SFG1818

REPUBLIC OF KAZAKHSTAN
MINISTRY OF INVESTMENT AND DEVELOPMENT
COMMITTEE FOR ROADS

CENTER SOUTH ROAD CORRIDOR PROJECT: KARAGANDA – BALKHASH – BURYLBAITAL SECTION

ENVIROMENTAL MANAGEMENT PLAN KARAGANDA – BALKHASH – BURYLBAITAL ROAD SECTION (KM 1620 – KM 1713)

FINANCED BY INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT AND THE REPUBLIC OF KAZAKHSTAN

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ABBREVIATIONS

Akimat	Regional executive body in Kazakhstan
CfR	Committee for Roads (Ministry for Investment and Development)
DE	Design Engineer
ESF	Environment and Social Field
EMF	Environmental Management Framework
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
FS	Feasibility Study
H&S	Health and Safety
HGV	Heavy Goods Vehicle
ME	Ministry of Energy of the Republic of Kazakhstan
CfEACSIiOG	Committee for Environmental Adjustment, Control and State Inspection in Oil and Gaz Sector
MID	Ministry of Investment and Development of the Republic of Kazakhstan
IBRD	International Bank for Reconstruction and Development
PAP	Project-Affected Persons
HCH	Historical and Cultural Heritage
PMC	Project Management Consultant
CSC	Construction Supervision Consultant
MP	Monitoring Plan
RK	Republic of Kazakhstan
RPF	Resettlement Policy Framework
SEE	State Environmental Expertise
SoW	Scope of Work
WB	World Bank

1. INTRODUCTION

The total length of Astana-Karaganda-Balkhash-Almaty road section of the Center South Corridor reconstruction, "Border of the Russian Federation (to Yekaterinburg)-Almaty km 1620-1713" is about 93 km. Partial reconstruction and widening of the existing road within the existing right of way is planned within the project implementation. The project passes through a variety of land forms, land-use types and (micro) climatic zones.

The Government of Kazakhstan has now requested that the World Bank provides funding for development of the Centre South Road Corridor Project through road rehabilitation and widening from 2-lane to 4-lane road on the existing alignment connecting Astana and Almaty in order to achieve the following:

- Lower vehicle operating costs;
- Lower travel times;
- Greater access to markets and job opportunities;
- Higher economic opportunities; etc.

In accordance with the requirements of the Government of Kazakhstan, the Environmental Impact Assessment (EIA) reports have been prepared. These EIA reports development was conducted in accordance with the provisions of the Environmental Code of the Republic of Kazakhstan and other applicable legal and regulatory guidance documents of the RK that are regulating environmental protection and safety issues. The content and composition of the EIA materials meets the requirements of "Guidelines for the Assessment of Proposed Economic and Other Activities on the Environment in Development of Pre-planned, Planned, Pre-design and Design Documentation approved by the Decree of the Minister of Environment of the Republic of Kazakhstan dated June 28, 2007 № 204-p".

In accordance with the World Bank requirements and operational procedures, this Road Corridor section has been defined as a Category A project, and the EIA report is necessary to be prepared in accordance with the World Bank Operational Procedures of "Environmental Impact Assessment" OP 4.01. Accordingly, the ESIA report structure has been prepared as suggested by the World Bank's operational policies and related guidelines. This work has been carried out by the Environmental Team experts from "KazdorNII" BJSC (Astana) together with the Appointed Sub-Consultant of "KazCEP" LLP in accordance with the Terms of Reference agreed with the Committee for Roads.

The ESIA report provides full information on the Center-South Project: Karaganda-Balkhash-Burylbaital-Kurty-Kapshagay road section; this document also covers all the 18 design road sections.

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

- Project Description
- Analysis of Alternatives
- Environmental and Social Baseline Data
- Environmental and Social Impacts Assessment

- Impacts Mitigation Measures
- Monitoring Plan
- Institutional Obligations
- Information Disclosure, Consultation and Public Hearings. Parties Involvement and Mechanism

2. PROJECT DESRIPTION

2.1 GENERAL PROJECT INFORMATION

"Center-South"Road Corridor Project is a large road segment with high level of traffic which connects Almaty and Astana. Karaganda-Balkhash-Burylbaytal road section from 1620 km to 1713 km has a total length of approximately 93 km.

Karaganda-Balkhash-Burylbaytal road section is located in Karaganda oblast. This route objective is to provide all-weather highway through the western China, Kazakhstan and Russia. This route will have significant economic benefits and will greatly improve flow of goods, tourists to improve social contact between China and Kazakhstan.

The existing road is Category II road which was constructed in late 2006, and now, it is planned to reconstruct the road section to Road Category Ib.

The proposed road alignment will be partially rehabilitated in the existing road within the existing right of way (70 m) almost parallel to the existing road. The design road crosses a variety of landscapes, land use types and (micro) climatic areas. The road alignment lies across Karaganda oblast.

The project has been structured and designed in two sections with the length of 46 km to 47 km as shown in the Table 2.1.1. The designs are under development and expected to be completed in late 2015. The detailed information for the design sections is presented below:

Table 2.1.1 Centre South Road Corridor: Karaganda – Balkhash – Burybaital Section

№ of section	**Name of Section**	**Length from and to, Km**	**Length of Each Section, km**
		Km	**Km**
1	**"Aksu-Ayuly-Batystau"**	**1620-1666**	**46**
2	**"Batystau-Akchatau"**	**1666-1713**	**47**
	Total:		**93**

The lengths of the road sections and oblast through which it will pass are presented below:

- Karaganda Oblast: Length of the road section is 93 km. The section is located in Shet District of Karaganda Oblast between Aksu-Ayuly and Akshatau villages.

This project is large and significant enough, which will have environmental and social impacts, as well as will require land acquisition along the existing route and for by-passes. All these land plots that are subject to acquisition will be identified upon completion of the detailed design. The above-specified impacts are site-specific; few impacts such as land acquisition for a new road section and bypasses are irreversible, but in most cases mitigation measures will be developed.

2.2 Project Characteristics

Key technical characteristics of the projected road are as follows:

- road category – 1b;
- length – 93 km;
- roadbed width – 25,5 m;
- number of traffic lanes – 4;
- width of median – 3m;
- maximum estimated width of right of way – 70 m;
- maximum estimated speed – 120 km/h;
- average estimated speed – 80 km/h;
- bridges and overpasses – will be determined upon the completion of detailed design for each road section
- culverts – will be determined upon the completion of detailed design for each road section
- rest areas – will be determined upon the completion of detailed design for each road section
- type of pavement and type of coverage – asphalt-concrete.

Estimated construction period: 3 years (36 months).

Construction works include the following:

- Site clearance and preparation;
- Borrow pits installation and operation;
- Construction of workers' camps, warehouses and workshops;
- Roadbed construction;
- Road surface construction;
- Road pavement construction;
- Construction of junctions and crossings;
- Construction of multi-level interchanges;
- Construction of bridges and overpasses;
- Installation of traffic signs and fences;
- Application of road marking;
- Construction of drainage channels for the roadway and bridges;
- Construction of training dikes near artificial structures

Typical road cross-section for the proposed widening in cases if the road passes through the flat terrain, undulating and hilly sections are shown below.

Figure 2.2.1 (a): Typical Road Cross-Section for the proposed rehabilitation and widening of the existing road.

Typical section of the proposed road passes through the flat terrain

The topography of the area is flat with natural incline.

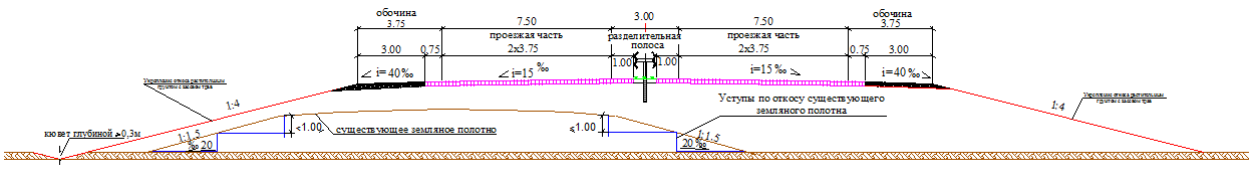
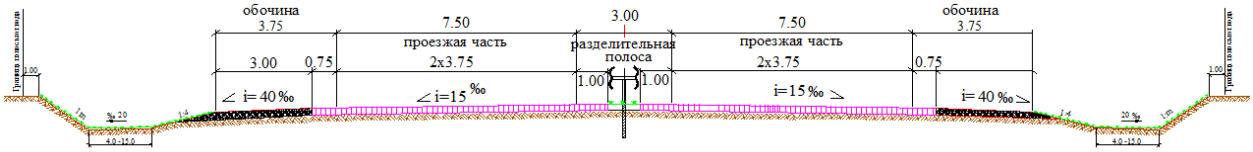


Figure 2.2.1 (b): Typical Road Cross-Section for the proposed rehabilitation and widening of the existing road.

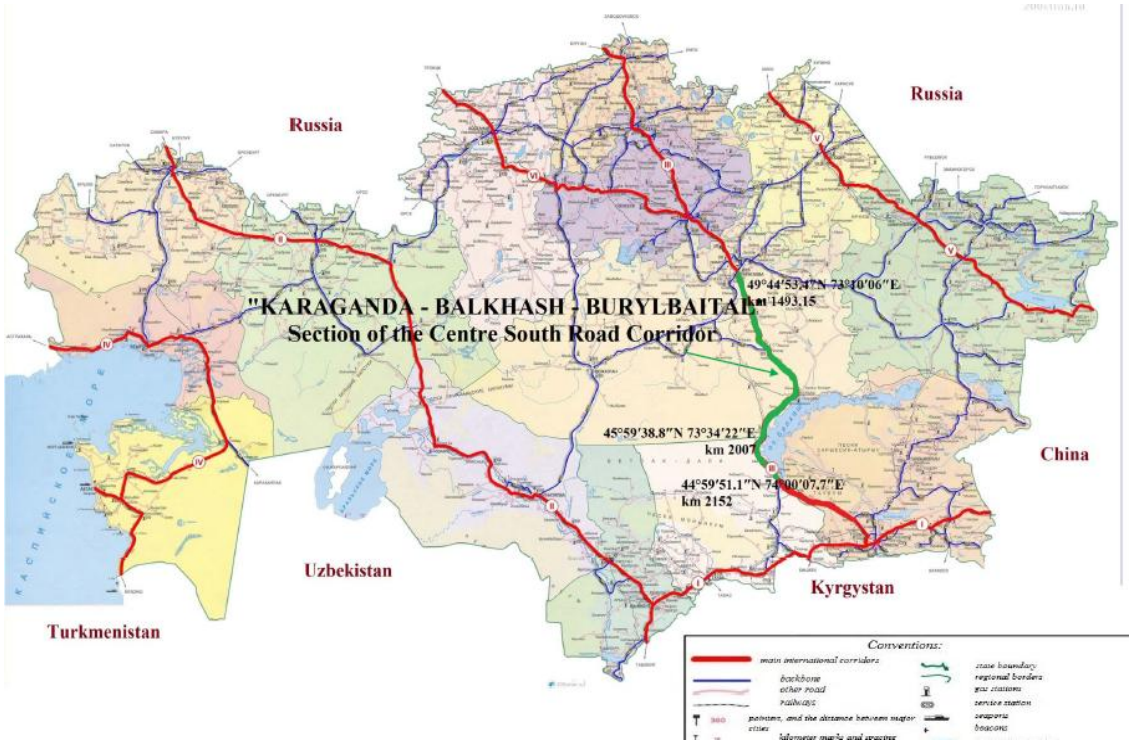
Typical road section passes through hilly and twisting areas



2.3 Road Section in Karaganda Oblast[1]

Astana-Karaganda-Balkash-Almaty road, "Border of the Russian Federation (to Yekaterinburg) – Almaty km 1620-1713" road section, is the III category main road that connects Astana and Almaty. The section is located in Shet District of Karaganda Oblast between Aksu-Ayuly and Akshatau villages.

The draft project for reconstruction of Astana-Karaganda-Balkash-Almaty road of the Center-South Corridor, "Border of the Russian Federation (to Yekaterinburg) – Almaty" road section for km 1620-1666 and km 1666-1713 has been developed by the designers, "Doris" LLP and "Astana" Engineering Center" LLP in accordance with the Terms of Reference and requirements of SNiP RK 3.03-09-2006* based on the standards for 1b category road



[1] Karaganda Oblast is located in the central part of Kazakhstan. It extends for 600 km from north to south and for 1 100 km from east to west. The area of the territory is 402.4 thousand. km2. In the north it borders with Kostanay, Akmola and Pavlodar oblasts, on the east - with East Kazakhstan, on the south - with Almaty, Zhambyl, South Kazakhstan and Kyzylorda oblasts, and on the west - with Aktobe Oblast. The total length of Karaganda Oblast borders is about 4 thousand km. Karaganda Oblast has three sequentially changing zones from north to south: arid steppe, semi-dry semi-desert and dry northern desert.

2.4 Traffic Volumes and Transport Modes

In roads classification, traffic volume is taken into account as one of many factors. Based on the information received from the Committee for Roads of the MID RK, the following traffic volume, specified in the Table 2.4.1., had been recorded in the past 5 years.

Table 2.4.1 Information on traffic along Karaganda-Burybaytal Road Section for the period of 2009-2014

Oblast	km	Traffic Volume	Year
Karaganda Oblast	1620 - 1713	4646	2009
		4916	2010
		5023	2011
		7352	2012
		6489	2013
		9916	2014

The table above shows that the traffic volume is increasing year after, due to which the road widening is required for further road safety compliance.

2.5 Artificial Structures

According to the results of completed draft projects reports on two following sections, 2 bridges construction has been planned: the bridge across waterless valley on the road section of km 1620-1666 and the bridge over Bidayyk River on the road section of km 1666-1713. Detailed information on the planned bridges is given below. Currently, the design works are continued for the remaining 16 sections of the road and information on bridges for these sections will be presented in the draft project.

Bridge across waterless valley on the road section of km 1620- km 1666

The bridge in the plan and longitudinal profile is located on a straight section. Dimension of the bridge carriageway is D = (9.5m + DS (Dividing Strip) – 3.0 + 9.5m). The bridge length is 18.1m. The size of the clearance and the number of spans for the new bridge has been approved by analogy with the existing replaceable bridge. Single-span beam-split bridge design has been developed in the project. The size of the span by the bearing axes is 17.4 m.

The size of the bridge clearance was approved given the executed hydraulic calculation and estimated flow characteristics received as the result:

Table 2.5.1 Bridge across waterless valley on the road section of km 1620 – km 1666

Water discharge Q1%, m^3/sec	Backwater before the bridge H_0, m	Critical depth of the flow under the bridge $h_к$, m	Average depth of the flow under the bridge h_c, m	Flow rate under the bridge V, m/sec
43,4	1,52	0,88	0,52	4,91

The platform of the bridge span bottom is set at mark of > 5.0 m above the ground taking into account agricultural machinery access according to the letter №28-01/04-1810 dated 09.12.2014, "KazAvtoZhol" National Company" JSC, Karaganda Oblast Branch in "Doris" LLP.

In addition to the bridge, the projected road provides small artificial structures - round and rectangular reinforced concrete pipes in the amount of 30 pcs. Detailed description of the existing and planned artificial structures is given in the draft report for the section of 1620 km-1666 km, and the probability of the artificial structures use for short-term movement of animals in the alignment area will be described in the RAP.

Bridge over Bidayyk River on the road section of km 1666- km 1713

2x18m bridge layout. The planned bridge crosses the existing riverbed at 90 degree angle. Water discharge in the riverbed is 86 m3/s.

Three-span beam reinforced concrete existing bridge over the dry riverbed of Bidayyk River has a rectangular shape and is oriented from northwest to southeast. The bridge length is 42.0 m, width 11.1m, the width of the carriageway is 8.6m, height is 2.6m. The bridge carriageway surfacing is made of asphalt-concrete, sidewalk is missing. The edges of the bridge have a fencing with the height of 1.2 m. Supports of the bridge have rectangular shape. The slope near ledges is firmed by reinforced concrete slabs of 1.5x0.8m dimension. State of the slabs is satisfactory. The bottom of the riverbed near the bridge is concreted. The bridge formula is 14.2+12.1+15.7.

The bridge designed is located in the layout in a circular curve with the radius of 5000m and on the longitudinal slope of 2%. The bridge is designed according to the scheme 2*18m separately for each traffic direction. The total length of the bridge is 36.21m. Dimension of the bridge: D-(2x11.5) + 2x0.75m. Clear opening height is 5.20m, approved for the passage of agricultural machinery. Carriageway for each traffic direction includes two lanes 3.75m wide, as well as the adjacent safe margins 2.0m wide. The total width of the dividing strip between the traffic lanes of different directions on the bridge, as well as on the main road, is 4.0 m. There are service passages with the width of 0.75 m on both sides of the bridge.

The project provides construction of an underpass for agricultural machinery and livestock in PK 266+72.22, PK 11+12.20, PK 102+40, PK 311+54.7, PK 334+01.8, PK 366+20.

The main road provides 67 small artificial structures – round ferroconcrete, rectangular ferroconcrete and corrugated metal pipes, including:

<u>34 pcs at km 1620-1666</u>

Round ferroconcrete pipes:

- d = 1,5m – 18 pcs, total length 486,57m.

Rectangular ferroconcrete pipes:

- opening (2,0x2,0m) - 8 pcs, total length 223,57m;
- opening (2,5x2,0m) – 1 pcs, length 30,49m;
- opening (4,0x2,5m) – 1 pcs, length 27,44m;
- opening 2x(4,0x2,5m) – 4 pcs, total length 92,47m.

Corrugated metal pipes (CMP):

- d = 6,0x3,07m - (PK 319+45) - 1 piece, length 32,64m;
- d = 2x(6,0x 3,07m) - (PK 420+79) – 1 pcs, length 32,64m.

33 pcs at km 1666-1713

Round ferroconcrete pipes:

- d = 1m – 3 pcs, total length 77,85 running m.
- d = 1,5m – 12 pcs, total length 627,58 rm.
- d = 2x1,5m – 7 pcs, total length 133 rm.
- d = 3x1,5m – 5 pcs, total length 189,60 rm.
- d = 1,5x1,5m – 1 piece, total length 19,27 rm.

Rectangular ferroconcrete pipes:

- opening 4x2,5m - 2 pcs, total length 74,32 rm;
- opening 2x(2x2,5m) – 2 pcs, length 97,42 rm;
- opening 2x(4,0x2,5m) – 1 piece, total length 92,47m.

Corrugated metal pipes (CMP):

- d = 6,0x3,07m - (ПК 319+45) - 1 piece, length 32,64m;
- d = 2x(6,0x 3,07m) - (ПК 420+79) – 1 piece, length 36,21 rm.

In addition, ferroconcrete pipes, d = 1,0m - 3 pcs, total length 51,74m, are installed at junctions.

All the ferroconcrete rectangular pipes, opening (4,0x2,5m), and corrugated metal pipes will be used as underpasses.

2.6 Borrow Pits and Construction Materials

Natural sources for inert aggregates suitable for road construction are available in the needed quantities along the road alignment areas. Locations of the licensed borrow pits at each road section will be determined by the designers.

District akimats and all other authorized institutions provided permits for the existing subsoil reserves and borrow pits, including environmental permits. It is available for use by the contractor depending on the contractor's precise requirements. The contractor is not normally interested in direct ownership of a borrow pit and enters into a contract with the owner/operator of the borrow pit to purchase the specified amounts of materials that are necessary for the project implementation.

The road contractor is responsible for maintaining the general public and private access roads between the borrow pit and the construction site.

Direct extraction of materials from the river beds is not allowed and is not approved by the Committee for Water Resources. Normally, borrow pits are not allowed to be established within the range of less than 500 meters from any river.

All proposed borrow pits require approval from a range of local authorized institutions, including inter-regional commissions. The EIA project must be developed by the owner/operator. When the contractor submits its application, it must attach the EIA along with all the documentation and expertise conclusions to Oblast Department for Environment Protection to obtain permits for emissions and impacts. The final approval process includes the requirement that in a borrow pit opening stage the removal and storage of fertile topsoil must be carried out, and then, the fertile topsoil must be re-cultivated after the borrow pit closure. This document will be prepared after signing the prospecting and extraction contract. The general approval process for a new borrow pit from Oblast and District authorized bodies may take up to 2 years. Therefore, contractors will

likely use the existing borrow pits with the existing permits. Permits from water resources protection authorities are not required; however, the EIA should contain the description of impacts on surface and groundwater resources.

For the existing borrow pits defined by the Design Engineers, all the EIA procedures have been completed and environmentally accepted. There will be no adverse impacts on surface and groundwater resources, as well as other aspects. Nevertheless, once the borrow pits that are used will have been identified by the Contractor, due inspection will be carried out to confirm that those borrow pits are operating or operable in an appropriate manner.

Detailed design for two road sections only out of the fourteen road sections of Karaganda-Balkhash-Burylbaital road section of the Centre South Road Corridor construction is under completion. These sections are between km 1 620 - km 1 666 and km 1 666 – km 1 713. Construction materials borrow pits and soil reserves along the alignment in these sections that have been suggested by the design engineers are specified below:

km 1 620 – km 1 666 Section

For the construction of pavement, imported stone materials, as well as local materials will be used, which will be provided by different suppliers, as it is shown in the table below:

Table 2.6.1 Construction Materials Borrow Pits for km 1 620 – km 1 666 Road Section

Construction materials	*Borrow pits*	*Status*	*Suppliers*
Sand-gravel	Karabass borrow pit, Kalagirskoye field.	Existing	"Karaganda Neruda" LLP, "MetallTerminalTrade" LLP
Crushed stone	Karabass borrow pit	Existing	"Karaganda Neruda" LLP
Concrete	is prepared on-site	Existing	
Bitumen	-		Pavlodar Refinery
Hot asphalt-concrete	-		Asphalt-Concrete Plant at km 1640 + 50

In the survey process, the design area was surveyed for the availability of soils that are suitable for use in the road reconstruction.

Fig. 2.6-1 Map of soil borrow pits for reconstruction of km 1620- km 1666 road section

In conduct of geological engineering survey, four subsoil reserves that can be used in the construction of the roadbed have been explored:

Table 2.6.2 Subsoil reserves in km 1 620-km 1 666 Road Section

No.	*Subsoil Reserve*	*Material*	*Status*	*Distance from the road, km*
1	Reserve №1 km 1620+400 of Almaty-Karaganda road	Loamy soil	Explored/ proposed by the Designers	110 meters from the road axis, soil-vegetable layer capacity is 0,1 m
2	Reserve № 6 km1645+950	Fusible clay soil	Explored/ proposed by the Designers	87 meters from the road axis, soil-vegetable layer capacity is 0,2 m
3	Reserve № 8 km 1657+300	Fusible clay soil	Explored/ proposed by the Designers	145,5 meters from the road axis, soil-vegetable layer capacity is 0,1 m
4	Reserve №9 km 1664+450	Loamy soil	Explored/ proposed by the Designers	135 meters from the road axis, soil-vegetable layer capacity is 0,2 m

1 666 km -1 713 km Section

Construction materials for reconstruction of km 1 666-1 713 road section must be supplied by the enterprises located nearby as shown in the table below:

Table 2.6.3 Construction materials borrow pits within 1666 km-1713 km road section

Construction Material	*Supplier*	*Borrow Pit*	*Borrow Pit Status*
Sand	"Gaukhartas" LLP	The borrow pit is located 2.3 km from Bereznyaki village	Existing
Fractional crushed stone	"Karaganda Neruda" JSC	"Karabas"	Existing
Fractional crushed stone	"Nova Zinc" LLP	"Akzhal"	Existing
Fractional crushed stone	"Nepz-D" LLP	The borrow pit is located 18 km north from the city of Balkhash	Existing

Characteristics of the material, data on borrow pits performance, as well as recommendations for use are given in the "Bulletin of Deposits and Other Sources of Construction Materials" in accordance with the results of laboratory tests and data provided by the manufacturers.

The following five soil reserves have been explored for the roadbed construction:

Table 2.6.4 Soil reserves within km 1666 – km 1713 road section

No.	*Soil Reserve*	*Material*	*Status*	*Area, ha/ Distance from the road, km*
1	Reserve №1 PK 89 + 50 - PK 96 + 93	Soil	Explored/ proposed by the Designers	27.42 ha./ 0.15 km to the right
2	Reserve № 2 PK 183+ 95 - PK 190 + 36	Soil	Explored/ proposed by the Designers	23.69 ha./ 0.27 km to the right
3	Reserve № 3 PK 289 + 35 - PK 294 + 75	Soil	Explored/ proposed by the Designers	32.7 ha./ 0,19 km to the right
4	Reserve №4 PK 412 + 94 - PK 417 + 74	Soil	Explored/ proposed by the Designers	14.85 ha./ 0,13 km to the right
5	Reserve №5 after the existing 1 713 km sign	Soil	Explored/ proposed by the Designers	15.25 ha./ 0,16 km to the right

The reserves that are under exploration are located in the territories occupied by low-value grasslands. Location of soil reserves, soil peculiarities and guidelines for its use, as well as data on transportation distance are specified in the soil reserves passports.

The proposed borrow pits are available for use by any contractor depending on the specific requirements of the contractor. The final decision in respect of the borrow pits selection will be made by the Contractor, and additional new borrow pits may be required. The contractor usually does not own and is not interested in the possession of a borrow pit. The contractor enters into a contract with the owner/operator of the borrow pit in order to acquire a certain amount according to the specification. The contractor will be responsible for the content of any public and private access roads between the borrow pit and construction site.

2.7 Roadbed Construction

In the roadbed construction, loosening of the existing top layer to a depth of 30 cm is provided, then the alignment, profiling, after sealing and soil filling up is done to the design level. Vegetable mold that is subjected to removal is all over the band near the road. The average vegetable mold capacity is 0.15 m.

In the area of the bridge over the waterless valley, the roadbed of accesses in the sections of junction to the extreme supports is widened to 1.0 meters on each side of the support. Embankment slopes are constructed with a slope of 1:1.5 and fixed at the full height with the monolithic reinforced slabs 15 cm wide with the size of 2.5×2.5 m by the crushed stone layer 15 cm thick.

In widening the existing embankment with the height of up to 2 m, the surface of slopes should be loosened; ledges construction is provided for the height of the existing embankment of over 2 m.

Particular attention in the roadbed construction should be given to thorough layer-specific soil compaction in the embankment. The subsequent layer filling is only allowed after leveling and compaction of the underlying layer with the help of road rollers to the desired density with water irrigation.

In slopes flattening and in the widening area, new road construction and exits fixing, removal of soil-vegetable layer (SVL) with the thickness of 15 cm and its moving outside the right of way is carried out.

After the roadbed reconstruction, SVL application will be provided for the slopes with the thickness of 20cm, as well as mineral fertilizers will be applied and perennial grasses will be planted by mechanized method.

3. ENVIRONMENTAL AND SOCIAL BASELINE DATA

3.1 Road Section in Karaganda Oblast

3.1.1 General Description

The length of Karaganda-Balkhash road section of the Centre South Road Corridor is 93 km. It passes along the existing road between Aksu-Ayuly and Akshatau villages of Shet District.

This section will pass along the existing Almaty-Astana M-36 alignment between Almaty and Astana. Location of the design section is shown in the Fig. 5.1.1.

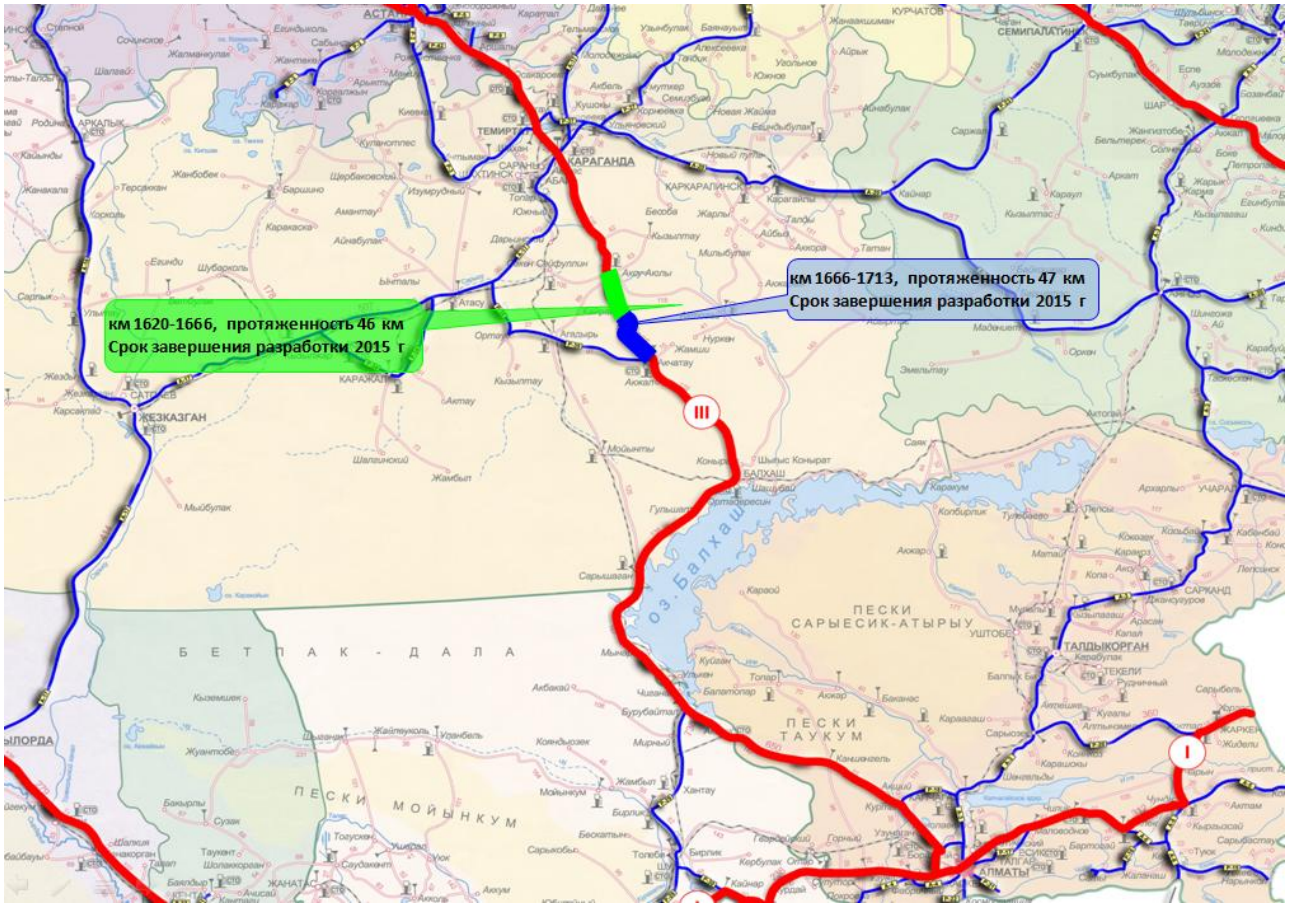


Fig. 3.1.1 Location of the design section

Karaganda Oblast is located in the central part of Kazakhstan and the Eurasian continent. It is almost equidistant from the Arctic, Indian, Atlantic and Pacific Oceans. The climate is sharply continental and droughty. There are 9 districts in the oblast, as well as 11 cities, 9 of which are of national importance and regional subordination, 11 urban-type settlements, 422 villages. The existing M36 highway, which will be widened under the Centre-South Road Corridor project, runs along the village of Novostroyka in Bukhar-Zhyrau District through Kurminka, Zhumabek, Spassk villages in Abay District, along Shopa, Nurataldy, Akshatau villages and through Aksu-Ayuly village in Shet District, through Balkhash city and Saryshagan village in Aktogay District of Karaganda Oblast.

The oblast occupies the most elevated part of the Kazakh Uplands, Saryarka, which is unique, heterogenic in geomorphic sense, high hills territory (absolute altitude is 400-1000 meters). The land-

scape has river valleys, dry riverbeds, hollow spaces, inland caves, lake basins, etc. The highest mountain groups are Karkaraly, Kent, Kyzylaray, Keshubay, Kyzyltas, Ulytau.

3.1.2 Climate

Natural climatic zones along the road section in Karaganda oblast are represented by steppe, semi-desert and desert landscape zones of the temperate zone.

The territory of Bukhar-Zhyrau District is included in the steppe landscape zone. The steppe zone is characterized by dry sharply continental climate: the summer is hot and dry, winter has little snow, but severe frost with winds and snowstorms. Evaporation in summer period exceeds atmospheric precipitation more than 3-7 times. Sharply continental climate is determined by severe winter, high summer temperatures, high annual and daily amplitudes of air temperature and low number of precipitation. Despite the variety of natural zones that exist in the region, winter periods are quite long, cold and snowy. The average temperature in January is -14 to -16 degrees. The snow cover throughout the district varies, is produced in the early days of November and can reach 25-45 cm for the most part. Unstable weather character is observed during the entire period. Short thaws may be replaced by lengthy periods of frost. Severe snowstorms, fog and black ice are an integral part of the cold period. Spring is late, the average temperature of the air warms up to + 20...+ 25 degrees and there are severe frosts, forming a strong frozen crust, during the night. Precipitation in the form of snow and wet snow are possible. Strong wind and overcast weather is replaced by relatively warm and sunny days. Active snow melting and heavy rainfall cause a sharp rise of water in the rivers region, which can often lead to flooding of settlements. Summer is usually warm, in some extended periods of hot and dry. Average thermometer readings in July are +23 to + 25°C. Intermittent rains and thunderstorms are mostly local showers type. Autumn is short-term, wind and cloudy days dominate. During the year, up to 275 mm of precipitation is observed in the territory of the district.

Abay District territory is a part of semi-desert landscape zone. Accordingly, the climate is sharply continental, which was caused by significant remoteness of the area from the oceans. Winter days are slightly cloudy and frosty. The average temperature in January is -16…-18 degrees. Snow cover is formed in mid-November. In winter, there may be brief thaws, weather is extremely unstable. Spring is late. The weather in this period may present various surprises in the form of unexpected snowfall, strong winds or heavy rain. Summer adheres to calendar values, warm and even hot in some periods. July temperatures reach an average of +16…+20 degrees. The bulk of precipitation occurs in July and August. According to the weather forecast for this period, a large number of short-term torrential intermittent rains and thunderstorms are observed. Autumn brings wind and mostly cloudy weather. During the year, up to 350 mm of precipitation is observed in the territory of the district. Much of the precipitation occurs in warm period.

The desert landscape area includes the territories of Shet and Aktogay districts. The climate throughout Shet and Aktogay districts is sharply continental. Large fluctuations in daily temperatures are observed during the entire year. Winters are short and moderately frosty and snowy. The average temperature in January is -9 ... -11 degrees. At night the temperature can drop to -25…-27 degrees. Snow cover is uncertain and cannot be formed in some years. Frequent thaws and strong winds accompany the entire cold period. The summer period is long, accompanied by a large number of sunny and clear days. The average temperature in July is +24…+26 degrees. At night, the air can cool down to +13…+15 degrees, and temperature rises up to +40 degrees or higher in the daytime. Extremely limited amount of rainfall leads to the formation of strong dust and sandstorms. During the year, up to 200 mm of precipitation is observed in the territory of the district.

3.1.3 Geomorphology and Geology

The area of the alignment is characterized by its complex geological structure. There are common rocks of all geological ages from Paleozoic to Quaternary sediments. Among the variety of sediments, dominant role belongs to sedimentary and eruptive complex formation. Intrusive and ancient metamorphic formations are much less developed.

The river valleys and lakes basin in the road reconstruction area are composed of thick layers of alluvial and alluvial-proluvial quaternary sediments. Capacity of sand and gravel-pebble deposits of Sarysu, modern river valley, Nura, Taldy, Tokrau, Mointy and others reaches 15-20 m and more. In addition, the ancient alluvium, buried under 50-70 meter layer of tertiary clays, is opened in the valleys of rivers boreholes. Ancient alluvium is represented by sandy-pebble deposits with a capacity of several tens of meters.

3.1.4 Soil, Sand and Soil-Forming Rocks

Karaganda – Balkhash and Burybaital road section of the Centre South Road Corridor has complex soil formation conditions. Soil characteristics and formation are affected by climatic, hydrological conditions, geological structure, vegetation and other factors.

The most common types of soil in this area are dark brown and light brown soils, which occupy about 40% of the territory. In the northern and northeastern part dark brown soil is common while the central part is mostly covered by light brown soil. In southern upland and adjacent plains brown and gray-brown soils are developed, and in the mountain valleys - mountain black earth and mountain-chestnut soils.

The subzone of desert steppes on light-brown soils covers the Abay district of Karaganda oblast. The main zonal types of soils in Shet district vary from the relatively meager light brown soil with a low content of organic matter to dark brown that are relatively fertile, rich by structure and which can keep moisture.

Overburden rocks and rocks of productive strata do not have elevated radioactivity, rare and precious metals in the ground have not been found.

Based on the soil texture, soil types in the oblast can be divided into three groups:

- sand, thin gravelly tightly-adjoined soil, light and sandy loam, characterized by increased infiltration. They are widely spread in sandy areas of southern and western regions;
- loamy soils of the southern and central areas of the oblast;
- heavy clay soils of the northern areas have the highest water-holding capacity. Sometimes they are found in the south of the area along the river valleys, in lake basins on takyrs and other depressions.

Vegetative layer of soil is found along the road, which will be removed for the use of land according to the project decision. Capacity of the vegetative layer was 0.17 m, fertile layer was 0.23 m and 0.20 m – on the slopes. The map of soils of Kazakhstan is shown in Figure 3.1.4.

Figure 3.1.4. Map of soils of Kazakhstan

3.1.5 Hydrological Characteristics

Kazakh Uplands is crossed by many unnavigable rivers. Major rivers are Ishym (basin of the Ob River), Nura, Sarysu, Silety, Shiderty, Tokyrau. They are mainly fed by spring snowmelt, and groundwater partly. During the flood time, they come out of its banks and pour the flood plain. In summer months, the rivers become shallow, turning into river reaches and dead channels; the riverbeds often become dry. Continuous flow is observed only on Ishim. To provide fresh water in the region, the channel of Irtysh-Karaganda was built. The Kazakh Uplands has many salt lakes. Freshwater lakes are located mainly in the area of Kokshetau Uplands: Borovoye, Schuchye, Large Chebachye, Imantau and others.

Nura River has about twenty major tributaries of the 1 order, for which water regime can be divided into permanent and intermittent at low water.

Such rivers as Akbastau, Baygozha, Kokpekty, Tuzdy, Shiderty, Ulken-Kundyzdy are related to permanent watercourses.

Valley of Akbastau River is connected with mountainous areas and is their submontane trough. The width of the valley is 1-1.5 km on average. The same as Baygozha River, Akbastau River begins on the northern slope of the watershed and flows almost in a straight line in the meridional direction. Average long-term discharge of the two rivers is 0.18 and 0.57 cubic m/s, respectively, and runoff modules from one square kilometer of the surface of the basin are 0.40 and 0.57 l/s.

River water is fresh with mineralization of up to 1 g/l with chloride, sodium, or hydrocarbonate-chloride composition.

Sherubay-Nura, Zharly, Ashisu, Otkelsyz, Kokpekty, Tuzdy and Oshagandy rivers are becoming dry in the summer period. During floods, these rivers are discharging up to 75-100% volumes of annual flow. Tuzdy and Kokpekty rivers are seasonal, there is almost no drought flow; the average consumption of water is 0.3 cu. m/s in the seasonal flood. In the spring seasonal flood, Kokpekty River has up to 100% of the annual flow.

The rivers are additionally fed by underground sources. Salt-tertiary clay, which is found there, leads to an increase in water salinity. Small rivers, being the main supplier of major rivers, are protected to a lesser extent. Compared with large and medium rivers, insufficient importance is given to them in terms of practical use. However, all the total river flow that is formed in the territory of the republic belongs to these rivers (60.4 billion cu. m.)

Along its alignment, the road crosses small left-bank tributaries of Sherubay-Nura River that are flowing from the left to the right, upper sections of the small rivers in Karaganda and Karabidayik flowing in the opposite direction.

The hydrological regime of rivers and temporary water streams of the area is determined by the conditions of their nourishment. In accordance with the exceptional value of the melted snow, the main stage of its regime in the nourishment of the water streams of the considered territory is sharply expressed spring seasonal flood, followed by a deep low water level up to complete drying up of small watercourses, as well as relatively large rivers often.

Surface water

Balkhash-Alakol and Irtysh river basins in the east and in the north-east are almost 75% of surface water sources in the country. Balkhash-Alakol basin occupies a vast area in the south-eastern Kazakhstan, part of China and a small part of Kyrgyzstan. Its area is 413 000 km2, including 353 000 km2 in Kazakhstan (Almaty and a part of Zhambyl and Karaganda oblasts and oblasts of East Kazakhstan). Permanent rivers flowing into Balkhash Lake – Ili, Karatal, Aksu, Lepsy, Ayaguz – originate in the mountainous areas of Tien Shan, Tarbagatay and Dzhengis Tau. Ili River flows into the Western Balkhash, while other rivers flow into the East Balkhash.

The territory of the basin of the lake Balkhash is characterized by its great diversity and complexity of the geological structure. The hydrographic network of the district is represented by Bidaiyk river with many tributaries. The absolute level of the surface within the boundaries of the projected area is up to 673.72 - 768.70 m.

The oblast is drained by rivers: Sarysu, Nura, Turgay, Uly-Zhilanshik, Tokrau, Kalmakkyrgan (Beleuty) and others closed basin of lakes of Central Kazakhstan, the southern part of the region belongs to the basin of lake Balkhash (Northern Balkhash).

The use of water from surface water and groundwater within the construction of roads is permitted only with the permission of the Committee for Water Resources under the Ministry of Agriculture of the RK. According to the working design of the road section km 1666 – km 1713 water for industrial purposes will be used from the lake, located next to Karkaralinsk - Aksu Ayuly Highway. Distance from the lake to the beginning of the project territory is 73 km. Distance from the lake to Karkaralinsk - Ayuly Aksu highway is 6 km away from the road. Distance from Karkaraly - Aksu Ayuly to Karaganda - Balkhash is 6 km away. Other sources of water for construction purposes will be determined after completion of the design of the rest 12 sections and obtaining permissions for special water use from the Committee for Water Resources under the Ministry of Agriculture of the RK.

Ground Water

Groundwater along the section km 1666- km 1713 of the project alignment of the area is taken off from down holes 1, 28, 35, 55, 56, 57, 62, 74, 75, 84, 149 and 150 in the areas of temporary streams, and belongs to perched groundwater. Set level of groundwater during the survey, was noted at the depths 1,30- 5,60 meters from the ground. Groundwater is nourished due to precipitation.

The chemical composition of chloride - sulphate - sodium, chloride - sodium and sulfate - chloride - calcium - sodium, with a dry residue of 1828 - 4478 mg/l. Reaction of alkaline water (pH = 7.0 - 7.2).

Groundwater have a weak adverse impact of carbonic acid on the concrete W4-W6 - on Portland cement, mild to moderate degrees of aggressiveness to the installation of reinforced concrete constructions with periodic moisture. Data on groundwater for the rest of the project sections will be known after completion of project works.

3.1.6 Flora and Fauna

The methodology of biodiversity study along the alignment

In the result of field studies conducted by the representatives PMC "KazdorNII" JSC and "KazCEP" LLP, as well as the field studies, it was concluded that the section of road in Karaganda oblast passes through the protected areas. During the public hearings in June 2015, issues of potential appearance of wild animals on the road section were discussed.

Vegetation – Flora

As a result of vegetation and fauna inspection in the road alignment area, as well as according to the official data, the main feature of the living conditions of desert vegetation, common to all desert areas has been revealed, which is a significant dry climate along with high heat supply. Main communities of deserts are presented by half-shrubs and bushes are characterized by low gross diversity, low projectivity and the absolute dominance of drought-resistant species of xerophytes and hyper xerophyte.

Section of the route through Shet District covers plant plain zoning types: complex wormwood Artemisia semiarida, Stipa sapertana, S.kirggisorum black dormouse Salsola arbusculiformis, Artemisia semiarida, Stipa Sapertana, S. Kirghisorum and tasbiyurguns Nanophyton erinaceum. This zoning is replaced by complex grass-black dormouse Salsola arbuscula, Artemisia terrae-albae, Stipa Sapertana, S.richteriana with Ferula ferulaeoides and tasbiyurguns Nanophyton erinaceum, which are located along the upper west coast of lake Balkhash. In some places there are turan sagebrush- and white earth sagebrush-black dormouse Salsola arbusculiformis, Artemisia terrae-albae, A. turanica, Ferula ferulaeoides, Ephedra distachia, E. Intermedia, Nanophyton erinaceum, Anabasis fruncata, Rhammatophyllum frutex.

Fauna

The area of the road section alignment is located under the influence of multi-component human impact. Ways of seasonal migrations and recreation of birds and mammals during migration in the project area is not marked. There are no rare endangered species of animals listed in the Red Book.

In general, the territory of the project is inhabited by the following species: saiga, wolf, wild boar, fox, korsak, gopher sandstone (zurman), groundhog, polecat, rabbit, goose, ducks.

Inhabitance of the following representatives of animal world is possible in the zone of impact:

- class of reptiles: sand lizard, agama, grass snake, adder, colorful lizard, copperhead;
- class mammals from rodents: field mouse, vole, mouse, gopher, jerboa, hedgehog-eared;
- class of amphibians: toad, moor frog, etc .;
- class insect phalanx, mosquito, fly, lacewing, a dragonfly;
- class of birds: Spanish sparrow, bird, crow, raven gray, starling, wagtail, roller, European bee-eater.

Site location area is under the influence of multi-component anthropogenic impact.
There are no paths of seasonal migrations and recreation sites, no birds and mammals during migrations observed in the territory of the site location.
There are no rare endangered species of animals listed in the Red Book.

3.1.7 Land Resources

Section of M36 road passes through cropland between Aksu-Ayuly and Akshatau villages, but during the pre-inspection of the road section the representatives of "KazCEP" LLP the irrigation systems have not been found.

The total area of land owned by the state, which will be acquired for permanent use in Karaganda oblast, will be determined after the completion of the detailed design and preparation of the list of affected people and will be described in the project on land acquisition and in Resettlement Action Plan (RAP).

Additional land will be required for borrow pits during quarrying of the construction materials, as well as for temporary entrance to the construction site for the warehouse building, workshops and housing for workers. In addition to them, additional land acquisition is required for the storage of constructional materials and for development of borrow pits and borrow pits for road - construction materials.

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 Land Code of the RK it is necessary to ensure that all land used temporary for construction are returned to their original condition through a reclamation program.

3.1.8 Physical Cultural Resources

Archaeological examinations along the road section alignment located in the territory of Karaganda oblast were conducted in accordance with the applicable laws of RoK. Archaeological examination was conducted by qualified archeologist. Examination was carried in accordance with the methodology of the archaeological examinations by the preliminary work with archival and bibliographic data, analyzing images from the space.

In the course of the examination all objects of historical and cultural value have been recorded (hereinafter the "Monuments") within the area of expertise (200 m to the right and 200 m to the left from the axis of the road).

The study identified 3 historical and cultural heritage facilities in the area of the road alignment (see Table 5.1.8 below).

Exact conclusion regarding availability/absence of Historical and cultural objects in the area of road alignment can be given only upon receiving results of archeological examination and field inspection.

Analysis of sources shows that archeological objects of different ages, from stone age to modern age, are common for the territory of road alignment.

Table 3.1.8 HCH revealed in the area of construction of "Astana-Karaganda-Balkhash-Almaty km 1666-1713" of the Center-South Corridor

№	The name of the object*	Geographical coordinates (WGS 1984 UTM 43 T zone)	Object description
1	Burmetam	N 48 276.181 E 73 791.204	Burmetam Mazar is located on the left side of the road, 15 meters from the axis of the road. The distance km 1671, 400 meters from the mark. Diameter - 6,5 m, height - 2.30 m. Mazar is rounded, the right upper part has been destroyed. On the right side of Mazar in the distance of 30 m memorial signs in the form of steles, which were established in 1998, are located. Preliminary dating of Mazar is the end of the 19th century – the beginning of the 20th century.
2	Batystau Burial	N 48 259.526 E 73 785.183	The burial consists of 5 mounds located on the right side of the road, at km 1677.4 at the distance of 30 m from the axis of the road. Preliminary dating is EIA (early Iron Age). Mound №1. Diameter is 11 m, height is 1 m. The mound is rounded shape. Filling of the mound is laid by average-sized torn stones ranging from 40 cm to 15 cm. A crater with a diameter of 1.5 m is located in the center of the mound. Mound №2. Diameter is 12 m, height is 0,80m. The mound is rounded shape. Made of stones. Mound №3. Diameter is 9m, height is 0,70m. The mound is rounded shape. Made of stones. Mound №4. Diameter is 8m, height is 0,50m. Mound is rounded shape. Made of stones. Mound №5. Diameter is 7m, height is 0,50m. The mound is made of large stones, is in an emergency condition; part of the mound has been plowed by heavy machinery during the construction of the road.
3	Zhalgyz Oba	N 48 259.526 E 73 785.183	Located on the left side of the road. Diameter is 15 m, height is 1,50 m. The burial mound is rounded shape. Made of stone and earth. Preliminary dating is early Iron Age.

According to the results of the survey, historical and cultural heritage facilities have not been found in the section km 1620-1666.

The Action Plan for Physical Cultural Resources is presented in Section 5 of this report.

3.1.9 Social and Economic Characteristics of the Section

Karaganda Oblast is located in the central part of Kazakhstan and the Eurasian continent. It is almost equidistant from the Arctic, Indian, Atlantic and Pacific Oceans. The climate is extremely continental and droughty. The region occupies the highest part of the Kazakh Hummocks – Saryarka. The region borders with Akmola Oblast in the north, Pavlodar Oblast in the north-east, East Kazakhstan Oblast in the east, Almaty Oblast in the south-west, Zhambyl Oblast, South Kazakhstan Oblast and Kyzylorda Oblast in the south, Aktobe Oblast in the west and Kostanay Oblast in the north-west.

Currently, Karaganda Oblast is the biggest in terms of the territory and industrial potential. It is rich in minerals and raw materials. The territory of the region makes 428 thousand sq km (15.7% of the territory of Kazakhstan). The tenth part of the country's population lives in the region. According to statistical data the population of Karaganda Oblast as of 1 April 2015 made 1 mln. 379 thous. 747 people.

The road passes through mainly rural area with low population density. Since the major part of route passes through open space, the population level living close to the road is very low. The average population density in the region is 3.1 people per one sq km.

Natural resources

Karaganda Oblast is a unique, rich with mineral resources region of Kazakhstan. 100% of the reserves of manganese, 36% of copper, 80% of wolframite, 64% of molybdenum, 54% of lead, over 40% of coal including 100% of reserves of surveyed coal resources are concentrated in the region. The soil of the region is also rich in rare and rare-earth metals: bismuth, silver, antimony, titanium, nickel, cobalt, aluminum oxide, arsenic, blunt, etc. The region has essential deposits of ironstone and polymetallic ore.

The region also has essential raw hydrocarbon deposits. The Karaganda coal basin Konyrat is one of the most gas-bearing among the CIS basins.

The deposits of methane are assessed to be potentially significant. Three oil and gas deposits were opened in the south-west of the region – Kumkol, South Kumkol and Maibulak. The explored reserves of oil makes 180 mln tons, gas – 13 bln cubic meters, gas condensate – 35 thousand tons. Kumkol deposit is developed. Maibulak field was prepared for development. South Kumkol is under preparation. Deposits of rhodusite-asbestos Kumola and Ushbulak are the only one in the CIS. They are located in the western part of the region. The biggest deposits of wollastonite Bosaga and Alaigyr are located in the central and southern parts.

Regional economy

Power and fuel energy, iron industry, engineering, chemical industry are among the basic sectors of the economy.

Administrative subdivision

There are 9 districts, 11 towns, 9 of which are of state imporatance and regional submission, 11 settlements of town and , 422 villages. There are 11 towns in the region – Abai, Balkhash,Zhezkazgan, Karaganda, Karachal, Karkaralinsk, Priozersk Saran, Satpayev, Temirtau, and Shakhtinsk. The existing highway M36 which will be widened in the framework of Center – South Road Corridor Project will pass through the Novostroika village in Bukhar-Zhyrau district, through villages of Kurminsk, Zhumabek, Spassk in Abai district, along the villages of Shopa, Nurataldy, Akshatau and through the Aksu-Ayuly village in Shet district, through Balkhash town and Saryshagan village in Aktogai district of Karaganda region. The information under districts are given in Appendix 6.

4. ENVIRONMENTAL MANAGEMENT, MONITORING PLAN AND INSTITUTIONAL RESPONSIBILITY

Environmental Management Plan has been developed under the World Bank's Operational Policy, and in accordance with Section 4, Chapter 14, Article 128 of the Environmental Code of the Republic of Kazakhstan.

The main factors that are adversely affecting the environment are: construction of camps, construction works for artificial structures, operation of specialized machinery, development of drove borrow pits during the construction of the road, as well as auxiliary production (mixing plant, asphalt and concrete plant, crushing and sorting plant, etc.).

The main purpose of the EMP is to reduce environmental pollution, stabilize environment quality indices and improvement of the environment quality. Ensuring environmental safety for the sustainable development of the region with application of the best international practices on the part of the Contractor.

4.1 Environmental Monitoring Plan

Environmental monitoring is a very important aspect of the environment management during the project implementation and operation to ensure safeguard for the environment. During construction, landslide monitoring, side slope monitoring and embankment monitoring will be conducted for the purpose of timely prevention of potential erosion. Borrow pits restoration, quarry activities, material storages, and locations of asphalt plants, community relations, and safety provisions are described within the Environmental Management Plan (EMP).

In response to the environmental impacts identified during the study, an environmental monitoring plan has been developed and is presented in Table 4.1 and Table 4.2. The contract documents will contain a list of all required mitigation measures and a timeframe for the compliance monitoring of these activities. The monitoring will include supervision to check the Contractor's execution of Contract provisions during construction period.

The construction supervision consultant (CSC) in cooperation with MID during project implementation will be required to:

- The Contractor will develop appropriate EMP. The CSC will use this monitoring plan as a basis for supervision of the Contractor's compliance with this EMP.
- Regular control for environment monitoring conducting, and submission of quarterly reports: the main parameters to be monitored are outlined in Table 4.1 and 4.2. The CSC will provide an Environmental Specialist as part of the CSC team.
- Regular control of the subproject roads, and submission of quarterly reports based on the monitoring data and laboratory analysis report. The Contractor and the Supervision engineer will be responsible for data collection for environmental monitoring.

A lump sum budget is allocated to cover monitoring cost during construction phase of the project. CR/PMC 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:

1. The tender and contract documents will clearly determinate the contractor's obligations to undertake the environmental mitigation measures as set out in this chapter of the EIA and which shall be stipulated as enclosure to specifications;

2. The recommended environmental mitigation cost should be included as an item in the Bills of Quantities. It will be a guarantee of specific environmental mitigation budget available, which will be conducted as required. During the procurement, Contractors will be encouraged to include these costs in their rates and present the mitigation costs as an item in the Bill of Quantities;

3. During construction, the Construction Supervision Consultant (CSC) in accordance with the Project Management Consultant (PMC) will control over construction, compliance with the requirements of safety, health and environment.

4. ENVIRONMENTAL MANAGEMENT PLAN: MONITORING AND INSTITUTIONAL RESPONSIBILITY: KARAGANDA – BALKHASH – BURYLBAITAL ROAD SECTION

Table 4.1 PROJECT IMPACT, MITIGATION MEASURES, MONITORING AND RESPONSIBILITY

CATEGORY	POTENTIAL IMPACT	SIGNIFICANCE	LOCAL IMPACTS	MITIGATION	RESPONSIBILITY	MONITORING	RESPONSIBILITY	LONG TERM IMPACT
1. Air quality	Air pollution: emissions from construction machinery and equipment, emissions from cement-concrete, asphalt-concrete plants, crushers, etc. Dust: from construction activity borrow pits and crushers transportation of materials	Potentially significant, especially during dry season	Generally in the main area of construction, the existing roads or bypass roads; Potential impact on adjacent villages Local influences on sites in Karaganda and Zhambyl oblasts are not predicted	All vehicles and the equipment used in construction have to be modern, be appropriately maintained and used according to recommendations of manufacturers. All access and bypass roads have to be watered. All plants/dust-generating equipment should be in good repair and be located at distance from all sensitive zones.	The contractor shall bear the responsibility for implementation of mitigation measures. Supervision Engineer monitors the compliance with mitigation plan.	Regular (monthly) monitoring by sub-contracted licensed laboratories at designated sampling points and on-site compliance checks by Construction Supervision Consultant (CSC), Engineer and local environmental protection authorities. Parameters to be monitored include: NOx, Inorganic dust of SiO2, SO2, C and CO. Meteorological characteristics during sampling include air temperature, speed/velocity of emissions, atmospheric pressure, and air humidity.	Contractors Construction Supervision Consultant (CSC)/Engineer	Long term impact is limited
2. Noise and vibration	Noise from construction machinery and equipment Noise from cement-concrete and asphalt concrete plants, crush-	Potentially significant	The area of construction, access and bypass roads. Potential impact on nearby residential areas. Potential impact on the	All vehicles and the equipment being in use in construction have to be modern, regularly maintained and used according to recommendations of the manufacturers.	The contractor shall bear responsibility for implementation of mitigation measures. Supervision Engineer monitors the compliance	Regular (monthly) monitoring of noise and vibration in specified places of project area undertaken by certified laboratory and Construction	Contractors (through licensed laboratories) Construction Supervision Consultant	No long term impact

	ers, etc. Transport noise on the access roads		settlements and villages Local impacts on the sections in Karaganda and Zhambyl oblasts are not predicted.	All plants/noise making equipment have to be in good repair and locate at distance from settlements. Any types of works during night time near residential areas of the villages/settlements in Karaganda and Zhambyl oblasts should be prohibited. Speed limit of 60 km/h for all construction equipment shall be enforced.	with mitigation plan.	Supervision Consultant (CSC), Engineer and local authorities (EP and SES bodies) on-site.	(CSC)/Engineer	
3. Water, drainage system and floods	Pollution by a runoff from the construction sites in the areas of bridges construction is possible Infiltration of the polluted water in the water-bearing horizons Pollution of underground waters at pits/quarries (accidental spills) Pollution of surface and underground water sewage from camps.	Influence is from moderate to insignificant. Places of water intakes from wells (drinking water and technical water) will be agreed with Committee on Water Resources. Pollution of underground waters is unlikely as deep soil excavation isn't planned. Pollution from rotational camps can be from moderate to significant	Potential impacts in the area of Balkhash Lake adjacent to the river (bridge construction). Potentially – all alignment Areas of location of the construction camps	Committee for Roads, Committee on water resources and Akimats of districts in consultation with contractors. The contractor shall provide water intake only from designated sources. Good management at construction sites. Areas of potential pollution of rivers will be designed to prevent accidental spills and runoff and protected by sediment basins. Sewage at construction camps will be collected in septic reservoir and transported/discharged at wastewater treatment plants.	Committee for Roads, Regional Departments of the Committee of water resources (permits for water intakes) and Akimats of districts in consultation with contractors. The contractor shall bear responsibility for implementation of mitigation measures. Construction Supervision Consultant (CSC), Engineer monitors the compliance with mitigation plan.	Regular (monthly) monitoring by licensed laboratories at designated sampling points and on-site compliance checks by Construction Supervision Consultant (CSC), Engineer and Regional office of the Committee on Water Resources implement control on site. Parameters monitored include: pH, turbidity, general hardness, solid residue, chlorides, nitrate nitrogen, nitrite nitrogen, fluorine, insoluble matter.	Contractors (through licensed laboratories) Construction Supervision Consultant (CSC), Engineer Committee on water resources	Long-term impacts are possible in case of non-execution of mitigation measures
4. Erosion and pollution of soils and subsoil layers	Soil erosion (wind and water) due to removal of vegetation and topsoil. Pollution of the soil	Potential impacts are low to medium (excavation works and operation of borrow pits).	Local impacts are expected only in the areas of borrow pits and earthworks on embankment along the align-	All recommended methods on reduction and elimination of an erosion were included in the program of construction Construction methods on re-	The contractor shall bear responsibility for implementation of mitigation measures. Construction Supervi-	Contractors jointly with Construction Supervision Consultant through periodic (bi-weekly) visual checks.	Contractors Construction Supervision Consultant (CSC), Engineer	Erosion is possible if there is no proper management and prevention

	and subsoil layers as a result of construction and accidental spills.		ment.	duction or elimination of pollution of soils and subsoil layers. All temporarily used lands have to be restored and returned in an agricultural turnover according to the legislation	sion Consultant (CSC), Engineer monitor the compliance with design impact reduction plan.		the Committee for Roads	during construction.
5. Flora and fauna and the sensitive and protected territories	Impacts on vegetation along the alignment. Disturbance of fauna in the area of influence of the construction works	Potential impacts are Low to Medium Temporary disturbance of birds and animals in the immediate proximity to the construction sites, concrete plants, crushers or borrow pits is possible.	Moderate loss of planting. Illegal hunting is possible	Culverts, cattle underpasses and bridges will serve as crossing points for wild animals. Illegal hunting around the project area will be prohibited.	The contractor shall bear the responsibility for implementation of the mitigation measures. Construction Supervision Consultant (CSC), Engineer shall monitor the compliance with design impact reduction plan.	Regular (monthly) monitoring of proper vegetation and rational topsoil management shall be carried out by the Contractor, Construction Supervision Consultant (CSC), Engineer shall monitor the compliance with design impact reduction plan.	Contractors Construction Supervision Consultant (CSC)/Engineer Local Committee of forest management and wildlife	No significant long-term impact on flora and fauna is expected
6. Social / Economic / Farmers	Land loss/ land acquisition . Possibility of employment during construction Inconvenience for farmers (cattle crossing the road) Loss of trade along the road	Potential impacts are low to moderate Employment opportunities emerge for local population Potential impacts on farmers (animal husbandry)	There are cases of land (open space land) acquisition along the alignment	Land acquisition will be carried out according to the legislation of Kazakhstan and Resettlement Action Plan (RAP) Encouragement of hiring of local labor Consideration with local population on additional cattle crossings as required Compensation for loss of income should be paid or other appropriate mechanisms will be put in place according to the legislation of Kazakhstan and RAP	Contractors Akimats	CfR, Akimats/local authorities and contractors	Regular monitoring of possible impacts on farmers shall be carried outby Construction Supervision Engineer Committee for Roadswill monitor the compensation payment to the affected persons.	Long-term consequences are possible if cattle crossings are not built
7. Historical and archeological monuments				Action Plan for Physical Cultural Resources was prepared. See Section 5 below.				

8. Traffic safety	The traffic volume on the main road can affect the traffic safety.	Potential impact is from low to medium	Road sections, located close to settlements and places of access/bypass roads joining the main road	Speed limit enforcement Correct road marking and signage shall be erected Informing of local population. Responsible actions of the contractor. Organization of additional crosswalks, if necessary.	Committee of road traffic police of the MIA of the RK	Regular (daily) monitoring and reporting of any accidents and complaints by local population or other actors.	Construction Supervision Consultant (CSC)/Engineer Committee of road traffic police of the MIA of the RK	No long-term impacts
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 roadbed construction. Household waste must be regularly exported from the section to the designated landfills	Contractor in cooperation with local authorities	Construction Supervision Consultant (CSC)/Engineer should carry out regular (monthly) monitoring of sites and activities on waste management	Construction Supervision Consultant (CSC) and local authorities	Provided that all waste will be exported to the designated landfills, long-term impacts are not expected
10. Borrow pits and access roads	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 have been already defined, but additional borrow pits will be required. 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 the works commencement Only approved pits can be used, together with the plan of works on closing and reclamation	Contractors Regional offices of the Committee for construction, housing and utilities infrastructure and land resources management of the RK	Regular (monthly) and special monitoring by the Contractor and Construction Supervision Consultant (CSC)/Engineer of any influences, cases and complaints.	Construction Supervision Consultant and local authorities	Provided that impacts are mitigated properly, long-term influences are not expected.

Table 4.2 IMPACTS DURING OPERATOIN; MITIGATION MEASURES, MONITORING AND RESPONSIBILITY

CATEGORY	POTENTIAL IMPACT	SIGNIFICANCE	LOCAL IMPACTS	MITIGATION	RESPONSIBILITY	MONITORING	RESPONSIBILITY
1. Air quality	Emissions from vehicles on the road Emissions from roads repair and maintenance activities	Insignificant provided that vehicles are in good operating conditions	Potential impact on adjacent sections in Karaganda and Zhambyl oblasts; Other local consequences are not expected	All vehicles must meet emissions standards All the equipment used for road repair and maintenance meets emissions standards Regular monitoring near residential areas to determine the necessity for additional mitigation measures	Committee for Roads, Committee for Environmental Regulation and Control of Karaganda, Zhambyl and Almaty oblasts.	Monitoring of air quality (N2, NOx, CO2, CO, C, hydrocarbons) near residential areas and other areas if necessary. Monitoring frequency will be determined based on monitoring data on traffic intensity.	Contractors within the warranty period
2. Noise and vibration	Emissions from vehicles on the road Emissions from roads repair and maintenance activities	Insignificant provided that vehicles are in good operating conditions	Potential impact on adjacent sections in Karaganda and Zhambyl oblasts; Other local consequences are not expected	All vehicles must meet noise level standards Old and faulty vehicles must not be found on the road Compliance with minimum and maximum speed limits All the equipment used for road repair and maintenance meets noise level standards	Committee for Roads, Department of Ecology of the Committee for Environmental Regulation and Control and Sanitary-and-Epidemiologic Institutions of Karaganda and Zhambyl oblasts	Monitoring near residential areas and other areas if necessary. Monitoring frequency will be determined based on monitoring data on traffic intensity.	Contractors within the warranty period
3. Water, drainage system and floods	Stability of water sources for operation Floods, pollution of surface and ground water due to activities on the road and in services/rest areas	Potentially localized impact Pollution is insignificant if the road is effectively managed	There are no specific local impacts	Maintaining drainage system in a proper condition Good road management and maintenance will ensure normal watercourses	Committee for Environmental Regulation and Control and Committee for Water Resources, "Kazakhavtodor" Republican State Enterprise, Local executive authorities.	Monitoring of surface water and drainage within the right of way of the alignment. Monitoring frequency will be determined based on monitoring data on traffic intensity.	Committee for Water Resources
4. Flora and fauna and protected territories	Long-term impacts on animals, especially migration and movement routes. Disturbance of flora and fauna resulted by the use of salts and chemical substances for deicing There might be an increase in illegal	Low impact	No specific localized impacts	Cattle droves will serve as passages for wild animals (will be incorporated in the design) Study the necessity of additional passages through pipes under the bridges for big mammals	Oblast regional inspection of the Department for Forestry and Fauna	Committee for Roads, Committee for Forestry and Fauna, as well as oblast administration will monitor the situation based on information on numbers of accidents associated with wild	Oblast regional inspection of the Department for Forestry and Fauna "Kazakhavtodor" Republican State Enterprise jointly with the district administra-

	hunting due to wider accessibility			Control and prohibit illegal hunting		animals.	tion follows the necessity in additional crossing points within the alignment for mammals and others
5. Social / Economic / Farmers	Increase in economic activities due to the improved road. Opportunities for constant work within the roads maintenance Opportunities for business and employment in roadside service areas Some disturbance to the activities of farmers who were affected by land acquisition for the road construction	Significant economic and social benefits Some unfavorable consequences in relation to the farmers' activities due to the necessity of underpasses use for movement of cattle and agricultural machinery	There no specific localized impacts, except for agricultural and grazing lands Villages along the existing road alignment	Hold informative activities for local communities on benefits that can be obtained from the improved alignment Consider additional livestock droves and passages for agricultural machinery if necessary and required (See Mitigation Measures)	Local executive authorities and "Kazakhavtodor" Republican State Enterprise will consider additional underpasses (bridges) in collaboration with local communities, if necessary Akimat/ local executive authorities	Monitoring of unfavorable impacts on local communities and farmers Affected persons will be kept in touch for checking compensation payment and other compensation forms provision	Administration of districts and Zhambyl and Karaganda oblasts .
6. Traffic safety/ Aesthetics	Increase in accidents Danger for pedestrians, there is not sufficient amount of pedestrian crossings	Low/ medium impact level	Regular passages crossing the road alignment	Special measures in the project will decrease the accidents risk: dividing strip, good visibility, limited access and exits, guard posts, etc. There will be several settlements near the road and a small number of pedestrians near the road or roads intersection	Will be incorporated in the design	Monitoring and registration of all road accidents	"Kazakhavtodor" Republican State Enterprise
7. Waste management	Waste generated from the road maintenance and rest/service areas: collection and disposal issues	Low impact	In rest and service areas	Committee for Roads should provide regular cleaning and collection of all liquid and solid wastes, as well as disposal in accordance with approved regulations and procedures. The company for road operation will be responsible for waste collection from rest/service areas	"Kazakhavtodor" Republican State Enterprise and Committee for Environmental Regulation and Control	Regular monthly monitoring of sites and wastes collection and disposal.	"Kazakhavtodor" Republican State Enterprise

5. ACTION PLAN FOR PHYSICAL CULTURAL TESOURCES

Action Plan for Physical Cultural Resources

Action plan for research and preservation of historic and cultural heritage sites of Kazakhstan during construction of Karaganda – Burylbaytal road (km 1620-1666 and km 1666-1713)

The Action Plan for the Research and Preservation of Archaeological Sites (hereinafter, the Action Plan) is a set of requirements and procedures regarding physical cultural resources which may be affected during project implementation. This Action Plan is based on the requirements of national legislation of the Republic of Kazakhstan and safeguard policies of the World Bank (i.e. OP 4.11 Physical Cultural Resources) and will be followed by Contractors, Subcontractors, and the Employer ("KazAvtoZhol" NC JSC) during project implementation.

Activities under this Action Plan will be performed at the territory of three historic sites: (1) architectural site Burmetam Mazar (end XIX – early XX century), (2) set/complex of five kurgans - burial mounds – called Batystau (archaeological monument), and (3) one stand-alone kurgan - Zhalgyz Oba (both 2 and 3 are archaeological monuments). All these sites are located within the area of construction/widening of the road. According to historic research, these kurgans belong to different historic times, including the era of Iron Age and contain materials that are valuable for the ancient history and culture of ancient times and the objects associated with the funeral cult and rituals of the Republic of Kazakhstan.

Site-specific EMPs for the different road sections should also include a survey/assessment to identify any other potential historic sites, and if so, the same types of mitigation measures that are indicated in this Action Plan should be applied.

Legislation of the Republic of Kazakhstan on Protection of Historic and Cultural Heritage

According to Article 127 of the Land Code of the Republic of Kazakhstan dated June 20, 2003, No. 442-II: "It is forbidden to carry out all types of works that may pose a threat to the existence of historical and cultural heritage objects". According to Article 39 of the Law of the Republic of Kazakhstan dated July 2, 1992, No. 1488-XII "On Protection and Use of Historical and Cultural Heritage Objects", Clause 3: "Works that may pose a threat to the existence of historical and cultural heritage objects are forbidden to be carried out".

According to Article 127 of the Land Code of the Republic of Kazakhstan dated June 20, 2003, No. 442-II: "In case of detection of historical, scientific, art and cultural objects, land users are obliged to suspend further conduct of works and inform a competent authority for the protection and use of historical and cultural heritage objects thereof". The contractor will be obliged to suspend the excavation works for the period of time required for full archaeological investigation by a company that has a license to perform archaeological survey works.

According to Article 38 of the Law of the Republic of Kazakhstan dated July 2, 1992, No. 1488-XII "On Protection and Use of Historical and Cultural Heritage Objects": relocation and changes of historical and cultural heritage objects is generally prohibited, however in some cases exceptions involving relocation or change of the monuments can be granted. Depending on the signifi-

cance of historic and cultural monuments (international, national, local monuments) exceptions may be granted by relevant authority[2] if: (a) 70% of the monument is ruined, (b) the monument's historic value has been lost, or (c) relocation of the monument will result in its better preservation/conservation (in consultation with special commission of the designated authority based on the statement of historical-cultural panel). The entities which have been granted such exception should comply with the requirements of legislation of the Republic of Kazakhstan and designated authority should undertake surveys and fixation of the historic and cultural monument. The costs associated with relocation or change of the monuments are covered by individuals and legal entities that were grated exemption (received a decision for the relocation of a historical and cultural site or its change).

In accordance with Article 40 of the Law of the Republic of Kazakhstan dated July 2, 1992, No. 1488-XII, "On Protection and Use of Historical and Cultural Heritage Objects": Excavations and surveys of archaeological monuments is done by licensed entities only. Licenses for archaeological and (or) research and restoration works on historical and cultural sites in the territory of the Republic of Kazakhstan are issued by an authorized body in coordination with the local authorities of oblasts, cities of republican significance and the capital.

All the materials and finds obtained by individual and legal entities of the Republic of Kazakhstan and other countries resulting from archaeological research in the territory of Kazakhstan are transferred to the possession of the state museums of the Republic of Kazakhstan after scientific recording, fixation, and processing in the manner prescribed by the authorized body. Its transportation outside the Republic of Kazakhstan is prohibited.

Scope of Archaeological Surveys

The spatial scope of the activities under this Action Plan are determined by the respective regulations of the Ministry of Culture and Sports of the Republic of Kazakhstan for archaeological sites (200 m to the right and 200m to the left from the axis of the alignment). This Action Plan is part of the Terms of Reference for licensed company (Subcontractor) to undertake an archaeological survey.

Description and Suggested Mitigation Measures

Excavation works during the road construction may potentially affect the cultural layers of archaeological sites and harm the movable and immovable archaeological artifacts that have significant cultural and historical value. Archaeological experts carry out research works in coordination with the competent authority in order to prevent the negative effect. During the archaeological excavations, archaeological experts will conduct fixed archaeological research, including photo and graphic fixation of cultural layers, carry out architectural measurement of architectural and kurgan-type structures, provide description of the artifacts, as well as study and document the finds with its subsequent reconstruction (where possible) and preservation.

[2] Exceptions for historic and cultural monuments of international and national significance are granted by the decision of the Government if the Republic of Kazakhstan. For historic and cultural monuments of local significance the exceptions are granted by local authorities.

The contract amount is to be determined by the General Designer Engineer along with the approval of the organization which will perform these types of works.

All the sites listed below are included in the State Register of Local and Regional Sites.

Table 1. Historical and Cultural Heritage sites found at km 1620-1666 and km 1666-1713 road sections.

Site	Description	Mitigation Measures
Burmetam Mazar (architectural monument) N48 276.181 E73 791.204	Burmetam Mazar (mausoleum) is an ***architectural monument*** and is located on the left side of Astana-Karaganda-Balkhash-Almaty road at km 1670,600. The mazar is located 15 meters away from the road axis. Physical dimensions: diameter - 6.5 m, height - 2.30 m. The mazar is round, right upper part has been destroyed. On the right side, at the distance of 30 m, commemoration signs represented by modern gravestones/steles dated/installed in 1998 are located. The mazar preliminary dates back to period between the end of 19th century and the beginning of the 20th century.	The alignment trajectory (axis of the road) will be designed to bypass the mazar with the protection zone of 50 m. The mazar is currently fenced and no additional mitigation measures will be required during road construction. The design institute will coordinate closely with the team of archaeologists (subcontractor) to make sure the new alignment does not affect the structural stability of the Mazar.
Batystau Burial (archaeological monument) N48 259.526 E73 785.183	The burial is located on the right side of the road alignment at km 1677,400, at the distance of 30 m from the road axis. The burial consists of 5 kurgans (burial mounds).	All of the kurgans are subject to full archaeological survey (excavations). Following the completion of the said survey, historical and cultural finds obtained during the survey will be preserved and transferred to the possession of state museums. The archaeological monument will be removed from the List of State Registration of Monuments. Based on the survey, the re-

		search report and the conclusion will be prepared in consultation with the Ministry of Culture and Sports of the Republic of Kazakhstan.
Zhalgyz Oba (archaeological monument) N48 259.526 E73 785.183	Located on the left side from the road. Diameter is 15 m, height is 1.50 m. Kurgan is round. The kurgan has stone-and-earth fill. It preliminary dates back to the Early Iron Age (?)	This kurgan is subject to full archaeological survey (excavations). Following the completion of the said survey, historical and cultural finds obtained during the survey will be preserved and transferred to the possession of state museums. The archaeological monument will be removed from the List of State Registration of Monuments. Based on the survey, the research report and the conclusion will be prepared in consultation with the Ministry of Culture and Sports of the Republic of Kazakhstan.

Schedule of Works

Archaeological works will be carried out within 75 working days. The tentative schedule of archaeological works is provided below.

1. Preparatory/inception phase Review of the sources of information for organization of archaeological surveys. Procurement of auxiliary equipment, materials, and supplies.	5 days
2. Field surveys Conducting archaeological surveys at the following sites: 1. Batystau Burial consisting of 5 burial mounds 2. Zhalgyz Oba	60 days
3. Laboratory-analytical work Cameral treatment of the materials received during archaeological surveys. Graphic works, studying and classification of finds. Preparation of	15 days

the scientific report based on the results of the field surveys. The report should include narrative part, attachments with photo and graphic illustrations. Preparation and submission of documentation for removal from the State Register of Historical and Cultural Monuments.	

All activities under this Action Plan, including the removal of the historic sites from the State Register of Historical and Cultural Monuments should be completed prior to the start of construction works.
The schedule will be coordinated with the contractor.

Obligations of the Subcontractor

Subcontractor is an entity that has the appropriate license and should undertake research and archaeological surveys of the archaeological sites mentioned above. According to the results of archaeological survey, the Subcontractor shall prepare a research report to be submitted to the General Contractor, the Employer and agreed upon by the local executive body. The historical and cultural finds will be transferred to the possession of a local museum's collection. Documents (description of artifacts and finds), photos and graphic recordings published in the form of the research reports shall be transferred to the possession of a regional museum and will be stored and exhibited. The Subcontractor will bear institutional responsibility for safekeeping of finds and other materials resulting from the archaeological survey prior to the transfer to the possession of the museum for further safekeeping and use.

The report on the research will be submitted by the competent authority of the Republic of Kazakhstan and to the General Contractor. Following the completion of works under this Action Plan and removal of the historic sites from the State Register of Historical and Cultural Monuments the Contractor can proceed with works start at the locations of these historic sites.