

ENVIRONMENTAL IMPACT ASSESSMENT

Project Number: 41121
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Kazakhstan: Multitranche Financing Facility for the CAREC Transport Corridor 1 (Zhambyl Oblast Section) Investment Program—Tranche 3

**Road section “Almaty–Kordai–Blagoveschenka–Merke–
Tashkent–Termez” (km 162 -260)**

Prepared by the Ministry of Transport and Communications for the Asian Development Bank

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CURRENCY EQUIVALENTS

(as of February 2010)

Currency Unit	–	tenge (T)
T1.00	=	\$0.006650
\$1.00	=	T150.365005

ABBREVIATIONS

ADB	–	Asian Development Bank
CAREC	–	Central Asia Regional Economic Cooperation
EA	–	executing agency
EIA	–	environmental impact assessment
EMP	–	environmental management plan
IA	–	implementing agency
MOTC	–	Ministry of Transport and Communications
PRC	–	People's Republic of China
ROW	–	right-of-way

NOTE

In this report, "\$" refers to US dollars.

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INTRODUCTION

In this project one of the main issues considered in the sphere of the environment protection is maintenance of ecological balance and rehabilitation of the lost qualities of the environment in the area of the preformed road capital repair works as well as the consequences for the community.

The Assessment of impact on the environment (AIE) of the solutions of the road reconstruction work project of road "Samara – Shymkent" at "Almaty-Kordai – Blagoveschenka – Merke – Tashkent – Termez" section, km 162-260, length 76.7 km, was worked out based on the assignment to develop AIE given by the general designer LLP "Kazdorproject".

LLP "GeoData Plus" is executing the assessment of impacts on the environment at the stage of "AIE" section of the work design of road construction "Samara - Shymkent" at "Almaty-Kordai – Blagoveschenka – Merke – Tashkent – Termez" section, km 162 - 260, length 76.7 km. This company is entitled to carry out AIE for all types of planning, reconstruction projects and new construction projects – license № 00039P of the Ministry of the Environment Protection dated April 29, 2004, re-registered with № 01193P (0042262) dated January 30, 2008.

All the previous materials were thoroughly analyzed and summarized during the project development which allowed to significantly complimenting to the field surveys and measurements done. The following sources were used during the work on the project:

1. Materials of field surveys, studies and measurements done by LLP Kazdorproject at present time and earlier.

2. Feasibility study and WP for road reconstruction "Samara – Shymkent" at "Almaty-Kordai – Blagoveschenka – Merke – Tashkent – Termez" section, km 162 - 260.

3. Study materials and scientific and technical reports of different road organizations of Kazakhstan.

4. Governmental National Program "Transport and Communication development", Section 5, "General scheme of network development of roads for general use for the period till 2010". The Program was developed in accordance with order N 82-p of the Prime-Minister of the Republic of Kazakhstan dated March 17, 1993, and was approved by the Ministry of Economy of the Republic of Kazakhstan, Decree N 20/2, dated June 25, 1993.

5. Governmental program of road network improvement and development of roads for general use "Roads of Kazakhstan" for the period till 2010, 1995.

6. Decree №1018 of the Government of the Republic of Kazakhstan dated 11.10.2005.

The structure, composition and contents of AIE documents were adopted in accordance with the assignment and "Instructions on assessment of supposed impact of economic or other activity on the environment during development of pre-planned, pre-project and project documents" (Astana, 2007), approved by order № 204-п of MEP dated June 28, 2007.

The project was developed in accordance with the requirements, regulations and legislative acts regarding protection of the environment existing in the Republic of Kazakhstan.

The road under reconstruction is located at the lands of Kordai region Zhambyl oblast. The beginning of the section under the project is km 162, the end is km 260 (Almaty-Termez motorway), length 76.7 km.

Today a new direction of by-pass of Kordai passage is needed considering future traffic intensity.

Two-lane traffic is adopted in the project in accordance with future intensity. Road construction will solve the problem of traffic safety, the capacity of this section will influence the decrease of commercial risks during goods delivery, will decrease transport costs, passengers' travel time, will have positive influence on social sphere of main regions of Kazakhstan, will decrease road impact on the environment. All these issues are highlighted in the respective sections of the project.

The following components of the ecological system were considered in this project: land, its mineral resources, surface and subsoil waters, plant and animal kingdoms, nature landscapes, national monuments of nature and architecture as well as social and economic conditions.

Implementation of this road construction will allow gaining stable transport communication of Central Asia and Middle East countries with Russian Federation, Ukraine, European countries and Transcaucusus countries, China, South Korea and will be of great significance.

The section includes determination of the character and the level of ecological danger during the construction of the abovementioned road section.

The main goal of AIE is prevention of the environment degradation, development of measures decreasing the level of ecological danger of planned economical activity.

The solutions on the road development are evaluated according their impact on the air, water and land resources, flora and fauna and other factors of the environment.

Total length of the road is 76.7 km.

Approximate construction terms at the road section 162 -260 km of M-39 motorway is 24 months.

The project is developed in accordance with the following documents:

1. Assignment for the project development issued by Zhambyl regional department of the Committee of Roads.
2. Registration certificate of the General designer LLP Kazdorproject.
3. Statistic card of the General designer LLP Kazdorproject.
4. TIN certificate of the General designer LLP Kazdorproject.
5. Certificate of VAT registration of the General designer LLP Kazdorproject.
6. State license of General designer LLP Kazdorproject.
7. Letters of Zhambyl regional department of the Committee of Roads.
8. Approval of state authorities regarding 162 -260 km of Almaty – Termez motorway.
9. Technical conditions for section 162 – 260 of “Almaty-Termez” motorway.
10. Bill of quantities of sources and transportation methods of building materials.
11. Structure of road cover.
12. Results of calculation of pollution matters disseminated in the air.
13. License of MEP RK issued to the developer of AIE LLP “GeoData Plus”.
14. Check list of ecological components.
15. Calculation of dust emission.

1. CHARACTERISTICS OF THE AREA OF ROAD LOCATION

1.1. Climate

Climatic characteristic of the surveyed area is carried out based on the data of many-years observations of meteorological stations which are situated near the road:

Stepnoye, absolute mark of meteo station	- 500 m.
Kolkhoz, named after Chapayev (Tash-Utkul),	- 506 m.
Kamyshanovka,	- 560 m.
Chuiskaya	- 596 m.
Konstantinovskaya	- 545 m.

The climate of the region is sharply continental, the summer is hot here, and the winter is moderately cold and with great daily range of temperatures.

There are no climatic data on snow and wind conditions for meteorological stations Stepnoye and "Kolkhoz, named after Chapayev (Tash-Utkul)". That is why the climatic characteristics of the meteorological stations "Kamyshanovka", "Chuiskaya" and "Konstantinovskaya" are indicated. These stations are situated on the territory of the Kyrgyz Republic. All the mentioned stations are situated not far from the road alignment.

The detailed climatic data of all the meteorological stations are shown in Attachment 1 (see climatic characteristic).

Taking into account high location of the road section (540-660 m) and the amount of precipitations and according to the road and climatic zoning of the territory of Kazakhstan the surveyed road sections are referred to the 4th road climatic zone (Constructions norms and regulations of RK 3.03.09 -2006, attachment 2, Roads).

1.2. Road location and relief

The designed road is located in Kordai region, Zhambyl oblast of the Republic of Kazakhstan and is the section of an international transit corridor.

In terms of geomorphology the surveyed road section is located in the right bank flood plain terrace of the river Chu near the bottom of the mountain Kendyktas. The section relief is mainly plain with small knaps and has slight slope from the piedmont towards the central part of the mountain trench.

Near the mountains the plain surface is complicated with many dry narrows and with the beds of temporary and permanent stream flows. The surface is somewhat divided with not wide river valleys which cross the road.

Absolute altitude marks at the road sections are varied within the range of 540-600 m above sea level.

1.3. Soils and soil-forming materials

The surveyed section is located in steppe-desert zone with specific soil and plant assemblage.

Serozem-like soils are widely spread over the area. Their thickness varies within 0,2 – 0,35 m.

Natural greenery is developed in the rivers and streams flood beds and on the plains and is represented with open woods and bushes.

Sage bush deserts are with keireuks and desert dormouses, grassland vegetation is poor.

There are tree belt areas along the existing road, mainly of English elms and poplars, rarely – bushes, dzhida, willows and fruit trees.

One of the main significant ecological problems in Kazakhstan, and in particularly, in the region of the road construction, is soil erosion. Lands spoiled with washing and weathering may be easily seen along the road. They are represented in the form of rain rills, gorges and "baldnesses", i.e. these are surfaces lacking soil. It threatens not only physical and biological environment but also people as croplands and rangelands where foodstuff is grown and cattle is grazed are destroyed. In these areas it is necessary to stabilize rain rills and gorges, to restore vegetable mold by grass planting, to restore destroyed surfaces, to plant greenery by trees and bushes planting.

1.4. Surface and subsoil waters

In terms of hydrogeology the surveyed area is referred to the zone with deep surface water occurrence, sometimes they are sub artesian and artesian wells prove it.

Underflow waters may underlay at the depth of 0,0-5,0 m at river crossings, at some water-logged areas, canals and irrigation ditches.

Main water artery of the region is the river Chu with its numerous feeders. Surface waters are hydro carbonate, non-corrosive and slightly corrosive according to pH value.

According to the character and degree of wetting the surveyed area is referred to as type I of the area. (The sections are shown according to the existing kilometer poles.)

Artesian wells are drilled to get fresh drinking water in all the villages along the surveyed areas.

1.5. Vegetarian and animal kingdom

Greenery of the surveyed area is characteristic for droughty steppe and desert zone and is represented by sage bush deserts with keireuks and desert dormouses, grassland vegetation is poor. Natural greenery is developed in the rivers and streams flood beds and on the plains and is represented with open woods and bushes.

Tree vegetation is represented by tree belt areas along the existing road, mainly of English elms and poplars, rarely – bushes, dzhida, willows and fruit trees.

Tree belt areas also fulfill the function of snow breakage.

Agricultural lands are used mainly as unwatered plough lands where grain crops are grown and as summer pastures in a minor way. Vegetable crops and forage grasses are grown at household plots in populated places.

Animal kingdom is characteristic for steppe and desert zone. Among mammals gnawing animals – ground squirrels, hamsters, hares, jerboas – are spread most of all. Among carnivores' foxes and polecats live there. There are many turtles, snakes, lizards and arachnids. Among birds' eagles, harriers, wind hovers, sparrows, wild partridges nest in the steppes. There are many different water fowls near rivers and lakes.

There are no revealed areas where the road crosses migration routes of wild animals.

There are river perches, crucian carps, stunned fish and others in the rivers. But due to often drying ups of the rivers, their resources are not big and do not have commercial value and are used only for amateur fishery. Among amphibians green frog is spread in the rivers and it proves favorable ecological conditions of the rivers.

Due to small density of population and decrease of plough lands ecological conditions of animals and birds are natural. However, often steppe fires in summer and autumn in dry years damage vegetarian and animal kingdom. The reasons of fires are different but main of them are careless handling of fire in steppes.

Not only greenery but also animals, especially small ones, die during steppe fires.

1.6. Social environment

The designed roads go through pastures. The road is very close to wintering grounds and sheep shelters at all the sections. Field roads with soil and asphalt concrete pavement lead to these grounds and shelters from the designed road.

Lately the amount of rural population has decreased in 2-3 times and it is connected with outflow of the population to Astana, Almaty, oblast and regional centers. The economy of the surveyed areas is catered for industry and agriculture. Rural population is busy mainly in production of agricultural products and trucking.

The problems at this section are mainly caused by the difficulties of filed works as well as traffic safety.

1.7. Cultural, historical and archeological monuments

One of the issues considered during the road construction is preservation of monuments of history and culture. Certain buildings, memorable places and other objects associated with historical events of people's life are referred to these monuments. Material and spiritual creative works of historical, scientific, art value (ancient buildings, burials, archeological objects), as well as unique nature wildlife reserves, national parks.

11 objects which were recognized as monuments of history and culture were revealed and studied during the survey works. One of them is a contemporary ethnic cemetery situated in the protective zone of the road alignment axle.

The conclusion of the archeological expertise is available.

1.8. Esthetics of the designed object

Natural landscape where the existing road is laid is typical for mountain – valley, mountain and high mountain relief. The type of the area is not perceived as monotonous, there are smoothly high focuses.

Natural landscape is a significant favorable factor as an existing component of the environmental conditions and, what is more important, as an important link in the ecological balance. That is why during the design work the issue of the road inclusion into such natural environment is very crucial. The compliance of the road with the landscape leads to the provision of psychological understanding of the motorway to the drivers and continuous change of focuses on the road contributes to traffic safety. The requirements to the combination of the road esthetics with the natural landscape must not be underestimated.

The existing road being introduced into the surrounding landscape does not improve landscape esthetics due to its condition. The road has old asphalt concrete pavement and gravel pavement at the rest length. The pavement surface is not smooth, it is wavy.

The existing ferrous concrete pipes and bridges are worn out very much. The earth bed of the existing road has embankments with different slopes and it creates discord in its esthetics.

Esthetic and landscape attractiveness of the section is 1 point out of six-point system of Volkov's evaluation (Roads and environment protection. Ornatski N.P., p.143-144). For this road the estimate is very unsatisfactory.

Taking into account the above said it is planned to develop measures which allow improving landscape and architectural view of the road and its esthetic impression.

1.9. Location of pits of building materials, soil reserves and water supply sources

To construct the road “Almaty – Kordai – Blagoveschenka – Merke – Tashkent – Termez” useful material as road building material can be used from the pits listed below:

1. Pit – dry river bed of Kurdaisai river – is located 4 km from the beginning of the designed road towards Otar village and 100-150 m to the left. Useful material is pebble gravel with sand filler. The area of deposit is 15 hectares, the pit is partially developed (40% of area), the depth of exploitation is 6-8 meters, and approximate reserves are more 500 thousand m³. Group of manual exploitation is 3(6B), coefficient of relative compaction is 1,0. Stripping is clay sand with thickness 1,0 m, group of manual exploitation is 1 (36B) including top soil – 0,15 m.

Gravel wear ability 18,3-19,6%.

Frost resistance type F 100.

Breakability type - 400.

Useful material is suitable for road bed and base layer after coarse fraction elimination. Appropriate soil wetness is 4,7 – 4,9 %, maximum dry density is 2,25-2,26 t/m³.

2. Gravel pit “Kakpatas river” is located 58+100 km off the designed road and 4,7 km to the left over the soil road. Useful material is pebble gravel with sand filler up to 25%. Group of manual exploitation is 3 (6B).

Coefficient of relative compaction is – 1,0.

The area of deposit is 24 hectares, recommended depth of exploitation is 3-6 m, and approximate reserves are 1 mln m³. Stripping is top soil layer with thickness of 0,15 m per 70% of the area, group of manual exploitation is 2 (9B). The amount of the useful material may be increased by means of exploitation area increase.

Gravel wear ability 13,9-14,3%.

Frost resistance type F100.

Breakability type - 600.

The useful material is suitable for base layer and road bed.

3. Pit of Agalatass factory of road building materials is located 28 km from Kordai village. Crushed stone is produced by crushing gray and pink-gray limestone with thickness of 100-150 m (according to Geological map issued 1970 with scale 1:200 000, sheet K-43-IX). Deposit area is 83000 m². Approximate reserves are more than 1 mln m³.

Wear ability of crushed stones 16,2-18,3%.

Frost resistance type F 100.

It is recommended to be used for the base of the road pavement.

All the above mentioned pits were earlier developed by road construction organizations. The possibility to increase these pits capacities were studied additionally.

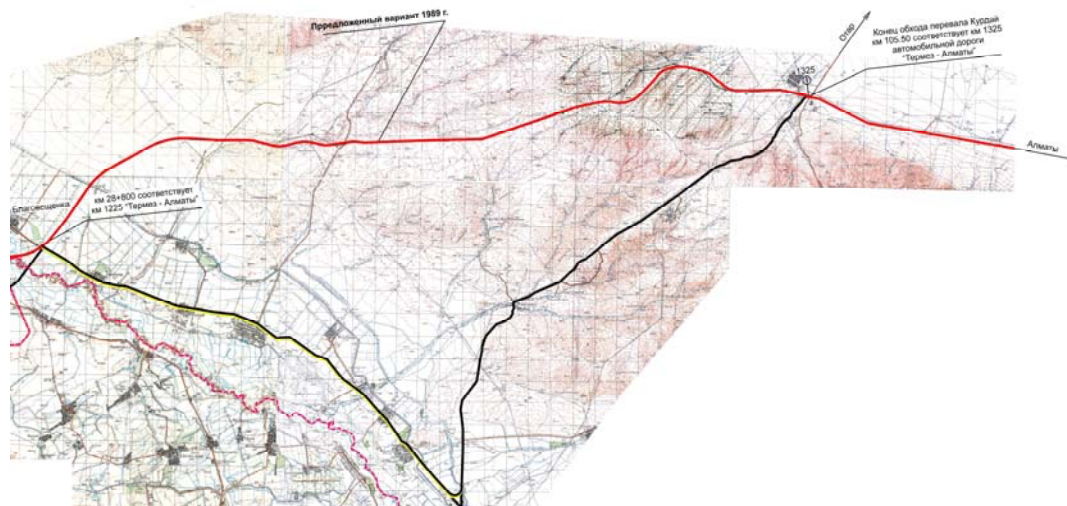
2. CHARACTERISTICS OF THE DESIGNED OBJECT

According to the project this road section is referred to as technical category II. The project offers to reconstruct the existing road and to construct a new by-pass in Kordai village from the turn to Otar (162 km) to the turn to Blagoveschenka (260 km).

This section covers the construction of “Trefoil leaf” type junction and 15 new bridges.

Field and settlement access tracks are being improved constructing asphalt concrete pavement. Bus stops and short-term rest areas are being developed.

Works on reinforcing of beds, road ditches, canals are being done. The project covers the arrangement of a man camp and ground for PPS, soil and asphalt concrete storage.



The following works are stipulated to provide traffic safety:

- Establishment of grounds for passing of opposing traffic
- Construction of bridges with standard sizes
- Installation of rails guards
- Marking of roadway
- Installation of road signs

These types and amounts of work are represented in “Summarized bill of quantities” which is an integral part of this project.

2.1. Construction arrangement

According to the working project solutions the construction of road section 162-260 (by-pass of Kordai village) is divided into two complexes going on simultaneously. Total length of construction is determined according to Construction norms and regulations 1.04.03-85* and is 37 months for each of the complexes. 215 people will be involved in the construction, 155 – general worker and 60 engineers at the first section and 210 people, 148 general workers and 62 engineers.

The construction time is determined by the assumption to construct a new bypass of Kordai passage in new direction during the process of works. Also the difficulties in work are caused by the road location in highlands and it is necessary to carry out drilling and blasting operations.

For the construction period it is supposed to install grounds for PPS and milled asphalt concrete storage in the following amounts:

<i>Name of material</i>	<i>Area of storage grounds s.m.</i>	<i>Amount of material t</i>
<i>1 complex</i>		
PPS	133800	464800
Milled asphalt concrete	200	805
<i>2 complex</i>		
PPS ППС	118000	404700
Milled asphalt concrete	2400	8917

According to the working project solutions two man camps are provided for at 26 km and 51 km of the designed road with the area 0,3 and 0,4 hectares.

The existing asphalt-concrete plant located in Kordai village owned by LLP “Monolit” will be used for asphalt concrete supply.

3. ENVIRONMENTAL IMPACT ASSESSMENT

To determine study scope and proposed mitigation measures it is necessary to consider all possible consequences for the environment during the implementation of the road rehabilitation project and its further operation.

The objective of the work is:

To reveal possible key positive as well as negative impacts, their scale, degree and continuity of direct and indirect influence on natural and social resources which may arise during project implementation and operation;

To determine actual mitigation measures against any impact on the environment, the use of which will allow avoiding negative consequences or reduce them;

To reveal residual effects from the impact, i.e. the effects which mitigation is either left out or impossible and which require indemnity payment.

Assessment of impact on the environment is performed in two scenario variants regarding the condition of the road:

1. The existing condition of the road is preserved till 2028.
2. The designed condition of the road is preserved till 2028.

3.1. Air

3.1.1. Assessment of impact during operation period

The source of air pollution is vehicle engine exhausts which drive along the road sector. Car engines not only use a great amount of oxygen but they also pollute the atmosphere with exhaust gases mainly with carbon oxide (CO), nitrogen oxide (NOx), carbon hydride (CmHn) and lead compounds (Pb). At present in world practice they do not regulate and do not control car exhausts of carbon dioxide CO₂ due to its non-toxicity and sulfur dioxide SO₂, due to its relatively insignificant amount in transport exhausts.

Concentration of toxic substances in the air depends on type of car engines (carburetor, diesel), engine capacity, traffic intensity and possibility of these substances dissemination in the atmosphere. Concentration of harmful products in the air decreases with the moving away from the road alignment and also it depends on wind direction and velocity and on the amount of incoming solar radiation.

The calculation of air pollution level with toxic substances was done by means of special computer program "Ecologist" taking into consideration all these factors. The program does the calculation of harmful substances concentrations in roadside area using the method of Main geophysical observatory named after Voeikov A.I. (OND – 86) taking into consideration traffic intensity and dangerous wind velocities. The calculation of concentrations near the ground was done taking into consideration the existing condition of the road and its condition after rehabilitation. All impact parameters were calculated (exhausts, noise, soil pollution, total toxicity). Maximum one-time permissible concentrations of harmful substances were used in calculations.

Traffic intensity	For the existing period, 2008	For reconstruction period, 2009	For road operation period, 2028
Transit transport (according to the calculations shown in Attachment 4)	2092	1945	5558
Total:	2092 cars per day	1945 cars per day	5558 cars per day

Maximum one-time permissible concentrations (PC) of toxic substances in the atmosphere, adopted in "Ecologist", are:

- Carbon oxides (CO) – 5,00 mg/m³,
- Nitrogen oxides (NOx) – 0,085 mg/m³,
- Carbon hydrides (CmHn) – 1,0 mg/m³,

Lead compounds (Pb) – 0,001 mg/m³.

It must be taken into account that the road and adjacent territory are industrially developed. The minutes of the calculation results of the air pollution level are indicated in Appendix 12. The plan and horizontal profile of the existing road axle were designed separately to analyze the existing situation.

According to the calculations the borders of the zones of toxic substances permissible concentrations (PC) in the air of the roadside do not exceed PC.

The border of PC zone of Nox in villages is located approximately within the fence lines, and the border of PC zone of other toxic substances is located within the road alignment. Harmful impact of toxic substances within sanitary protective zone is not expected by 2028. At the same time the indices of air pollution in the project solution option are somewhat better on the whole in comparison with the indices of air pollution in the option of maintaining of the existing condition of the road.

3.1.2. Assessment of impact during construction period

The scope of works regarding all structural elements of the road, types of mechanisms used during the construction and their capacity were taken as basis for the calculation of harmful substances exhaust in the atmosphere during the road reconstruction.

ACCORDING TO LOCAL PROJECT ESTIMATION COSTS DURING CONSTRUCTION AND INSTALLATION WORKS 35 TYPES OF BUILDING MACHINES AND VEHICLES USING DIESEL FUEL WILL BE USED.

No	Name	Fuel consumption, l/car-hour	Amount of cars	Schedule of work car/hour	Specific fuel consumption t
1	Road grader of average type 99 kVt /135 l.s./	16,3	1	38675	542,15
2	Bitumen spraying machines 7000 l	11,0	1	477	4,51
3	Bulldozer on tractor DZ-170, 170 l.s.	15,6	1	6842	91,80
4	Bulldozers 59 kVt /80 l.s.	11,5	1	1025	10,14
5	Bulldozers 79 kVt /108 l.s.	13,0	1	82853	926,30
6	Road levelers self-moving smooth 13 t	13,0	1	24267	271,30
7	Road levelers self-moving mutityred 16 t	14,0	1	51055	614,71
8	Truck cranes 16 t	7,0	1	1439	8,66
9	Crawler cranes 16 t	11,0	1	388	3,67
10	Crawler cranes 25 t	13,7	1	4431	52,20
11	Drilling crane vehicles with drilling depth of 3,5 m on truck	14,0	1	494	5,95
12	Sprinkler tanks, 6000 l	10,5	1	642641	5803,05
13	Crawler tractors 79 kVt /108 l.s./	17,5	1	355	5,35
14	Crawler tractors 96 kVt /130 l.s./	19,0	1	121468	1984,78
15	Tractors ДТ	19,0	1	54	0,89
16	Tractors Т	17,5	1	958	14,41

17	Pneumatic tamper during compressor work	3,8	1	7731	25,26
18	Asphalt paver	14,3	1	37	0,45
19	Excavator Э-652, bucket capacity 0,25 m ³	4,7	1	30793	124,46
20	Excavator Э-652, bucket capacity- 0,65 m ³	7,9	1	44222	300,44
21	Excavator ЭО-4121, bucket capacity 1,0 m ³	16,0	1	180	2,47
Total fuel consumption for all machines and mechanisms					10792,94

During their work fuel consumption products will be exhausted into the air: benzopyrene; aldehyds and nitrogen dioxide – class of hazard 2; sulfur dioxide and smut coal – class of hazard 3; carbon oxide – class of hazard 4; carbon hydrides.

To determine the amount of harmful exhaust we use their specific values and fuel consumption values for the whole construction period.

Gross annual exhaust of harmful substances is calculated using the formula:

$$M = G_d \cdot q_i = G_d \cdot (q_{co} + q_{no} + q_c + q_{al} + q_{ca} + q_{so} + q)$$

where G_d – fuel consumption by vehicles for the construction period;

q_i – specific values of exhaust of i – substance in the atmosphere per unit.

Gross exhaust for the whole construction period

Substance	Code	Specific values of exhaust	Gross exhaust t/year
Nitrogen dioxide	0301	0,008	86,34355567
Nitrogen oxide	0304	0,0013	14,0308278
Smut coal	0328	0,0155	167,2906391
Sulfur dioxide	0330	0,02	215,8588892
Carbon oxide	0337	0,01	107,9294446
Alkanes	2754	0,03	323,7883338
Benz-a-pyrene	0703	$3,2 \cdot 10^{-7}$	0,003453742

Maximum one-time exhaust of harmful substances is calculated using the formula:

$$M^I = \frac{G_v \cdot q_i \cdot n \cdot 10^3}{3600}$$

where G_v – hourly consumption of diesel fuel by a vehicle,

q_i – specific indicator of exhausting polluting substance, g/g fuel,

n – maximum amount of vehicles at the site at one time.

Maximum one-time exhaust of harmful substances (g/s) is calculated taking into consideration the technology of construction works when a bulldozer, a tractor and an excavator may be at the site at one time.

Maximum one-time exhaust of harmful substances

Substance	Code	Specific values of exhaust	Maximum one-time exhaust g/s
Nitrogen dioxide	0301	0,008	0,085333333
Nitrogen oxide	0304	0,0013	0,013866667
Smut coal	0328	0,0155	0,165333333
Sulfur dioxide	0330	0,02	0,213333333
Carbon oxide	0337	0,01	0,106666667
Alkanes	2754	0,03	0,32
Benz-a-pyrene	0703	$3,2 \cdot 10^{-7}$	$3,41333 \cdot 10^{-6}$

Calculation of dust exhaust during transportation of building materials

The calculation of dust exhausts is done using "Method of calculation of polluting substances exhausts into the atmosphere from enterprises producing building materials" approved by order №100-п of MEP RK dated 18.04.2008.

Dust exhaust is determined by the transport traffic within the site. The dust is exhausted as a result of wheels interaction with the road surface and when it is winded off the surface of material in the cargo body.

Maximum one-time exhaust is calculated using the formula:

$$M_{\text{sec}} = \frac{C_1 \times C_2 \times C_3 \times k_5 \times C_7 \times N \times L \times q_1}{3600} + C_4 \times C_5 \times k_5 \times q' \times S \times n, \text{ g/s},$$

And gross exhaust is calculated using the formula:

$$M_{\text{year}} = 0,0864 \times M_{\text{sec}} \times [365 - (T_{\text{cn}} + T_{\text{d}})], \text{ t/year},$$

where: C_1 – coefficient of average load capability of one vehicle;

C_2 – coefficient of average speed of vehicle. Average speed of transportation is determined

using the formula: $V_{\text{cc}} = \frac{N \times L}{n}$, km/hour;

N – number of passes (back and forth) of all the vehicles per hour;

L – average duration of one pass within the site, km;

n – number of cars working in the pit;

C_3 – coefficient of road condition (table 3.3.3);

C_4 – coefficient of material surface profile at the platform determined as correlation $\frac{S_{\text{факт.}}}{S}$,

where: S_{actual} – actual surface of material on the platform, m^2 ;

S – area of open surface of transported material, m^2 .

Value of C_4 varies within the range 1,3-1,6 depending on fineness of material and degree of platform filling;

C_5 – coefficient of airflow velocity ($V_{\text{об}}$) of material, which is determined as geometrical sum of

wind speed and reciprocal vector of average speed of road traffic using the formula: $V_{\text{об}} = \sqrt{\frac{v_1 \times v_2}{3,6}}$,

m/s,

where: v_1 – wind speed most characteristic for this region, m/s;

v_2 – average speed of a vehicle, km/hour;

k_5 – coefficient of wetness of material surface layer;

C_7 – coefficient of dust share blown off into the atmosphere and equal 0,01;

q_1 – dust exhaust into the atmosphere per 1 km of run at $C_1, C_2, C_3=1$, accepted as equal 1450 g/km;

q' – dust exhaust from a unit of actual material surface at the platform, $\text{g}/\text{m}^2 \cdot \text{s}$;

T_{cn} – amount of days with stable snow cover;

$T_{\text{д}}$ – amount of days with rain precipitation calculated using the formula:

$$T_{\text{д}} = \frac{2 \times T_{\text{д}}^0}{24}, \text{ days},$$

Results of calculations of maximum one-time and gross exhausts

Name of works	Coefficients						Dust exhaust per 1 km g_1, g	Dust exhaust from surface unit g_2, g	Area of cargo body, F_0, m^2	Amount of cars n	Number of passes per hour N	Average distance of transportation L	Dust exhaust g/s	Gross exhaust $t/period$
	C_1	C_2	C_3	C_4	C_5	C_7								
Soil transportation	1,6	1,5	0,5	1,3	1,26	0,01	1450	0,002	12	17	0,4	8	0,684	15,459

Transportation of PGS and crushed stone	1,6	1,5	0,5	1,3	1,26	0,01	1450	0,002	12	15	0,4	10	0,609	13,716
Total:													1,293	29,175

Calculation of non-organic dust exhausts during earthworks and construction of road pavement

The amount of non-organic dust exhausted into the atmosphere during construction of road bed as well as road pavement construction is exhausted during the excavation works. The calculation of exhaust is done according to "Methods of calculation of exhaust norms from non-organic sources" approved by order №100-п of MEP RK dated 18.04.2008.

Dust exhaust amount may be described with the formula

$$Q = \frac{P1 * P2 * P3 * P4 * P5 * P6 * B1 * G * 10^6}{3600}, \text{ g/s}$$

where P1 — dust fraction in massive material; determined by washing and sifting of an average sample with dust fraction separation with particles size 0—200 mkm (P1=k1);

P2 — fraction of flying dust transferring into aerosol with particles size of 0—50 mkm relative to all the dust in the material (it is supposed that not all flying dust is transferred into aerosol);

P3 — coefficient of wind speed in the area of excavator activity;

P4 — coefficient of material wetness;

G — amount of massive material developed with the excavator, t/hour

P5 — coefficient of material size;

P6 — coefficient of local conditions;

B1 — coefficient depending on height of overturning;

$$M = \frac{Q \cdot T \cdot 3600}{10^6}, \text{ t/year}$$

T — time of work, hour/year

Name	P1	P2	P3	P4	P5	P6	G	B1	T	exhaust g/s	Gross exhaust t/period
Earthworks	0,06	0,06	1	0,01	1	1	489	0,5	75194	2,934	794,22911

Calculation of exhausts during overturning of dust-exhausting materials and from the storages of building materials

Intensive non-organized sources of transforming are overturning of material, loading of material and loading to the warehouse and storage of materials in the warehouse. The calculation of exhausts is done according to "Methods of calculation of exhaust norms from non-organized sources" approved by order №100-п of MEP RK dated 18.04.2008.

Storage grounds for PPS, soil and milled asphalt concrete are stipulated for during the construction period. To calculate them their amounts are taken from the cost estimates and working project materials:

Name of material	Storage grounds area sq.m.	Amount of material t
1 complex		
PPS	133800	464800
Milled asphalt concrete	200	805
2 complex		
PPS	118000	404700
Milled asphalt concrete	2400	8917

Exhausts during storage of building materials and overturning are calculated using the software Era 1.7., (Attachment 16).

Total exhaust is

Substance	Maximum exhaust g/s	Gross exhaust t/period
Non-organic dust: 70-20%	22.17906	700.637666
silicone dioxide		

Calculation of exhaust during explosive works

Amount of carbon dioxide and nitrogen oxide exhausted into the atmosphere is calculated using the formula:

$$M_{year} = M1_{year} + M2_{year}, \text{ t/year,}$$

where: M1_{year} – amount of 1 – polluting substance exhausted together with dust and gas ebby during the explosion, t/year;

M2_{year} – amount of i-polluting substance gradually exhausting into the atmosphere from the exploded massive material, t/year.

Amount of gaseous polluting substances exhausted together with dust and gas ebby during the explosion is calculated using the formula:

$$M1_{year} = \sum_{j=1}^m q_{ij} \times A_j \times (1 - \eta), \text{ t/year,}$$

Where : m – amount of types of explosive substances used during the year;

q_{ij} – specific exhaust of i-polluting substance during the explosion of 1 ton of j- explosive substance, t/t;

A_j – amount of exploded j- explosive substance, t/year;

η – efficiency of gas-suppressive means used during the explosion, unit fraction. The efficiency of nitrogen oxide suppression in use of water stemming is $\eta = 0,35-0,5$.

Amount of gaseous polluting substances exhausted gradually into the atmosphere from the exploded massive material is calculated using the formula:

$$M_{year} = \sum_{j=1}^m q'_{ij} \times A_j, \text{ t/year,}$$

where q'_{ij} – specific exhaust of i-polluting substance from the exploded massive material, t/t of explosive substance.

Total exhausts of nitrogen oxide (NO_x) are divided into nitrogen dioxide and nitrogen oxide.

Amount of dust exhausted into the atmosphere during explosions per year is calculated using the formula :

$$M_{year} = \frac{0,16 \times q_n \times V_{zm} \times (1 - \eta)}{1000}, \text{ t/year,}$$

where: q_n – specific dust exhaust per 1 m³ of exploded massive material, kg/m³;

0,16 – non-dimensional coefficient of gravity sedimentation of hard particles within the open pit;

V_{zm} – volume of exploded massive material, m³/year;

η – efficiency of dust-suppressive means used during the explosion, unit fractions.

Maximum amount of polluting substances exhausted during the explosions, g/s, and adjusted to 20 minutes average interval is calculated using the formula:

$$\text{For gases: } M_{sec} = \frac{q_{ij} \times A_j \times (1 - \eta) \times 10^6}{1200}, \text{ g/s;}$$

$$\text{For dust: } M_{sec} = \frac{0,16 \times q_n \times V_{zm} \times (1 - \eta) \times 10^3}{1200}, \text{ g/s,}$$

where: A_j – amount of exploded explosive substance per one mass explosion, t;

V_{zm} – maximum volume of exploded massive material per one mass explosion, m³;

Background data for calculation:

No	Name	Value
1	complex	
1	Explosive substance	Ammonite 6 ЖБ
2	Amount of exploded explosive substance	1517 ton
3	Efficiency of gas-suppressive means used during the explosion, unit fraction	0.5
4	Volume of exploded massive material, including:	4267250 cub.m.
	Drilling and blasting works	2240750 cub.m.
	Blasting charge	442300 cub.m.
	Deep-hole charge	1584200 cub.m.
5	Amount of blasted explosive substance per one mass explosion	0.6 t
6	Maximum amount of blasted massive material per one	1688 cub.m.

	mass explosion	
2	complex	
1	Explosive substance	Ammonite 6 ЖБ
2	Amount of exploded explosive substance	63 ton
3	Efficiency of gas-suppressive means used during the explosion, unit fraction	0.5
4	Volume of exploded massive material, including:	177050 cub.m.
	Drilling and blasting works	93110 cub.m.
	Blasting charge	65840 cub.m.
	Deep-hole charge	18100 cub.m.
5	Amount of blasted explosive substance per one mass explosion	0.6 t
6	Maximum amount of blasted massive material per one mass explosion	1688 cub.m.

Results of calculation of exhausts during drilling and blasting works

Name of substance	Code	Maximum one-time exhaust g/s	Gross exhaust t/period
1 complex			
Drilling and blasting works			
Non-organic dust: 70-20%	2908	10.128	3.69
Nitrogen (IV) oxide (Nitrogen dioxide)	0301	0.68	1.592
Nitrogen oxide	0304	0.1105	0.2587
Carbon oxide	0337	2.75	19.1
Blasting works with blasting charges			
Non-organic dust: 70-20%	2908	10.128	0.728
Nitrogen (IV) oxide (Nitrogen dioxide)	0301	0.68	0.314
Nitrogen oxide	0304	0.1105	0.051025
Carbon oxide	0337	2.75	3.765
Blasting works with deep-hole charges			
Non-organic dust: 70-20%	2908	10.128	2.617
Nitrogen (IV) oxide (Nitrogen dioxide)	0301	0.68	1.128
Nitrogen oxide	0304	0.1105	0.1833
Carbon oxide	0337	2.75	13.53
2 complex			
Drilling and blasting works			
Non-organic dust: 70-20%	2908	10.128	0.153
Nitrogen (IV) oxide (Nitrogen dioxide)	0301	0.68	0.066
Nitrogen oxide	0304	0.1105	0.010725
Carbon oxide	0337	2.75	0.792
Blasting works with blasting charges			
Non-organic dust: 70-20%	2908	10.128	0.1114
Nitrogen (IV) oxide (Nitrogen dioxide)	0301	0.68	0.048
Nitrogen oxide	0304	0.1105	0.0078
Carbon oxide	0337	2.75	0.576
Blasting works with deep-hole charges			
Non-organic dust: 70-20%	2908	10.128	0.02784
Nitrogen (IV) oxide (Nitrogen dioxide)	0301	0.68	0.012
Nitrogen oxide	0304	0.1105	0.00195
Carbon oxide	0337	2.75	0.144
Total for all types of works			
Non-organic dust: 70-20%	2908	60.768	7.32724
Nitrogen (IV) oxide (Nitrogen dioxide)	0301	4.08	3.16
Nitrogen oxide	0304	0.663	0.5135
Carbon oxide	0337	16.5	37.907

During reconstruction of water development facilities the main sources of exhausts will be the unit of concrete mixture preparation. Gross exhausts can be determined using the method of calculation according to specific indicators "Methods of calculation of polluting substances exhausts into the atmosphere from enterprises producing building materials" approved by order №100-п of MEP RK dated 18.04.2008.

In case of use of specific indicator of dust exhaust per unit of raw material and material consumption the calculation is done using the formula:

$$M_{year} = \frac{q \times T}{1000}, \text{ t/year,}$$

q – specific indicator of dust exhaust, kg/hour (7,1 for cement);

T – time of work of technological process (equipment).

$$M_{year} = \frac{7,1 \times 3506}{1000} = 24.8926 \text{ t/period}$$

Maximum one-time exhaust is determined from the specific indicator of dust exhaust kg/hour:

$$Q = \frac{q \cdot 1000}{3600} \text{ g/s}$$

$$Q = \frac{7,1 \cdot 1000}{3600} = 1.97 \text{ g/s}$$

Calculation of exhaust during minor repair of construction equipment

If there are minor breakdowns of construction equipment it is supposed to carry out minor repair works at the site mainly connected with welding. One welder is used for welding. During its work electrodes of Э46 type at the amount of 79 kg for the whole construction period are used.

The calculation of gross exhaust of polluting substances is done using ПНД 211.2.02.03-2004. It is done using the formula:

$$M_{year} = \frac{B_{year} \times K_m^x}{10^6} \times (1 - \eta), \text{ t/year}$$

where B -year – calculation of used welding material, type Э46 – 79 kg;

K_m^x - specific indicator of polluting substance exhaust "x" per unit of weight of consumed (prepared) raw materials and materials, g/kg;

η - degree of air clearance in the corresponding device which is provided for the group of technological devices – 0.

Maximum one-time exhaust of polluting substances exhausted into the atmosphere during welding, deposit welding, coating and metal coating is determined using the formula:

$$M_{sec} = \frac{K_m^x \times B_{hour}}{3600} \times (1 - \eta), \text{ g/s}$$

where Bhour – actual maximum consumption of used raw materials and materials taking into consideration resolution of equipment performance – 1 kg/hour;

Name of substance	CODE	Exhaust g/s	Gross exhaust t/period
Black iron (II) oxide	0123	0.000407	0.000772
Manganese and its compounds	0143	0.0000721	0.0001367
Fluoric gaseous compounds (enumerated per fluorine)	0342	0.00001667	0.0000316

Norm for harmful exhausts into the atmosphere for the construction period.

The indicated above calculations for construction of 162-260 km section of «Almaty – Kordai – Blagoveschenka – Merke – Tashkent – Termez» road are the basis for establishment of norms for polluting substances exhausts during construction period. The permission for the environment pollution for the construction period is processed by the company awarded with the construction tender.

Zhambyl oblast, by-pass of Kordai passage 162-260

Production section	Number of exhaust sources	Norms for polluting substances exhausts				Year of MPE reach
		the existing condition				
		For 2009		MPE		
		g/s	t/period	g/s	t/period	
1	2	3	4	5	6	7
***Ferrous trioxide (iron oxide) /in equivalent of iron/ (0123)						
Organized sources						
Construction section 162-260 2 complex	of 0016	0.000407	0.000772	0.000407	0.000772	
***Manganese and its compounds /in equivalent of manganese(IV)oxide/ (0143)						
Organized sources						
Construction section 162-260 2 complex	of 0016	0.0000721	0.0001367	0.0000721	0.0001367	
***Nitrogen (IV) oxide (Nitrogen dioxide) (0301)						
Non -organized sources						
Construction section 162-260 1 complex	of 6009	0.68	1.592	0.68	1.592	
	6010	0.68	0.314	0.68	0.314	
	6011	0.68	1.128	0.68	1.128	
Construction section 162-260 2 complex	of 6012	0.68	0.066	0.68	0.066	
	6013	0.68	0.048	0.68	0.048	
	6014	0.68	0.012	0.68	0.012	
	6018	0.085333333	86.34355567	0.085333333	86.34355567	
Total:		4.165333333	89.50355567	4.165333333	89.50355567	
***Nitrogen (II) oxide (Nitrogen oxide) (0304)						
Non -organized sources						
Construction section 162-260 1 complex	of 6009	0.1105	0.2587	0.1105	0.2587	
	6010	0.1105	0.051025	0.1105	0.051025	
	6011	0.1105	0.1833	0.1105	0.1833	
Construction section 162-260 2 complex	of 6012	0.1105	0.010725	0.1105	0.010725	
	6013	0.1105	0.0078	0.1105	0.0078	
	6014	0.1105	0.00195	0.1105	0.00195	
	6018	0.013866667	14.03	0.013866667	14.03	
Total:		0.676866667	14.5435	0.676866667	14.5435	
***Carbon (Smut coal) (0328)						
Non -organized sources						
Construction	of 6018	0.16533333	167.2906391	0.16533333	167.2906391	

section 162-260 2 complex						
***Sulfur dioxide (Sulfur anhydrate) (0330)						
Non -organized sources						
Construction section 162-260 2 complex	of	6018	0.21333333	215.8588892	0.21333333	215.8588892
***Carbon oxide (0337)						
Non -organized sources						
Construction section 162-260 1 complex	of	6009	2.75	19.1	2.75	19.1
		6010	2.75	3.765	2.75	3.765
		6011	2.75	13.53	2.75	13.53
Construction section 162-260 2 complex	of	6012	2.75	0.792	2.75	0.792
		6013	2.75	0.576	2.75	0.576
		6014	2.75	0.144	2.75	0.144
		6018	0.1066667	107.9294446	0.1066667	107.9294446
Total:			16.6066667	145.8364446	16.6066667	145.8364446
***Fluoric gaseous compounds (hydrofluoride, silicon (0342)						
Organized sources						
Construction section 162-260 2 complex	of	0016	0.00001667	0.0000316	0.00001667	0.0000316
***Benz-a-pyrene (3,4-Benzpyrene) (0703)						
Non -organized sources						
Construction section 162-260 2 complex	of	6018	0.000003413	0.003453742	0.000003413	0.003453742
***Alkane C12-19 (Solvent P1K-265II) /in equivalent of carbon/ (2754)						
Non -organized sources						
Construction section 162-260 2 complex	of	6018	0.32	323.7883388	0.32	323.7883388
***Non-organic dust: 70-20% silicon dioxide (coal clay, cement, dust (2908)						
Non -organized sources						
Construction section 162-260 1 complex	of	6001	11.64	367.6	11.64	367.6
		6002	0.016	0.892	0.016	0.892
		6003	0.0174	0.55	0.0174	0.55
		6004	0.00533	0.001546	0.00533	0.001546
		6009	10.128	3.69	10.128	3.69
		6010	10.128	0.728	10.128	0.728
		6011	10.128	2.617	10.128	2.617
		6015	1.97	24.8926	1.97	24.8926
Construction section 162-260 2 complex	of	6005	10.27	324.2	10.27	324.2
		6006	0.016	0.777	0.016	0.777
		6007	0.209	6.6	0.209	6.6
		6008	0.00533	0.01712	0.00533	0.01712
		6012	10.128	0.153	10.128	0.153
		6013	10.128	0.1114	10.128	0.1114
		6014	10.128	0.02784	10.128	0.02784
		6017	1.293	29.175	1.293	29.175

Total:	6018	2.934 89.14406	794.22911 1556.261616	2.934 89.14406	794.22911 1556.261616	
Total for enterprise:		111.2920925	2513.0873774	111.2920925	2513.0873774	
Hard:		89.30987584	1723.5566175	89.30987584	1723.5566175	
Gaseous, liquid:		21.9822167	789.53075987	21.9822167	789.53075987	

3.1.3. Noise impact

Alongside with air pollution noise is becoming a negative factor of impact on a person. Disordered mixture of sounds of various frequencies creates noise. Level of noise is measured in decibel (dB). Impact of transport noise on the environment and first of all human environment has become a problem. Systematic noise impact causes irritation, tiredness, increase stresses, disturbs sleep.

According to Construction norms and regulations 11-12-77 "Protection from noise" and in accordance with order №136 of the acting Minister of Healthcare RK dated March 24, 2005, maximum permissible noise level is 70 dB.

Maximum permissible noise level is accepted for the territories adjacent to dwelling houses, rest areas of districts, and group of dwelling houses, kindergarten areas, school areas, taking into account the following corrections:

For noise created by transport means – 10 dB

For existing housing development – 5 dB

For the daytime from 7 a.m. till 11 p.m. – 10 dB

Transport factors: traffic intensity, components of cars fleet, transport operational condition of road, influence noise level most of all.

Vibrations appearing in road pavement are conditioned by its temporary contraction during car pass and further quick elimination of load. The developed vibrations are transferred to the soil and further to buildings and facilities, situated at the roadside. The transfer of vibrations depends on soil, its density, wetness, and smoothness degree and granulometric composition.

Level of noise from road traffic as well as from all road construction machines and mechanisms used during major rehabilitation of the road is very high and is within the range of 75-90 dB. The greatest noise is from bulldozers, scrapers, pneumatic paving breakers, vibrators and other machines. Thus, noise from scrapers is 83-85 dB, during dump truck unloading is 82-83 dB, noise from working soil compactor during soil compaction is 76-78 dB. Great noise level is formed during the work of several road construction mechanisms.

Traffic intensity and its components have significant influence of noise level from traffic flow. Noise intensity in traffic flow considerably exceeds noise level of one car. Besides type of engine and driving speed of a car, the condition of road pavement and traffic arrangement influence noise level.

Based on the calculations we may make a conclusion that noise impact in settlements located along the road is within normal limits. At the same time the indices of noise impact in the project solution option are somewhat better on the whole in comparison with the indices of noise impact in the option of maintaining of the existing condition of the road.

3.2. Surface and subsoil waters

Pollution of surface waters may happen as a result of discharge of industrial and household flows and as a result of penetration of chemical and mechanical pollutants from the road into the water. Pollution of ground waters may happen due to flow leakage from the ground surface as well as with waste water discharge from the roads into the underground without purification.

Oil products penetration into the water is of main concern among substances polluting water. The first signs in the form of separate colored spots appear at leakage of 4 ml/m². Maximum permissible concentrations for oil and oil products are 0.1 – 0.3 mg/l.

The projects provides for the measures preventing penetration of polluting substances into rivers. On the designed bridges the flow from the surface of the bridge carriageway is directed along barrier curbs without holes to tray-type discharges. Further the flow is discharged along these discharges along road bed slopes to special wells filled with filters. Thus penetration of discharges of industrial and household drain flows into the river waters as well as chemical and mechanical pollutants from the road is completely excluded.

There are no ground waters revealed along the roadside. Thus, there will be no pollution of surface waters.

The project provides for water usage for technical and household needs during the road construction. The source of the water for these purposes is river Kakpatas and Georgievski canal.

Water transportation to the places of usage (road, construction site, man camps and others) will be done in tank trucks. Technical and drinking water will be transported in separate tanks supposed for each of these purposes.

Water withdrawal points must be coordinated with the authorities of Kordai region, Zhambyl oblast of the Republic of Kazakhstan.

3.2.1. Water supply and sewage for the construction and reconstruction period.

During the road reconstruction industrial and drinking water supply will be done from the existing water pipeline of the nearby villages on the agreement basis delivered with special transport.

Norms for water consumption during road reconstruction are determined based on standard construction period and amount of water consumption per one worker according to Construction norms and regulations 2.04.01-85 .

According to the working project solutions the construction of road section 162-260 (by-pass of Kordai village) is divided into two complexes going on simultaneously. Total length of construction is determined according to Construction norms and regulations 1.04.03-85* and is 37 months for each of the complexes. 215 people will be involved in the construction, 155 – general worker and 60 engineers at the first section and 210 people, 148 general workers and 62 engineers.

It is necessary to install biotoilets for workers needs near construction sites as well as dib-holes for household waste waters with their further assenization.

The bottom of dib-holes must be done of concrete to exclude leakage of waste waters into ground waters.

The duration of waste waters storage in the dib-hole must not exceed 3-4 days. Waste waters are taken away to waste water treatment facilities with special transport.

Water consumption during construction works

№№	Name of water consumers (section)	Unit	Capacity	Water consumption per unit, m ³					Annual water consumption, thousand m ³				Notes	
				Recycling reused water	Fresh from spring				Fresh from spring					
					Total	including			Total	including				
						industrial technical needs	household drinking needs	Watering or irrigation		industrial technical needs	household drinking needs	Watering or irrigation		
1	Workers	man	155		0,0250		0,0250			2,8675		2,8675		CNR 2.04.01-85 rule.3 item.12 740 w.d.
2	Engineers	man	60		0,0160		0,0160			0,7104		0,7104		CNR 2.04.01-85 rule.3 item.12 740 w.d.
3	Workers	man	148		0,0250		0,0250			2,7380		2,7380		CNR 2.04.01-85 rule.3 item.12 740 w.d.
4	Engineers	man	62		0,0160		0,0160			0,7341		0,7341		CNR.04.01-85 rule.3 item.12 740 w.d.
5	watering of existing road	m ²	1250000		0,0004			0,0004		180,0000			180,0000	According to project 360 days 1 time per day
6	Embankment contraction	m ³	1560000		0,1			0,1		156,0000			156,0000	Standard indicators for material consumption, Collection 36
7	Layer and road sides	m ³	403000					0,07		28,2100			28,2100	Standard indicators for material consumption, Collection 36
8	Fixing of roadsides	m ³	483000					0,07		33,8100			33,8100	Standard indicators for material consumption, Collection 37
TOTAL										405,0700		7,0500	398,0200	

Working days(day and night)	Man	Amount of nominal dishes - 6.6	Per 1 person, 16l/day In canteen	Total Q ₁ ,m ³ canteen	Q ₂ ,m ³ /day canteen	shower unit	Per unit per day, l	total Q ₂ ,m ³ shower	TOTAL, m ³	Notes
740	215	6,6000	16,0000	16800,9600	22,7040	10,0000	500,0000	3700,0000	20500,9600	CNR 2.04.01-85 rule.3 items 20 and 29
740	210	6,6000	16,0000	16410,2400	22,1760	10,0000	500,0000	3700,0000	20110,2400	CNR 2.04.01-85 rule.3 items 20 and 29
Total:				33211,20				7400,00	40611,20	

Total consumption of water for household needs is 40618.25 m³ for the whole period of construction.

398020 m³ of industrial water will be required for the road reconstruction according to the certain amount of resources.

Water diversion to the sewage systems (assanization) will be 38159.8 cubic meters excluding irrecoverable losses for the whole period of construction.

Withdrawal of water for industrial and household needs is provided for according to the bill of water supply sources (Attachment 17). The need for industrial water during road construction is connected with the production process to damp soil of road bed and road pavement layers, unprocessed with bitumen up to appropriate moisture content during compaction. Water is also used for addition to concrete mix and for elimination of dust formation during road construction works. After soil or material compaction and addition of water to concrete mix the water is evaporated into the atmosphere without pollution.

3.3. Soil pollution and erosion

Complex of production processes regarding road bed formation usually damages the environment most of all. First of all pollution of soil covering is observed at temporary occupied lands for the pit, for the site as well as at the reconstructed road.

Soil pollution mainly occurs due to fallout of hard fine and dust particles to the pavement from the atmosphere brought by the wheels of cars from the roads and passages with rough pavement, due to partial losses of transported bulk cargo, due to wearing-off products of tyres and covers as well as due to toxic components of exhaust gases of cars.

Soil pollution occurs due to accumulation in the soil, mainly, of lead compounds contained in exhaust gases of car engines. About 80% of lead contained in exhaust gases get into the soil. Sustainability of lead compounds in the soil and its intensive accumulation in the greenery with further transfer to animals and people is worth mentioning. At the roadside area about 50% of lead exhausts in the form of micro particles are immediately spread over the surface of the adjacent territory.

Soil erosion as a result of road construction is unlikely in the roadside area as main works are carried out on the existing road with protective works in the water drain system.

Some soil erosion may occur at the areas of building materials winning. But this erosion is limited regarding area and duration with small impact as these areas are located at the lands of low value for agricultural use.

Soil pollution may also occur due to leakage of lubricants, fuel and bitumen during construction period. It is supposed that the affect will be minimal and only within roadbed and on temporary allocated lands.

3.4. Mineral resources

Land resources are influenced most of all during the road construction. Total amount of earthworks is indicated in the table below.

Ecological requirements stipulated by the legislation on the environment protection must be satisfied at all the stages of mineral resources management as a priority.

First of all efficient and complex use of mineral resources must be provided for at all the stages of mineral resources management.

Also the following must be provided for – preservation of earth surface due to the use of special methods of deposits development, prevention of industrial land desertisation, prevention of wind erosion of soil, piles of spare or uncovering soils, their corrosion and spontaneous inflammation, prevention of surface and subsoil waters pollution, liquidation of winning and lubricants remains.

Name	Unit	Amount
Profiled amount including:	m ³	8548650
embankment	m ³	5251620
excavation	m ³	3262010

Name	Unit	Amount
road ditch	m3	35020
Paid work scope	m3	6327680
Decovering of topsoil	m3	543190

Negative impact on mineral resources during road construction may be done at temporary allocated areas during construction works. Roadbed and road facilities do not influence directly on mineral resources.

3.5. Impact on flora and fauna

Taking into consideration the fact of the existence of the road for quite a long period of time before the construction and existing habitant of animal kingdom, insignificant additional impact on vegetarian and animal kingdom by the rehabilitation may be noted.

But it is worth mentioning the following. Harmful consequences for greenery occur from the impact of cars and transport exhausts. The specialists determined the influence of different pollutions causing colorant destroy, suppression of abiotic polymerization and ferments and other functions of plants. All this results in disturbance of growth and development, in speed up of aging process especially with perennial plants.

Besides, it is worth mentioning the capability of some plants to accumulate heavy metals polluting soil. Pollution of earth surface and greenery with transport exhaust occurs gradually and it is in direct dependence on the distance from the carriageway of the road.

Several factors negatively influencing animal kingdom are worth mentioning. They are: Factors preventing natural migration of species to their temporary and permanent habitant, exchange of gene bank, reproduction, etc. These are elements of road structure – slopes, embankments, excavations, road barriers, roadbed itself. Disturbance factors scaring animals and disturbing their habitant - they are: noise, vibration, light from traffic movement. As it is known the reaction of animals for the disturbance factor may be different in different species.

Change of animal species takes place in the roadside under the influence of gas pollution, noise, vibration. As a result of roadside pollution with heavy metals, salts and other harmful substances greenery eaten by animals and birds may cause poisoning and death of different faunal forms.

Clash with moving transport may cause death of faunal forms on the roads. All these factors lead to decrease of population level.

Insignificant negative impact on vegetarian and animal kingdom directly from construction may be only during construction period in case of accidental exiting of construction equipment outside construction site. Illegal actions of people towards animals and greenery (killing of animals, extraction of timber, and so on) are excluded at the territory of reservation park.

Perforce cutting of some trees, stumps and clearance from bushes and low forests is provided for in the project.

3.5.1. Planting of greenery and landscaping.

Demolition of green planting is planned during the road construction due to its expansion and improvement up to 1 technical category. There is the permission for this by “Zhambyl oblast department of hunting and forest sector” (Attachment 8). Cutting and stumping of trees will be carried out according the bill (Attachment 18).

It is planned to demolish total 3980 trees along the whole sector length, out of them: 405 items – up to 16 cm diameter, 1113 items – up to 24 cm diameter, 1495 items – up to 32 cm diameter, 967 items – more than 32 cm diameter. Also it is planned to cut bushes at the area of 0,5 hectares.

Expenditures for restoration of green planting are stipulated for in the design and estimate documentation which are 12188,795 thousand tenge in current prices including VAT.

3.6. Social environment

Despite of existing negative impacts of the road on the human habitat, vegetarian and animal kingdom, the significance of the road in social and economic development of the society and life necessities of population is explicit.

The quality of service of population will considerably increase with the improvement of transport operation indicators of the road as a result of implementation of road construction works.

A person suffers most of all from car exhausts. However, understanding great and various positive functions of a car – almost the only means of individual transportation at present, people do not object to it on large scale. Exhausts of burnt gases as well as other types of energy losses: noise, vibration, electromagnetic radiation, is considered to be the most hazardous type of transport pollution. The main criterion for hazard of these impacts is the damage to people's health.

Impact of construction processes will last for a comparatively short period of time though the possibility of an emergency situation may occur due to the bad condition of the road.

On the whole, the impact on social environment of the road construction project will be only positive.

During the construction a lot of work places will be created including places for local natives who will be able to take part in the road construction.

Road reconstruction will fundamentally improve movement conditions, increase traffic speed and decrease travel time, increase traffic safety.

In its turn it will result in improvement of social condition of population in the road area and of road users.

3.7. Cultural, historical and architectural monuments

As it was mentioned in Chapter 1, 11 monuments of history and culture were determined during the route line survey. Regarding 9 monuments located directly on the route line and in crucial nearness to road line it is necessary to change the route line taking into account recommended protective areas from the borders of each monument. In case it is not possible to change the route line it is necessary to carry out complete complex of scientific and research works at the mentioned monuments in order to prevent historical and cultural heritage. After that the route line may remain unchanged.

To avoid damage to the determined objects during road construction it is necessary to preserve their entirety for the whole period of construction works. It is necessary to establish protective areas within 100 m from the borders of the object as well as protective barriers along the perimeter of the monuments for the whole construction period.

3.8. Land resources

The existing road at the designed sector is located on the lands of Kordai region, Zhambyl oblast of the Republic of Kazakhstan.

Occupied lands are pastures. Land acquisition from agricultural use is the most important factor of road impact on the environment.

Due to long road operational period without rehabilitation, the abovementioned road does not conform to transport operational requirements of the roads of relative categories. To upgrade the parameters of the existing road up to the technical requirements for the roads of category 2 additional land resources will be required during reconstruction works.

It is planned to use occupied land resources temporarily. The use of right-of-way and pasture lands is planned for the road construction. The bill of lands acquired for temporary or permanent use is shown in relative bills (Attachment 20).

Land acquisition from agricultural use is the most important factor of road impact on air environment.

Taking into consideration requirements of the land legislation and further use of land resources, acquired for temporary use, for agriculture the restoration of this land is a must approved by land management authorities and environment protection authorities. The technology, sequence and scope of restoration works is indicated in the respective sector of the project.

Approving of temporary land acquisition for rehabilitation of the road with land management departments and environment protection departments was carried out at the stage of survey works. The act for land selection for road reconstruction is attached (Attachment 20).

3.8.1. Production wastes

Production process for road rehabilitation and its further operation does not provide for production of waste requiring allocation and disposal.

All construction materials (sand and gravel mix, sand, crushed stone, soil, etc.) have 100% usage.

The project plans to return reusable parts of water pipes, concrete warning low poles, rail guards and other types of road facilities to industrial of Road Operation Department for further use during repair works. Construction rubbish may appear during construction works. It must be taken away to dumping site.

The contractor must reimburse for construction rubbish and household wastes utilization to nature protection authorities.

Municipal wastes (for reconstruction period)

Number of people	Norm	Reference for regulatory document	Estimated amount, ton
215	0.04 t/year	Guidebook on clean-up	$215 \cdot 0.04 = 8,6$
210	0.04 t/year	Guidebook on clean-up	$210 \cdot 0.04 = 8,4$

For the whole construction period the amount of MSW will be totally 52,42 t.

During reconstruction of water facilities industrial wastes may appear.

Scrap metal (electrode stubs, paint cans) – is referred to fourth hazard class.

Approximate amount of metal scrap will be 65,7 tons according to the bills. It will be given for recyclable materials units after some accumulation.

Construction rubbish (concrete forms, wood wastes, cement sags, remnants of dismantled iron concrete structures, etc.) – is formed during the construction and referred to as fourth hazard class.

Approximate amount of wastes will be 47 tons according to the estimates. It will be taken away to the landfill after some accumulation.

According to the Ecological Code of RK (2007), some legislative acts and regulations, adopted in the Republic of Kazakhstan, production and consumption wastes must be gathered, stored, neutralized and transported to the places of utilization and disposal.

Wastes for disposal must be stored taking into consideration prevention of environment pollution.

3.9. Traffic safety

Different road accidents may take place during operation and rehabilitation of the road. They are one of the negative factors of road impact on the environment and person's life. It is expressed by damage to governmental and private property, risk of traumas and risk of death of users of roads and adjacent area.

Accepted standards, operational condition of the road and methods of traffic management have an impact on the improvement of traffic safety and on the decrease of road accidents probabilities.

Bad condition of road pavement, pot-holes, unevennesses and sagging in road dressing, unsatisfactory condition of pavement surface nonskid quality have an impact on increase of road accidents. At present traffic is managed only with the help of road signs, there is no necessary road furniture. Road signs provide insufficient information on the road.

After road rehabilitation traffic safety conditions will correspond to the road category and type of locality.

4. MITIGATION MEASURES AGAINST ROAD AND TRANSPORT IMPACT ON THE ENVIRONMENT

During road construction besides technical and economic indicators the degree of the road impact on the environment as well as compatibility of the road with landscape must be taken into consideration preferring solutions having minimal impact on the environment. Requirements on environment protection legislation must be taken into consideration during allocation of artificial and roadside facilities, production areas, temporary by-pass or approach roads and other temporary structures.

Also one must be guided by the principal of preservation of valuable natural landscapes, forests as well as of places for location, feeding and migration ways of wild animals, birds and water inhabitants.

The environment pollution occurs during most of production processes concerning construction or rehabilitation of roads as well as preparation of road building materials. It is worth mentioning that the environment pollution during work performance and particularly during physical impacts is of temporary nature and lasts only during the production process. That is why despite of high intensity the consequences of their impacts on the environment are easier to prevent.

Despite the fact that the present project is considered to be the project with insignificant negative impact on the environment it provides for different measures and obligatory requirements are developed for the Contractor and the Employee in order to avoid or mitigate negative impact. The control for the execution of the mitigation measures must be done by the Employee of the project and governmental ecological and environment protection authorities (regional and oblast). Such work must be done at the stage of contractor's selection during tender procedures. The section "Environment protection" must be an integral part of contract documents during conclusion of agreement with the Contractor for the road rehabilitation.

The contractor must pay primary attention to the aspects of the environment; he must follow project requirements and fulfill measures concerning environment protection. He also must develop the draft of works execution and the section "Environment protection" and coordinate it with the governmental bodies for ecology and environment protection and he must follow its execution.

4.1. Mitigation measures against negative impact on air

During construction works the Contractor is obliged to fulfill the requirements below in order to mitigate negative impact on air quality:

- The contractor establishes production procedures so that to minimize dust formation and polluted gas exhausts.
- The contractor uses effective water sprinklers during production and delivery of bulky materials (crushed stone, PGS, soil, etc) and to water stored bulky materials in dry and windy weather.
- During transportation of dusty materials in the body of the trucks, the material must not be loaded above the sides and must be covered with canvas cover in good condition.
- Temporary roads with soil or gravel covering for transportation of building materials must be constantly (several times per day) watered in dry weather. In this project temporary by-pass of the construction site is not planned. So, if necessary, the roadbed which is used for traffic movement must be watered.
- Plant for asphalt and concrete production must be equipped with modern purification equipment and filters to entrap hard particles (dust and smut coal) from heating system and it must be located at least 0,5 km from open water surfaces and settlements.
- Construction transport and construction equipment must be kept in working conditions. Decrease of vibration depends on the technical condition of a vehicle. Operation mode of vibrating machines must be observed during the work. Their vibration must conform to sanitary norms. It is recommended to have two regulated breaks. Acceptable levels of transport and technological vibration must correspond to the requirements of order №310 of the Minister of healthcare "On approval of

sanitary and epidemiological regulations” dated June 29, 2005, and registered in the list of legislative documents of RK under number 3781.

- The contractor must take relative measures on reduction of exhaust of burnt gases from engines of construction vehicles and equipment and must also include the description of these preventive measures in his plan on mitigation and control of impact.
- The contractor must take relative measures on prevention of road dusting and on provision of safety traffic in four settlements through which the road goes.

As it was indicated above it is not assumed to have a significant impact on the air during the road operation. The measures providing continuous uninterrupted movement with high speed decrease the level of air pollution with burnt gases. The following measures stipulated in the project include:

- Road horizontal and vertical alignment planning with smooth curves of big radius providing high traffic speed and other requirements according Construction Norms and Regulations RK 3.03-09-2003 with additions and amendments, Construction Norms and Regulations RK 3.03-19-2003 with additions and amendments, and CT RK 1380-2005:
- Usage in the project longitude gradients of the road not exceeding maximum standard gradients.
- Installation of new asphalt concrete pavement with even surface.
- Increase of carriageway width up to 8 m (with hard strips).
- Installation of speed-change lanes on the interchange in one level.
 - Fixing of road margins with gravel sand mix of effective granule composition (to provide dust forming decrease during driving on the margin).
- Furniture of the road with signs, markings, barriers, providing high speed steady driving with stable engine operation mode.

To localize source areas of dust formation it is necessary to use aspiration hoods of conveyers loading.

Regarding the environment protection the necessity to construct the existing road is explicit. As the exhausts of harmful substances from passing transport due to decrease of average speed of traffic stream, often braking because of low quality of the road are considerably higher than after the construction.

Calculation of money compensation from the environment pollution with passing vehicles and mechanisms along the road during the road construction was not done due to compensation recovery for nature management at the place of vehicle registration according to the amount of the fuel burnt by the vehicle.

4.2. Mitigation measures against negative impact on surface and ground waters

During works execution the Contractor must fulfill the following requirements to mitigate the impact on surface and ground waters:

- Territories where water is used regularly to decrease dust formation including warehouses. Concrete, crushed stone and asphalt plants must be equipped with drainage system of water drain to special reservoirs for sedimentation of hard particles. After sedimentation water may be reused for dust removal and washing.
- The contractor is forbidden to dump and pour any materials and substances received during work execution into water sources and topographic low places.
- The contractor must always ensure that all permanent and temporary water streams and water outlets on the site and outside the site must be kept clean and free of rubbish and wastes.
- All polluted waters and discharge liquids from the site(s) must be gathered and transferred to special reservoirs or buried so that not to pollute or poison waters and soils.
- It is forbidden to locate or work with road construction equipment in close proximity to water sources.

4.3. Mitigation measures against negative impact on soil

In order to prevent natural surfaces, to liquidate and to prevent wash ways and washouts of topsoil, to prevent formation of mudflows and gorges, the project provides for:

- Longitude gradients of water drain canals and ditches of not more than 2% in order to prevent wash ways.
- Longitude gradients of roadbed 1:4 (in exceptional cases on high embankments - 1:1.5).
- Fixing of all culverts (pipes) and installation of water drains by means of open conduits from "Reno" mattresses to prevent wash ways of riverbeds and slopes.
- Fixing of irrigation canals along sidewalks by means of reinforced concrete assembly conduits.
- Design solutions described in item 4.1 which decrease lead compounds deposits in the soil.

Requirements for the Contractor to prevent soil pollution with lubricants are the following:

- Storage of lubricants, bitumen and chemicals is supposed only on specially allocated grounds equipped for these purposes, usually at the bases.
- All the storages of fuel, bitumen and chemicals must be located on the waterproof foundation at the secured and fenced territory. The bottom, walls and top of reservoirs and tanks for storage of these materials must be impenetrable and their capacity must be 110% from total required capacity of fuel or substance.
- Filling and discharging of lubricants must be strictly monitored in accordance with official regulations.
- In case of fuel and oils the Contractor must immediately take measures for liquidation of consequences and removal of split substance so that not to have negative impact on the environment (water, soil, air).
- All hosepipes, taps, fuelling nozzles must be protected from illegal access and vandalism. After the use they must be turned off and safely locked.
- The content of all reservoirs, storage bunkers and warehouses must be clearly marked with relative signage.
- It is forbidden to discharge any pollutants into water and soil.

4.4. Mitigation measures against negative impact on mineral resources

For the road construction works the project provides for the use of mineral resources of the existing enterprises using local road construction materials for production of asphalt concrete mixes and concrete mixes for production of reinforced concrete structures and details under the recommendations of road operation service and Akimat of Kordai region.

Before the development of the recommended pit, i.e. introducing the land lot into the mineral resources management, it is necessary to conclude the Contract with the relevant authority. The funds for the Contract signing must be provided for. After winning works the mentioned deposit must be restored.

4.5. Mitigation measures against negative impact on flora and fauna

Negative impact on flora and fauna is mitigated to some or other degree by all the above described measures, designed as well as recommended during the road construction work execution. It is specially forbidden to hunt wild animals and to cut wild-growing trees or trees growing in forest plantation without the permission of the relevant governmental authorities approved by the governmental service for the environment protection.

4.6. Mitigation measures against negative impact on social environment

The impact of the construction and rehabilitation of transport facilities on social and economical environment is usually estimated by the quantitative characteristics of transport pollutions, by land acquisition for the road and protective strips, buildings demolition, breach of existing infrastructure.

Mitigation measures provided for in this project regarding reduction of toxic substances exhausts, decrease of noise level and negative impact on flora and fauna, prevention of water streams pollution directly concern health and public life of population.

With the increase of cargo traffic and improvement of transport operation indicators of the road as a result of construction works execution, the significance of the road will considerably increase in social and economic development of the region and in the level of population welfare. The time for transportation of cargo and population will decrease, additional enterprises will be created and the number of working places will increase.

The improvement of transport operation indicators of the road will result in reduction of accidents.

After the construction the road will contribute to the improvement of transport connections of the Republic of Kazakhstan.

4.7. Mitigation measures against negative impact on land resources

4.7.1. Land resources acquisition under the reconstruction of the road

The designed section of the road will be the part of the Republican road network and will correspond to 1 technical category afterwards. According to the solutions of the working project technical characteristics of the road conform to Constructions Norms and Regulations 3.03-09-2003 with additions and amendments, Constructions Norms and Regulations 3.03-19-2003 with additions and amendments and CT RK 1380-2005.

The road alignment planning, pits locations were agreed with land users. Temporary land acquisition for man camps and temporary construction sites as well as permanent acquisition for the road and its infrastructure was agreed upon.

The project provides for indemnity of agricultural production due to acquisition of agricultural lands for rehabilitation of the road according to the existing legislation of the Republic of Kazakhstan and indemnity of other costs due to land acquisition. The act of land selection for the road reconstruction is attached (Attachment 20).

The demand for permanent lands acquisition for the road construction, allocation of furniture objects including rest areas, bus stops, weight control points, road police points, sand depots and interchange ramps will be 477,17 hectares.

Temporary land acquisition for out-of-road soil reserves as well as for builders' camp, parking of construction machinery, storage grounds for road construction materials with the area of 76,8 hectares will be required to ensure construction of by-pass of Kordai passage. (Attachment 19).

4.7.2. Land restoration

The important stage of road section rehabilitation project implementation is restoration of lands damaged during road construction execution.

The project of land restoration was developed in accordance with the requirements of the regulation documents existing in RK:

Instructions on drawing restoration projects of damaged lands and lands under damage in the Republic of Kazakhstan, GosNPCzem 1993.

General requirements for land restoration, GOST 17.5.3.04-83.

Decree №1037 of the Government of the Republic of Kazakhstan dated October 8, 2003, " On approval of norms of indemnity for losses of agricultural and forestry production due to exemption of agricultural and forest areas for their use with the purposes not connected with agriculture and forest management and Regulations on indemnity of agricultural production losses taking into account sums spent for areas restoration".

Restoration of lands temporary occupied for the road rehabilitation was done by the project at the following sections:

Restoration of lands temporary occupied for the construction site of the Contractor;

Restoration of other temporary grounds of different purposes;

Restoration of temporary approach roads to the construction objects;

Restoration of lands earlier (before flattening) occupied with the existing road;

Scopes of works for lands restoration acquired for temporary use and returned to Governmental Land Fund are indicated in Attachment 14.

Range of works on lands restoration damaged during the road rehabilitation consists of two stages:

First stage – technical restoration including measures on decoupling and storage of topsoil, grading of lands after development, slopes flattening, returning of topsoil for the planned surface, development of soil with cultivator;

Second stage – biological restoration including measures on restoration of fertility of damaged lands after finishing of the first stage, soil development before seeding, planting of plurannual grasses and after planting rolling.

Name of works	Unit	Amount
1-complex		
Restoration		
Restoring of construction site		
Waste collection	hectares	0,32
Loosening of cover at the site		
From gravel sand mixture with riper-dozers 79kvt	m3	2000
Decovering with bulldozers 79kvt		
With pile removing up to 10 m	m3	2000
Loading of covering with excavator 0,65m3		
To dump trucks and transportation to the pit		
Up to 30 km	m3	2000
Land formation with bulldozer 79 kvt	m2	3200
Returning of topsoil		
To the formed surface of the site		
With bulldozer 79 kvt with soil removing		
Up to 30 m	m3	1500
Soil level cultivation with cultivator		
КПП – 2,2 depth 10-12 cm	hectares	0,32
Soil plough with depth of 25 cm with tractor		
With simultaneous dragging with tooth harrow	hectares	0,32
Early spring soil dragging with		
tooth harrow	hectares	0,32
Planting of permanent grasses with seeder		
C3C – 2,1 in terms of:	hectares	0,32
Wheat grass 10 kg/hectares	kg	10
Awnless brome grass 20 kg/hectares	kg	20
Rolling of seeds with star-wheeled		
rollers	hectares	1,32
Restoration of temporary grounds for	items	5
Storage of topsoil	hectares	13,38
Land formation with bulldozer 79 kvt	m2	133800
Restoration of pits		
Decoating of topsoil with bulldozer 79 kvt		
With removing up to 30 m into rolls and loading with		
Excavators 0,65m3 to dump trucks and transportation		

Up to 1 km to side-piling.		
Soil of 1 group Y - 1,2 t/m3	m3	20540
Soil of 2 group Y - 1,4 t/m3	m3	7740
Soil cultivation with bulldozer 79 kvt at grade flattening		
Of pits 1:10 with soil removing		
Up to 50 m , soil of 3 group	m3	133800
Slope grading and pit bottom with bulldozer		
79 kvt soil of 3 group	m2	215130
Loading of topsoil in side-piling with		
Excavators 0,65m3 to dump trucks and transportation		
Up to 1 km to the pit		
Soil of 1 group Y - 1,2 t/m3	m3	20540
Soil of 2 group Y - 1,4 t/m3	m3	7740
Returning of topsoil		
To the formed surface With bulldozer 79 kvt		
Up to 100 m		
Soil of 1 group	m3	20540
Soil of 2 group	m3	7740
Soil level cultivation with cultivator		
КПП – 2,2	hectares	21,52
Soil plough with depth of 25 cm with tractor		
With simultaneous dragging with tooth harrow	hectares	21,52
Early spring soil dragging with		
tooth harrow	hectares	21,52
Planting of permanent grasses with seeder		
C3C – 2,1 in terms of:	hectares	21,52
Wheat grass 10 kg/hectares	kg	215,2
Awnless brome grass 20 kg/hectares	kg	430,4
Rolling of seeds with star-wheeled		
rollers	hectares	21,52
2 complex		
Restoring of construction		
site		
Waste collection	hectares	1,8
Loosening of cover at the site		
From gravel sand mixture with riper-dozer		
79kvt	m3	2000
Decovering with bulldozers 79kvt		
With pile removing up to 10 m	m3	2000
Loading of covering with excavator 0,65m3		
To dump trucks and transportation to the side-piling		

Up to 2 km	m3	2000
Land formation with bulldozer 79 kvt	m2	18000
Returning of topsoil		
To the formed surface of the site		
With bulldozer 79 kvt with soil removing		
Up to 30 m	m3	1500
Soil level cultivation with cultivator		
КПП – 2,2 depth 10-12 cm	hectares	1,68
Soil plough with depth of 25 cm with tractor		
With simultaneous dragging with tooth harrow	hectares	1,8
Early spring soil dragging with		
tooth harrow	hectares	1,8
Planting of permanent grasses with seeder		
C3C – 2,1 in terms of:	hectares	1,8
Wheat grass 10 kg/hectares	kg	10
Awnless brome grass 20 kg/hectares	kg	20
Rolling of seeds with star-wheeled		
rollers	hectares	1, 8
Restoration of temporary grounds for	items	5
Storage of topsoil	hectares	11,8
Land formation with bulldozer 79 kvt	m2	118000
Restoration of pit		
Decoating of topsoil with bulldozer 79 kvt		
With removing up to 30 m into rolls and loading with		
Excavators 0,65m3 to dump trucks and transportation		
Up to 1 km to side-piling.		
Soil of 2 group Y - 1,4 t/m3	m3	25920
Soil cultivation with bulldozer 79 kvt at grade flattening		
Of pits 1:10 with soil removing		
Up to 50 m , soil of 3 group	m3	135000
Slope grading and pit bottom with bulldozer		
79 kvt soil of 3 group	m2	571400
Loading of topsoil in side-piling with		
Excavators 0,65m3 to dump trucks and transportation		
Up to 1 km to the pit		
Soil of 2 group Y - 1,4 t/m3	m3	25920
Returning of topsoil		
To the formed surface With bulldozer 79 kvt		
Up to 100 m		
Soil of 2 group	m3	25920

Soil level cultivation with cultivator		
КПП – 2,2	hectares	57,2
Soil plough with depth of 25 cm with tractor		
With simultaneous dragging with tooth harrow	hectares	57,2
Early spring soil dragging with		
tooth harrow	hectares	57,2
Planting of permanent grasses with seeder		
C3C – 2,1 in terms of:	hectares	57,2
Wheat grass 10 kg/hectares	kg	571,4
Awnless brome grass 20 kg/hectares	kg	1142,8
Rolling of seeds with star-wheeled		
rollers	hectares	57,2

4.8. Mitigation measures against negative impact of the road regarding traffic safety

The execution of the road construction will require limitation of vehicles passing those sectors where the construction works will be going on. Existing traffic operation of transit transport should be maintained.

To ensure traffic safety during the operation period the project provides for:

- Installation of flat (1:4) designed slopes of roadbed;
- Marking of the road carriageway with thermal plastic;
- Vertical marking of the road;
- Installation of guard devices in the form of metal barriers on metal posts at sections of high embankments;
- Installation of signaling posts;
- Installation of road signs for the drivers information and traffic management;
- Establishment of bus stops;
- Construction of bus pavilions;

4.9. Measures on creation of esthetics of the designed object

A Road as any technical structure directly influences the environment by changing parameters of nature systems. A wide range of tasks arises during the designing of a road. These tasks characterize its interrelation with the environment. Ecological safety of the road, esthetic condition of the designed object, degree of stability of a new natural and industrial landscape created by a person depend on the completeness of these tasks solving.

Direct preservation of the environment, necessity to insert the road into the landscape, external harmony with the environment is the main principles for landscape esthetic design.

Esthetic requirements are included in the components of the evaluation of the environment impact on road users in the international roads design regulations of the European Community. At the same time the landscape elements must be used to increase the traffic safety level and comfort of its users as well as to improve visual road orientation of drivers and passengers.

Measures improving road esthetics and surrounding landscape should include:

- Smoothness of the road surface in lay out and cross section (horizontally and vertically);
- Road markings regulating traffic;
- Installation of painted barriers;
- Painting of pavilion surfaces;
- Establishment of rest areas;
- Establishment of flat slopes of roadbed smoothly transferring into the natural relief of the place;

- High degree of the road furniture information capacity;
The developed project satisfies these requirements.

4.10 Safety measures and labor protection during the road reconstruction

Main part

During the works execution the relative field and administrative regulations for safety measures and industrial sanitary must be observed.

The designed solutions regarding the road constructions were adopted in accordance with the existing regulation and design documents concerning transport construction where measures on the environment protection, labor protection and safety measures are included.

During the works execution one must be guarded with the requirements of Constructions Norms and Regulations 3.06.04-91 "Safety measures in construction". "Regulations on safety measures during construction, rehabilitation and maintenance of roads" and "Regulations on safety measures and industrial sanitary during construction of bridges and pipes" are applied during road construction. It is necessary to apply "Instructions on safety measures" for every construction vehicle during road construction works.

Safety measures are stipulated for in this road construction project. The Contractor is responsible for these measures execution.

The Contractor is obliged to:

- Appoint Engineer on safety measures and environment protection who will be subordinate to the Team Leader;
- Provide mandatory preliminary and repeated instructions (introductory and general) and instructions at working place;
- Provide safety of working place and safety access to working place;
- Provide measures on elimination of emergency situations liquidation including evacuation procedure from the site;
- Ensure fire safety providing all the sites with fire-fighting equipment and alarm system;
- Provide with personal protective equipment that must be used to protect people from potential hazards where there can be danger for head, eyes, arms, legs, body, in particular:
 - Protective clothing;
 - Protective boots;
 - glasses, respirators;
 - helmets;
 - nonconducting and working gloves;
 - soap;
 - milk;
 - first-aid kits
 - special complexes of exercises, preventive treatment with vitamins should be used in order to increase protective properties of organism, working capacity and labor activity.

Personal protective equipment must comply with relative GOSTs (apron – according to GOST 12.4.029, rubber gloves – according to GOST 20010, leaf-type respirator – according to GOST 12.4.028, gloves – according to GOST 12.4.010, glasses – according to GOST 12.4.013, gas masks of type B or type B with filter, helmets).

The Contractor must be responsible for provision and maintenance of construction site facilities including without limitations electrical supply, water supply, compressed air supply, communication means, temporary water drain and sewage systems.

The sector must be kept in safety, clean and good condition. "The Contractor" is responsible for the cleaning of the sector from bits and pieces, construction and household wastes, their disposal to solid waste landfill. Doing this he must be guided with Sanitary rules №3.01.016.97.

Besides it is necessary to carry out regular technical check-up of vehicles and equipment in order to determine their technical good order and to follow terms of repair, training and instructing of workers maintaining the equipment on safety methods of work. Safety measures regarding equipment are also important for prevention of traumas and accidents. This equipment includes:

- means of transport.
- Pumps, compressors.
- Generators, crushing equipment.
- Lifting equipment (cranes, cable lift devices, conveyors).
- Electrical equipment.
- Drilling equipment.

Construction sites and field camps must be provided with medicines, first-aid facilities, drinking water and water for industrial needs which must be kept in separate reservoirs. Drinking water must be not farther than 75 m from working places. The permission for water usage must be obtained in the Sanitary and Epidemiological Inspectorate and must correspond to Sanitary Norms and Regulations RK № 3.05.017.97.

Locations of field camps must be coordinated with land management departments and Sanitary and Epidemiological Inspectorate authorities. The Contractor is obliged to provide medical services. The most important from medical services are: first aid to the injured at the site, provision of quick and efficient transportation to the nearest hospital and support of the injured during transportation.

Initial Contractor's obligations are subdivided into medical services, services in case of accidents, transportation in case of severe cases to the nearest hospital and financial support.

During works execution and elimination of deficiencies it is necessary:

- To cater for the safety of all employees working at the site and to maintain the site in perfect order so that avoid accidents;
- To provide lighting, barrier railings, warning signs and barriers;
- To take every necessary measure to protect the environment at the site and outside of it in order to avoid traumas and other unpleasant consequences for people and their property which may be caused with air pollution, noise and other reasons (special complexes of exercises, preventive treatment with vitamins should be used in order to increase protective properties of organism, working capacity and labor activity).
- All the moving parts of vehicles, devices, electrical and steam conduits as well as areas for material delivery and distribution of finished products are safely guarded. The devices with gas, steam and dust emission are equipped with safe protective devices and ventilation.

All self-propelled vehicles and towed machines must be equipped with sound and light alarming, during the work at night-time forward and backward lighting is installed on vehicles. Steel cables and chains as well as hydraulic systems of vehicles are checked at least once per week in order to avoid accidents. At towed machines random setout from the tow-truck must be excluded.

2. Safety measures regulations during work of road machinery.

Before starting work the working order of engine, transmission system, working attachments, drawbars, lever arms, control elements, measurement devices, lighting and alarm equipment as well as the availability of organizational equipment, tools and spare parts must be carefully checked. If there is any malfunction revealed the vehicle must be stopped.

It is forbidden to work on a vehicle which is out of order. In case of stoppage, repair or transportation of road machinery the measures must be taken to exclude their self-moving or turning-over.

Works during darkness must be carried out with artificial lighting in accordance with norms of electrical lighting of construction and installation works. Independently of lighting of work places and areas vehicles must have their own lighting of working attachments and operation mechanisms.

Road machinery and engines of devices are filled with fuel and lubricants on the horizontal ground in electrical or natural lighting using power supply or accumulators. It is

forbidden to smoke, light matches or use kerosene torches or other sources of open fire during filling of vehicles.

To fill with ethyl gasoline is allowed only at the gas station. All other types of filling are strictly forbidden in that case.

Work of two or several self-propelled vehicles or towed machines following each other is allowed observing minimum distance between them (including their echelon and wedge assembly type of following):

- Scrapers, graders for contraction of roadbed2 m
- Rollers for contraction of road clothing..... 5 m
- Asphalt pavers and rollers..... 5 m
- Concrete pavers and concrete surface finishers10 m
- Other vehicles20 m

Self-propelled vehicles and towed machines must not come to the edge of the embankment or roadbed closer than:

- Tractor with compaction plate.....0.5m
- Excavators with compaction plate3.0m
- Graders and auto graders1.0 m
- Scrapers up to embankment edge1.0 m
- Up to high excavation slope 0.5 m
- Distributors of crushed stone, gravel and sand1.0m

3. Storage of fuel and chemicals

Storage of all types of fuel and chemicals must be in a certain place with mandatory fencing made of barbed wire. The storage area must be located far from water sources and low places.

The area and fenced territory must be convenient and provide allocation of fuel tanks with capacity of 110% from the required amount. Filling and unloading must be strictly controlled and performed according to the established procedure. All the bolts and taps must be secured from undesirable interference and vandalism and must be easily closed and opened when in use. Internal of tanks must be clean. Measurements must be done so that not to take into account the influence of moisture and water.

4. Main rules of safety measures for asphalt and concrete plant (ACP)

Before start-up of the plant equipment it is checked for working order of all moving units and engines. Also it is ensured that all the personnel are at their working places and the signal is given before the start-up. To initiate the burners when there is no automatic ignition it is necessary to have a special torches. A safety screen made of fire-resisting material must be installed during start-up and adjustment of burners.

If there is no automatic control system at asphalt and concrete plant and cement and concrete plant the workers at the warehouses for stone materials, mineral powder and cement as well as weightmen and burner operators must be provided with protective glasses. All bitumen taps must be open gradually. Places polluted with bitumen must be regularly cleaned and sanded. Check and repair of dryer drums and mixing machines is allowed only after their complete stop. Check and repair of dryer drums is allowed after their cooling. Dust prevention of all units' joints and material reloading centers must be ensured at ACP and CCP. Also dust and gas suction must be ensured with exhaust ventilation and special dust catching units. From time to time it is necessary to check the availability and safety of all the railings on vehicles and ACP and CCP units.

ACP bitumen storages must be fenced and covered with tent. Trapdoors of bitumen smelteries and consumable boilers-tanks must be tightly closed or equipped with protective grates or covers.

In case of sudden stoppage of one machine of a technological complex all other units and mechanisms must be turned off immediately, firstly in the direction from the loading point of the machine, then – to unloading point of the ready mix. After such a stoppage to start work again is allowed only with the instruction of a mechanic on shift.

At automatic ACP and CCP it is necessary to check the condition and good order of all the automatic system (control units and control devices) and start-up mechanisms and devices every shift.

4.11. Anticorrosive protection

On the bases of the decisions of the Government of Kazakhstan, Integrated System Standards for products and materials protection from corrosion and premature aging the following measures on protection of metal and reinforced concrete structures from corrosive environment are stipulated in the project: installation of surface waterproofer on pipes and other reinforced concrete structures in the ground, use of road signs and indicators of plant production with anticorrosive protection.

CONCLUSION

Environmental impact assessment of the adopted project solutions is made at all stages of life cycle of the construction from feasibility studies and land acquisition to road operation. EIA is based on forecasts of environmental consequences resulting from environment changes caused by road construction and operation. Meanwhile, the notion of the environment comprises all the factors affecting conditions of human vital activity and their health: purity of air, water, soil, flora and fauna, as well as social and economic conditions.

Rehabilitation of 162 – 260 km road section will improve social and economic living conditions of the region's population.

All road design elements are executed with regard to the erosion prevention.

As a result of project implementation traffic safety will be improved due to traffic control regulation by road furniture.

Based on the calculation results of noise level no exceeding of sanitary standards is observed.

Maximum permissible concentration of harmful substances from exhaust gases of cars is located within the right-of-way.

Flora and fauna will not be significantly impacted by the road rehabilitation. The damaged temporary occupied lands are restored.

The loss of agricultural production and losses for temporary land acquisition were considered.

The technical and regulation documentation requirements were taken into account during road construction project planning.

The road aesthetics will be considerably improved due to the developed measures.

Consequently, all the mitigation measures stipulated in this project will contribute to the improvement of the ecological conditions of the road location.

The Contractor must guarantee that all activities are made in compliance with environmental protection norms and standards according to the Laws of the Republic of Kazakhstan.

Based on the results of environmental impact assessment "Environmental impact Statement" was made which includes:

- Main results of investigations conducted in the EIA process and the conclusion;
- Important environmental impacts and their consequences on population health and living conditions;
- Environmental safety obligations and assurances of the project's initiator during the whole period of road operation;

Environmental impact statement is submitted by the Customer to all interested parties, government, administrative and control authorities.

SOURCES :

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 - «On air protection» 2003
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 - «On sanitary-epidemiological well-being of the population»
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 14. Farming system in the Almaty oblast
 15. Soils of Kazakh SSR
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- 17 «Reclamation general requirements» Gost 17.5.3.04-83
 - 18 Requirements for determination of the fertile soil layer standard disposal Gost 17.5.3.06-85
 - 19 Decree of the Government of the Republic of Kazakhstan dated October 8, 2003, “ On approval of norms of indemnity for losses of agricultural and forestry production due to exemption of agricultural and forest areas for their use with the purposes not connected with agriculture and forest management and Regulations on indemnity of agricultural production losses taking into account sums spent for areas restoration”.
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 - 21 Requirements and guidance for use of environmental management system Gost RISO 14001-98
 - 22 Construction arrangement СНиП 3.01.01.85.Moscow 1990
 - 23 Recommendations for account of environmental requirements in the design of roads and bridge-crossings. Moscow. 1995

ENVIRONMENT PROTECTION. TECHNICAL SPECIFICATIONS

General

The Contractor must take all the necessary precaution measures and guarantee that all site and off-site works are performed in compliance with the norms and regulations, relating to environmental protection requirements, established by law, including those stipulated in other chapters of this document.

The Contractor must take all precaution measures to avoid any unpleasant noise or vibration, resulting from construction works. This should be applied in any place where it is easier to suppress noise at its source than in other places.

These points may not be executed unless it is required in emergency situations for saving lives, property or construction safety.

If any wastes, fragments or dirt deposits from the sites are stored in any territory adjacent to site the Contractor must immediately remove all rubbish to cleanse the site and restore the destroyed area to its original state to the satisfaction of the Engineer.

Presenting the Program based on Technical specifications the Contractor must present mitigation and ecological monitoring plans. If the conditions of the environmental protection Program are not observed, the construction supervision consultant is entitled to suspend the Contractor's works. The Contractor imposes control on environmental program implementation on one of his leading specialists, who will direct all the staff activity and report to the construction supervision consultant.

Storage of fuel and chemicals

Storage of all kinds of fuel and chemicals must be located in a specific storage place with barbed wire fence. Storage place should be located far from water sources and low-lying areas. The place and the fenced area must be convenient and provide allocation of fuel tanks of capacity to contain 110% of the necessary amount. The loading and unloading must be strictly controlled and made in accordance with the established procedure.

All valves and taps must be protected from undesired interference and vandalism and must be easy to open and close when used.

The insides of all fuel tanks must be clean.

Water and moisture influence must be considered when measurements are made.

Water quality

The Contractor must prevent all interference relating to depletion and pollution of water resources (including influent ground water) during construction works.

The areas where water is regularly or occasionally used for dust reduction (including limitless amounts of stock piles on concrete and asphalt and concrete plants) will be watered from specially designed basins which allow regulating stream power and spread. After regulation the water can be reused for dust reduction and irrigation.

All the water and other liquid wastes arising from the works must be collected and directed to designated areas or away from the sites in a way causing no noise or pollution.

The Contractor carries liability for adding any substances or materials arising from construction works unless permit is issued by the Engineer or the authorities, regulating the point in question.

The Contractor must always guarantee that all the riverbeds and drainages located within the site or adjacent to it are preserved untouched and are protected from any fragments or other construction materials.

The Contractor must protect all riverbeds, stretches of water, ditches, water channels, drainages, etc. from pollution, silting, overflowing or erosion resulting from construction works.

The Contractor must submit for consideration and approval of the Engineer the details of his drainage system (including all surface channels, sedimentation tanks, washing basins and water-lowering sump) before starting construction works.

Air quality

The Contractor must apply such machinery and methods of work which allow minimizing the emission of dust, gas and other substances and performing works in a way that minimizes negative impacts on air quality.

The Contractor must use effective water sprays during the delivery and loading of the materials when dust is likely to be created, and to dampen the stored materials during dry and windy weather.

The Contractor must use efficient purification system water stream during delivery and processing of materials when there is probability of dust formation. Piles of stored materials are dampened during dry and windy weather. Piles of loose materials must be covered with clean tent using spraying of water during dry and windy weather. Piles of materials and construction wastes must be dampened before their transporting except cases when it contradicts specifications.

Any transport with open body used for transportation and potentially dust forming must have appropriate side devices and back header. Potentially dusting materials should not be loaded above the level of side and back headers and must be covered with clean tent in good condition. The tent must be appropriately fixed and extended at least 300 mm each side and backward.

During strong winds it is not allowed that dust will spread more than 200 m from storages along the wind direction.

Transport and equipment of the contractor must be maintained in good working condition, engines must be switched off when they are not used. Proposed measurement methods must take into account limits of mechanic life of transport, machines and plants. The Contractor must include the details of such measurements in the plan of delivery and use of equipment which is submitted to the Engineer according to Contract Conditions.

In dwelling areas or other important places such as kindergartens, hospitals, etc., the permission must be received from the authorized people in advance so that to determine measures which must be taken before works commencement.

Noise

The Contractor must regard noise as an environmental factor and limit its level while doing planning and construction works.

The Contractor must use plants and equipment which conform to international standards and requirements for noise and vibrations and must include the results of measuring of the expected noise level into the plan of delivery and use of the equipment, submitted to the Engineer as stipulated in the Contract Conditions.

The Contractor must take all the required measures to guarantee that during construction works all the machinery on the Site and near it will not produce any unnecessary or excessive noise according to the applicable requirements for environment protection. The Contractor must take all necessary steps and keep all noise-reducing facilities and equipment in good order to minimize noise emission during construction works.

When the works are done in such important areas as dwelling areas, kindergartens or medical institutions, the working hours must be limited to from 8 am to 8 pm.

Earthworks

Exceeds of developed ground or top soil received during winning of side reserves or pits or other areas must be approved by the Engineer. Such materials must be used provided that erosion does not take place and the vegetation previously covering the ground is restored

Antique preservation

The Contractor must take all necessary measures to protect any antiques or archeological objects as stipulated in the Contract Conditions.

When antiques are shown on the drawings or otherwise indicated during the works execution, they must be protected with adequate fencing or other barriers to the satisfaction of the Engineer. The Contractor must provide access of persons responsible for security and pay for their participation.

Measures on environment protection

Upon completion of all works the Contractor must restore the territory's natural vegetation to the satisfaction of the Engineer.

The contractor must remove all old tires and disks outside the right-of-way to the places agreed upon with the land owners at the distance of not less than 75 m off the baseline. The Contractor must store all the materials in a way approved by the Engineer.

Where the Engineer indicates the Contractor must improve and restore the lands within the right-of-way determined for removing of all soil and ground in accordance with the natural land surface and must restore natural vegetation where it is required. All soil and used materials must be stored at the places approved by the Engineer.

8	Estimated area of land acquisition	Total – 1,01213 hectares including – 1,012 hectares of temporary, 0,00013 hectares of permanent acquisition
9	Radius and area of protective area	Radius of protective area-100 m,
10	Amount and number of floors of engineering buildings	no
11	Planned construction of relevant objects of cultural and everyday aspects of social life	no
12	List of main manufactured products and amount	Natural gas
13	Main production processes	Gas transfer
14	Justification of social and economical necessity for the planned activity	
15	Terms of planned construction (full capacity)	2009-2010

Conditions of natural management and possible impact of planned activity on the environment

№	Indicator	Value
Atmosphere		
	Construction	
	List and amount of pollutants supposed to be exhausted into the atmosphere:	Iron oxide, manganese, nitrogen dioxide, nitrogen oxide, smut coal, sulfur dioxide, hydrogen sulphide, carbon oxide, fluorides, methane, benzopyrene, formaldehyde, mercaptans, carbohydrates, suspended matters, non-organic dust
	Total exhaust, (t/year)	38,035921
	Hard, (t/year)	1,083785
	Gaseous (t/year)	36,952136
2	Estimated concentrations of harmful substances at the border of protective area	0,75 MPC, suspended matters
3	Sources of physical impact, their intensity and zones of possible influence: -electromagnetic radiation -acoustic - vibration	no Transport, pumps, electrical engines – working range – 50m. Transport, pumps, electrical engines – working range – 10m.
Water :		
4	Fresh water withdrawal: -one-time, to fill water cycle systems (m ³) - permanent (m ³ /day)	
5	Water supply sources: - surface (items/m3/year) - underground (items/m3/day)	Delivered - 3/1022m ³ /day

№	Indicator	Value
6	- water pipeline (items/m3/day) Amount of discharged waste waters:	110m ³
	- to natural water bodies and water streams	No
	- to sewage ponds (m3/year)	
	- to outside sewage systems (m3/day)	0,75m ³ /day
7	Concentration and amount of main pollutants contained in waste waters – by components (mg/l)	- БПК ₂₀ up to 250 mg/l: - suspended matters up to 300 mg/l.
8	Concentration of pollutants by components at the nearest water usage location (with discharge of waste waters into water bodies and water streams)	
Earth		
9	Characteristics of acquired lands:	pastures
	Area:	Total – 1,01213 hectares
	For permanent use	- 0,00013 hectares
	For temporary use	1,012 hectares
	Including plough lands	no
	- forest range	no
10	Damaged lands requiring restoration:	no
	including - pits (items/hectares)	no
	- piles (items/hectares)	no
	- Storages (sewage ponds, hydraulic ash disposal areas, etc..)	No
	Others	
Greenery:		
11	Types of greenery exposed to partial or complete demolition (hectares)	no
	including	
	- area of cutting in forests (hectares)	
	- amount of received wood (m3)	no
Fauna:		
12	Sources of direct impact on animal kingdom including water fauna	Not available
13	Impact on protected nature territories	Not available
14	Production wastes:	169,9648 t/year - construction
	Amount of unutilized wastes	126,473 t/year - construction
	Including toxic (t/year)	no
15	Proposed methods of waste neutralization and disposal	Municipal and industrial solid waste landfill, utilization
16	Presence of radioactive sources, evaluation of their possible impact	There are no sources of radioactive emission

№	Indicator	Value
17	Possibility of emergency situation: potentially hazardous technologies and objects:	Not available
18	Probability of emergency situations occurrence	Possible, in case of fire
19	Radius of possible impact	Border of allotment – 100 m
20	Complex assessment of changes in the environment caused by the object impact as well as its influence on the life conditions and health of population	Complex assessment of all the types of impact showed that the designed production objects do not have significant irreversible impact on the environment. Due to remoteness of settlements there is almost no impact on life and health of population
21	Forecast of the environment condition and possible consequences in social and public sphere according to the results of the object activity	<p>Input into the pollution of the air will be within the sanitary norms.</p> <p>The impact on water resources is minimal.</p> <p>The impact on land resources will be compensated with landscaping, use of cut top soil for land improvement.</p> <p>All the above said determine the acceptable impact degree of the planned construction project on all the parameters of natural environment and living conditions of population.</p>
22	Client's obligations (investor of economical activity) to create favorable living conditions for population during construction, operation and liquidation of the object.	<p>Constant monitoring of ecological condition which will be fulfilled by oblast and regional departments of environment protection with attraction of city laboratory of sanitary and ecological supervision.</p> <p>To provide for all necessary environmental protection measures from possible occurrence of emergency situations.</p>