

**REPUBLIC OF KAZAKHSTAN
MINISTRY OF INVESTMENT AND DEVELOPMENT
COMMITTEE FOR ROADS**



**SOUTH WEST ROADS PROJECT: WESTERN EUROPE – WESTERN
CHINA INTERNATIONAL TRANSIT CORRIDOR’S KURTY –
BURYBAILTAL ROAD SECTION (KM 2295 – KM 2380)
OF THE CENTER SOUTH ROAD**

**DRAFT
“ENVIRONMENTAL AND SOCIAL IMPACT
ASSESSMENT”**

MARCH 2015

EXECUTIVE SUMMARY

The Project

The Project involves the rehabilitation, upgrading and new construction of about 85 kilometers of 4 – lanes Road of South West Road Project: Western Europe – Western China International Transit Corridor’s Kurty – Burybaital Road Section of the Centre South Road. The road section passes through the various environments and landscapes. The Project has all the physical characteristics of a large linear infrastructure project, with insignificant spatial extension, visible impact on landscape, biosphere and land use patterns as well as insignificant impacts on topography, climate, natural conditions and human activity. The alignment crosses of a variety of land forms, land use types, and micro-climatic zones. The project is being structured and designed in two different Sections of 40km and 45km of length. These Sections are described below, including features and information relevant for safeguards classification and the design of safeguards instruments.

Road Section 1: (km 2295-km2335). The project road section km 2295- km 2335 is included in the Centre-South Corridor, “Astana – Karaganda – Balkhash – Kapshagay – Almaty” Road. On administrative division the projected road section passes across the territory of Aydarly and Sartaukum rural areas of Zhambyl district of Almaty Oblast. Most of the road section will follow the existing road alignment. The length of this project road section is 40.04 km. and the main road direction is south-east.

Climate of the area is sharp-continental and dry, road –climatic zone-V; The hottest month–July; Average temperature - +25,4°C; Absolute maximum of air temperature +47°C; The coldest month-January; Average temperature – 11,7°C; Absolute minimum of air temperature: - 46oC; Thickness of snow cover with estimated probability of excess 5% - 35 cm. Wind region - III.

Road Section2: (km2335- km2380). This section will pass on the existing road Almaty-Astana, starting from Kurty village. On administrative division the projected site passes across the territory of Ili and Zhambyl region of Almaty Oblast. The road has a dense infrastructure network and some settlements with intensive agricultural activity in undeveloped places. The length of this project road section is 45 km.

The main waterway crossing the highway is Kurty River, which originates on northern slopes of ridges Kastek and Zhetyzhol and is formed by merge of numerous inflows, such as Copa, Zhirenaygyr, Aksengir, Zhyngyldy. In the hydrological relation around alignment only the river of Kurty is studied where the capital dam with a reservoir is constructed. The existing bridge through Kurty River on km 2377+400, which was built in 2002, will be reconstructed and the new bridge will be built for additional two lanes.

Also the alignment crosses the river Byryozek (Utegen) at km 2349+150. The existing bridge was built in 1974 on a place of crossing by the road on the seasonal waterway which is now in a critical condition. Most likely this bridge will be built anew one under the project design.

The average level of the section is 600 m above the sea level; with a minimum of 560 meters and a maximum of 640 meters.

The terrain is flat, Seismic activity of the region of 9 points –SNiP RK 2.03 -30-2006.

The soil cover around alignment is developed poorly, presented by slightly humid gray soils with thickness up to 20 cm.

World Bank Safeguards Requirements

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

Safeguards Policies

The project was classified as Category “A” according to the Bank policies. This classification is justified by the widening and upgrading the road Sections planned under the project.

Below those safeguards policies are listed and discussed that were either triggered, or, due to their thematic relevance given enhanced attention during safeguards discussion and the preparation of environmental due diligence documents.

Environmental Assessment OP/BP 4.01 (triggered): The main envisaged potential negative impacts during construction are the operation of borrow areas, generation of waste (construction materials, spent consumables, household waste and wastewater from camps), excessive land use, topsoil destruction and erosion. There is also a potential impact on groundwater and surface water from excessive turbidity and siltation, washing equipment in rivers (e.g. cement trucks) and accidental spills involving fuels and lubricants. During operation of the road storm drainage management, soils, ground and surface water contamination by heavy metals, soot and organic compounds (e.g. PAH), noise, dust, air pollution will be the main issues. Moreover, there is a potential risk of destruction or disruption of natural habitats and ecosystems by poor construction management.

The Borrower has already prepared one EIA/OVOS report for every alignment Section (i.e. a total of 2 reports). They were found to contain an adequate project description and collection of baseline data, all major elements of impact analysis and useful basis for the planning of mitigation measures. Site-specific EMPs will be prepared and integrated into bidding and contract documents to provide clear guidance and contractual obligations for environmental due diligence in further project design and implementation.

Natural Habitats OP/BP 4.04 (not triggered, but addressed in ESIA):

The project road of reconstructed corridor “Kurty – Burybaital Road Section” goes through the territory of Zhusandaly protected area which occupies very large territory (2 757 500

ha). The following mammals are characteristic for this area: goitered gazelle, wolf, jackal, fox, corsac fox, bear. Ornithofauna includes about 200 species (Berezovikov et al., 1999), including 83 breeding species, and more than 100 migrants. Breeding species represent the typical complex of the northern Eurasian desert with such species as *Chlamydotis undulata*, *Aquila heliaca*, *Falco naumanni*, *Burchinus oedicephalus*, *Charadrius leschenaultia*, *Charadrius asiaticus*, *Syrrhaptes paradoxus*, *Pterocles orientalis*, *Calandrella rufescens*, *Calandrella brachydactyla*, *Hippolais rama*, *Sylvia nana*, *Oenanthe deserti*, *Cercotrichas galactotes*, *Lanius pallidirostris* (excubitor), *Corvus ruficollis*, *Rhodospiza obsoleta* and *Emberiza bruniceps*. It should be noted, however, that birds and mammals are generally found far away from the existing alignment and it is not expected that the Project will affect their habitats. No regular or seasonal strong movement of animals is observed in this area. At the same time, bridges over the rivers, culverts and cattle and agricultural underpasses¹ will serve as potential routes for random movement of animals in the area of the alignment.

Forests OP/BP 4.36 (not triggered, but addressed in ESIA): No significant impacts on forests are expected and the policy thus not triggered. Trees from roadside, which need to be cut due to project activities, will be replaced under the measures prescribed by the EMP (environmental management plan). This will be undertaken by a separate landscaping contract.

Physical Cultural Resources OP/BP 4.11 (not triggered, but treated in ESIA): Kazakhstan is a country rich in cultural heritage, especially along the historic silk-road corridor. An archaeological survey was carried out by a licensed Consultant – LLC “Archaeological Expedition” prior to appraisal. An inventory of known PCR produced, which are located in the project area and may be potentially affected by the project. A PCR management plan has been included into the EMP.

OP/BP 4.37 on the Safety of Dams is not triggered. No dam safety issues were found during assessment of the project area.

Projects on International Waters OP/BP 7.50 (not triggered). There are no international waterways in the project area. There will be no impact on the hydrological regime of rivers crossed by bridges, as their hydrological flow pattern will remain entirely unchanged.

Environmental and Social Baseline Conditions

The project corridor runs parallel to the Tien Shan mountain range over its entire length at a distance ranging from 10 to 30 km. It thus will be confined to the alluvial plains of the foreland, which have soft morphology, a geology characterized by thick accumulations of proglacial, aeolian and fluvial sediments, and a surface water network that drains to the North and all flows into Lake Balkash eventually. Groundwater is relatively abundant in the project area, ranging in depth from shallow aquifers in young sediments, to deep thermal waters.

The Climate varies from moderate in the West, to arid in the East, with clear continental character, cold winters and hot, dry summers, precipitation occurring in relatively short

¹ Agricultural underpasses are usually 18m wide. Culverts have dimensions of 1.5 m in diameter (tube), Cattle underpasses have dimensions of 2m x 2.5 m and 2m x 4m.

periods in spring and fall. Natural hazards do not pose a key risk in the project area. The main hazard results from rivers traversed by the road, many of which have their catchment areas in the mountains and thus show high seasonal variability with a significant potential for flash floods during storm events. Erosion or rock falls, landslides and mudflows are not seen as significant potential risk for the road.

Most of the alignment is located within the traditional for this area human activity – pasture animal husbandry. Some localities have irrigated agriculture, most of them are on the section 1. The entire project corridor shows anthropogenic impact mainly in forms of animal husbandry and agriculture. There will be no conversion of pristine, untouched habitats under the project. However, settlements close to the alignment may require installation of noise protection screens.

Impacts and their Mitigation and Management

The design of the road sections included measures for the minimization of environmental impacts. The route follows existing alignment and thus is limiting the conversion of land to other land use types. The design includes measures to increase traffic safety by speed controls, pedestrian crossings and underpasses. The design also has taken into account requirements articulated from farmers along the alignment for safe crossings for animals and farm machinery through agricultural underpasses. The underpasses for cattle will serve as wildlife crossings (mainly wolves, hares, goitered gazelle) and no purpose-built wildlife crossings will be needed. The design has included results from hydrographic and hydrological studies, installing sufficient culverts to avoid damming of permanent or seasonal watercourses and the creation of swamps or waterlogged areas. The design of bridges is taking into account the seasonality of discharges, as well as the likelihood of flash floods.

Most impacts during the construction period will be mitigated by good housekeeping measures. There will be standard procedures for the control and mitigation of emissions, such as dust, noise, exhaust fumes and liquid discharges from camps and the road platform. Surface watercourses will be protected by settling ponds and filters (e.g. straw bales). Wastewater from construction camps will be treated on site in settlement and aeration basins, where biological waste will be processed, before discharge into surface streams or rivers. Septic sludge from toilets will either be composted on site or trucked to existing water treatment plants along the alignment. Groundwater is not expected to be impacted by the project, as no deep excavations or major cuts are expected.

Water for the construction activities will be taken from Kurty river, water content of which is sufficient and will not be depleted by the construction. Kurty river is 123 km long and its basin is 12 500 km². Intensity of flow is 190 080 m³/day. There is a reservoir southward from the alignment. The reservoir is used for irrigation of the agricultural fields are eastward from the river.

Drinking water will be supplied from existing wells of the public supply system of Kanshengel. The costs of water supply will be borne by the contractors. Generally, water availability is unconstrained in the project area.

Noise and exhaust emissions will be minimized by the requirement for Contractors to use modern equipment and machinery complying with modern emission standards, and to

maintain the equipment in good working order throughout the project. This will be prescribed in the equipment specifications in the tender documents. Nuisance to the public will moreover be minimized by limiting work hours and not allowing nighttime works. Where works are carried out in close vicinity to residential areas additional measures, such as noise barriers or the installation of insulating windows will be implemented in accordance with good practice and in consultation with the community.

Borrow pits will be operated by the Contractors only at locations that have been pre-identified previous to project implementation and for which both operational and environmental permits have been obtained. No borrow pit will be operated without a site specific EMP that will contain a plan for its closure, remediation and re-cultivation that will be approved by the local environmental authorities (as required under Kazakh regulations) as well as the supervising engineer (who will ensure that international good practice is followed), and reviewed by the Bank.

All environmental management measures to be carried out by the Contractors during the construction period will be integrated in the tender documents and become part of the works contracts. This will also include a manual on chance find procedures to be followed in case of unanticipated discovery of potential PCR. The Contractors will be required to have permanent staff on site with the specific responsibility of environmental and social management (including a grievance specialist), reporting to the supervision engineers and local authorities.

During operation, the functionality of noise and traffic safety measures described above in the Section on design will be monitored and maintained. Any required modifications, upgrades or additions will be flagged and integrated into the road repair and maintenance plans for rectification.

Analysis of Alternatives

During preparation of the design and estimate documentation of the Kurty-Burylbaytal road section, km 2295 – 2380, no changes of the existing alignment was made to avoid any impacts on the road. The existing main cable communication lines and power lines which will be kept in the same corridor. In the project of road section Kurty – Burylbaytal alternative options, as "without project" and "with the project" have been considered.

The alternative - absence of the project - would have negative consequences on environment and on social conditions in settlements along the existing route. Danger of accidents to local road users will increase if the road is not improved. Rehabilitation and construction of the dual carriageway will not have negative social affect. The construction will influence the agricultural activity, but no significant negative impacts associated with this alternative is expected. In general, from the point of view of environmental protection, it is considered that the chosen plan of the route offers the best approach to the solution of problems with the existing road, with stimulation of economic development and with improvement of connectivity between the cities.

Land Acquisition and Resettlement

The proposed project entails land acquisition and associated impacts, as is to be expected minimum in a highway project with 85-km of road alignment. Only, few people and

properties will be affected by the proposed rehabilitation and 4 laning. Total permanent land acquisition with road side infrastructure for the road rehabilitation and 4 laning will be required 31 land plots consisting of 170 ha in Zhambyl District and 22 land plots consisting of 159 ha in Illi District. Five borrow pits are identified for the rehabilitation and construction with total area of 26 ha and additional borrow pits will be opened, the area of which will be identified at a later stage. There are two land plots (1.25 ha) identified for temporary land use during the construction for road and roadside infrastructure are three land plots are required to be acquired for use. A Resettlement Action Plan has been prepared in relation to Land Acquisition and Compensation to be paid.

a) Principles and standards incorporated into the Resettlement Action Plan, agreed between the CR and the Bank, for use throughout the Western China- Western Europe Corridor program, apply to the proposed project;

b) Resettlement Implementation Review has been conducted, to assess the land acquisition that has already occurred against RAP principles and standards, and to propose supplemental measures as necessary to fully meet RAP requirements.

c) Arrangements for continued monitoring and reporting on the individual cases of land acquisition compensation process during the construction stage has been put in place in RAP.

A draft Resettlement Action Plan has been prepared. It indicates that a total of 348.50 hectares of privately owned or leased agricultural land will be required for the project permanent works. In addition to that 24.92 hectares for temporary land acquisition for the road construction works and for borrow pits respectively.

A draft Resettlement Action Plan has provided all the details information in relation to various types of land acquisition required.

Public Consultation and Disclosure

Public consultation/hearings was held in August 2014 were mainly about design and location of junctions and underpasses for cattle (important on social side) and also discussed the location of the construction facilities (concrete plants, camps, parking lots, etc.) and sources of water supply.

Additional public hearings and consultation of stakeholder will be conducted in late April 2015 on the EIA/EMP inviting the affected people and local communities along the road section. Hence, upon completion of the update of the EIA/EMP (and after Bank clearance), the document (EIA/EMP) will have to be disclosed and public consultations organized. More informal consultation and disclosure will be done during implementation through:

- The preparation and dissemination of a brochure in Kazakh and Russian, explaining the project, works required and anticipated timing of the works; and
- Setting up a formal grievance redress committee with a representation from the affected people. The Project supervision Consultant in association with the Contractor will be responsible for managing the effective grievance redress program.

Finding, Recommendation and Conclusions

The EIA concludes that there are no major adverse environmental impacts associated with the project provided that full compliance with the recommendations set out below and the provisions of the EMP are implemented.

The following recommendations result from the EIA:

- Apart from the construction of proposed second carriageway along the side of the road, the original design of the rehabilitated road should not deviate from the existing road alignment other than the improvement of the existing road alignment as and where applicable;
- Design documents for construction should make full provisions for the incorporation of the various mitigation measures as described;
- Contract documentation shall include appropriate clauses to cover all of the environmental protection requirements as listed in Chapter 6. Construction material (gravel and sand) should only be taken from licensed borrow pits. Surplus or spoil materials should be disposed in an environmental friendly way.

ABBREVIATION

WB	World Bank
COR	Committee for Roads
IFI	International Financial Institution
MIR	Ministry for Investment and Development
PMC	Project Management Consultant
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EMP	Environmental Management Plan
PCR	Physical Cultural Recourses
RCZ	Road Climate Zone
ME RK	Ministry of Energy of the Republic of Kazakhstan
EE	Ecological Expertise
SEE	State Ecological Expertise
MPE	Maximum Permissible Emission
WPI	Water Pollution Index
SIEA	Social Impact Environmental Assessment
HCH	Historical Cultural Heritage
WHO	World Health Organization
MAC	Maximum Allowable Concentration
MAL	Maximum Allowable Level
MPL	Maximum Permissible Level
MPD	Maximum Permissible Discharge
RAP	Resettlement Action Plan
PAH	Poli-aromatic Hydrocarbon
RIR	Resettlement Implementation Report
M&E	Monitoring and evaluation
IMA	Independent Monitoring Agency
CEP	Committee of Environmental Protection
PIG	Project Implementation Group

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INTRODUCTION

The Kurty – Burybaital Road section of the South West Road Project” has a total length of 85km, which will be partly reconstructed of the existing road within the existing right of way and partly newly constructed as second carriageway of the proposed 4 - lanes road. The project crosses a variety of land forms, land use types and (micro) climatic zones.

The project alignment lies within Zhambyl and Ili districts of Almaty Oblast. The project consists of two (2) design sections consisting of 40 km and 45 km of length which are likely to translate into construction lots during implementation. This is a large and significant project with a range of Environmental and other impacts.

In accordance with the requirements of the Government of Kazakhstan an Environmental Impact Assessment (EIA) has been carried out. The EIA was conducted in accordance with the provisions of the Environmental Code of Republic of Kazakhstan (RK) and other applicable legal and regulatory guidance documents concerning environmental issues and environmental safety. The content and composition of the EIA meets the requirements of "Guidelines for the Assessment of Proposed Economic and Other Activities on the Environment in Developing planning, design and project documentation, as approved by the Order of the Minister of Environment of the Republic of Kazakhstan" 28 "June 2007 № 204 - n".

The Government of Kazakhstan has now requested that the World Bank provides funding through THE funds saved from loan 7681-KZ for the construction of the road “Kurty-Burybaital” with length of 85 km, which is the part of the corridor center-north, connecting Astana and Almaty, funding through a loan for the construction of the project. In accordance with World Bank requirements and operational procedures this has been defined as a Category A project and an EIA is necessary in accordance with World Bank Operational Procedures (Environmental Assessment OP 4.01). The original EIA document has therefore been translated and various amendments and adjustments carried out to reflect the requirements of the World Bank which are seen to reflect good international practice. This has included rearranging the sections of the original document to be in accordance with the report structure suggested by World Bank operational policies and related guidelines. This work has been carried out by the Environmental Team of “KazdorNII” JSC, Astana branch in accordance with an agreed Terms of Reference from the Committee of Roads.

This ESIA covers two road sections:

- Chapters 1,2,3 are common to all two road sections of the alignment
- There are separate Chapters on Baseline Conditions, Impacts and Mitigation measures for each road section
- Chapter 6 is also common for two sections

The purpose of ESIA is to identify the environmental and other impacts of the proposed road development and the report includes the following main sections:

The purpose of EIA is to identify the environmental and other impacts of the proposed road development and the report includes the following main sections:

- Policy and Administrative Framework
- Project Description
- Analysis of Alternatives
- Baseline Data
- Predicted Environmental Impacts
- Environmental Management Plan

1. POLICY AND ADMINISTRATIVE FRAMEWORK

1.1 OVERALL LEGAL FRAMEWORK

Environmental protection is administered in Kazakhstan by the Ministry of Energy of the RK. This Ministry is made during reorganization of the Government of the RK in August 2014. The ministry has taken functions and responsibilities of liquidated Ministry of Oil and Gas of the RK, Ministry of Industry and New Technologies and the Ministry of Environmental Protection and Water Resources. The Environmental Code was adopted in January 9, 2007 and is the basic legislative framework for environmental protection activity. Three main laws (the *Law on Environmental Protection*, the *Law on Ecological Expertise* and the *Law on Air Protection*) were abrogated subsequent to their integration into the Environmental Code. Moreover, some 80 normative legal acts were abrogated after the adoption of the Environmental Code.

1.2 ENVIRONMENTAL IMPACT ASSESSMENT

All EIA requirements are included in the Environmental Code. The basis of EIA development is “Instruction on conducting environmental impact assessment of planned economic activity when developing pre-planning, planning, initial project and project documentation, approved by the Order of the Minister of MEP, 28 June 2007, No.207-p”.

According to the instruction there are four stages:

- 1) Review of Environmental Conditions;
- 2) Preliminary EIA;
- 3) EIA;
- 4) Section “Environmental Protection”

The first stage of the EIA “Review of Environmental Conditions” includes general characteristics of natural and socio-economic environment of the area of planned activity, analysis of main trends of practical use of the territory and defining of principal positions of EIA. This stage of the EIA is based on the conceptual design, available materials, other special literature, project description etc. The purpose of this stage is to evaluate the environmental conditions, identify key environmental issues, choose the best option available for siting of the development, and to define scope of work for the second stage.

The Second stage of EIA “Preliminary EIA” – potential possible changes of components of natural and socio-economic environment and its impacts are defined. The purpose of this stage is to assess baseline environmental conditions, identify potential impacts, and design mitigation measures to offset such impacts, which is then included as a chapter into feasibility study of the project. All materials supporting decision-making on regulatory requirements (EIA study and statement, minutes of public hearings, permit applications and other supporting documents) must be reviewed by competent environmental authorities within a procedure known as “ecological expertise”. Ecological expertise (EE) is conducted by The Department of Natural Resources and Environmental Management staff for category I enterprises, by TEPOs for categories II and III, and –since 2007- by local administration (Territorial Department of Environment) for category IV enterprises. Recourse to external experts can be made but they only have a consultative role. Services provided by these experts are paid by project developers; the so-called public expertise may be conducted by independent experts. However, the final documents (expert opinions and permits) are not available to the general public and, sometimes, not even to field inspectors.

According to Article 36 of the Environmental Code, “Development of Environmental Impact, assessment is obligatory for all types of activities that can have a direct or indirect impact on the environment or health of the people”. The procedure on public hearings is regulated by the 2007 ministerial order on Rules for carrying out of public hearings. EIA and SEE are two interconnected procedures. The developer has to conduct an EIA, which is carried out by accredited private companies, and is in charge of preparing the EIA documentation. The EIA procedure is a two-phase process: the proper EIA and then SEE. Once the EIA is approved, the developer should apply to the SEE. The competent authority checks the documents` quality prepares its own evaluation and returns both to the developer. The evaluation takes into account the opinions and views expressed by the public and other authorities which have participated in the process. The EIA procedure is performed before the permitting procedure and the developer has to attach the EIA report and the competent authority`s statement together with the permit application. EIA procedure lasts about two months and SEE up to three months. A post-project analysis by the authorities is mandatory and carried out one year after the construction is completed. Experience in other IFIs-financed projects in the country, shows that, the authorities, are proactive and compliant with regulations in their oversight of projects with potential significant environmental dimensions.

It is forbidden to implement projects for economic and activities or to finance it by banks and other financial institutions without a positive resolution of the state ecological examination. The positive conclusion of state ecological expertise that is given to the project is generally valid for five years from the date of its issuance.

In the case of green-field projects (i.e. new facilities), environmental authorities must be consulted on land allocation despite the fact that allocation as such is done by *akimats* (sub national administration). At this stage, project developers are obliged to assess baseline environmental conditions and to present this study, together with the Declaration of Intent, for ecological expertise. The Declaration should be discussed with the general public in hearings organized to this purpose. If environmental expert evaluation is positive, land may be allocated to the project developer.

A “preliminary” EIA is required at the feasibility study stage, when technological solutions are assessed. For a large-scale project, field prospecting should be conducted at this stage. Impacts should be estimated but precise emission calculations are not expected. The

feasibility study, including all environmental related documentation, is then presented for EE. This EE is carried out by Ministry of Energy staff at the national or local level, depending on the importance of the project.

An approved “preliminary” EIA is a prerequisite to receive a budget for implementing the project. And as such, it may trigger a “yes or no” decision on the project feasibility. The next stage implies a “full-fledged” EIA. At this stage, very detailed information is required, including calculations of emission limit values (ELVs), an emergency preparedness plan, monitoring programs for all media, etc. Again, this documentation must be presented for review by authorities. If design documentation undergoes any changes at a later stage (e.g. adjustment in the technology), the developer is required to adjust the EIA materials accordingly. Such adjustments require review by authorities as well.

Finally, a “post-construction” EIA must be carried out for large projects with capital investments of over \$50 million one year after the operation of the road starts. This is done to confirm the environmental safety of the economic activity and to correct the plan of environmental protection measures during operation.

Public hearings are required at all stages of ESIA. Minutes from these hearings are part of the ESIA documentation. Although the Ist public hearings` conducted and quality may not yet correspond to good international practice as promoted by international protocol (e.g. Aarhus convention) their wide application helps to advance the principle of public participation in Kazakhstan and to take root not only in procedural guidance but also in real practice. Second public hearing will be organized to meet the requirements for Category 1 projects.

Table 1-1 Legislation and Regulations Governing the EIA Process

Name of Legislation	Date and number of registration
Methodology for Determining Emissions Standards to the Environment	Approved by the Order of the Minister of MEP, 21 May 2007, No. 158-p.
“Instruction on Conducting Environmental Impact Assessment of Planned Economic Activity when Developing Pre-planning, Planning, Initial project documentation,	Approved by the Order of the Minister MEP, 28 June 2007, No. 204-p”
The Amendments to the Order of the Minister of Environment Protection of Republic of Kazakhstan on Approval of “Instruction on Conducting Environmental Impact Assessment of Planned Economic Activity when Developing Pre-planning, Planning, Initial project and Project documentation”	Approved by the Order of the Minister of MEP, 20 March 2008, No.62-p”.
Regulations on Conducting State Ecological Expertise.	Approved by the Order of the Minister of MEP, 28 June 2007, No.207-p”.
The Amendments to the Order of the Minister of Environment Protection of Republic of Kazakhstan on Approval of Regulations on Conducting State Ecological Expertise	Approved by the Order of the Minister of MEP, 9 October 2007, No.296-p”.
Rules for Conducting Public Hearings	Approved by the Order of the Minister of MEP, 7 May 2007, No.135-p”.
Instructions for Qualifying Requirements to Licensed Activity on Environmental Design, Regulation and Development of Environmental Impact Assessment	Approved by the Order of the Minister of MEP, 21 October 2003, No.239-p”.
Methodological Guidelines to the Licensed Activity on Environmental Design, Regulation and Development of Environmental Impact Assessment	Approved by the Order of the Minister of MEP, 10 February 2005, No.51-p”.

Final Environmental Supervision Experts Opinion on Definite Types of Licensed Works and Services	Approved by the Order of the Minister of MEP, 1 July 2004, No.192-p”.
The Rules for Licensing and Qualification Requirements to Work Implementation and Delivery of Services in the Field of Environmental Protection	Approved by the Order of the Government of Republic of Kazakhstan, 5 June 2007, No.457-p”.
Environmental Code of the Republic of Kazakhstan	9 January 2007, No.212-p”.
Law of the Republic of Kazakhstan “On Amendments and Additions to Some Legislative Acts of Kazakhstan on Environmental Issues”	9 January 2007, No.213-p”.
Law of the Republic of Kazakhstan “On Ratification of the Stockholm Convention on Persistent Organic Pollutants”	7 June 2007, No. 259-p”.
The Concept of Transition to Sustainable Development for 2007-2009 (Action Plan)	The Order of the President of RK, 14 November 2006, No. 216-p”.
The Concept of Environmental Security of the Republic of Kazakhstan for 2004-2015	The Order of the President of RK, 3 December 2003, No. 1241

1.3 TRANSPORT LAW

The Law of Republic of Kazakhstan ‘On the road’ dated 17 July 2001 laid out the basic legal, economic and organizational principles of governance roads in the Republic of Kazakhstan. The Road Law covers all aspects of the development and use of roads including design, engineering, traffic requirements, dimensions and providing land.

The size of the right of way for projected roads for common use is set depending on the category under the rules of allotment of land for roads of public use, namely: for road of I technical categories – 35 meters from the roads axis, for roads of II technical categories – 20 meters, for roads of III technical categories – 15 meters, for roads of IV technical categories – 13 meters, for roads of V technical categories – 12 meters. Road right of way lands are in the possession and use of road authorities or concessionaries, and are intended only for the development, improvement of roads and location of road services.

1.4 AIR QUALITY STANDARDS

The standards for air quality establish the permissible limit of the content of harmful substances both in industrial areas and residential areas. The main terms and definitions related with the atmospheric air contamination, monitoring programs, behavior of pollutants in the atmospheric air determined by the GOST 17.2.1.03-84; Environmental Protection, Atmospheric Air’ Terms and Definitions for Contamination Control.

The regulatory document containing information on harmful substances in the atmospheric air is the “Sanitary and Epidemiological requirements for the Atmospheric Air Quality” approved by the Order of the Ministry of Health of the RoK № 629 dd 18.08.2004.

The emission of hazardous substances (pollutants) in the atmospheric air by the stationary source is allowed only on the basis of the permit issued by the authorized state body in the field of atmospheric air protection or its territorial subdivisions in the manner established by the Government of the Republic of Kazakhstan. The permit is based on total emission amounts supplied by the applicant (the developer) and does not show emissions from individual vehicles. The procedure of issue of the atmospheric air pollution permits during

operation of the motor vehicles or other transport facilities is defined by the Government of the Republic of Kazakhstan.

All motor vehicles of any type (including buses and trucks) are required to pass an annual roadworthy test which includes emission testing which must be in accordance with the regulations referred to below.

Table 1-2 Air Quality Legislation

Instruction on Agreement and Approval of the Design of the Maximum Permissible Emission (MPE) and Maximum Permissible Discharges (MPD)	The Order of the Ministry for Environmental Protection of the RoK No.61n dd24.01.2004
Collected Book of Methods for Calculation of the Atmospheric Air Pollution by Different Types of Production	The Order of the Ministry of Ecology and Bio resources 01.12.96. <i>Included in the list of the current regulatory legal acts in the field of the environmental protection, the Order of the Ministry for Environmental Protection No 324-n dd October 27, 2006</i>
The Inventory rules for Emissions of the Hazardous substances (Pollutants), harmful Physical Effects on the Atmospheric Air and Their Sources	The Order of the ministry for Environmental Protection of the RoK No.217-n dd.August 4,2005
The procedure of Calculation of the Hazardous Substances Concentrations Containing in the Atmospheric Discharges of the Enterprises. Guiding normative document 211.2.01.01-97	The Order of the Ministry of Ecology and Bioresourcesdd 01.08.1997. Included in the List of the current regulatory legal acts in the field of the environmental protection, the Order of the Ministry for Environmental Protection No 324-n dd October 27, 2006
The procedure of Calculation of the Hazardous Substances Concentrations Containing in the Atmospheric Discharges of the Enterprises	Approved by the Order of Minister of environmental Protection No.100-n dd April 18,2008 (Attachment 18)
Recommendations on Execution and Content of the Design Standards of the Maximum Permissible Emissions (MPE) in the Atmospheric Air made by the Enterprises of the Republic of Kazakhstan. Guiding normative document 211.02.02-97	The Orders of the Minister of Ecology and Bio resources of the Road August 1, 1997 and Order of the Ministry of natural resources and environmental protection of the RoK No. 156 dd 06.07.2001 <i>Included the List of the current regulatory legal acts in the field of the environmental protection, the Order of the Ministry for Environmental Protection No.324-n dd October 27, 2006</i>
Instruction on the Normalization of the Emission of contaminants in to the Atmosphere of the Republic of Kazakhstan	The Order of the Ministry of natural resources and environmental protection of the RoK No.516-n dd 21.12.0 Included the List of the current regulatory legal acts in the field of the environmental protection, the Order of the Ministry for Environmental Protection No.324-n dd October 27, 2006
The Calculation Procedure of Motor Vehicles Emissions for Carrying Out of the Summary Calculations of Atmospheric Pollution	The Order of the Ministry for Environmental Protection of the RoK No.324-n dd October 27, 2006

Guiding normative document 211.2.02.07-2004	<i>Included in the List of current regulatory legal acts in the field of the environmental protection, the Order of the Ministry for Environmental Protection No.324-n dd October 27, 2006</i>
The Calculation Procedures of the Specific Emissions of the Atmospheric Pollutants and Damage Depending on the Type of Fuel Used in the Republic of Kazakhstan Guiding Normative Document 211.3.02.01-97	The Order of the Ministry for Ecological and Bio resources of the Road 09.07.97. <i>Included in the List of current regulatory legal acts in the field of the environmental protection, the Order of the Ministry for Environmental Protection No.324-n dd October 27, 2006</i>
The procedure of Calculation of Discharge (Emissions) of Contaminants into the Atmosphere Caused by the Motor Transport enterprises	Approved by the Order of the Minister of Environmental Protection No.100-n dd April 18, 2008 (Attachment 3)
The Rules of Governmental Accounting of the Sources of Greenhouse Gases Emission into Atmosphere and Consumption of Ozone-destroying Substances	The Governmental Decree No 124 dd February 8, 2008
The Rules of Restriction, Stoppage or Decrease of the Greenhouse Gases Emissions into Atmosphere	The Governmental Decree No.128 dd February 11,2008

1.5 WATER QUALITY LEGISLATION AND STANDARDS

The main legislative act in the area of water resources protection and use is the Water Code of the Republic of Kazakhstan #481 dated July 09, 2003. According to the definition provided in this document “protection of water bodies” is an activity aimed at preservation, rehabilitation and reproduction of water bodies as well as prevention of water from detrimental effect.

I. According to Article 112 the water bodies shall be protected from:

- 1) natural and industrial pollution by hazardous chemical and toxic substances and their compounds, as well as thermal, bacterial, radiation and other types of pollution;
- 2) infestation (blockage) with hard, non-soluble subjects, production and household and other wastes;
- 3) defecation.

II. Water bodies shall be protected to prevent:

- 1) disturbance of the environmental stability of the natural systems;
- 2) causing harm to the lives and health of population;
- 3) reduction of fishery resources and other water fauna;
- 4) deterioration of the water supply conditions;
- 5) weakening of the natural self-reproduction and cleansing functions of the water bodies;
- 6) other unfavorable conditions that negatively affect physical, chemical and biological qualities of water bodies.

III. Protection of water bodies is carried out through:

- 1) Taking into consideration competing or conflicting demands related to the protection of water bodies to all water users who use water for any purpose;
- 2) improving and applying water protective activities/ measures with the help of new equipment and environmentally and epidemiologically safe technologies;

- 3) establishment of water conservation zones and sanitary protection zones for protection of public (drinking) water supply sources;
- 4) execution of public (state) and other forms of control over the use and protection of the water bodies;
- 5) applying sanctions for non-observance of the water protection requirements.

IV. Central and local execution authorities of the Oblasts (cities of republican significance, capitals), in line with the legislation of Republic of Kazakhstan, take measures in compliance with the principles of sustainable development towards water resources conservation, prevention of pollution and blockage.

V. Physical and legal entities, activities of which affect the water bodies, are obliged to carry out managerial, technological, forestry, ameliorative, land treatment, hydro technical, sanitary-epidemiological and other activities, which ensure protection of water bodies from pollution, blockage and depletion.

Article 116 of the Law regulates issues related to the water protection zones: to maintain water bodies and water facilities in the condition required by the hygiene and sanitary and ecological norms; to prevent contamination, blockage and depletion of the surface water; to preserve flora and fauna water protection zones and belts are required.

While developing any project, which may have any impact on the water system/ resources, the project designs should be agreed with the local executive entity for water resources protection. A Water Code, adopted on March 31, 1993, is in force in the Republic of Kazakhstan. The Government has approved the *Conception for the development of the water sector of the economy and water policy until 2010 and has approved the sectoral program for Drinking Water*.

In developing the Water Code, the Government of the Republic of Kazakhstan has adopted normative acts concerning the procedure for allowing water reservoirs for special use, a procedure for agreeing to end issuing permits for the special use of water, a procedure for using water for fire fighting needs, classifying water ways as navigable routes, and for using reservoirs for air transport needs. The Government has approved lists of reservoirs (underground waters) that have health significance of the Republic and reservoirs that have special state significance or special scientific value, the granting of which for use is restricted or entirely forbidden.

As for the atmospheric air so for the water such standards are the maximum allowable concentrations (MAC). The MACwrf (water reservoirs for fishing) are stricter than MACwrdd (water reservoirs for drinking water) as rule. It is necessary to emphasize that this refers primarily to the fish industry as such and protection of the human needs though some principles of water ecosystem protection, to all probability, were also taken into account during determination of the standards. As in the case of atmospheric air there are the various indices used for comparative assessment of the water contamination which enable the consideration of the presence of several pollutants. The most widely used index is the integrated hydro chemical water impurity index (WII). The basic document regulating the condition of the surface waters and content of the hazardous substances in them is the sanitary and epidemiological norms and regulations "Sanitary and Epidemiological Requirements for the Surface Waters Protection Against the Pollution" #3.dd 02.03.04 approved by the Order of the Ministry of Health of the RoK #506 dd 28.06.2004.

The legislative and regulatory and procedural documents in the field of the water environment protection are listed below:

Table 1-3 Water Quality Legislation

<p>Recommendations on Execution and Content of the Design Standards of the Maximum Permissible Discharge (MPD) in the Water Bodies for the Enterprises of the Republic of Kazakhstan.</p>	<p>The Order of the Ministry of Ecology and Bioresources of the RoK 1992.</p> <p>Included in the List of the current regulatory legal acts in the field of the environmental protection, the Order of the Ministry for Environmental Protection #324-n dd October 27, 2006</p>
<p>Instruction on the Normalization of the Discharge of Contaminants into the Water Bodies of the Republic of Kazakhstan</p> <p>Guiding normative document 211.2.03.01-97</p>	<p>The Order of the Ministry of Natural Resources and Environmental Protection of the RoK#516-n dd 21.12.00.</p> <p>Included in the List of the current regulatory legal acts in the field of the environmental protection, the Order of the Ministry for Environmental Protection #324-n dd October 27, 2006</p>
<p>The Calculation Procedure for Standards of Discharged Waters with Pollutants (MPD) into the Water Bodies, Disposal Fields and Relief of Land</p>	<p>Approved by the Order of the Minister of Environmental Protection #100-n dd April 18, 2008 (Attachment 19)</p>
<p>The Procedure of Establishment of the Maximum Permissible Discharge (MPD) of the Pollutants onto the Disposal Fields and Natural Depressions of the Land.</p> <p>Guiding normative document 211.3.03.03-2000</p>	<p>The Ministry of Environmental Protection of the RoK #156-n dd 06.07.2001</p> <p>Included in the List of the current regulatory legal acts in the field of the environmental protection, the Order of the Ministry for Environmental Protection #324-n dd October 27, 2006</p>
<p>The Recommendations on Control over the Operation of the Treatment Facilities and Discharge of the Wastewaters.</p>	<p>The Order of the Ministry of Ecology and Bioresources of the RoKdd 21.05.94.</p> <p>Included in the List of the current regulatory legal acts in the field of the environmental protection, the Order of the Ministry for Environmental Protection #324-n dd October 27, 2006</p>
<p>The Rules of Surface Waters Protection in the RoK</p> <p>Guiding normative document 01.01.03-94</p>	<p>The Order of the Ministry of Ecology and Bioresources of the RoKdd 27.06.94.</p> <p>Included in the List of the current regulatory legal acts in the field of the environmental protection, the Order of the Ministry for Environmental Protection #324-n dd October 27, 2006</p>
<p>The Guidelines on Application of the Rules of Surface Waters Protection in the RoK</p>	<p>The Order of the Ministry of Ecology and Bioresources of the RoKdd 12.02.97.</p> <p>Included in the List of the current regulatory legal acts in the field of the environmental protection, the Order of the Ministry for Environmental Protection</p>

	#324-n dd October 27, 2006
The Procedural Definitions of Norms and Standards of Water Resources Use in the Various Natural Climatic Zones of the Republic of Kazakhstan During Carrying out of the Ecological Zoning.	Approved by the Order of the Minister of Ecology and Bioresources of the RoKdd 1997

1.6 SOIL STANDARDS

New sanitary rules introduced in Kazakhstan following the long-term scientific studies-SanPiN (Sanitary Rules and Norms) 2.1.7.1287-03 Sanitary and Epidemiological Requirements for Quality of Soil and Subsoil which establish the specifications for soils quality in the inhabited localities and agricultural lands and control the observance of the sanitary-hygienic standards during engineering, construction, renewal (technical upgrading and operation of the facilities of different purposes, including those which may cause the adverse effect on the soils status.

The main terms related to the chemical contamination of soils are defined by the GOST 27593-88. Soils.Terms and Definitions. The basic regulatory documents for control of the soil pollution content is “Standards of the Maximum Allowable Concentrations of the Hazardous Substances, Harmful Microorganisms and Other Biological Materials Being the Soil Pollutants” approved by the Order of the Ministry of Health of the RoK#99 dd 30.01.2004 and Order of the Ministry for Environmental Protection of the RoK #21II dd 27.01.2004.

The maximum allowable concentrations (MAC) or allowable permissible concentrations (APC) of the chemical substances in soil are the principal criterion of the sanitary assessment of the soil contamination by the chemical agents.

This requirement applies to all land uses and does not differentiate between various land uses. The verification of the MAC of the chemical substances in the soil is based on 4 main nuisance values identified

1.7 NOISE STANDARDS

The level of the road traffic noise is determined according to the norms of the SNIp (construction norms and rules) 11-12-77 «Noise Protection». The limit of noise exposure generated by the motor vehicles in the distance of two meters from the buildings facing to the noise sources in compliance with the SNIp 11-12-77 (tab.1.2) is 70 dBA.

The maximum allowable noise level is assumed for areas neighboring on the residential houses, rest areas of the micro-districts and residential groupings, school areas, playgrounds of the preschool after adjustment as follows:

- for noise made by the motor vehicles - 10 dBA
- for existing residential construction - 5 dBA
- for daylight time from 7 hour till 23 hour - 10 dBA

1.8 HEALTH AND SAFETY DURING CONSTRUCTION AND OPERATION

It is required to follow the requirements of the SNiP 3.06.04-91 «Construction Safety» during the execution of works. There are the «Safety Regulations for Construction, Repair and Maintenance of the Automobile Roads», «Regulations for Safety and Production Sanitary During the Building of the Bridges and Pipes» are applied in the road construction. At performance of the road construction works it is necessary to use the «Safety Instructions» for each construction machine.

The personal protective equipment shall comply with the applicable GOSTs (apron under the GOST 12.4.029, rubber gloves under the GOST 20010, respirator "The Petal" under the GOST 12.4.028, gloves under the GOST 12.4.010, goggles under the GOST 12.4.013 and breathing mask of B type or B with filter, helmets). The site shall be kept in a safe, clean and good sanitary state. The "Contractor" shall bear the responsibility for cleanup of the site from garbage, construction waste and household rubbish and their removal to the municipal solid waste landfill (MSW). The "Contractor" shall be guided by the SanPiN №3.01.016.97 in that regard.

In addition, it is necessary to carry out routine inspection of the machinery and equipment and observance of the repair, training and instruction of the workers engaged in maintenance of the machinery, tools and equipment on safe methods and techniques of work. The protective measures with respect to the equipment are also important for prevention of injuries and accidents. Such equipment includes the following:

- motor vehicles;
- pumps, compressors;
- generators, crushing equipment;
- lifting equipment (cranes, hoists, wire ropes, loaders);
- electrical equipment.

For provision of the sanitary and living conditions for the workers it is required to establish a field camp; changing rooms, drying premises, wash rooms, shower rooms, warming premise for workers, dining facility with three meals daily, toilet facility, field office, rest room, machinery parking facility and household waste storage area. There shall be the information on safety, occupational health, production and household sanitary in the rest room. There shall be medicine boxes, first-aid outfit, drinking water and service water kept in the separate containers provided on the construction sites and field camps. The drinking water shall be located at the distance of maximum 75 m from the working area. The water permit shall be obtained in the sanitary supervision and disease control authorities and comply with the requirements of the SanPiN of the RoK № 3.05.017.97.

It is required to perform works during the hours of darkness provided that artificial lighting in accordance with the standards of the electric lighting for the installation and construction works. Irrespective of the lighting of the sites and working areas the machinery shall be equipped with the independent (built-in) lighting of the working elements and control devices.

The storage of all types of fuel and chemicals shall be in the special location with the

mandatory barbed wire fence. The storage area shall not be located near the water source and depressions. The filling and unloading of materials shall be strictly controlled and performed in accordance with the established procedure. All valves and plugs shall be protected against the undesirable interference and vandalism and shall be turned off and opened easily when used. The inner surface of the tanks shall be clean. The measurement shall be carried out so that the impact of moisture and water was not taken into account.

1.9 ARCHAEOLOGY AND CULTURAL HERITAGE

The main legislation comprises:

- The Law of the Republic of Kazakhstan "About Culture", dated 15.12.2006
- The Law of the Republic of Kazakhstan "On Protection and Use of the Historical Cultural Heritage", dated 2.07.1992
- The Land Code of the RoK, dated 20.06.2003

For the purpose of recording and protection of the historical and cultural monuments they are divided into the following categories:

- Historical and cultural monuments of international status representing the historical, scientific, architectural, artistic and memorial objects included in the UNESCO World Heritage List;
- Historical and cultural monuments of national status representing the historical, scientific, architectural, artistic and memorial objects, having the special significance for the history and culture of the whole country;
- Historical and cultural monuments of local significance representing the historical, scientific, architectural, artistic and memorial objects, having the special significance for the history and culture of the oblasts (city of republican status, capital), regions (cities of oblast sub ordinance).

According to Article 39 of The Law of the Republic of Kazakhstan "On Protection and Use of the Historical Cultural Heritage", development and use of any allocated lands shall be made only after archaeological research. Any works that may endanger the existence of monuments are prohibited. Businesses, organizations, institutions, public associations and citizens in case of detection of archaeological and other sites of historic, scientific, artistic, and other cultural value, are obliged to inform the authorized body for the protection and use of historical and cultural heritage, and to suspend continuing such works.

1.10 COMPARISON OF KAZAKH AND WORLD BANK ENVIRONMENTAL LAWS

An evaluation of the national environmental protection legislation and WB procedures and its bearing on the Project is presented in this section of the report. Much of the environmental legislation of Kazakhstan has been designed to provide for control of developments and control of adverse impacts on the environment and human health. The submission of EIAs for Ecological Expertise does not accord with best international practice, which includes a significant component of ongoing evaluation in an iterative process. The EIA in Kazakhstan focuses more on the calculation of emissions, for which charges are levied and is weak on

relevant analysis and conclusions with a focus on understanding impacts and actions to avoid or mitigate them. Data collection often becomes disconnected from the objective of the EIA and the boundaries of the project.

The practice of public consultations in Kazakhstan does not involve broad citizen engagement and is often restricted to the local authorities, rather than the general public. On August 5-6, 2014 public hearings were carried out concerning this project with participation of representatives of the Employer JSC Branch NC KazAvtoZhol, designers, PMC environmental specialist, heads of local executive bodies, and also locals.

Having comprehensively discussed the current situation with representatives of local executive bodies, an additional public hearing was held on August 8, 2014 in the village of Akshy of the Ili district of Almaty Oblast for discussion and consultation of the project. A further round of Consultations at each Rayon of the Ili district where the EIA conclusions will be presented has been planned 30 days after publication of the Draft (refined) EIA. Responses from these consultation meetings will be incorporated into the final EIA.

Additional Public hearings hearing were held successfully. General designers presented presentation materials of a project road section, including, information on the main indicators, the map of project road section with the indication of junction and cattle crossing locations, and also information on the land plots getting to a zone of construction of the highway with the indication of the area required for temporary and permanent land acquisition. During consideration of the submitted presentation materials, participants of the hearings asked the questions concerning location of junctions and cattle crossings, and also design for junctions. Following the results of hearings appropriate places for cattle crossings and junctions have been provided. During public hearings there was made video filming and materials are presented to the Employer on an electronic media (CD disk). The Minutes of these hearings are presented in the Appendix 5.

The practical procedures are not adapted to monitoring during construction of a project, as for example the Oblast Environment Department has to apply to the Chief Prosecutor’s Office for an application to conduct an audit and can do that only once per year, giving the contractor 2 weeks notice of the upcoming audit. The content of Kazakh EMPs includes only a description of generic mitigation and monitoring measures, minus location and responsibility details, focusing on listing norms and standards and is of little use to contractors.

Standards are used as thresholds above which pollution is permitted so long as payments are made.

Overall, there are several public organizations involved to varying degrees in environmental protection. These include the Ministry of Agriculture and Ministry of Energy and Mineral Resources. There are special institutions in Kazakhstan such as the State Expertise in Environment and several environmental think tanks also involved.

A comparison of the legislation is presented below in Table 1.10

Table 1.10 Comparison of Kazakhstan ESIA and environmental legislation and World Bank Standards

EA Step	Kazakhstan	WB
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EA Step	Kazakhstan	WB
Sources	RK 2007. Ecological Code Ministry of Environmental Protection Order 204-п, 28 June 2007: “The Instruction of Conducting the Environmental Impact Assessment during the preliminary planning, planning, preliminary design and full design documentation”	World Bank Operational Policy 4.01
Basic Principles		
Most sensitive component rule	There does not appear to be a ‘most sensitive’ rule. The sensitivity of project is measured by the Sanitary Epidemiological (SE) classes of dangers. There are four categories and within each, one or more levels of danger, a category 1 project has two levels of severity, either trigger a full EIA. A Category 2 project is considered a 3 rd level severity and as such a lesser assessment is undertaken, although still referred to as an Environmental Assessment. A category 3 and 4 project are considered 4 th and 5 th level severity and as such generally do not warrant an assessment.	Projects are categories according to the most sensitive component, e.g. if 6 of 7 components are not sensitive and one is the entire project becomes a Category A or B.
	The planning and conduct of an assessment is the duty of the proponent, in this case MOTC. MOTC often retains a licensed consultant to do this work; and frequently a member of the team undertaking the Feasibility Study. The assessment must be preceded with a scoping study which must be approved before the EIA can begin. The EIA process has 5 stages: 1) Overview of Environmental Condition; 2) Preliminary EIA 3) EIA; 4) Chapter of Project Documentation “Environmental Protection”; 5) Post-project Analysis.	Usually EAs are required to be prepared by the country, and donors will request this. Often the proponent’s EA capacity is not there or funds are scarce, or the EA prepared is incomplete or non-compliant, in which case consultants help fill the gaps, undertake new studies on behalf of the proponent or assist national specialist to fill the gaps and improve the documentation. This is a proponent focused activity, with the requirement for close collaboration and ownership. In the case of this project the existing EIA prepared by the Design Consultants have been refined and strengthened by International Consultants to the Committee of Roads, Astana, to be in accordance with World Bank OP.
Document Preparation		When the donor funds are used to prepare IEEs, SiEAs and EIAs <u>on behalf of</u> the country, these documents are always the country’s documents, and as such must be presented as if the country were preparing them. Where consultant recommendations are included, this must be made clear. Summaries of the IEEs and EIAs often contain review and comments by the donors or the donor’s consultants on behalf of the Banks
Document Ownership	Category 1 projects are assessed by the MOEP in Astana, Category 2 and 3 by the Oblast or Regional Environment Department, and 4 at the rayon level.	

EA Step	Kazakhstan	WB
The Environmental Management Plan	As specified in Ecological Code Article 41 an environmental assessment documentation should include “10) <i>Description of measures provided for preventing and mitigating impacts on environment, including proposal for ecologic monitoring</i> ”— <i>more or less a partial EMP</i> . This description does not comply with donor requirements and construction monitoring is far from rigorous.	The EMP is required by WB for A and B category projects, It is considered to be an integral but distinct part of the assessment document. It is not a separate document, but the key summary of the mitigation and monitoring measures to be applied should be extractable as a stand-alone section or set of Tables.
Public consultation	Kazakhstan has a consultation process but it involves the public sector and rarely a common citizen.	Public consultation is a requirement for WB. The World Bank has a mandatory 2 sessions for full EIAs and 1 session for category B projects. For full EIAs the sessions are scheduled to coincide with early EIA planning and the preparation of the draft EMP or record of likely impacts. For the B -level projects a session during the impact definition stage is most useful, although exact timing is a function of the environmental issues emerging and the proponent’s wishes. Consultations must be announces and for full EIAs advance notices of consultations and contact details must be published in the media for several weeks in advance of the session(s).
Classification	Projects are classified by the 5 danger levels with 1 being the highest as defined by norms and standards developed by the Sanitary and Epidemiological Services, in relation to human health and safety. There is little reference to protection of the environment and e.g., forests and wildlife populations. As with the Banks, certain projects have been pre-classified, e.g. the road projects are mostly considered Category 1 of requiring a full EIA.	There is a classification of activities according to risk level from I (high) to V (low) in Kazakhstan. Depending on the risk level Environmental Category form 1 to 4 is assigned. Sanitary-Epidemiological Regulations specify Environmental Category through lists of activities by sector (e.g. chemical industry, metallurgy, agriculture, etc.) and by risk category (i.e. I - V). Environmental Category 1 covers activities of the I and II risk level. This “dual” classification does not specify size of the facility or scope of production. The main purpose of Sanitary Rules is to establish sanitary-protection zone (SPZ), which for Category 1 facilities is not less than 1000 m for risk category I and not less than 500 m for risk category II.
Document Form	Nothing specified other than a ‘minor environmental statement’	No specific documentation required
Summary Doc	None defined	None required.
Consultation & Information Disclosure	None specified	Not needed

EA Step	Kazakhstan	WB
Timing		
Disclosure	None required	None required
		EIA and EMP disclosed prior to project appraisal both locally in the country and in the World Bank's InfoShop. SiEAs do not require an analysis of alternatives
Document Form	All environmental assessment documents are stand alone reports	A section of the Feasibility Study
Summary Document	Each assessment document as its final section "Main conclusions of the EIA". No other summary was referred to in the Code or related standards	An executive Summary—but with no special designation
Consultation and Information Disclosure Timing	No consultation required	At least once during IEA/SiEA preparation
Disclosure	None required	All environmental assessment documentation is available on World Bank Information Centre website and in the borrowing country office as well, but there is no formal public review.
Category A: EIA	EIA is required for projects of Sanitary and Epidemiological class 1, which will have significant impacts on the human safety. According to Section 26 of the EIA Instructions the third stage of EIA process – "Environmental Impact Assessment" requires detailed analysis in full volume on all aspects of environmental impact of the specified objects, and includes the following components: air, water, mineral resources, production wastes, physical impacts, soil, plants, animals, socio-economic condition, and ecological risks. The Category A is required to undertake the 5 th stage of EIA process, Post-project Analysis, 1 year after the end of project. The 5 th stage should be undertaken by different licensed organization than which conducted the EIA.	The World Bank's Category A requirements include environmental and social assessments. EIAs must also include a detailed analysis of alternatives, especially the "no project" alternative. This report is in accordance with this requirement.
Document Form	Each stage of EIA process has its own stand alone document with prescribed format and the level of detail.	Stand Alone document with prescribed format and minimum level of detail
Summary Documentation	Each of 5 assessment stages has its own stand alone document; and each has a "Conclusions" section, which acts as a summary.	An executive summary is prepared and is attached to the EIA but often used separately. An Executive Summary is included in this report.

EA Step	Kazakhstan	WB
Consultation and Information Disclosure Timing	No information on specific consultations, except for public hearing as part of the EIA – the Instructions for Public Hearing are published by the MOEP Order №135, 7 th May 2007.	Minimum 2x mandatory, with timing specified. Once with the TOR for the EIA, once to present the draft EIA. For the disclosure of the draft EIA, Category A projects must be allowed a 120-day period for stakeholder evaluation and comments between disclosure of draft EIA/EMP and project appraisal. The 120 day rule will commence once this document has been completed in accordance with World Bank requirements.
Disclosure	From the time a full environmental assessment is submitted to the local /oblast-level environment agency to the time it is reviewed by the central government is 60 days. During the first 30 days there is a theoretical time for the "public" to comment. But since there is no real announcement this does not happen. Further, there is a 'public debate/hearing' held as part of the final EIA approval. Again, this is not transparent and the public are not necessarily involved. <u>There is no other disclosure. This document when agreed by the Bank as suitable for public disclosure under the 120 rule will be put on the CR website in Russian. 30 days after this submission the next round of public consultation will take place.</u>	The public must be informed about the availability of EIA documentation, which must be prepared in English and the local language (sometimes English, Russian and local language), and be accessible at convenient locations in country, at a published website and on the donors website (InfoShop) 120 days before project appraisal. Loan processing cannot proceed during this period. This document will be disclosed at WB website and CR website once agreed by the WB as suitable for public disclosure.
Land Acquisition and Resettlement Review	No internal review of land acquisition and resettlement.	World Bank requested a review of resettlement, land acquisition and compensation payment to ensure all activities were undertaken in accordance with World Bank Guidelines OP 4.12. A Resettlement Implementation Review (RIR) was undertaken by the PMCo to CR. This is now being finalized.

Conclusions and Recommendations from Gap Analysis:

The following conclusions and recommendations address those issues where divergence of standards and subsequent practice between Kazakhstan and the World Bank may lead to shortcomings in environmental due diligence during implementation, because local practice may be rigid and well established and incorporating new elements or changing practices may need extra efforts during project supervision:

1. Kazakhstan has not yet put into practice an iterative process to ensure that project design and environmental analysis have an actively managed interface, and that data and findings from either are incorporated into the other. Usually the design approval process in KZ is quite advanced when ESIA's are conducted, which may prevent recommendations for design changes based on the environmental analysis being implemented, as they would require a repetition of the approval processes. Design changes may, however, be introduced during the

construction design stage once a contract has been awarded with relatively minor review and approval requirements. This is the recommended approach to mainstream design changes based on environmental findings into the designs submitted by the Contractor to the Client for approval and construction. Such design changes are likely to mainly concern the number and location of under- and overpasses for animals, farm traffic and wildlife.

2. Environmental protection is often seen as compliance with emission or pollution standards, while an understanding of environmental values such as fauna and flora, soils, landscape, biodiversity, esthetics, and the priority in enforcement appears on compensation payments rather than preventive and remedial action to avoid, minimize, mitigate or repair damage. This will require enhanced capacity building and supervision efforts during project implementation, with practical, implementation-focused training's for Contractors, supervising engineers and environmental authorities (incl. those representing forestry, national parks, water). It is recommended to ensure the presence of a consultant with international best practice experience in environmental site supervision and management during the first 6 months of project implementation (starting with Contractor's mobilization) to establish knowledge and compliance practice from early implementation stages onwards.
3. Site-specific EMPs will be prepared and included in construction contracts..
4. The competences and powers of Kazakh environmental authorities regarding site inspections are very limited, with visits legally limited in number and having to be announced several weeks in advance to the project owner. While this practice is unlikely to be changed within the project context, a strong supervision system needs to be contractually embedded, with effective enforcement mechanisms including penalties and arrangements for required remedies (e.g. by third parties with costs deducted from the contracts). It would be recommendable to entrust a project management consultant with the enforcing mandate that would in countries implementing best practice be with the authorities. In parallel the authorities should be kept well informed on all project activities and included in training and capacity building programs.

2. PROJECT DESCRIPTION

2.1 BACKGROUND

The Kurty – Burybaital Road Project has total length of 85km (km 2295 – km 2380) of the South West Road Project included in the Centre South Road Corridor “Astana-Karaganda-Balkhash–Kapshagay–Almaty Road”, located in Zhambyl and Ili districts of Almaty Oblast. The road will provide an essential link in the route between western China and Western Europe. The route objective is to provide an all - weather divided highway through western China, Kazakhstan and Russia. The route will have significant Economic benefits and will provide a greatly improved route for goods, for tourists and for improved social contact between China and Kazakhstan.

The existing road is Category III was constructed in 60s in the past century and the planned road section for reconstruction will be under Category Ib.

The proposed road will be partly reconstructed along the existing roads but with a widening of the present right of way (approximately 50% of the total alignment), and partly newly constructed alignment (approximately 50%) almost parallel to the existing road. The project crosses a variety of land forms, land use types and (micro) climatic zones. The project alignment lies entirely within Almaty Oblast and passes through the Zhambyl and Ili districts. Total road length is 85.04 km.

- The length of road section in Ili district – 21km
- The length of road section in Zhambyl district-64,04km

The project is structured in two designed sections with 40 km and 45km of length. This is a large and significant project, which will have environmental and other impacts and the land acquisition of about 53 plots with almost 329 hectares. These impacts are site- specific; few if any are irreversible; and in most cases mitigation measures can be designed.

2.2 PROJECT CHARACTERISTICS

Key indicators of the projected road are as follows:

- Road category – 1b;
- length – 85,04 km;
- embankment width – 25,5 m;
- number of traffic lanes – 4;
- width of median – 3m;
- maximum width of right of way – 70 m;
- maximum rated speed – 120 km/h;
- estimated average speed – 80 km/h;
- bridges and overpasses-2Nos.
- culverts-62 Nos.

- rest areas – 2 Nos.
- type of pavement and the type of coverage – asphalt concrete.

Estimated construction period: 3 years (36 months).

- section 1-36 months
- section 2-35 months
- Bridge across Buryozek river (Utegen)-35 months
- Bridge across Kurty river-35 months

The construction activities will include:

- Site clearance and preparation;
- Establishment and operation of borrow pits;
- Construction and operation of camps, depots and workshops
- Construction of embankment;
- Construction of roadbed;
- Construction of road pavement;
- Construction of junctions and crossings;
- Construction of multi-level interchanges
- Construction of bridges and overpasses;
- Installation of traffic signs and fences;
- The application of road markings;
- Construction of drainage channels for the roadway and the bridges
- Construction of training dikes near artificial structures.

2.3 SECTION 1

Section 40km (км2295-км2335): The main direction is south-east as shown in the project location Map below in Figure 2.2.1 and Figure 2.2.2. This section will pass along the existing alignment Almaty-Astana between villages Kanshengel and south of the village Aydarly. On administrative division the project road section goes along the territory of Aydarly and Sarytaukum rural districts of Zhambyl district of Almaty Oblast. The alignment crosses one dry river bed Ashisu, which becomes dry in summer, but gains its water capacity in spring.

The average elevation of the road is 600 m above the sea level; the minimum being 560 meters and the maximum being 640 meters.

Figure 2.3.1: Showing the road section 1 along the Kurty – Burybaital Road Section I

Figure 2.3.2: Road Alignment of Road Section I

Figure 2.3.3: Typical Road Cross-Section under Section I of the proposed rehabilitation and dueling of the existing road

2.4 SECTION 2

Section 2: 45 (km 2335-km 2380). This road section will go along the existing alignment Almaty-Astana, starting from Kurty village as shown below in Figure 2.3.1 along with the proposed road cross-section in Figure 2.3.2 and Figure 2.3.3 . On administrative division the project road section passes on Ili and Zhambyl districts of Almaty Oblast. The road is passing through the dense infrastructural network and several villages with intensive agricultural activities in open-spaces.

Figure 2.4.1: Road Alignment of Road Section 2

Figure 2.4.3: Typical Road Cross-section under Section 2 of the proposed rehabilitation and dueling of the existing road

The main waterflow, crossing the road is Kurtyriver, which starts on the northern slopes of the mountain ranges Kastek and Zhetyzhol and formed from the merges of numerous inflows, such as Kopa, Zhirenaygyr, Aksengir, Zhyngyldy.

The average elevation of the road is 600 m above sea level, the minimum being 560m and maximum 640 m.

The area is a flat terrain; natural terrain slope is not expressed.

The soil cover around the project alignment is developed poorly, presented by gray weak humicsoils with thickness up to 20 cm.

Bridges and Interchanges of Section 2 are shown in Table 2.4.

Table 2.4 – Section 2.Bridges and Interchanges

№	Section	Length, m	Pavement	Location
1	2	3	4	5
1	Bridge across Buryozek (Utegen) river	46.0	Asphalt	Km 2349+150
2	Bridge across Kurty river	71.2	asphalt	Km 2377+400

2.5 QUARRIES AND BORROW-PITS

The Designers have already defined a few existing and geological-exploration works on two (2) road sections. They are shown in tables 2.13 and 2.14. These are not part of the approved

design since the contractor will make the final decision on the selection of borrow pits. Additional new borrow pits will be needed (see Section 4.1.5)

The existing legal borrow pits have already received approval from the Rayon Akimat and all other responsible institutions including environmental approvals. They are available for use by any contractor depending on the contractor's precise requirements. The contractor does not normally own or have an interest in the ownership of a borrow pit. The contractor merely enters into a contract with the owner/operator of the borrow pit to buy specified amounts to an agreed specification. The road contractor would be responsible for maintaining any public and private access roads between the borrow pit and the construction site.

Extracting material from river beds is not acceptable and will not be approved by environmental authorities. Normally borrow pits are not allowed within 500 meters from any river.

All proposed borrow pits require approval from a range of local government institutions including an inter-regional committee of the Oblast. An EIA has to be prepared by consultants for the owner/operator. When the contractor submits his application he must include the EIA along with all documentation and expertise conclusions to Oblast Department of Environment Protection for getting permits for emissions and impacts. The final approval process will include a requirement that at the Borrow pit opening stage that the removal and storage of topsoil must be carried out and that the top soil must be re-cultivated after the closure of the borrow pit. This document is prepared after signing extraction contract. The total approval process for a new borrow pit through the Oblast and Rayon can take up to 2 years for final approval and agreement. Any contractor is therefore most likely to use existing borrow pits with the existing approvals rather than try to use new sites for the extraction of material. No specific approval is required from the water/river authority but the EIA should refer to any impacts on surface and groundwater resources.

For the existing borrow pits defined by the Design Engineers it is understood that all sites are legal and formal sites and have completed EIA procedures and are environmentally acceptable and will not adversely impact on surface and groundwater resources or any other environmental issues. Nevertheless, once the borrow pits to be used have been identified by the Contractor a due diligence review will be carried out to confirm that those sites are indeed operating or operable in an appropriate manner.

Whichever sites are used existing local roads will be used as access to the road construction site. On the main road it is unlikely that the construction traffic will have a significant impact on traffic flows and noise disturbance to the existing communities. Nevertheless this will need to be reviewed and monitored in detail prior to the commencement of the construction period. For the minor roads that cross the new alignment and for any access routes construction traffic will significantly increase traffic flows and potential air and noise disturbance. A traffic count on all possible access roads to road construction site together with a regular monitoring program will be prepared prior to the commencement of the construction period as part of the environmental due diligence and management measures.

Table 2.13: Section 1, Borrow pits/quarries

No.	Item	Material	Status	chainage, km/ distance from the road
1	Borrow pit №1	Soil	Explored/ proposed by the Designer	Km 5/ 0,2 km
2	Borrow pit№ 2	Soil	Explored/ proposed by the Designer	km15/ 0,2km
3	Borrow pit№ 3	Soil	Explored/ proposed by the Designer	km25/ 0,2km
4	Borrow pit№4	Soil	Explored/ proposed by the Designer	km36/ 0,2km
5	«Ulken-Tas», quarry «Ush-Balyk- 1»	Granular aggregate, quarry stone, sifting material, GSM	Existing	km383/ 183km
6	«Ulken-Tas», quarry “Ulken”	Granular aggregate 25-60 mm	Existing	km383/ 183km

Table 2.14: Section 2, Quarries

No.	Item	Material	Status	Chainage, km/Distance from the road
1	Quarry №1	Gravel-Sand Mix	Explored/ proposed by the Designer	km 2335+175/ 60,29
3	Quarry№ 3	Gravel-Sand Mix	Explored/ proposed by the Designer	km 1244+750/ 64,26
4	Quarry№4	Gravel-Sand Mix	Explored/ proposed by the Designer	km2356+850/ 67,28
5	Quarry №5	Gravel-Sand Mix	Explored/ proposed by the Designer	km2373+750/ 81,64

3. ANALYSIS OF ALTERNATIVE

Alternatives of alignment

During the conceptual design and feasibility study phases no alternative alignments were considered with the principal options referring to sections 1 and 2 due to the existing

alignment and its location. It is considered that the present alignments of the above two section as defined in this report are the most suitable in environmental impact terms and causes the minimum of environmental and social impacts. The selected alignment has the maximum environmental benefits. It does not pass near to or through any existing or planned settlements, nor does it divide or isolate any existing communities.

The route doesn't pass close or through the existing or planned settlements, doesn't divide or isolates the existing settlements; mainly passes through farmlands or pastures and through some undeveloped lands. The only settlement, near which there passes the road, is the settlement Kanshengel. However the offered road alignment passes on the existing road which has rather wide Right of Way and without any sensitive objects along it. The route passes across the suburb of Kanshengel settlement and was always a zone of influence of transport, business, roadside service and small enterprises that defines it as insensitive to noise and air pollution. After consideration of options of the route, the final version was approved by Almaty Road Department and regional akimats. The detailed description of options is given below.

On Section 1 and 2 there weren't any essential changes, only widening of the road under 1b category which will cause land acquisition

Environmental Impact of a Do Nothing Alternative

Do nothing would involve no new capital investment in the road and the present road would take all future traffic flows. This would create significant environmental disturbance to the existing communities along the present alignment; number of communities are now located along the present road. There would be increased noise and vibration, air pollution, and significantly danger to local communities and road users, in particular pedestrians. Crossing the road would become more hazardous and the roadside communities would be physically segregated between the different sides of the road. Traffic congestion would increase and the economic disadvantages of this would be significant. Overall the quality of the environment and social conditions would deteriorate along the present road. Increased traffic volumes would also flow through the Astana – Almaty direction will increase, quality of atmospheric air will decrease and noise level will increase. On sensitive sites considerable impact will be made. In general, quality of ecological and social conditions will worsen along the existing road.

Environmental Impact of a Widening Alternative

The widening alternative would involve the widening of the present carriageway to 4 lanes with a dividing strip. This would generally mean a widening of the ROW.

Conclusion

Both the do nothing and widening alternatives would have significantly larger adverse impacts on the environment and on the social conditions within the existing communities along the exiting road. Danger to local road users and pedestrians would increase, particular from the do nothing alternative. Danger to local road users will increase, especially at alternative of lack of implementation of the project. The selected alternative which involves proposed rehabilitation passing along the existing alignment avoids all settlements and impacts on local communities will be minimal. There will be some disturbance to agricultural activities during construction and some smaller long term impacts on agriculture. There are no impacts on natural habitats. Overall it is considered that the selected

alignment offers the best environmental approach to solving the problems with the present alignment and encouraging better transport connectivity.

4. SECTION 1

4.1 BASELINE DATA: SECTION 1

4.1.1 GENERAL DESCRIPTION

The Kurty- Buribaital Road Section of the South West Road Project included in the Center-South Road Corridor “Astana-Karaganda-Balkhash-Kapshagay-Almat” is the main highway connecting Astana and Almaty cities. The area of road alignment is located on the territory of AydarlyaqndSarytaukum rural districts of Zhambyl district in Almaty Oblast.

Section (км2295-км 2335). The main direction is south-east. This section will pass along the existing alignment Almaty- Astana M-36 is located between villages Kanshengel and the village Aydarly. On administrative division the project road section goes along the territory of Aydarly and Sarytaukum rural districts of Zhambyl district of Almaty Oblast. The area has several villages with agricultural activities. The alignment crosses two seasonal/dry river beds Ashisu and Otegen.

Figure 4.1 – Situational Map of Almaty Oblast

The total area of Almaty Oblast is 428,000 square kilometers. The administrative center is Taldykorgan. The Oblast includes 16 rural districts, 10 towns, 15 townships and 759 villages

The population of the Oblast is approximately 1 631,400 inhabitants (excluding Almaty city).

The total length of the Section is 40 km (Figure 4.1).

Zhambvldistrict- the length as per project is 40 km.

Figure .4.2. – Situational scheme of an arrangement of Section1

Table 4.1.1: Summary sheet of junctions at the reconstruction of corridor Center-South “Astana-Karaganda-Balkhash-Kapshagay-Almaty” section of road of republican significance “Border of Russian Federation (to Yekaterinburg)-Almaty” km 2295-2335.

№	Direction	PK+	left	right	angle, degree.	Category of secondary road	Carriageway width, m	Distance to settlement
1	Kanshengel	43+00	+		90	V	7,00	0,5
2	Kopa	42+40,17		+	100	IV	7,00	126
3	Topar	43+00,00	+		170	IV	7,00	130
4	Farm household	131+22,60	+		90	V	7,00	<input type="checkbox"/> 1 KM
5	Mynbay	131+29,62		+	90	V	7,00	<input type="checkbox"/> 1 KM
6	Ashchysu	220+17,17	+		102	IV	7,00	3
7	Sholakespe	220+50,26		+	90	V	7,00	5
8	Farm household	288+72.68		+	90	V	7,00	<input type="checkbox"/> 1 KM
9	Aydarly	307+87,09	+		102	IV	7,00	2
10	YeskyAydarly	349+21,29		+	115	V	7,00	2
11	Farm household	349+34,45	+		122	V	7,00	<input type="checkbox"/> 1 KM
Total:								

4.1.2 CLIMATE

The climatic characteristics of key towns on the alignment corridor are shown in Table 2.1. The key climate factors are:

- 1) Sharply continental climate. °C. Absolute maximum of air temperature +47°C, absolute minimum of air temperature -46°C;
- 2) Rainfall varies between 150 mm to 400 mm per year. Most rain in the spring and little rain during the summer;
- 3) Snow cover starts in November and lasts on average 80-100 days, with a depth of 21-38 cm;
- 4) Snow depths protects soil from continuous freezing
- 5) Winds are normally from the North East and North West;
- 6) Dust storms occur during summer and soil erosion can occur.

The main climatic characteristics of the projected road are shown in the nearest weather station at Almaty and Kurty shown in Table 2.1.

Table 2.1 – Main climate characteristics of MS «Almaty», «Kurty»

№	Climatic indicators		
		Almaty	Kurty
1	2	3	4
1	Average annual temperature C	+ 8,9	+ 7,9
2	The average temperature in the coldest month (January) ⁰ C	- 6,5	- 11,7
3	The average temperature for the warmest month (July) ⁰ C	+ 20,7	+ 25,4
4	The absolute minimum temperature ⁰ C	- 38,0	- 46,0
5	The absolute maximum temperature ⁰ C	+ 42,0	+ 47,0
6	Average rainfall in mm including the winter period	491	243
7	The snow cover with a 5% probability of exceeding, cm	50	50
8	Number of days per year:		
	sleet	12	2,0
	hail	7	2,0
	blizzard	5	25
	wind> 15 m/sec	21	25
9	Typical periods of air temperature		
	More than 0 ⁰ Cstart	13/03	7/03
	end	11/11	18/11
	duration	242	255
	More than 5 ⁰ Cstart	27/03	21/03
	end	25/10	31/10
	duration	211	223
	More than10 ⁰ Cstart	13/04	6/04
	end	9/10	15/10
duration	178	191	
10	The average annual wind speed m/s	1,7	3,9

4.1.3 GEOMORPHOLOGY AND GEOLOGY

The project area has a complex geomorphology and varied terrain due to its location between the high ridges of the Northern Tien Shan to the South, and the plains of the foreland with Lake Balkhash to the north-west and the Ili River to the north-east.

The route is laid in Ili-Balkhash-Alakul to a desert hollow. This extensive province is located in a sub-band of the average desert and in the piedmont semi-desert in the southeast of Kazakhstan. In the West the province is limited to Chu-Ili Mountains, in the north the Central Kazakhstan Hummocks, in the east ridges Barlyk and the DzungarianAla Tau, and in the south ZailiyskyAla Tau.

The southern part of Ili-Balkhash-Alakols hollow is the intermountain hollow of river Ili. Directly the route passes across the foothill semidesertic flat-bed plain (Zhusundala) with the general slope to the river Ili, crossed with – bakanas.

Permanent and closest watercourse is Kurtyriver. Kurtyriver is a last left affluent of Ili river – main waterway of south-eastern Kazakhstan. The river length is 123 km, starts on the northern slope of Chu-Ili mountains, and lower comes to the Ili hollow, rain, snow and ground feed. The river is low, used for irrigation, reservoir is created. The Almaty region is a sub mountain foreland of the south-western range of Karatau. A significant part of the region is occupied by the Balkhash-Alakol and Ili valleys (figure. 4.2).

Figure 4.3 Contour Map

4.1.4 SOILS AND SOIL FORMING ROCKS

Almaty Oblast has complex soil conditions. Soil characteristics and formation are affected by climate, hydrological conditions, geological structure, vegetation and other factors.

The project area is within a semi-desert and desert area. The examination and classification of soils was carried out according to the “Systematic list and main diagnostic indicators of soil of Kazakhstan” and included both a consultation of existing soil maps and atlases for Kazakhstan, as well as soil sampling and classification during the geotechnical investigations done during preparatory works. The soil cover includes heterogeneous light gray soils, underdeveloped, gray-brown, sand ridges and hilly areas in conjunction with clay saline soils. Soils are mostly saline. Mechanical composition differs from sands to clay loams and light clay. Soil-forming rocks are mostly saline alluvial with no talus deposits, represented by loam, sandy loam and sand.

The most important aspect of the soil characteristics is its suitability for removal, retention and subsequent use. In accordance with GOST 17.5.3.06-85 (Definition requirements for removal of topsoil and excavation) Standard 15.5.1.03-86 (Classification of overburden and host rock for biological reclamation of land) all soils were investigated for fitness for removal and subsequent use for bioremediation are divided into two groups:

Group 1: Soils with limited agricultural value

Light-chestnut medium depth general, light chestnut slightly saline ferrous mixed with medium saline ferrous 10-30%, meadow-light chestnut general medium depth general, mixed with meadow boggy soil meadow gray general soil with slightly seminiferous 10-30 %

These soils have humus depth level from 20 to 47 cm. Humus content ranges from 1,65 to 3,31%. Mechanical makeup comprises medium-hard sand-loam. Recommended depth to remove from 20-40 cm

Group 1, accounts for approximately 100 km of Section 1 (90 % of total Section 1 alignment)

Group 2: Soils with significant agricultural value

The second group comprises: meadow light chestnut medium saline with meadow-boggy medium saline 10-30%, light chestnut slightly truncated (eroded) with flood meadow 10-30%, light chestnut heavily saline mixed with hydromorph 10-30%, grey common medium

eroded oil, grey general heavily saline, grey common heavily saline medium eroded mixed with meadow boggy 10-30%.

Normally this soil is not recommended for removal but since it is common within river valleys in the area it is not possible to avoid. As this soil type is considered more valuable for agricultural purposes any activities disturbing or negatively affecting it shall be minimized to the extent possible, e.g. the soil type shall be considered for temporary works such as haul roads, laydown areas and camp-sites, to minimize impacts and ensure that restoration is diligently carried out

4.1.5 LAND RESOURCES

Most of the land of Section 1 is presented by irrigated and pasture lands. Land is acquired on permanent basis for construction of the road, access roads and junctions, and also for the temporary use. On the sections selected for the alignment sites of burial, and archaeological monuments are absent. Residential and uninhabited buildings, and also other engineering linear constructions which are subject to demolition don't get to a construction strip.

Total area to be acquired for permanent use with in Zhambyl district is 80.429 ha of pasture.

The total number of privately owned lands to be acquired in each district is shown below:

Table 4.2 Lands under the permanent acquisition for road construction

District	Number of owners	Area (ha)	Notes
Zhambyl	67	80.429	

Additional land will be required for borrow pits for construction material, and for temporary construction access and for construction depots, workshops and workers accommodation. There will be acquired 28,7 ha of pasture lands, 3,7 ha out of them are for stockpiling sites for construction materials and 25.0 ha for development of quarries and borrow pits for road construction materials.

Figure 4.3 The scheme of the land plots getting under road construction , Section 1

Contractors will obtain access to all land required for temporary use solely through negotiation with the owner or user;

In accordance with the requirements of Government land legislation it is necessary to ensure that all land used temporary for construction are returned to their original condition through a

reclamation program. The technology, procedures and materials are specified in the relevant section of the design.

4.1.6 HYDROLOGICAL CHARACTERISTICS

Surface Water

Although rainfall is comparatively low as indicated in section 4.1.2 the Almaty region is fairly rich in water resources due to the proximity of the mountains, where precipitation is higher and snow-melt and glaciers provides a perennial runoff. The region is drained by a number of large rivers and lakes which flow into the internally closed (Endorheic) Balkhash Basin at Alakul. The most significant waterway is the Ili River.

Permanent and closest watercourse is Kurty River. Kurty River is a last left tributary of Ili river – main waterway of south-eastern Kazakhstan. The river length is 123 km, starts on the northern slope of Chu-Ili mountains, and lower comes to the Ili hollow, rain, snow and ground feed. The river is low, used for irrigation, reservoir is created (located near Kurty village).

Ground Water

The Design Engineers supplemented the existing data and literature in the area by a series of boreholes along the alignment at approximately 500 meter intervals in relatively flat land and more frequent where there are gradients.

Groundwater characteristics of the area is shown in Fig. 4.4.

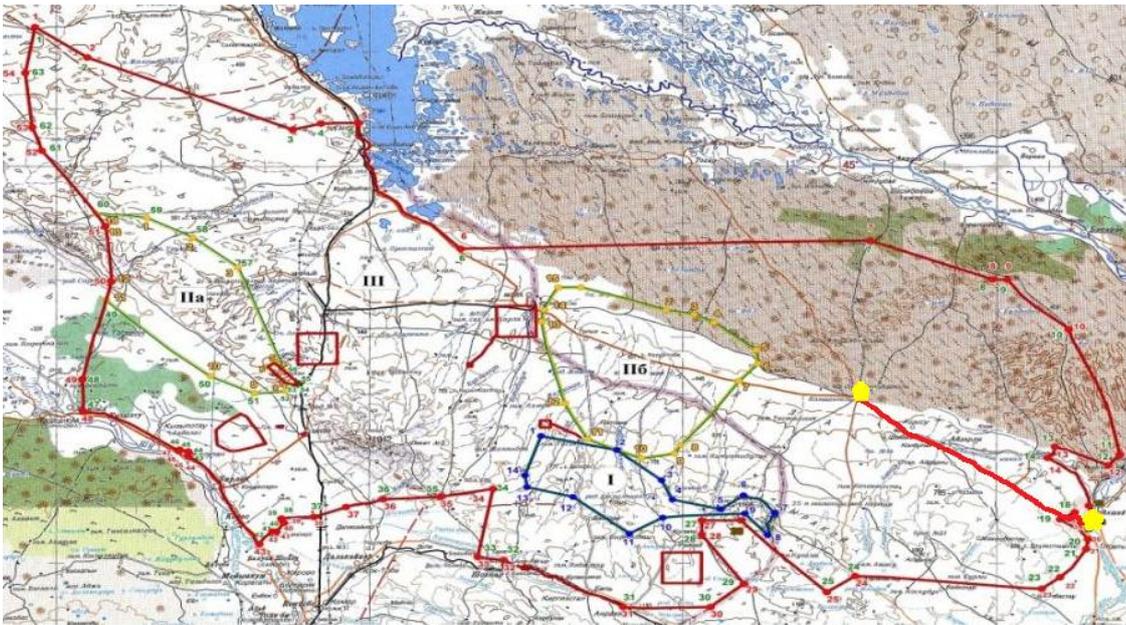
Figure 4.4 – Hydro geological map of the projected road

4.1.7 FLORA AND FAUNA

The alignment goes through the territory of Zhusandaly protected area located at the territory of Ili, Zhambyl districts of Almaty Oblast and Korday, Moynkum and Shu districts of Zhambyl Oblast.

Fauna

The road goes through Zhusandaly protected area which occupies very large territory (2 757 500 ha). The picture below shows the alignment (red line between two yellow dots at the right), which – while being located within the territory of the protected area – is still far away from strictly protected zones (I, II a, and II б) and places of occurrence of animals as shown on pictures below.



The following mammals occur in this broader protected area Zhasandaly: goitered gazelle, wolf, jackal, fox, steppe fox, hear. At the same time, as shown on figures below (4.6, and 4.7), the areas of occurrence of animals are located further to the North and West and no regular or seasonal strong movement of animals is observed in this area of the alignment. Bridges, culverts and cattle and agricultural underpasses² will serve as potential routes for random movement of animals. The average embankment height is 2-3 meters above existing ground level and will “direct” animals to underpasses and culverts.



Figure. 4.6. Schematic map of occurrence wolf, jackal, fox and steppe fox

² Agricultural underpasses are usually is 18m wide. Culverts have dimensions of 1.5 m in diameter (tube). Pre-fabricated underpasses for cattle have dimensions of 2mx2.5 m and 2mx4m.

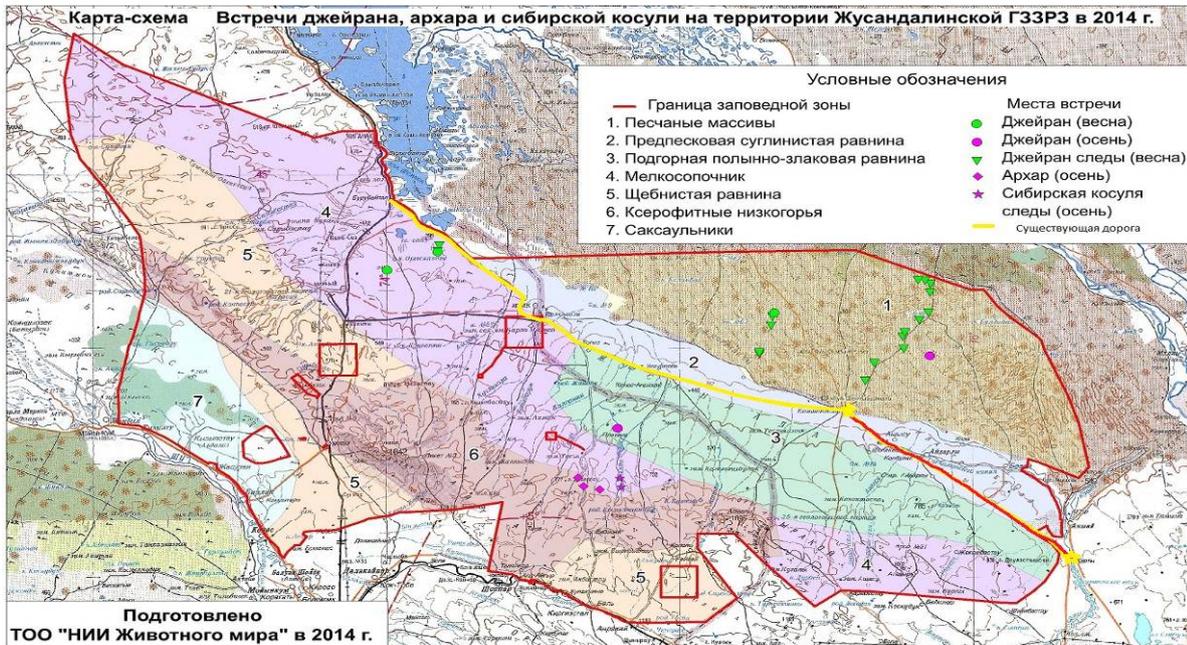


Figure 4.7. Schematic map of occurrence of goitered gazelle, wild sheep and roe deer

About 200 species of birds occur in Zhasandala (Berezovikov et al., 1999), including 83 breeding species, and more than 100 migrants. Breeding species represent the typical complex of the northern Eurasian desert with such species as *Chlamydotis* *ikipedi*, *Aquila* *ikipedi*, *Falco naumanni*, *Burchinus oedicephalus*, *Charadrius leschenaultii*, *Charadrius asiaticus*, *Syrhaptes paradoxus*, *Pterocles orientalis*, *Calandrella rufescens*, *Calandrella brachydactyla*, *Hippolais rama*, *Sylvia nana*, *Oenanthe deserti*, *Cercotrichas galactotes*, *Lanius pallidirostris* (*excubitor*), *Corvus ruficollis*, *Rhodospiza* *ikipedi* and *Emberiza bruniceps*. Areas of occurrence of birds are shown in figures 4.8., and 4.9.

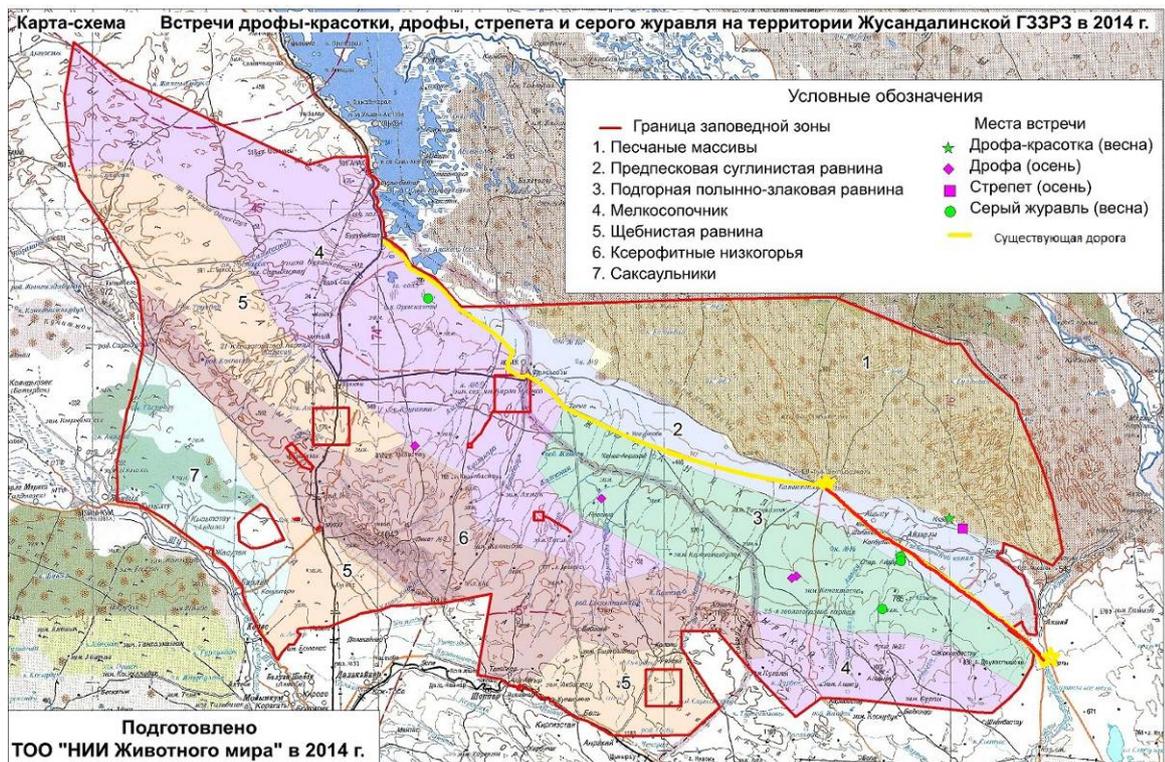


Figure 4.8. Schematic map of meeting houbara bustard, bustard, little bustard and grey crane

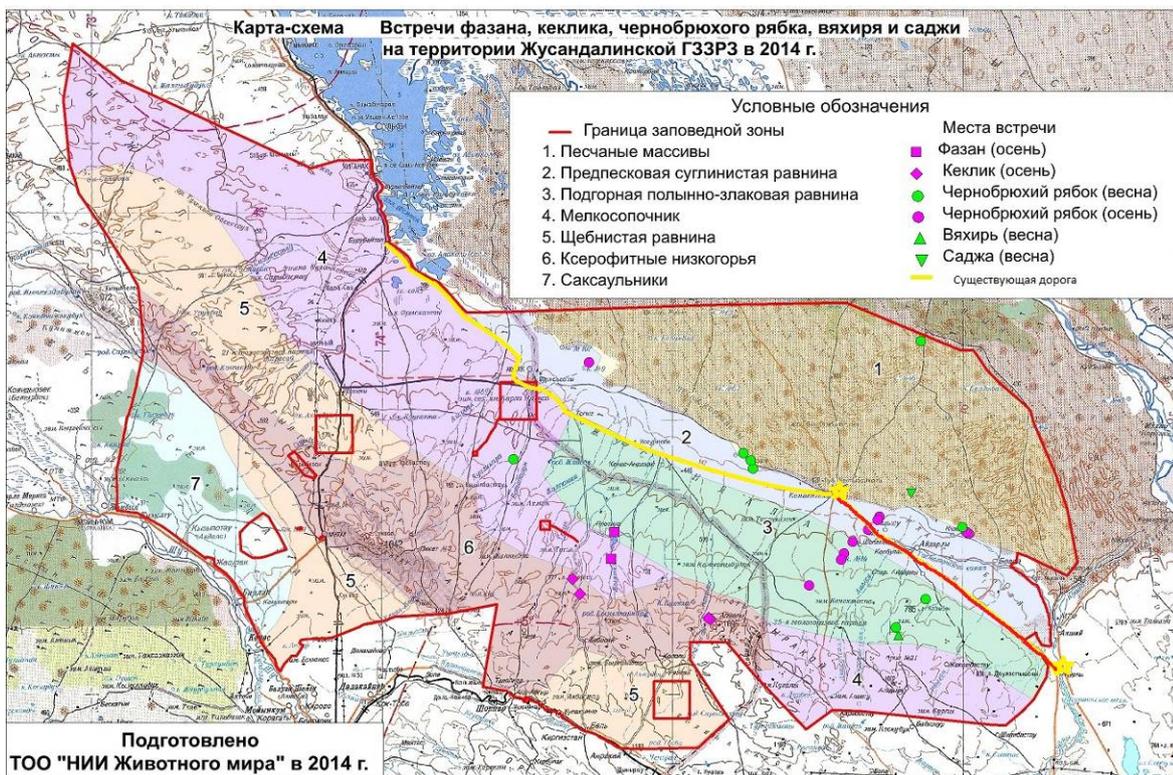


Figure 4.9. Schematic map of meeting pheasant, chukar, black-bellied sandgrouse, ringdove and Pallas's sandgrouse

Flora

The proposed route alignment is located in the desert-steppe zone of irrigated, dry farming and sheep and cattle breeding. Vegetation on the gray soils consists mainly of wormwood. A significant part of the vegetation is Ephemera: bulbous bluegrass, brome, small sedge, poppies.

The following species can be found in the larger area of Zhasandala.

The species of plants which are under the threat of disappearance:

- TuliparegeliiKrasn (Liliaceae).Status – rare, disappearing, endemic;
- Atraphaxisteretifolia (M.Pop.) Kom.(Polygonaceae).Статус – rare, endemic, relic;
- SilenebetpakdalensisBajt. (Caryophyllaceae). Status – rare, endemic;
- NiedzwedzkiasemiretschenskiaB.Fedtsch. (Bignoniaceae).Status – veryrare, narrow-endemic, реликвия, relic.

Rare plant species:

- Tulipaalbertii Regel (Liliaceae). Status – rare, endemic;
- StipakarataviensisRoshev (Poaceae). Status – rare species with decreasing range;
- Tulipagreigii Regel (Liliaceae). Status – rare, endemic with decreasing range;
- Tulipakolpakowskiana Regel (Liliaceae). Status – almostendemicspecies, with intensively reducing number;
- IridodictyumKolpakovskianum (Regel) Rodion.(Iridaceae).Status– species with reducing range and number;
- SilenemuslimiiPavl. (Caryophyllaceae).Status – rare, endemic species;
- Stubendorffiagracilis (Pavl). Botsch.etVved. (Brassicaceae).Status – relic, endemic species, found in limited places;
- AstragaluspseudocytisoidesM.Pop.(Fabaceae). Status – rare, narrow endemic;
- Ferula taucumicaBajt. (Apiaceae).Status – rare, narrow endemic;
- AcantholimontitoviiLincz. (Limoniaceae).Status – rare, endemic, for the last time with sharply reduced range;
- PedicularisczuiliensisSemiotr. (Scrophulariaceae).Status – rare, narrow endemic;
- Cancriniellakrascheninnikovii (N.Rubtz.) Tzvel.(Asteraceae).Status – Narrow endemic plant of monotypic type;
- JurinearobustaSchrenk (Asteraceae). Status – rare, relic, endemic species;
- ScorzonerachantavicaPavl. (Asteraceae).Status – rare, narrow endemic species with decreasing number.

Widespread species, but rarely appearing on the territory of SPNR:

- Celtiscaucasica wild. (Cetacean).Status – widespread species, but seldom meeting in the northeast of the area.

It should be noted, however, that the variety of species in the proximity to the existing and to-be-constructed alignment has been significantly affected by economic activity – primarily pasture husbandry and irrigated agriculture.

Flora and Fauna: Methodology for investigation of biodiversity issues on the alignment.

Based on the Consultant field work within the alignment and the knowledge and fieldwork of the Design Engineers there is no evidence to show that the alignment has any sensitive fauna or flora. During the public consultations held in August there was a discussion held in relation to potential problems with wild animals on the Section 1.

The Environmental team of PMC undertook a number of site visits to the alignment accompanied by the design engineers and other experts. They met with experts and others whilst on site, at consultation meetings, and at other meetings in Almaty. Telephone interviews were conducted with officials and other experts. The team also researched a number of Russian language and English language websites to determine and understand the Fauna resources and issues in the Kurty-Burylbaytal areas.

4.1.8 PHYSICAL CULTURAL RESOURCES

One of the issues that must be considered during the construction of the road is the preservation of physical cultural resources (PCR) such as historic and cultural monuments and including structures, memorials, cemeteries and burial sites, and other objects associated with historical events in the life of the community. This includes materials of historical, scientific, or/and cultural/artistic value (old buildings, graves, archaeological sites).

As per the conclusion of expertise of archeological research on section km 2295-2335 under reconstruction of the road of republican significance “Astana-Karaganda-Balkhash-Kapshagay-Almaty” №AEC-04 dated 20.05.2014, carried out by Archeological Expedition” LLP», economic development of the territory which is taken away under construction of the highway on the specified site is authorized at observance of the conditions provided by article 39 of the Law of the Republic of Kazakhstan “About protection and use of objects of historical and cultural heritage”. That is, after full archaeological studying of the monuments located in a zone of construction of the highway and their removal from the State account:

- At development of territories before acquisition of land plots research works on identification of objects of historical and cultural heritage have to be carried out.
- In case of detection of the objects having historical, scientific, art and other value, natural and legal entities are obliged to suspend further conducting works and to report about it to authorized body.
- It's forbidden to carry out works which can create threat to existence of objects of historical and cultural heritage.

On the basis of the provided Law, conducted researches in the Southern Kazakhstan area within a Right of Way of Section 1, making 100 m to the right and 100 m to the left from an axis of the existing highway (Further – “Right of Way”).

Expertize is carried out at the territory, which is 40,0 km long and 400 m wide (200 m to the left and 200 m to the right from axis of the existing highway (Further – “The territory of examination”).

The expertize included examination of 8 objects of historical and cultural heritage (Further – “Objects of HCH”), including:

- 2 Objects of HCH are archeology monuments (objects No. No. 6, 7);
- 6 modern funeral monuments (objects No. No. 1-5, 8). These monuments do not trigger the policy on Physical Cultural Resources.

Table 4.4. Monuments of Historical and Cultural Heritage revealed during archeological examination on the Section 1

№	Object of HCH	Geographical coordinates UTM	Location against road axis	Description of HCH object
	Starting point of Section 1	43 T539648.57 4908051.01	2295 km of the M36 road	
1	Modern Funeral Monument	43 T541045.38 4907831.30	On the right from M36	Established to Studenov Igor Petrovich 1961-1993
2	Modern Funeral Monument	43 T549519.06 4902718.59	On the left from M36	Established to Skladanyuk Galina Pavlovna 1960-1993
3	Modern Funeral Monument	43 T555413.91 489621.72	On the right from M36	Established to Dyorov Pavel Petrovich 1927-1981
4	Modern Funeral Monument	43 T556228.49 4896373.25	On the right from M36	Established to Dzhadrayeva Zarema Mukashevna 1983-2005
5	Modern Funeral Monument	43 T557413.71 4895837.37	On the left from M36	Established to the dog with sign “To Chip-unfailing dog»
6	Single burial mound	43 T562936.84 4892888.79	On the right from M36	Fill of the burial mound is flattened-semispherical shape. Round in the plan, made of soil and stone, weakly grassy. Diameter is 13m, height 0.3 m. On an outer edge at the bottom of an embankment the ditch 0,8 m wide, up to 0,2 m in depth is tracked.
7	Burial ground	43 T564370.19 4891853.56	On the right from M36	Consists of five barrows extended in the area of SW-NE. Embankments are put from the earth and a stone, with flattened-semispherical shape, roundish in the plan. With a diameter of embankments from 11 to 15 m, height is from 0,1 to 0,3 m.
8	Modern nameless grave	43 T564864.16 4891753.51	On the left from M36	Metal fencing of Muslim burial. Nameless
	Final point of the site	43 T572681.85 4886660.62	2335 km of M36	

For ensuring preservation of Objects revealed at the territory of examination it is recommended:

- Regarding Objects №№ 6 and 7: To establish protective fencing on perimeter of the specified objects taking into account a security zone of 50 m from its border for the entire period of construction of the highway.
- Concerning Object №1-5, 8 (modern funeral monuments): To coordinate potential relocation of the monuments with local authorities.
- At construction of the highway, according to the Law RK of 02.07.1992. “About protection and use of objects of historical and cultural heritage”, it is necessary to show vigilance and care, in case of chance finds (remains of ancient constructions, artifacts, bones and other signs of material culture) it is necessary to stop construction works and to report about finds in local executive bodies or in Archeological Expedition LLP.

Socio –Economic Characteristics of the Area

The road passes through a predominantly rural area with low population densities. The total number of population of 2 districts through which this road section lies is the following:

Table 4.3 Populations of District in Section 1

District	Population (2011)
Zhambyl district	126108
Ili district	154124

As, in the majority the route passes through the open space, level of population, living directly near the road, is very low.

Zhambyl district

Kastek (nowadays Zhambyl) district was established on September 3, 1928.

To the 75th anniversary of the great akyn Zhambyl Zhabayev on the basis of the Resolution of the Central executive committee of Kazakhstan of 19.05. 1938 the Kastek district was renamed into the Dzhambul district. On the basis of the Resolution of board of Presidium of the Supreme Council of the Republic of Kazakhstan of May 4, 1993 “About an ordering of an exact transcription of names of toponymics with the Kazakh language into Russian and renaming of certain administrative-territorial settlements of RK the Dzhambul district became the Zhambyl district.

On the basis of the Resolution of Dzhambul regional council of People’s Deputies No. 14-7 of February 15, 1992 in the territory of the district executive committees of regional and village councils of People’s Deputies were abolished.

On the basis of the decision of Zhambyl regional council of People’s Deputies No. 11-680 of November 29, 1993 activity of regional and 21 village councils was stopped ahead of schedule, and on the territory of former regional, rural Councils of People’s Deputies authorized representatives of the head of regional administration were entered.

Since January, 1994 the decision of regional council No. 1-6 of January 6, 1994 formed rural administrations.

Regional and rural administrations were abolished and by Akim of Zhambyl district decision No. 3-46 of March 5, 1996 Administration of regional Akim and administrations of rural and village districts.

The decree of the President of Kazakhstan “About changes in the administrative-territorial division of Almaty region” of May 23, 1997 abolished the Kurty district and Aydarly, Bozoy, Temirzholy, Sarytaukum rural districts and the Ulken settlement district were transferred to the Zhambyl district.

23 rural and 1 settlement are part of the district.

The Zhambyl district is located in southwest part of spurs of ZailyAla Tau, in the western part of Almaty oblast. The area of the territory is 19,3 thousand sq.km where are 61 settlements.

Population of the district as of January 1, 2013 is 136 800 people. The population is presented by more than 30 nationalities.

The regional center is the Uzynagashvillage , with the population of 38 589 people.

The Zhambyl district belongs to regions of an agrarian orientation. An important factor is the proximity of an arrangement of cultural and financial center of Kazakhstan – Almaty.

Minerals

In Kastek, Chinasylsay deposits there are available reserves of gold, silver, lead and zinc. In the Chilbastau deposit- gravel, cement raw materials are extracted. Near the Kargala village there is a large supply of gravel and sand mix.

Water Resources

The large rivers are– Uzynkargala, Kutyrghan, Zhirenaygyr, Karakastek, Kastek, Zhamanta. Ulken settlement is located on the bank of Balkhash Lake.

The Agriculture

For 2013 the volume of gross output of agriculture made 21 681,4 million KZT or increased to the level of 2002 for 4,7% (4627,9 million KZT.).

Under crops it is occupied 91,1 thousand hectares that is more than a level of 2010 on 3,4 thousand hectares.

The areas of cultivation of agricultural cultures with application of intensive technology are brought to 6,4 thousand hectares (2010 – 4,1 thousand hectares), the moisture preserving technology – to 6,5 thousand hectares (2010 – 4,6 thousand hectares), a drop irrigation – to 20 hectares (2010 – 15 hectares).

Grain crops are cultivated in all regions of the area and occupy 51,9% of all cultivated areas, crop volume exceeds 1200,0 million tons in recent years (2011 – 99,2 thousand tons).

Annually production of oil-bearing crops, vegetables, potatoes, fruits and berries, grapes increase.

In the area 1 elite and seed-growing and 2 farms on production of high-reproductive seeds of agricultural cultures function.

Within the district there are 293 hectares of gardens at the fructifying age. The laying of new gardens is made annually. In 2011 11 fruit crops are put.

For providing the population of the area and Almaty during the interseasonal period with fresh vegetables there realized measures for development of hothouse economy.

For today there working 71 greenhouses on cultivation of vegetable production with a total area of 4,58 hectares.

It is observed that steady increase in production of livestock production and number of farm animals in animal husbandry.

For today in the district,16 breeding subjects are acting. Specific weight of a breeding number of cattle in the general herd makes 13,05%, sheep – 10,5%, horses – 12,5%.

In 2013 the volume of gross output of agriculture made 21,6 billion KZT. Production of plant growing – 10 494,0 million KZT, production of animal husbandry – 11 127,4 million KZT.

The Industry

In 2013 an industrial output made 7 763,8 million KZT or the index of physical volume – 101,0% increased to the level of 2002 for 3,6% (2 133,9 million KZT).

The mining industry and development of pits occupies 13,4% in area total production, for the reporting period is made production for 1 046,3 million KZT, manufacturing industry – 76,9%, are let out production on 5 971,2mln. KZT.

The volume of power supply, supply of gas, steam and air conditioning made 7,9% of total amount of industrial production in the area (618,9 million KZT), water supply; sewer system, control over collecting and distribution of waste, respectively – 1,6% (127,4 million KZT).

Highways and Transport

Extent of public highways in the area makes 1318 km, of them 412 km of republican significance, 659 km of regional and 247 km of local significance.

On roads of regional and rural value of area there are 13 Bridges and 511 culverts available.

Among roads of regional significance 69 km (10%) have an asphalt concrete covering; a black rubble covering – 561 km (85%); a gravel and crushed-stone covering – 9 km (1%); without covering (soil) – 22 km (3%)

On roads of regional and district significance it is possible to note that only their insignificant part is in a good shape (86%). Other roads can be classified as the road to satisfactory-11% and an unsatisfactory state – 30%. The road of regional significance –45% have no hard coating. Traffic lights and a road marking equipped only in the regional center, regional roads and republican roads.

Roads of regional value and the street of settlements don't meet the requirements neither for traffic speed, nor for axial loadings and don't ensure traffic safety.

Annually in the area the current and average repairs of roads are carried out. In 2012 the current, average and capital repairs of roads of the area are made, in 2013 the current and average repair of streets of settlements of the Zhambyl district is planned.

In the area there is an automobile type of transport. Transportation of passengers and baggage is carried out by TRANSSERVICE LLP which has the equipped production base and auto station. 1 auto station works. In the area 20 long-distance routes are functioning.

In comparison with 2004 turnover of the motor transport increased by 92,1% and made in 2012 196037,0 thousand, t,km, the passenger turnover automobile for 95,2% and made 219173,4 thousand pass-km in 2009.

Through the Zhambyl district there passes the railway line of the general extent – 110 km.

Problems:

- high extent of aging of park of cars – operation over 12 years;
- lack of district wide routes;
- lack of parking for a taxi.

On reconstruction of highways on these projects, namely on a site of TOP Geodeziya LLP of km 2214-2295 (81 km) and Kazdorprojekt LLP of km 2295-2335 (40 km) in 2 km from the road the settlement of “Kanshengel” of the Zhambyl district of Almaty oblast.

The name of the settlement of “Kanshengel” came from the Kazakh word “KalynShengel” that means the “Dense thickets” of local bushes called “shengely”. On another of versions, in the ancient time here passed terrible, bloody wars and then all bushes became red from enemy blood (blood on Kazakh “Cahn”). At the beginning of the 18th century in 60 km there was a Great Anrakay Battle with Zunghars from here. Anyway, all locals and old residents agree in opinion that the earth is sacred here. In Soviet period the settlement was used as a transit point when shepherds (shepherds of sheep) overtook a flock (herd of sheep) from winter (kystau) in sand, in a summer pasture (zhaylau) in mountains and vice versa. Here was also flight strip for planes of easy aircraft which was liquidated before the collapse of the Soviet Union. In the settlement there was a bulky communication station which provided with communication even with the Moscow, unfortunately now it also doesn't exist. Now it is the compact settlement — a mix of the Kazakh nomadic culture and modern technologies.

Kopa — the village in the Zhambyl district of Almaty oblast. Is a part of the Samsin rural district. It is located approximately in 53 km to the northwest from the Uzynagash village.

In 1999 the population of the village of the Kopa made 531 persons (260 men and 271 women). According to census 2009, in the village of Topar lived 570 people (299 men and 271 women).

Topar — the village in the Balkhash district of Almaty oblast. Administrative center and only settlement of the Topar rural district.

In 1999 the population of the village of Topar made 1327 people (696 men and 631 women). According to census of 2009, 1305 people (680 men and 625 women) lived in the village .

Ashchisu (kaz.Ashchysu) — the village in the Zhambyl district of Almaty Oblast. Administrative center and only settlement of the Sarytaukum rural district.

In 1999 the population of the village made 621 persons (327 men and 294 women). According to census of 2009, 340 people (173 men and 167 women) lived in the village.

Aydarly — the village in the Zhambyl district of Almaty oblast. Administrative center and only settlement of the Aydarlinsky rural district.

In 1999 the population of the village made 1246 people (659 men and 587 women). According to census of 2009, in the village lived 1251 persons (623 men and 628 women).

In all the above villages, inhabitants are engaged in introduction of animal husbandry, in particular cultivation of camels, KRS, horses and a small cattle.

The land plots are used for a cattle pasture, and on sites where there is a fertile soil, melon cultures are grown up.

The Ili district is located in the central part of Almaty oblast and borders in the northeast with Balkhash area, in the West with Karasay and Zhambyl districts, in the southeast — with city lands of Almaty, in the east with Talgar district.

About 80% of the territory is located in desert and desert and steppe zones: sand Sartaukum and Plato Karaoy. The plateau is used by Karaoy for dry-farming agriculture. Sand Sartaukum — is winter, spring and autumn pastures. The relief is characterized by existence the ridgy and ridgy-hilly sandy formations.

Climate of the area is sharply continental. Average temperature in January $-7-9$ °C, July is 22-25 °C. [4] The annual quantity of an atmospheric precipitation makes 200-3500 mm.

The rivers Ili, Kaskelen flow Across the territory of the district and there laid the Big Almaty channel, Kapchagay reservoir adjoins to the territory in the north.

Soil are –light brown, gray soils.

There grows sheep fescue, wormwood, cheegrass, tereskep, alkali grass, sedge, oleaster. Reed, saxaul. There live wolf, fox, corsac, hare, a boar.

On July 17, 1928 the Ili district was renamed into the Kargaly district with the center in the village Bezvodnoye. In 1970 in the territory of the district regional newspapers “IlyichZholy”, “Way of Ilyich” started being published. Kazakhs make 54,6%, Russian – 30,1%, Uygurs – 1,7%. The area – 7 800 sq.km.

Economy.

Across the territory of the area there passes the railroad Almaty — Semipalatinsk, the highway Alma-Ata — Kapshagay.

As of 1987 the area of agricultural grounds made 435.5 thousand hectares, including: pastures of 435,5 thousand hectares, the arable land of 136,7 thousand hectares (irrigated 14,5 thousand hectares), haymakings of 2,2 thousand hectares, the woods of 11,9 thousand hectares. The cultivated area in 1987 made under grain crops 84,6 thousand hectares, technical (generally sugar beet) 3,4 thousand hectares, melon 1 thousand hectares, grapes of 600 hectares, fruit and berry 300 hectares.

The cattle livestock in 1985 made: cattle of 32 thousand heads, sheep and goats of 196,1 thousand, pigs of 68 thousand, horses of 3,2 thousand, poultry 1,6 million.

Enterprises.

The Almaty sugar plant is included into Almatykant corporation now, Repair base served sugar plant earlier, now it exists at the expense of private orders, the brick-works don't function now, on a pit place where earlier clay was extracted the warehouse of oil products is constructed, instead of the former plant “Kazmramor” where till 1991 about 1000 people worked there is a “AssylTas and Co” with number of workers of 30-40 people, plant of Frutay drinks, the Universal base TUMA “Almatyaulkurylysa” on the basis of poultry farm Bent, 2 bakeries and many others. On east suburb of the settlement the airport of Boralday is located.

Akshy — the village in the Ili district of Almaty oblast Administrative center of the Kurty rural district is on the right river bank of Kurtyriver, approximately in 82 km to the southeast from the settlement of Otegen-Batyr, an administrative center of the distict, at the height of 507 meters above sea level.

In 1999 the population of the village made 4662 persons (2300 men and 2362 women). According to census of 2009, 5646 people lived in the village (2800 men and 2846 women).

Site visit: Environmental specialist team of **PMC**, who are in charge of preparation of the preliminary EIA report visited the road alignment “Kurdy-Burylbaytal”:

- July 10th: visited site with Engineers-Designers and representatives of Regional Department Committee for Road, and also with representative of World Bank – Social specialist. It was the first site visit, in purpose of review of general direction of road alignment and obvious effect of the Project.
- August 7th: visited site with Design-Engineers in order to identify locations of residential buildings, commercial buildings and agricultural lands along the alignment and need in additional cattle crossings.

Discussion with the following people on fauna and potential problems caused by road construction were held:

- DzhybaniyazocZhanibek, RSCE “PO” OKHOTZOO PROM”, Zhusandaly state preserved zone of the republican significance. Deputy Director (telephone conversations, letters on these population of animals and plants).
- SultanbekKarimov, Kazdorproject LLP, General director, Chief Engineer of the Project on Section 1 (support during site visits and public consultations, phone conversations)
- Yashchenko S.U, Doris LLP, Chief Engineer of the Project on Section 2 (support during site visits and public consultations).

Websites reviewed and referred to:

1. ru.wikipedia.org
2. redbookkz.info
3. caspionet.kz
4. greensalvation.org
5. unesco.org/en/tentativelists
6. birdlife.org/datazone/sitefactsheet.
7. egov.kz/wps/portal/
8. en.wikipedia.org/wiki/Endangered_species
9. iucnredlist.org
10. wwf.panda.org

Additionally a number of travel and tourism in Almaty oblast websites provided useful indications of wildlife and livelihood of viewing these animals.

Conclusion: The PMC Environmental team obtained data from a range of sources and people who are familiar with the area and the alignment. Since the alignment passes through a corridor already impacted by development and the new road alignment will incrementally add to this anthropogenic impact, but not create substantial new impacts.

4.2 ENVIRONMENTAL IMPACT ASSESSMENT: SECTION 1

4.2.1 INTRODUCTION

During the construction of roads the main types of environmental impacts normally are:

- Air pollution caused by exhaust gases of various construction vehicles and various moving and stationary equipment;
- Noise caused by machines and equipment and various other construction activities;
- Contamination by dust from wear of road surface, from construction materials and from the transportation of construction materials.;
- Possible contamination of agricultural food production activities during the extraction of road building materials, dredging, and new construction activities;
- Potential contamination of top soil, surface water sources, ground water resources, and vegetation adjacent to the road;
- Disturbance to nesting birds and the habitats of animals;

During operation phase impacts such as air, noise, etc. are dependent on the distance from the carriageway:

- Air pollution and noise from all vehicles passing along the new route;
- Contamination by dust from wear of road surface and erosion of adjacent soil Pollution of road by dumping of industrial and household waste;
- Road kills of animals and birds;
- Interruption of random movement routes;
- Potential pollution of surface runoff from the roadway;
- Potential pollution of groundwater from run off and other contamination;

Zones of Impact

The following corridors adjacent to the carriageway have been defined:

- **Zone of Impact:** A corridor of up to 3,000 meters where some impacts from the road may occur or be measurable (e.g. noise, dust, air pollution);
- **Protection zone:** A strip adjacent to the right of way where impacts are expected to occur with higher intensity or magnitude. In some cases the impact may be significant; noise and air quality, drainage impacts, soil contamination etc.
- **Reserve zone:** A strip within the right of way that is required for emergencies, potential long term use for the road, for road services and cuttings, and embankments. Significant impacts will occur and changes to the local environment will already have been carried out during the construction of the road.

Approximate dimensions of the zone of impact, protection strip, and reserve strip are shown in Table 4.4

Table 4.4- Estimated size of the zone of impact, the protection strip and reserve strip

Impacted zones	Distance from road, m, For environmental class of road		
	I	II	III
Zone of Impact	3000/1500	2000/1000	600
Protection strip	250/150	150/90	60/30
Reserve strip	30	12	-

4.2.2 AIR IMPACT

Construction and Operation Period

The proposed construction and operation of the road will be accompanied by emissions of pollutants during the construction period (emissions from construction activities and operation of motor vehicles and machinery), and emissions from vehicles traveling on highways during the operation period. Table 4.5 lists the typical emission sources during the construction and operation of a major highway.

Table 4.5– Emission source characteristics

Works type	Name and characteristics of emission sources	Name of potential air emissions
1	2	3
Construction	Dust generation during works	Inorganic dust
	Exhaust gases from internal combustion engines	Nitrogen dioxide, soot, carbon monoxide, benz(a)pyrene, carbohydrates
	Welding	Iron oxide, manganese and its compounds, hydrogen fluoride
	Paint works	White spirit, xylol
Operation	Exhaust gases from internal combustion engines	Nitrogen dioxide, soot, sulfur dioxide, Carbon monoxide, carbohydrates C12-C19, lead compounds

The composition of engine emissions comprise: carbon monoxide, hydrocarbons, nitrogen dioxide, lead, sulfur dioxide and particulate matter (soot).

The assessment of the level of air pollution caused by exhaust gases is based on a computer program. The predicted amount of pollutants emitted into the atmosphere during the construction and operation of the facility is presented in Table 4.6. The values of maximum permissible concentration (MPC) of pollutants is obtained from the sanitary-epidemiological regulations and guidelines “Sanitary-epidemiological requirements to the atmospheric air.” № 629 of the Republic of Kazakhstan of 18 August 2004. The data listed in the table are obtained by summing the emissions for each component calculated in Appendix 1.1 using the methods agreed upon by the Ministry of Environment of the Republic of Kazakhstan. Assessing the impact on the air during the operation period is based on traffic forecasts up to 2028 prepared for the Feasibility Study.

The calculated value of acceptable concentration of harmful substances contained in exhaust gases from the various types of cars in mixed-flow traffic is shown. The impact on the atmosphere is considered acceptable if the content of harmful substances in atmospheric air of populated areas does not exceed the maximum permissible concentration laid down in SanPiN “Sanitary-epidemiological requirements to the atmospheric air” dated August 18, 2004 N 629.

Table 4.6– Section 1: Calculated air emission pollutants(maximum permissible concentrations: MPC)

Pollutant code	Name of pollutant	MPC m.s.mg/m ³	MPC a.d.mg/m ³	TSEL mg/m ³	Hazard class	Predicted Emissions, Tons
1	2	3	4	5	6	7
Air emissions during construction						
0123	Iron oxide		0,04		3	0,0849
0143	Manganese oxide	0,01	0,001		2	0,0094
0301	Nitrogen dioxide	0,085	0,04		2	80,2623
0328	Soot	0,15	0,05		2	14,2779
0330	Sulfur dioxide	0,5	0,05		3	16,5329
0337	Carbon monoxide	5,0	3,0		4	595,0564
0342	Fluorides	0,020	0,005		2	0,0034
0703	Benz(a)pyrene		1*10 ⁻⁵		1	0,0002
0616	Xylol	0,2			3	0,1845
2752	White spirit			1,0		0,1845
2754	Carbohydrates	1			4	84,5841
1310	Aldehydes	0,015	0,075		3	6,2764
2907	Inorganic dust (SiO ₂ more than 70%)	0,150	0,05		3	1827,7552
2908	Inorganic dust (SiO ₂ 70-20%)	0,300	0,100		3	1115,6786
	Total:					3740,8907
Air emissions during operation						
0328	Solid particles (soot)	0,15	0,05		2	56
0337	Carbon monoxide	5	3		4	193974
0301	Nitrogen dioxide	0,085	0,04		2	3586
0330	Sulfur dioxide	0,5	0,05		3	266
2754	Carbohydrates			50		1109
0184	Lead and its inorganic compounds	0,001	0,0003	0,005	1	487
	Total:					199478

Assessing the level of impact on adjacent residential areas and sensitive uses is based on modeling of emissions in the atmosphere, according to “Methods of calculating concentrations of air pollutants contained in the emissions of businesses. RND 211.2.01.01-97” In calculating the dispersal of emissions from vehicles and to determine the concentration of toxic substances at a distance of 20 meters from the road the model used a Gaussian model distribution of pollutants in the atmosphere at low altitudes. The results of calculations of air pollution are presented in 1.2.

Calculations have been made for a single concentration (MPC) in accordance with SanPiN “Requirements for atmospheric air of populated areas» № 3076 from 841 from 18.09.2004g

3.12.2004g. Approved by the Ministry of Health of the Republic of Kazakhstan. Calculations have been prepared and are shown in Table 4.7.

Table 4.7– Motor vehicle emissions dispersion calculation

Emission type	Calculated at 20 meters from road, mg/m ³	MPC m.s.,mg/m ³	Average daily MPC, mg/m ³	Hazard class
1	2	3	3	4
Carbon monoxide	0,056	5,0	3,0	4
Hydrocarbons	0,011	1,0	1,5	3
Nitrogen oxide	0,0056	0,085	0,04	2
Lead compounds	0,000032	0,0010	0,0003	1

Conclusion Construction and Operation Periods

Construction: The detailed calculations for construction and operation periods yield results that are within the limit values prescribed by Kazakh legislation. Also, since the alignment passes through predominantly open rural land with only a few sensitive zones km 43, 220, 307 and 349 there. Dwelling are located close to the existing road, which will be used to construct new road. It will be essential to ensure no depots or worksites are located in these areas. Regular monitoring of air pollution against Kazakh standards (and international, e.g WHO, for any parameters not covered by local regulations) shall be carried out throughout the construction period. The Party responsible for monitoring will be the Contractor, who will be obliged to report to the Engineer as well as local environmental authorities.

Operation: The results show that the magnitude of the impact of transport on the air quality does not exceed the maximum allowable concentrations to a distance of 20 m from the nearest traffic lane. During the operation phase concentrations of toxic substances contained in exhaust gases within the areas adjacent to the road are within the allowable MAC, and do not adversely impact on the environment or sensitive uses.

4.2.3 NOISE AND VIBRATION IMPACT

Construction Period

The various mechanical processes during the construction of roads are a source of intense noise, which can adversely affect humans. The intensity of the ambient noise of road machinery depends on the type of machinery and equipment and the distance from the workplace to sensitive and residential development. Especially problematic is the noise created by the work of bulldozers, vibrators, compressors, excavators, and Diesel Trucks. The noise produced during construction is temporary and localized but can still create an annoying impact.

According to GOST 12.1.003-83 Section “Noise” standards for noise level have been adopted of 70-80 dBA. Zones with noise level above 80 dBA must be marked with safety signs. To ensure acceptable noise levels construction activities should not take place at night. Sound proofing of the engines of construction road vehicles should be carried out with multilayer insulating coatings of rubber, foam rubber, etc. This action can reduce the noise by up to 5 dBA.

Conclusion: Construction Period

In view of the generally isolated characteristics of the area through which the road passes it is concluded that there will be only limited construction noise impact on any housing or sensitive uses, these are houses at km 43, km220, km 307 and km 349. These are existing housing adjacent to existing alignment which will be used for the new construction. From experience and engineering

judgment it is still predicted that noise levels will remain below the levels recommended in the regulations referred to above. There will be an increase in construction traffic using the existing main road and the minor roads leading to the road alignment.

Possible existing borrow pit locations have already been indicated by the Design Engineers for Section 1. All are located north of the alignment, typically at a distance of less than 5 km. The sites are approved locations and the selected Contractor will – in consultation with Engineer and local environmental authorities – propose at which locations are most suitable to start exploitation activities. Nevertheless whichever sites are used existing local roads will be used as access to the road construction site. On the main road it is unlikely that the construction traffic will have a significant impact on traffic flows and noise disturbance to the existing communities but this will need to be reviewed and monitored in detail prior to the commencement of the construction period. For the minor roads that cross the new alignment and for any access routes, construction traffic will significantly increase traffic flows and potential noise disturbance. A traffic count on all possible access roads to road construction site together with a regular monitoring program will be prepared prior to the commencement of the construction period as part of the environmental due diligence and management measures.

Operation Period

Operation noise levels are influenced by traffic volume, fleet composition, speed, vehicle operating condition, age of vehicle, and condition of the road. Sources of noise on the car are the engine and the tire noise hitting the road surface. The noisiest are heavy trucks and trailers with diesel engines; the most “quiet” are new and more expensive cars.

Maximum allowable noise levels (PDU) of noise – this is the factor level which is in daily work (during the working experience) should not cause annoyance, distress or cause or worsen health of the present or future generations.

These calculations of noise during operating period are shown in Appendix 1.2.

Calculated MPL are adopted in accordance with the “Standard Specifications of noise levels in residential and public buildings and housing areas» № 841 dated from December 3, 2004, by the Ministry of Public Health of the Republic of Kazakhstan.

Permissible maximum levels of noise, caused by vehicles, are adopted in accordance with the above standards, it is 70dBA. Analysis of the results obtained from noise level calculations shows that the distance from the road for the 70dBA standard is approximately 20 meters without installation of any noise barriers, and 10 meters with the installation of appropriately designed barriers.

Conclusion for the Operation Period

As referred to above at only two locations does the alignment pass close to sensitive uses, i.e. housing at km 43, km 220, km 307 and km 349. These are existing housing adjacent to existing alignments which will be used for the new alignment. From experience and engineering judgment it is still predicted that noise levels will remain below the levels recommended in the regulations referred to above. .

In conclusion during the operation period the predicted noise impact to any residential or sensitive uses will be minimal, and where required further reduced by appropriate engineering measures, such as sound barriers, plantations and landscaping elements. This approach has successfully been implemented in the World Bank financed “South West Roads Project” which has similar objectives, approach, dimensions and issues. During operation regular monitoring of the noise situation and characteristics along the alignment and the access roads will be necessary. Any additional mitigation measures will be included in the repair and maintenance budget on a running basis and carried out within those activities.

4.2.4 HYDROLOGICAL IMPACT

This Section covers 1) the availability of water for the construction and operation of the road and 2) the potential impacts including contamination impacts that the road will have on water resources in the area: surface and groundwater.

Water Needs for Construction Period

The planned construction work on the site of the proposed road will require water for construction activities and for drinking and domestic needs of the construction workers.

Consumption of water for construction for compaction of sub grade and washing of road-building materials is estimated to be 160 131 m³. The required amount of water is based on “Estimated ratios and costs for construction work.”

The water consumption for the period of construction of the road is based on number of employees and extent of construction period. Since construction period is 38 months, and number of employees -198 persons during the max shift, and 60 of them are engineering-technical workers (ETW), so having accepted consumption 28 l/day per person and 12 l/day for ETW.

Construction period=798 days

Water consumption for drinking water supply is calculated in accordance with the legislation of the Republic of Kazakhstan. The water consumption for the period of construction of the road is based on an average of 28l/day per person according to SNIP 2.04. 01-85. Consumption of water for domestic needs (washing, cooking etc), based on the number of employees – 198 people and the projected construction period (798 days) are shown in Table 4.8.

Table 4.8 – Water needs for drinking and household use and generation of wastewaters during construction period

No.	Water Users (section)	Unit of measurement	Quantity	Water consumption per unit of measurement m ³ day			Annual water consumption, m ³		Notes
				Construction Period days	Fresh from source		Fresh from source		
					Total	Per day	Total	Per year	
1	workers	Persons	138	798	3.4500	3.4500	2753.10	2753.10	SniP 2.04.01-85 r.3 c.12 504 w.d
2	ETW	persons	60	798	1.5000	1.5000	1197.00	1197.00	SniP 2.04.01-85 r.3 c.12 504 w.d
Total							3950.10	3950.10	

Water Resources Conclusion Construction Period

In the course of construction, water is used for economic domestic needs, production needs (preparations of mixes, feed system of wheels wash. Safety and qualities of water will be provided according to “The instruction about quality and safety of food products”, the Republic of Kazakhstan approved by the Government resolution of November 29, 2000 №1783.

It is planned to receive technical water supply from Kurty river (intensity of flow is 190 080 000 l/day) and partially from the artesian well located in Kanshengel village. The well is self-streaming, its output 43200 l/day. For obtaining the necessary volume, it is necessary to put a ditch/tank (capacity) for water intake and supply (now water spreads, and wasted). Water has mineralization of 3125,3mg/dm³, but can be used for specific purposes. At km 2325+750(306+00) to the left 30m, below a pipe (an indistinct spring at depth of 1,5-2,0m) ground water plays out. This source can be used for water supply if size of a ditch is increased.

Drinking water supply – a well on 8th km and the road Kanshengel – Topar 500 m to the right, its output is 8640 l/day. The well at km 2325+750 (pk306+00) to the left 200m, an output 43200 l/day, quality of water conforms to requirements of GOST 2761.

According to information received during EIA/OVOS preparation the area has abundant reserves of ground water. Surface water (i.e. Kurty river) has the capacity to supply water for technological purposes during construction. Based on the preliminary estimates of water requirements during the construction period it is assumed that adequate volumes of water for all construction activities are available and sources of water will not be affected.

Water Needs for Operation Period

A continuous supply of water will be required for routine cleaning and maintenance requirements and for cleaning after accidents. Water will also be required for the various uses within the rest/service areas.

Water Resources Conclusion Operation Period

Based on the potential water requirements during the operation period and the known reserves of surface and groundwater there is adequate water for all operation activities and available water sources will not be affected. It is assumed that same sources of water (i.e. Kurty river with flow intensity of 190 080 000 l/day, and artesian well at Kanshengel village with output of 43 200 l/day) will be used during operation period.

Pollution of Water Bodies during Construction of Bridges

There are two seasonal rivers - Ashysu and Otegen at the Section 1 and one – Kurty at Section 2. The are potential environmental risks associated with construction of bridges, unless mitigation measures are not implemented. For Ashysu and Otegen the contractors are required to undertake earthworks and basic bridge structures during dry season in order to avoid water erosion and effects of turbidity downstream and implement mitigation measures prescribed in the site-specific EMPs. For Kurty - mitigation measures to protect the river will include, careful organization of works in water protection zone, prevention of accidental spills, construction of sedimentation traps/barriers to prevent storm runoff, and other mitigation measures prescribed by the design and site-specific EMP.

Contamination of Groundwater Resources Conclusion: Construction and Operation Period

Based on the groundwater levels within Section 1 and the design characteristics of Section 1 it is concluded that pollution of groundwater resources during the construction period will not occur. There will be no substantive subsoil works such as major cuts or deep borrow pits. Spill prevention measures will be put in place by the contractors.

During the operation period pollution of groundwater will not occur provided that the provisions of good practice are reflected by the design and properly implemented. Examples of key design features to be implemented for groundwater protection can be effective drainage systems that channels storm water quickly towards the surface drainage network and avoid stagnant ponds that may infiltrate. Also, the concentrations expected during runoff will be relatively small.

Contamination of surface water during operation period

The road drainage system, designed as part of the project consists of several drainage and structural measures designed to prevent water logging and flooding of the roadbed and to intercept and divert water flowing to

the sub grade. For surface water diversion the project design provides for side drainage ditches, pipes for the passage of watercourses and water under the roadbed to prevent any possibility of stagnation, which can lead to water logging of the land adjacent to the road.

Culverts are arranged at the intersections of roads with streams, and areas mud flow-prone areas. Pipe and box culverts have been included in the design. A description of the designed structures for watercourses, channels and ditches, culverts and sewers are shown in Appendix 1.4.

Although the design of the drainage system has been carried out in accordance with best engineering design practice in exceptional circumstances some local drainage problems and deficiencies may become apparent during or on completion of construction. Any deficiencies should be overcome at the earliest opportunity and monitoring of the drainage will be a long term operational activity.

Road surface run-off pollutant emissions

To assess pollution runoff from roads and identify the need to mitigate any pollution it is necessary to calculate the maximum permissible discharge of substances into water bodies. Under the maximum permissible discharge (MPD) of substances in the water body defines the mass of matter in the wastewater, the maximum allowable abstraction from source the established regime in the provision of water volume per unit time in order to ensure water quality control point.

Maximum permissible discharge (MPD) from bridges, located at the sections of the designed road, through rivers, which have permanent runoff have been calculated for this project. The calculation of the MPD is in compliance with "Recommendations on accounting requirements for the protection of the environment when designing roads and bridges ."Moscow, 1995.

Contamination of Surface Water Conclusion: Operation Period

The investigation outlined above indicates that the calculated discharge of pollutants are all within the regulated maximum permissible discharge rates and that provided all regulations and legal procedures are carried out there will be no impact on water resources from pollution during the operation period.

Borrow pits

Possible borrow pits have been defined by the design engineers but these are not part of the approved design since the contractor will make the final decision on the selection of borrow pits. (Paragraph 2.6) The existing borrow pits have received EIA approval from the Rayon and it thus may be assumed that they will not be interfering with sensitive aquifers that have any significance as drinking water resource. Moreover, aside from accidental spills (by themselves unlikely) the operation of borrow pits has little contamination potential. The main risk is the failure to properly close and re-cultivate the pits, which may lead to their conversion into illegal waste dump sites, which would have a substantial contamination potential. An important part of closure will thus be to dismantle and / or block all access roads.

The environmental impacts from river bed extraction are likely to be acceptably low where such operations are carried out under valid licensing and supervision by the authorities. Generally the high dynamics of the rivers in the project area, especially the very high sediment loads due to the proximity of the mountains, and the floods in spring that carry these loads down the river beds, speak for a low environmental sensitivity of these rivers towards gravel extraction. This potential source of construction materials, especially aggregates, thus need not a priori be excluded due to environmental considerations.

Construction camps

Construction camps will generate sanitary waste from workers and staff who work and will live close to the alignment. In view of the scale of the construction activity the number of workers at any one time will be

many hundreds and possibly more. For Section 1 it is estimated that there will be 300 workers employed on the site. At this stage it has not been possible to define the locations of the construction camps. Since this is an agricultural area it will be necessary to ensure that no contamination of the soil, groundwater, and existing agricultural produce takes place. It will therefore be essential to ensure appropriate offsite disposal facilities are incorporated into the design of the construction camps.

Hydrology Conclusion

Overall the impact on groundwater and surface water is expected to be low. No cuttings occur on Section 1 that might affect the groundwater regime and change the water table. Rivers (there are two seasonal rivers along the alignment) will be crossed by the bridges, and embankments will have sufficient culverts to prevent damming of surface runoff and subsequent water logging.

4.2.5 SOIL AND LAND IMPACT

Soil Damage

The site clearance, the cut and fill activities, and the construction of the sub grade usually causes the most damage to the soil and the sub soil environment. A significant volume of topsoil will be required to be removed for the alignment itself and for diversion roads, borrow pits, construction camps and other construction activities. In these areas there will be potential for contamination, disturbance and damage to the soil cover. In particular soil can become compacted and damaged along temporary access routes and in construction work areas. Disturbance and damage is inevitable and this will be more critical in the areas defined as Group 2 soils but this can be minimized with appropriate construction technology.

Soil Contamination

Of equal importance is the potential for pollution and contamination of the soil and sub soil on the alignment itself and sites immediately adjacent. This pollution can have an impact on the surface and groundwater resources in the area and on the agricultural activities in the areas adjacent to the alignment. Some contamination can occur during normal construction activities, but the most serious contamination can occur from accidental fuel spills and storage of materials for long periods of time without any precautions.

During the construction phase the most important potential for contamination will be on the sub soil. This is the subsurface crust, below the soil layer. This will be exposed during the construction of the road sub grade and materials used in the construction of the sub grade could cause contamination. Provided common natural resources (sand and gravel, sand, soil, rubble) are used from local quarries for the construction, contamination is unlikely to occur to the road sub base.

Contamination may also occur during the operation period. The main criterion for evaluating the risk of soil contamination by chemicals is maximum permissible concentration(MPC) - the maximum amount of substance in mg / kg oven-dry soil, which guarantees the absence of a negative direct impact on human health. Lead is considered the most frequent and toxic transport pollutant due to its continued presence in fuels in Kazakhstan and is used as an indicator of contamination..maximum permissible concentration of lead in soil (MPC) in the Republic of Kazakhstan is calculated according to the "standards of maximum permissible concentrations of harmful substances, harmful microorganisms and other biological contaminants soil", approved by joint order of the Minister of Health from 30.01.2004 № 99 and the Minister Environmental Protection from 27.01.2004 № 21-p, and is set at 32 mg / kg.

According to the calculations lead levels at a distance of 20 meters from the roadway from 14 to 47 mg / kg. MP:C of lead in soil is 32 mg / kg. Consequently, at a distance of 20 meters measured lead in soil in some areas is slightly higher than the MPC. Where there is debris, broken pavements and tires, broken engine exhaust of cars, leaking fuel and lubricants, or negligent acts of drivers and maintenance personnel, and other poor management and maintenance additional pollution and lead levels may occur.

De-icing materials, especially salts, are also toxic. Because of the limit of permissible concentration of CL (chlorides) when exposed to anti-icing agents on the ground in the roadside of the zone approved level - 0.04%. With a significant accumulation, they can change the biological composition of roadside soils.

Soil Erosion

Although the general area through which the alignment passes is surrounded by mountain areas particularly to the north and south the selected road alignment passes through a generally flat or undulating terrain. Based on a review of the design by PMC, it is noted that Section 1 lies between 560 and 625 meters elevation, there are no cuttings and gradients are very low. The average embankment height is 2-3 meters above existing ground level. With these characteristics, even in extreme dry or extreme wet conditions, erosion or landslides will not take place.

Soil Impact Conclusions: Construction and Operation Periods

Based on the investigations and the characteristics of the area provided appropriate construction techniques and management are followed there will be no adverse impact on soils and sub soils during the construction and operation periods. Soil contamination, erosion and landslides will not occur. Similarly during the operation period contamination of the soil and sub soil will not have a significant impact.

4.2.6 FLORA AND FAUNA IMPACT

The environmental objective of the construction and operation of this road should be to protect the natural ecological system including vegetation, wildlife, and natural landscapes. Additional special protection is necessary where rare or endangered plant and animal species may be present.

Road construction and operation may have impact on flora and fauna either 1) during construction through loss of habitat and destruction, or 2) during the operation through the impact of various pollutants on the flora or fauna. Road traffic emissions can cause the destruction of the pigments, the suppression of the synthesis of proteins, enzymes and other functions of plants. The road can also cause impact on individual animals that pass along or live close to the road alignment and fragment some animal populations into unsustainable small groups.

For flora pollution can lead to disruption of growth and development, and can accelerate the aging process, especially in perennial plants. In designing interventions to reduce harmful impacts on the flora it should be noted that broad leafed plants survive better than conifers in tolerating air pollution, because the processes of transpiration occurs quicker. Pollution of the ground and vegetation from traffic emissions occurs gradually and is directly dependent on the distance from the carriageway of the road. Some plants are more sensitive to pollution from exhaust gases of vehicles than that of humans and of many animals. Of the inorganic pollutants that have a significant impact on plants, de-icing chemicals, mainly salt are the most relevant and significant. Salts have a negative effect on the surrounding area to the road, including VECs such as soils, plants, insects, animals and birds. Additionally, under the influence of these salts, the structure and physico-chemical properties of soils deteriorate which will have an adverse impact on all plants.

Adverse effects of salts on plants result from direct contact with the pollutants, and from absorption through the root system. Direct contact with the salts leads to the destruction of plant tissues, especially the leaves. Sodium ions, concentrated in the soil, inhibit the absorption of nutrients by the root system so slowing growth and accelerating death of the plants.

During the operation stage as a result of roadside pollution by heavy metals, salts, oils and other harmful substances, animals and birds may be poisoned though direct contact or through eating

vegetation in the vicinity of the road. However the new planting and landscaping may minimize pollution impacts in the immediate vicinity of the road.

Additionally larger and slower moving mammals crossing the road may be killed. Hedgehogs are frequently affected, but also foxes and mice, rats etc can be regularly killed. Though these individual events are unfortunate the total number of animals killed in this way is not high.

Flora and Fauna Impact Conclusion: Construction and Operation Periods

In conclusion, the natural flora and agricultural fields close to the road may be potentially adversely impacted by the construction and operation activities, however, these impacts are unlikely to be significant.

According to the preliminary calculations made by the designer a insignificant number of trees will be cut within the ROW. The compensation measures, i.e. the replanting of at least an equal amount of trees, plus a contingency for falling out seedlings, are based on these quantities. All replanting will be carried out by a separate contract and will not be part of the road construction contract.

Based on the above review, site examinations, and discussions there is no evidence to indicate that the Section 1 alignment, which is predominantly agricultural, would have a significant impact on the fauna in the area or would impact on any rare, endangered or vulnerable animals.

4.2.7 SOCIAL AND ECONOMIC IMPACT

During construction and operation noise, air pollution and water pollution may affect the nearby residents and in extreme conditions could impact on people's health, particularly amongst the more vulnerable groups; the old, those already sick, and children. However, as referred to above, noise, air pollution and water pollution are not predicted to be a significant impact for this road project.

The road development will also require the acquisition of some land which may affect people's income and livelihoods particularly in the short term Land acquisition will be discussed in the Resettlement Action Plan (RAP).

The road development may have some impact on the economic activities of the local communities on the present road. It should be noted, however, that there are only few small businesses near the alignment (at Kanshengel) which are not expected to be relocated and negative impact is expected to be minimal.

Nevertheless it will be important for the CoR to consider the establishment of service areas and it is understood that potential rest/service areas are being considered though no sites have yet been agreed. Normally these areas will provide facilities for resting, for buying petrol, for buying other goods and for eating and possibly overnight accommodation. These service areas could accommodate areas for local traders and farmers to sell produce. Signage to existing communities and local services and the provision of temporary spaces for local businesses can offset some of the potential for loss of trade. These matters are outlined in part 4.3.6 of this report.

There is no mechanism in Kazakhstan to compensate businesses for loss of trade. This loss of business and profits does not come within any World Bank Operational Policies and there is no evidence to show that it is included in any national requirements both in the developed and developing economies. In some countries (UK for example) businesses who can prove that their

business has been adversely impacted by a nearby road construction can claim a reduction in their local taxes.

Although there may be some local economic adverse impacts overall economically the road will bring significant benefits to the local, regional, and national economy. A fast, safe and all weather road will allow the efficient and rapid movement of goods between China, Kazakhstan, Russia and beyond in Europe and Central Asia. Goods manufactured within all the linked countries will benefit from the fast route. Agricultural produce from the area, which is a major employment sector and a significant part of the local economy, can be transported rapidly to a wider market, not just Almaty. Labor will be able to move more freely between the countries, and most important for regional and international economies tourism will be encouraged and the natural and social features of Kazakhstan can be exploited sustainably. On a regional basis the larger communities along the alignment, Kanshegel, Ashysu and Aydarly will benefit from faster travel times between the towns and to other urban centers in the south and south west of Kazakhstan. More opportunities for employment and business will be opened up.

Social and Economic Impact Conclusion: Construction and Operation Periods

There will be some negative social and economic including disturbance during the construction period and some potential loss of trade to businesses on the existing main road, but overall the social and economic impacts of a purpose built fast route within southern Kazakhstan will be beneficial.

4.2.8 PHYSICAL CULTURAL RESOURCES IMPACT

During a detailed survey of the site in close proximity to the site of a road has found 8 objects of archeological of historical and cultural heritage (hereinafter –“Objects of HCH”) and memorial sites:

- 2 objects of HCH are archeological monuments (objects №6, №7);
- 6 objects are modern funeral monuments or memorial sites (objects №1-5, №8).

For ensuring safety of Objects of HCH and memorial sites revealed in the territory of examination it is recommended sites which may be affected due to their proximity to the alignment:

It is general practice in Kazakhstan to publish academic papers on the recovered materials, thus contributing to knowledge and awareness on the history of the Central Asian region and Kazakhstan.

For ensuring preservation safety of Objects of HCH and memorial sites revealed in the territory of examination, the LLC “Archaeological Expedition” provided following recommendations:

1. Regarding Object №№ 6 and 7: To establish protective fencing on perimeter of the specified barrow taking into account a security zone of 50 m from its border for the entire period of construction of the highway.
2. Concerning Object №1-5, 8 (modern funeral monuments): To coordinate security actions in their relation for construction of the highway in local executive body.
3. At construction of the highway, according to the Law RK of 02.07.1992. "About protection and use of objects of historical and cultural heritage", it is necessary to show vigilance and care, in case of detection of the remains of ancient constructions, artifacts, bones and other

signs of material culture, it is necessary to stop all construction works and to report about finds in local executive bodies or to LLC “Archeological Expedition”.

For any PCR that are discovered during the construction works chance find procedures shall apply that are governed by Kazakh legislation and guidelines, specifically by paragraph 2 of Article 39 of the “Law on Protection and Use of Historical and Cultural Heritage in the Republic of Kazakhstan” which stipulates: *"In case of detection of objects of historical, scientific, artistic, and other cultural value, physical and legal persons are obliged to suspend the further conduct of the work and inform the authorized body."*

Conclusion Historic and Archeological Impacts Construction and Operation

In case of compliance with the above measures, construction works will not affect any cultural resources of this region.

4.2.9 ROAD SAFETY AND AESTHETICS IMPACT

Road Safety

Road safety and the potential for accidents to pedestrians and all road users is an important issue for all new road developments. On the existing route traffic flows, particularly of long distance trucks and buses, are expected to reduce and the incidence of traffic accidents should also be reduced. Correspondingly, hazards to pedestrians and non-motorized traffic along the existing route should also decrease.

For motorized traffic the project road itself will be significantly safer because of its upgraded design (e.g. optimized curve radii), separated carriageways, better visibility and limited access points. Randomly crossing traffic as well as slow moving non-motorized traffic will be eliminated.

Nevertheless there will still be a residual element of danger for pedestrians. Farmers, farm workers and herdsmen may need to cross the road at certain points and there will be some pedestrian traffic near settlements. There is a range of engineering and organizational measures available to slow down motorized traffic and improve traffic safety for pedestrians, animals, animal-powered carriages and cyclists. This includes signposting and speed enforcement with speed cameras; pedestrian crossings, if required with traffic lights; rumble strips and speed bumps to force speed reduction; light signals to warn drivers of crossings or non-motorized traffic participants. The design already foresees a number of these measures, the final scope, layout and locations will be decided in consultation with the affected communities prior to construction.

Aesthetics

The proposed road passes through areas of high aesthetic quality landscape with limited adverse visual impacts. The landscape in Section 1 though not significant in itself in the alignment area, has the important and visually impressive backdrop of the Almaty Mountains some 10 kilometers to the south. The retention and conservation of the natural landscape is therefore important. The design of the proposed road will ensure that this landscape quality is not negatively impacted by the new road construction and does not in any way detract from the landscape and views southwards.

3.2.10 WASTE GENERATION IMPACT

Estimated wastes during construction

During construction and operation of the projected road a number of waste streams will be generated:

- Inert mineral materials such as excavated earth, sand and gravel asphalt and concrete rubble, which will be entirely recycled and used as construction materials for filling, grading and landscaping.
- Potentially noxious or hazardous materials such as waste from construction camps and workshops, concrete slurries from washing plants, barrels and containers from fuels, lubricants and construction chemicals, scrap metal, and spent welding electrodes. This will be disposed via existing municipal waste management facilities in accordance with Kazakh regulations.
- Timber from felled trees and other organic matter from the clearing of the alignment will be collected and stored in appropriate locations outside the immediate construction zone and if suitable made available for sale to the public as firewood.

The following volumes of waste generation have been calculated for Section 1:

Table 4.9 – Generation of construction waste (calculation made by the Designer)

№	Name, type of waste	Classification	Way of storage and disposal	Waste volume, ton/period
1	2	3	4	5
1	Construction waste	GG170 Green List Construction, construction sites Site improvement	Special ground	2.9
2	Exhaust oil	AC-030, amber list wastes	Special enterprises for disposal	2.864
3	Electrode stubs	GA090 Green List	Special enterprises for disposal	0.00153
4	Waste end	AC-030 Amber list	Special enterprises for disposal	0.01145
5	Solid municipal waste	GO060 Green List	Ground	388.74

Waste Estimates during Operation

Waste generated during operation will mainly be gravel and salt remnants from winter care, sludge / cake from settling ponds for storm-water, and asphalt, concrete and gravel from repair and maintenance works. None of these wastes is very hazardous and disposal pathways will either be existing municipal waste management facilities, landfills for mineral materials (gravel, rubble) or recycling facilities (cement kilns or asphalt plants). The annual quantities will fluctuate depending on weather conditions (length and severity of wintery conditions) and volume of maintenance works. The range is expected to lie between a few 100s to a few 1,000s of m³ per annum.

In addition there will be waste and litter from users of the road and from the various activities within the planned rest/service areas. This waste could be quite significant if all service areas are operational, though this is unlikely that all will be operating for many years.

4.3. ENVIRONMENTAL MANAGEMENT: MITIGATION MEASURES: SECTION 1

4.3.1 AIR QUALITY MITIGATION

Vehicle Exhaust Mitigation

In general the amount and concentration of exhaust emissions of vehicles during the construction and operation periods depends on several factors, most important of which are:

- Design features and technical condition of vehicles, especially emission standards and related technical specifications;
- Traffic volume and traffic composition (mix of motor vehicle types);
- Road conditions: curve radii, longitudinal slope, carriageway width, visibility, type of road, smoothness and roughness of the road surface, the presence of human settlements, intersections and junctions of roads, railway crossings, and other factors that regulate the speed of the traffic flow;
- Driving habits of drivers;
- Meteorological factors, wind speed and direction, air temperature, humidity, solar radiation, temperature inversions, and air turbulence in the surface layer, etc.

Mitigation during Construction Period

The concentration of pollutants for each source of contamination when working on the construction of the road shall not exceed the maximum allowable limits set by the Kazakh standard SanPiN RK № 3.03.015-97. Various measures to ensure accordance with this requirement and to reduce the intensity and toxicity of emissions during road construction can be summarized as follows;

- Ensuring that all construction vehicles and equipment are maintained in accordance with manufacturers recommendations and that any repairs are carried out immediately in accordance with manufacturers recommendations. ;
- Systematic monitoring of the technical state of fuel equipment of diesel engines, the exhaust gases of which are prone to contain significant amounts of soot;
- Ensuring the uniform and proper operation of paving machinery, sealing equipment and asphaltting machines that will help prevent unacceptable concentrations of pollutants (e.g. aliphatic and aromatic hydrocarbons, including carcinogenic benz-a-pyrene, PAH)the working area and the surrounding areas.
- As a means of reducing annoyance to and potential harmful impacts eliminate nighttime construction operation within the vicinity of the sensitive uses (adjacent settlements) at Km 0 and Km 107. No mixing of materials, storage of materials and construction camps or depots to be located within 200 meters of these sensitive areas.
- Regular monitoring of air pollution shall be carried out throughout the construction period and focusing specifically, close to the communities.

Mitigation during Operation Period

- Improving the design of highways. Reduced longitudinal slopes, improved visibility in the horizontal vertical curves, the increase in their radius leads to ensure a higher operating speed of traffic flow and reduce toxic emissions. These requirements are incorporated into the design of this alignment.
- Given that the projected road passes through flat terrain, the longitudinal slope does not exceed 10% of the radii of curves and visibility on the road comply with the technical categories, thus providing the highest operational condition of the road, giving significant reductions in emissions of toxic pollutants. These requirements are incorporated into the design of this alignment.
- To reduce frequent braking and acceleration of vehicles as a means of reducing emissions install appropriate traffic and warning signs and roadway markings. These requirements are incorporated into the design of this alignment.

- One of the easiest ways to reduce the toxic components in exhaust gases (exhaust) is to convert vehicles to pressurized natural gas, resulting in the reduction of NO_x emissions by the factor 4-10;
- Recent legislation has established the requirement for every motor vehicle to be inspected and checked once per year for basic technical functionality, including emission standards. The inspection certificate has to stay with the vehicle at all times and is checked by road police during routine traffic controls.
- The use of unleaded gasoline is increasing in Kazakhstan and leaded gasoline will be phased out, which will progressively reduce lead emissions into the environment.
- Regular monitoring of air pollution should be carried out throughout the operation period and focusing specifically, close to the communities.

Dust Mitigation during Construction and Operation

Dust can be a major problem during construction and is caused by a range of activities including site preparation where the soil is disturbed, during aggregate and cement handling for concrete production, from the transportation of materials particularly cement, and transport generally on unpaved surfaces.

To reduce dust pollution during construction and repair work on the road during operation the following mitigation should be carried out:

- Maintaining, cleaning and watering of road sections where there is intensive dust formation. When choosing the dusting materials, preference should be given to Calcium Chloride, inhibited by Phosphates (CCP).
- Periodic watering of dirt roads at a rate of 2 l/m² per watering cycle;
- Set and enforce speed limit on sections of roads subject to intense dust formation;
- Ensure that the transport of all potentially dusty materials is done in covered trucks or the material is contained in secure bags.

Dust mitigation must be enforced with special care and attention in the locations at PK 43+00, PK 42+40.17, PK 43+00, PK 131+29.62, PK 307+87,09 close to the villages.

4.3.2 NOISE AND VIBRATION MITIGATION

The level of traffic noise at any sensitive point generated by vehicles traveling on the highway, shall not exceed the values set in, SanPiN № 841 from 12.03.2004, Republic of Kazakhstan, at 70 dBA.

Mitigation of Noise during Construction Period

Noise can be caused by a range of equipment and by vehicles transporting goods and equipment. Significant noise can be created by bulldozers, scrapers, pneumatic hammers, vibrators, cutters.

Reducing construction noise is achieved through the following activities:

- Impose a speed limit of traffic during construction to 60km/h. This can reduce noise by 7 dB (as compared to 80 km/h);

- Undertake construction work during the daytime to reduce any potential impact on sensitive uses particularly in construction access roads;
- Effective soundproofing of all vehicles and equipment by the use of foam, rubber and other soundproofing materials, as well as through the use of hoods with multilayer coatings; ensure that Contractors either have modern equipment that fulfill noise reduction norms, or that equipment is retrofitted to meet the required standards;
- Stationary units (e.g. aggregates or compressors) shall be placed in sound-absorbing areas or tents, which can reduce the noise level by up to 70%.
- The definition of road construction zones with high sound levels above 80 dBA must be designated with safety signs, and workers in this area should be provided with personal protective equipment (ear muffs or earplugs).
- All depots, special working areas, batching or mixing plants should be located at a distance from any sensitive areas
- As a means of reducing annoyance to and potential harmful impacts eliminate nighttime construction operation within the vicinity of the sensitive uses at Km 0 and Km 107 (settlements). No plants for batching and mixing of materials, for asphalt or concrete production, and no storage sites, lay down areas or construction camps shall be located within 200 meters of these sensitive areas.
- Regular monitoring of noise levels near any sensitive areas particularly at Km 0 and Km 107 must be carried out to ensure there is no disturbance to those uses. If acceptable night time noise levels are exceeded the community must be consulted and additional mitigation methods such as the installation of temporary noise control barriers should be considered.

Operation Noise Mitigation

The calculation of noise during the operation period indicates that traffic noise does not exceed the maximum permissible at any location along the alignment. However it will be particularly important to monitor operation noise levels along the built-up areas to determine whether noise levels are exceeded or whether the community is disturbed by the noise. The use of noise barriers or noise bunds shall be considered if indicated by monitoring data and / or requested by the affected communities.

Vibration Mitigation

Vibration normally occurs when piling takes place. This may only occur at a number of locations mainly at bridge construction. If it does not take place near the sensitive uses the impacts on the community will be small. The most important impact will be the impact on workers on the construction site. All workers exposed to vibration should be given special clothing, earplugs and given regular breaks.

4.3.3 HYDROLOGICAL MITIGATION

Construction

Overall the impact on groundwater and surface water is expected to be low. There are no cuttings in Section 1. The impact on groundwater levels is likely to be minimal and contamination will be unlikely. It is unlikely that any groundwater resources will be impacted by the construction activities. Embankments will have sufficient culverts to prevent damming of surface runoff and subsequent water logging.

During road construction in order to prevent pollution watercourses must be constantly monitored

These pollutants risk entering the water and releasing harmful toxic substances and pollution with particulate matter of mineral and organic origin, represented suspended particles of sand, clay, silt and other materials.

Discharge of Waste Water from Construction Camps

The discharge of wastewater to water courses is only allowed with permission of the sanitary-epidemiological service and fisheries. The composition of the wastewater must comply with SanPiN to protect surface waters from pollution № 3.02.002.04.

For domestic wastewater disposal a pit of precast concrete rings with a diameter of 1.5 meters and a depth of not less than 3 meters should be used. To eliminate the filtration of waste water into the groundwater the floor of the pit should be concreted.

Surface and Groundwater Protection

Defined water protection zones prohibit the establishment of landfills, use as industrial waste sites, as parking, refueling, cleaning and repair of motor vehicles and road equipment. The pollution and contamination of water, during construction without devices to prevent pollution and contamination of water, wasteful use of water, the violation of water protection regime in catchments and other violations, will be banned.

The water protection zones are defined as follows: for small rivers the zone is, 100 meters, and for large rivers it is 500 meters. Work within the water protection zone are allowed only by special permission of local water protection authorities, fishery protection and sanitary-epidemiological services.

Specific Mitigation during Construction should include:

Department of Roads, Committee of Water Resources and Rayon in consultation with Contractors to ensure all water extraction for construction and workers only takes place from sustainable resources from wells (for construction activities) and from piped supply system (for domestic use in camps etc). The contractor shall be responsible for obtaining all permits required for use of surface and groundwater resources from the Rayon and competent authorities. No water shall be used without those specific permits.

- Good management of all areas of the construction site to ensure no short term flooding occurs.
- Good management of all areas of the construction site to ensure contamination from all construction activities does not occur.
- All surface water courses in all construction are to be protected by settling ponds and filters.
- Waste water from construction camps to be treated on site before discharge into surface rivers;
- Septic sludge from toilets to be taken to offsite treatment plants.

Operation

During operation to prevent contamination, the road will include drainage channels and culverts for removing storm water from the carriageway of the road outside. Drainage from the roadway and bridges in places where a potential impact on rivers, creeks or other water bodies is possible will be treated in settlement ponds, before reaching natural streams, rivers or canals.

Water from road bridges passes to the paving blocks and curbs along the borders assigned to drainage cradles at the beginning and end of the bridge, then enters the water receiving wells, where the filtering occurs. To ensure the removal of pollutants from the roadway of the bridge sidewalk

concrete curbs are located along the entire length of the bridge. Rain water on the pedestrian part of the bridge is protected from harmful toxic substances from the roadway of the bridge by a continuous barrier so there is no threat to the ecosystem. On small bridges pollution is also excluded from entering the surface water by a continuous curb railing.

Discharge of water from the carriageway flows by longitudinal trays along the edge of the roadway, and then cross-trays, arranged on the slopes of the embankment height greater than 4 meters, with a longitudinal slope of a slope of 0.03, as well as for concave curves. The end of the trays are arranged along the slope embankment to prevent erosion of the sub grade.

4.3.4 SOIL EROSION AND CONTAMINATION MITIGATION

Soil Erosion

During the construction phase it will be essential to ensure that all efforts are taken to eliminate soil erosion and the causes of erosion. However as referred to in section 4.1.4 above because of the characteristics of the landscape and of the design even in extreme dry or extreme wet conditions, erosion or landslides will not take place to any extent. Nevertheless all construction activities must be undertaken to eliminate potential erosion.

Soil Reclamation

The Construction of the road will require the use of land for a temporary period for construction activities and it is a legal requirement that all land used for a temporary period for construction must be reclaimed and returned to the original users and owners in a condition suitable for its original agricultural use. Any use of land that involves the removal of any soil creates instability to the local environment and wider environment and it is essential to preserve the natural topography and existing vegetation.

Guided by the Land Code of the Republic of Kazakhstan from 20.06.2003g. and "Guidelines for the assessment of proposed economic and other activities on the environment in developing pre, design and project documentation" Astana 2007. All land used must be returned in a condition suitable for agriculture.

Biological reclamation allows for the planting of grasses to encourage the restoration of fertility. Land reclamation should be done during or after the completion of the construction activities. It is important to reclaim in all place where soil and sub soil has been disturbed by construction and associated activities.

Remediation activities to reduce loss and erosion of soil during construction includes the following:

- Removal of sand and detritus mixture (20 cm) from the surface of the road with a bulldozer moving into piles up to 50m, followed by loading an excavator to dump 0.65 m² to transport up to 1 km (35,000 x 0.20);
- The preparation of the road surface by bulldozer;
- Deep subsoil loosening by bulldozer;
- Backward sliding of topsoil from the dumps to the prepared surface layer by the bulldozer

Activities on the site after construction should include:

- Use of tillage cultivator;
- Mechanized sowing of perennial grasses as follows: alfalfa - 25% of 18 kg / ha 30% perennial ryegrass - 75% of 35 kg / ha of 30%.

- After sowing, rolling the surface by a ring-roller

The best perennial grasses are wheatgrass and sainfoin. Wheat has a high resistance to drought. The wheat grass grows equally well in early spring and autumn. Sainfoin - a long-standing drought-resistant and extremely valuable winter-hardy legume crop is sown in wide aisles with 30-60cm. It is planted mainly in the early spring period and the green mass is eaten by cattle, and also provides excellent hay.

Immediate and proper reclamation of land reduces the adverse impact of disturbed land on the environment. It will reduce dust and pollution, can have a beneficial impact on human health and eliminates environmental damage.

Soil Contamination

During the construction period it is important that the contractor undertakes all activities in accordance with contract specifications and manages all site activities in an environmentally sustainable manner.

To ensure soil is not polluted it is essential to undertake the following activities:

- Ensure, through proper construction management, that oil and other spills do not occur, and that if they do immediate action is taken to minimize impacts on the soil.
- Storage of construction materials only takes place in properly prepared locations;
- Immediate sorting and removal of construction debris to an offsite landfill;
- Dismantling after use the base of construction sites and access/haul roads
- Apply topsoil on all vacant sites as soon as practical;

Operation

During operation it will be important that all pollution is minimized and managed. All liquid wastes of any kind must be taken from the road and disposed of in an approved landfill. It will be the responsibility of the road agency to ensure speedy and full clearance of all waste from the road and from its vicinity.

4.3.5 FLORA AND FAUNA MITIGATION

Flora and fauna will be impacted by the construction and operation of the road. Air pollution, noise and vibration and potential for occasional flooding and wind and water erosion will all have an impact, normally adverse on the local and sometimes wider original ecology.

The mitigation methods referred to above for air pollution and noise and vibration impacts will also benefit the flora and fauna. Specifically to reduce the negative impact on flora and fauna of the road development the following environmental protection measures are proposed:

- Ensuring high quality condition of the road surface throughout the operation period to minimize noise and particularly air pollution which has adverse impacts on fauna and can also impact sensitive flora;
- Ensure fauna can make use of culvert and other crossing points by special treatment of the culvert floor (putting sand/soil on the floor);

- Reduce the use of salt and chemical materials used to disperse snow and ice in winter so that soils, plant tissues, animals and birds are not adversely affected or destroyed. An alternative is to replace salt and other chemicals with friction materials such as sand or gravel;
- Use de-icing materials that are less toxic to the environment including anti-HCF-type materials (calcium chloride, inhibited phosphate) or MRA (potassium-magnesium acetate), which do not lead to irreversible changes in photosynthesis and the subsequent destruction of plant tissues and animal deaths;
- Reduce the incidence of dust pollution by good maintenance of the road, regular cleaning and watering to reduce negative effect on vegetation.

Dust, depending on the chemical composition, has a specific effect on plants, caused by the penetration of harmful compounds into the leaf tissue. At the same time accumulation of compounds in plant tissues causes a disturbance of metabolic functions of the body, reducing the amount absorbed by the leaves of photo synthetically active energy and results in accelerated aging. Additionally all transport and haulage vehicles using the road, including construction traffic, should use dust protection tarpaulin or other suitable cover.

Temporary or longer term localized flooding and waterlogging shall be prevented by culverts and drainage systems to ensure flora and fauna are not affected.

The loss of trees is not stipulated in this project, but if it has place, Contractor will be offset by a tree replacement ratio of at least 1:1 plus a contingency for the portion of saplings that does not grow (typically 25%) or allocate to local budget payment equal to planting and cultivation of forest crops.

Specific Fauna mitigation during Construction:

The Contractor shall ensure that no excessive and/or unnecessary disturbance to fauna within or close to the alignment takes place. Game hunting by the contractor's personnel will be forbidden in the project area. The Contractor and Supervision Engineers will strictly enforce these requirements.

4.3.6 SOCIAL AND ECONOMIC MITIGATION

Local Businesses

The road development may have some impact on the economic activities of the local communities on the present road alignment. Alongside the present road there are various permanent and temporary commercial activities including restaurants, convenience stores, car repair establishments, and temporary stalls selling local fruit, vegetables and other local produce. These businesses rely predominantly on passing traffic for their customers. This is particularly strong in the western part of the road, closer to Almaty. With the construction of the new alignment some of the businesses may lose some, though clearly not all, of the passing trade. It is likely that much of the existing trade will not be lost when the new road is constructed though it is impossible to make any definite predictions. There are no World Bank or domestic policy requirements to compensate persons indirectly affected in this manner. During the recent consultation process this matter was not referred to by any members of the community or the Rayon administrations.

There are however a number of approaches that would provide opportunities for the local community adversely impacted by the road development. Three approaches would be:

- Providing sites for local businesses and farmers to sell their produce to travelers using the new road. Information obtained from Regional Department of Roads, Almaty is that there will be 5 Rest/Service areas along the alignment. These sites are not part of the present design and land will be purchased on a willing buyer-willing seller basis and design and development will take place at a later date. They are the responsibility of the ministry of Tourism. It is recommended the design should included sites for local farmers and business as a means to ensure that the local community can benefit from the new road and as a means of offsetting potential losses to existing businesses on the present road.

- Good signage on the new road and at junctions to show the location of the nearest petrol station, shops, market, restaurants etc. located on the original road. This will enable users of the new road to make easy access to the local commercial uses on the original road. \
- After the construction of the road and prior to opening of the Service/rest areas to allow small traders to set up at vacant sites at some interchanges. This would need to be in accordance with road safety regulations and should only occur at specific approved sites where space is available of the road for parking and visibility is good. Signs informing roads users of these locations should be incorporated into the proposed road signage.

Livestock crossing points

During the first consultation many farmers were concerned about ensuring that sufficient livestock and farm equipment crossing points were included in the design. This is particularly important where a farmer's land is along both sides of the road alignment. But it is also an issue where the road blocks traditional routes for farmers moving livestock and machinery. The design has included 36 under road crossing points for livestock and farm machinery. In addition there are local road overpasses. The Regional Department of Roads, Almaty has agreed that additional crossing points can be provided if the community shows that a route is necessary for the farmers or other land users in the area, and that it has no engineering issues. Preferably decisions on the location of any additional crossing points should be made prior to construction start.

Land acquisition mitigation aspects are covered in the Resettlement Implementation Report but it is important to stress that the outstanding acquisition is to be completed as soon as possible in accordance with Government procedures and the Resettlement Implementation Report. Any objections and complaints should be in accordance with the Grievance Mechanism included in the RIR for the completion of the acquisition and for the construction period.

4.3.7 PHYSICAL CULTURAL RESOURCES MITIGATION

All historic sites and memorial placemenks and their protection zones are located within 2 km of the centerline of the alignment. As discussed earlier, archaeological sites №№ 6 and 7 will be fenced to ensure protection during the works and memorial placemarks will be relocated in coordination with local authorities.

The four mounts not directly affected by the road construction are at approximate distances of 150, 300, 450, and 600 meters from the centre line of the road. The mounds not directly affected may, because of the improved access and public knowledge, come under pressure from illegal damage and removal of objects. This can be managed in two ways: 1) Complete and secure closure of the mounds to ensure no illegal damage takes place, or 2) to open the mound up to public view and information ensuring that the community can understand the history of the area. If it is opened up to public view there is less incentive to rob or damage and proper security can also be installed. If the monument is opened up to public view road and pedestrian access should not be off the new road and access should be via minor access roads. The Institute of Archeology should review the situation and take the necessary actions.

For any PCR that are discovered during the construction works chance find procedures shall apply that are governed by Kazakh legislation and guidelines, specifically by paragraph 2 of Article 39 of the "Law on Protection and Use of Historical and Cultural Heritage in the Republic of Kazakhstan" which stipulates: "*In case of detection of objects of historical, scientific, artistic, and other cultural value, physical and legal persons are obliged to suspend the further conduct of the work and inform the authorized body.*"

The time required for investigation and salvage dig at the burial mound one field season will be required, which will be taken into account in the construction schedule. In the unlikely event that ancient settlements would be discovered, two field seasons would be required for investigations and salvage digging.

4.3.8 ROAD SAFETY AND AESTHETICS MITIGATION

Road Safety

The provision of a new well designed restricted access divided highway ensures many inbuilt safety features not provided in an existing traditional road. Specifically the design of the proposed road will incorporate the following:

- Divided carriageways;
- Limited access and exit;
- Multi- level interchanges at busy junctions;
- Good horizontal and vertical sight lines and visibility;
- Clear and consistent road markings;
- Absence of pedestrians and non-motorized vehicles;
- Emergency lanes and emergency parking areas;
- High intensity lighting at key intersections and other locations;
- Clear warning and information signs;
- Safety barriers in accordance with international standards, at junctions, embankments and cuttings.

At junctions and access roads to the proposed road it will be necessary to ensure appropriate warning and information signs, street lighting where necessary, and safe facilities for pedestrians and non-motorized traffic. Specifically the design has included speed cameras at intersections connected to a central control area. Rumble strips prior to junctions and at other locations have been also included in the design to warn drivers of junctions and slow traffic.

Pedestrian Crossing Points

No specific pedestrian crossing points have been included in the design of Section 1. Consideration must be given to the provision of pedestrian crossing points where there may be pedestrian movement in Section 1. Pedestrian crossing at the road junction and road crossing points should include white (zebra) strips on the carriageway, signs and advance warning signs.

At junctions and access roads to the proposed road it will be necessary to ensure appropriate warning and information signs, street lighting where necessary, and safe facilities for pedestrians and non-motorized traffic. Rumble strips prior to junctions and at other locations have been also included in the design to warn drivers of junctions and slow traffic.

Aesthetics

The objective of good aesthetics is to ensure a high quality of design, construction and operation to ensure that the road and its associated structures enhance and improve the landscape and esthetic quality of the area. This can be done through the following design and operation requirements:

- The design of the road and its associated development is of the highest quality, in keeping with the local landscape characteristics and features, and visually pleasing to the eye;
- Wherever possible for the road to be designed to follow existing contours so reducing the need for visually obtrusive deep cuttings and embankments:

The above two requirements have already been incorporated into the design of the road.

- Ensure that all non-operational land is planted and landscaped to the highest level with trees and vegetation that are endemic and suitable for the severe Kazakhstan climatic conditions
- Ensuring the all warning signs, kilometers signs and all other road furniture is designed as a whole and are compatible with the landscape features of the area.

The above two requirements will be incorporated into the detailed design of the road.

- Ensuring that all elements of the road are well maintained, particularly the adjacent landscaped areas and any embankments and cuttings;

This will be operational requirements of the road operators.

4.3.9 WASTE MITIGATION

Waste during Construction Period

The project preparatory work should provide special site provision for temporary storage of waste, indicating methods of removal to a place of disposal, processing or marketing. Disposal of wood and waste from tree and plant trimming should be carried out during the season of felling (preferably in winter).

Contractors must provide containers for all construction waste and should be separated; metals, plastics and construction materials. Any waste and scrap that can be recycled or reused must be separated and stored or taken off site as necessary. Waste materials for recycling and reusing within the construction site should be clearly marked and separated. In all cases storage must take place in clearly marked areas and taken off site as soon as practical. The Waste Management Authority and Rayon Akimat should be consulted in all waste matters. It must be the responsibility of the Contractor to dispose of all waste and to do so in accordance with local and national regulations. Any hazardous waste must be disposed of in accordance with local and national regulations. Disposal of any waste on adjacent sites with or without the land owner's permission, outside the construction site perimeter is not permitted unless the sites are approved waste disposal sites. Prevention of construction waste incineration: burning or incineration of any waste should not normally be permitted unless specifically approved by the waste disposal authority and environmental authority.

All general waste from the workers camps and office locations will be regularly taken by the contractor to the nearest approved waste disposal site. Disposal and incineration at the construction site will not be allowed. Temporary collection points will be provided within the site for all general waste and these will be clearly signed and will be collected regularly. Any medical waste will be disposed of separately to approve medical waste sites.

At the completion of the contract all waste including all temporary site buildings and installations and all unused materials shall be taken off site by the contractor. No waste should be left on any part of the construction site.

Waste during Operation Period

Waste generated during operation will mainly be gravel and salt remnants from winter care, sludge / cake from settling ponds for storm-water, and asphalt, concrete and gravel from repair and maintenance works. None of these wastes is very hazardous and disposal pathways will either be existing municipal waste management facilities, landfills for mineral materials (gravel, rubble) or recycling facilities (cement kilns or asphalt plants). The annual quantities will fluctuate depending on weather conditions (length and severity of wintery conditions) and volume of maintenance works. The range is expected to lie between a few 100s to a few 1,000s of m³ per annum.

Existing waste management disposal facilities within the area are the responsibility of the Rayon. The operator will agree prior to operation on what waste will be delivered to the publicly operated waste management sites. Other waste disposal will be agreed with the Rayon prior to any disposal. Only Rayon approved disposal sites will be used. Any hazardous or medical waste will be disposed of at separate approved disposal sites. The operator will be responsible for all collection within the road and service areas and disposal to the approved and agreed sites. No disposal will take place on the alignment or at the service/rest areas. No incineration will take place on the alignment or service rest areas unless it is in accordance with local and national incineration regulations.

The issue of crossing points for livestock and farm vehicles and equipment is also covered in the RIR.

5. SECTION 2

5.1 BASELINE DATA: SECTION 2

5.1.1 GENERAL DESCRIPTION

The Kurty –Burybaital Road section of the South West Road Project included in the “Corridor Center- South Road Corridor “Astana-Karaganda-Balkhash-Kapshagay-Almaty” is the main highway connecting Astana and Almaty cities. The area of the road alignment is located in Almaty oblast, on the border of two districts: Ili and Zhambyl.

Road Section 2: 45 km (km2335-2380). This section will pass on the existing road Almaty-Astana, starting from Kurty village. On administrative division the projected site passes across the territory of Ili and Zhambyl region of Almaty Oblast. The road has a dense infrastructure network and some settlements with intensive agricultural activity in undeveloped places.

The main waterway crossing the highway is Kurty River which originates on northern slopes of ridges Kastek and Zhetyzhol and is formed by merging of numerous inflows, such as Copa, Zhirenaygyr, Aksengir, Zhyngyldy. In relation to the hydrological analysis, only the river of Kurty has been studied where the capital dam with a reservoir is constructed. The existing bridge through Kurty River at km 2377+400 which was built in 2002, will be reconstructed and the new bridge will be built for additional two lanes.

Also the alignment crosses the river Byryozek (Utegen) at km 2349+150. The existing bridge was built in 1974 on a place of crossing by the road of a periodic waterway is now in a critical condition. Most likely this bridge will be built new.

The average level of the above road section is 600 m above the sea level; with a minimum of 560 meters and a maximum of 640 meters.

The terrain is flat, Seismic activity of the region of 9 points –SNiP RK 2.03-30-2006.

The soil cover around the alignment is developed poorly, presented by slightly humic gray soils with thickness up to 20 cm.

The project road runs through the territory of Zhusandaly protected area. (information on potential impacts and mitigation are the same as for road section #1).



Figure 5.1. – Situation map of Almaty Oblast

The total area of Almaty Oblast is 428.000 square kilometers. The administrative center is Taldykorgan. The Oblast includes 16 rural districts, 10 towns, 15 townships and 759 villages.

The population of the Oblast is approximately 1 631.400 inhabitants (excluding Almaty city).

The total length of the Section is 45 km (figure 5.2)

1) Zhambyl district– the length as per the project is 24km;

Ili district –the length as per the project is 21 km.

Схема
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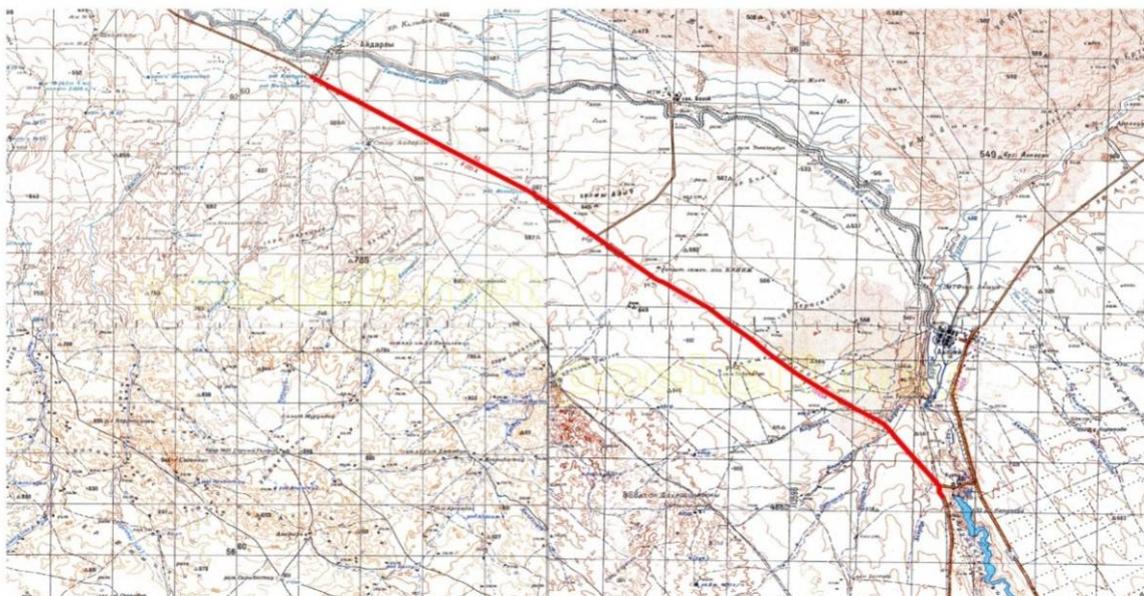


Figure 5.2. – Situational map of Section 2

Table 5.1.1: Summary sheet of junctions at the reconstruction of corridor Center-South “Astana-Karaganda-Balkhash-Kapshagay-Almaty” section of road of republican significance “Border of Russian Federation (to Yekaterinburg)-Almaty” km 2335-2380

№	Direction	PK+	left	right	angle, degree.	Category of secondary road	Carriageway width, m	Distance to settlement
1	Farm household	303+76		+	90	V	8,00	0,5
2	Uzynagash village	405+00		+	15	IV	10,00	36
3	Akshy village	441+50	+		33	IV	8,00	11
4	Kurty village	449+23		+	71	V	8,00	2 км
Total:			1 No	3 Nos				

5.1.2 CLIMATE

Same as Road Section I and presented under item 4.1.2

5.1.3 GEOMORPHOLOGY AND GEOLOGY

Same as Road Section I and presented under item 4.1.3

5.1.4 SOILS AND SOIL FORMING ROCKS

Same as Road Section I and presented under item 4.1.4

5.1.5 LAND RESOURCES

Section 2 passes through irrigated land near the village. To the east of the village Nurly area is represented by not irrigated lands, which are almost not suitable for pasture or unused semi-desert. Land is taken under the permanent acquisition for the construction of roads and access roads and junctions, including agricultural land with a small amount of commercial and industrial buildings. There are no residential buildings affected under the land acquisition. Land acquisition is almost completed, and all described in the Report on the implementation of resettlement activities. At all sites there are sections that have not been withdrawn (86 land plots).

Land acquisition for the construction and reconstruction of the road was made at the stage of survey work with land management agencies and bodies for the protection of the environment. Total number of private lands that were affected by the acquisition in each area is provided below. Most of the land plots already withdrawn and compensation for them were paid.

Table 5.2 Land under permanent acquisition for road construction

Region	Number of owners	Land area (ha)	Note
Enbekshikazakhskiy	470	491.72	Part is on the section 1
Uigurskiy	2	3.38	Part is on the section 3

Additional land will be required for a career and building of bases, workshops and camps for workers. Contractors will have access to all land for temporary use by negotiating with the owners or tenants. In all cases, the land required for temporary and permanent use is agricultural, pastoral or uncultivated.

Taking into account the requirements of the land legislation, all temporarily occupied areas must be cultivated. Technology, procedure and amount cultivation works are described in the relevant section of the working draft.

5.1.6 HYDROLOGICAL CHARACTERISTICS

Same as Road Section I and presented under item 4.1.6

5.1.7 FLORA AND FAUNA

Same as Road Section I and presented under item 4.1.7

5.1.8 SOCIO-ECONOMICAL CHARACTERISTICS

The road passes through rural areas with low population density. There are 2 districts through which this road section passes:

Table 5.3 Population in Section 2

District	Population(2011)
Ili	154 124
Zhambyl	126108

As, mainly the route passes through the open district, level of population, living directly near the road, is very low.

5.1.9 PHYSICAL CULTURAL RESOURCES

Based on the survey carried out for this Section of the alignment there were no cultural or archeological sites or remains found directly on or immediately adjacent to the alignment.

5.2 ENVIRONMENTAL IMPACT ASSESSMENT: SECTION 2

5.2.1 INTRODUCTION

During the construction of roads the main types of environmental impacts normally are:

- Air pollution caused by exhaust gases of various construction vehicles and various moving and stationary equipment;
- Noise caused by machines and equipment and various other construction activities;
- Contamination by dust from wear of road surface, from construction materials and from the transportation of construction materials.;
- Possible contamination of agricultural food production activities during the extraction of road building materials, dredging, and new construction activities;
- Potential contamination of top soil, surface water sources, ground water resources, and vegetation adjacent to the road;
- Disturbance to nesting birds and the habitats of animals;

During operation phase impacts such as air, noise etc., are dependent on the distance from the carriageway.

- Air pollution and noise from all vehicles passing along the new route;
- Contamination by dust from, wear of road surface and erosion of adjacent soil ;
- Potential pollution of surface runoff from the roadway;
- Potential pollution of groundwater from run off and other contamination;

Zones of Impact

The following corridors adjacent to the carriageway have been defined:

- Zone of Impact: A corridor of up to 3,000 meters where some impact of the road may occur or be measurable;
- Protection Strip: A strip adjacent to the right of way where some impacts will occur. In some cases the impact may be significant; noise and air quality, drainage impacts, soil contamination etc.
- Reserve strip: A strip within the right of way that is required for emergencies, potential long term use for the road, for road services and cuttings, and embankments. Significant impacts will occur and changes to the local environment will already have been carried out during the construction of the road.

Approximate dimensions of the zone of impact, protection strip, and reserve strip are shown in Table 5.4.

Table 5.4 - Estimated size of the zone of impact, the protection strip and reserve strip

Impacted zones	Distance from road, m, For environmental class of road		
	I	II	III
Zone of Impact	3000/1500	2000/1000	600
Protection strip	250/150	150/90	60/30
Reserve strip	30	12	-

5.2.2 IMPACT ON AIR QUALITY

Construction and Operation Period

The proposed construction and operation of the road will be accompanied by emissions of pollutants during the construction period (emissions from construction activities and operation of motor vehicles and machinery), and emissions from vehicles traveling on highways during the operation period.

Table 5.5 lists the typical emission sources during the construction and operation of a major highway.

Table 5.5 – Emission source characteristics

Works type 1	Name and characteristics of emission sources 2	Name of potential air emissions 3
Construction	Dust generation during works	Inorganic dust
	Exhaust gases from internal combustion engines	Nitrogen dioxide, soot, carbon monoxide, benz(a)pyrene, carbohydrates
	Welding	Iron oxide, manganese and its compounds, hydrogen fluoride
	Paint works	White spirit, xylol
Operation	Exhaust gases from internal combustion engines	Nitrogen dioxide, soot, sulfur dioxide, Carbon monoxide, carbohydrates C12-C19, lead compounds

The composition of engine emissions comprise: carbon monoxide, hydrocarbons, nitrogen dioxide, lead, sulfur dioxide and particulate matter (soot).

The assessment of the level of air pollution caused by exhaust gases is based on a computer program. The predicted amount of pollutants emitted into the atmosphere during the construction and operation of the facility.

Calculations have been made for a single concentration (MPC) in accordance with SanPiN "Requirements for atmospheric air of populated areas» № 3076/841, 18.09.2004g 3.12.2004g. Approved by the Ministry of Health of the Republic of Kazakhstan. Calculations have been prepared and are shown in Table 5.6.

Table 5.6 – Motor vehicle emissions dispersion calculation

Emission type	Calculated at 20 meters from	MPC m.s., mg/m ³	Average daily MPC, mg/m ³	Hazard
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	road, mg/m ³			class
1	2	3	3	4
Carbon monoxide	0,056	5,0	3,0	4
Hydrocarbons	0,011	1,0	1,5	3
Nitrogen oxide	0,0056	0,085	0,04	2
Lead compounds	0,000032	0,0010	0,0003	1

Conclusion Construction and Operation Periods

Construction: The detailed calculations for construction and operation periods yield results that are within the limit values prescribed by Kazakh legislation. Also, since the alignment passes through predominantly open rural land with no sensitive uses near the alignment the adverse impact on any community will be minimal. Regular monitoring of air pollution against Kazakh standards (and international, e.g. WHO, for any parameters not covered by local regulations) shall be carried out throughout the construction period. The party responsible for monitoring will be the Contractor, who will be obliged to report to the Engineer as well as local environmental authorities.

Operation: The results show that the magnitude of the impact of transport on the air quality does not exceed the maximum allowable concentrations to a distance of 20 m from the nearest traffic lane. During the operation phase concentrations of toxic substances contained in exhaust gases within the areas adjacent to the road are within the allowable MAC, and do not adversely impact on the environment or sensitive uses.

Table5.7 – Motor vehicle emissions dispersion calculation

Emission type	Calculated at 20 meters from road, mg/m ³	MPC m.s., mg/m ³	Average daily MPC,mg/m ³	Hazard class
1	2	3	3	4
Carbon monoxide	0,056	5,0	3,0	4
Hydrocarbons	0,011	1,0	1,5	3
Nitrogen oxide	0,0056	0,085	0,04	2
Lead compounds	0,000032	0,0010	0,0003	1

Conclusion Construction and Operation Periods

Construction: Construction: The detailed calculations for construction and operation periods yield results that are within the limit values prescribed by Kazakh legislation. Also since the alignment passes through predominantly open rural land with no sensitive uses near the alignment the adverse impact on any community will be minimal. Regular monitoring of air pollution against Kazakh standards (and international, e.g. WHO, for any parameters not covered by local regulations) shall be carried out throughout the construction period. The party responsible for monitoring will be the Contractor, who will be obliged to report to the Engineer as well as local environmental authorities.

Operation: The results show that the magnitude of the impact of transport on the air quality does not exceed the maximum allowable concentrations to a distance of 20 m from the nearest traffic lane. During the operation phase concentrations of toxic substances contained in exhaust gases within the areas adjacent to the road are within the allowable MAC, and do not adversely impact on the environment or sensitive uses.

5.2.3 NOISE AND VIBRATION IMPACT

Construction Period

The various mechanical processes during the construction of roads are a source of intense noise, which can adversely affect humans. The intensity of the ambient noise of road machinery depends on the type of machinery and equipment and the distance from the workplace to sensitive and residential development. Especially problematic is the noise created by the work of bulldozers, vibrators, compressors, excavators, and Diesel Trucks. The noise produced during construction is temporary and localized but can still create an annoying impact.

Noise from trucks greatly exceed noise from most other vehicles and can become a particular problem during construction. Factors such as traffic volume, fleet composition, speed, operational condition of the vehicle freight operating condition of the road have the greatest impact on the noise level. Trucks, especially from diesel engines can cause noise levels up to 15 dB higher than cars.

A special problem is the noise of heavy trucks, working in quarries, where their limited speed capabilities and long periods working on idling. The noise level of trucks and all road construction machinery used for road reconstruction can be within 75-90 dB range. Noise from bulldozers, scrapers, pneumatic hammers, vibrators and other machines can be considerable. The noise from a single the scraper is 83-85 dBA, while unloading dump 82-83 dBA, from working with soil compaction rollers is estimated at 76-78 dB.

According to GOST 12.1.003-83 Section "Noise" standards for noise level have been adopted of 70-80 dBA. Zones with noise level above 80 dBA must be marked with safety signs. To ensure acceptable noise levels construction activities should not take place at night. Soundproofing of the engines of construction road vehicles should be carried out with multilayer coatings of rubber, foam rubber, etc. Through the application of insulating coatings the noise of cars can be reduced by 5 dBA.

Conclusion Construction Period: In view of the isolated characteristics of the area through which the road passes it is concluded that there will be no construction noise impact on any housing or sensitive uses. From experience and engineering judgment it is predicted that noise levels will remain below the levels recommended in the regulations referred to above.

Possible existing borrow pit locations have already been indicated by the Design Engineers for Section 2. The sites are approved locations and the selected Contractor will – in consultation with Engineer and local environmental authorities – propose at which locations are most suitable to start exploitation activities. .

Whichever sites are used existing local roads will be used as access to the road construction site. On the main road it is unlikely that the construction traffic will have a significant impact on traffic flows and noise disturbance to the existing communities but this will need to be reviewed and monitored in detail prior to the commencement of the construction period. For the minor roads that cross the new alignment and for any access routes construction traffic will significantly increase traffic flows and potential noise disturbance. A traffic count on all possible access roads to road construction site together with a regular monitoring program will be prepared prior to the commencement of the construction period as part of the environmental due diligence and management measures.

Operation Period

Operation noise levels are influenced by traffic volume, fleet composition, speed, vehicle operating condition, age of vehicle, and condition of the road. Sources of noise on the car are the engine and the tire noise hitting the road surface. The noisiest are heavy trucks and trailers with diesel engines; the most "quiet" are new and more expensive cars.

Maximum allowable noise levels (PDU) of noise - this is the factor level which is in daily work (during the working experience) should not cause annoyance, distress or cause or worsen health of the present or future generations.

Calculated MPL are adopted in accordance with the "Standard Specifications of noise levels in residential and public buildings and housing areas» № 841 dated from December 3, 2004, by the Ministry of Public Health of the Republic of Kazakhstan.

Permissible maximum levels of noise, caused by vehicles, are adopted in accordance with the above standards, it is 70dBA. Analysis of the results obtained from noise level calculations shows that the distance from the road for the 70dBA standard is approximately 20 meters without installation of any noise barriers, and 10 meters with the installation of appropriately designed barriers.

Conclusion for the Operation Period

In conclusion during the operation period the predicted noise impact to any residential or sensitive uses will be minimal, and where required further reduced by appropriate engineering measures, such as sound barriers, plantations and landscaping elements. This approach has successfully been implemented in the World Bank financed "South West Roads Project" which has similar objectives, approach, dimensions and issues. During operation regular monitoring of the noise situation and characteristics along the alignment and the access roads will be necessary. Any additional mitigation measures will be included in the repair and maintenance budget on a running basis and carried out within those activities.

5.2.4 HYDROLOGICAL IMPACTS

This Section covers 1) the availability of water for the construction and operation of the road and 2) the potential impacts including contamination impacts that the road will have on water resources in the area: surface and groundwater.

Water Needs for Construction Period

The planned construction work on the site of the proposed road will require water for construction activities and for drinking and domestic needs of the construction workers.

Consumption of water for the whole period of construction (for compaction of sub grade and washing of road-building materials) is estimated to be 160 131 m³. The required amount of water is based on "Estimated ratios and costs for construction work." Given that the flow capacity of Kurty river is 190 080 m³/day, it is assumed that there will be no shortage of water

Water consumption for drinking water supply has been calculated in accordance with the legislation of the Republic of Kazakhstan. The water consumption for the period of construction is based on average estimate of 27 l / day per person according to SNIP 2.04. 01-85.

Water Resources Conclusion Construction Period

Based on the water requirements during the construction period and the abundance of estimated reserves of ground and other water resources and it is considered that there is adequate water for all construction activities and total resources will not be affected.

Water Needs for Operation Period

A continuous supply of water will be required for routine cleaning and maintenance requirements and for cleaning after accidents. Water will also be required for the various uses within the rest/service areas.

Water Resources Conclusion Operation Period

Based on the potential water requirements during the operation period and the known reserves of surface and groundwater there is adequate water for all operation activities and total resources will not be affected

Contamination of Water Sources

Contamination can impact in the following ways:

- Seepage of contaminated water into groundwater and aquifers
- Contaminated runoff into streams and rivers
- Exposure and contamination of groundwater in borrow pits
- Impacts of wastewater management at construction camps

Sources of contamination are widespread during construction and operation. There is a moderate contamination potential from vehicles used on construction sites which can contain, use, release or carry a number of hazardous substances: heavy metals, NO_x, SO_x and soot from the combustion of fuels, particles from wear of tires, oil, lubricants and payloads of fuel, cement, paint, construction chemicals etc.

Possible pollution sources during operation may be roadside filling stations, service stations, workshops, points of inspection and locations where vehicles are cleaned. Also a potential pollutant is salt and chemicals used for deicing, which, when washout by rain and melted snow lead to concentrations of various pollutants in runoff water. Additionally, there is the risk of unwanted spills of hazardous or toxic substances due to road accidents.

Among the more serious pollutants would be particulate matter such as soot (which may be enriched by lead due to the lead content still added to some gasoline), rubber particles and heavy metal containing abrasives from brake pads, and liquids such as fuels, oil and lubricants containing aliphatic and aromatic hydrocarbons, PAH (polycyclic aromatic hydrocarbons) and phenols.

During intensive run off during heavy rainfall which normally occurs in the period March to June accumulated dust may become mobilized and contaminate runoff water and subsequent recipients. Calculations of maximum water flow were carried out in accordance with the recommendations of "Handbook to determine the hydrological characteristics of the settlement" and SNIP 2.01.14-83.

Contamination of Groundwater Resources Conclusion: Construction and Operation Period

Based on the groundwater levels within Section 1 and the design characteristics of Section 2 where cuttings only occur at certain locations it is concluded that pollution of Groundwater Resources during the construction period will not occur. Also during the operation period pollution of groundwater will not occur provided that the provisions of good practice are reflected by the design and properly implemented. Examples of key design features to be implemented for groundwater protection can be effective drainage systems that convey storm water quickly towards the surface drainage network and avoid stagnant ponds that may infiltrate. Also, although the total pollutant loads over the section are significant, the concentrations expected during runoff will be relatively small.

Contamination of Surface Water during Operation Period

The road drainage system, designed as part of the project consists of several drainage and structural measures designed to prevent water logging and flooding of the roadbed and to intercept and divert water flowing to the sub grade. For surface water diversion the project design provides for side drainage ditches, pipes for the passage of watercourses and water under the roadbed to prevent any possibility of stagnation, which can lead to water logging of the land adjacent to the road.

Culverts are arranged at the intersections of roads with streams, dry valleys, and waste channels. Pipe and box culverts have been included in the project.

Although the design of the drainage system for road and structures (i.e. bridges, intersections) has been carried out in accordance with best engineering design practice in exceptional circumstance some local drainage problems and deficiencies may become apparent during or on completion of construction. Any deficiencies should be overcome at the earliest opportunity and monitoring of the drainage will be a long term operational activity.

Road Surface run-off Pollutant Emissions

To assess pollution runoff from roads and identify the need to mitigate any pollution it is necessary to calculate the maximum permissible discharge of substances into water bodies. Under the maximum permissible discharge (MPD) of substances in the water body defines the mass of matter in the runoff water, the maximum allowable abstraction from source the established regime in the provision of water volume per unit time in order to ensure water quality control point. The engineering solutions for addressing the runoff from bridges into Kurty river will be considered when the detailed design will be prepared.

Contamination of Surface Water Conclusion: Operation Period

The investigation outlined above indicates that the calculated discharge of pollutants are all within the regulated maximum permissible discharge rates and that provided all regulations and legal procedures are carried out will be no impact on water resources from pollution during the operation period.

Borrow Pits

Possible borrow pits have been defined by the design engineers but these are not part of the approved design since the contractor will make the final decision on the selection of borrow pits. (See paragraph 2.6)

Construction Camps

Construction camps will generate significant sanitary waste from workers and staff who work and will live close to the alignment. In view of the scale of the construction activity the number of workers at any one time will be many hundreds and possibly more. For Section 2 it is estimated that there will be 600 workers employed on the site. At this stage it has not been possible to define the locations of the construction camps. Since this is an agricultural area it will be necessary to ensure that no contamination of the soil and groundwater and existing agricultural produce takes place. It will therefore be essential to ensure appropriate offsite disposal facilities are incorporated into the design of any construction camps.

Hydrology Conclusion

Overall the impact on groundwater and surface water is expected to be low. No cuts or tunnels are planned that might affect the groundwater regime and change the water table. The embankments will have sufficient culverts to prevent damming of surface runoff and subsequent water logging.

5.2.5 SOIL AND LAND IMPACT

The expected impacts are similar to those discussed for Section 1.

5.2.6 FLORA AND FAUNA IMPACT

The expected impacts are similar to those discussed for Section 1.

5.2.7 SOCIAL AND ECONOMIC IMPACT

During construction and operation noise, air pollution and water pollution may affect the nearby residents (in Kanshengel and Kurty) and in extreme conditions could impact on people's health, particularly amongst the more vulnerable groups; the old, those already sick, and children. However, as referred to above, noise, air pollution and water pollution are not predicted to be a significant impact for this road project.

The road development will also require the acquisition of some land which may affect people's income and livelihoods particularly in the short term. Issues of land acquisition are discussed in the Resettlement Action Plan (RAP).

A more important impact will be on those families; exclusively farmers, who will have had some of their land acquired for the development of the road. Though generally the amount of land lost by each farmer is not significant the most important impact will be that a farmer's land holding may now be located on two sides of the road, separated by the road. This will create difficulties on operation and could make the operation of the farm inefficient and in extreme cases inoperative. In order that the farmer can still operate his farm in an efficient manner it will be essential that regular crossing points/cattle underpasses are provided for the farmer.

The road development may have some impact on the economic activities of the local communities on the present road. Alongside the present road there are various permanent and temporary commercial activities including restaurants, convenience stores, car repair establishments, and temporary stalls selling local fruit, vegetables and other local produce. These businesses rely predominantly on passing traffic for their customers. It's mostly developed in western part closer to Almaty, where there is a big transport flow from the villages along the existing road and next to it. Because of road construction business will lose part, but not all passing buyers.

It is important for the Committee for Roads to consider the establishment of service areas and according to the project potential rest/service areas are being considered. Normally these will provide facilities for resting, buying petrol, for buying other goods and food and possibly overnight accommodation. These service areas could accommodate areas for local traders and farmers to sell produce. Signage to existing communities and local services and the provision of temporary spaces for local businesses can offset some of the potential for loss of trade.

Although there may be some local economic adverse impacts overall economically the road will bring significant benefits to the local, regional, and national economy. A fast, safe and all weather road will allow the efficient and rapid movement of goods between China, Kazakhstan, Russia and beyond in Europe and Central Asia. Goods manufactured within all the linked countries will benefit from the fast route. Agricultural produce from the area, which is a major employment sector and a significant part of the local economy can be transported rapidly to a wider market, not just Almaty. Labor will be able to move more freely between the countries, and most important for regional and international economies tourism will be encouraged and the natural and social features of Kazakhstan can be exploited sustainably. On a regional basis the larger communities along the alignment will benefit from faster travel times between the towns and to other urban centers in the south and south west of Kazakhstan. More opportunities for employment and business will be opened up.

Social and Economic Impact Conclusion: Construction and Operation Period

There will be some negative social and economic including disturbance during the construction period and some potential loss of trade to businesses on the existing main road, but overall the social and economic impacts of a purpose built fast route within southern Kazakhstan will be beneficial.

5.2.8 PHYSICAL CULTURAL RESOURCES IMPACT

Based on the survey referred to in paragraph 4.1.9 above there are no Physical Cultural resources within or close to Section 2 alignment.

For any PCR that are discovered during the construction works chance find procedures shall apply that are governed by Kazakh legislation and guidelines, specially by paragraph 2 of article 39 of the " Law on Protection and Use of Historical and Cultural Heritage in the Republic of Kazakhstan" which stipulates: "

In case of detection of objects of historical, scientific artistic and other cultural value (chance finds), physical and legal persons are obliged to suspend the further conduct of the work and inform the authorized body.

The time will be required for investigation and digging of any newly found sections.

Time will be required for investigation and carry out salvage excavation at any discovered site.

5.2.9 ROAD SAFETY AND AESTHETICS IMPACT

Road Safety

Road safety and the potential for accidents to pedestrians and all road users is an important issue for all new road development.

On the existing route traffic flows, particularly of long distance trucks and buses, are expected to reduce and correspondingly the incidence of traffic accidents should also be reduced. Correspondingly, hazards to pedestrians and non-motorized traffic along the existing route should also decrease.

For motorized traffic the project road itself will be significantly safer because of its upgraded design (e.g. optimized curve radii), separated carriageways, better visibility and limited access points. Randomly crossing traffic as well as slow moving non-motorized traffic will be eliminated.

Nevertheless there will still be a residual element of danger for pedestrians. Farmers, farm workers and herdsmen may need to cross the road at certain points and there will be some pedestrian traffic near settlements. There is a range of engineering and organizational measures available to slow down motorized traffic and improve traffic safety for pedestrians, animals, animal-powered carriages and cyclists. This includes signposting and speed enforcement with speed cameras; pedestrian crossings, if required with traffic lights; rumble strips and speed bumps to force speed reduction; light signals to warn drivers of crossings or non-motorized traffic participants. The design already foresees a number of these measures, the final scope, layout and locations will be decided in consultation with the affected communities prior to construction.

Aesthetics

The proposed road passes through areas of high aesthetic quality landscape with limited adverse visual impacts. The landscape in Section 3 is important and there are long distance views to the mountains range in the south and in the north. The retention and conservation of the natural landscape is therefore important. The design of the proposed road will ensure that this landscape quality is not negatively impacted by the new road construction and does not in any way detract from the landscape and the long distance mountain views to the north and south.

5.2.10 WASTE GENERATION IMPACT

The expected impacts are similar to those discussed for Section 1.

5.3 ENVIRONMENTAL MANAGEMENT: MITIGATION MEASURES: SECTION 2

5.3.1 AIR QUALITY MITIGATION

Vehicle Exhaust Mitigation

In general the amount and concentration of exhaust emissions of vehicles during the construction and operation periods depends on several factors, most important of which are:

- Design features and technical condition of vehicles, especially emission standards and related technical specifications; traffic volume and traffic composition (mix of motor vehicle types);
- Road conditions: curve radii, longitudinal slope, carriageway width, visibility, type of road, smoothness and roughness of the road surface, the presence of human settlements, intersections and junctions of roads, railway crossings, and other factors that regulate the speed of the traffic flow;
- Driving habits of drivers;

- Meteorological factors, wind speed and direction, air temperature, humidity, solar radiation, temperature inversions and air turbulence in the surface layer, etc.

Mitigation during Construction Period

The concentration of pollutants for each source of contamination when working on the construction of the road shall not exceed the maximum allowable limits set by the Kazakh standard SanPiN RK № 3.03.015-97. Various measures to ensure accordance with this requirement and to reduce the intensity and toxicity of emissions during road construction can be summarized as follows;

- Ensuring that all construction vehicles and equipment are maintained in accordance with manufacturers recommendations and that any repairs are carried out immediately again in accordance with manufacturers recommendations. ;
- Systematic monitoring of the technical state of fuel equipment of diesel engines, the exhaust gases of which are prone to contain significant amounts of soot;
- Ensuring the uniform and proper operation of paving machinery, sealing equipment and asphaltting machines that will help prevent unacceptable concentrations of pollutants (e.g. aliphatic and aromatic hydrocarbons, including carcinogenic benz-a-pyrene, PAH)the working area and the surrounding areas.
- Since there are no sensitive uses within the vicinity of the road there will not be a pressing need to restrict night time operation or to locate construction depots and camps in locations that will not impact on sensitive uses.
- Regular monitoring of air pollution shall be carried out throughout the construction period to ensure that there are no impacts to the community and construction workers.

Mitigation during Operation Period

- Improving the design of highways. Reduced longitudinal slopes, improved visibility in the horizontal vertical curves, the increase in their radius leads to ensure a higher operating speed of traffic flow and reduce toxic emissions (These requirements are incorporated into the design of this alignment).
- Given that the projected road passes through flat terrain, the longitudinal slope does not exceed 10% of the radii of curves and visibility on the road comply with the technical categories, thus providing the highest operational condition of the road, giving significant reductions in emissions of toxic pollutants. These requirements are incorporated into the design of this alignment.
- To reduce frequent braking and acceleration of vehicles as a means of reducing emissions install appropriate traffic and warning signs and roadway markings. These requirements are incorporated into the design of this alignment.
- One of the easiest ways to reduce the toxic components in exhaust gases (exhaust) is to convert vehicles to pressurized natural gas, resulting in the reduction of NOx emissions by the factor 4-10;
- Recent legislation has established the requirement for every motor vehicle to be inspected and checked once per year for basic technical functionality, including emission standards. The inspection certificate has to stay with the vehicle at all times and is checked by road police during routine traffic controls.
- The use of unleaded gasoline is increasing in Kazakhstan and leaded gasoline will be phased out, which will progressively reduce lead emissions into the environment.
- Regular monitoring of air pollution should be carried out throughout the operation period to ensure that there are no adverse impacts to any members of the community or the construction workforce.

Dust Mitigation during Construction and Operation

Dust can be a major problem during construction and is caused by a range of activities including site preparation where the soil is disturbed, during aggregate and cement handling for concrete production, from the transportation of materials particularly cement, and transport generally on unpaved surfaces.

To reduce dust pollution during construction and repair work on the road during operation the following mitigation should be carried out:

- Maintaining, cleaning and watering of road sections where there is intensive dust formation. When choosing the dusting materials, preference should be given to Calcium Chloride, inhibited by Phosphates (CCP).
- Periodic watering of dirt roads at a rate of 2 l/m² per watering cycle;
- Set and enforce speed limit on sections of roads subject to intense dust formation;
- Ensure that the transport of all potentially dusty materials is done in covered trucks or the material is contained in secure bags.

5.3.2 NOISE AND VIBRATION IMPACT MITIGATION

The level of traffic noise at any sensitive point generated by vehicles traveling on the highway, shall not exceed the values set in, SanPiN № 841 from 12.03.2004, Republic of Kazakhstan, at 70 dBA.

Mitigation of Noise during Construction Period

Noise can be caused by a range of equipment and by vehicles transporting goods and equipment. Significant noise can be created by bulldozers, scrapers, pneumatic hammers, vibrators, cutters.

Reducing construction noise is achieved through the following activities:

- Impose a speed limit of traffic during construction to 60km/h. This can reduce noise by 7 dB (as compared to 80 km/h);
- Undertake construction work during the daytime to reduce any potential impact on sensitive uses particularly in construction access roads;
- Effective soundproofing of all vehicles and equipment by the use of foam, rubber and other soundproofing materials, as well as through the use of hoods with multilayer coatings; ensure that Contractors either have modern equipment that fulfill noise reduction norms, or that equipment is retrofitted to meet the required standards;
- Stationary units (e.g. aggregates or compressors) shall be placed in sound-absorbing areas or tents, which can reduce the noise level by up to 70%.
- The definition of road construction zones with high sound levels above 80 dBA must be designated with safety signs, and workers in this area should be provided with personal protective equipment (ear muffers or plugs).
- All depots, special working areas, batching or mixing plants should be located at a distance from any sensitive areas .
- Since there are no sensitive uses within the vicinity of the road there will not be a pressing need to restrict night time operation or to locate construction depots and camps in locations that will not impact on sensitive uses.
- Regular noise monitoring shall be carried out throughout the construction period to ensure that there are no impacts to the community and construction workers.

Operation Noise Mitigation

The calculation of noise during the operation period indicates that traffic noise does not exceed the maximum permissible standards at any location along the alignment. Regular noise monitoring should be carried out to ensure no potential disturbance.

Vibration Mitigation

Vibration normally occurs when piling takes place. This may only occur at a number of locations mainly at bridge construction. If it does not take place near the sensitive uses the impacts on the community will be

small. The most important impact will be the impact on workers on the construction site. All workers exposed to vibration should be given special clothing, earplugs and given regular breaks.

5.3.3 HYDROLOGICAL MITIGATION

Construction

Overall, the impact on groundwater and surface water is expected to be low. There won't be any tunnel cutting, which could affect ground waters or change water system. The embankments will have sufficient culverts to prevent flooding.

In the course of highway construction for prevention of pollution of water ways it is necessary to support constantly all drainage constructions located on the highway in working order. The specified works are connected with risk of hit in waterways and reservoirs of harmful toxic substances and pollution by their weighed substances of a mineral and organic origin presented by suspended particles of sand, clay, silt and other materials.

The Contractor is responsible for obtaining all permissions, necessary for use of surface and ground water sources from district competent authorities. Water sources cannot be used without special permissions.

Operation

During operation to prevent contamination, the road will include drainage channels and culverts for removing waste water from the carriageway of the road outside. Drainage from the roadway and bridges shall be treated in settlement ponds where necessary, before reaching natural streams and rivers, or canals.

Water from road bridges passes to the paving blocks and curbs along the borders assigned to drainage cradles at the beginning and end of the bridge, then enters the water receiving wells, where the filtering occurs.

To ensure the removal of pollutants from the roadway of the bridge sidewalk concrete curbs are located along the entire length of the bridge. Rain water on the pedestrian part of the bridge is protected from harmful toxic substances from the roadway of the bridge by a continuous barrier so there is no threat to the ecosystem. On small bridges pollution is also excluded from entering the surface water by a continuous curb railing.

Discharge of Waste Water from Construction Camps

The discharge of wastewater to water courses is only allowed with permission of the sanitary-epidemiological service and fisheries. The composition of the wastewater must comply with SanPiN to protect surface waters from pollution № 3.02.002.04.

For domestic wastewater disposal a pit of precast concrete rings with a diameter of 1.5 meters and a depth of not less than 3 meters should be used. To eliminate the filtration of waste water into the groundwater the floor of the pit should be concreted.

Surface and Groundwater Protection

Defined water protection zones prohibit the establishment of landfills, use as industrial waste sites, as parking, refueling, cleaning and repair of motor vehicles and road equipment. The pollution and contamination of water, during construction without devices to prevent pollution and contamination of water, wasteful use of water, the violation of water protection regime in catchments and other violations, will be banned.

The water protection zones are defined as follows: for small rivers the zone is, 100 meters, and for large rivers it is 500 meters. Works within the water protection zone are allowed only by special permission of local water protection authorities, fishery protection and sanitary-epidemiological services.

Specific Mitigation during Construction should include:

Local Representatives of CoR, Committee of Water Resources and Rayon in consultation with Contractors to ensure all water extraction for construction and workers only takes place from sustainable resources from wells (for construction activities) and from piped supply system (for domestic use in camps etc). The contractor shall be responsible for obtaining all permits required for use of surface and groundwater resources from the Rayon and competent authorities. No water shall be used without those specific permits.

- Good management of all areas of the construction site to ensure no short term flooding occurs.
- Good management of all areas of the construction site to ensure contamination from all construction activities does not occur.
- All surface water courses in all construction are to be protected by settling ponds and filters.
- Waste water from construction camps to be treated on site before discharge into surface rivers;
- Septic sludge from toilets to be taken to offsite treatment plants;

5.3.4 SOIL EROSION AND SOIL CONTAMINATION MITIGATION

Soil Erosion

During the construction phase it will be essential to ensure that all efforts are taken to eliminate soil erosion and the causes of erosion. However as referred to in section 4.1.4 above because of the characteristics of the landscape and of the design even in extreme dry or extreme wet conditions, erosion or landslides will not take place to any extent. Nevertheless all construction activities must be undertaken to eliminate potential erosion.

Soil Reclamation

The Construction of the road will require the use of land for a temporary period for construction activities and it is a legal requirement that all land used for a temporary period for construction must be reclaimed and returned to the original users and owners in a condition suitable for its original agricultural use. Any use of land that involves the removal of any soil creates instability to the local environment and wider environment and it is essential to preserve the natural topography and existing vegetation.

Guided by the Land Code of the Republic of Kazakhstan from 20.06.2003g. and "Guidelines for the assessment of proposed economic and other activities on the environment in developing pre, design and project documentation" Astana 2007. All land used must be returned in a condition suitable for agriculture.

Biological reclamation allows for the planting of grasses to encourage the restoration of fertility. Land reclamation should be done during or after the completion of the construction activities. It is important to reclaim in all place where soil and sub soil has been disturbed by construction and associated activities.

Remediation activities to reduce loss and erosion of soil during construction includes the following:

- Removal of sand and detritus mixture (20 cm) from the surface of the road with a bulldozer moving into piles up to 50m, followed by loading an excavator to dump 0.65 m² to transport up to 1 km (35,000 x 0.20);
- The preparation of the road surface by bulldozer;
- Deep subsoil loosening by bulldozer;
- Backward sliding of topsoil from the dumps to the prepared surface layer by the bulldozer

Activities on the site after construction should include:

- Use of tillage cultivator;
- Mechanized sowing of perennial grasses as follows: alfalfa - 25% of 18 kg / ha 30% perennial ryegrass - 75% of 35 kg / ha of 30%.
- After sowing, rolling the surface by a ring-roller

The best perennial grasses are wheatgrass and sainfoin. Wheat has a high resistance to drought. The wheat grass grows equally well in early spring and autumn. Sainfoin - a long-standing drought-resistant and extremely valuable winter-hardy legume crop is sown in wide aisles with 30-60cm. It is planted mainly in the early spring period and the green mass is eaten by cattle, and also provides excellent hay.

Immediate and proper reclamation of land reduces the adverse impact of disturbed land on the environment. It will reduce dust and pollution, can have a beneficial impact on human health and eliminates environmental damage.

Soil Contamination during Construction period

During the construction period it is important that the contractor undertakes all activities in accordance with contract specifications and manages all site activities in an environmentally sustainable manner.

To ensure soil is not polluted it is essential to undertake the following activities:

- Ensure, through proper construction management, that oil and other spills do not occur, and that if they do immediate action is taken to minimize impacts on the soil.
- Storage of construction materials only takes place in properly prepared locations;
- Immediate sorting and removal of construction debris to an offsite landfill;
- Dismantling after use the base of construction sites and access/haul roads
- Apply topsoil on all vacant sites as soon as practical;

Soil Contamination During Operation period

During operation it will be important that all pollution is minimized and managed. All liquid wastes of any kind must be taken from the road and disposed of in an approved landfill. It will be the responsibility of the road agency to ensure speedy and full clearance of all waste from the road and from its vicinity.

5.3.5 FLORA AND FAUNA IMPACT MITIGATION

Flora and fauna will be impacted by the construction and operation of the road. Air pollution, noise and vibration and potential for occasional flooding and wind and water erosion will all have an impact, normally adverse on the local and sometimes wider original ecology.

The mitigation methods referred to above for air pollution and noise and vibration impacts will also benefit the flora and fauna. Specifically to reduce the negative impact on flora and fauna of the road development the following environmental protection measures are proposed:

- Ensuring high quality condition of the road surface throughout the operation period to minimize noise and particularly air pollution which has adverse impacts on fauna and can also impact sensitive flora;
- Some animals will make use of the various drainage culverts and livestock crossing points to cross the road, particularly during the night. In the area of Zhasandaly protected area it is essential that sufficient number of culverts and cattle underpasses is constructed to ensure that animals are not deterred from crossing the route and that their normal, or near normal random movement is not adversely affected;
- Reduce the use of salt and chemical materials used to disperse snow and ice in winter so that soils, plant tissues, animals and birds are not adversely affected or destroyed. An alternative is to replace salt and other chemicals with friction materials such as sand or gravel;
- Use de-icing materials that are less toxic to the environment including anti-HCF-type materials (calcium chloride, inhibited phosphate) or MRA (potassium-magnesium acetate), which do not lead

to irreversible changes in photosynthesis and the subsequent destruction of plant tissues and animal deaths;

- Reduce the incidence of dust pollution by good maintenance of the road, regular cleaning and watering to reduce negative effect on vegetation.

Dust, depending on the chemical composition, has a specific effect on plants, caused by the penetration of harmful compounds into the leaf tissue. At the same time accumulation of compounds in plant tissues causes a disturbance of metabolic functions of the body, reducing the amount absorbed by the leaves of photo synthetically active energy and results in accelerated aging. Additionally all transport and haulage vehicles using the road, including construction traffic, should use dust protection tarpaulin or other suitable cover.

Temporary or longer term localized flooding and water logging shall be prevented by culverts and drainage systems to ensure flora and fauna are not affected.

Tree cutting and planting are not applicable and included in this contract.

Specific Fauna Mitigation

The mitigation measures are similar to those discussed for Section 1.

5.3.6 SOCIAL AND ECONOMIC MITIGATION

Livestock Crossing Points

During the first consultation many farmers were concerned about ensuring that sufficient livestock and farm equipment crossing points were included in the design. This is particularly important where a farmer's land is along both sides of the road alignment. But it is also an issue where the road blocks traditional routes for farmers moving livestock and machinery. The design has included 36 under road crossing points for livestock and farm machinery. In addition there are local road overpasses. Almaty Regional Branch of JSC NC "KazAutoZhol" has agreed that additional crossing points can be provided if the community shows that a route is necessary for the farmers or other land users in the area, and that it has no engineering issues. Preferably decisions on the location of any additional crossing points should be made prior to construction start.

Outstanding Acquisition

Land acquisition mitigation aspects are covered in the Resettlement Implementation Report but it is important to stress that the outstanding acquisition is to be completed as soon as possible in accordance with Government procedures and the Resettlement Implementation Report. Any objections and complaints should be in accordance with the Grievance Mechanism included in the RIR for the completion of the acquisition and for the construction period. The issue of crossing points for livestock and farm vehicles and equipment is also covered in the RIR.

5.3.7 HISTORICAL AND ARCHEOLOGICAL MITIGATION

Since there are no Physical Cultural resources within or close to Section 2 alignment special mitigation will not be required.

Nevertheless in the event of any PCR that are discovered during the construction works procedures shall apply that are governed by Kazakh legislation and guidelines, specifically by paragraph 2 of Article 39 of the "Law on Protection and Use of Historical and Cultural Heritage in the Republic of Kazakhstan" which stipulates: "*In case of detection of objects of historical, scientific, artistic, and other cultural value, physical and legal persons are obliged to suspend the further conduct of the work and inform the authorized body.*"

Time will be required for investigation and salvage dig at any discovered site.

5.3.8 ROAD SAFETY AND AESTHETICS MITIGATION

Road Safety

The provision of a new well designed restricted access divided highway ensures many inbuilt safety features not provided in an existing traditional road. Specifically the design of the proposed road will incorporate the following:

- Divided carriageways;
- Limited access and exit;
- Multi level interchanges at busy junctions;
- Good horizontal and vertical sight lines and visibility;
- Clear and consistent road markings;
- Absence of pedestrians and non motorized vehicles;
- Emergency lanes and emergency parking areas;
- High intensity lighting at key intersections and other locations;
- Clear warning and information signs;
- Safety barriers in accordance with international standards, at junctions, embankments and cuttings.

At junctions and access roads to the proposed road it will be necessary to ensure appropriate warning and information signs, street lighting where necessary, and safe facilities for pedestrians and non motorized traffic. Specifically the design has included speed cameras at intersections connected to a central control area. Rumble strips prior to junctions and at other locations have been also included in the design to warn drivers of junctions and slow traffic.

Pedestrian Crossing Points

No specific pedestrian crossing points have been included in the design. Consideration must be given to the provision of pedestrian crossing points where there may be pedestrian movement in Section 2. At grade pedestrian crossing points should include white (zebra) strips on the carriageway, signs and advance warning signs.

At junctions and access roads to the proposed road it will be necessary to ensure appropriate warning and information signs, street lighting where necessary, and safe facilities for pedestrians and non motorized traffic. Specifically the design has included speed cameras at intersections connected to a central control area. Rumble strips prior to junctions and at other locations have been also included in the design to warn drivers of junctions and slow traffic.

Aesthetics

The objective of good aesthetics is to ensure a high quality of design, construction and operation to ensure that the road and its associated structures enhance and improve the landscape and esthetic quality of the area. This can be done through the following design and operation requirements:

- The design of the road and its associated development is of the highest quality, in keeping with the local landscape characteristics and features, and visually pleasing to the eye;
- Wherever possible for the road to be designed to follow existing contours so reducing the need for visually obtrusive deep cuttings and embankments:

The above two requirements have already been incorporated into the design of the road.

- Ensure that all non-operational land is planted and landscaped to the highest level with trees and vegetation that are endemic and suitable for the severe Kazakhstan climatic conditions

- Ensuring the all warning signs, kilometers signs and all other road furniture is designed as a whole and are compatible with the landscape features of the area.

The above two requirements will be incorporated into the detailed design of the road.

- Ensuring that all elements of the road are well maintained, particularly the adjacent landscaped areas and any embankments and cuttings;

This will be operational requirements of the road operators.

5.3.9 WASTE MITIGATION

Waste during Construction Period

The project preparatory work should provide special site provision for temporary storage of waste, indicating methods of removal to a place of disposal, processing or marketing. Disposal of wood and waste from tree and plant trimming should be carried out during the season of felling (preferably in winter).

Contractors must provide containers for all construction waste and should be separated; metals, plastics and construction materials. Any waste and scrap that can be recycled or reused must be separated and stored or taken off site as necessary. Waste materials for recycling and reusing within the construction site should be clearly marked and separated. In all cases storage must take place in clearly marked areas and taken off site as soon as practical. The Waste Management Authority and Rayon Akimat should be consulted in all waste matters. It must be the responsibility of the Contractor to dispose of all waste and to do so in accordance with local and national regulations. Any hazardous waste must be disposed of in accordance with local and national regulations. Disposal of any waste on adjacent sites with or without the land owner's permission, outside the construction site perimeter is not permitted unless the sites are approved waste disposal sites. Prevention of construction waste incineration: burning or incineration of any waste should not normally be permitted unless specifically approved by the waste disposal authority and environmental authority.

All general waste from the workers camps and office locations will be regularly taken by the contractor to the nearest approved waste disposal site. Disposal and incineration at the construction site will not be allowed. Temporary collection points will be provided within the site for all general waste and these will be clearly signed and will be collected regularly. Any medical waste will be disposed of separately to approved medical waste sites.

At the completion of the contract all waste including all temporary site buildings and installations and all unused materials shall be taken off site by the contractor. No waste should be left on any part of the construction site.

Waste during Operation Period

Waste generated during operation will mainly be gravel and salt remnants from winter care, sludge / cake from settling ponds for storm-water, and asphalt, concrete and gravel from repair and maintenance works. None of these wastes is very hazardous and disposal pathways will either be existing municipal waste management facilities, landfills for mineral materials (gravel, rubble) or recycling facilities (cement kilns or asphalt plants). The annual quantities will fluctuate depending on weather conditions (length and severity of wintery conditions) and volume of maintenance works. The range is expected to lie between a few 100s to a few 1,000s of m³ per annum.

Existing waste management disposal facilities within the area are the responsibility of the Rayon. The operator will agree prior to operation on what waste will be delivered to the publicly operated waste management sites. Other waste disposal will be agreed with the Rayon prior to any disposal. Only Rayon approved disposal sites will be used. Any hazardous or medical waste will be disposed of at separate approved disposal sites. The operator will be responsible for all collection within the road and service areas and disposal to the approved and agreed sites. No disposal will take place on the alignment or at the

service/rest areas. No incineration will take place on the alignment or service rest areas unless it is in accordance with local and national incineration regulations.

6. INSTITUTIONAL REQUIREMENTS

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

An environmental monitoring program has been prepared and the cost associated with its implementation has been considered included in the Civil Works Contracts and consultancy supervision project.

6.1 ORGANIZATION ROLES AND RESPONSIBILITIES

The institutions to be involved in the environmental management of the project are the following:

- Government of the Kazakhstan Republic
- Ministry of Investment and Development (MoID)
- Committee for Roads
- International Bank for Reconstruction and Development (IBRD)
- Committee of Environmental Protection under the Government of the Republic of Kazakhstan
- KazAvtoZhol NC – Project implementing Agency
- RSE “KazakhAutoDor” Enterprise on maintaining and operating
- Project Management Consultant (PMC)
- Project Supervision Consultant (PSC)
- PMC – Environmental staff
- Contractor
- Regional and local administration
- Affected communities

6.2 MINISTRY OF INVESTMENT AND DEVELOPMENT (MOID)

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

Specialist staff will be assigned to the PMC to undertake all environmental assessment related tasks. The PMC environment staff will be supported by the PSC (Project Supervision Consultant). The PSC’s team will need to provide an environmental monitoring specialist and social impact monitoring specialist. Currently there are no full-time staff in the PMC assigned to environmental assessment, management or monitoring. Such tasks will be undertaken on a project by project basis by Consultants.

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

- Environmental specialists that are part of the project supervision consultant’s team. The specialists will assist in all aspects of environmental planning and implementation, internal monitoring and evaluation (M&E), and training of PMC and relevant government staff on environmental assessment and World Bank’s Environment Policy; and
- An independent monitoring agency (IMA) could be hired to (i) conduct periodic monitoring and evaluation, (ii) third party validation of implementation of the IEE and EMP activities, and (iii) to ensure that all the identified adverse impacts are being/have been mitigated.

The Committee of Environmental Protection(CEP) under the Government of the Republic of Kazakhstan will be consulted during the feasibility and detailed design processes and will also be requested to confirm, or otherwise, the categorization of the project. The CEP will be requested to review the EIA and approve the

project for its environmental importance. Ongoing consultation with CEP will be required during the implementation of the project.

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

Responsibilities for the implementation of the monitoring requirements of this EIA are shown in Table 7.1. and Table 7.2 under the Environmental Management Plan, Monitoring and Institutional Responsibility of Chapter 7.

Implementation of mitigation measures during the construction stage will be the responsibility of the contractor in compliance with the contract specifications and loan requirements. The environmental specialists of project supervision consultant will supervise the monitoring of implementing mitigation measures during the construction stage. The national environmental specialist will coordinate with the international environmental specialist for resolving complicated issues that arise in the field and to provide continuously updated information in order to submit reports to PMC and WB.

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

It is recommended that periodic environmental monitoring for fauna is needed following the construction of the road.

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

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

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

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

(a) Planning of the road project with special account being taken of:

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

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

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

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

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

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

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

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

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

7. ENVIRONMENTAL MANAGEMENT, MONITORING PLAN AND INSTITUTIONAL RESPONSIBILITY

7.1 ENVIRONMENTAL MONITORING PLAN

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

In response to the environmental impacts identified during the study, an environmental monitoring plan has been developed and is presented in Table 7.1 and Table 7.2. The contract documents will contain a list of all required mitigation measures and a time frame for the compliance monitoring of these activities. The monitoring will comprise surveillance to check whether the contractor is meeting the provisions of the contract during construction.

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

- The contractor will develop site-specific EMPs. The PSCs will use this monitoring plan as a basis for supervision of the Contractor's compliance with these EMPs.
- Supervise the environmental monitoring regularly, and submit quarterly reports: the main parameters to be monitored are outlined in Table 7.1 and 7.2. Usually the PSC provides an Environmental Specialist as part of the PSC team.
- Supervise the subproject roads regularly, and submit quarterly reports based on the monitoring data and laboratory analysis report. The main parameters to be monitored by the contractor are outlined in Table 7.1 and Table 7.2. The contractor and the Supervision engineer will be responsible for subcontracting data collection of environmental monitoring to a recognized organization (e.g., CEP's Analytical Control Laboratory).

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

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

- The tender and contract documents will clearly set out the contractor's obligations to undertake the environmental mitigation measures as set out in this EIA and to be appended to contract specifications;
- The recommended environmental mitigation cost should be included as an item in the Bills of Quantities. This will ensure that there is specific environmental mitigation budget and will be implemented as required. During the procurement, contractors will be encouraged to include these costs in their rates and present the mitigation cost as a line item in the Bill of Quantities.

The PMC will recruit an environmental supervising consultant as part of the PSC team who will supervise the contractor's environmental, safety and health performance. The consultant will cooperate with the local administration.

7. ENVIRONMENTAL MANAGEMENT PLAN: MONITORING AND INSTITUTIONAL RESPONSIBILITY: KURTY –BURYBAITAL ROAD SECTION

Table 7.1:PROJECT IMPACT; MITIGATION MEASURES, MONITORING AND RESPONSIBILITY

CATEGORY	POTENTIAL IMPACT	SIGNIFICANCE	LOCAL IMPACTS	MITIGATION	RESPONSIBILITY	MONITORING	RESPONSIBILITY	LONG TERM IMPACT
1. Air quality	<p>Air pollution:</p> <p>emissions from construction machinery and equipment, emissions from cement-concrete, asphalt-concrete plants, crushers, etc.</p> <p>Dust:</p> <p>from construction activity</p> <p>borrow pits and crushers</p> <p>transport of materials</p>	Potentially significant, especially during dry season	<p>Generally in the area of construction, the existing roads or bypass roads;</p> <p>Potential impact on adjacent villages Kanshengel, Mynbay, Kurty, etc.;</p> <p>Local influences Sections 1 and 2 aren't predicted</p>	<p>All vehicles and the equipment used in construction have to undergo technical/maintenance check-up, be appropriately maintained and used according to recommendations of manufacturers.</p> <p>All access and bypass roads have to watered.</p> <p>All plants/dust-generating equipment should be technically fit and be located at distance from all sensitive zones.</p>	<p>The contractor bears responsibility for implementation of mitigation measures.</p> <p>Supervision Engineer monitors the compliance with mitigation plan.</p>	Regular (monthly) monitoring by licensed laboratories at designated sampling points and on-site compliance checks by Supervision Engineer.	<p>Contractors</p> <p>Supervision Engineer</p>	Long term impact is limited
2. Noise and vibration	<p>Noise from construction machinery and equipment</p> <p>Noise from cement-concrete and asphalt concrete plants, crushers, etc.</p> <p>Transport noise on the access roads</p>	Potentially significant	<p>The area of construction, access and bypass roads.</p> <p>Potential impact on nearby residential areas.</p> <p>Potential impact on the settlement Kanshengel;</p> <p>Local impacts on Sections 1 and 2 are not predicted.</p>	<p>All vehicles and the equipment used have to be technically fit, regularly maintained and used according to recommendations of manufacturers.</p> <p>All plants have to work according to recommendations of the manufacturer and located at distance from residential areas.</p> <p>Any types of works during night time near residential areas of the settlements of Kanshengel and Aydarly, Mynbay and Kurty should be prohibited.</p> <p>Speed limit of 60 km/h for all construction machinery enforced.</p>	<p>The contractor bears responsibility for implementation of mitigation measures.</p> <p>Supervision Engineer monitors the compliance with mitigation plan.</p>	Regular (monthly) monitoring by licensed laboratories at designated sampling points and on-site compliance checks by Supervision Engineer.	<p>Contractors (through licensed laboratories)</p> <p>Supervision Engineer</p>	No long term impact
3. Water,	Pollution by a runoff from	Influence is moderate to	Potential impacts in the area	CoR, Committee on water resources	CoR, Committee on water	Regular (monthly)	Contractors (through	Long-term

drainage system and floods	<p>the construction sites in the areas of bridge construction is possible</p> <p>Infiltration of the polluted water in the water-bearing horizons</p> <p>Pollution of underground waters at pits/quarries (accidental spills)</p> <p>Pollution of surface and underground water sewage from camps.</p>	<p>low. Places of water intakes from wells (drinking water and technical water) and river Kurty (technical water) will be agreed with Committee on Water Resources.</p> <p>Pollution of underground waters is unlikely as deep soil excavation isn't planned.</p> <p>Pollution from camps can be moderate to significant</p>	<p>of Kurty river (bridge construction).</p> <p>Potentially – all alignment</p> <p>Areas of location of the construction camps</p>	<p>and Akimats of districts in consultation with contractors. The contractor will organize water intake only from designated sources.</p> <p>Good housekeeping at construction sites.</p> <p>Areas of potential pollution of rivers will be designed to prevent accidental spills and runoff and protected by sediment settlement ditches.</p> <p>Sewage at construction camps will be collected in septic tanks and transported/discharged at wastewater treatment plants.</p>	<p>resources (permits for water intakes) and Akimats of districts in consultation with contractors.</p> <p>The contractor bears responsibility for implementation of mitigation measures.</p> <p>Supervision Engineer monitors the compliance with mitigation plan.</p>	<p>monitoring by licensed laboratories at designated sampling points and on-site compliance checks by Supervision Engineer.</p>	<p>licensed laboratories)</p> <p>Supervision Engineer</p> <p>Committee on water resources</p>	<p>impacts are possible if mitigation measures are not in place</p>
4. Erosion and pollution of soils and subsoil layers	<p>Soil erosion (wind and water) due to removal of vegetation and topsoil.</p> <p>Pollution of the soil and subsoil layers as a result of construction and accidental spills.</p>	<p>Potential impacts are low to medium (earthworks on the alignment and operation of borrow pits).</p>	<p>Local impacts are expected only in the areas of borrow pits and earthworks on embankment along the alignment.</p>	<p>All recommended methods on reduction and elimination of an erosion were included in the program of construction</p> <p>Construction methods on reduction or elimination of pollution of soils and subsoil layers.</p> <p>All temporarily used lands have to be restored and returned in an agricultural turn according to the legislation</p>	<p>The contractor bears responsibility for implementation of mitigation measures.</p> <p>Supervision Engineer monitors the compliance with design and mitigation plan.</p>	<p>Contractors</p> <p>Supervision Engineer</p>	<p>Contractors</p> <p>Supervision Engineer</p> <p>Committee on roads</p>	<p>Erosion is possible if there is no proper management and prevention during construction.</p>
5. Flora and fauna and the sensitive and protected territories	<p>Impacts on vegetation along the alignment.</p> <p>Disturbance of fauna in the area of influence of the construction works</p>	<p>Potential impacts are Low to Medium</p> <p>Impacts on protected area Zhasandaly will be minimal.</p> <p>Temporary disturbance of birds and animals in the immediate proximity to the construction sites, batching plants, crushers or borrow pits is possible.</p>	<p>Moderate loss of vegetation is possible.</p> <p>Illegal hunting is possible</p>	<p>Culverts, cattle underpasses and bridges will serve as crossing points for wild animals.</p> <p>Hunting by workers around the project area will be prohibited.</p> <p>The contractor should prevent his personnel from hunting/poaching in the area of Zhasandaly protected area.</p>	<p>The contractor bears responsibility for implementation of mitigation measures.</p> <p>Supervision Engineer monitors the compliance with design and mitigation plan.</p>	<p>Regular monitoring of proper vegetation and topsoil management by the Contractor.</p> <p>Supervision Engineer will monitor the compliance with design and mitigation plan.</p>	<p>Contractors</p> <p>Supervision Engineer</p> <p>Committee on forestry and wildlife</p>	<p>No significant long-term impact on flora and fauna is expected</p>
6. Social / Economic /	Land loss/ land plots	Potential impacts are low	There are cases of land (open space land plots)	Land acquisition will be carried out according to the legislation of	Contractors	CoR, Akimats/local authorities and	Regular monitoring of possible impacts on	Long-term consequences

Farmers	<p>acquisition .</p> <p>Possibility of employment during construction</p> <p>Inconvenience for farmers (cattle crossing the road)</p> <p>Loss of trade along the road</p>	<p>to moderate</p> <p>Employment opportunities emerge for local population</p> <p>Potential impacts on farmers (animal husbandry)</p>	<p>acquisition along the alignment</p>	<p>Kazakhstan and Resettlement Action Plan (RAP)</p> <p>Encouragement of hiring of local labor</p> <p>Consideration with local population on additional cattle crossings (August 2014)</p> <p>Compensation for loss of income should be paid or other appropriate mechanisms put in place according to the legislation of Kazakhstan and RAP</p>	Akimats	contractors	<p>farmers by Supervision Engineer</p> <p>Committee on Roads will monitor if the affected persons were compensated.</p>	<p>are possible if cattle crossings are not built</p>
7. Historical and archeological monuments	<p>Some archaeological monuments on Section 1 are within right of Way.</p> <p>Danger of loss and destruction of barrows outside the RoW on Section1</p> <p>There are no historic or cultural sites on Section 2.</p>	<p>Potential indirect impacts on archaeological monuments ## 6 and 7 and on memorial placemarks.</p>	<p>Potential indirect impacts on archaeological monuments ## 6 and 7 and on memorial placemarks. .</p>	<p>Archaeological monuments ## 6 and 7 should be fenced to secure protection.</p> <p>Memorial placemarks will be relocated in coordination with local authorities. Other historic places outside Right of Way, but within 2 km from the route have to be protected from plunder and destruction.</p> <p>Chance finds procedure to be followed by the contractors. According to the state procedures, works will be immediately stopped, for studying, record and excavation.</p>	<p>The contractors will be responsible for fencing of the archaeological monuments ## 6 and 7 and relocation of memorial placemarks.</p> <p>In case of chance finds, the contractors should immediately inform the Ministry of Culture on any found artifacts or remains, and stop all construction works and notify the authorities on cultural heritage.</p> <p>Protection of other monuments on Section 1 is responsibility of state institutions on protection of cultural and archaeological heritage (i.e. Ministry of Culture)</p>	<p>Supervision Engineer, local authorities and authorized representative of the Ministry of Culture will check compliance with this plan and chance finds procedure.</p>	<p>Supervision Engineer and authorized representative of the Ministry of Culture</p>	<p>Provided that all laws will be observed and the specified archaeological sites ## 6 and 7 will be fenced and memorial placemarks relocated, long-term influences aren't expected.</p>
8. Traffic safety	<p>The intensity of traffic on the main road can affect traffic safety.</p>	<p>Potential impact is low to medium</p>	<p>Sections of the alignment close to settlements and places of access/bypass roads joining the main road</p>	<p>Speed limit enforcement.</p> <p>Correct road marking and signage</p> <p>Informing local population.</p> <p>Responsible actions of the contractor.</p>	The Committee on Roars and the contractors	<p>Regular monitoring and reporting of any accidents and complaints</p>	<p>Supervision Engineer</p> <p>Committee on Roads</p>	<p>No long-term impacts</p>

				Arrangement of crosswalks, if required.				
9. Waste management	Generation of the construction debris and household wastes which are subject to landfill disposal.	Potential impact is low to medium	Potential impacts near construction camps	.Construction debris will be used (if technically possible) for construction of embankments. Household waste regularly to be disposed at designated landfills	Contractor together with local authorities	Supervision Engineer should carry out regular monthly monitoring of sites and activities on waste management	Supervision Engineer and local authorities	Provided that all waste will be taken out to designated landfills, long-term impacts aren't expected
10. Borrow pits/quarries and access roads	Quarries/Borrow pits: Local violations in environment, especially dust and noise from equipment and vehicles. Inconveniences for agricultural activity Access roads: Inconveniences for agricultural activity	Potential impacts are possible. Existing pits are already defined, bur additional borrow pits will be needed. Location of access roads have to be coordinated with local authorities within 2 weeks after the beginning of works.	Considerable local impacts near pits and access roads are possible.	Location of borrow pits and access roads have to be coordinated prior to works Only approved pits can be used, together with the plan of works on closing and recultivation	Contractors Local authorities	Regular monthly monitoring of any influences, cases and complaints	Supervision Engineer and local authorities	Provided that impacts are mitigated properly, long-term influences aren't expected.

Table 7.2: IMPACTS DURING OPERATION; MITIGATION MEASURES, MONITORING AND RESPONSIBILITY

CATEGORY	POTENTIAL IMPACT	SIGNIFICANCE	LOCAL IMPACTS	MITIGATION	RESPONSIBILITY	MONITORING	RESPONSIBILITY
1. Air quality	Emissions from transport on the route Emissions from activities for repair and the maintenance of roads	insignificant provided that vehicles are in a good condition	Potential impact on adjacent sites near the settlement of Kanshengel; Other local impacts are not expected	All vehicles have to conform to standards of emissions All equipment for repair and the maintenance of the road conforms to standards of emissions Regular monitoring at designated sampling sites for determination of need of additional measures for mitigation	CoR and Committee of environmental regulation and control of Almaty oblast	monitoring near sensitive zones sites and in other places as required	Contractor during defects liability period
2. Noise	Emissions from transport on the route Emissions from activities for repair and the maintenance of roads	insignificant provided that vehicles are in a good condition	Potential impact on adjacent sites near the settlement of Kanshengel; Other local consequences aren't expected	All vehicles have to conform to standards of emissions Old and faulty vehicles shouldn't be on the route To observe the minimum and maximum restriction of speed All equipment for repair and the maintenance of the road conforms to standards of noise monitoring near sensitive zones for determination of need of additional measures for mitigation	CoR and Committee of ecological regulation and control of Almaty oblast	monitoring near sensitive zones sites and in other places as required	Contractor during defects liability period
3. Water, drainage system and floods	Sustainability of water sources for operation Floods Pollution of surface and underground water because of activity on the road and places of rest/service	Potential localized impacts Pollution won't be considerable if the road is in effective management.	No significant local impacts expected	To maintain drainage systems operational. Good management and the maintenance of the route will provide a normal flow of water courses.	Committee on water resources RSE KazakhAutoDor	monitoring of water quality (surface water)	Committee on water resources
5. Flora and fauna and the sensitive and protected	Long-term impact on wild animals, Violation of flora and fauna from use of salts and chemicals for thawing of	Impacts are low	There are no any exact local impacts	Underpasses for cattle will serve as crossing points for wild animals (it is	RSCE «PD «Okhotzoorpom»	CoR, Committee on forestry and wildlife , and	RSCE «PD «Okhotzoorpom» and Department of forestry and wildlife, RSE KazakhAutoDor together with regional administration to control requirement in

territories	snow and ice The increase in illegal hunting because of increased access			already included in the project) To study need of additional measures (e.g. fencing) for large mammals. To control and prohibit illegal hunting	and Department of forestry	regional administration	additional points of crossing of the route for mammals, etc.
6. Social / Economic / Farmers	Increase in economic activity because of the improved road. Opportunities for permanent job in the maintenance of roads Opportunities for business and employment in zones of roadside service Some violation of activity of farmers who got under land acquisition for construction of the highway.	Considerable economic and social benefits Some adverse effects on activity of farmers due to the need to use underpasses for animals and/or agricultural machinery.	There are not any exact local influences, except for agricultural and pasturable lands. Settlements along the existing road	To hold informative events for local population, how to receive benefit from the improved route To consider additional cattle crossings and passes for agricultural machinery if necessary and as required (see mitigation measure)	Regional administration and RSE KazakhAutoDor have to consider additional points of transition (bridges) in cooperation with local population, if necessary. Akimats/local authorities	Monitoring of adverse effects on local population and farmers Affected persons will be contacted to check if compensation in any form took place.	Administration of districts and Almaty oblast
7. Traffic safety and esthetics	Increased number of road accidents Danger to pedestrians, there are not enough crosswalks	Low / medium level of impact	Alignment generally Crosswalks	Special measures in the project will reduce risk of accidents: the separation barrier, good visibility, road marking and signs, etc. There will be some settlements near the road, and very few pedestrians near the road and road crossing	Already included in the project	Monitoring and registration of all road accidents	RSE KazakhAutoDor
8. Waste management	Wastes from the maintenance of roads and rest stops / service: problems of collecting and waste disposal	Low impact	In rest and service areas	CoR has to ensure regular cleaning and collecting all liquid and solid waste and utilization according to the accepted rules and procedures. The company for operation of the road will be responsible for collecting waste from rest stops / service.	Road Department and local administration	Regular monthly monitoring of sites and collecting and waste disposal.	RSE KazakhAutoDor

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