the north of the road;
2. At km **105+500 - 105+760 burial mound Kyrk-Kyz (OHCH complex #7).** The complex is tentatively dated to the Bronze Age and the transition period from the Bronze Age, there are 20 objects in the form of enclosures of round and sub-rectangular shape. Object #1 (diameter is 14 meters) is located in 20 meters to north of the road. Partially destroyed by the installation of a power line pylon;
3. At km **105+850 - 105+950 burial mound Kyrk-Kyz 2 (OHCH complex #8)** consists of 18 objects, commemorative fences and mounds of round shape with an earth embankment. Mound #1 is located in **25 meters** to north of the road;
4. At km **106+000 - 106+130 burial mound Kyrk-Kyz 3 (OHCH complex #9),** Saks time burial mound is also located north of the road in 30 and further meters from the road and consists of 9 mounds. Mound #1 is located in 25 meters to north of the road, mound #2 in 38 meters to north of the road, mound #3 – 46 meters north of the road and mound #5 – 47 meters north to the road;
5. At km **136+000 - 136+900 archaeological complex Altyn-Aryk (OHCH complex #10).** Complex consists of royal type (about 46 mounds) burial mounds (VIII-III BC). On almost each mound there are one or more mausoleums of Ethnographic time (XVII-XIX centuries.) 24 mounds are located close to the road at a distance to 48 meters on both sides of the road. In addition to burial mounds and mausoleums, **10 other mausoleums are located along the road, located at a distance of up to 50 meters from the road**. Thus, the complex of gumbezes is part of the **Kyrk-Choro**

mausoleum complex of Jumgal Rayon. Complex is registered in the state list of OHCH under number 308;

6. At km **139+500 - 139+850 complex Altyn-Aryk 5 (OHCH complex #14)**, which consists of 4 mounds of Saks Time (Ethnographic and present-day cemetery). 3 of 4 mounds are located on the territory of cemetery. **Mound #1 (outside the cemetery) located in 7 meters to south of the road, mound #2 (inside the cemetery) – 11 meters to south of the road**;
7. At km **140+100 - 141+050 burial mound Kuiruchuk 1 and 2 (OHCH # 15 and 16)** Saks time. Kuiruchuk 1 is in a form of chain, where **Mounds # 1-6 and 12-14** located at a distance of **16-49 meters on both sides of the road**. Kuiruchuk 2 consists of 17 mounds, where **mounds #1-13** are located at a distance of **17-43 meters on both sides of the road**;
8. At km **145+400 - 145+600 complex Kuiruchuk 3 (OHCH complex #17)**, which consists of **1 burial mound of royal type (13 meters to south of the road) and remains of the cemetery of Ethnographic period (47 meters to north of the road);**
9. At km **152+950 - 153+000 mausoleums and cemetery of Ethnographic Period (OHCH # 28).** Mausoleums are located in 12 meters and 25 meters to south of the road.

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. At km **91+100 - 91+600 Burial mound Ak-Chiy (OHCH #1)** of Saks Period (VIII-III BC) within 220m to south of the road;
2. At km **92+400 - 92+800** 90-100 meters to north of the road and **Burial mound Ak-Chiy 3 (OHCH complex #3)** in 100 meters to south of the road;
3. At km **93+700 - 93+840 complex Ak-Chiy 4 (OHCH complex #4),** consisting of remains of mausoleums, mounds of Saks time and Medevial period, located within 50 meter to the north of the road;
4. At km **98+450 - 98+600 complex Uzun-Bulak 2 (OHCH complex #6),** consisting of burial mound of Bronze Age, fences and tash-koroo, located at a distance of 90 meter to the north of the road;
5. At km **136+000 - 136+900 complex Altyn-Aryk 2 (OHCH complex #11)** at a distance of 220 meters to north of the road and **Altyn-Aryk 3 (OHCH complex #12)** at a distance of 300 meters to north of the road;
6. At km **138+700 - 138+800 complex Altyn-Aryk 4 (OHCH complex #13)**, consists of burial mound of Saks Time and tortkul (fortification) at a distance of 70 meter and more to north of the road;

7. At km **146+550 - 147+900 Burial mound Tugol-Say 1 (OHCH complex #20), Tugol-Say 2 (OHCH complex #21) and Tugol-Say 3 (OHCH complex #22)** aks-Usun period (VIII century BC - II centuries AD), located at a **distance from 20 and more, but located on the hill of second terrace of Jumgal River (there is no direct impact due to the construction of the road, subject to restriction of road widening);**
8. At the same section within the floodplain of Jumgal River there is a **settlement Tugol-Say (OHCH #23) and two tortkuls (fortifications) (OHCH #24 and 25) at a distance of 500 meter to south of the road;**
9. At km **151+600 - 151+750 burial mound Tugol-Say 4 (OHCH complex #26) at a distance of 320 meters to north of the road and Tugol-Say 5 (OHCH complex #27) at a distance of 260 meters to south of the road;**
10. At km **153+100 - 153+200 burial mound Tugol-Say 6 (OHCH #29)** Saks time, located at a distance of more than **50 meters to south of the road;**
11. At km **154+400 - 154+600 burial mound Tugol-Say 7 (OHCH # 30)** Saks time, located at a distance of **more than 50 meters to south of the road.**

Recommendations:

1. At km 92+400 - 92+800 it is required to create **protection zone of burial mound Ak-Chiy 2 (OHCH #2) and Ak-Chiy 3 (OHCH #3)** based on a distance of at least 50 meters from the borders of each grave. Moreover, MCIT KR needs to take the following actions with regard to the administration of the local aiyl aimak: to make a request for the status of the land on which the cemetery is located, to take measures to protect and preserve, and to add to the register of state property the protection zone of Ak-Chiy 2 and Ak-Chiy burial mounds as complexes of objects of historical and cultural heritage;
2. At km **93+700 – 93+840** it is required to create the **protection zone for archeological complex Ak-Chiy 4 (OHCH #4),** based on a distance of at least 50 meters from the borders of each OHCH**;**
3. At km 97+300 - 97+500 it is required to create **protection zone of archaeological complex Uzun-Bulak (OHCH #5),** based on a distance of at least 50 meters from the borders of each OHCH, except fence #10, which is located at a distance of 19 meters. Right of way at this section of the road should be reduced to 20 meters. Construction works to be conducted without vibration;
4. At km **98+450 - 98+600** it is required to create **protection zone for archeological complex Uzun-Bulak 2 (OHCH complex #6),** based on a distance of at least 50 meters from the borders of each OHCH;

5. At km **105+500 - 106+130** it is required to create the **general protection zone, construction regulation zone and historic and cultural landscape zone for burial mounds Kyrk-Kyz 1 (OHCH #7), Kyrk-Kyz 2 (OHCH complex #8) and Kyrk-Kyz 3 (OHCH complex #9).** During the construction the right of way needs to be reduced to 20 meters and construct the road without the shoulder on northern side with appropriate fences. Construction works to be carried out without vibration and under the supervision of Archaeologist;
6. At km **136+000 - 136+900** it is required to create the **general protection zone, construction regulation zone and historic and cultural landscape zone for complex Altyn-Aryk (OHCH complex #10), burial mounds Altyn-Aryk 2 (OHCH complex #11) and Altyn-Aryk 3 (OHCH complex #12).** Right of way shall not exceed the width of the existing road (15 meters).The road needs to be constructed without shoulders on both sides with appropriate fences. Construction works to be carried out without vibration and under the supervision of Archaeologist;
7. At km 138+700 - 138+800 it is required to create the **protection zone for the archaeological complex Altyn-Aryk 4 (OHCH complex #13),** based on a distance of at least 50 meters from the borders of each OHCH. Moreover, MCIT KR needs to take the following actions with regard to the administration of the local aiyl aimak: to make a request for the status of the land on which the cemetery is located, to take measures to protect and preserve, and to add to the register of state property the protection zone of burial mounds as complexes of objects of historical and cultural heritage;
8. At km **139+500 - 139+850** it is required to create the **protection zone for the archaeological complex Altyn-Aryk 5 (OHCH complex #14)**. Right of way shall not exceed the width of the existing road (15 meters).The road needs to be constructed without shoulders on both sides with appropriate fences. Construction works to be carried out without vibration and under the supervision of Archaeologist;
9. At km **140+100 - 141+050** it is required to create the **general protection zone, construction regulation zone and historic and cultural landscape zone for burial mound Kuiruchuk 1 (OHCH complex # 15) and Kuiruchuk 2 (OHCH complex #16)** (monuments of State significance). Right of way needs to be reduced to 20 meters. The road needs to be constructed without shoulders on both sides with appropriate fences.

   Construction works to be carried out without vibration and under the supervision of Archaeologist. Moreover, MCIT KR needs to take the following actions with regard to the administration of the local aiyl aima due to the intensive damage of mounds during agricultural works;

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10. At km 145+400 - 145+600 it is required to create the **protection zone for archaeological complex Kuiruchuk 3 (OHCH complex #17)**. Right of way needs to be reduced to 20 meters. The road to be constructed without shoulder on southern side, where the mound is located and with appropriate fences. Construction works to be carried out without vibration and under the supervision of Archaeologist;
11. At km146+550 - 147+900 it is required to create **o general protection zone, construction regulation zone and historic and cultural landscape zone for burial mounds Tugol-Say 1 (OHCH #20), Tugol-Say 2 (OHCH #21) and Tugol-Say 3 (OHCH complex #22). The road is strictly prohibited to be widened on northern part.** Construction works to be carried out without vibration;
12. At km **152+950 - 153+000** it is required to create the **protection zone for 2 mausoleums and cemetery of Ethnographic period (OHCH complex #28).** Right of way needs to be reduced to 20 meters. The road to be constructed without shoulder on southern side with appropriate fences. Construction works to be carried out without vibration and under the supervision of Archaeologist;
13. At km **153+100 - 153+200** it is required to create the **protection zone for burial mound Tugol-Say 6 (OHCH complex #29)** based on a distance of at least 50 meters from the borders of each OHCH;
14. At km 154+400 - 153+200 it is required to create the **protection zone for burial mound Tugol-Say 7 (OHCH complex #30),** based on a distance of at least 50 meters from the borders of each OHCH;
15. During the construction and other works and / or development of the land of Section 2B of construction of the alternative North-South Road (CAREC Corridors 1 and 3 Connector Road), Epkin-Bashkuugandy, from km 89+500 to km 159+200, in the territory of Jumgal Rayon in Naryn Oblast, it is necessary to exercise vigilance and caution during the road reconstruction work. Any work on the sites where archaeological sites were discovered should be carried out under the supervision of an archaeologist, according to the Management Plan in relation to the identified objects of historical and cultural heritage;
16. When developing the adjacent zones from the territory of Section 2B of construction of the alternative North-South Road (CAREC Corridors 1 and 3 Connector Road), Epkin-Bashkuugandy, from km 89+500 to km 159+200, in the territory of Jumgal Rayon in Naryn Oblast, it will be necessary to conduct additional archaeological examinations for the presence of monuments of historical and cultural heritage.

Signature ________________

Performer: **A. Abdykanova**

Signature _________________

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APPENDIX

Fig. 1. Section 2B (CAREC 1 and 3 Connector Road), Epkin-Bashkuugandy, km 89+500 - 159+200 (highlighted with pink line)

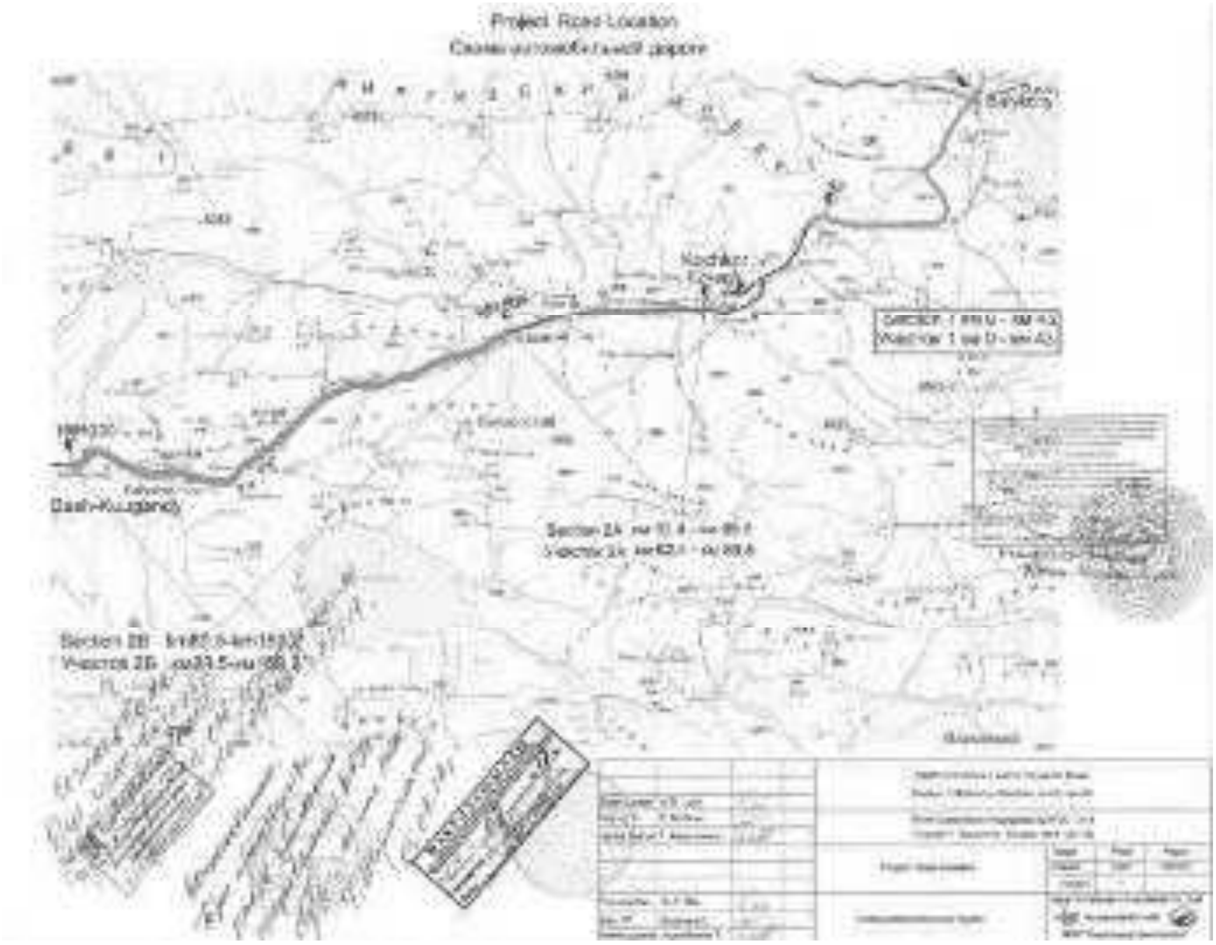

Fig. 2. Location map of Gunn time burial mound Kyzart on Kyzart Pass (A.N. Bernshtam)

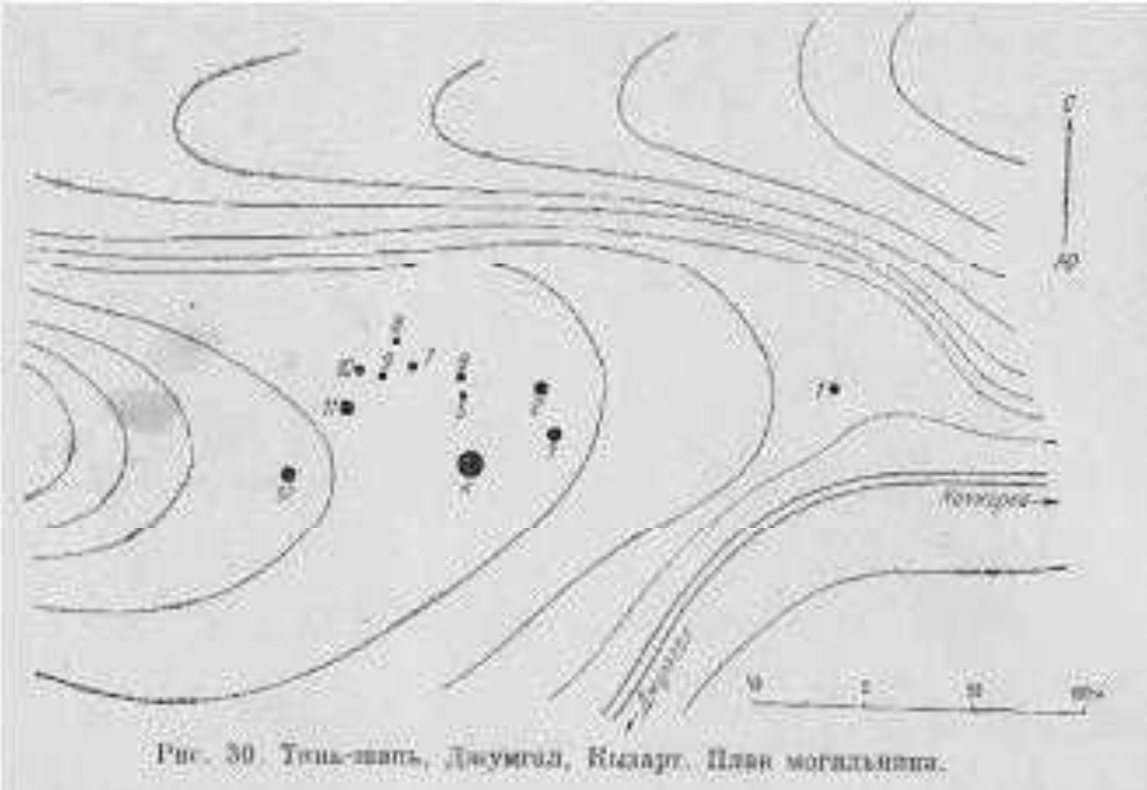

Fig. 3. Section 2B, km 90+500-91+900 (lower scheme)

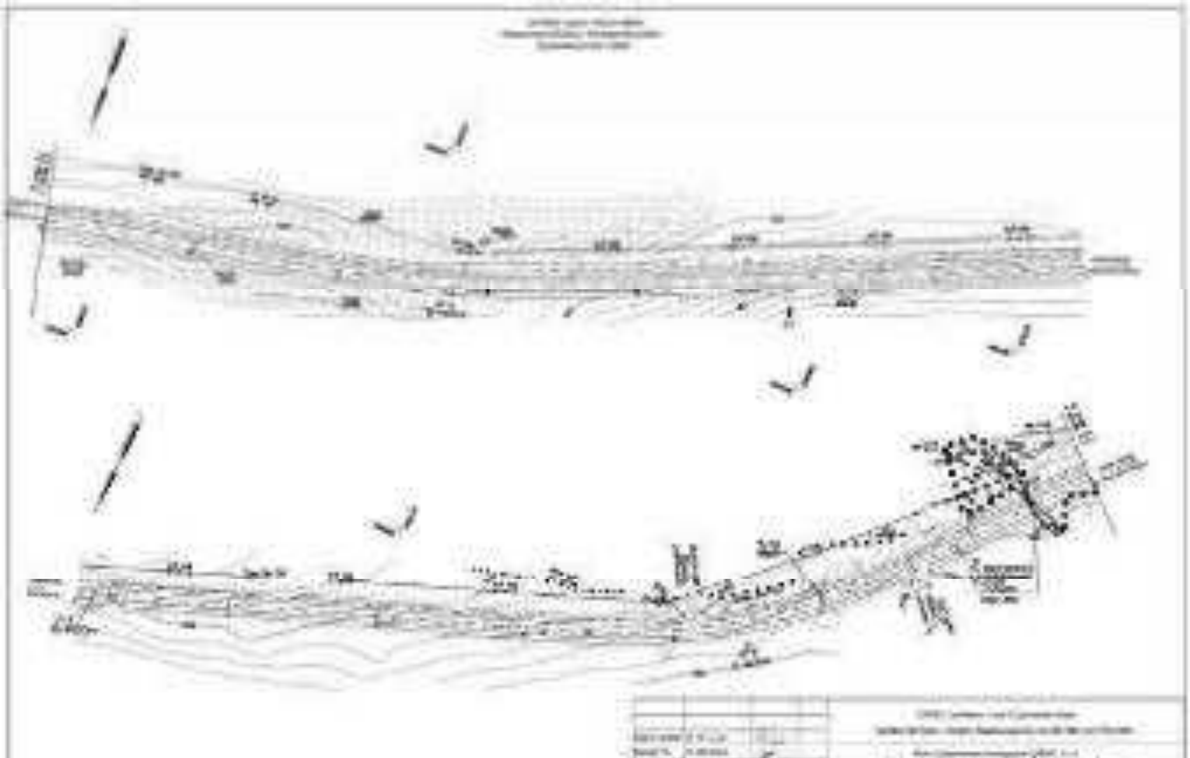

Fig. 4. Burial mound Ak-Chiy

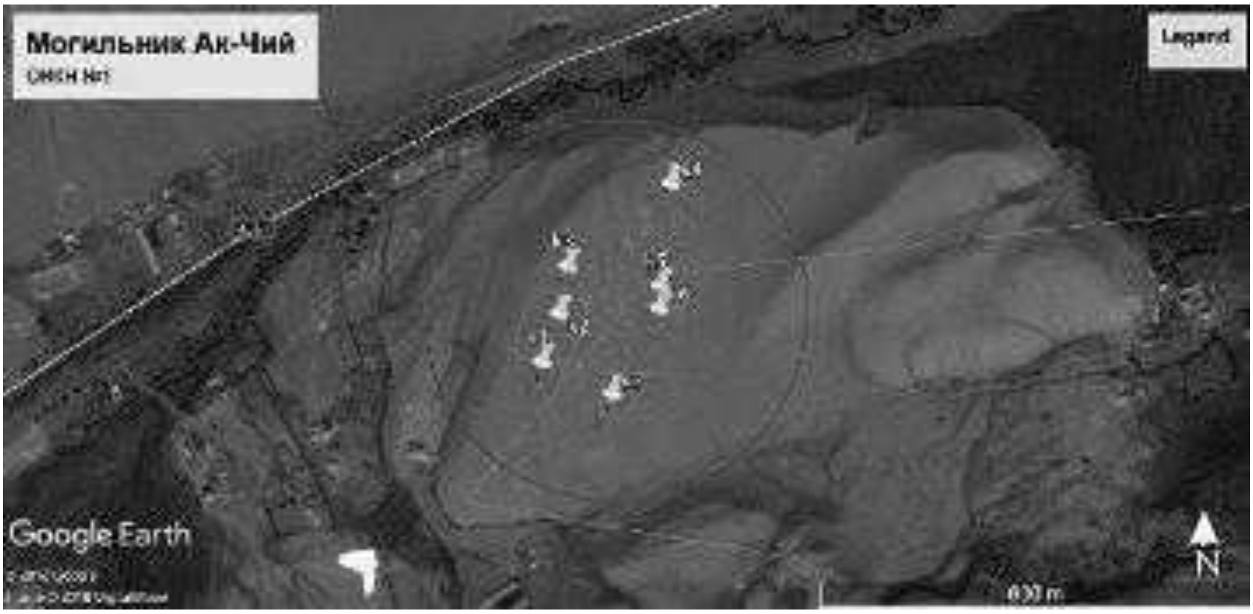

Fig. 5. Section 2B, km 91+900 - 93+300

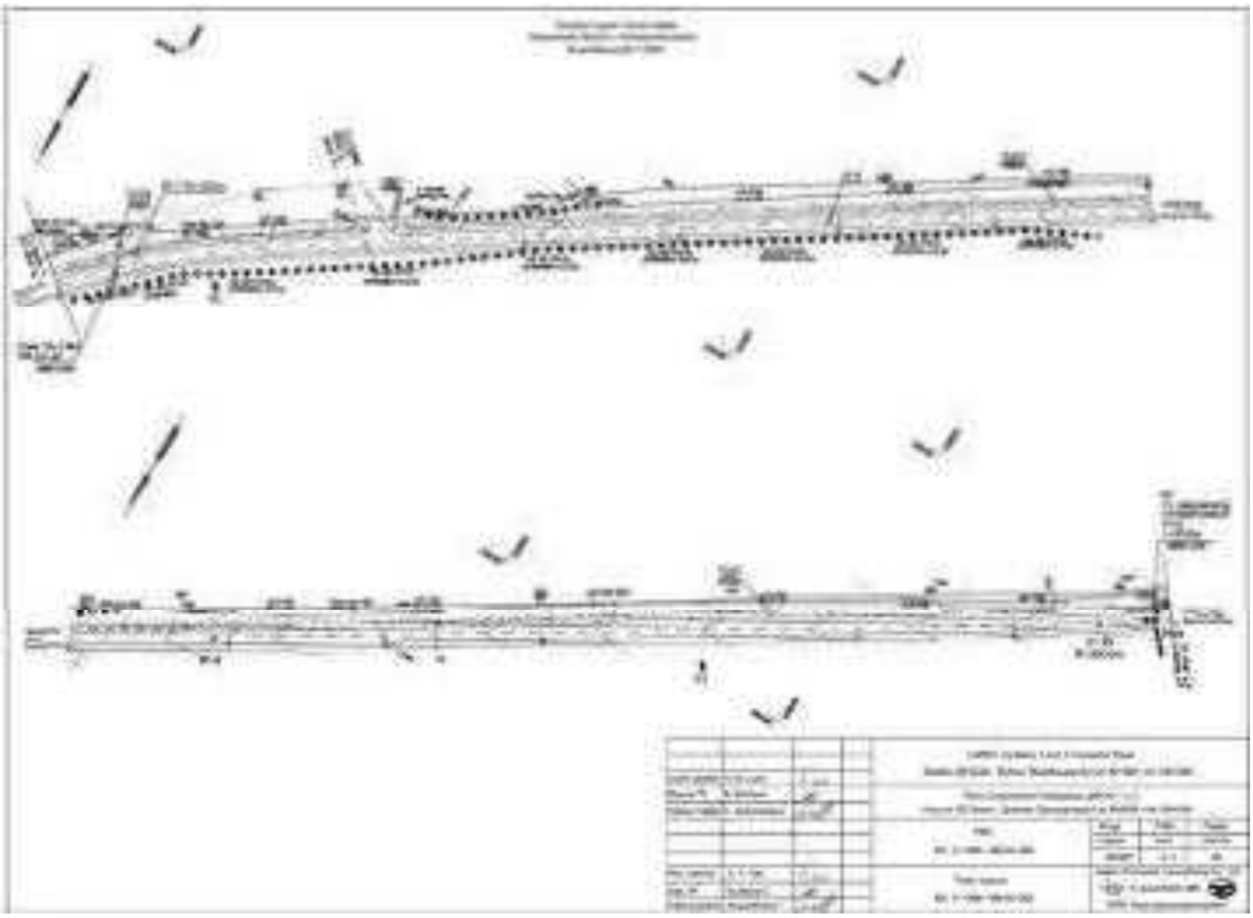

Fig.6. Burial mound Ak-Chiy 2 and Ak-Chiy 3

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Fig.7. Mound Ak-Chiy 2, grave #1

Fig.8. Ak-Chiy 3, mounds and cemetery

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Fig.9. Section 2B, km 93+300-94+700 (upper scheme)

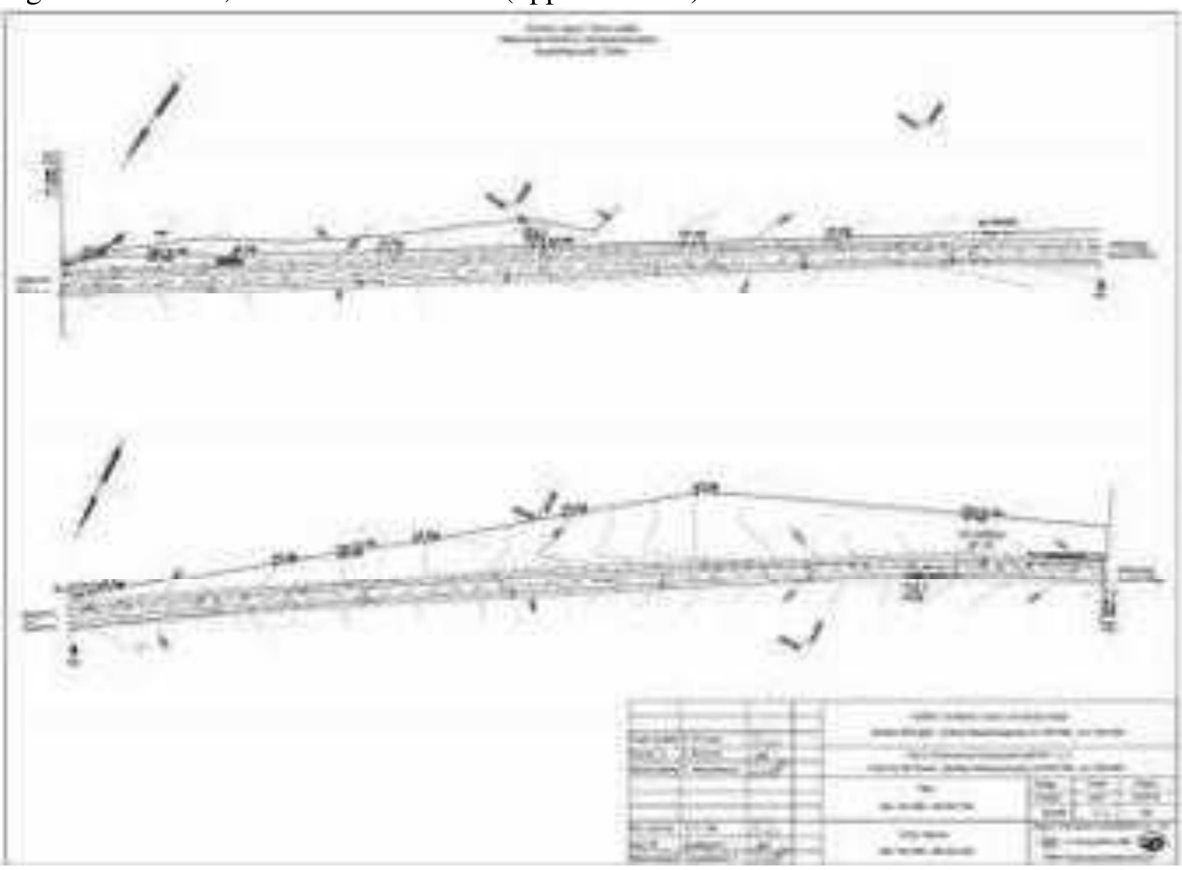

Fig.10. Complex Ak-Chiy 4

Fig.11. Complex Ak-Chiy 4, ruins of the mound

Fig.12. Complex Ak-Chiy 4, Saks mound

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Fig.13. Complex Ak-Chiy 4, Medieval mounds

Fig.14. Section 2B, km 96+100-97+500 (lower scheme)

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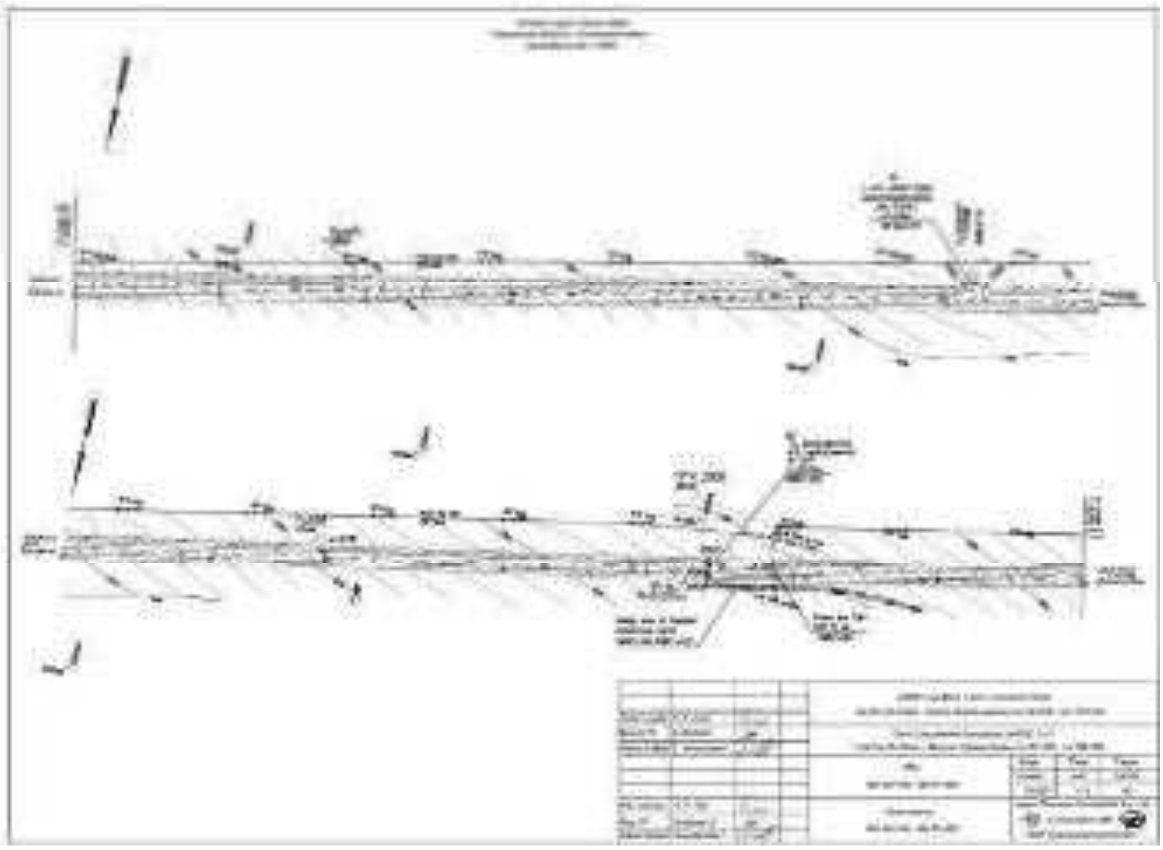

Fig.15. Burial mound Uzun-Bulak

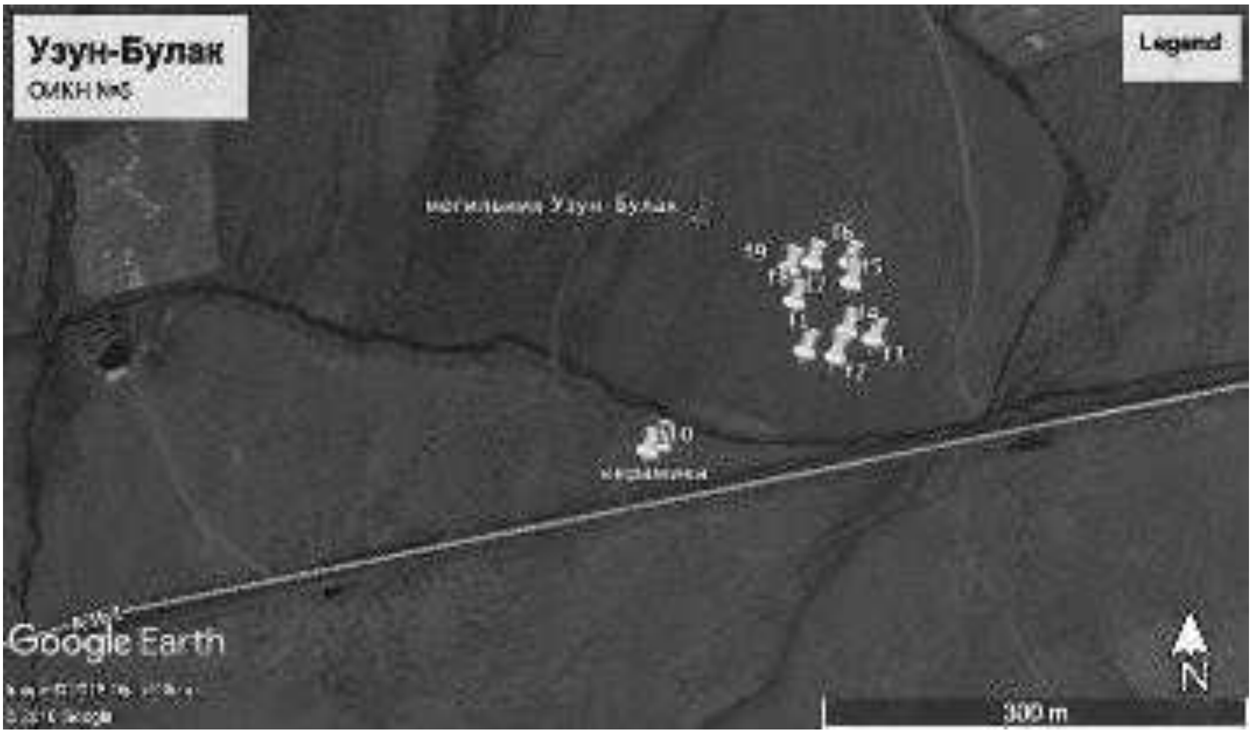

Fig.16. Burial mound Uzun-Bulak, fence

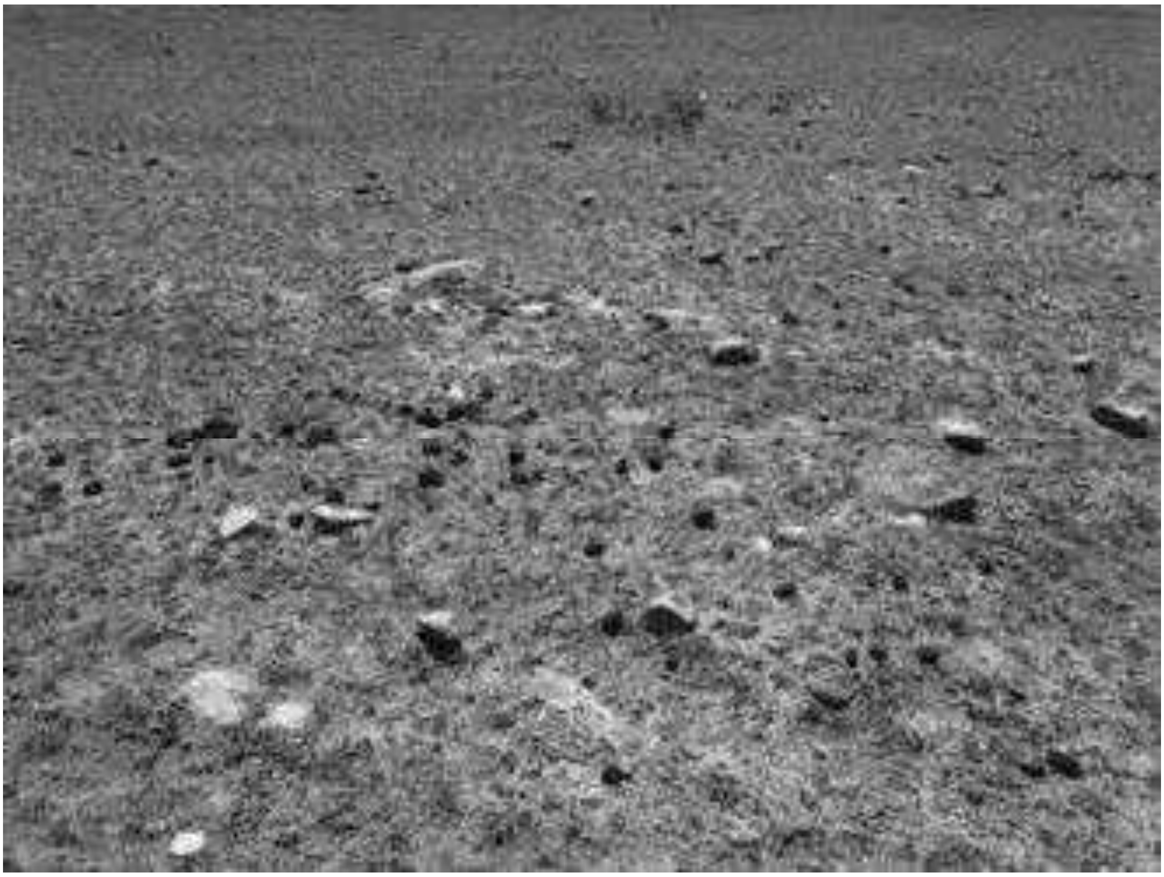

Fig.17. Burial mound Uzun-Bulak, fragment of the ceramics

Fig.18. Section 2B, km 97+500-98+900 (lower scheme)

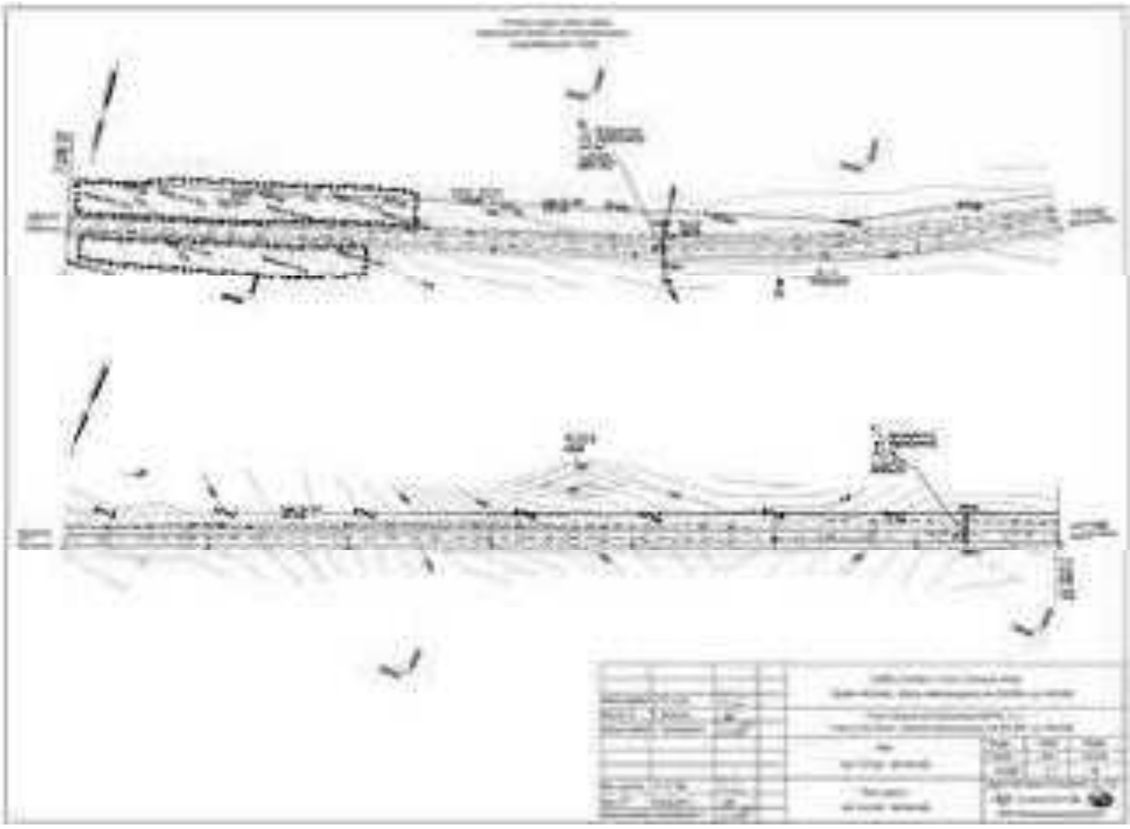

Fig.19. Burial mound Uzun-Bulak 2

Fig.20. Burial mound Uzun-Bulak 2, mound

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Fig.21. Burial mound Uzun-Bulak 2, mound

Fig.22. Section 2B, km 105+300-106+200

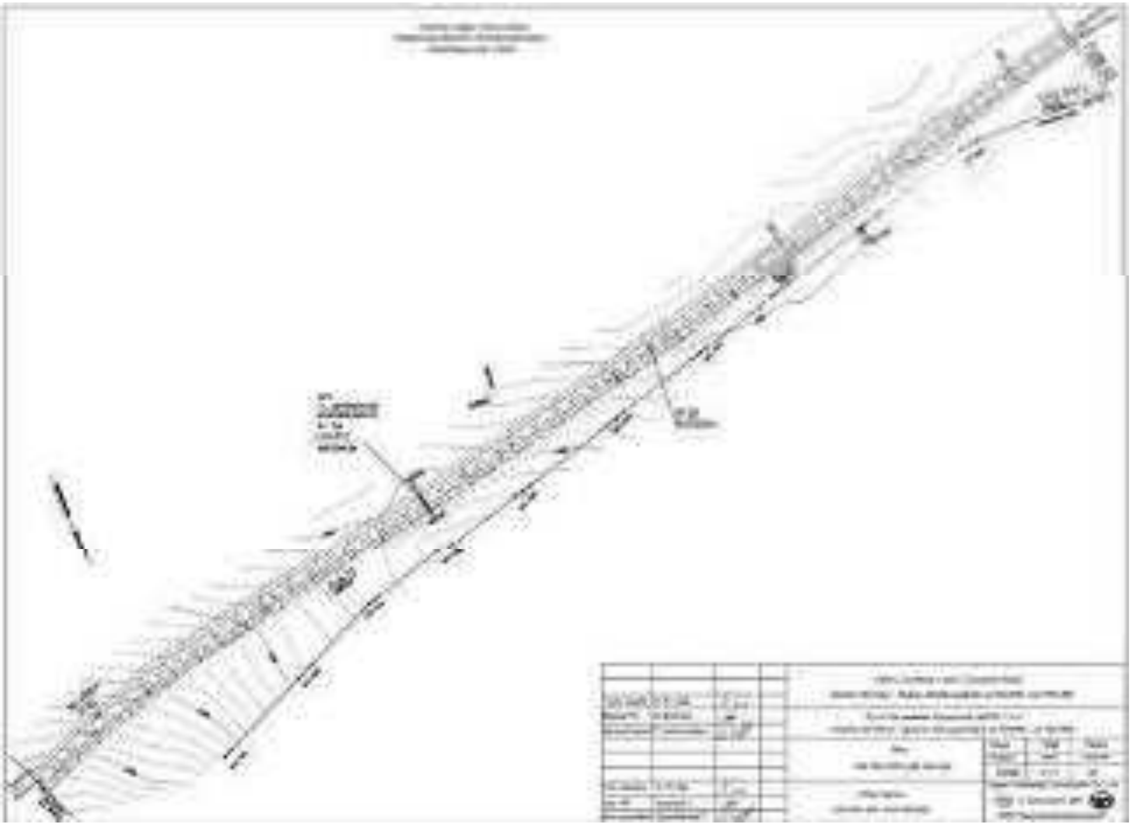

Fig.23. Mounds Kyrk-Kyz 1, 2 and 3

Fig.24. Mound Kyrk-Kyz, grave

Fig.25. Mound Kyrk-Kyz, grave

Fig.26. Mound Kyrk-Kyz, grave

Fig.27. Mound Kyrk-Kyz 2, grave

Fig.28. Kyrk-Kyz 3, grave

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Fig.29. Kyrk-Kyz 3, fence

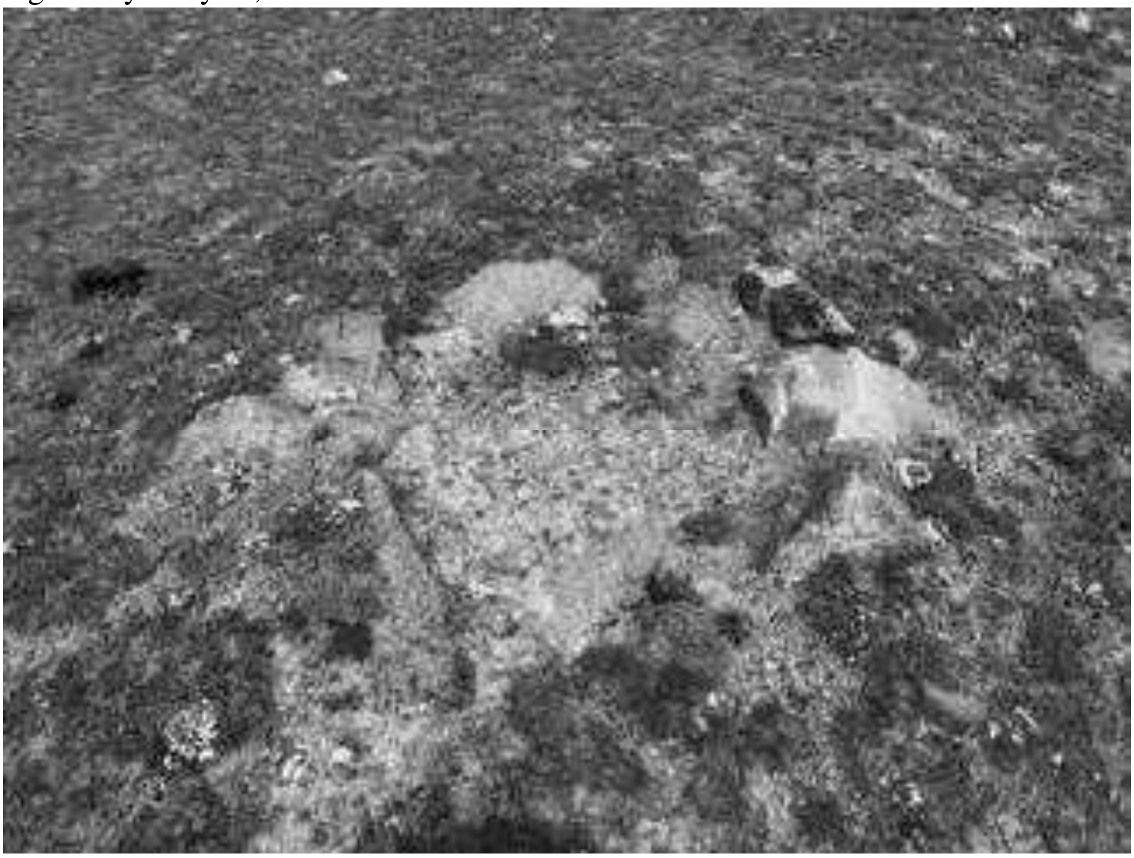

Fig.30. Section 2B, km 135+800-137+200

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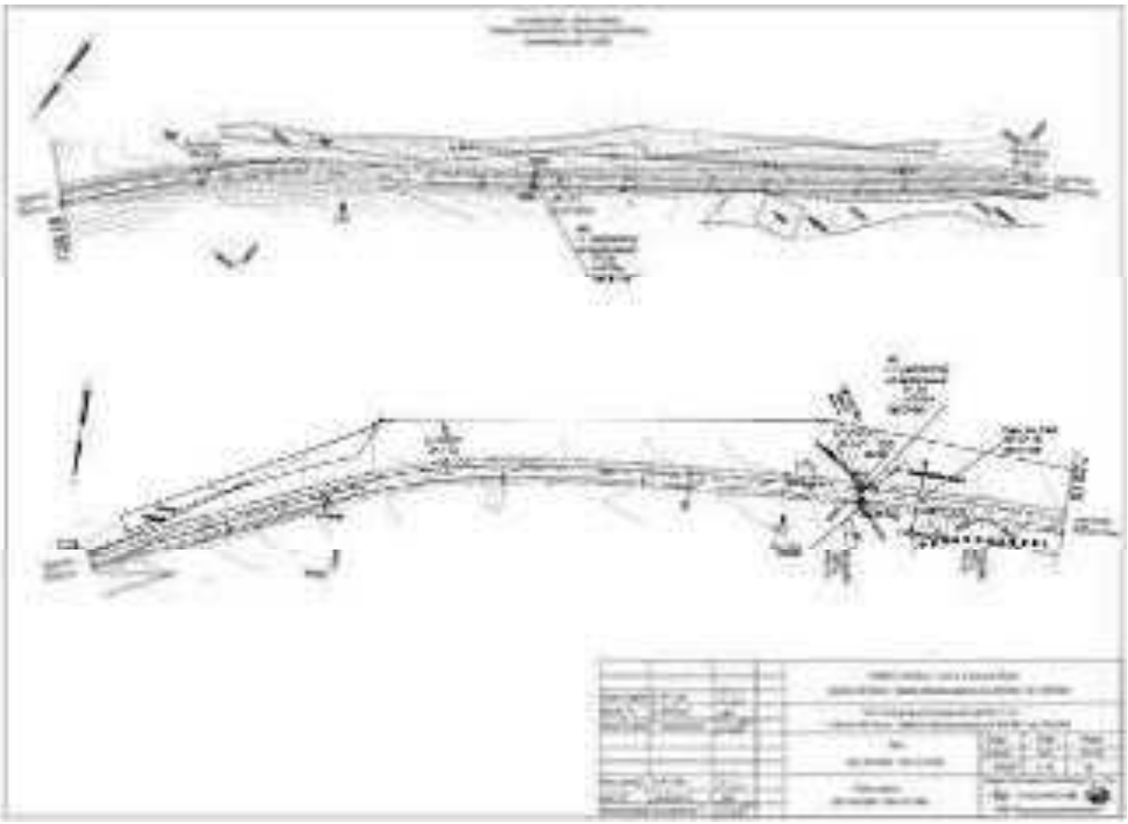

Fig.31. Complex Altyn-Aryk 1, 2 and 3

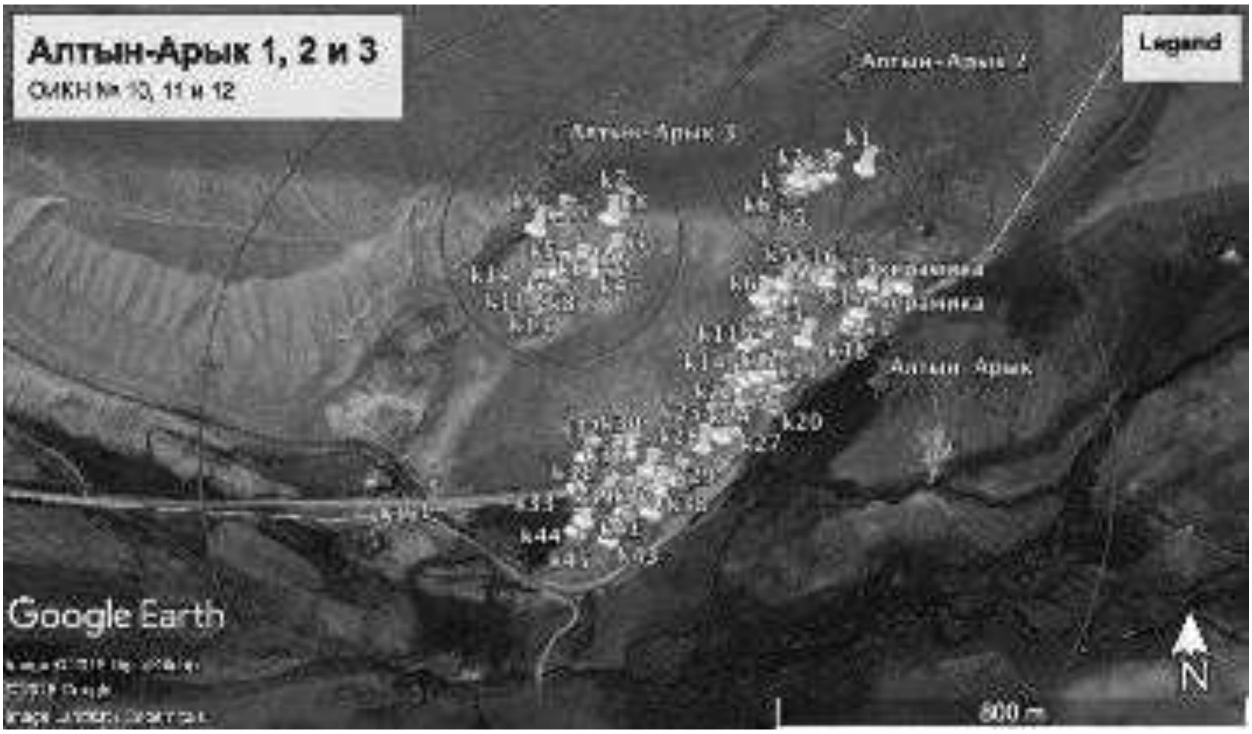

Fig.32. Altyn-Aryk, mausoleum beside the road

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Fig.33. Altyn-Aryk, grave beside the road

Fig.34. Altyn-Aryk, grave beside the road

Fig.35. Altyn-Aryk, mausoleums and graves

Fig.36. Altyn-Aryk, mausoleum beside the road

Fig.37. Altyn-Aryk, view from north

Fig.38. Altyn-Aryk 2, grave

Fig.39. Altyn-Aryk 3, graves

Fig.40. Section 2B, km 138+600-140+000

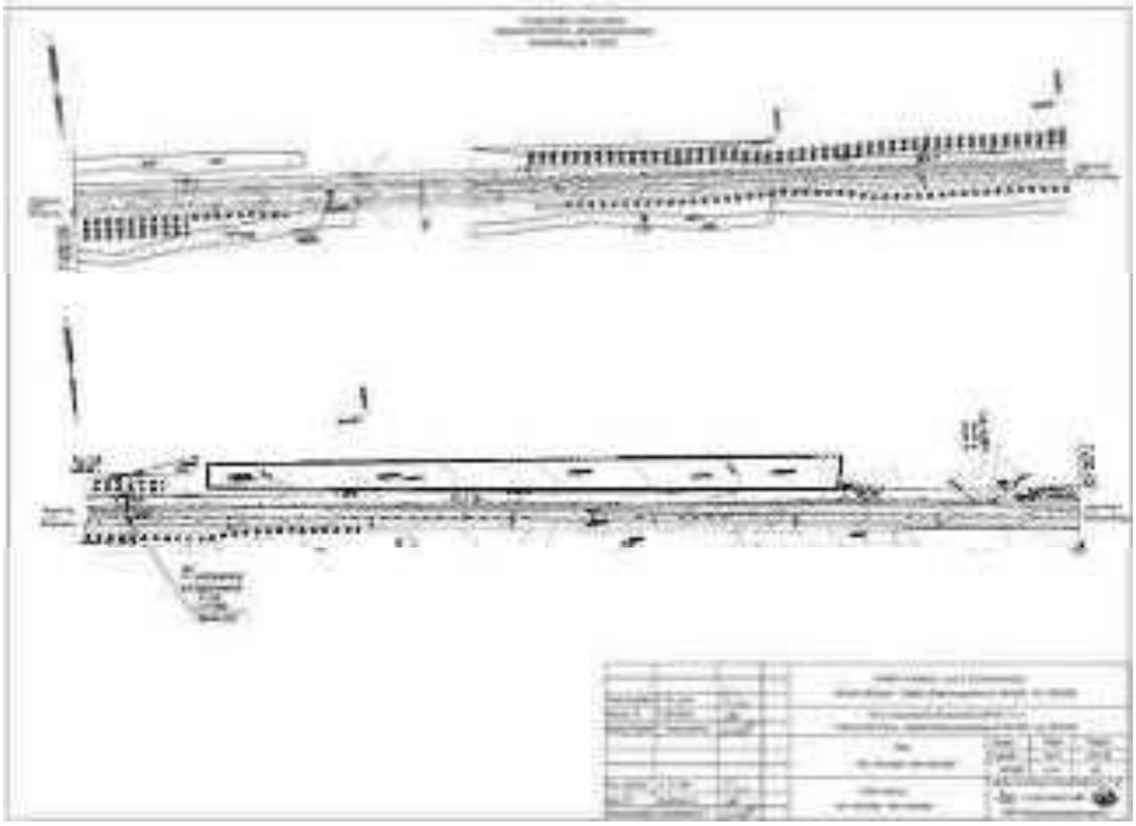

Fig.41. Altyn-Aryk 4

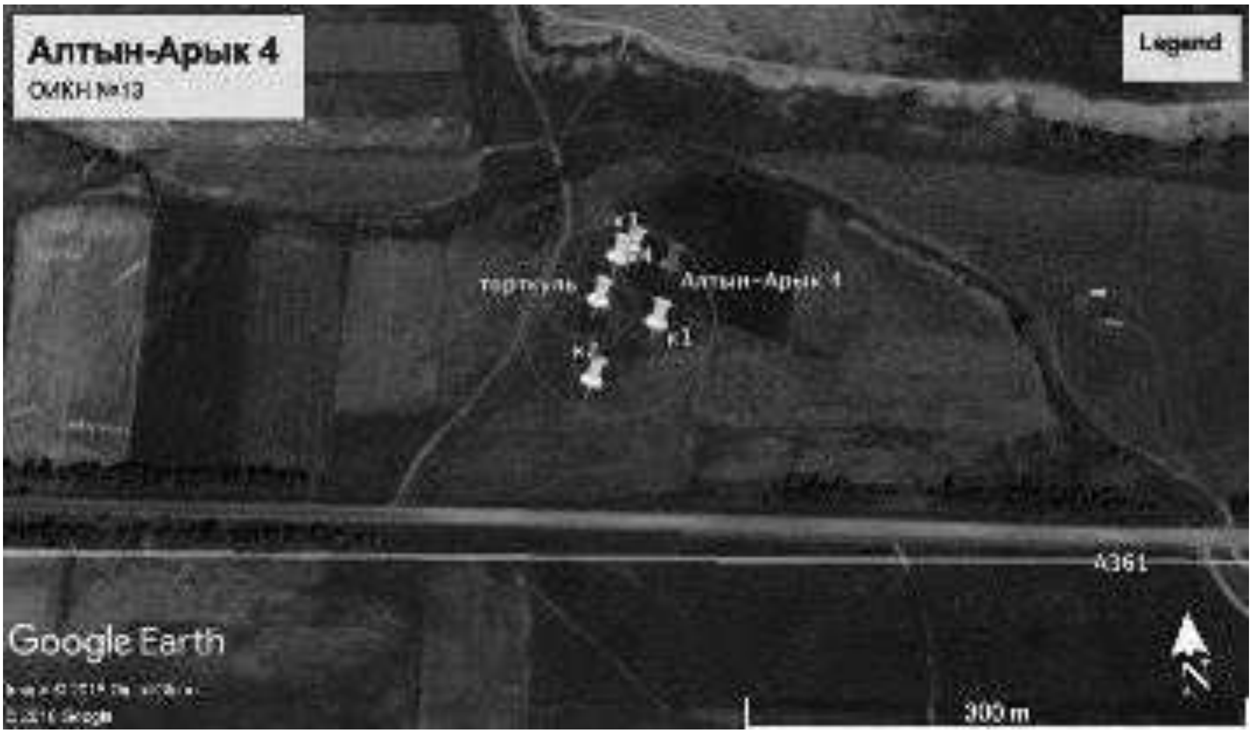

Fig.42. Altyn-Aryk 4, grave

Fig.43. Altyn-Aryk 4, tortkul

Fig.44. Altyn-Aryk 5, Kuiruchuk 1 and Kuiruchuk 2

Fig.45. Altyn-Aryk 5, grave

Fig.46. Altyn-Aryk 5, grave

Feg.47. Section 2B, km 140+000-141+400

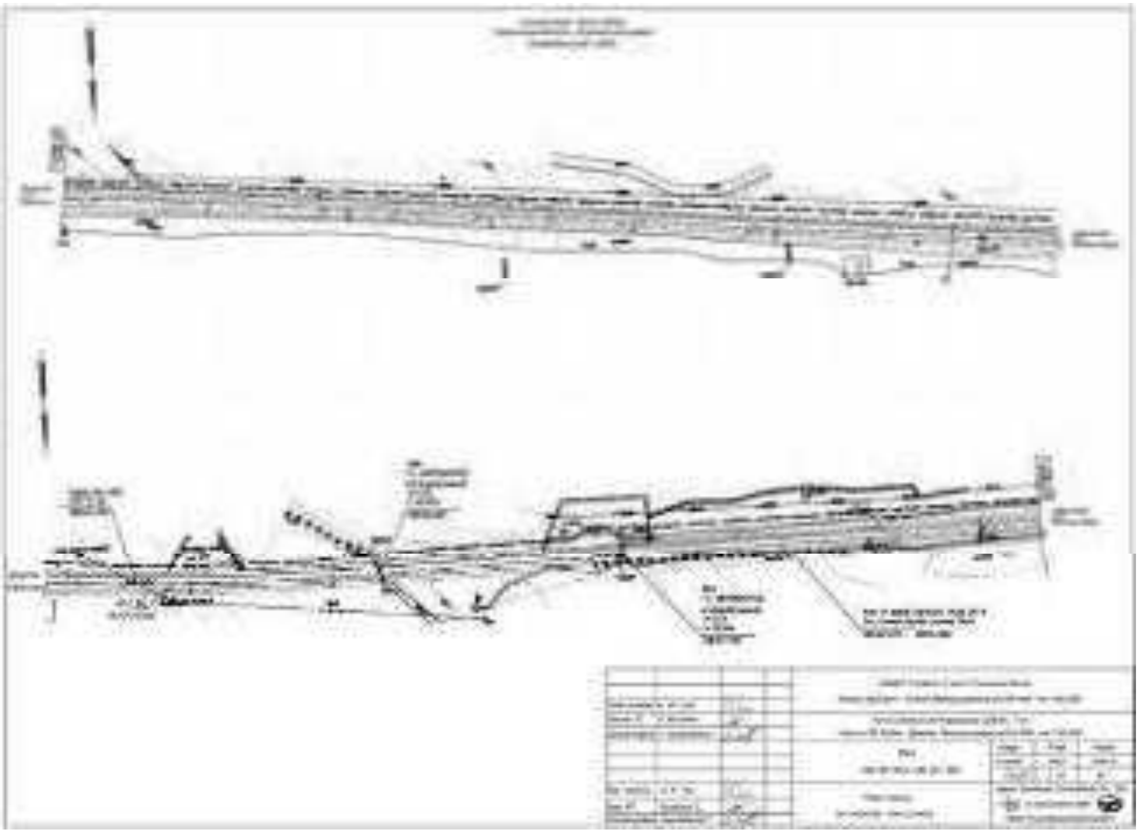

Fig.48. Burial mound Kuiruchuk 1, grave

Fig.49. Burial mound Kuiruchuk 1, grave

Fig.50. Burial mound Kuiruchuk, graves

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Fig.51. Burial mound Kuiruchuk 2, graves

Fig.52. Burial mound Kuiruchuk 2, damaged grave

Fig.53. Burial mound Kuiruchuk 2, damaged graves

Fig.54. Section 2B, km 144+900-146+300

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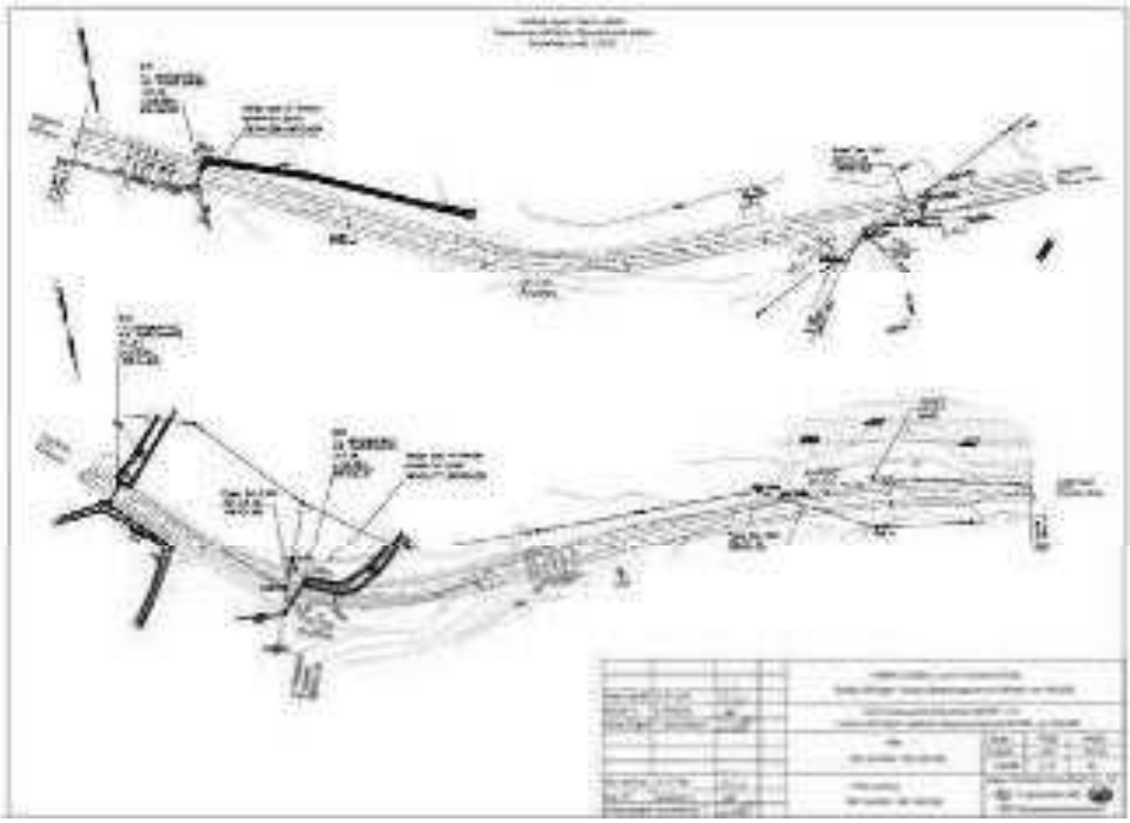

Fig.55. Complex Kuiruchuk 3

Fig.56. Complex Kuiruchuk 3, grave

Fig.57. Section 2B, km 146+300-147+700

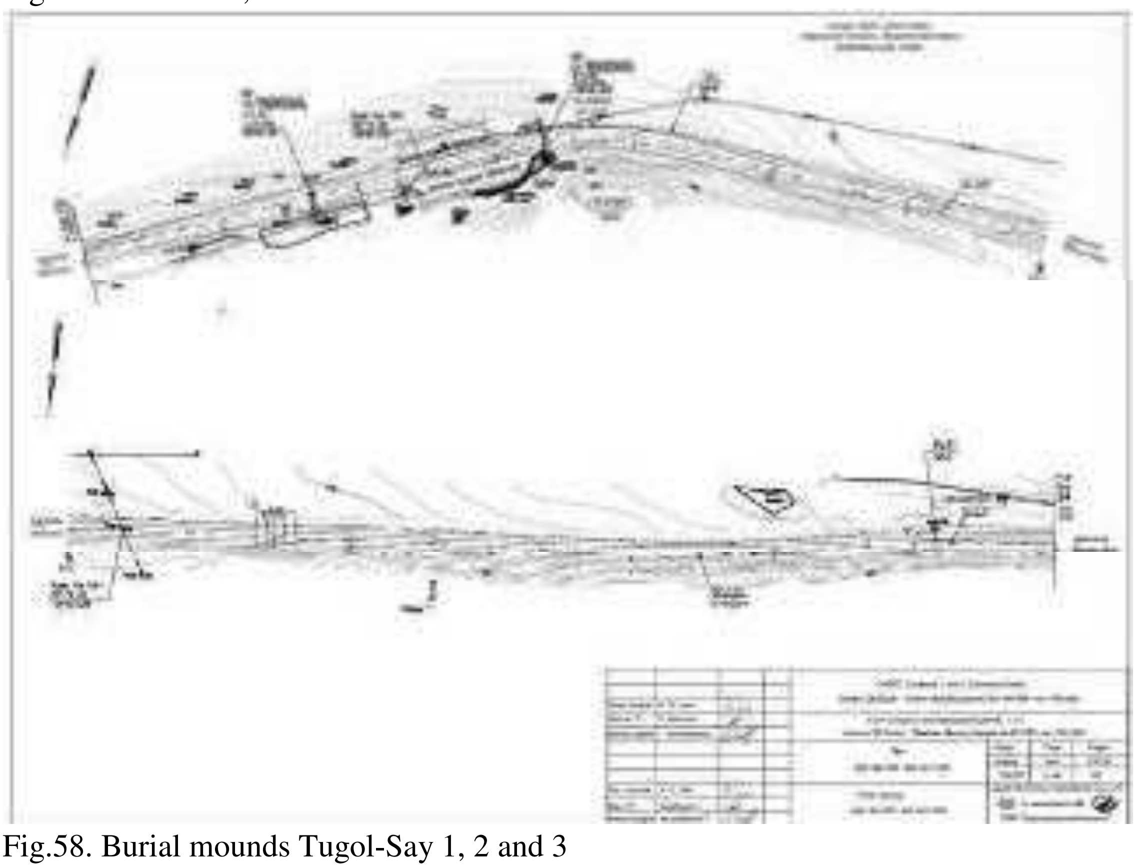

Fig.58. Burial mounds Tugol-Say 1, 2 and 3

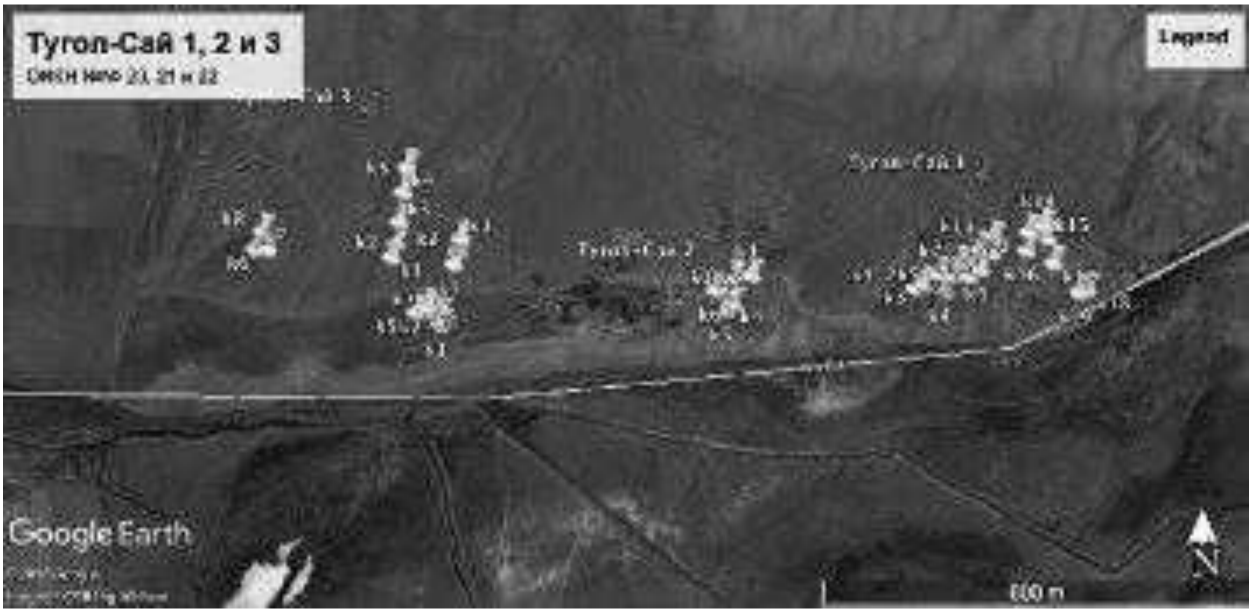

Fig.59. Burial mound Tugol-Say 1, graves

Fig.60. Settlement Tugol-Say, tortkuls and mounds

Fig.61. Tugol-Say 4, 5, 6 and 7

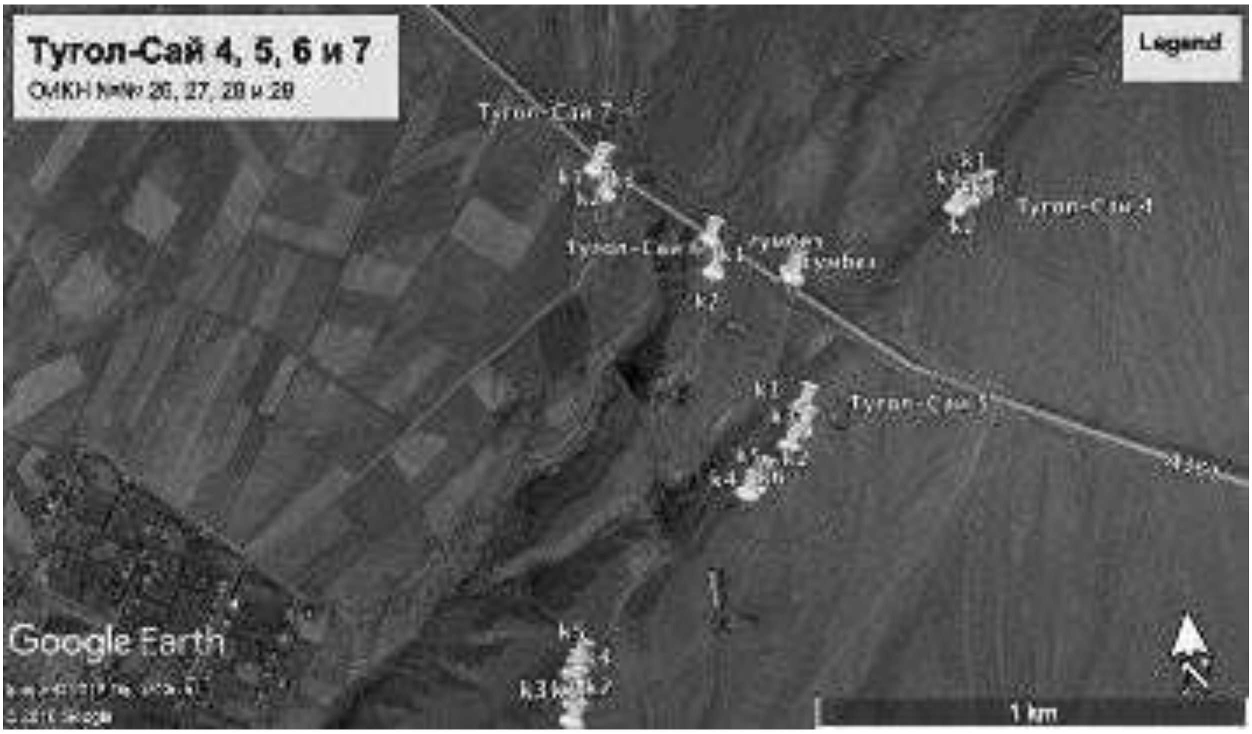

Fig.62. Graves and mausoleums

Fig.63. Burial mound Tugol-Say 7

Plan of archaeological management of objects of historical and cultural heritage "CAREC 1 and 3 Connector Road Project, Section 2B, Kochkor-Epkin, 89+500-159+200 km"

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, Epkin-Bashkuugandy km 89+500 – 159+200 km" (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 2B (Chargynov T., 2016). As a result of the survey, in the immediate vicinity to the road, 10 archaeological monuments were found. Three of them: burial mounds Kuiruchuk 1, Kuiruchuk 2 and monument's complex Kyrk-Chor are the monuments of State significance.

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, 30 complexes of OHCH, mostly archaeological monuments, dating from the Saks Period ((VIII-III BC) to the Ethnographic Age, were discovered on the stretch of the right-of-way and in close vicinity to the road. These include the possible settlements, burial mounds and cemeteries of ethnographic period.

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, regulated construction zones and historical and cultural heritage 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.

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 Archaeologist. Results of the monitoring to be submitted to the Authorized Department under MCIT KR.

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 rightof-way to be reduced to 20 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 areas where OHCH are located close to the road, the right-of-way should remain as existing (15 meters). Road construction to be carried out without shoulder with appropriate fencing (wall);

5) 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 findings)

The Contractor must be familiar with the procedures before commencing work. The procedures 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 rightof-way, the size of the monument, historical value.

Proposals for the protection of OHCH discovered during the archaeological examination in Section 2B 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 2B.

#	Name and brief description on OHCH	Coordinates/Section of the road	Distance from the road	Additional design measures	Protection measures
1	Burial mound Ak-Chiy, Saks Period (VIII-III BC)	General coordinates: 42° 9'12.62"N 75°21'48.25"E	At km 91+100 - 91+600, 220 meters to south of the road	Company and the Contractor should be aware about the location of OHCH on work map.	Burial mound should also enter to the zone of a single historical and cultural landscape of section Ak-Chiy
2	Burial mound Ak-Chiy 2 (Saks time VIII-III BC), 2 mounds	General coordinates: #1 42° 9'6.64"N 75°21'6.35"E (90 meters) #2 42° 9'1.54"N 75°20'54.77"E (100 meters)	90-100 meter north to the road At km 92+400 - 92+800	Company and the Contractor should be aware about the location of OHCH 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 section Ak-Chiy. Ensure the monitoring during the construction of the road.

3	Burial mound Ak-Chiy 3 (Saks time VIII-III BC), 5-6 mounds)	Coordinates: #1 42° 8'56.08"N 75°21'8.29"E #2 42° 8'54.78"N 75°21'8.26"E #3 42° 8'51.76"N 75°21'3.68"E	100 meters to south of the road At km 92+400 - 92+800	Company and the Contractor should be aware about the location of OHCH 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 section Ak-Chiy. Ensure the monitoring during the construction of the road.
4	Complex Ak-Chiy 4 (remains of mausoleums, mounds of Saks time and Medieval period (VIII-III BC))	Coordinates of Saks mounds: #1 42° 8'34.35"N 75°20'1.63"E #2 42° 8'34.26"N 75°20'1.28"E #3 42° 8'33.81"N 75°20'1.01"E Coordinates of some Medieval period mounds: #1 42°11'38.84"N 75°31'44.20"E; #2 42°11'39.67"N 75°31'45.92"E; #3 42°11'39.67"N 75°31'45.92"E.	50 meters and further to north of the road At km 93+700 - 93+840	Company and the Contractor should be aware about the location of OHCH on work map. Location zone of the OHCH should be fenced and provided with informational signs. Drainage design and other objects to be changed with consideration the location of the protection zone.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH). Ensure the monitoring during the construction of the road.

5	Burial mound Uzun-Bulak, Bronze Age	Coordinates of the fences: #1 42° 8'6.86"N 75°17'52.48"E #2 42° 8'6.73"N 75°17'53.42"E #3 42° 8'7.13"N 75°17'54.59"E #4 42° 8'7.33"N 75°17'53.79"E #5 42° 8'8.43"N 75°17'53.93"E #6 42° 8'8.88"N 75°17'53.88"E #7 42° 8'7.99"N 75°17'52.17"E #8 42° 8'8.89"N 75°17'52.73"E #9 42° 8'8.75"N 75°17'52.01"E **#10 42° 8'4.62"N 75°17'47.59"E (19 from the road)** **Coordinates of the location of fragment of ceramics: 42° 8'4.79"N 75°17'47.99"E (20 meters to north of the road)**	At the distance of 19 meters and further At km 97+300 - 97+500	Company and the Contractor should be aware about the location of OHCH on work map. Location zone of the OHCH should be fenced and provided with informational signs. Right-of-way to be reduced to 20 meters. Drainage design and other objects to be changed with consideration the location of the protection zone.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH), except fence #10, the protection zone of which to be 19 meters from the road. Conduct monitoring during the construction of the road.

6	Complex Uzun-Bulak 2, consists of the Bronze Age burial mounds (possibly a transitional period from the Bronze Age to the Iron Age), fencing and tash-koro (stone circle pitching)	Coordinates: #1 42° 7'57.63"N 75°17'1.70"E #2 42° 7'59.42"N 75°17'1.73"E #3 42° 7'59.56"N 75°17'1.54"E #4 42° 7'59.73"N 75°17'1.73"E #5 42° 8'0.59"N 75°17'0.32"E #6 42° 8'0.48"N 75°17'0.06"E #7 42° 8'0.72"N 75°16'59.97"E #8 42° 8'1.52"N 75°16'59.26"E #9 42° 8'1.71"N 75°16'59.24"E #10 42° 7'58.41"N 75°16'59.09"E	90 meters and further At km 98+450 - 98+600	Company and the Contractor should be aware about the location of OHCH on work map. Drainage design and other objects to be changed with consideration the location of the protection zone.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH), except object #1, the protection zone of which to be 20 meters from the road. Conduct monitoring during the construction of the road.
7	Complex Kyrk-Kyz, tentatively dated to the Bronze Age and the transition period from the Bronze Age to the Early Iron Age	Coordinates: **#1 42° 6'26.61"N 75°12'23.12"E (20 meters to north of the road)** #2 42° 6'27.33"N 75°12'22.66"E #3 42° 6'28.12"N 75°12'23.67"E #4 42° 6'28.45"N 75°12'23.26"E #5 42° 6'28.46"N 75°12'24.22"E #6 42° 6'28.52"N 75°12'23.97"E #7 42° 6'28.81"N 75°12'24.04"E #8 42° 6'29.09"N 75°12'24.15"E #9 42° 6'29.23"N 75°12'23.58"E #10 42° 6'29.40"N 75°12'24.31"E № ° ' . "N 75°12'24.56"E #12 42° 6'29.77"N 75°12'24.18"E #13 42° 6'29.77"N	20 meters and further to north of the road At km 105+500 - 105+760	Company and the Contractor should be aware about the location of OHCH on work map. Location zone of the OHCH should be fenced and provided with informational signs. Right-of-way to be reduced to 20 meters. Drainage design and other objects to be changed with consideration the location of the protection zone.	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 section Kyrk-Kyz. Conduct monitoring during the construction of the road.

		75°12'24.18"E #14 42° 6'30.03"N 75°12'24.28"E #15 42° 6'30.21"N 75°12'24.19"E #16 42° 6'29.95"N 75°12'24.65"E #17 42° 6'30.04"N 75°12'25.16"E #18 42° 6'30.23"N 75°12'25.80"E #19 42° 6'30.62"N 75°12'25.56"E #20 42° 6'30.70"N 75°12'25.30"E #21 42° 6'26.62"N 75°12'14.54"E #22 42° 6'26.08"N 75°12'14.22"E			
8	Complex Kyrk-Kyz 2, tentatively dated to Early Iron Age	Coordinates: **#1 42° 6'22.82"N 75°12'7.47"E (25 meters to north of the road)** #2 42° 6'23.66"N ° ' . "E м ах к о о о и #3 42° 6'23.85"N 75°12'6.75"E #4 42° 6'24.05"N 75°12'6.72"E #5 42° 6'24.35"N 75°12'6.93"E #6 42° 6'23.88"N 75°12'7.28"E #7 42° 6'24.33"N 75°12'7.31"E #8 42° 6'24.33"N 75°12'7.31"E #9 42° 6'24.03"N 75°12'7.41"E #10 42° 6'23.88"N 75°12'7.58"E #11 42° 6'24.03"N 75°12'7.82"E #12-13 42° 6'24.13"N 75°12'7.91"E	25 meters and further to north of the road At km 105+850 - 105+950	Company and the Contractor should be aware about the location of OHCH on work map. Location zone of the OHCH should be fenced and provided with informational signs. Right-of-way to be reduced to 20 meters. Drainage design and other objects to be changed with consideration the location of the protection zone.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH), except object #1, the protection zone of which to be 25 meters from the road. Burial mound should also enter to the zone of a single historical and cultural landscape of section Kyrk-Kyz. Conduct monitoring during the construction of the road.

		#14 42° 6'24.38"N 75°12'8.62"E #15 42° 6'24.16"N 75°12'8.96"E #16 42° 6'24.50"N 75°12'9.48"E #17 42° 6'23.99"N 75°12'9.46"E #18 42° 6'24.36"N 75°12'10.04"E			

9	Burial mound Kyrk-Kyz 3, Saks time	Coordinates: **#1 42° 6'21.67"N 75°12'2.65"E (25 meters to north of the road)** **#2 42° 6'21.92"N 75°12'2.15"E (38 meters to north of the road)** **#3 42° 6'22.24"N 75°12'2.47"E (46 meters to north of the road)** #4 42° 6'22.46"N 75°12'2.52"E **#5 42° 6'22.07"N 75°12'1.66"E (47 meters to north of the road)** #6 42° 6'21.95"N 75°12'0.30"E #7 42° 6'22.82"N 75°12'1.29"E #8 42° 6'22.83"N 75°12'2.21"E #9 42° 6'23.24"N 75°12'2.40"E	30 meters and further to north of the road At km 106+000 - 106+130	Company and the Contractor should be aware about the location of OHCH on work map. Location zone of the OHCH should be fenced and provided with informational signs. Right-of-way to be reduced to 20 meters. Drainage design and other objects to be changed with consideration the location of the protection zone.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH), except objects #1, 2 and 5 the protection zones of which to be 25, 38, 46 and 47 meters from the road. Burial mound should also enter to the zone of a single historical and cultural landscape of section Kyrk-Kyz. Conduct monitoring during the construction of the road.
10	Complex Altyn-Aryk, consists of royal type burial mounds of Saks time (VIII-III BC), complex of mausoleums Kyrk-Choro (XVII-XIX AD). Complex of gumbezes is part of the KyrkChoro mausoleum complex, which is registered in the State list of	Coordinates: #1 41°58'41.50"N 74°54'42.21"E (4 meters to north of the road) #2 41°58'42.26"N 74°54'36.74"E #3 41°58'42.25"N 74°54'35.74"E #4 41°58'41.68"N 74°54'35.23"E #5 41°58'42.23"N 74°54'34.91"E #6 41°58'41.46"N	Close to the road and further from both sides of the road At km 136+000 - 136+900	Company and the Contractor should be aware about the location of OHCH on work map. Location zone of the OHCH should be fenced and provided with informational signs. Right-of-way shall not exceed the width of existing road (15	Ensure the creation of protection zone (all three complexes Altyn-Ary, AltynAryk 2 and AltynAryk 3) on AltynAryk section (at least 50 meters from the borders of each OHCH), except those objects that are located close to the road on both sides of the road. Burial mound should also enter to the zone of a single

	OHCH under number 308.	74°54'34.50"E #7 41°58'41.48"N 74°54'33.12"E #8 41°58'40.91"N 74°54'34.01"E #9 41°58'40.94"N 74°54'34.46"E #10 41°58'40.43"N 74°54'34.58"E #11 41°58'40.42"N 74°54'33.17"E #12 41°58'39.79"N 74°54'33.49"E #13 41°58'39.35"N 74°54'32.84"E #14 41°58'38.87"N 74°54'32.17"E #15 41°58'42.41"N 41°58'42.41"N #16 41°58'42.15"N 74°54'37.77"E #17 41°58'39.94"N 74°54'39.84"E (close to the road to north) #18 41°58'40.30"N 74°54'39.99"E (5 meters to north of the road) #19 41°58'39.20"N 74°54'36.31"E (20 meters to north of the road) #20 41°58'35.63"N 74°54'34.00"E (10 to south of the road) #21 41°58'37.53"N 74°54'33.97"E (15 meters to north of the road) #22 41°58'37.26"N 74°54'32.96"E (20		meters). Construction at this location to be carried out without shoulders on both sides with appropriate fences. The works to be carried out without vibration. Drainage design and other objects to be changed with consideration the location of the protection zone.	historical and cultural landscape of section Altyn-Aryk. Conduct monitoring during the construction of the road.

		meters to north of the road) #23 41°58'37.00"N 74°54'32.23"E (20 meters to north of the road) #24 41°58'36.68"N 74°54'31.34"E (26 meters to north of the road) #25 41°58'36.20"N			

		74°54'30.46"E (20 meters to north of the road) #26 41°58'35.59"N 74°54'30.02"E (14 meters to north of the road) #27 41°58'34.45"N 74°54'30.99"E (14 meters to south of the road) #28 41°58'33.98"N 74°54'30.32"E (17 meters to south of the road) #29 41°58'33.48"N 74°54'28.81"E (18 meters to south of the road) #30 41°58'33.13"N 74°54'23.34"E (4 meters to north of the road) #31 41°58'32.86"N 74°54'22.42"E (close to the road to north) #32 41°58'32.80"N 74°54'20.29"E (6 meters to north of the road) #33 41°58'31.18"N 74°54'19.62"E (16 meters to south of the group) #34 41°58'36.33"N 74°54'32.97"E (close to the road to north) #35 41°58'35.94"N 74°54'31.86"E (close to the road to north) #36 41°58'32.12"N 74°54'24.92"E (16 meters to south of the road) #37 41°58'31.61"N 74°54'26.96"E (53 meters to south of the road) #38 41°58'31.15"N 74°54'25.56"E (48			

		meters to south of the road) #39 41°58'30.63"N 74°54'24.00"E (52			

		meters to south of the road) #40 41°58'29.83"N 74°54'25.11"E (86 meters to south of the road) #41 41°58'30.52"N 74°54'23.28"E (48 meters to south of the road) #42 41°58'29.85"N 74°54'23.16"E (67 meters to south of the road) #43 41°58'28.31"N 74°54'21.95"E (97 meters to south of the road) #44 41°58'29.38"N 74°54'20.10"E (67 meters to south of the road) #45 41°58'28.80"N 74°54'19.52"E (86 meters to south of the road) $46 41°58'40.72"N 74°54'40.43"E (9 meters to north of the road) In addition to burial mounds and mausoleums, 10 other mausoleums are located along the road, located at a distance of up to 50 meters from the road.			
11	Burial mound Altyn-Aryk 2, consists of mound of Hunn time (II BC – II AD)	Coordinates: № ° ' . "C ° ' . "B № ° ' . "C ° ' . "B № ° ' . "C ° ' . "B № ° ' . "C ° ' . "B	220 meters to north of the road At km 136+000 - 136+900	Company and the Contractor should be aware about the location of OHCH on work map.	Burial mound should also enter to the zone of a single historical and cultural landscape of section Altyn-Aryk. Determine the construction regulation zone of the road.

		№ ° ' . "C ° ' . "B			
12	Burial mound Altyn-Aryk 3, consists of 17 mound of Saks time	Coordinates: № ° ' . "C ° ' . "B № ° ' . "C ° ' . "B	300 meters to north of the road At km 136+000 -	Company and the Contractor should be aware about the location of OHCH	Burial mound should also enter to the zone of a single historical and cultural landscape of

		№ ° ' . "C ° ' . "B № ° ' . "C ° ' . "B № ° ' . "C ° ' . "B № ° ' . "C ° ' . "B № ° ' . "C ° ' . "B № ° ' . "C ° ' . "B	136+900	on work map.	section Altyn-Aryk. Determine the construction regulation zone of the road.

13	Complex AltynAryk 4, consists of mound of Saks time and tortkul (fort or fortification)	Coordinates: № ° ' . "N 74°52'56.02"E № ° ' . "N 74°52'54.13"E № ° ' . "N 74°52'55.48"E № ° ' . "N 74°52'55.09"E Coordinates of tortkul: 41°58'39.31"N 74°52'54.47"E.	70 meters and further to north of the road At km 138+700 - 138+800	Company and the Contractor should be aware about the location of OHCH on work map. Drainage design and other objects to be changed with consideration the location of the protection zone.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH). Conduct monitoring during the construction of the road.
14	Burial mound Altyn-Aryk 5 of Saks time	Coordinates: #1 41°58'38.42"N 74°52'22.07"E (7 meters to north of the road) #2 41°58'36.81"N 74°52'20.77"E (11 meters to south of the road) #3 41°58'35.36"N 74°52'20.14"E (55 meters to south of the road) #4 41°58'34.27"N 74°52'19.82"E	7 meters to south of the road and 11 meters to south of the road	Company and the Contractor should be aware about the location of OHCH on work map. Location zone of the OHCH should be fenced and provided with informational signs. Right-of-way to be reduced to 20 meters. Construction at this location to be carried out without shoulders on northern side with appropriate fences. The works to be carried out without vibration. Drainage design and other objects	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH), except objects #1 and 2 the protection zones of which to be 7 and 11 meters from the road. Burial mound should also enter to the zone of a single historical and cultural landscape of section Kuiruchuk 1 and Kuiruchuk 2. Conduct monitoring during the construction of the road.
				to be changed with consideration the location of the protection zone.	

15	Burial mound Kuiruchuk 1 of Saks time (in form of chain from north to south)	Coordinates: #1 41°58'42.63"N 74°51'29.66"E (16 meters to north of the road) #2 41°58'42.88"N 74°51'30.40"E (26 meters to north of the road) #3 41°58'43.03"N 74°51'30.25"E (27 meters to north of the road) #4 41°58'43.41"N 74°51'29.93"E (38 meters to north of the road) #5 41°58'43.69"N 74°51'29.35"E (49 meters to north of the road) #6 41°58'43.53"N 74°51'30.43"E (38 meters to north of the road) #7 41°58'44.57"N 74°51'30.86"E #8 41°58'46.33"N 74°51'31.32"E #9 41°58'47.01"N 74°51'31.48"E #10 41°58'47.82"N 74°51'31.69"E #11 41°58'49.03"N 74°51'32.17"E #12 41°58'42.81"N 74°51'26.82"E (19 meters to north of the road) #13 41°58'42.04"N 74°51'37.60"E (10 meters to south of the road) #14 41°58'40.61"N 74°51'37.61"E (9 meters to south of the road)	9 meters and further from both sides of the road At km 140+100 - 141+050	Company and the Contractor should be aware about the location of OHCH on work map. Location zone of the OHCH should be fenced and provided with informational signs. Right-of-way to be reduced to 20 meters. Construction at this location to be carried out without shoulders on northern side with appropriate fences. The works to be carried out without vibration. Drainage design and other objects to be changed with consideration the location of the protection zone.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH), except objects that located at a distance less than 50m. The protection zones of which to be 9 meters from the road. Burial mound should also enter to the zone of a single historical and cultural landscape of section Altyn-Aryk 5 and Kuiruchuk 2. Conduct monitoring during the construction of the road.

16	Burial mound Kuiruchuk 2 of Saks time (in form of chain from north to south)	Coordinates: #1 41°58'38.64"N 74°51'55.82"E (24 meters to south of the road) #2 41°58'38.16"N 74°51'55.64"E (41 meters to south of the road) #3 41°58'38.15"N 74°51'54.40"E (43 meters to south of the road) #4 41°58'38.53"N 74°51'54.27"E (35 meters to south of the road) #5 41°58'38.42"N 74°51'53.98"E (37 meters to south of the road) #6 41°58'38.21"N 74°51'53.90"E (45 meters to south of the road) #7 41°58'41.00"N 74°51'55.89"E (23 meters to north of the road) #8 41°58'40.71"N 74°51'55.45"E (17 meters to north of the road) #9 41°58'40.67"N 74°51'55.95"E (20 meters to north of the road) #10 41°58'40.61"N 74°51'56.17"E (18 meters to north of the road) #11 41°58'40.79"N 74°51'56.40"E (22 meters to north of the road) #12 41°58'40.66"N 74°51'56.79"E (19 meters to north of the road) #13 41°58'40.96"N 74°51'56.53"E (31 meters to north of the road)	17 meters and further from both sides of the road At km 140+100 - 141+050	Company and the Contractor should be aware about the location of OHCH on work map. Location zone of the OHCH should be fenced and provided with informational signs. Right-of-way to be reduced to 20 meters. The works to be carried out without vibration. Drainage design and other objects to be changed with consideration the location of the protection zone.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH), except objects that located at a distance less than 50m. The protection zones of which to be 17 meters from the road. Burial mound should also enter to the zone of a single historical and cultural landscape of section Altyn-Aryk 5 and Kuiruchuk 1. Conduct monitoring during the construction of the road.

		#14 41°58'42.01"N 74°51'55.94"E #15 41°58'43.01"N 74°51'56.38"E #16 41°58'45.36"N 74°51'56.38"E #17 41°58'46.49"N 74°51'57.18"E			
17	Comple: 3, of Kuiruchul consist: 1 and mounc remains of gı Ethnographic	Coordinates: **41°59'18.12"N 74°48'6.50"E (13 meters to south of the road).** Coordinates of the remains of the mound: **41°59'22.26"N 74°48'19.27"E (47 meters to north of the road).**	13 meters to south of the road 47 meters to north of the road At km 145+400 - 145+600	Company and the Contractor should be aware about the location of OHCH on work map. Location zone of the OHCH should be fenced and provided with informational signs. Right-of-way to be reduced to 20 meters. The works to be carried out without vibration. Drainage design and other objects to be changed with consideration the location of the protection zone.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH), except the mound that located at a distance less than 50m. The protection zones of which to be 13 meters from the road. Conduct monitoring during the construction of the road.
18-19	Burial mound Kuiruchuk 4, Hunn time (II BC – II AD)	Coordinates of some mounds: № ° ' . "C 74°48'31.07"B № ° ' . "C ° ' . "B № ° ' . "C ° ' . "B	370 meters and further to north of the road At km 144+700-145+450	Company and the Contractor should be aware about the location of OHCH on work map.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH). Conduct monitoring during the construction of the road.

20	Burial mound Tugol-Say 1, preliminary Saks-Usun time (VIII BC – II AD)	Located on the hill of the third terrace of the Jumgal River. Coordinates: 41°59'4.52"N 74°47'21.29"E	20 meters and further to north of the road, at 9-10 meters high At km 146+550 - 146+900	Company and the Contractor should be aware about the location of OHCH on work map. Widening on the northern side is prohibited.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH). Conduct monitoring during the construction of the road.
21	Burial mound Tugol-Say 2, preliminary Saks-Usun time (VIII BC – II AD)	Located on the hill of the third terrace of the Jumgal River. Coordinates: 41°59'2.67"N 74°47'5.73"E	20 meters and further to north of the road, at 9-10 meters high At km 147+100 - 147+250	Company and the Contractor should be aware about the location of OHCH on work map. Widening on the northern side is prohibited.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH). Conduct monitoring during the construction of the road.
22	Burial mound Tugol-Say 3, preliminary Saks-Usun time (VIII BC – II AD)	Located on the hill of the third terrace of the Jumgal River. Coordinates: 41°59'2.04"N 74°46'48.31"E	20 meters and further to north of the road, at 9-10 meters high At km 147+100 - 147+250	Company and the Contractor should be aware about the location of OHCH on work map. Widening on the northern side is prohibited.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH). Conduct monitoring during the construction of the road.
23-25	Settlement Tugol-Say and 2 tortkuls	Coordinates of the settlement: 41°58'38.68"N 74°46'37.45"E Coordinates of tortkuls: № ° ' . "N 74°47'10.35"E и № 41°58'46.97"N 74°45'38.92"E	500 meters and further to south of the road At km 146+550 - 147+900	Company and the Contractor should be aware about the location of OHCH on work map.	
26-27	Burial mound Tugol-Say 4 and Tugol-say 5	Coordinates: Tugol-Say 4 41°59'58.42"N 74°43'31.67"E; Tugol-Say5 41°59'43.64"N 74°43'13.50"E	Tugol-Say 4 is located at 320 meters to north of the road, Tugol Say 5 – 260 meters to south of the road At km 151+600 - 151+750	Company and the Contractor should be aware about the location of OHCH on work map.	

28	2 mausoleums and mound of Ethnographic time	Coordinates: **№ ° ' . "N 74°43'13.65"E (12 meters to south of the road)** **№ ° ' . "N 74°43'13.72"E (25 meters to south of the road)**	12 meters and further to south of the road At km 152+950 - 153+000	Company and the Contractor should be aware about the location of OHCH on work map. Location zone of the OHCH should be fenced and provided with informational signs. Right-of-way to be reduced to 20 meters. The works to be	
				carried out without vibration. Drainage design and other objects to be changed with consideration the location of the protection zone.	
29	Burial mound Tugol-Say 6 of Saks time	Coordinates: №1 41°59'57.44"N 74°43'5.19"E № ° ' . "N 74°43'5.34"E	57 meters to south of the road At km 153+100 - 153+200	Company and the Contractor should be aware about the location of OHCH on work map.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH). Conduct monitoring during the construction of the road.
30	Burial mound Tugol-Say 7	Coordinates: № °'. "N 74°42'54.37"E № °'. "N 74°42'53.48"E № °'. "N 74°42'54.04"E	50 meters and further to south of the road At km 154+400 - 154+600	Company and the Contractor should be aware about the location of OHCH on work map. Drainage design and other objects to be changed with consideration the location of the protection zone.	Ensure the creation of protection zone (at least 50 meters from the borders of each OHCH). Conduct monitoring during the construction of the road.

For all discovered OHCH in the area of the Altyn-Aryk, it is necessary to create a single zone of historical and cultural landscape. Between villages Jumgal and Tugol-Say on a Google Earth program were detected other OHCH complexes in a significant distance of the road on both sides.

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;

4) Changing the drainage design and other objects with consideration the location of OHCH protection zones;

5) Reducing the right-of-way from 20 to 15 meters, where OHCH are located at a distance less than 30 meters;

6) Construction of the road without shoulders with appropriate fencing.

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.