KAZAKHSTAN

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SOUTH WEST ROAD CORRIDOR DEVELOPMENT PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN

AS OF JUNE 2008

9.1 INTRODUCTION

Ecological problems became the global issues of humanity as they affect all and each person individually. At present awareness of people all over the world is increasing that destroying environment, society destroys its future.

The use of enormous riches of Kazakhstan on one hand and retention of environmental integrity on the other is the basic objective to be solved by the country.

Taking into account that environmental policy is a prerequisite of successful social and economic reforms, these problems were reflected in the government decrees and the long-term developmental strategy of the country till 2030 adopted by the President of the Republic of Kazakhstan and its component "Environment and natural resources -2030".

The territory of the Republic of Kazakhstan is located in Central Asia, borders on Russia in the North and the Northwest, on China in the East, and Kyrgyzstan and Uzbekistan in the South. The section of the transit corridor "Western China - Western Europe" ensures the connection between these countries.

Traffic volume of transport on the road wholly depends on social and economic development of these countries. Any change in trading relations between these countries will render a notable increase in traffic volume along this road. The economy of the Republic of Kazakhstan, in view of its geographical location, depends on ground-based transport system for export and import of commodities.

The section of the highway “Western China - Western Europe” is an important international transit corridor for this trade.

Ensuring ecological safety of highways is tightly connected with the sustainable development model of the country. No economic programs can enjoy success if they do not fully realize the importance of ecologically sustainable development.

The essence of the contemporary ecological crisis lies in the fact that self-preservation of the biosphere becomes already impossible as it can hardly resist negative results of human activity.

The issue of environmental protection usually covers ecological systems, including flora, fauna and the environment where they exist. In the process of roads construction, plants can easily adapt to some changes in the laying provided there are insignificant changes in the relief, however such consequences of industrial activities as the destruction of the fertile layer of soils, change in the level of ground waters, etc. can cause changes in the entire biosystem.

Global changes in nature are caused by rapacious exploitation of natural resources and large-scale environmental pollution by toxic substances, which lead to rapid degradation of nature. The share of transportation pollution of all forms of transport in the overall environmental pollution by industrial objects constitutes approximately 15%. Automobile transport is responsible for about 80% of economic damage caused by the pollution of natural resources among the branches of road-transport complex.

At the same time one should consider that the intensity of environmental pollution by automobile transport directly depends on road conditions.

Pollution level from automobiles is caused by road conditions, i.e. by technical level and transport-operational state of highways.

One of the major issues in the sphere of “protection of natural environment" such as ensuring environmental equilibrium and restoration of lost qualities of the environment in those areas where industrial works are carried out, and also consequences for social and economic development and survivability of the population has been raised in the Feasibility Study (FS) on the reconstruction of the highway "Western China - Western Europe" with access to adjoining countries.

Basic principle of the FS is the comparison of two versions, the so called "with the project "and "without the project". The first version considers

the existing highway which is maintained on the basis of yearly investments. The second version provides for works on rehabilitation, reconstruction or even new construction. In our case it is local improvements of those areas that do not meet requirements of road safety, including bypasses of the populated areas. Construction of large bypasses both of large cities such as oblast centers and separate regions with unfavorable geological or hydrological conditions can be examined here as a sub-version.

An instruction "On assessment order of the environmental impact of planned economic and other activity in the process of developing pre-plan, pre-design, and design documentation" approved by the Ministry of Environmental Protection of the Republic of Kazakhstan, Astana, 2005 and also the Ecological Code have been taken as the basis of the FS development.

The FS considers basic environmental issues:

- Air protection from pollution by motor transport;
- Water protection, including surface and ground waters;
- Protection of the populated areas from transport noise impact;
- Soil protection and rational use of land resources;
- Retention and protection of flora and fauna;
- Impact of highway on social and economic environment of society.

9.2 Climatic features, natural zones, soil and plant cover, surface and ground waters

West-Kazakhstan oblast

Western Kazakhstan oblast is located to the West of the republic and occupies territory of 151.3 thousand sq. km. The oblast center is Uralsk city. There are 12 rayons, 2 cities and 480 populated areas, including settlements and villages in the oblast. The population accounts for 614.2 thousand people, given this, an increase in the population for the last 6 months estimated 1.7%, which is one of the lowest indices in the republic as a whole. The number of economically active population for II quarter of 2007 composed 327.3 thousand people, which is equivalent to 68.9% ratio to the economically inactive population.

Relief

The Highway "Ural-Kamenka" at the boundary of the Russian Federation is

located on the Predsyrtovoe ledge, in the middle of the Poduralskoe plateau and the Common Szyrt on one side, and by the Caspian lowland on the other, within absolute altitudes of 45-100m. The Predsyrotovoe ledge is elongated by a narrow strip towards its latitudinal direction.

Relief of the Predsyrotovoe ledge is plain, divided by valleys of small rivers from the North to the South and a number of watershed sections.

Climate

The region of the highway route can be defined as dry and continental. Average annual precipitation is about 300mm per year. During the warm period from April till October falls out around 62-75%. The maximum of precipitation is fallen from May till July. Precipitation volumes during the year are inconstant.

The average annual air temperature is positive and composes 3.9-4.4°. Seven months in the year display positive average monthly temperature and other five months - negative.

Average depth of snow cover composes 38-47cm.

Absolute minimal temperature reaches -43°, while absolute maximal - +42°. Temperatures change significantly not only during the year or the month, but even twenty-four hours.

Southern and southeastern winds predominate; winter winds demonstrate higher speed than summer winds. Winds change their direction in spring and summer periods, northern winds predominate. Average annual wind speed is 4.5-4.8m/s.

The route of the highway passes the steppe zone, subzone of arid and moderately dry steppe.

Natural zones

The zone of moderately dry steppe is characterized by increased aridity of climate, lesser snow cover and snow reserves, and more intensive evaporation and represented by dark-chestnut normal soils.

Soil cover

Dark-chestnut normal soils are formed on flat increased watersheds and upper parts of slopes. Elluvial deposits of Paleogene and upper-Cretaceous age and also Neogene and quaternary deposits form these soils.

Humus horizon composes 40-60mm. Below lies the carbonate layer with

ocellar components. Sulfates lie deeper than the carbonate layer. These soils refer to sandy loams and rocky loam varieties. Ground waters lie deep (usually deeper than 10m) and therefore they do not influence the soil formation. These soils are widely used for agricultural purposes.

Surface and ground waters

The Ural which carries its waters into the Caspian Sea is the largest river in the region. The Chagan and the Derkulom from the right and the Utva, Barbastau and Solyanka from the left fall into the river. Ural water is fresh. The largest lakes of the region are the Chalkar Kamysh-Samarskoe. Ground waters lie in the valleys of rivers and ravines at the depth of 3-10m. Hydrogeological zone with ground waters from 2-3 to 70m is located on the Predsyrtovskoe ledge.

Vegetation

Plant cover is diverse as in floral so in geo-botanical within the region, and is represented by xerophiles and continental plants with some plants of boreal nature along the river where fresh waters are thinned out.

Feather-grass steppes with narrow-leaved sod grasslands predominate – feather-grass and sheep fescue. The combinations of sheep fescue and feather-grass are the most popular. Deciduous forests with steppe bushes can be met in those places which obtain additional moistening.

Aktobe Oblast

Aktobe oblast is located in the North-west of Kazakhstan. It is an extensive physical and geographical and economic region with the territory of more than 300.6 thousand sq. km., which is equivalent to approximately 11% of the entire area of the republic. Population for 01 July 2007 estimated 699.5 thousand people, where economically active population constitutes 386.3 thousand people. Density of population – 2.3 man per 1 sq. km. The territory of the region is divided into 12 rayons with 8 cities and 426 villages (auls).

Relief

A large extension of the region from the North to the South and from the West to the East determines quite complex relief with the variety of natural conditions.

According to the relief, the territory of the region is subdivided into three geo-morphological regions: Mugodzharskie mountains, the Poduralskoe (Ural-Emba plateau), the Turgay table plateau (Turgay - Aral table plain).

The region is located in the depth of the Eurasian continent, far from the oceans and high mountains. This determines significantly mainland climate with high continentality, which increases from the Northwest to the Southeast.

Climate

The region is characterized by sharp temperature contrasts: cold severe winter and hot summer, rapid passage from winter to summer, and a short spring period. Instability and deficiency of atmospheric precipitations, increased dryness of the air, and intensive evaporation are typical for the region.

The temperature of the warmest month (July) reaches 21.0-27.50°, and the coldest month (January) – 11.0-18.00°. The minimal temperature according to the average long-term data falls down to minus 31-38°, and the absolute minimal temperature reaches 37-47° frost in various years.

The absolute maximal temperature is equal to 40-46°. The period with the average-daily temperature of higher than 0° lasts 209-230 days. The duration of the frost-free period in the North of region lasts 4.0-4.5 months, in the South – 5.0 months.

Late spring and early autumn frost in the air and soils are observed on the territory of the region.

Annual amount of precipitation is 150-350mm per year. The maximum of precipitation is fallen during the summer period, what is the characteristic feature of continentality. Deficient moisture is worsened by high winds (number of days with high winds with the speed of 15m/sec varies from 32 to 105 days in the year). Average annual wind speed varies, within 4-5 m/sec.

A considerable extension of the region from the North to the South and from the West to the East resulted in the variety of soils and climatic conditions. The overall territory of the region is divided into four natural zones, which are distinguished by climate, soils, vegetation, and other signs: steppe, dry-steppe, semiarid, and desert.

The proposed section of the highway "Western Europe - West China" passes through four natural zones on the territory of Aktobe region.

Natural zones

Steppe zone is located in the Northern part of the region and represented by southern humus and dark-chestnut soils. As a whole this zone should be considered favorable for the agriculture.

Dry-steppe zone compared to the steppe is characterized by increased aridity, poorer snow cover and snow reserves, and more intensive evaporation.

The zone serves as the southern boarder of unwatered agriculture. Natural vegetation is represented by feather-grass, wormwood, and sheep fescue.

This zone should be classified as cattle-and grain breeding zone.

Semiarid zone differs from the previous by expressed aridity, poorer snow cover and snow reserves in water, and more intensive evaporation. Hummock-and-hollow topography is characteristic for this zone with significant erosion and table forms and light-chestnut soils.

The zone is considered to be cattle-breeding in natural-economic sense.

Desert zone within the region covers significant spaces. The zone is subdivided into two soil subzones: brown and grayish-brown soils. The subzone of brown soils is halophytic-wormwood desert. The relief of the subzone is hummock-and-hollow in some places. In economic sense both subzones have specific cattle-breeding value. Agricultural activities are possible given the lands are irrigated.

Soil cover

Southern humus is in wavy plain of the Or-Ilek watershed. Among them there are normal, carbonate, solonized, and underdeveloped soils. Loams and clays form local soils, less frequently it is sandy loam. Soils are not solonized, loamy varieties predominate by the mechanical composition. The thickness of the fertile layer removing is 35cm. The content of humus also varies and in the upper levels is equivalent to 2.2-6.0%. These soils are suitable for cultivation. The vegetation cover of these soils is represented by various combinations of sheep fescue and feather-grass.

Dark-chestnut soils are formed under sheep fescue and feather-grass vegetation with poor mixed grass and are subdivided into the same kinds and forms as southern humus. According to the relief they occupy the highest, significantly dismembered by rivers part of the Podural plateau, the northern part of the Mugodzharskie mountains, and the small part of the Turgay

table plateau.

The thickness of the fertile layer removal of the above mentioned soils is 30cm.

Quaternary loams and clays, eluvium and aggregated chalky diluvium in the form of loams and sandy loams serve as soil-forming species at the Poduralskoe plateau.

The Turgay table plateau is formed by tertiary clays, sandstones, sands and sandy loams, where eluvium serves as the soil-forming species.

The Ustyurt plateau is featured by Sarmatian limestone, where eluvium serves as the soil-forming species. Saliferous clays can be found on cavities which are formed by solonized soils.

Sandy loam and sandy loam deposits with sand massifs of sands, serve as soil-forming species in the Caspian lowland.

Chestnut soils: there are normal, phosphor, carbonate, solonized, carbonate and solonized, residual carbonate (chalky), and underdeveloped soils.

They also are very diverse by the mechanical composition: from clay to sandy loam and pure sand. Humus horizon composes 1.5-3%. The fertile layer removal is 25cm. Soils are not salted.

Light-chestnut: zone soils with feather-grass. Normal, solonized, chalky, carbonate-solonized, and undeveloped soils are distinguished among these soils. Humus horizon does not exceed 25cm. Humus content varies from 0.5-2%. Sandy loam and more frequently salty loam serve as soil-forming species. Solonized soils as uniform massifs and complexes with zonal soils are widely spread among light-chestnut soils.

As a result of significant moisture deficiency and poor organic content, light-chestnut soils refer to the group of conditionally workable lands for agricultural use.

Brown soils: there are normal, solonized, and underdeveloped soils amongst them. Most frequently they are combined with dry-type playa and alike soils, and saline lands. These soils are characterized by low humus horizon – humus content estimates 0.4-0.8%. The fertile layer of soil is not subject to removal.

Grayish-brown soils: occupy the very southern part within the Ustyurt

plateau, in the subzone of desert and saltwort deserts. The relief is plain with extensive reductions characteristic for the plateau.

Surface and ground waters

Rivers: The thickness of the drainage network in the region is heterogeneous. It is the thickest in the North and North-west where precipitations are more frequent in the region. In the South it is the thinnest and mainly represented by small ravines (piers) and temporary water flows which drain only during the spring flood.

The large rivers which flow from western slopes of the Mugodzharskie mountains are the inflows of the Ural River (Or and Ilek rivers), of the Caspian Sea (Emba River), and Uil and Sagiz Rivers. The Irgiz River flows from the eastern slope of the Mugodzharskie mountains with many shallow and frequently drying up right tributaries.

The rivers of the region are used predominantly for everyday needs of the population and watering of cattle.

More than 150 fresh and salt lakes are counted in the region. The most significant of them are the Chelkar-Tangiz, Zharkamys, Melde-Kol, Belkopa, and Chelkar. Because of significant saltiness water of the lakes is not suitable for practical use.

Ground waters lie from 0 to 4m, and from 5 to 18-20m on high terraces.

Vegetation

Vegetation is represented by various grasslands: predominantly feather-grass, wormwood, and sheep fescue. Feather grass and sheep fescue occupy the majority of the space. During the herbage farmers cultivate the lands; one can observe wormwood, erek, eurotia, ebelek sumchatyi, etc.

Kyzylorda Oblast

Kyzylorda oblast is located in the Southern part of the republic, along the lower flow of the Syrdarya River, on the coasts of the Aral Sea. The oblast borders on Uzbekistan in the Southwest. The territory of the oblast occupies 226 thousand sq. km. There are only 628.6 thousand people living on the enormous territory of Kyzylorda oblast, i.e. 2.8 people per 1 sq. km., which is 2 times below the average figure in the country. The oblast center is Kyzylorda city, where lives 32.4% of the

oblast population. From 1925 to 1929 the city of Kyzylorda was the capital of Kazakhstan. There are 7 rayons, 3 cities, and 287 settlements and villages in the oblast.

Relief

The region is located in the belt of Asian deserts, along the lower flow of the Syrdariya River. It is located in the extensive Turanian lowland with the plain relief, the largest part which is the ancient-delta plain of the Syrdariya, Sarysu, and Chu rivers. Absolute marks of the plains vary from 200m in the Southeast to 53m in the West, on the shore of the Aral Sea. Southwestern slopes of the western part of the Karatau mountains - which are the part of the Tien Shan mountains – are in the Eastern part of the region. Absolute marks of the range of mountains vary within 400-600m, the maximum height is 1418m.

There are extensive (individual sections in the North) massifs of sands with cellular and uneven structure in the South and the West of the oblast.

Climate

The climate of the region is sharply continental: hot dry summer and cold winter with unstable snow cover. The average annual temperature in the region composes +7-11°. The annual amplitude of the temperature (the difference of the average temperature of the warmest and coldest months) varies from +34 to - 41°.

The absolute maximum temperature composes 42-46°, minimum - 34-39°. The region is very arid. Precipitation level reaches 95-159mm per year, in separate dry years can fall out only 30-60mm, and during the most moisturized period - 200-2 13mm.

Average annual wind speed does not exceed 3-4 m/s. Wind speed reaches its maximum during spring and winter months. North-eastern and North-western winds predominate in the South-east. Dusty storms are observed during warm seasons.

Natural zones

Zone of hot dry desert steppes and deserts: divided into three subzones: a) Northeastern, b) Central, c) Southeastern.

The first and second subzones are characterized by the watered agriculture (rice) and cattle breeding. The third zone is good for cattle breeding.

Soil cover

Soils of the region vary significantly but are distinctly subdivided into two large regions: the region of the moistened (hydro-morphic) soils and dried up (sub-aerial) soils with signs of ancient irrigation of the soils in desert zones.

The highway route displays the following soils: brown with desert alkali soils, sands in combination with brown soils, grayish-brown soils; dry-type playa soils in combination with sands, and pure sands.

As mentioned above, the soils of region are extremely diverse with the exception of sandy soils and soils which are formed by tertiary and chalky deposits and grayish-brown soils. The soils possess the following general features: high carbonate content; layered structure of soils; absence of the microstructure and waterproof microstructure; saltiness (salted chloride-sulfate with dominating sulfates of sodium and calcium); strong biogenic processes which lead to rapid decomposition of humus and loss of the fertility of soils.

The content of humus varies from 0.6 to 3%. As soil-forming species serve sandy loam, loams, clays, and sand. Fertile soil cover is subject to removal for 15cm on grayish-brown soils.

Surface and ground waters

According to hydrological division Kyzylorda oblast refers to the ponds of the internal drain of Central Asia and Kazakhstan. The drainage network of the region is represented by the Syrdaraya River which flows into the Aral Sea and by temporary water flows (Besaryk, Tules, Zhideli, Akuyuk, Shulak, and others) which exist during the flood period. The Syrdariya River forms many lakes (Zhaksykylysh, Kamystybas, Arys, and Ashikol) on its way along the plain. These lakes are called oxbows.

Ground waters lie at the depth of 2-7m. Ground water of dry-type playa plains lie at the depth of 10-30m and strongly mineralized. Besides ground water there are many artesian sources. Wells of 5-50 l/s predominate.

Vegetation

Vegetation of the region is diverse: erekovo-wormwood, black saxsaul, kuyreuk, zhantak, byurgun, licorice, couch-grass, adzherek; from wood species -

oleaster, willow, poplar, tamarisk, ephemer.

South-Kazakhstan Oblast

South-Kazakhstan oblast is located in the southern part of the republic, it is formed in 1932. Territory of the region is 117.3 thousand sq. m. The center of region is located in Shymkent city, formed in XII century. City population estimates 506.5 thousand people or about 20% of the entire population of the region. The population of the region for 01 July 2007 composed 2 309.7 thousand people. The territory of South-Kazakhstan oblast estimates 117.3 thousand sq. km. There are 8 cities, including those of provincial subordination - 4, rayons - 12 (the largest region – Paktaaralskiy with the population of 248.5 thousand people), settlements - 11, and villages (auls) - 865. Urban population composes 36%, rural population 64%, respectively.

One of the most ancient cities of Kazakhstan – Turkestan - is located in the North of the region - 160 km from Shymkent.

Relief

The region varies in its relief. Clayish desert Betpak-dala is located in the North. Sandy desert Moyynkum is in the South from the Shu River. In the South-west - sands of the Kyzyl Kum desert and the Shardarinskaya steppe. In the far south - Myrzashol, in the center – the range of Karatau mountains (Bessaz mountain, 2176m); the entire southeast is occupied by several ridges of Western Tien Shan - Talasskiy Alatau, Kenzhetau, Ogemskiy ridge (Sairam mountain, 4238m).

The Karatau ridge which passes through the middle of the region from the southeast to the northwest, divides the plains into two parts: northern part occupied by Moyynkum sands and the Betpak-dala plateau, and the southern part occupied by the Syrdar lowland and Kyzyl Kum sands.

Talasskiy Alatau ridge within the region crosses its western part through the Dzhabaglinskie mountains where one of the most interesting preserves of Kazakhstan is located - Aksu-Dzhabaglinskiy.

Climate

The climate of the region is continental and dry due to its location in the depth of the continent and significant distance from seas and oceans.

Climatic conditions of the region are diverse; the relief is heterogeneous

(desert, foothills, and mountains) and the region possesses significantly extended territory.

The abundance of insulation and thermal resources is the characteristic feature of the climate of the region as it is located in the far south of the republic.

The climate is continental: soft and short winter with frequent thaws, snow cover is insignificant and unstable, hot, prolonged and exceptionally dry summer. The average temperature in January in the North is -120°, in the South -2-4°, in July +26-29°. The average annual temperature varies along the region from +8-9 to +14°, rising through the North to the South. Several days in summer in the South the temperature can reach 45-47°, in the North - 43-44°.

Annual amount of precipitation in plains is only 130-250mm; in foothills - 400-700mm due to mountainous environment (at the heights more than 1000m above the sea level) it can estimate 750+900mm and more. However, precipitations are unstable, and their quantity varies.

Northern, northeastern and eastern winds predominate in the region. Average annual wind speed reaches 3-3.8 m/s in the northeastern part of the region, in the southwestern part they are weaker (1.5-2.8 m/s). In the regions with dismembered relief winds usually depend on local conditions.

Natural zones

There are two natural zones in the region where the highway route is located: dry hot zone of deserts and semi-deserts and very arid hot foothill zone. Differences in thermal resources of the vegetal period and differences in the relief, soil cover, and vegetation formed a basis for the subzones.

Dry hot zone of deserts and semi-deserts: covers the large part of the territory of the region and is occupied by deserts Betpak-dala, Moyynkum, and Kyzyl-kum, and Hungry steppe. Furthermore, it includes the center of the region.

The sub-zone is engaged in cattle-breeding and agricultural activities. Insufficient water resources undermine development of the agriculture which is possible only with the irrigation.

Very arid hot foothill zone: this zone is most favorable for development of the dry agriculture and horticulture. Development of viticulture at present revives again.

Soil cover in the region where the highway route passes has the following features: gray desert soils - southern light- and average- and sandy

loam, gray desert soils - southern regular- average- and sandy loam, meadow gray soils non-saline clay and rocky clays, and gray desert soils - southern- dark- average- and sandy loam.

Extraordinary heterogeneity of physical and geographical conditions of the region specifies very wide variety of its soils.

Gray desert soils within the region occupy the large part of the territory and are the basic soils, used for agricultural purposes.

Gray desert soils, southern and dark occupy foothills of southern and eastern spurs of the Talass Alatau, Ugam ridge, Korzhintau and the North - western spurs of Karatau. These soils are located at 700-800 to 1200-1300 m above the sea level.

Soil-forming species are mainly loess deposits. Ground waters lie deeply at 20-30 m. The thickness of the fertile layer removal is 30 cm.

The described soils are carbonate, by the mechanical composition these soils are middle- and extremely clayish.

Plant cover is represented by exceptionally couch and blue grass.

Gray desert soils, southern and regular - are located in high parts of the sub-mountain plains and within the lower parts of "aydyrov" from 250-300 to 700-800m above the sea level. These soils are formed on loess deposits. The thickness of the fertile layer removal is 20-25cm.

By the mechanical composition usual gray desert soils predominantly medium-loamy, but sandy loam soils can also be met.

Ground waters lie deeply and do not influence the process of soil formation. Plants are represented by ephemer groups with significant portions of xerophytic bushes.

Gray desert soils, southern and bright occupy the lower part of sub-mountain plains and high terraces of the Syrdariya River. These soils are characterized by close location of ground waters which significantly affect the soil-formation processes in some places.

Loess deposits, ancient-alluvial deposits, and also proluvial deposits serve as the soil-forming species. The thickness of the fertile layer removal is 15-20cm.

According to the mechanical features these soils relate to medium-loamy, partially sandy loam, and sandy soils.

Plant cover is ephemer and wormwood.

Meadow gray soils, non-saline are popular among regular and

dark gray desert soils. They are also met on elongated dry-valley reductions. These soils are formed as a result of suspended ground or surface moistening.

Loess deposits, loess loams and alluvial deposits serve as the soil-forming species. These soils embody transfer of meadow soils to gray desert soils and therefore representatives of both types can be met.

The described soils are not solonized. The mechanical composition of soils is heavy and medium-loamy. The thickness of the fertile layer removal is 20cm.

Surface and ground waters

River networks are distributed along the region extremely unevenly according to the drainage thickness. The majority of rivers are in mountainous regions. The plains of the region are poor in rivers and deserts completely lack a surface drain.

All rivers belong to the basins of the rivers Syrdaruiya and Chu. The large part of the rivers belongs to the Syrdarya River and only insignificant part (rivers in the northeastern slope of the Karatau ridge) - to the Chu basin.

The largest river - Syrdariya passes the region only in its middle part. The Syrdariya River has inflows only on the right side which begin in the Western Tien Shan ridges. The largest of them which reach the Syrdariya River is the Chirchik River (with inflows Chatkal, Pskem, and Ugam), Keles and Arys (with inflows Borolday and Badam). Among small rivers there are the Bogen, Chayan, Karachik, and others. They are lost in foothills. The Teres River should be noted on northeastern slopes of the Karatau ridge.

The lakes of the region are not popular; the largest of them is Akzhaykyn, Akzhar, and Kaldykol.

Ground waters are diverse. Underground waters lie at various depths and have different degree of mineralization.

Vegetation

Plant cover is diverse as soils due to deserts, semi-deserts, and mountains in the region. The most popular plants are wormwood-biyurgunovaya, azhereko-wormwood, wormwood and ephemer, desert dormous and wormwood. Tamarisk, salt tree, reed, oleaster, euphrates poplars and willow can also be met.

Zhambyl Oblast

Zhambyl oblast is located in the South of Kazakhstan. Oblast center is Taraz City. The territory of Zhambyl oblast occupies 144.3 thousand sq. km, population density estimates 6.8 people per 1 sq. km. Population constitutes 1013.0 thousand people for 01 July 2007 which is equivalent to an increase on 3.8 thousand people from the beginning of 2007. Given this, the migration balance is negative - the number of those who left the oblast is on 3772 people exceeds the number of those arrived.

Relief

Zhambyl oblast is located within 300-4500m of absolute altitude which specifies its complex surface. The northern part of the territory - plain, in the south within the region there are substantial parts of the Kyrgyz and Talas Alatau ridges. In the East there is an extensive low-mountain massif – Chu and Iliyskie mountains, on the Southwest – the Karatau ridge.

Erosion and structural, erosion, eolian and accumulative relief types are widespread in the region. The first and second types are represented by alpine regions and separated massifs of medium and low mountains.

The northern and northwestern slopes of the Kyrgyz and Talass, and Karatau ridges refer to erosion and structural relief types.

Erosion relief type is observed in the western spurs of the Zailiyskiy Alatau and at Chu-Iliyskiy mountains.

Eolian relief is met in the sandy desert Moyynkum. Accumulative type of the relief is represented in plains and valleys of the rivers.

Climate

Region is diverse in climatic conditions which are stipulated by geographical location and vertical zones in the mountains.

The characteristic property of the climate is significant insolation, sharp continentality and strong aridity.

The climate of region is characterized by sharp temperature contrasts: uneven rainfall distribution over the years and areas, dry air, intensive evaporation, and abundant solar heat.

Amount of precipitation varies within 81-359mm; the greatest quantity is

reached during the spring period.

Snow cover is fixed in the beginning of December. Snow cover thickness varies within 10-35cm.

The average annual temperature is equal to 9.1°. The absolute maximum is +45°, the absolute minimum - 41°.

The winds of southern, southwestern and western directions are prevailing winds. Average annual wind speed is 2-5.9 m/s.

Natural zones

In the region of the highway route the following zones are distinguished: mountain steppes, hot dry and very arid foothill.

Zone of mountain steppes - covers the northern slopes of Kyrgyz Alatau and the eastern part of the Karatau ridges.

Arid foothill zone is found in flat mountain peaks, steep slopes, sub-mountain sloping plains.

Hot dry zone covers the enormous territory of the region. Sands of the Moyynkum, Bekpak-Dala plateau, and delta plains of the Assa, Talas, and Shu rivers.

Soil cover

Chestnut soils are found in high foothills, lower zones display gray desert soils (dark gray desert soils, regular gray desert soils) and meadow dark soils, meadow solonized, and alkali soils.

Dark- chestnut soils are found at the Talass foothills and the most elevated parts of the Taratau ridge. Basic elements of the relief - slopes of different exposure, inclined foothill plains, and wavy plateaus.

Soil-forming species - weak under-sorted eluvial and diluvial and proluvial loess loams at the depth of 1-2.5m mixed with compact rocks and sandy and pebble deposits.

The thickness of the fertile layer of soils composes 30sm. These soils are used in the agriculture.

Light-chestnut soils are located in foothills of the Kyrgyz and Talass Alatau, Karatau ridge and Shu- Iliyskiy mountains. The relief is inclined plains of different exposure and intermountain valleys.

Significantly thick loess deposits and loess loams with underlying gravel and pebble formations serve as the soil-forming species. The thickness of the fertile layer of soils composes 20-25cm.

Gray desert soils - in the region of the highway route dark gray desert soils and regular gray desert soils of different mechanical composition (light-, middle, and heavily clayish) soils are popular, as well as meadow and gray soils. These extensively sloping sub-mountainous plains along the Chu Iliyskiy mountains and the Kyrgyz Alatau present desert and steppe sub-mountain zone.

Loess deposits and loess loams, with frequent interventions of macadam and cartilaginous, shallow sandy and pebble layers form local soils. These soils are carbonate. Gray desert soils usually differ from dark gray desert soils in terms of humus thickness. Thickness of the fertile layer of soils is 20-25cm.

Meadow gray soils – saz strips of a semi-hydromorphic soil types are found in foothill plains and terraces of rivers. These soils are mostly solonized by readily soluble salts. Among them can be met both alkali soils and solonized soils. They are sulfate in nature which is not dangerous though strongly salty sulfate alkali soils need to be washed.

Meadow gray soils are good for workable lands. Thickness of the fertile layer of soils is 25-30cm.

Surface and ground waters

Zhambylskaya oblast is sufficiently rich in available water resources. The Shu and the Talas Rivers, southwestern (fresh) part of the Balkhash lake, and quite large fresh lakes Biylikol and Akkol, salty lakes Tuzkol and Ashchykol are located on its territory. Furthermore, there are many small rivers which flow the Karatau, Cu-Iliyskiy mountains and other ridges of the Tien Shan mountains.

According to formation structure, ground waters of the region can be divided into two parts: mountain and sub-mountain plains. In the mountainous part there are deep underground waters which lie deeply and do not influence the soil formation. Underground waters source springs in the valleys and foothills.

Due to complicated geo-morphological and geological structure the formation of ground waters are significantly diverse. Ground waters lie at depth from 1.5 to 25m.

Vegetation

The following types of vegetation can be distinguished: desert (xerophytic and suffrutescent) - gray wormwood, Turanian wormwood, and ebelek.

Steppe type vegetation is insignificantly extended, represented by erkek and tyrsik.

Meadow type vegetation is met in river valleys, ravines, around springs and lakes. Most frequently is found reed, rush, reedgrass, quackgrass, azhrek, kiyak and vostrets.

Bushy type vegetation is sufficiently widespread and represented by meadow-sweet, pea shrub, salt tree, tamarisk, zhuzgun brushwood.

Wood type vegetation is mostly represented by black saxsaul, euphrates poplars, and elaeagnus.

Almaty Oblast

Almaty Oblast is located in the Southeast of the republic. The region borders on the North on East-Kazakhstan oblast, in the Northwest on Karaganda, on the Southwest on Zhambyl Oblast, in the South on the Republic of Kyrgyzstan, and in the East on the People's Republic of China.

Density of the population is 7 people per 1 sq.km. The center of the region is located in Taldykorgan city, based in 1944. The population of the region constituted 1 6314 thousand people (without the City of Almaty). The territory of the region is equal to 224.0 thousand sq. m. (without the City of Almaty). There are 16 rural areas, 10 small cities, 15 settlements, and 759 villages (auls) in the region. The number of urban population composes 29.6%, rural – 70.4%.

The largest city is Almaty - the former capital of the republic from 1929 to 1997, based in 1854, with the population of more than 1305.3 thousand people or 7.8% of the entire population of the region. Population increase from January 2007 to July 2007 constituted 18.1 thousand people.

Relief

The territory of the region is slightly inclined plain towards the Balkhash lake. The substantial part of the region is occupied by Balkhash-Alakolskaya and Ileyskaya cavities with numerous sandy massifs (Saryesik-Alatau, Taukum, Moyynkum, Zhamankum, and others).

The Zaileyskiy Alatau, Kungey Alatau, and Ketpen ridges are located in the South. The Zhetysuskiy, Zhongarskiy Alatau, and Zhongarskie gates are in the

South-east. Foothill plains are located in the foot of the mountains.

Climate

The climate is extremely diverse. A climate change is subject to the law of vertical zonality. Climate is continental, soft in the foothill strip.

The average temperature in January in the plains -15°, in the foothills -6-8°. In July it is +24° and +24-25°, respectively.

The average minimum temperature composes -35-41°. The absolute maximum temperature is +42° . Annual amount of precipitation in the plains can reach 300 mm, in the foothills - 500-700mm, and 1000mm in the mountains. The average depth of snow cover is 13-30cm, in the mountains - 69-71cm.

Prevailing winds are northeastern and eastern winds (Panfilov and Chilik zones) and southeastern and southern winds. Average annual speed of winds is 1.7-3.8 m/sec.

Natural zones - desert and steppe zone of irrigation and dry agriculture are occupied by Priiliyskuyu valley, foothill plains of the Zailiyskiy Alatau and Ketmen ridge.

Foothill zone is located in the foothill plain of the Zailiyskiy Alatau and in the northern slope of the Ketmen ridge. Almost all arable and workable lands are concentrated in this zone.

Desert zone is mainly represented by the Balkhash desert. Agricultural lands are pastures and hay mowing.

Soil cover is represented by rocky dark-chestnut soils, dark-chestnut soils, light-chestnut soils, regular gray desert soils, extremely rocky gray desert soils and light gray desert soils.

Mountain dark- chestnut soils - are popular, mostly typical for eastern and western parts of the region. They are formed on the basis of low mountain relief. These soils are rich in nourishing elements. The content of humus in these soils is significant and comprises 0-28cm – 2.76-3.33% in the upper layers. The thickness of the fertile layer of soils is 40cm.

Dark-chestnut soils - are found in the foothill plain. Also popular on loess loams, they are carbonate. They are quite rich in humus. According to the mechanical composition these soils refer to medium-loamy and close to heavy loamy soils. The content of humus in them varies from 3-4.3%. The

thickness of the fertile layer is 40cm.

Light- chestnut carbonate soils - are found in the foothills of the Ketmen ridge and the Zailiyskiy Alatau; they compose the upper subzone of desert and steppe zone. Light-chestnut carbonate soils differ significantly from eastern soils according to the relief and soil-forming species.

The relief of the eastern part is characterized by inclined sub-mountain plain which is cut by temporary river beds and deep ravines in several places. Coarse gravel proluvial deposits serve as soil-forming species. The profile of these soils contains a significant quantity of road metal.

The relief of the western part is characterized by hilly and strongly dismembered sub-mountain plains. Loess deposits serve as soil-forming species and in contrast to eastern light-chestnut carbonate soils, they are complete in structure. Ground waters lie deep and do not influence the process of soil formation. These soils are all carbonate. These soils are medium-loamy by the mechanical composition. The thickness of the fertile layer of soils estimates 30cm.

Regular gray desert soils - profile of these soils differs slightly from light-chestnut soils. These soils form the second subzone of desert and steppe zone. The difference between them is in the content of humus. Gray desert soils usually contain humus considerably less.

The extension of regular gray desert soils is observed in the middle and lower part of slightly inclined foothill plain, which is characterized by the hilly relief in the West and relatively flat surface with many small dry river beds in the East.

According to the nature of soil-forming species, the western part differs from the eastern part. In the first case regular gray desert soils are formed by loess loams, whereas the second mostly contains proluvial coarse gravel deposits which lie quite close to the surface. Ground waters lie deep and do not influence the soil formation process.

The thickness of the fertile layer composes 20cm. By the mechanical composition these soils refer to heavy and average loams.

Regular gray desert soils, strongly crushed - are located in the slightly inclined sub-mountain plain. Many dry small lairs can be found here. Ground waters lie deeply. These soils are characterized by significant crushed structure. Crushed stone is found on the surface in abundance. Pebbles

and crushed stone is an underlying layer deeper than 40-50cm.

These soils are developed on proluvial deposits. The fertile layer of soil is absent.

Light gray desert soils - are located in the lower part of the sub-mountain plain to the North from the subzone of regular gray desert soils, where desert conditions are in place with predominantly light composition of soils.

Light gray desert soils are formed on loess loams and sandy loams, frequently with underlying rocky and pebble deposits. Ground waters lie deep and do not affect the soil-formation process.

By the mechanical composition light gray desert soils are of predominantly light composition. Carbonate layer appears at the depth of 40-60cm.

These soils are characterized by low humus content, poor humus (10cm), weak illyuvial, lack of structure, and salty and solonized structure.

Surface and ground waters - the most powerful water resources of the region are represented by the following rivers: Ile, Lepsi, Karatal, Aksu, Tnetek, Yrgayty, Kaskelen, Talgar, large and small Almatinka, Shyryn, Issyk, Chilik, Charyn, Khorgos, and others.

The largest lakes are Balkhash, Alakol, Sasykkol, Zhalanashkol. Ground waters lie deep. Ground waters are thinned at the debris cone, thus forming springs and swampy places (saz). Ground waters are weakly mineralized. At the Iliyskoe valley the level of ground soils rises and lies at the depth of 0.5-2 and in several places at 5 meters. On the watersheds between the rivers which flow from northern slopes of the Ketmen ridge, ground waters lie deep at 15-20cm.

Vegetation

The plant cover of the region is very diverse. It is represented by sheep fescue and wormwood, izenevaya with interventions of feather-grass, ebelek, bulbous bluegrass, tipchak, and leban. Plants are mainly represented by ephemers: bonfire, small sedge, and poppies.

In the flood-lands of rivers and along the coasts of lakes tugai-type forests with shiya and reed brushwood grow. Mountains are characterized by high-altitude zonation.

Forest belts along the road are represented by small-leaved elm, poplar, Tartar maple, narrow-leaved oleaster; bushes are mainly

represented by spiraea, golden currant, tamarisk, and others.

9.3 Impact of the automobile transport on the environment

Automobile transport is responsible for about 80% of economic damage caused by the pollution of natural resources among the branches of road-transport complex. At the same time one should consider that the intensity of environmental pollution by automobile transport directly depends on road conditions. Pollution level from automobiles is caused by road conditions, i.e. by technical level and transport-operational state of highways.

The following impacts on the environment are caused by highway and road construction activities:

- pollution by exhaust gases of engines and also of road-building machines and equipment used in rehabilitation works;
- acoustic, vibration, electromagnetic, radiant, and technological pollution in the process of works;
- pollution by dust and waste products of road surface and automobile tires, and also during transportation of road-building materials;
- pollution by outputs of production activity of enterprises (quarries and temporary storage areas for construction materials and articles),
- pollution from parking lots and technical maintenance of cars and equipment (mechanisms, production bases and ABZ;
- surface contamination on roadway of the roads and bridges, and also in places of storages for road-building works;
- pollution by dust-removing and anti-ice materials for soils, surface and ground waters, and vegetation of roadside, and also adjacent territories to the places of permanent and temporary storage;
- pollution as a result of water and air erosion;
- pollution of roadside by everyday and production garbage.

9.4 Measures on environmental safety while in the process of reconstruction works on the highway

9.4.1 Measures on atmospheric protection

Quantity and composition of exhaust gases from engines of automobiles and road-building equipment used in reconstruction works depend on the

number of the factors, amongst them the following are the most essential:

- design features and technical state of engines of automobiles and road equipment;
- traffic volume and composition of motor transport means;
- road conditions: the value of radius of curves on the plan, front slopes, the width of the roadway, visibility conditions, evenness and roughness of the road surface, the presence of populated areas, intersections and contiguities of roads, railroad passages and other factors which regulate the speed of the motion of transport flow;
- motion regimes selected by drivers;
- meteorological factors: wind direction and speed, temperature and humidity of the air, solar intensity, the presence of temperature inversions and turbulence of the air in the lowest layers of the atmosphere, etc.

In the present FS the following types of works on reconstruction and operation of the highway are recommended in order to reduce the toxicity of automobile ejections:

- ensuring appropriate ignition systems and carburetion of automobiles and road equipment in the exploitation process;
- monitoring the relevance of features of the used fuel to specifications of engines of automobiles and road equipment;
- guaranteed quality of road surfaces;
- ensuring appropriate road motion which will decrease frequent braking and accelerations of the transport flow and will contribute to reduction in the pollution levels;
- building fences, pavements, and parking lots for automobiles in populated areas and bus stops;
- systematic control over technical state of the fuel equipment of diesel engines whose exhaust gases contain much soot;
- guaranteed uniform rhythm of work of packing, sealing equipment and transportation equipment used for coating operations by hot asphalt-concrete mixtures, which will reduce inadmissible concentration of harmful toxic hydrocarbons in working areas and adjacent territories, including concentrations of carcinogenic benzopyrene;

The most unfavorable indices for truck transport are specific ejections into the atmosphere of pollutants (carbon monoxide, nitrogen oxides, hydrocarbons,

sulfur dioxide, soot, aldehydes, benzopyrene, and lead).

Carbon dioxide is the most mass "greenhouse" gas which influences a climate change. A quantity of sulfur dioxide SO2 must be controlled ejected from diesel engines. Sulfur dioxide is dissolved well in water, forming sulfurous acid. "Acidic rains" cause extensive damage to vegetation far beyond the limits of the ejection sources. An increase in the acidity decreases the ability of soil to adsorb contaminators.

Presence of nitrogen oxides NO2 in the atmosphere – is one of the main reasons of the dangerous phenomenon - photochemical smog.

The most numerous subgroup of toxic substances consists of hydrocarbons, some of their forms refer to cancerogenic.

Among the composition of polluting agents from automobiles and highway equipment there are the so-called "solid particles". The basic component is soot: on its surface different hydrocarbons are adsorbed which present a threat to the health of population. Small particles with micro size form aerosols and they are distributed with gases for long distances.

Pollution of the environment by heavy metals is related to the first class of threat, where lead occupies the first place. Lead is classified as number one polluting agent.

Concentration of pollutants for each source in the process of highway rehabilitation works should not exceed the maximum permissible standards specified in SanPiN RK #3.03.015-97 and other normative documents, developed by the Sanitary and epidemiological authorities and approved by appropriate agencies.

The FS provided the calculation of harmful substances concentration for the highway reconstruction period, taking into account increased traffic volume. Calculations are performed in “CREDO” software.

The calculations performed allow establishing a quantity of toxic substances contained in OG within permissible Maximum contamination level (MCL) within the road strip. However, in places where the highway passes through populated areas such as Kurayly, Aktobe city, Khromtau city, Zhosaly city, Kyzylorda city, Shieli, Ikan, Temirlan, Ak Biik, Shakpak-baba, Zhana Turmys, Saryagash, Kurkules, Birtelek, Abay, Shakpak-Ata, B. Momyshuly, Aysha-Bibi, Taraz city, Aryk-Tobe, Korday, Merke, Sypatay, Zhantogan, Andas batyr, Alga, Guldala, Panfilov, Enbekshi, Novoalekseevka, Kulzha, Enbek, Birlik, Baltabay, Malovodnoe, Taskensu, Ashchisay, Karaturyk, Lavr, Shelek, Bayseit, Nura, Bakhar,

Taskarasu, Kokpek, Zharkent, Keshi Shyagan, Ulken shygan, Akkent, Avat, Penzhim, and Korgos where the construction line is located at a distance of 5-35 meters from the highway, the content of nitrogen oxides NOX practically reaches the established MCL standard (maximally single). Lead deposits on the surface of roadside strip - taking into account proposed intensity (up to 2027) – are within the MCL limits at a distance of 40m from the edge of the highway. Calculations of concentrations of toxic substances are attached.

While assessing the relative danger of the atmospheric pollution in populated areas through measures on smog prevention (based on the experience of the largest cities in the world), there can be a sharp reduction traffic volumes in these populated areas due to the construction of detour highways.

The present FS provides the calculation of MCL standards for harmful substances into the atmosphere (MPE – maximum permissible emissions) for automobile transport based on the two versions: proposed for the existing direction and alternative with larger circuits. Total emissions for regions are given below.

Calculation is produced by the formula which considers emissions for each passing automobile and summarizes all emissions from the separate transportation means:

$$[M]j=Ómji \times Li \text{ of } x[P]Rji \text{ t/yr}$$

Where: i is the number of selected groups of motor transport means

m is the specific emission of the j-th substance by the automobile of i-th group at the point of the calculated period, g/km;

L is the path of the motor transport of i-th group at the point of the calculated period, mln km/yr;

PRji – multiplication of coefficients on n factors.

While calculating MPE during the reconstruction of highways, a quantity of specific emissions of harmful substance from separate automobiles has been accepted in accordance with the case studies performed by MADI (Moscow Highway Institute), and they were given below in the table.

Emissions	Types of automobiles					
	VAZ 1111	GAS 2410	GAS 5312	LIAZ 677	KamAZ 5320	KrAZ 260
Solid particles	-	-	-	12,4	10	10
C O 2	184,5	212,6	715,9	1022,8	606,8	1608,3
C O	7,12	12,51	29,06	50,47	7,15	28,34
NOx	1,43	0,39	0,83	6,06	7,0	28,63
SO2	0,13	0,15	0,51	0,73	2,09	5,53
CmHn	1,39	1,63	4,86	5,9	2,32	8,46
Pb	0,022	0,025	0,085	0,121	0	0
TOTAL	**194,59**	**227,31**	**751,25**	**1098,5**	**635,36**	**1689,3**

West-Kazakhstan Oblast

Fuel consumption for the period of a motor road reconstruction according to the approved alternative for the existing motor road including local changes

Item No.	Source of hazardous substance emission	Fuel type	Fuel consumption, kg/h	Machinery operation time, m/h	Fuel consumption, ton
1	Dump trucks KamAZ 5511	Diesel	3,33	98,8	32,90
2	Street-washing machine ZIL-130, 6000 l	Gasoline	9,54	891,02	850,03
3	Bus, Ikarus 611	Diesel	1,07	390	41,73
4	Motor grader, 99 kWt	Diesel	13,8	152,36	210,26
5	Motor tar sprayer, 7000 l	Gasoline	9,54	2,06	1,97
6	Asphalt spreader	Diesel	3,71	50,06	18,57
7	Bulldozers				
	108 hp.	Diesel	7,63	888,05	677,58
	130 hp.	Diesel	10,9	0,53	0,58
	165 hp.	Diesel	11,7	6,65	7,78
8	Self-propelled rollers				
	8 t	Diesel	4,45	248,92	110,77
	13 t	Diesel	4,51	437,18	197,17
	16 t	Diesel	4,45	41,21	18,34
9	Vehicle-mounted crane				
	6,3 t	Gasoline	6,04	188,14	113,64
	10 t	Diesel	6,25	19,79	12,37
10	Caterpillar-tracked crane				
	16 t	Diesel	3,71	0,51	0,19
	25 t	Diesel	6,36	28,26	17,97

11	Pneumatic wheel-mounted crane, 25t	Diesel	4,45	1209,54	538,25
12	Marking machine T -40	Diesel	1,7	2,04	0,35
13	Crushed stone distributor	Diesel	3,93	12,12	4,76
14	Tractor T -130	Diesel	17,5	18,41	32,22
15	Tractor MTZ - 80	Diesel	6,4	8,45	105,12
16	Excavator E -652B, 0,65 m3	Diesel	6,48	164,25	106,43
17	Excavator E -10011, 1,0 m3	Diesel	9,86	256,84	253,24
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	11,9	197,07	234,51

Calculation of exhaust gas emissions (EGE) during operation of machines and mechanisms for the period of the motor road reconstruction

No.	Source of hazardous substance emissions	Fuel type	Fuel consumption, ton	Emissions for the construction period, tons				
				CO_2	CH	NO_2	C	SO_2
	Specific emissions, tons/tons of fuel	Diesel		0,01	0,03	0,04	0,05	0,02
		Gasoline		0,07	0,10	0,04	0,05	0,002
1	Dump trucks KamAZ 5511	Diesel	32,90	2,00	0,99	1,32	1,65	0,66
2	Street-washing machine ZIL - 130	Gasoline	850,03	59,50	85,00	34,00	42,50	1,70
3	Bus, Ikarus 611	Diesel	41,73	0,42	1,25	1,67	2,09	0,83
4	Motor grader, 99 kW	Diesel	210,26	2,10	21,03	8,41	10,51	4,21
5	Motor tar sprayer	Gasoline	1,97	0,02	0,06	0,08	0,10	0,00
6	Asphalt spreader	Diesel	18,57	0,19	0,56	0,74	0,93	0,37
7	Bulldozers							
	108 hp.	Diesel	677,58	40,37	121,10	161,46	201,83	80,73
	130 hp.	Diesel	0,58	21,29	63,85	85,14	106,43	42,57
	165 hp.	Diesel	7,78	0,47	1,41	1,88	2,35	0,94
8	Self-propelled rollers							
	8 t	Diesel	110,77	6,72	20,17	26,89	33,62	13,45
	13 t	Diesel	197,17	11,96	35,88	47,84	59,81	23,92
	16 t	Diesel	18,34	1,11	3,34	4,45	5,57	2,23
9	Vehicle-mounted crane							
	6,3 t	Gasoline	113,64	48,67	69,53	27,81	34,76	0,23
	10 t	Diesel	12,37	0,12	0,37	0,49	0,62	0,25
10	Caterpillar-tracked crane							
	16 t	Diesel	0,19	0,00	0,01	0,01	0,01	0,00
	25 t	Diesel	17,97	0,18	0,54	0,72	0,90	0,36
11	Pneumatic wheel-mounted crane, 25t	Diesel	538,25	5,38	16,15	21,53	26,91	10,77
12	Marking machine	Diesel	0,35	0,00	0,01	0,01	0,02	0,01
13	Crushed stone distributor	Diesel	4,76	0,05	0,14	0,19	0,24	0,10
14	Tractor T -130	Diesel	32,22	0,32	0,97	1,29	1,61	0,64
15	Tractor MTZ - 80	Diesel	105,12	1,05	3,15	4,20	5,26	2,10
16	Excavator E -652B, 0,65 m3	Diesel	106,43	1,06	3,19	4,26	5,32	2,13
17	Excavator E -10011, 1,0 m3	Diesel	253,24	2,53	7,60	10,13	12,66	5,06
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	2343,51	23,44	70,31	70,31	117,18	46,87
	Total for the motor road reconstruction period	Diesel	5695,73	228,96	526,59	514,85	672,85	240,13
		Gasoline	965,64	108,19	154,59	61,89	77,36	1,93
Total of emissions: 9248,71 tons including diesel - 7879,11 tons, gasoline - 1369,6 tons								

Aktobe Oblast

Fuel consumption for the period of the motor road reconstruction for the existing direction					
Item No.	Source of hazardous substance emission	Fuel type	Fuel consumption, kg/h	Machinery operation time, m/h	Fuel consumption, ton
1	Dump trucks KamAZ 5511	Diesel	3,33	98,8	199,71
2	Street-washing machine ZIL-130, 6000 l	Gasoline	9,54	891,02	5159,7
3	Bus, Ikarus 611	Diesel	1,07	390	253,3
4	Motor grader, 99 kWt	Diesel	13,8	152,36	1276,26
5	Motor tar sprayer, 7000 l	Gasoline	9,54	2,06	11,92
6	Asphalt spreader	Diesel	3,71	50,06	112,74
7	Bulldozers				
	108 hp.	Diesel	7,63	888,05	4036,55
	130 hp.	Diesel	10,9	0,53	2128,53
	165 hp.	Diesel	11,7	6,65	47,03
8	Self-propelled rollers				
	8 t	Diesel	4,45	248,92	672,37
	13 t	Diesel	4,51	437,18	1196,11
	16 t	Diesel	4,45	41,21	111,31
9	Vehicle-mounted crane				
	6,3 t	Gasoline	6,04	188,14	695,28
10	10 t Caterpillar-tracked crane	Diesel	6,25	19,79	75,08
	16 t	Diesel	3,71	0,51	1,15
	25 t	Diesel	6,36	28,26	109,1
11	Pneumatic wheel-mounted crane, 25t	Diesel	4,45	1209,54	5,38
12	Marking machine T -40	Diesel	1,7	2,04	0,21
13	Crushed stone distributor	Diesel	3,93	12,12	28,91
14	Tractor T -130	Diesel	17,5	18,41	195,56
15	Tractor MTZ - 80	Diesel	6,4	8,45	32,83
16	Excavator E -652B, 0,65 m3	Diesel	6,48	164,25	646,05
17	Excavator E -10011, 1,0 m3	Diesel	9,86	256,84	1537,19
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	11,9	197,07	1420,38

Calculation of exhaust gas emissions (EGE)
during operation of machines and mechanisms for the period of the motor road reconstruction for the existing direction

No.	Source of hazardous substance emissions	Fuel type	Fuel consumption, ton	Emissions for the construction period, tons				
				CO2	CH	NO2	C	SO2
	Specific emissions, tons/tons of fuel	Diesel		0,01	0,03	0,04	0,05	0,02
		Gasoline		0,07	0,10	0,04	0,05	0,002
1	Dump trucks KamAZ 5511	Diesel	199,71	2,00	5,99	7,99	9,99	3,99
2	Street-washing machine ZIL - 130	Gasoline	5159,70	361,18	515,97	206,39	257,99	10,32
3	Bus, Ikarus 611	Diesel	253,30	2,53	7,60	10,13	12,67	5,07
4	Motor grader, 99 kW	Diesel	1276,26	12,76	127,63	51,05	63,81	25,53
5	Motor tar sprayer	Gasoline	11,92	0,12	0,36	0,48	0,60	0,02
6	Asphalt spreader	Diesel	112,74	1,13	3,38	4,51	5,64	2,25
7	Bulldozers							
	108 hp.	Diesel	4036,55	40,37	121,10	161,46	201,83	80,73
	130 hp.	Diesel	2128,53	21,29	63,85	85,14	106,43	42,57
	165 hp.	Diesel	47,03	0,47	1,41	1,88	2,35	0,94
8	Self-propelled							
	8 t	Diesel	672,37	6,72	20,17	26,89	33,62	13,45
	13 t	Diesel	1196,11	11,96	35,88	47,84	59,81	23,92
	16 t	Diesel	111,31	1,11	3,34	4,45	5,57	2,23
9	Vehicle-mounted crane							
	6,3 t	Gasoline	695,28	48,67	69,53	27,81	34,76	1,39
	10 t	Diesel	75,08	0,75	2,25	3,00	3,75	1,50
10	Caterpillar-tracked crane							
	16 t	Diesel	1,15	0,01	0,03	0,05	0,06	0,02
	25 t	Diesel	109,10	1,09	3,27	4,36	5,45	2,18
11	Pneumatic wheel-mounted crane, 25t	Diesel	5,38	0,05	0,16	0,22	0,27	0,11
12	Marking machine	Diesel	0,21	0,00	0,01	0,01	0,01	0,00
13	Crushed stone distributor	Diesel	28,91	0,29	0,87	1,16	1,45	0,58
14	Tractor T -130	Diesel	195,56	1,96	5,87	7,82	9,78	3,91
15	Tractor MTZ - 80	Diesel	32,83	0,33	0,98	1,31	1,64	0,66
16	Excavator E -652B, 0,65 m3	Diesel	646,05	6,46	19,38	25,84	32,30	12,92
17	Excavator E -10011, 1,0 m3	Diesel	1537,19	15,37	46,12	61,49	76,86	30,74
18	Pulvimixer, on the tractor	Diesel	1420,38	14,20	42,61	42,61	71,02	28,41
	Total for the motor road reconstruction period	Diesel	14016,91	140,17	509,83	546,47	700,84	280,34
		Gasoline	5866,90	409,97	585,86	234,68	293,35	11,73
Total of emissions:		23597,04 tons including diesel-16194,56 tons, gasoline-7402,48 tons						

Fuel consumption for the period of the motor road reconstruction for the alternative direction

Item No.	Source of hazardous substance emission	Fuel type	Fuel consumption, kg/h	Machinery operation time, m/h	Fuel consumption, ton
1	Dump trucks KamAZ 5511	Diesel	3,33	98,8	193,11
2	Street-washing machine ZIL-130, 6000 l	Gasoline	9,54	891,02	4989,18
3	Bus, Ikarus 611	Diesel	1,07	390	244,93
4	Motor grader, 99 kWt	Diesel	13,8	152,36	1234,08
5	Motor tar sprayer, 7000 l	Gasoline	9,54	2,06	11,53
6	Asphalt spreader	Diesel	3,71	50,06	105,41
7	Bulldozers				
	108 hp.	Diesel	7,63	888,05	3903,15
	130 hp.	Diesel	10,9	0,53	2058,19
	165 hp.	Diesel	11,7	6,65	45,47
8	Self-propelled rollers				
	8 t	Diesel	4,45	248,92	650,15
	13 t	Diesel	4,51	437,18	1156,58
	16 t	Diesel	4,45	41,21	107,64
9	Vehicle-mounted crane				
	6,3 t	Gasoline	6,04	188,14	672,3
	10 t	Diesel	6,25	19,79	72,6
10	Caterpillar-tracked crane				
	16 t	Diesel	3,71	0,51	1,11
	25 t	Diesel	6,36	28,26	105,49
11	Pneumatic wheel-mounted crane, 25t	Diesel	4,45	1209,54	5,2
12	Marking machine T -40	Diesel	1,7	2,04	0.2
13	Crushed stone distributor	Diesel	3,93	12,12	27,96
14	Tractor T -130	Diesel	17,5	18,41	189,09
15	Tractor MTZ - 80	Diesel	6,4	8,45	31,74
16	Excavator E -652B, 0,65 m3	Diesel	6,48	164,25	624,7
17	Excavator E -10011, 1,0 m3	Diesel	9,86	256,84	1486,39
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	11, 9	197,07	1376,45

Calculation of exhaust gas emissions (EGE)
during operation of machines and mechanisms for the period of the motor road reconstruction for the alternative direction

No.	Source of hazardous substance emissions	Fuel type	Fuel consumption, ton	Emissions for the construction period, tons				
				CO2	CH	NO2	C	SO2
	Specific emissions, tons/tons of fuel	Diesel		0,01	0,03	0,04	0,05	0,02
		Gasoline		0,07	0,10	0,04	0,05	0,002
1	Dump trucks KamAZ 5511	Diesel	193,11	1,93	5,79	7,72	9,66	3,86
2	Street-washing machine ZIL - 130	Gasoline	4989,18	349,24	498,92	199,57	249,46	9,98
3	Bus, Ikarus 611	Diesel	244,93	2,45	7,35	9,80	12,25	4,90
4	Motor grader, 99 kW	Diesel	1234,08	12,34	123,41	49,36	61,70	24,68
5	Motor tar sprayer	Gasoline	11,53	0,12	0,35	0,46	0,58	0,02
6	Asphalt spreader	Diesel	105,41	1,05	3,16	4,22	5,27	2,11
7	Bulldozers							
	108 hp.	Diesel	3903,15	40,37	121,10	161,46	201,83	80,73
	130 hp.	Diesel	2058,19	21,29	63,85	85,14	106,43	42,57
	165 hp.	Diesel	45,47	0,47	1,41	1,88	2,35	0,94
8	Self-propelled							
	8 t	Diesel	650,15	6,72	20,17	26,89	33,62	13,45
	13 t	Diesel	1156,58	11,96	35,88	47,84	59,81	23,92
	16 t	Diesel	107,64	1,11	3,34	4,45	5,57	2,23
9	Vehicle-mounted crane							
	6,3 t	Gasoline	672,30	48,67	69,53	27,81	34,76	1,34
	10 t	Diesel	72,60	0,73	2,18	2,90	3,63	1,45
10	Caterpillar-tracked crane							
	16 t	Diesel	1,11	0,01	0,03	0,04	0,06	0,02
	25 t	Diesel	105,49	1,05	3,16	4,22	5,27	2,11
11	Pneumatic wheel-mounted crane, 25t	Diesel	5,20	0,05	0,16	0,21	0,26	0,10
12	Marking machine	Diesel	0,20	0,00	0,01	0,01	0,01	0,00
13	Crushed stone distributor	Diesel	27,96	0,28	0,84	1,12	1,40	0,56
14	Tractor T -130	Diesel	189,09	1,89	5,67	7,56	9,45	3,78
15	Tractor MTZ - 80	Diesel	31,74	0,32	0,95	1,27	1,59	0,63
16	Excavator E -652B, 0,65 m3	Diesel	624,70	6,25	18,74	24,99	31,24	12,49
17	Excavator E -10011, 1,0 m3	Diesel	1486,39	14,86	44,59	59,46	74,32	29,73
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	1376,45	13,76	41,29	41,29	68,82	27,53
	Total for the motor road reconstruction period	Diesel	13619,65	140,17	509,83	546,47	700,84	280,34
		Gasoline	5673,01	409,97	568,79	227,84	284,80	11,35
Total of emissions: 22973,06 tons including diesel - 15797,30 tons, gasoline - 7175,76								

Kyzylorda Oblast

Fuel consumption for the period of the motor road reconstruction for the existing direction					
Item No.	Source of hazardous substance emission	Fuel type	Fuel consumption, kg/h	Machinery operation time, m/h	Fuel consumption, ton
1	Dump trucks KamAZ 5511	Diesel	3,33	98,8	269,13
2	Street-washing machine ZIL-130, 6000 l	Gasoline	9,54	891,02	6953,27
3	Bus, Ikarus 611	Diesel	1,07	390	341,35
4	Motor grader, 99 kWt	Diesel	13,8	152,36	1719,9
5	Motor tar sprayer, 7000 l	Gasoline	9,54	2,06	16,08
6	Asphalt spreader	Diesel	3,71	50,06	151,92
7	Bulldozers				
	108 hp.	Diesel	7,63	888,05	5542,62
	130 hp.	Diesel	10,9	0,53	4,73
	165 hp.	Diesel	11,7	6,65	63,64
8	Self-propelled rollers				
	8 t	Diesel	4,45	248,92	906,09
	13 t	Diesel	4,51	437,18	1612,84
	16 t	Diesel	4,45	41,21	150,01
9	Vehicle-mounted crane				
	6,3 t	Gasoline	6,04	188,14	929,55
	10 t	Diesel	6,25	19,79	101,18
10	Caterpillar-tracked crane				
	16 t	Diesel	3,71	0,51	1,55
	25 t	Diesel	6,36	28,26	147,02
11	Pneumatic wheel-mounted crane, 25t	Diesel	4,45	1209,54	4402,85
12	Marking machine T -40	Diesel	1,7	2,04	2,84
13	Crushed stone distributor	Diesel	3,93	12,12	38,96
14	Tractor T -130	Diesel	17,5	18,41	263,54
15	Tractor MTZ - 80	Diesel	6,4	8,45	44,24
16	Excavator E -652B, 0,65 m3	Diesel	6,48	164,25	870,63
17	Excavator E -10011, 1,0 m3	Diesel	9,86	256,84	2071,54
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	11,9	197,07	1918,32

Calculation of exhaust gas emissions (EGE)
during operation of machines and mechanisms for the period of the motor road reconstruction for the existing direction

No.	Source of hazardous substance emissions	Fuel type	Fuel consumption, ton	Emissions for the construction period, tons				
				CO2	CH	NO2	C	SO2
	Specific emissions, tons/tons of fuel	Diesel		0,01	0,03	0,04	0,05	0,02
		Gasoline		0,07	0,10	0,04	0,05	0,002
1	Dump trucks KamAZ 5511	Diesel	269,13	2,69	8,07	10,77	13,46	5,38
2	Street-washing machine ZIL - 130	Gasoline	6953,27	486,73	695,33	278,13	347,66	13,91
3	Bus, Ikarus 611	Diesel	341,35	3,41	10,24	13,65	17,07	6,83
4	Motor grader, 99 kW	Diesel	1719,90	17,20	171,99	68,80	86,00	34,40
5	Motor tar sprayer	Gasoline	16,08	0,16	0,48	0,64	0,80	0,03
6	Asphalt spreader	Diesel	151,92	1,52	4,56	6,08	7,60	3,04
7	Bulldozers							
	108 hp.	Diesel	5542,62	55,43	166,28	221,70	277,13	110,85
	130 hp.	Diesel	4,73	0,05	0,14	0,19	0,24	0,09
	165 hp.	Diesel	63,64	0,64	1,91	2,55	3,18	1,27
8	Self-propelled							
	8 t	Diesel	906,09	9,06	27,18	36,24	45,30	18,12
	13 t	Diesel	1612,84	16,13	48,39	64,51	80,64	32,26
	16 t	Diesel	150,01	1,50	4,50	6,00	7,50	3,00
9	Vehicle-mounted crane							
	6,3 t	Gasoline	929,55	65,07	92,95	4,05	46,48	18,59
	10 t	Diesel	101,18	1,01	3,04	4,05	5,06	2,02
10	Caterpillar-tracked crane							
	16 t	Diesel	1,55	0,02	0,05	0,06	0,08	0,03
	25 t	Diesel	147,02	1,47	4,41	5,88	7,35	2,94
11	Pneumatic wheel-mounted crane, 25t	Diesel	4402,85	44,03	132,09	176,11	220,14	88,06
12	Marking machine	Diesel	2,84	0,03	0,09	0,11	0,14	0,06
13	Crushed stone distributor	Diesel	38,96	0,39	1,17	1,56	1,95	0,78
14	Tractor T -130	Diesel	263,54	2,64	7,91	10,54	13,18	5,27
15	Tractor MTZ - 80	Diesel	44,24	0,44	1,33	1,77	2,21	0,88
16	Excavator E -652B, 0,65 m3	Diesel	870,63	8,71	26,12	34,83	43,53	17,41
17	Excavator E -10011, 1,0 m3	Diesel	2071,54	20,72	62,15	82,86	103,58	41,43
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	1918,32	19,18	57,55	57,55	95,92	38,37
	Total for the motor road reconstruction period	Diesel	28523,78	206,24	739,14	805,81	1031,25	412,50
		Gasoline	7898,89	551,96	788,76	282,82	394,94	32,53
Total of emissions: 41668,63 tons including diesel - 3171 8,72, gasoline - 9949,91 tons								

Fuel consumption for the period of the motor road reconstruction for the alternative direction

Item No.	Source of hazardous substance emission	Fuel type	Fuel consumption, kg/h	Machinery operation time, m/h	Fuel consumption, ton
1	Dump trucks KamAZ 5511	Diesel	3,33	98,8	256,88
2 3	Street-washing machine ZIL- Bus, Ikarus 611	Gasoline Diesel	9,54	891,02	6636,8
4	Motor grader, 99 kWt	Diesel	1,07	390	325,82
5	Motor tar sprayer, 7000 l	Gasoline	13,8	152,36	1641,62
6	Asphalt spreader	Diesel	9,54	2,06	15,34
7	Bulldozers		3,71	50,06	145,01
	108 hp.	Diesel	7,63	888,05	5290,36
	130 hp.	Diesel	10,9	0,53	4,51
	165 hp.	Diesel	11,7	6,65	60,75
8	Self-propelled rollers				
	8 t	Diesel	4,45	248,92	864,85
	13 t	Diesel	4,51	437,18	1539,43
	16 t	Diesel	4,45	41,21	143,18
9	Vehicle-mounted crane				
	6,3 t	Gasoline	6,04	188,14	887,24
	10 t	Diesel	6,25	19,79	96,57
10	Caterpillar-tracked crane				
	16 t	Diesel	3,71	0,51	1,48
	25 t	Diesel	6,36	28,26	140,33
11	Pneumatic wheel-mounted crane,	Diesel	4,45	1209,54	4202,46
12	Marking machine T -40	Diesel	1,7	2,04	2,71
13	Crushed stone distributor	Diesel	3,93	12,12	37,19
14	Tractor T -130	Diesel	17,5	18,41	251,54
15	Tractor MTZ - 80	Diesel	6,4	8,45	42,22
16	Excavator E -652B, 0,65 m3	Diesel	6,48	164,25	831
17	Excavator E -10011, 1,0 m3	Diesel	9,86	256,84	1977,26
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	11,9	197,07	1831,01

Calculation of exhaust gas emissions (EGE)
during operation of machines and mechanisms for the period of the motor road reconstruction for the alternative direction

No.	Source of hazardous substance emissions	Fuel type	Fuel consumption, ton	Emissions for the construction period, tons				
				CO2	CH	NO2	C	SO2
	Specific emissions, tons/tons of fuel	Diesel		0,01	0,03	0,04	0,05	0,02
		Gasoline		0,07	0,10	0,04	0,05	0,002
1	Dump trucks KamAZ 5511	Diesel	256,88	2,57	7,71	10,28	12,84	5,14
2	Street-washing machine ZIL - 130	Gasoline	6636,80	464,58	663,68	265,47	331,84	13,27
3	Bus, Ikarus 611	Diesel	325,82	3,26	9,77	13,03	16,29	6,52
4	Motor grader, 99 kW	Diesel	1641,62	16,42	164,16	65,66	82,08	32,83
5	Motor tar sprayer	Gasoline	15,34	0,15	0,46	0,61	0,77	0,03
6	Asphalt spreader	Diesel	145,01	1,45	4,35	5,80	7,25	2,90
7	Bulldozers							
	108 hp.	Diesel	5290,36	52,90	158,71	211,61	264,52	105,81
	130 hp.	Diesel	4,51	0,05	0,14	0,18	0,23	0,09
	165 hp.	Diesel	60,75	0,61	1,82	2,43	3,04	1,21
8	Self-propelled							
	8 t	Diesel	864,85	8,65	25,95	34,59	43,24	17,30
	13 t	Diesel	1539,43	15,39	46,18	61,58	76,97	30,79
	16 t	Diesel	143,18	1,43	4,30	5,73	7,16	2,86
9	Vehicle-mounted crane							
	6,3 t	Gasoline	887,24	62,11	88,72	3,86	44,36	17,74
	10 t	Diesel	96,57	0,97	2,90	3,86	4,83	1,93
10	Caterpillar-tracked crane							
	16 t	Diesel	1,48	0,01	0,04	0,06	0,07	0,03
	25 t	Diesel	140,33	1,40	4,21	5,61	7,02	2,81
11	Pneumatic wheel-mounted crane, 25t	Diesel	4202,46	42,02	126,07	168,10	210,12	84,05
12	Marking machine	Diesel	2,71	0,03	0,08	0,11	0,14	0,05
13	Crushed stone distributor	Diesel	37,19	0,37	1,12	1,49	1,86	0,74
14	Tractor T -130	Diesel	251,54	2,52	7,55	10,06	12,58	5,03
15	Tractor MTZ - 80	Diesel	42,22	0,42	1,27	1,69	2,11	0,84
16	Excavator E -652B, 0,65 m3	Diesel	831,00	8,31	24,93	33,24	41,55	16,62
17	Excavator E -10011, 1,0 m3	Diesel	1977,26	19,77	59,32	79,09	98,86	39,55
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	1831,01	19,18	54,93	54,93	91,55	36,62
	Total for the motor road reconstruction period	Diesel	27225,56	200,22	712,97	779,09	996,75	398,70
		Gasoline	7539,39	526,84	752,86	269,95	376,97	31,05

Total of emissions: 39810,34 tons including diesel-3031 3,29, gasoline- 9497,06 tons

South-Kazakhstan Oblast

Fuel consumption for the period of the motor road reconstruction for the existing direction					
Item No.	Source of hazardous substance emission	Fuel type	Fuel consumption, kg/h	Machinery operation time, m/h	Fuel consumption, ton
1	Dump trucks KamAZ 5511	Diesel	3,33	98,8	103,31
2	Street-washing machine ZIL-130, 6000 l	Gasoline	9,54	891,02	2669,1
3	Bus, Ikarus 611	Diesel	1,07	390	131,03
4	Motor grader, 99 kWt	Diesel	13,8	152,36	660,21
5	Motor tar sprayer, 7000 l	Gasoline	9,54	2,06	6,17
6	Asphalt spreader	Diesel	3,71	50,06	58,32
7	Bulldozers				
	108 hp.	Diesel	7,63	888,05	2127,61
	130 hp.	Diesel	10,9	0,53	1,81
	165 hp.	Diesel	11,7	6,65	24,43
8	Self-propelled rollers				
	8 t	Diesel	4,45	248,92	347,82
	13 t	Diesel	4,51	437,18	619,11
	16 t	Diesel	4,45	41,21	57,58
9	Vehicle-mounted crane				
	6,3 t	Gasoline	6,04	188,14	356,82
	10 t	Diesel	6,25	19,79	38,84
10	Caterpillar-tracked crane				
	16 t	Diesel	3,71	0,51	0,59
	25 t	Diesel	6,36	28,26	56,44
11	Pneumatic wheel-mounted crane, 25t	Diesel	4,45	1209,54	1690,09
12	Marking machine T -40	Diesel	1,7	2,04	1,09
13	Crushed stone distributor	Diesel	3,93	12,12	14,96
14	Tractor T -130	Diesel	17,5	18,41	101,16
15	Tractor MTZ - 80	Diesel	6,4	8,45	16,98
16	Excavator E -652B, 0,65 m3	Diesel	6,48	164,25	334,2
17	Excavator E -10011, 1,0 m3	Diesel	9,86	256,84	795,19
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	11, 9	197,07	736,37

Calculation of exhaust gas emissions (EGE)
during operation of machines and mechanisms for the period of the motor road reconstruction for the existing direction

No.	Source of hazardous substance emissions	Fuel type	Fuel consumption, ton	Emissions for the construction period, tons				
				CO2	CH	NO2	C	SO2
	Specific emissions, tons/tons of fuel	Diesel		0,01	0,03	0,04	0,05	0,02
		Gasoline		0,07	0,10	0,04	0,05	0,002
1	Dump trucks KamAZ 5511	Diesel	103,31	1,03	3,10	4,13	5,17	2,07
2	Street-washing machine ZIL - 130	Gasoline	2669,10	186,84	266,91	106,76	133,46	5,34
3	Bus, Ikarus 611	Diesel	131,03	1,31	3,93	5,24	6,55	2,62
4	Motor grader, 99 kW	Diesel	660,21	6,60	66,02	26,41	33,01	13,20
5	Motor tar sprayer	Gasoline	6,17	0,06	0,19	0,25	0,31	0,01
6	Asphalt spreader	Diesel	58,32	0,58	1,75	2,33	2,92	1,17
7	Bulldozers							
	108 hp.	Diesel	2127,61	21,28	63,83	85,10	106,38	42,55
	130 hp.	Diesel	1,81	0,02	0,05	0,07	0,09	0,04
	165 hp.	Diesel	24,43	0,24	0,73	0,04	1,22	0,49
8	Self-propelled							
	8 t	Diesel	347,82	3,48	10,43	13,91	17,39	6,96
	13 t	Diesel	619,11	6,19	18,57	24,76	30,96	12,38
	16 t	Diesel	57,58	0,58	1,73	2,30	2,88	1,15
9	Vehicle-mounted crane							
	6,3 t	Gasoline	356,82	24,98	35,68	14,27	17,84	0,71
	10 t	Diesel	38,84	0,39	1,17	1,55	1,94	0,78
10	Caterpillar-tracked crane							
	16 t	Diesel	0,59	0,01	0,02	0,02	0,03	0,01
	25 t	Diesel	56,44	0,56	1,69	2,26	2,82	1,13
11	Pneumatic wheel-mounted crane, 25t	Diesel	1690,09	16,90	50,70	67,60	84,50	33,80
12	Marking machine	Diesel	1,09	0,01	0,03	0,04	0,05	0,02
13	Crushed stone distributor	Diesel	14,96	0,15	0,45	0,60	0,75	0,30
14	Tractor T -130	Diesel	101,16	1,01	3,03	4,05	5,06	2,02
15	Tractor MTZ - 80	Diesel	16,98	0,17	0,51	0,68	0,85	0,34
16	Excavator E -652B, 0,65 m3	Diesel	334,20	3,34	10,03	13,37	16,71	6,68
17	Excavator E -10011, 1,0 m3	Diesel	795,19	7,95	23,86	31,81	39,76	15,90
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	736,37	7,36	22,09	22,09	36,82	14,73
	Total for the motor road reconstruction period	Diesel	7917,14	79,17	283,73	308,39	547,46	156,28
		Gasoline	3032,09	211,88	302,78	121,28	395,86	6,06
Total of emissions: 13362,13 tons including diesel - 9292,17 tons, gasoline - 4069,96 tons								

Fuel consumption for the period of the motor road reconstruction for the alternative direction

Item No.	Source of hazardous substance emission	Fuel type	Fuel consumption, kg/h	Machinery operation time, m/h	Fuel consumption, ton
1	Dump trucks KamAZ 5511	Diesel	3,33	98,8	99,19
2	Street-washing machine ZIL-130, 6000 l	Gasoline	9,54	891,02	2562,85
3	Bus, Ikarus 611	Diesel	1,07	390	125,82
4	Motor grader, 99 kWt	Diesel	13,8	152,36	633,24
5	Motor tar sprayer, 7000 l	Gasoline	9,54	2,06	5,93
6	Asphalt spreader	Diesel	3,71	50,06	56
7	Bulldozers				
	108 hp.	Diesel	7,63	888,05	2042,91
	130 hp.	Diesel	10,9	0,53	1,74
	165 hp.	Diesel	11,7	6,65	23,46
8	Self-propelled rollers				
	8 t	Diesel	4,45	248,92	333,97
	13 t	Diesel	4,51	437,18	594,46
	16 t	Diesel	4,45	41,21	55,29
9	Vehicle-mounted crane				
	6,3 t	Gasoline	6,04	188,14	342,61
	10 t	Diesel	6,25	19,79	37,29
10	Caterpillar-tracked crane				
	16 t	Diesel	3,71	0,51	0,57
	25 t	Diesel	6,36	28,26	54,19
11	Pneumatic wheel-mounted crane, 25t	Diesel	4,45	1209,54	1622,81
12	Marking machine T -40	Diesel	1,7	2,04	1,05
13	Crushed stone distributor	Diesel	3,93	12,12	14,36
14	Tractor T -130	Diesel	17,5	18,41	97,14
15	Tractor MTZ - 80	Diesel	6,4	8,45	16,31
16	Excavator E -652B, 0,65 m3	Diesel	6,48	164,25	320,9
17	Excavator E -10011, 1,0 m3	Diesel	9,86	256,84	763,53
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	11,9	197,07	707,06

Calculation of exhaust gas emissions (EGE)
during operation of machines and mechanisms for the period of the motor road reconstruction for the alternative direction

No.	Source of hazardous substance emissions	Fuel type	Fuel consumption, ton	Emissions for the construction period,				
				CO2	CH	NO2	C	SO2
	Specific emissions, tons/tons of fuel	Diesel		0,01	0,03	0,04	0,05	0,02
		Gasoline		0,07	0,10	0,04	0,05	0,002
1	Dump trucks KamAZ 5511	Diesel	99,20	0,99	2,98	3,97	4,96	1,98
2	Street-washing machine ZIL - 130	Gasoline	2562,85	179,40	256,29	102,51	128,14	5,13
3	Bus, Ikarus 611	Diesel	125,82	1,26	3,77	5,03	6,29	2,52
4	Motor grader, 99 kW	Diesel	633,24	6,33	63,32	25,33	31,66	12,66
5	Motor tar sprayer	Gasoline	5,93	0,06	0,18	0,24	0,30	0,01
6	Asphalt spreader	Diesel	56,00	0,56	1,68	2,24	2,80	1,12
7	Bulldozers							
	108 hp.	Diesel	2042,91	20,43	61,29	81,72	102,15	40,86
	130 hp.	Diesel	1,74	0,02	0,05	0,07	0,09	0,03
	165 hp.	Diesel	23,46	0,23	0,70	0,04	1,17	0,47
8	Self-propelled							
	8 t	Diesel	333,97	3,34	10,02	13,36	16,70	6,68
	13 t	Diesel	594,46	5,94	17,83	23,78	29,72	11,89
	16 t	Diesel	55,29	0,55	1,66	2,21	2,76	1,11
9	Vehicle-mounted crane							
	6,3 t	Gasoline	342,61	23,98	34,26	13,70	17,13	0,69
	10 t	Diesel	37,29	0,37	1,12	1,49	1,86	0,75
10	Caterpillar-tracked crane							
	16 t	Diesel	0,57	0,01	0,02	0,02	0,03	0,01
	25 t	Diesel	54,19	0,54	1,63	2,17	2,71	1,08
11	Pneumatic wheel-mounted crane, 25t	Diesel	1622,81	16,23	48,68	64,91	81,14	32,46
12	Marking machine	Diesel	1,05	0,01	0,03	0,04	0,05	0,02
13	Crushed stone distributor	Diesel	14,36	0,14	0,43	0,57	0,72	0,29
14	Tractor T -130	Diesel	97,14	0,97	2,91	3,89	4,86	1,94
15	Tractor MTZ - 80	Diesel	16,31	0,16	0,49	0,65	0,82	0,33
16	Excavator E -652B, 0,65 m3	Diesel	320,90	3,21	9,63	12,84	16,04	6,42
17	Excavator E -10011, 1,0 m3	Diesel	763,53	7,64	22,91	30,54	38,18	15,27
18	Pulvimixer, on the tractor	Diesel	707,06	7,07	21,21	21,21	35,35	14,14
	Total for the motor road reconstruction period	Diesel	7601,23	76,01	272,37	296,08	380,06	152,05
		Gasoline	2911,39	203,44	290,72	116,46	145,57	5,82
	Total of emissions: 12451,20 tons including diesel-8777,80 tons, gasoline- 3673,40 tons							

Zhambyl Oblast

Fuel consumption for the period of the motor road reconstruction for the existing direction

Item No.	Source of hazardous substance emission	Fuel type	Fuel consumption, kg/h	Machinery operation time, m/h	Fuel consumption, ton
1	Dump trucks KamAZ 5511	Diesel	3,33	98,8	147,39
2	Street-washing machine ZIL-130, 6000 l	Gasoline	9,54	891,02	3808,11
3	Bus, Ikarus 611	Diesel	1,07	390	186,95
4	Motor grader, 99 kWt	Diesel	13,8	152,36	941,95
5	Motor tar sprayer, 7000 l	Gasoline	9,54	2,06	8,8
6	Asphalt spreader	Diesel	3,71	50,06	83,2
7	Bulldozers				
	108 hp.	Diesel	7,63	888,05	3035,57
	130 hp.	Diesel	10,9	0,53	2,59
	165 hp.	Diesel	11,7	6,65	34,86
8	Self-propelled rollers				
	8 t	Diesel	4,45	248,92	496,25
	13 t	Diesel	4,51	437,18	883,31
	16 t	Diesel	4,45	41,21	82,16
9	Vehicle-mounted crane				
	6,3 t	Gasoline	6,04	188,14	509,09
	10 t	Diesel	6,25	19,79	55,41
10	Caterpillar-tracked crane				
	16 t	Diesel	3,71	0,51	0,85
	25 t	Diesel	6,36	28,26	80,52
11	Pneumatic wheel-mounted crane, 25t	Diesel	4,45	1209,54	2411,34
12	Marking machine T -40	Diesel	1,7	2,04	1,55
13	Crushed stone distributor	Diesel	3,93	12,12	21,4
14	Tractor T -130	Diesel	17,5	18,41	144,33
15	Tractor MTZ - 80	Diesel	6,4	8,45	24,23
16	Excavator E -652B, 0,65 m3	Diesel	6,48	164,25	476,82
17	Excavator E -10011, 1,0 m3	Diesel	9,86	256,84	1134,53
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	11,9	197,07	1050,62

Calculation of exhaust gas emissions (EGE)
during operation of machines and mechanisms for the period of the motor road reconstruction for the existing direction

No.	Source of hazardous substance emissions	Fuel type	Fuel consumption, ton	Emissions for the construction period, tons				
				CO2	CH	NO2	C	SO2
	Specific emissions, tons/tons of fuel	Diesel		0,01	0,03	0,04	0,05	0,02
		Gasoline		0,07	0,10	0,04	0,05	0,002
1	Dump trucks KamAZ 5511	Diesel	147,39	1,47	4,42	5,90	7,37	2,95
2	Street-washing machine ZIL - 130	Gasoline	3808,11	266,57	380,81	152,32	190,41	7,62
3	Bus, Ikarus 611	Diesel	186,95	1,87	5,61	7,48	9,35	3,74
4	Motor grader, 99 kW	Diesel	941,95	9,42	94,20	37,68	47,10	18,84
5	Motor tar sprayer	Gasoline	8,80	0,09	0,26	0,35	0,44	0,02
6	Asphalt spreader	Diesel	83,20	0,83	2,50	3,33	4,16	1,66
7	Bulldozers							
	108 hp.	Diesel	3035,57	30,36	91,07	121,42	151,78	60,71
	130 hp.	Diesel	2,59	0,03	0,08	0,10	0,13	0,05
	165 hp.	Diesel	34,86	0,35	1,05	0,04	1,74	0,70
8	Self-propelled							
	8 t	Diesel	496,25	4,96	14,89	19,85	24,81	9,92
	13 t	Diesel	883,31	8,83	26,50	35,33	44,17	17,67
	16 t	Diesel	82,16	0,82	2,46	3,29	4,11	1,64
9	Vehicle-mounted crane							
	6,3 t	Gasoline	509,09	35,64	50,91	20,36	25,45	1,02
	10 t	Diesel	55,41	0,55	1,66	2,22	2,77	1,11
10	Caterpillar-tracked crane							
	16 t	Diesel	0,85	0,01	0,03	0,03	0,04	0,02
	25 t	Diesel	80,52	0,81	2,42	3,22	4,03	1,61
11	Pneumatic wheel-mounted crane, 25t	Diesel	2411,34	24,11	72,34	96,45	120,57	48,23
12	Marking machine	Diesel	1,55	0,02	0,05	0,06	0,08	0,03
13	Crushed stone distributor	Diesel	21,40	0,21	0,64	0,86	1,07	0,43
14	Tractor T -130	Diesel	144,33	1,44	4,33	5,77	7,22	2,89
15	Tractor MTZ - 80	Diesel	24,23	0,24	0,73	0,97	1,21	0,48
16	Excavator E -652B, 0,65 m3	Diesel	476,82	4,77	14,30	19,07	23,84	9,54
17	Excavator E -10011, 1,0 m3	Diesel	1134,53	11,35	34,04	45,38	56,73	22,69
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	1050,62	10,51	31,52	31,52	52,53	21,01
	Total for the motor road reconstruction period	Diesel	11295,84	105,96	836,80	613,01	564,79	225,92
		Gasoline	4326,00	302,29	431,98	173,04	216,30	8,65
Total of emissions: 19100,59 tons including diesel-13642,32 tons, gasoline-5458,27 tons								

Fuel consumption for the period of the motor road reconstruction for the alternative direction

Item No.	Source of hazardous substance emission	Fuel type	Fuel consumption, kg/h	Machinery operation time, m/h	Fuel consumption, ton
1	Dump trucks KamAZ 5511	Diesel	3,33	98,8	139,39
2	Street-washing machine ZIL-130, 6000 l	Gasoline	9,54	891,02	3601,59
3	Bus, Ikarus 611	Diesel	1,07	390	176,81
4	Motor grader, 99 kWt	Diesel	13,8	152,36	890,86
5	Motor tar sprayer, 7000 l	Gasoline	9,54	2,06	8,33
6	Asphalt spreader	Diesel	3,71	50,06	78,69
7	Bulldozers				
	108 hp.	Diesel	7,63	888,05	2870,92
	130 hp.	Diesel	10,9	0,53	2,45
	165 hp.	Diesel	11,7	6,65	32,97
8	Self-propelled rollers				
	8 t	Diesel	4,45	248,92	469,33
	13 t	Diesel	4,51	437,18	835,4
	16 t	Diesel	4,45	41,21	77,7
9	Vehicle-mounted crane				
	6,3 t	Gasoline	6,04	188,14	481,78
	10 t	Diesel	6,25	19,79	52,41
10	Caterpillar-tracked crane				
	16 t	Diesel	3,71	0,51	0,8
	25 t	Diesel	6,36	28,26	76,15
11	Pneumatic wheel-mounted crane, 25t	Diesel	4,45	1209,54	2280,55
12	Marking machine T -40	Diesel	1,7	2,04	1,47
13	Crushed stone distributor	Diesel	3,93	12,12	20,18
14	Tractor T -130	Diesel	17,5	18,41	136,51
15	Tractor MTZ - 80	Diesel	6,4	8,45	22,91
16	Excavator E -652B, 0,65 m3	Diesel	6,48	164,25	450,96
17	Excavator E -10011, 1,0 m3	Diesel	9,86	256,84	1073
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	11,9	197,0 7	993,63

Calculation of exhaust gas emissions (EGE)
during operation of machines and mechanisms for the period of the motor road reconstruction for the alternative direction

No.	Source of hazardous substance emissions	Fuel type	Fuel consumption, ton	Emissions for the construction period, tons				
				CO2	CH	NO2	C	SO2
	Specific emissions, tons/tons of fuel	Diesel		0,01	0,03	0,04	0,05	0,02
		Gasoline		0,07	0,10	0,04	0,05	0,002
1	Dump trucks KamAZ 5511	Diesel	139,39	1,39	4,18	5,58	6,97	2,79
2	Street-washing machine ZIL - 130	Gasoline	3601,59	252,11	360,16	144,06	180,08	7,20
3	Bus, Ikarus 611	Diesel	176,81	1,77	5,30	7,07	8,84	3,54
4	Motor grader, 99 kW	Diesel	890,86	8,91	89,09	35,63	44,54	17,82
5	Motor tar sprayer	Gasoline	8,33	0,08	0,25	0,33	0,42	0,02
6	Asphalt spreader	Diesel	78,69	0,79	2,36	3,15	3,93	1,57
7	Bulldozers							
	108 hp.	Diesel	2870,92	28,71	86,13	114,84	143,55	57,42
	130 hp.	Diesel	2,45	0,02	0,07	0,10	0,12	0,05
	165 hp.	Diesel	32,97	0,33	0,99	0,04	1,65	0,66
8	Self-propelled							
	8 t	Diesel	469,33	4,69	14,08	18,77	23,47	9,39
	13 t	Diesel	835,40	8,35	25,06	33,42	41,77	16,71
	16 t	Diesel	77,70	0,78	2,33	3,11	3,89	1,55
9	Vehicle-mounted crane							
	6,3 t	Gasoline	481,78	33,72	48,18	19,27	24,09	0,96
	10 t	Diesel	52,41	0,52	1,57	2,10	2,62	1,05
10	Caterpillar-tracked crane							
	16 t	Diesel	0,80	0,01	0,02	0,03	0,04	0,02
	25 t	Diesel	76,15	0,76	2,28	3,05	3,81	1,52
11	Pneumatic wheel-mounted crane, 25t	Diesel	2280,55	22,81	68,42	91,22	114,03	45,61
12	Marking machine	Diesel	1,47	0,01	0,04	0,06	0,07	0,03
13	Crushed stone distributor	Diesel	20,18	0,20	0,61	0,81	1,01	0,40
14	Tractor T -130	Diesel	136,51	1,37	4,10	5,46	6,83	2,73
15	Tractor MTZ - 80	Diesel	21,91	0,22	0,66	0,88	1,10	0,44
16	Excavator E -652B, 0,65 m3	Diesel	450,96	4,51	13,53	18,04	22,55	9,02
17	Excavator E -10011, 1,0 m3	Diesel	1073,00	10,73	32,19	42,92	53,65	21,46
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	993,63	9,94	29,81	29,81	49,68	19,87
	Total for the motor road reconstruction period	Diesel	10685,00	106,85	382,91	416,18	527,26	213,70
		Gasoline	4091,70	285,92	408,59	163,67	204,58	8,18
Total of emissions: 17494,54 tons including diesel-12331,90 tons, gasoline-5162,64 tons								

Almaty Oblast

Fuel consumption for the period of the motor road reconstruction for the existing direction

Item No.	Source of hazardous substance emission	Fuel type	Fuel consumption, kg/h	Machinery operation time, m/h	Fuel consumption, ton
1	Dump trucks KamAZ 5511	Diesel	3,33	98,8	165,82
2	Street-washing machine ZIL-130, 6000 l	Gasoline	9,54	891,02	4284,17
3	Bus, Ikarus 611	Diesel	1,07	390	210,32
4	Motor grader, 99 kWt	Diesel	13,8	152,36	1059,69
5	Motor tar sprayer, 7000 l	Gasoline	9,54	2,06	9,9
6	Asphalt spreader	Diesel	3,71	50,06	93,6
7	Bulldozers				
	108 hp.	Diesel	7,63	888,05	3415,01
	130 hp.	Diesel	10,9	0,53	2,91
	165 hp.	Diesel	11,7	6,65	39,21
8	Self-propelled rollers				
	8 t	Diesel	4,45	248,92	558,28
	13 t	Diesel	4,51	437,18	993,73
	16 t	Diesel	4,45	41,21	92,43
9	Vehicle-mounted crane				
	6,3 t	Gasoline	6,04	188,14	572,73
	10 t	Diesel	6,25	19,79	62,34
10	Caterpillar-tracked crane				
	16 t	Diesel	3,71	0,51	0,95
	25 t	Diesel	6,36	28,26	90,59
11	Pneumatic wheel-mounted crane, 25t	Diesel	4,45	1209,54	2712,76
12	Marking machine T -40	Diesel	1,7	2,04	1,75
13	Crushed stone distributor	Diesel	3,93	12,12	24,01
14	Tractor T -130	Diesel	17,5	18,41	162,38
15	Tractor MTZ - 80	Diesel	6,4	8,45	27,26
16	Excavator E -652B, 0,65 m3	Diesel	6,48	164,25	536,43
17	Excavator E -10011, 1,0 m3	Diesel	9,86	256,84	1276,35
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	11,9	197,07	1181,95

Calculation of exhaust gas emissions (EGE)
during operation of machines and mechanisms for the period of the motor road reconstruction for the existing direction

No.	Source of hazardous substance emissions	Fuel type	Fuel consumption, ton	Emissions for the construction period, tons				
				CO2	CH	NO2	C	SO2
	Specific emissions, tons/tons of fuel	Diesel		0,01	0,03	0,04	0,05	0,02
		Gasoline		0,07	0,10	0,04	0,05	0,002
1	Dump trucks KamAZ 5511	Diesel	165,82	1,66	4,97	6,63	8,29	3,32
2	Street-washing machine ZIL - 130	Gasoline	4284,17	299,89	428,42	171,37	214,21	8,57
3	Bus, Ikarus 611	Diesel	210,32	2,10	6,31	8,41	10,52	4,21
4	Motor grader, 99 kW	Diesel	1059,69	10,60	105,97	42,39	52,98	21,19
5	Motor tar sprayer	Gasoline	9,90	0,10	0,30	0,40	0,50	0,02
6	Asphalt spreader	Diesel	93,60	0,94	2,81	3,74	4,68	1,87
7	Bulldozers							
	108 hp.	Diesel	3415,01	34,15	102,45	136,60	170,75	68,30
	130 hp.	Diesel	2,91	0,03	0,09	0,12	0,15	0,06
	165 hp.	Diesel	39,21	0,39	1,18	0,04	1,96	0,78
8	Self-propelled							
	8 t	Diesel	558,28	5,58	16,75	22,33	27,91	11,17
	13 t	Diesel	993,73	9,94	29,81	39,75	49,69	19,87
	16 t	Diesel	92,43	0,92	2,77	3,70	4,62	1,85
9	Vehicle-mounted crane							
	6,3 t	Gasoline	572,73	40,09	57,27	22,91	28,64	1,15
	10 t	Diesel	62,34	0,62	1,87	2,49	3,12	1,25
10	Caterpillar-tracked crane							
	16 t	Diesel	0,95	0,01	0,03	0,04	0,05	0,02
	25 t	Diesel	90,59	0,91	2,72	3,62	4,53	1,81
11	Pneumatic wheel-mounted crane, 25t	Diesel	2712,76	27,13	81,38	108,51	135,64	54,26
12	Marking machine	Diesel	1,75	0,02	0,05	0,07	0,09	0,03
13	Crushed stone distributor	Diesel	0,05	0,00	0,00	0,00	0,00	0,00
14	Tractor T -130	Diesel	162,38	1,62	4,87	6,50	8,12	3,25
15	Tractor MTZ - 80	Diesel	27,26	0,27	0,82	1,09	1,36	0,55
16	Excavator E -652B, 0,65 m3	Diesel	536,43	5,36	16,09	21,46	26,82	10,73
17	Excavator E -10011, 1,0 m3	Diesel	1276,35	12,76	38,29	51,05	63,82	25,53
18	Pulvimixer, on the tractor 121,5 kWt, 165 hp.	Diesel	1181,95	11,82	35,46	35,46	59,10	23,64
	Total for the motor road reconstruction period	Diesel	17574,56	126,84	454,69	494,01	634,19	253,68
		Gasoline	4866,80	340,08	485,99	194,67	243,34	9,73
Total of emissions: 25678,59 tons including diesel-19537,97 tons, gasoline- 6140,62 tons								

In accordance with the carried out calculation the maximum permissible emission of hazardous substances into the atmosphere is determined for the year of the motor road reconstruction. The maximum permissible emission by Oblasts is:

Oblast	Existing direction	Alternative direction
	MPE, tons	MPE, tons
West-Kazakhstan	9248,71	-
Aktobe	23579,04	22973,06
Kyzylorda	4 1668,63	398 10,34
South-Kazakhstan	13396,13	12451,20
Zhambyl	19100,59	17494,54
Almaty	25678,59	-

The maximum permissible emission of hazardous substances into the atmosphere is calculated taking into account an increase in traffic because of a freight turnover increase as well as operation of construction machineries during the motor road rehabilitation.

The availability and type of machinery, activity organization are accepted tentatively based on analogs. The exact scope of work and activity organization will be determined at the stage of the detailed design.

Due to decline in the average speed of the traffic flow because of low quality and deterioration of paving the emissions of hazardous substances from passing vehicles will increase if the motor road is not reconstructed. The need for reconstruction of the existing motor road is obvious considering the environment protection.

The calculation of financial compensation for atmosphere pollution by passing vehicles and machineries in case of the motor road reconstruction has not been made because of a fee collection for nature management in a place of registration of each vehicle based on a volume of a fuel burnt by a vehicle.

Conclusions: an assumed volume of pollutants to be disposed into the atmosphere is:

- Carbon oxide 0,00 -0,5 mg/m3 MPE 0.3 mg/m3
- Hydrocarbon 0,00 -0,186 mg/m3 MPE 0.1 mg/m3
- Lead in air 0,00-0,0001 mg/m3 MPE 0.0003 mg/m3
- Nitrogen oxide 0,00-0,004 mg/m3 MPE 0.04 mg/m3
- Lead in soil of 0,00-29,0 mg/m3 MPE 32.0 mg/m3

Emissions into the air meet the standards within a central reserve of the motor road. Fulfillment of the project activities aimed at atmospheric air protection will decrease the atmosphere pollution level.

9.4.2 Measures for transport noise impact decrease.

Along with the atmospheric air pollution, noise is a consequence of technical progress and transport development impacting negatively on people. The chaotic mixture of different sounds with a different frequency creates noise.

Impact of transport noise on environment, first of all, on a human environment has caused a problem. The systematic noise impact results in irritation, fatigue, increases the probability of stress, leads to disturbance of sleep.

Transport factors: traffic volume, composition of fleet, traverse speed, operating condition of a motor road, have the highest impact on a noise level.

Settlements located near a motor road (5-35m) are under the highest noise impact.

Settlements in Aktobe Oblast

Item No.	Location, km	Settlement Name	Location
	From Aktobe to the boundary of Kyzylorda Oblast (Samara – Shymkent motor road)		
1	753+000	Aktobe City	to the right
2	773+000	Belogorka s.	to the left

3	775+000	Tabantal s.	to the right
4	803+100	Tassay s.	to the left
5	803+100 - 804+400	Novorossiskoye s.	on the right -200 m
6	811+300	Prostornoye s.	to the right
7	827+800	Abai s.	to the right -6 km
8	834+000 - 842+000	Khromtau City	to the left along the road
9	865+500	Kuduksai s.	to the right
10	866+800	Katy Kodyr s.	to the right
11	892+000 - 894 +000	Bugetsai s.	on the left there are 10 houses - 30m, on the right - ravine - riverbed
12	895+800	Shiliksai s.	to the right
13	907+000	Karlau s.	to the left
14	929+700	Belkopa s.	on the right 500m
15	930+600	Aktasy s.	to the left
16	962+900	Korpe s.	on the right - 200m
17	965+000 - 970+000	Karabutak s.	on the left -800m
18	982+200	Araltogai s.	on the right -500m
19	1018+800	Ulgansai s.	
20	1052+600	Kumtogai s.	to the right -26km
21	1075+900	Kalybai s.	on the right -500m
	From Aktobe to the boundary of the Russian Federation		
1	1+600	Ilek s.	to the right
2	2+800	Reservoir	to the right
3	13+800 - 16+300	Kuraily s.	on the right -100m
4	24 +200	Khlebodarovka s.	to the left -100m
5	44+600 - 46+000	Sarzhansai s.	on the right -100m
6	54+800 - 56+500	Kensakhara s.	on the right -300m

7	63+900	Novoalekseyevka s.	to the left
8	69+000	Martuk s.	to the right -1km
9	89+800 - 90+000	Voznesenovka s.	to the right
10	93+000 - 95+000	Zhaisan s.	on the left

Settlements in Kyzylorda oblast

Item No.	Location, km	Settlement Name	Location
	Samara - Shymkent motor road		
1	1335+050	Sekseuil	to the right-37 km
2	1343+350	Shizhaga s.	to the left-3 km
3	1357+500	Ara City	to the right-1 km
4	1361+180	Aral Tuz location	to the left -3 km
5	1366+850	Altykudyk s.	on the right-200m
6	1375+900	Tasboget s.	on the right-500m
7	1383+250	Sapak s.	to the right -1km.
8	1398+800 - 1401+250	Aralkum s.	on the right-200m
9	1410+400	Shomish s.	to the right-1km.
10	1434+600	Kamystybas s.	on the right-2km.
11	1444+150	Akbai s.	on the right-500m
12	1473+800	Kazalinsk s.	to the right-1 km
13	1480+750	Altai s.	on the right-150m
14	1486+250	Oiyndy s.	on the right-800m
15	1496+200	Kobek s.	to the right-1km
16	1501+100	Kyzyisker s.	on the right-600m
17	1518+800	Medina s.	to the left-1km

18	1511+900	Mailybas s.	to the right-1km
19	1522+400	Passing place No.99	to the right-1km
20	1533+600	Kazaly s.	to the right-1km
21	1538+850	Baikozha s.	to the right-1km
22	1546+900	Passing place No.101	to the right-1km
23	1554+250	Passing place No.102	to the right-1km
24	1560+150	Passing place No.103	to the right-1km
25	1567+600	Toretam s.	to the right-2km
26	1576+850	Elshibai s.	to the right-6km
27	1584+100	Sartogai s.	to the right-1km
28	1594+400	Deirmenttobe s.	on the right-500 m
29	1603+800	Kemesalgan s.	on the right-300 m
30	1624+800	Korkyt s.	on the right-300 m
31	1627+300 - 1627+350	Korkyt Ata Museum	on the right- 500 m (an access road shall be provided from the pass-by)
32	1629+800	Shoshkakol s.	to the right-1km
33	1636+300	Ordazy s.	to the right-300 m
34	1637+150	Terminal	to the right-1km
35	1643+000 - 1649+000	Zhosaly s.	on the left along the road - 10m
36	1650+500	Zhas-Orken s.	to the left-2 km
37	1652+150	Zhosaly s.	to the right-23km
38	1661+1100	Iirkol s.	to the right-5km
39	1676+800	Zhana-Zhol s.	to the left-7km
40	1681+650	Internatsional s.	to the right-500

			m
41	1687+200	Aktobe s.	to the right-1km
42	1692+050	Akzhar s.	to the right-12km
43	1711+720	Tan s.	to the left-5 km
44	1726+050	Bakharbai-Batyr s.	to the left-6 km
45	1729+1100	Ak Aryk s.	to the right-21 km
46	1738+150	Ak Kum s.	on the left-500m
47	1745+200 - 1746+900	Akzharma s.	100m to both directions
48	1752+650	Zhanadaria s.	to the right-25 km
49	1761+800 - 1763+800	Shagan s.	to the left-80 m, to the right-150m
50	1762+600	Terenozek s.	to the left
51	1773+050	Iliyasov s.	to the left-2km
52	1774+1050	Shirkeili s.	to the right-6km
53	1808+300 - 1832+000	Kyzylorda s.	on the left - building, on the right gas-water-heat supply pipeline
54	1856+200	Beket s.	to the right-15km
55	1863+600	Berlistik s.	on the left-300 m
56	1864+800	Sulutube s.	to the left-1km
57	1874+000	Passing place No. 16	to the right
58	1879+800	Passing place No. 16	to the right
59	1892+300	Tortogai s.	to the right 500m
60	1913+000 - 1915+000	Baigemuk s.	on the left – 10 houses shall be demolished

61	1914	Baigemul s.	to the left 1km
62	1930+000 - 1932+000		on the right – houses are located along the road for the distance of 10m
63	1936+900 - 1940+700	Shiyeli s.	a settlement on the left is located very close to the road
64	1960+800	Sunak Ata s.	on the left-300m
65	1968+800	Tonerak s.	to the right-3km
66	1971+600	Zhuldyz s.	to the right-3km
67	1996+000 - 1998+000	Zhana Kurgan s.	Building-on both sides
68	2012+030	Birlik s.	to the right-500m
69	2017+600	Kyrash s.	to the left-1km
70	2025+100	Kosuienki s.	to the left-14km
71	2038+200	Talap s.	to the right-3km
72	2044+850	Besaryk s.	to the left-5km

Settlements in the South-Kazakhstan Oblast

Item No.	Location, km	Settlement Name	Location
	From the boundary of the Kyzylorda Oblast to Shymkent (Samara-Shymkent)		
1	2060+150	Sauran s.	to the left-1 km
2	2063+950	Sauran s.	to the left- 1 km
3	2071+400	Sauran s.	to the right-2 km
4	2080+500	Atabai s. to the left 38 km	Baltakol s. to the right -62 km
5	2083+000 - 2086+250		on the right, building – 80m
6	2097+400 - 2099+000	Settlement named after	on both sides -

		Satara Yerubayeva	for 200m
7	2099+300 - 2105+700	Turkestan City	on both sides – for 60 m
8	2105+700 - 2109+750	Turkestan City	on the right – from 100m up to 200m
9	2109+750 - 2113+000	Turkestan City	to the right - more than 200m
10	2113+300 - 2115+250	Yntymak s.	on both sides – for 100m
11	2119+100	6 houses	to the right- 300m
12	2127+400 - 2131+000	Ikan s.	width between houses – 21m, 51 yards, post office, 8 shops, 2 cafes, fuel station, vulcanization on the left shall be demolished in order to continue a motor road.
13	2135+450 - 2138+000	Settlement named after Yassy Dikhanobad	on the right- 150m
14	2147+200 - 2148+600	Dostyk s.	on the right- 300m
15	2159+700	Ordabasy s.	to the left-1 km
16	2163+750	Bogen s.	to the left-1 km
17	2167+500 - 2168+700	Korakal s.	to the left-100m
18	2172+100	Sheuildir s.	to the right-50km
19	2172+900 - 2175+300	Tortkol s.	on both sides – for 80m
20	2178+300 - 2181+000	Sypatayev s.	on both sides – for 100m
21	2190+200	Zhiyankum s.	to the right-2 km
22	2199+000 - 2200+600	Yekpindi s.	to the right-300m
23	2200+050	Sholakkorgan s.	to the left-112km
24	2202+600	Kondybai s.	to the left
25	2220+650 - 2223+500	Temirlan s.	on both sides – 20m

26	2223+240	Arys s.	to the right-44km
27	2231+100	to the left Shubar s. 3 km	to the right-Badam s.- 20 km
28	2247+600	Kainar Kus	to the right
29	2251+700	Badam s.	to the right-15 km
30	2255+200 - 2257+1070	Yntymak s.	on both sides – 20m, the settlement are amalgamated with the city
31	2256+920	airport	to the right -1 km
	From Shymkent to the boundary of Zhambyl oblast (Termez-Shymkent-Taraz-Almaty City)		
1	836+300	Kershetas s.	to the right-2,5km
2	841+950	Astobe s.	to the left
3	853+200	Zhaskeshu s.	on the left-60m
4	853+950	Tulkibas s.	to the right-15km
5	854+600 - 857+700	Balykchi s.	Building - along the road on both sides
6	861+250 - 863+550	Tastumsyk s.	Building - along the road on both sides
7	863+550 - 866+450	Azatyk s.	Building- along the road on both sides
8	866+900 - 873+940	Settlement named after Turar Ryskulov	on the right
9	875+000 - 880+950	Ak Biik s.	building on the left - 10m, on the right – 3m
10	886+050 - 890+980	Shakpak Baba s.	building on the left - 10m, on the right - 5m
	Zhibekzholy-Saryagash-Kyzylasker-Sardaria motor road (South-Kazakhstan Oblast)		

1	2+700 - 4+300	Zhana Turmys s.	Building- along the road 3-10m
2	14+150 - 18+300	Saryagash s.	Building- along the road – 10m
3	19+100 - 22+900	Kurkules s.	Building-along the road on both sides
4	23+050 - 23+900	Yankes s.	to the left-300m
5	25+200 - 26+600	Kultuma s.	on both sides – 80m
6	27+800 - 29+400	Darkhan s.	Building-on the left – 100m
7	30+350 - 35+550	Birtilek s.	Building - along the road -10m
8	36+800 - 41+350	Abai s.	Building - along the road -10m

Settlements in Zhambyl Oblast

Item No.	Location, km	Settlement Name	Location
	From the boundary of Zhambyl Oblast to Taraz City (Termez-Shymkent-Taraz-Almaty motor road)		
1	897+050 - 900+220	Shakpak-Ata s.	building line – 8m from the edge on both sides
2	900+220	Koksala s.	to the right
3	908+700 - 912+950	settlement named after B. Mamyshuly	909+200 starting point of the building on the right – 10m, 909+400 on the left – 16m; 912+300 end of the building on the left, 912+650 – on the right
4	911+100	Koshkar-Ata s.	to the left
5	915+400	Amanbayev s.	to the right
6	917+850	Burnooktyabrsk s.	to the right-500m
7	920+200	Burnooktyabrsk s.	to the right
8	930+000	Teris-Ashibulak s.	to the right

9	939+100	Zhanatas to the left	Bilikol s. to the right – 27km
10	949+300	Kyzyltan s.	to the left
11	953+250	Dala Kosy s.	to the right 6km
12	953+950 - 956+900	Aisha Bibi s.	Building on both sides - 10, 15m
13	958+850	Bypassing of Taraz City	
	Bypassing of Taraz City		
1	4+600	village	on the left-250 m
2	9+100	Gypseous Plant	on the right-30m from the edge
3	10+050	Chemical industrial super phosphate	to the left to the right
4	13+950 - 14+600	Tanty s.	farmstead on the right – 60m
5	16+450	Kotyrtobe s.	to the left
6	18+800	Taraz City	to the left
7	18+900 - 19+100	buildings	on both sides - 10m from the edge
8	20+950 - 21+800	village	houses – on the right – 100m
9	22+100	Zhetibai s. Taraz City	to the left to the right
10	24+580	Sarykemer s. Taraz City	to the left to the right
11	25+400 - 25+900	building	on the left along the edge
12	25+900 - 25+950	building	a house on the right – 10m from the edge
	Taraz-Utmek (14km)		
1	0+000 - 6+000	settlement	a street with width of 15-18m, building line - 2-

			5m
2	8+000 - 10+600	settlement	A street with width of 15-18m, building line - 20-30m
	From Taraz City to the boundary of the Almaty Oblast (Termez-Shymkent-Taraz-Almaty motor road)		
1	981+600 - 982+900	Talas s.	on both sides-30m from the road
2	983+100	Akbulym s.	
3	988+450	Baizak s.	to the left-1km
4	998+300	Zhibek Zgoly s.	to the left
5	1010+1150	Tuimekent s.	to the left-22km
6	1010+600 - 1011+900	Aksholak s.	on the right-60m
7	1026+950	Kaiendy s.	to the right
8	1033+900 - 1036+950	Aryk Tobe s.	building line on the right-60m, 1033+100 - 1033+430 shops are on the shoulder
9	1052+800 - 1054+150	Maldibai s.	building line on the right-80m
10	1061+700 - 1062+000	Algabas s.	on the right-60m
11	1064+250	Yubileinoye s. Kumapak s.	to the left to the right-2km
12	1065+300	Karakemer s.	to the right
13	1074+350 - 1077+100	Kokdonen s.	on both sides-40m from the road
14	1079+000 - 1081+350	Zhaksylyk s.	Building line on the left - 60m, from 1080+300 houses on the left by the foot, on the right -30m
15	1082+500 - 1090+500	Kulan s.	Bypassing of

			Kulan s. 1081+550-1091+200
16	1091+550 -1094+750	Kokaryk s.	on the left - 20m, on the right - 40m
17	1109+900 - 1111+300	Zhanaturmys s.	on the left -100m
18	1119+300 - 1121+150	Aktogan s.	building line on the right -50m
19	1201+150	Steptoye s.	to the right
20	1219+800	Kamyshanovka s.	to the right
21	1229+700 - 1231+470	Sary-bulak s.	Building line on the left -100m, on the right -200m
22	1238+300 - 1240+600	Kakpatas s.	Building line on both sides - 50m
23	1243+850 - 1246+400	Betkainar s.	Building line on the right-60m, 1245+800 structures on both sides
24	1256+950 - 1261+000	Zhambyls s.	Building line on the left-60m, 1261+000 building line on the left-30m
25	1259+900	Stepnoye s.	to the right
26	1264+000 - 1264+950	Kasyk s.	Building line on the right-80m
27	1269+300 - 1270+950	Kordai s.	Building line one both sides, 1270+950 exit road to the motor road Almaty-Bishkek
28	1290+100 - 1291+300	Alga s.	Building line on the right-30m
	From 1124 km Termes-Zhymkent-Taraz-Almaty motor road with direction Merke-Chardovar (32km)		

1	0+000 - 5+000	Merke s.	Building lineon the left-20m, before building – gas pipeline, cable, lighting; on the right –water supply pipeline, cable, power transmission line 0.4kV and gas pipeline, building line - 15m
2	5+000 - 8+980	Sarybaldayev s.	Between structures - 60m, before building – gas pipeline, cable; on the right – water supply pipeline, cable, PTL - 0.4kV, lighting and gas pipeline
3	8+980 - 10+550	Yekpendi s.	Between structures - 60m, before building – gas pipeline, cable; on the right – water supply pipeline, cable, PTL - 0.4kV, lighting and gas pipeline
4	11+100 - 14+100	AkAral s.	Building line on the right - 20m, gas pipeline, PTL – 10kV, water supply pipeline, Л.св. 12 пр along the edge; on the left - 30m, cable, gas pipeline
5	14+600 - 16+550	с. Сыпатай	строения on the left - 12m, кабель и ЛЭП 0.4кв
6	19+900 - 23+950	Zhantogan s.	on the right – building lie-10m, gas pipeline, water supply pipeline, lighting; on the left - 30m, 2 communication lines with 12пр, cable. Gas

			pipeline
7	24+460	Mynkazan s.	to the left-500m
8	30+000 - 31+500	Andas Batyr s.	Building line on the right-20m, gas pipeline, Л.св. 16пр, water supply pipeline at 5m from the edge; on the left - 40m, cable, gas pipeline

Settlements in Almaty Oblast

Item No.	Location, km	Settlement Name	Location
	From the boundary of Zhambyl Oblast up to Almaty		
1	1357+ 450	Akterek s. Chilbastau s.	to the right-8km to the left
2	1374+ 500	Beriktas s.	to the right
3	1381+ 200	Kopa s. Degeres s.	to the left to the right
4	1387+000 - 1388+400	Targap s.	Building on both sides
5	1403+ 600	Ungurtas s. Prudki s.	to the right-6km to the right-22km
6	1403+ 870	Ulguli s.	to the left
7	1408+750 - 1409+650	Samsy s.	Building on both sides
8	1433+ 400	Uzynagash s.	to the right-4km
9	1434+ 450	Mynbayevo s.	to the right -10km
10	1434+ 700	Shamalgan s.	to the left-29km
11	1437+ 700	Fabrichnyi s. Mynbayevo s.	to the right to the left-12km
12	1438+ 300	Fabrichnyi s. Mynbayevo s.	to the right to the left-12km

13	1439+ 500	Kasymbek s.	to the left-2km
14	1442+ 550	farm	to the left
15	1446+ 350	Yenbekshi s.	to the left-1km
16	1448+ 650	Shamalgan s. Shamalgan station	to the right-3km to the left
17	1450+ 900	Solid waste disposal area	to the left
18	1451+ 100	Solid waste disposal area	to the right
19	1453+ 250	Shamalgan s.	to the right - 6km
20	1453+ 700	Aitei s.	to the left -1km
21	1455+ 000	Kaskelen s.	to the right -1km
22	1457+ 650	Shamalgan s. Kaskelen s.	to the left to the right -2km
23	1460+ 000	Kaskelen s.	to the right -2km
24	1460+ 300	Kaskelen s.	to the right-2km
25	1460+ 350	Almylybak s.	to the left- 0,5km
26	1460+ 700	Dolan s.	to the right
27	1463+ 800	village	to the left
28	1465+ 000	Kemertogan s. Raiymbek s.	to the left-3km to the right-3km
29	1466+150	Irgeli s.	to the left-1km
30	1467+ 150	Irgeli s. Abai s.	to the left-1km to the right-1km
31	1467+ 750	Abai s.	to the right-1km
	From Almaty up to the boundary of China		
1	14+150 - 17+130	Guldala s.	on the right 3 water lines - 10m, on the left -building line - 15m
2	21+750 - 23+650	Panfilivo s.	Building line on the left - 10m, on the right - 15m

3	27+850 - 28+300	Yenbekshi s.	Building line on the right - 20m
4	30+400 - 32+200	Novoalexeyevka s.	Building line on the right - 10m, on the left - 20m
5	47+300 - 48+450	Kulzha s.	Building line on both sides - 20m
6	53+000 - 57+700	Yenbek s.	Building line on the right - 20m, on the left - 35m
7	57+700 - 59+750	Birlik s.	Building line on the left - 30m, on the right -40m
8	59+750 - 62+150	Baltabai s.	Building line on the left - 20m, on the right - 30m
9	64+ 000	Turgen s.	to the left
10	67+200 - 70+850	Akshi s.	on the left from the foot - 30 m - cemetery
11	70+800 - 76+000	Malovodnoye s.	Houses by the foot
12	78+100 - 80+150	Zhanaturmys s.	Building line on both sides - 50m
13	87+700 - 89+500	Teskensu s.	Building line on the left - 20m, on the right - 30m
14	96+200 - 98+200	Ashisai s.	Building line on the left - 20m, on the right - 35m
15	98+200 - 103+100	Karaturyk s.	on the left from the edge to the fence - 5m, on the right forests - 4m
16	106+100 - 107+300	Lavar s.	Building-5 m from the bottom
17	115+ 800	Koram s.	to the right 300m
18	117+000 - 123+550	Shelek s.	Building line on the left - 30m
19	125+ 050	Chilik lands for hunting	to the left
20	129+600 - 131+700	Baiseit s.	on the right л.св.- 4m, building line- 8m, on the left PTL- 4m, building line - 10 m
21	140+400 - 142+600	Nura s.	Building line on the left - 30-35m
22	146+ 700	Malybai s.	to the right
23	164+500 - 165+500	Kokpek s.	Building line on the left - 28m, on the right - 6m

24	204+ 000	Sharyn s.	to the right 22km
25	235+700 - 237+200	Bakhar s.	Building line on the left - 20-25m
26	244+ 000	Shyryn s.	to the right 6km
27	254+ 500	Rakhat s.	to the right 7km
28	256+300 - 259+700	Taskarasu s.	on the left from the edge up to the houses - 10 m
29	259+ 900	Charyn s.	to the left- 6km
30	285+ 600	Aidarly s.	to the left-12km
31	304+ 500	Akkuly s.	to the left
32	321+500 - 327+850	Zharkent s.	Building line on the left - 12m, on the right - 10m
33	328+ 000	Molodezhnoye s.	to the left
34	328+150 - 331+000	Kishi Shagan s.	From the edge to the building line on the left-20m, on the right-15m
35	331+000 - 333+000	Ulken Shygan s.	Building line on the left from the edge - 15m,on the right - 12m
36	336+ 700	Berlik s.	to the left
37	337+150 - 337+900	Akkent s.	Building line on the right - 100m
38	338+000 - 339+500	Avat s.	on the right from the edge to the fence - 8-10 m
39	341+900 - 344+200	Penzhim s.	On the left-lighting poles from the edge - 4,63 m, from the edge to the fence-10,5 m, on the right from the edge to the fence-4,60 m
40	352+ 500	Baskunchi s.	to the left
41	358+700 - 360+000	Korgos s.	Up to the building line to the left - 20m, to the right - 16m

From the produced calculations of the level of noise in some settlements, located along the highway "West China - Western Europe", it follows that the impact of noise at some distance from the carriageway at 10-25 meters insignificantly exceeds the sanitary standards and are 71,2-75,2 dBA.

The level of the transport noise, created by the traffic, shall not exceed

values, in accordance with the order of the Ministry of Healthcare of the Republic Kazakhstan No841 as of 03.12.2004, namely 70 dBA.

During movement of motor transport along the highway as well as road construction machinery and equipment used for reconstruction of the highway, the level of noise is considerably high. Especially strong noise is created by bulldozers, the scrapers, pneumatic jack-hammers, vibrators and milling cutter.

A decrease in the level of transport noise is achieved via realization of the following measures:

- construction of pavements from fine asphalt-concrete mixtures and wearing course from fine crushed stone;
- limitation of the velocity of the traffic flow during construction to 60 km/h will lead to reduction of the noise for 7 dBA;
- carrying out repair works during daytime;
- installation of the noise screens, the degree of reflection and sound absorption of which depends on the materials used for their construction - concrete, reinforced concrete, glass, aluminum, wood, plastic;
- landscaping of roads with the selection of the species of trees and bushes, shape of their crown, method of planting during different combinations of the elements of the road, area relief, surrounding landscape and season will make it possible to reduce the level of noise to 10-12 dBA;
- sound-proofing of engines of road machinery by protective housings from foam-rubber, rubber and other sound-proofing materials, and also by using the cowlings with the multilayer covers;
- low-mobility facilities (compressors) shall be placed at the sound-absorbing areas or in sound-absorbing tents, which reduce the level of noise to 70%.
- when carrying out road construction works, the areas with the level of noise above 80 dBA shall be marked by the signs of safety, and people working in this area shall be provided with the individual protection equipment.

During construction of the highway the workers may be subject to the effect of machinery vibration. The decrease of vibration depends on the technical state of machinery. During construction works it is necessary to comply with the operating mode of the vibrating machinery the vibration of which corresponds to the sanitary standard. Two regulated stops are

recommended for that.

To improve protective properties of organism, working capacity and working activity there shall be used special complexes of industrial gymnastics, vitamin care.

The fulfillment of all recommendations will lead to noise reduction at the designed site.

9.4.3 Measures to protect surface and ground water from pollution

During traffic flow a large number of the harmful substances is formed: heavy metals from the combustion of fuel, carcinogenic dust from the wear of automobile tires, mineral oils, deicing salts that are washed off by rain from the carriageway, thus, contaminating soil, water bodies and watercourses. Filling stations, maintenance shops, check stations and washbays particularly contaminate the environment with mineral oils and cleansing fluids.

During reconstruction of the highway to prevent the pollution of watercourses it is necessary to constantly maintain the working conditions of all drainage and treatment facilities located along the highway.

This TOR envisages dismantling and replacement of culverts as well as construction of new ones considering the estimated flow.

Highway runs through six oblasts, West-Kazakhstan, Aktobe, Kyzylorda, South_Kazakhstan, Zhambyl and Almaty, where it is planned to carry out huge work on capital overhaul and replacement of bridges.

West-Kazakhstan oblast - 1 bridge - replacement

Aktobe region - 35 bridges, of them 18 bridges have unsatisfactory state, (replacement of bridges and capital overhaul), 17 bridges are in satisfactory state.

Kyzylorda oblast - 49 bridges, of them 44 bridges are in unsatisfactory state, (replacement of bridge and capital overhaul), 2 bridges are in satisfactory state, 3 bridges are in good state.

South-Kazakhstan oblast - 37 bridges, of them 32 bridges are in unsatisfactory state, (replacement of bridge and capital overhaul), 5 bridges are in satisfactory state.

Zhambyl oblast - 37 bridges, of them 31 bridges are in unsatisfactory state, (replacement of bridge and capital overhaul), 7 bridges are in

satisfactory state, 1 bridge is in good state.

Almaty oblast - 54 bridges, of them 28 bridges are in unsatisfactory state, (replacement of bridge and capital overhaul), 26 bridges are in satisfactory state.

The specified works relate to the penetration risk of hazardous toxic substances into watercourses and water bodies as well as to their contamination with suspended substances of mineral and organic nature, represented by suspended particles of sand, clay, silt and other materials.

To prevent the pollution of the watercourses of water economic significance, the TOR envisages measures for draining run-off water from the carriageway outside the watercourses. Drainage from the carriageway and bridges shall be done by means of cross and longitudinal slopes. Water from the carriageway shall be drained into longitudinal chutes constructed on the embankment slopes with the height over 4 meters at the longitudinal slope over 0.03 as well as at the sag curves.

Drainage of run-off waters into watercourses shall be done only with the permission of the sanitary and epidemiological service and fishery protection service, although, the composition of the run-off water shall meet SanPin No3.02.002.04 on protection of surface water from pollution.

Traffic forms a large volume of hazardous substances: heavy metals from the combustion of fuel, carcinogenic dust from the wear of automobile tires, mineral oils, deicing salts that are washed off by rains from the carriageway, thus, contaminating soil, water bodies and watercourses. Filling stations, maintenance shops, check stations and washbays particularly contaminate the environment with mineral oils and cleansing fluids.

During reconstruction of the highway to prevent the pollution of watercourses it is necessary to constantly maintain the working conditions of all drainage and treatment facilities located along the highway.

In the submountain area of the irrigated agriculture the cost of small artificial facilities, with the cost of regulatory facilities, make up no less than 40-50% of the total cost of the highway.

Entire regulatory system requires practically new construction.

The whole system of irrigated agriculture requires complete reconstruction. 95% of pipes oriented at planned water use require to be replaced.

The highway running through the region of rice planting requires

strengthening of slopes with geotextiles or concrete, construction of verges with the width of 4 - 4.5m as well as raising subgrade for 1,3 m from the water level at rice bays.

TOR includes the estimation of the maximum permissible discharge [MPD] from the bridges located in the sections of the reconstructed highway, across the rivers with constant run-offs.

The MPD was estimated in accordance with the “Recommendations for consideration of environment protection requirements when designing highways and bridges”. Moscow, 1995.

The value of the actual discharge (AD) of pollutants with the surface run-off water in g/h for each ingredient (substance) is determined by the formula:

[AD]=3600xCa X Qr

Where: **3600 -** conversion factor into other units of measurement;

Ca - actual concentration of pollutants in surface run-off water for each pollutant, mg/l. It is taken from the table;

Qr – estimated flow of surface run-off water, l/s.

The estimated flow of surface run-off water shall be determined as average-hourly water flow of actual run-off period of rain (storm) water. The estimation of the level of the pollution of aquatic environment by surface run-off water from the highway was done for Syrdaria River and is similar for other rivers, which data is given in the table.

When estimating MPD for highways of different technical categories the following coefficients shall be used: Category II - 0.8, Category III - 0.6, Category IV - 0.4 and Category V - 0.3.

Protocol of the ecological calculation of the Syrdaria River water pollution level caused by surface run-off from motor roads

Parameter	Marking	Unit of measurement	Volume	Source
Calculation of the storm-water run-off				F.4.4.2
Length of the motor road section	S	m	200	design
Width of the motor road section	Bo	m	15,00	design
Water-collecting area	F	ha	0,24	page 43
Coefficient on the map	N		0,85	p.4.4.1

Concentration time of the surface run-off	T	min	5	p.4.4.1
Longitudinal slope of the motor road section	I	%	5,00	design
Coefficient	K		2,22	t.4.4.3
Specific storm-water run-off	q	l/s*ha	3,90	t.4.4.2
Calculated storm-water run-off	Θc	l/s	2,1	f.4.4.3
Calculation of the melt water run-off				f.4.4.3
Area of the melt water run-off	Np		4	p.4.4.2
Flow layer for 10 day hours	h	m m	7	p.4.4.2
Time of melt water flowing to the station	t	hour	1,0	page.43
Water-collecting area	F	ha	0,24	page.43
Snow hilling-up coefficient	Kc		0,80	page.44
Calculated melt water run-off	Θст	l/s	0,7	f.4.4.3
Calculation of actual discharge				f.4.4.1
Calculated surface water flow	Θc	m3/s	0,002	page.44
Pollution of water flow by suspended matters	Fa_sm	mg/l	520	f.4.4.1
Pollution of water flow by lead	Fa_Pb	mg/l	0,11	f.4.4.1
Pollution of water flow by mineral oil	Fa_mo	mg/l	9,60	f.4.4.1
Actual discharge of suspended matters	Ad_sm	g/h	3890	f.4.4.1
Actual discharge of lead	Ad_Pb	g/h	0,8	f.4.4.1
Actual discharge of mineral oil	Ad_mo	g/h	71,8	f.4.4.1
Calculation of MPC and MPE				
Calculated surface water flow	Θc	m3/s	0,02	page.44
Water flow in the river with 95% of water provision	Θв	m3/s	230,0	t.4.4.4
MPC of suspended matters	Cmpc_sm	mg/l	5,25	t.4.4.4
MPC of lead	Cmpc_Pb	mg/l	0,10	t.4.4.4
MPC of mineral oil	Cmpc_CH	mg/l	0,05	t.4.4.4
Concen. of suspended matters in living con.	C_sm	mg/l	5,0	t.4.4.4
Concen. of lead in living conditions	C_Pb	mg/l	0,00	t.4.4.4
Concen. of mineral oil in living conditions	C_CH	mg/l	0,00	t.4.4.4
Concentration of mixing of run-off with water flow of Rodzilleru	Gamma		0,6726	f.4.4.6
Coefficient	Betta		0,000	f.4.4.7
Coefficient of the mixing hydraulics	Alfa		2,11	f.4.4.8
Coefficient of the run-off drainage	Epsilon		1,00	page 46
Coefficient of the sinuosity of the river bed	Fi		1,00	page 46
Coeff. of turbulent diffusion according to Potapov	E		0,0195	f.4.4.9
Maximum permissible concentration of suspended solids in run-off considering mixing	Cmax.sm	mg/l	18616,18	f.4.4.5
Maximum permissible concentration of lead in run-off considering mixing in waterway	Cmax. Pb	mg/l	7444,47	f.4.4.5
Maximum permissible concentration of mineral oil in run-off considering mixing in waterway	Cmax. CH	mg/l	3722,24	f.4.4.5
Maximum permissible discharge of suspended matters	MPD_вв	g/h	139259	f.4.4.4
Maximum permissible discharge of lead	MPD_Pb	g/h	55688,5	f.4.4.4
Maximum permissible discharge of mineral oil	MPD_CH	g/h	27844,2	f.4.4.4

Ecological calculation of the water pollution level by surface run-off from motor roads

Parameter	Unit of measurement	Quantity
Category of a motor road		2

Traffic intensity	car/day	2410
Length of a motor road section	m	258,35
Width of a motor road section	m	15
Improved type of a motor road coating		
Longitudinal slope of a motor road section	%	5.0
Category of the river according to water-use		highest
Riverside outlet of run-off to the river		
Water flow in the river with 95% of water provision	m3/s	230.0
Average water flow velocity in the river bed	m/s	1,3
Average depth in the river bed with the determined level	m	3.0
Quantity of suspended matters in the waterway in living conditions	mg/l	5.0
Quantity of lead in the waterway in living conditions	mg/l	0.00
Quantity of mineral oil in the waterway in living conditions	mg/l	0.00
Distance from the point of water flow discharge to the calculated station at the river stream	m	200
Distance from the point of water flow discharge to the calculated station along the straight line	m	200
Calculated melt water flow	l/s	0.7
Area of melt water flowing		4
Time of melt water flowing to the station	hour	1.0
Layer of the flow for 10 hours, mm on fig 4.4.2	m m	7
Coefficient of snow hilling-up		0.80
Calculated storm-water flow	l/s	2.1
Coefficient n on fig 4.4.1		0.85
Time of the surface run-off concentration	min	5
Specific storm-water run-off	l/s*ha	3.90
Coefficient K in the formula 4.4.2		2.22

Basic results of the calculation

Parameter	Unit of measurement	Quantity
Actual discharge of suspended matters	g/hour	3890
Maximum permissible discharge of suspended matters	g/hour	139259
Actual discharge of lead	g/hour	8.0
Maximum permissible discharge of lead	g/hour	55688.5
Actual discharge of mineral oil	g/hour	718
Maximum permissible discharge of mineral oil	g/hour	27844.2

Calculation is made by a computer using "CREDO" software based on FDD methods of the Ministry of Transport of the Russian Federation, methodology of the Main Geophysical Observatory named after A.E. Voyeikov.

The alternative calculation of the concentration of pollutants: unfavorable meteorological conditions with hazardous wind velocity. Emission of pollutants has been obtained through modeling of the system “Driver-Car (Engine)-Motor Road, Traffic intensity”.

Calculation of MPD on bridges

Item no.	Location of the object	Maximum permissible discharges, g/hour	Actual Discharge from a motor road, g/hour AD
1	Bridge on Ilek River	6631	4584
2	Bridge on Or River	596,2	46,8
3	Bridge on Arys River	404,35	294,4
4	Bridge on Shayan River	218, 70	18,78
5	Bridge on Bugun River	18,70	13,96
6	Bridge on Karachik River	220,72	13,20
7	Bridge on Assa River	1595,87	23,09
8	Bridge on Talas River	580,16	31,86
9	Bridge on Teres River	64,41	44,58
10	Bridge on Yesik River	182.54	67,23
11	Bridge on Turgen River	149,3	83,8
12	Bridge on Yevgenyevka River	12,94	109,7
13	Bridge on Turmys River	153,65	75,3
14	Bridge on Tekensu River	56,31	23,15
15	Bridge on Lavar River	46,89	18,95
16	Bridge on Chilik River	580,16	31,86
17	Bridge on Nura River	324,25	118,7
18	Bridge on Syugaty River	68,77	36,8
19	Bridge on Charyn River	74,6	33,09
20	Bridge on Brokhudzir River	21,08	11,39
21	Bridge on Kamenka River	78,54	36,96
22	Bridge on Kamenka River	58,32	32,86
23	Bridge on Usek River	16,48	8,35
24	Bridge on Tyshkan River	79,36	44,21
25	Bridge on Chizhim River	86,51	27,63
26	Bridge on Khorgos River	64,41	44,58

It is evident from the given indices of MPD calculation and actual discharge

from bridge floors that the volume of actual drainage does not exceed the indices of the maximum permissible discharges from the bridge. Drainage from floors of mentioned bridges shall be made by longitudinal and cross slopes through troughs along slopes to an area with treatment and flow suppressing devices preventing ground eroding at the point of water drainage.

Structures for treatment facilities should be determined based on standard projects in force.

Sizes of the water protection zones in each direction from the average summer shoreline shall be: for small rivers - 100 meters, for large rivers - 500 meters. Within water protection zones contamination of earth surface, in particular, dumping of garbage, industrial wastes as well as parking, car filling with fuel, washing and repair of automobiles and road-building machinery are prohibited.

With observance of the measures mentioned environmental impact of construction-assembly activity will be reduced.

Work implementation within a protection zone is allowed based on a special permit of local water protection authorities, fish protection and sanitary epidemiological services.

9.4.4 Measures for dust formation reduction

Dust is formed as a result of wear of coatings under impact of automobiles and climatic factors, wear of automobile tires, pollution of road surfaces by automobiles entering a roadway from natural shoulders and dirt roads, moving of vehicles by temporary and by-pass roads with pavement of the lowest and transitional type, fulfillment of works on production, processing and transportation of rock materials and ground.

For reduction of environment pollution by dust during reconstruction of the motor road it is necessary to carry out the following activities:

- dust removal from sections of roads with intensive formation of dust, first of all, from roads passing through settlements, along agricultural fields, reserves, historical places and forest-park zones;
- periodic moistening by water of dirt roads, access roads and roads inside of open pits with consumption of 2l/m2;
- limitation of the traverse speed at sections of roads subject to intensive dust formation;
- transportation of dust-forming materials in vehicles provided with tarpaulin or other covers for prevention of entry of dust particles of transported materials into the atmosphere.

One of the methods of dust control during fulfillment of works on reconstruction and operation of motor roads is treatment of road pavement with dust-removing materials providing for reduction of the atmosphere pollution by dust, improvement of traffic safety and sanitary-hygienic conditions for all participants in the transport process (drivers, passengers, cargoes and automobiles) and the environment of territories adjacent to motor roads.

A norm for dust-removing material consumption in each specific case is determined on a test basis depending on a type of the material used, traffic intensity and composition, weather-climatic conditions, type and condition of pavement.

When selecting dust-removing materials the preference should be given to chloride calcium inhibited by phosphates (CCph).

9.4.5 Measures for negative impact reduction of the motor road on flora and fauna

Motor roads are clearly expressed right-of-ways from ecological point of view since they cut community habitats formed during a long period of time. As a result on both sides of a motor road specific biogeocenosises are being formed.

Under impact of gas concentration, noise, vibration at a wayside a gradual replacement of species of vegetation and animals takes place. All above-mentioned measures for negative impact reduction of emissions from vehicles, noise and vibration are directly related to the flora and fauna on the territory adjacent to a motor road. For decreasing negative impact on flora and fauna by works carried out during reconstruction of the motor road it is necessary to follow nature-conservation requirements, namely:

- provision of a proper technical condition of a pavement;
- guarantee of control over an optimum regime of operation of vehicles and road-building machinery;
- at parking places for automobiles and road machines, storage areas of road-building materials it is necessary to remove a fertile soil layer, ensure its storage for its subsequent use for land reclamation;
- provide a metal light-reflecting fencing provided by the feasibility study to scare away animals from motor roads. At night time when light of automobile headlights falls on a fence it reflects bright frightening rays in a transverse direction from a road;
- green plantings along a motor road catch a significant quantity of dangerous pollutants. Different pests and diseases develop under impact of toxic substances resulting sometimes in death of plantings. Therefore, sanitary and improvement felling play a significant role for planting conservation;
- under impact of anti-glaze salt the structure and conditions of soil change, destruction of plants' tissue takes place, and as a result of poisoning by salt animals and birds die. The best measures is to stop using salt during a motor road maintenance and replace it with friction materials;
- use of less toxic materials for the environment as CCph (chloride calcium inhibited by phosphates) or CMA (calcium-magnesium acetate) not leading to irreversible changes in the process of photosynthesis and subsequent

destruction of plants' tissue and death of animals;

– use of operational machines with a high accuracy of even distribution of an anti-glaze material over an area of pavement (as "Shmidt" type) capable of ensuring the accuracy of distribution up to 1 g/m2;

- dust air pollution occurs when fulfilling many road works, and impacts negatively on vegetation and plantings within a wayside. Dust, depending on chemical composition, makes a specific impact on plants caused by penetration of harmful compounds into a leaf tissue. At that, accumulation of compounds in plants' tissues causes disturbance of exchange functions of an organism, reduction in quantity of photosynthetically active energy absorbed by leaves and leads to acceleration of aging processes.

– for the purpose of dust formation reduction it is necessary to make a preliminary moistening of ground in places of its development and laying, and also when constructing temporary bypass roads;

– ground which has a sufficient humidity practically does not form dust from wind blowing;

– transportation of materials being a source of dust shall be made in vehicles equipped with a dustproof tarpaulin or other covers;

– for the purpose of a negative impact prevention on a habitat, liquidation of bogging of low sections of an area, side and close-to-route reserves by storm and melt water it is necessary to provide for works on organization of an efficient drainage system, timely implementation of engineering and agro-technical measures for its maintenance.

9.4.6 Soil erosion and pollution prevention

During reconstruction of the motor road, elimination of erosion sources and liquidation of reasons for its appearance shall be considered as first priority work. Special attention at that shall be given to prevention of further development of separate erosion sources with their subsequent transformation from the point to the linear sources. For these purposes it is necessary to consider:

– restoration of a damaged fertile layer of soil on a right-of-way, slopes of filling and grooves with required strengthening by grass sowing;

– taking measures for anti-erosion strengthening of ravines and stoppage of their further development including drainage of melt and storm water on

slopes and at the head of a ravine, increase in steadiness of landslide slopes, development of green plantings.

- on sections of filling, where erosion processes are observed, it is necessary to provide filling of slopes using drainage soil;
- one of the important measures for water erosion prevention of discharge channels of small artificial facilities is their strengthening.

The process of emission and distribution of pollutants over soil surface is also complex as in the air. Lead is the most common and toxic transport pollutant of soil. The maximum permissible concentration of lead in soil in the Republic Kazakhstan is established at the level of 32 mg/kg.

According to calculations made for reconstruction of the motor road in the Feasibility Study it is established that the greatest content of lead within a wayside has been discovered at a distance of 10 meters from a roadway and is from 5,7 to 444,1 mg/kg with a sharp decline, and at a distance of 40 meters - from 0,00 to 30,23 mg/kg, i.e. it does not exceed MPC. Soil surface contamination by transport emissions accumulates gradually and remains for a long period of time. Therefore within limits of a reserve-technological strip with a width of 50 meters hay production and its use as forage, and also mushrooms and berries gathering are prohibited along roads.

Products of wear of road surfaces and automobile tires, disintegration of exhaust gases of engines of automobiles and road machines, fuels and lubricants falling upon a roadway as a result of leakage from a fuel system of engines or criminal-negligent actions of drivers and service personnel, losses during transportation of cargo, and also salts used for a winter road maintenance, scattered remains of inert materials, binding and organic-mineral mixtures used for reconstruction of a road contaminate a roadside territory. With significant accumulation they can change the biological composition of a roadside strip. Therefore a necessary sanitary level of a wayside must be achieved via timely utilization of garbage and agro-technical methods.

9.4.7 Measures to mitigate negative impact of the motor road from a road safety point of view

Safety provision of a traffic and guarantee of high transport qualities of a motor road is the first priority responsibility of all road agencies: design, construction and operating agencies.

The international transit corridor "Western Europe - Western China" goes along motor roads located in 6 Oblasts. The majority of them, (with exception of those reconstructed for the last 1-2 years), do not correspond to the requirements on motor roads of a state and international significance.

On existing roads radiuses of curves on a plan and profile do not correspond to values accepted for this category of roads, there are dangerous turnings, inclines of longitudinal profile up to 9%, cross section also does not correspond to standards. There is no visibility on a plan and longitudinal profile on many sections. The existing road goes through a number of settlements. With close building, absence of pavements, strips for local traffic it creates a high danger for all participants of traffic - both drivers and pedestrians.

The poor provision of existing motor roads with technical equipment for organization of road traffic is observed: road signs, safety fence, guides, road marking and light signals in large settlements. Exceptions are the sections on which reconstruction was conducted in 2006-2007 (Zhambyl, Almaty Oblasts - “Almaty – Bishkek” motor road, 15-221 km). The roadway has defects, which lead to increased accident rates. The minimum coefficient of the accidence rate on existing roads is not less than 57,0 - 63,1 which is absolutely unacceptable. According to the Industry Building Code 25-86 the designs for reconstruction of motor roads and new construction recommend to redesign the sections with the total coefficient of the accidence rate of 15,0 - 20,0 (on mountain roads - 35,0). When determining the coefficient of the accidence rate at reconstructed sections the following coefficients have been established:

Oblast	Existing road	Accepted alternative
West-Kazakhstan	63,1	8,8
Aktobe	148,6 - 182,2	1,7 - 12,7
Kyzylorda	57,0 - 261,1	2,5 - 27,8
South-Kazakhstan	108,8 - 152,4	8,3 - 20,3
Zhambyl	14,9 - 147,8	3,17 - 13,8
Almaty	13,5 - 353,3	1,3 - 13,5

The road infrastructure is well demonstrated on recently reconstructed sections in Zhambyl and Almaty Oblasts (motor road “Almaty – Bishkek”).

For the purpose of a traffic improvement on intersection of roads with high intensity, for guaranteeing the uninterrupted and safe traffic flows in different directions two-level road interchanges are considered by the Feasibility Study.

	"Pipe" type	“Cloverleaf” type
Aktobe	12 units	3 units
Kyzylorda	6 units	6 units
South- Kazakhstan	6 units	5 units
Zhambyl	3 units	7 units
Almaty	7 units	9 units

In regions predominantly with a cattle-breeding trend of economy development a livestock drove system is arranged with compulsory information of drivers about its presence using warning signs.

In places of a road passing across settlements a high attention is paid to a safety of traffic and pedestrians. Sidewalks, strips for a local traffic are provided. A roadway shall be separated by curbs, and for a regulated pedestrian traffic - by a cable fence.

On large bridges, interchanges and overpasses in settlements and on access roads to them it is necessary to provide lighting of a roadway:

West-Kazakhstan Oblast	– 2 km;
Aktobe Oblast	- 12,4 km;
Kyzylorda Oblast	- 41,3 km;
South-Kazakhstan Oblast	– 60 km;
Zhambyl	– 48 km;
Almaty Oblast	– 90 km.

For organization of traffic, guarantee of safety, information of drivers on a travel line, road signs are installed in accordance with Construction Requirements of the Republic of Kazakhstan 1125-2002 “Road signs. General technical specifications".

For organization of traffic of vehicles and pedestrians a road marking is provide on a roadway according to Construction Requirements of the Republic of Kazakhstan 1124-2003 "Road marking. Technical requirements" and Construction Requirements of the Republic of Kazakhstan 1412-2005 "Technical means for traffic organization. Rules of application". Horizontal marking is applied with a width of a roadway of 6 m and more – beyond boundaries of settlements. Vertical marking is made on elements of supports of bridges, over-bridges, tunnels, on fencing and curbs to increase their visibility by participants of a road traffic.

If a road passes through settlements with a high traffic intensity, road light signals are provided which shall be used for regulating traffic of vehicles and pedestrian circulation. They shall be used also beyond boundaries of settlements for marking dangerous sections of roads.

In detail all types of works on construction and organization of safe traffic along the international transit corridor "Western Europe - Western China" are considered in accordance with normative documents accepted in the Republic of Kazakhstan when developing designs for these sections.

9.4.8 Industrial wastes

The technology of work implementation for reconstruction of the motor road and subsequent maintenance of it does not provide for production of waste requiring placement and burial.

All construction materials (sand-gravel mixture, sand, crushed stone, ground, etc.) are used 100%. The technology for construction of temporary facilities with use of crushed rock ground provides for removal of crushed rock ground and its use for construction of shoulders of motor roads.

The project provides for return of those replaced water supply pipes, concrete signal posts, railing and other types of facilities to an industrial base of a client for further use for repair works. When carrying out works construction garbage may be produced to be disposed to a dump. The volume of the maximum permissible wastes has not been calculated within the Feasibility Study because this issue will be considered in detail at the stage of the detailed design.

Solid domestic wastes shall be stored in containers and disposed to solid waste disposal areas (coordinated by the Contractor with the local agencies).

Contractor shall pay compensation to nature-conservation agencies for utilization of construction waste.

9.5. Allotment of land resources to be used for the motor road reconstruction

The reconstructed motor road "Western China - Western Europe" with access to neighboring countries passes across the territory of the West-Kazakhstan, Aktobe, Kyzylorda, South-Kazakhstan, Zhambyl, Almaty Oblasts.

The width of a right-of-way for the existing motor-road according to documents for land use is from 21 to 100 meters. The width of a right-of-way is given in a list of a permanent right-of-way (documents for land use are attached herewith).

This Feasibility Study is a comparison of two alternatives, so called with "the project" and without "the project". The first alternative provides for appropriate maintenance of the existing motor road based on annual investments.

The second alternative proposes extension of a route of the motor road: reconstruction of the existing motor road (alternative with local changes) and the alternative providing for bypassing of large cities, settlements with partial use of the existing motor road.

The additional permanent land allotment for reconstruction of the existing motor road (alternative with local changes) is planned on sections of broadening of a road bed to be corresponded to a relevant technical category is 6831,9 ha of lands with breakdown by Oblasts:

West-Kazakhstan Oblast - 42,5 ha;

Aktobe Oblast - 706,2 ha;

Kyzylorda Oblast - 1620,3 ha;

South-Kazakhstan Oblas - 787,0 ha;

Zhambyl Oblast - 1383,6 ha;

Almaty Oblast - 2292,3 ha.

For the period of the motor road reconstruction it is planned to allot lands for temporary use for bypasses, construction sites, sites for storage of road construction materials, water-intake sites, ground reserves and access roads to them, sites for storage of a fertile layer of soil and shift work camps of contractors, Asphalt Concrete Mixing Facilities with area of 9529,2 ha with breakdown by Oblasts:

West-Kazakhstan Oblast - 394,0 ha;

Aktobe Oblast - 1501,6 ha;

Kyzylorda Oblast - 2555,17 ha;

South-Kazakhstan Oblast - 1065,6 ha;

Zhambyl Oblast – 1882,6 ha;

Almaty Oblast – 2130,2 ha.

As of the alternative proposal 5963,0 ha is required for permanent use for

reconstruction of the motor road with breakdown by Oblasts:

Aktobe Oblast	– 1134,9 ha;
Kyzylorda Oblast	– 1573,6 ha;
South-Kazakhstan Oblast	– 1510,12 ha;
Zhambyl Oblast	-1744,4 ha.

7368,6 ha of lands is required for temporary use with breakdown by Oblasts:

Aktobe Oblast	– 2036,9 ha;
Kyzylorda Oblast	– 2286,0 ha;
South-Kazakhstan Oblast	– 1254,3 ha;
Zhambyl Oblast	- 1791,4 ha;
Almaty Oblast	- 2130,2 ha.

All lands to be allotted are preliminary and subject to confirmation at the detailed design stage.

A required quantity of road construction materials is planned to be provided by development of concentrated reserves of ground and sand-gravel mixture, close-to-route reserves and also use of construction material deposits on the territory of Oblasts across which the motor road (location map of widespread minerals are attached) passes.

The total land area planned to be allotted for reconstruction of the motor road is specified in the summery list of lands subject to allotment.

All lands requested for allotment for temporary use upon construction work completion shall be reclamated and returned to land users in condition suitable for use in agriculture or other sectors of national economy.

According to "Land Code of the Republic of Kazakhstan" and "Norms on compensation of losses in agricultural production" the Feasibility Study provides for calculation of expenses for compensation of losses in agricultural production because of land allotment for permanent and temporary use. Losses of agricultural production based on the accepted alternative with local changes are 2867446,6 thousand Tenge, based on second alternative providing for large bypasses - 1556253,442 thousand Tenge.

Funds from compensation of losses in agricultural production shall be remitted to income of the Republican Budget.

Calculation for compensation of losses caused by occupation of lands

(ploughed fields, pastures) with breakdown by regions for the existing and new directions has been made as well. Calculation is made based on an approximate market value.

The market value is taken from the report of “BaiKOS” Ltd. (license – registration No. of the legal entity - 0084-(44914-1910-TOO). Compensation of losses for occupied lands for the accepted alternative with local changes is 18223927,7 thousand Tenge, for the alternative providing for large bypasses - 3143480,8 thousand Tenge. Calculation of losses in agricultural production and damages are attached herewith. Calculation of cost for demolishing dwelling and commercial structures, homestead lands based on a market value is made as well.

"Kazdorproekt" Ltd. has got a preliminary approval of the Feasibility Study for the motor road "Western China - Western Europe" with access roads to neighboring countries from Akimats (local administration) of: Uralsk City, Zelenovsky Raion, Martuksky Raion, Khromtausky Raion, Aitekebisky Raion, Irgizsky Raion, Shalkarsky Raion, Turkestan City, Ordabasynsky Raion, Tyulkubassky Raion, Zhualynsky Raion, Baizakovsky Raion, Raion named after T. Ryskulov, Kordaisky Raion, Zhambylsky Raion, Karasaisky Raion, Talgarsky Raion, Enbekshikazakhsky Raion, Uigurky Raion, Panfilovsky Raion and other approvals. Lists of approvals by Oblasts are attached herewith.

Documents of approvals are attached herewith. A final approval according to Article 44 of the Land Code of the Republic of Kazakhstan shall be made upon the detailed design stage.

9.6. Land reclamation

In accordance with the Land Code of the Republic of Kazakhstan as of 20.06.2003 and "Instruction for environment impact assessment of economical and other activity when developing pre-planned, pre-design and design documentation", Astana 2005, this Feasibility Study for reconstruction of the motor road provides for bringing lands allotted for temporary use to a condition suitable for use in agriculture.

Land reclamation shall be made during or after completion of works during a year.

Lands allotted for bypassing motor roads, construction sites near bridges and pipes, parking sites for road-building machinery and sites for storage of materials, water-intake sites, concentrated ground reserves and

access roads to them, shift work camps of contractors, asphalt concrete mixing facilities with area of 9529,2 ha based on the accepted alternative and 7368,6 ha based on the second alternative are subject to reclamation.

The technical reclamation is one of the basic types of preparatory works which include:

- removal of a fertile layer of soil;
- piling of fertile soil layers for storage and further use when making reclamation;
- disposal of construction garbage;
- flattening of ground reserves' sides 1:10;
- planning of surface of disrupted lands;
- dismantling of the foundation of construction sites and bypasses (Industrial and Civil Engineering or State System of Industrial Automation Equipment) with transportation for a distance up to 5 km to shoulders;
- return of fertile soil layers.

Before putting a fertile layer on a planned surface it is necessary to make deep subsoil loosening.

This measure contributes to better connection of an applied fertile soil layer with a subsoil layer and facilitates the penetration of plants' roots into the subsoil layer.

The biological stage of reclamation of disturbed lands provides for agro-technical measures for fertility restoration of disturbed lands.

When carrying out the biological reclamation of disturbed lands grass sowing is provided for restoring a fertility and structure of soils. Use of perennial grasses is recommended for this purpose.

Soil tillage considering a limited volume of precipitations (in separate raions) and soil-and-climatic conditions of raions of the motor road location shall be conducted in accordance with agro-technology suitable for each raion. An increase in productivity of pastures must take place, first of all, due to effective agricultural methods application. Earlier spring harrowing and sowing of high-quality grasses are considered mainly.

Sowing of perennial grasses is recommended to make by grain-grass seeding machines.

Land reclamation ensures reduction in impact of disturbed soils on components of environment, atmosphere, surface and ground water, soil, flora and fauna, favorably effects a human health and is aimed at ecological damage elimination.

The social-ecological result of reclamation lies in creation of favorable conditions for a human vital activity and functioning of ecological systems within an area of disturbed lands after their restoration.

9.7 A motor road impact on social and economic conditions of population life

The reconstructed motor road "Western China - Western Europe" with access to neighboring countries provides for traffic both of transit vehicles: interurban, intergovernmental and local.

A motor road is an integral part of the social environment. At present, when an issue of population employment is a high priority, the motor road will settle it partially through employment of local population for maintenance of the motor road. In recent years a number of recreation facilities for people (hotels), public catering facilities, automobile technical maintenance stations and automobile filling stations is increased along the road.

As for passenger and cargo transportation a motor road is the most optimal solution for adjacent raions, since it is not tied to a traffic schedule of transportation means (railroad, plane), that facilitates increase in volumes of

cargo traffic.

With an increase in volume of cargo traffic and improvement of transport-operating indices of the motor road, the role of the motor road will increase significantly in social and economic development of raions and in a population standard of living.

The reconstructed motor road does not affect nature-conservation zones and architectural monuments along its full length.

As a result of the project implementation a negative impact on the landscape, the natural complexes and social-household conditions for population, settlements adjacent to the motor road will not be made.

The reconstruction of the motor road will contribute to improvement of transport communication both inside of Kazakhstan and with neighboring and far countries.

9.8 Water consumption and sanitation

Calculation of water consumption for economic and household needs during reconstruction of the motor road is determined on the basis of the normative period of construction, quantity of water consumption per one worker, according to Construction Norms and Regulations of the Republic of Kazakhstan 4.01-02-2001 “Water supply. External pipe networks to facilities.

Stationary water supply sources are not required for the period of the motor road reconstruction. Water for construction brigades will be delivered by water carriers and shall be stored in special tanks and meet requirements of Construction Norms and Regulations of the Republic of Kazakhstan 3.01 .667-97 “Potable water "

On shift work sites it is necessary to provide a pit made of precast concrete rings with a diameter of 1,5 m and depth of not less than 2 m.

The bottom of the pit shall be concreted to prevent filtration of effluents into ground waters.

Effluents shall not be kept in the pit more than for 3-4 days. Effluents shall be disposed by a special vehicle to treatment facilities.

Need for water for technical needs during reconstruction of the motor road is connected to the technology of works implementation:

– for moistening of ground of a road bed and material of a subsoil layer;

– for an optimum humidity provision during compaction;

– for watering of a crushed stone foundation to decrease friction between granules and mixing of concrete;

– for decreasing of dust formation on a temporary bypass road. After compaction of material and mixing of concrete water evaporates into the ambient atmosphere without pollution.

Places for taking potable water and water for technical needs should be agreed with the concerned agencies and sanitary-epidemiological services at the detailed design stage. A required volume of water for potable, household and technical needs will be determined in the course of the detailed design.

9.9 Safety measures and labor protection during the motor road reconstruction

1. Main section

When implementing works it is necessary to observe relevant sectoral and departmental regulations for safety and industrial sanitation. The design solutions for reconstruction of the motor road are accepted in accordance with the acting normative and design documents on transport construction, which cover activities for protection of nature, environment, labor and safety measures. When carrying out works it is necessary to observe requirements of Construction Norms and Regulations of the Republic of Kazakhstan 1.03-05-2001 "Safety engineering in construction ".

As for road construction "Safety regulations during construction, repair and maintenance of automobile motor roads", "Regulations for safety and industrial sanitation during construction of bridges and pipes" are in force. When carrying out road construction works it is necessary to use "Safety regulations" for each construction machine.

This Feasibility Study provides for activities for safety provision. The Contractor shall be responsible for all these activities.

"Contractor" is obliged:

- to appoint a ТБОЗО engineer subordinate to the project management;
- to ensure mandatory preliminary and repeated instructions (inception and general) and on a work place;
- to ensure safety of a work site and a safety access to a work place;
- to undertake measures for elimination of emergency situations including the procedure of evacuation from a construction site;
- to ensure fire safety providing all construction sites with fire-control equipment and signaling;
- to ensure personal protective equipment (PPP) for protection of people from potential danger which may pose a threat for a head, eyes, arms, feet, body, namely:

- special uniform;
- special boots;
- glasses, respirators;
- helmet;
- dielectric and working mittens;
- soap;
- milk;
- the first-aid kit.

Individual protective means shall meet requirements of relevant GOSTs (State Standards) (an apron according to GOST 12.4.029, rubber mittens according to GOST 20010, a respirator of the “Lepestok” (Petal) type according to GOST 12.4.028, gloves according to GOST 12.4.010, glasses according to GOST 12.4.013, anti-gas B and V masks with a filter, helmets).

The Contractor shall be responsible for provision and maintenance of the facilities of construction sites including, without limitation, conditions for supply of electricity, water, compressed air, provision of communication, temporary disposal of wastewater and sewerage.

The site shall be kept in safe, clean and good sanitary conditions. The responsibility for removal of garbage, construction and household wastes from sites to a solid waste disposal area shall be taken by the Contractor. At that the Contractor shall follow the requirements of the Sanitary Norms and Regulations No. 3.01 .016.97.

Besides, it is necessary to carry out a regular technical inspection of machines and equipment for the purpose of determination of their technical operability and observance of repair periods, safety and work method training and instruction of workers engaged in maintenance of machines, mechanisms and equipment. Protective measures with respect to equipment are also important for prevention of injuries and accidents. This equipment includes:

- vehicles,
- pumps, compressors,
- generators, crushing equipment,
- hoisting equipment (cranes, hoists, ropes, conveyers),
- electrical equipment.

For provision of sanitary-household conditions for builders, it is necessary to organize a field camp made of mobile cars: wardrobes, rooms for drying, washrooms, shower rooms, premises for warming of workers, dining rooms, lavatory, office for a foreman, room for rest, area for machinery and waste disposal area. A room for rest shall be provided with information on safety measures, labor protection and production and everyday sanitation. Construction sites and field camps shall be provided with first-aid kits with drugs, means for first aid provision, potable water and water for technical needs, which shall be stored in separate tanks.

Potable water shall be kept at the distance of not more than 75 m from a place of work. A permit for water-use shall be obtained from sanitary-epidemiological services and meet requirements of Sanitary and Epidemiological Standards and Regulations No. 3.02.002.04, Almaty, 2005.

Location of field camps shall be coordinated with agencies of land-management services and agencies of the State Sanitary and Epidemiological Supervision.

As for self-propelled and trailing road machines with long gripping devices the first-aid kits shall be in a driver's cab. Medical services are compulsory requirements for the Contractor. The most important of medical services are as follows:

- rendering of acute care to an injured person on a construction site;
- provision of adequate and rapid transportation to the nearest hospital and support of an injured person during transportation.

Primary obligations of the Contractor are subdivided into medical services, services in emergency accidents, transportation in case of serious accidents to the nearest hospital and financial support. During work implementation and elimination of imperfections it is necessary:

- to worry about safety of all colleagues on a construction site and to keep a site in order to avoid accidents;
- to provide lighting, railing, warning signs and fencing;
- to undertake all necessary measures for environmental protection on the construction site and beyond it in order to avoid injuries and other unpleasant consequences for people and their property which may take place because of air pollution, noise or any other reasons.
- all moving parts of machines and facilities, electricity cables and steam pipelines and also places of material delivery and finished products supply by machines shall be fenced properly. Facilities where gas, steam emission and dust formation take place shall be equipped with protecting devices and ventilation.

All self-propelled and trailing machines shall be equipped with an audio and light signal system; At night shift work machines shall have front- and back-lights.

To avoid accidents not less than once a week it is necessary to check steel ropes and chains as well as units of hydraulic systems of machines.

For trailing machines arbitrary uncoupling from a tractor shall be excluded.

2. Safety regulations when operating road machinery

The road machinery shall be allowed to be operated by the workers not younger than 18 years old, who have the license for operating such machine and know the requirements to the safety of works.

Before beginning the works a thorough examination shall be done of the engine, transmission, operating units, hookup mechanisms, levers and control elements, measuring meters, illumination and signal equipment, and also presence of inventory equipment, tools and spare parts. The machine must be stopped upon the detection of any malfunction.

It shall be forbidden to operate a faulty machine. During stoppage, repair and transportation of road machinery, measures shall be taken to prevent their spontaneous displacement and overthrow.

Works at night must be carried out with the artificial lighting in accordance with the standards of the electrical illumination for construction and installation works. Regardless of the illumination of places and sections of work, machinery shall have their own illumination of operating units and mechanisms of control. Road machinery and engines of installations shall be filled with fuel and lubricants on a horizontal area with the natural or electrical illumination from the network or the storage batteries. When filling the machinery with fuel it is forbidden to smoke, to ignite matches and to use kerosene lamps or other sources of the free flame.

Filling with ethanol shall be allowed only at the filling stations. All other methods of filling in this case are strictly forbidden.

The operation of two or several self-propelled or trailer machines moving in a single line, including stagger formation or V formation, shall be allowed with observance of the minimum distance between them:

Scrapers, graders when compacting the subgrade ..... 2 m

Rollers when compacting road pavements ..... 5 m

Asphalt paver and roller 5m
Concrete-laying and road finishing machines.....10 m
Other machinery.....20 m

Self-propelled and trailer road machines shall not approach the edge of the dumped embankment or a verge of the subgrade for less than:

Tractor with compaction plate 0,5m
Excavator with compaction plate ....…...3,0m
Graders and motor graders ..... 1,0 m
Scrapers to the verge of the embankment..... 1,0 m
To the top slope of excavation .....:. ..... 0,5 m
Spreaders of the crushed stone, gravel, sand 1,0m

The decrease of vibration depends on the technical state of the machinery. During the works it is necessary to observe the operating mode of the vibrating machines, vibration of which shall comply with the sanitary standard. Two regulated stops are recommended for that.

To improve protective properties of organism, working capacity and working activity there shall be used special complexes of industrial gymnastics, vitamin care.

3 Safety measures when working with the tools

All tools - pneumatic, electrified and manual – shall be stored in the storerooms on the shelves. When transporting or carrying-over, sharp parts of the tools should be protected by the cases or other methods.

It is forbidden to give defective or unexamined tools for work. It is forbidden to leave the mechanical tools, connected to the electricity or the conduits of the compressed air without control; to stretch and to bend cables and air-duct hoses; to install cables and hoses with crossing them with wires, conductor lines, to take by hands the revolving parts of the mechanized tools.

4 Storage of fuel and chemicals

All fuels and chemicals shall be stored in the specific place obligatory fenced with the barbed wire. The place of storage shall be located far from the sources of water and depressed places.

The area and the protected territory shall be convenient and ensure the placement of tanks with the capacity for the fuel 110% of the necessary quantity.

Filling and unloading shall be strictly controlled and carried out in accordance with the set procedure.

All gates and taps shall be protected from undesirable interference and vandalism and shall easily be shut and opened, when they are used. The interior of the tanks shall be clean.

Measurement shall be carried out in such a way that the influence of moisture or water would not be considered.

5. **Basic safety regulations when operating Asphalt Plant**

Before commissioning the equipment of the plant, the running order of all moving aggregates and engines shall be examined and the presence of the service personnel at their work places shall be controlled. A signal shall be given before the start.

For the ignition of the injectors when there is no automatic ignition it is necessary to have a special torch; when starting and regulating the injectors a filler screen of the fire-proof material shall be installed.

In the absence of the automatic control system at the asphalt plant and cement-concrete plant, the workers of the storages for rock materials, mineral powder and cement as well as the weighers and injecting men shall be supplied with the protective spectacles.

All bituminous taps should be opened gradually. The places, contaminated by bitumen, shall be regularly cleaned and sanded. Inspection and repair of drying drums and mixers shall be allowed only after their total stoppage, and drums after their cooling.

At the asphalt plants and cement-concrete plants there shall be ensured dedusting of all joints of the installations and materials transfer units as well as exhausting of dust and gas with the exhaust ventilation and special dust collectors.

It is necessary periodically to check the availability and safety of all installed barriers at the machinery and installations of the asphalt and cement-concrete plants.

Bitumen reservoirs at the asphalt plant shall be fenced and protected by shed, and the hatches of bitumen heaters and feeding chambers – tanks either closed fast or equipped with safety cages and covers.

Upon sudden stoppage of one machine of the technological complex

the rest of the aggregates and mechanisms shall be stopped immediately, first in the direction from the point of the load of machine, and then to the unit of unloading ready mixture. The start-up after such stoppage shall be allowed only upon instruction of the shift operator.

On automated asphalt and cement-concrete plants it is necessary at every shift to examine the state and proper working order of the entire system of automation (control equipment and control devices) and mechanisms of the local start-up of machines and devices.

ENVIRONMENTAL PROTECTION

(Technical specifications)

1. General

The Contractor shall undertake all necessary precautionary measures and guarantee, that the fulfillment of works and all related activities at the site or off-site works are carried out in accordance with the standards and rules, the relating to the requirements of environmental protection, established by the law, including those specified in other chapters of this document.

The Contractor shall undertake all precautionary measures in order to avoid any unpleasant noise or vibration resulted from the execution of works. This shall be done everywhere, where it is possible to suppress the noise at its source easier than in other places.

These clauses shall not be fulfilled in whole, if it is required for the immediate works in a critical state when it is necessary to save a life or property or for the purposes of the safety of Works.

Where any wastes, fragments or deposits of mud from the Sites are stored at any adjacent territory, the Contractor shall immediately remove all such garbage in order to clean the site and to restore the damaged area, thus, bringing it to initial state for the satisfaction of the Engineer.

When representing the Program based on the technical specifications, the Contractor shall present the plan to mitigate the effect of the construction on the environment and the ecological monitoring. If the conditions of the Program on the protection of environment are not observed, the Engineer for supervision of the construction shall be entitled to stop the work of the Contractor. Control of the execution of the environmental guide the activity of entire personnel and report to the Engineer for the supervision.

1.1. Storage of fuel and chemicals

All fuels and chemicals shall be stored in the specific place obligatory fenced with the barbed wire. The place of storage shall be located far from the sources of water and depressed places.

The area and the protected territory shall be convenient and ensure the placement of tanks with the capacity for the fuel 110% of the necessary quantity.

Filling and unloading shall be strictly controlled and carried out in accordance with the set procedure.

All gates and taps shall be protected from undesirable interference and vandalism and shall easily be shut and opened, when they are used.

The interior of the tanks shall be clean.

Measurement shall be carried out in such a way that the influence of moisture or water would not be considered.

1.2. Quality of water

The Contractor shall prevent any interference related to the depletion or pollution of the available water resources (including the underground filtering water) as a result the fulfillment of Works.

The areas, where the water is regularly or periodically used for dedusting (including without the limitation the stockpiles at the concrete and asphalt plants) will be watered from specially designed reservoirs, which allow to regulate the force and spreading of the stream. After regulation the water can be repeatedly used for dedusting and irrigation.

All water and other liquid waste shall be collected and diverted to the special place or from the Sites using the method, which shall not cause noise or pollution.

– The Contractor shall not be released from any responsibility for contaminating water with any substances or materials resulted from the execution of Works, except for based on the authorization of the Engineer and authorities concerned with this issue.

– The Contractor shall always guarantee, what all existing river beds and drainages within the Site and adjacent areas - will be preserved and protected from any fragments and any materials resulted from the Works.

– The Contractor shall protect all river beds, waterways, ditches, channels, drainages, lakes and so forth from the pollution, silting, flooding or erosions as

a result of the fulfillment of Works.

The Contractor shall present for consideration the details of its temporary drainage system (including all surface channels, settling ponds, washing ponds and water-lowering wells) to the Engineer for the approval prior ot the start of Works at the Site.

1.3.Quality of air

The Contractor shall use such devices and methods of work so as to minimize the emission of dust, gas or emission of other substances and to carry the works out in a way to minimize unfavorable impact on the quality of air.

The Contractor shall ensure effective spraying of water during delivery and loading of the materials which particularly creates the dust and shall moisten materials during dry and windy weather.

The Contractor shall use an effective system of cleaning with water streams during delivery and treatment of the materials, when the appearance of dust is probable, and the stockpiles of the stored up materials shall be moistened during dry and windy weather. The stockpiles of loose material shall be covered with a clean tarpaulin, with spreading water in dry and windy weather. The stockpiles of the material or construction garbage shall be moistened prior their transportation, except for the cases, when this contradicts the Specification.

Any transport vehicle with the open body used for transportation and potentially creating dust, shall have the appropriate side devices and back header. Potentially dust-forming materials shall not be loaded to the level higher than the side and back headers and shall be covered with a clean tarpaulin in a good state. The tarpaulin shall be properly fixed and extended, at least 300 m m each side and to the back.

It shall not be permitted during strong winds for the dust to spread at the distance over 200 m from the storage places in the direction of the wind.

The transport vehicles and equipment of the Contractor shall be maintained in a good working order, the engines shall be switched off, when they are not used. The proposed methods of measurement shall consider the maximum service life of the transport vehicles, machinery and plants and the Contractor shall include the details of such measurements with regard to the delivery and use of equipment which are provided to the Engineer in line with the Contract Conditions.

In the residential areas or other critical places, such as kindergartens, hospitals and so forth, preliminary permission shall be obtained from the responsible persons so as to determine the measures that shall be undertaken prior to start of the Works.

1.4. Noise

The Contractor shall consider the noise as the factor of environment and limit its value when planning and fulfilling the Works.

The Contractor shall use plants and equipment corresponding to the International standards and to the requirements with respect to the noise and vibration and shall include the results of the measurements of the expected noise in the plan of delivery and use of the equipment, which shall be provided to the Engineer in accordance with the Contract Conditions. The Contractor shall take all necessary measures in order to guarantee, that the work of the entire machinery during construction at the Site and next to it will not produce any unnecessary or excessive noise, taking into account applicable requirements on the protection of environment. The Contractor shall use all necessary measures and shall maintain all installations and equipment, which decreases noise, in a good state in order to minimize noise emission when carrying out the Works.

When works are executed in such critical areas such as residential, kindergartens or medical institutions, the working hours of the Contractor shall be limited from 8 in the morning till 8 in the evening.

1.5. Earthworks

The surpluses of excavated soil or topsoil resulted from excavation of side borrow pits, quarries or other areas shall be approved by the Engineer. Such materials shall be used provided no erosion will take place and the vegetation that covered the surface before would be restored.

1.6. Preservation of the ancient values

The Contractor shall take all necessary measures in order to protect any antiquarian or archeological items as per the Conditions of the Contract.

When the ancient monuments are shown on the drawings or marked by any other method during the execution of works, they shall be protected with the use of the acceptable fences or the barriers for the satisfaction of Engineer. Contractor shall maintain and ensure access for the persons responsible for

preservation of the monument.

1.7 Environmental protection measures

Upon the completion of all works the Contractor shall restore all places taking into account natural vegetation for the satisfaction of the Engineer. Contractor shall remove all old tires and disks outside the right-of-way to the places agreed upon with the owners of the land, to additional places at the distance not less than 75m from the roads axis. Contractor shall stockpile all materials by the method approved by the Engineer.

Where it is indicated by the Engineer, the Contractor shall improve and restore the lands within the right-of-way established for displacing all soils and ground in accordance with the natural earth's surface and restore the natural vegetation, where it is required. All soils and utilized materials shall be stored in the places approved by the Engineer.

CONCLUSIONS

The evaluation of the impact on the environment by the design decisions taken shall be conducted at all stages of the life cycle of the construction, from the substantiation of investments and allocation of land to the operation of the road. EIA shall be based on the forecasts of ecological consequences resulted from the changes of the environment as a result of reconstruction and operation of the road. However, the concept "environment" shall include all factors, which influence the conditions of the vital activity of a man and his health: clean air, water, soil, flora and fauna and also socio-economic conditions.

When preparing the Section "Environmental impact assessment" the TOR of the motor road "West China - Western Europe" there were envisaged measures to eliminate negative consequences of the reconstruction of the motor road on the natural environment and socio-economic conditions of the society.

The project for the reconstruction of the motor road envisages:

- Construction of the road pavement of capital type;
- Construction of new culverts;
- repair and construction of new bridges;
- improvement in the transport-operational qualities of the motor road via changing cross profiles of the motor road and improving the quality of the road pavement;
- organization of measures of traffic safety;

- road furniture;
- restoration of temporarily damaged lands.

Based on the aforesaid, the reconstruction of the motor road will improve socio-economic conditions of the population of the region by improving traffic.

All structural elements of the motor road shall be done to prevent erosion.

The implementation of the project will result in improvement of traffic safety by regulating the traffic with the road furniture measures.

The results of the conducted estimation of the noise level show no excess of the sanitary norms.

The boundary of the maximum permissible concentrations of harmful substances from the emissions of motor transport is located within the reserve - technological zone.

Construction of new waterproofing and coating, water-collecting chutes at the beginning and end of the bridge on the bridge passages prevents the leakage of the contaminated water in the river beds.

The reconstruction of the motor road will not have significant impact on the flora and fauna.

The losses of agriculture due to occupation of lands into permanent and temporary use are taken into account.

The losses for taking lands from private individuals, removal of structures and gardening plots were calculated at the market price.

When designing the reconstruction of the motor road the requirements of normative and technical documentation was taken into account.

The developed measures will increase the aesthetical state of the motor road.

Consequently, all measures, foreseen in this project with regard to reduction of the negative impact on the environment will promote improvement of ecological conditions of the area of the motor road location.

Contractor shall guarantee the fulfillment of all works in accordance with the standards and rules, that relate to the requirements of environmental protection, according to the laws of the Republic of Kazakhstan, as per the accompanying technical specification on the protection of environment.

Note: All BOQs, calculations of emissions, agreements are attached.

LIST OF THE LITERATURE USED

1 SNIP RK of 3.03-09-2003 "Motor roads", Additions and changes to SNIP RK 3.03-09-2003, Astana 2005

2 SN RK 3.03. - 02 2001 "Norms for allotment of lands for motor roads" Astana, 2002

3 Laws of the Republic of Kazakhstan:

- "On oil and use of mineral resources", 2005
- "On motor roads"
- "On sanitary and epidemiological welfare of the population"

4 Codes of the Republic of Kazakhstan

- Ecological code of 2007
- Land code of 2003
- Forest code of 2001
- Water code of 2001

5 Instruction on the procedure for considering factors which influence environment when designing motor roads and road structures. The Ministry of transport and communications of the Republic of Kazakhstan, Almaty, 1997.

6 Instruction on the procedure for development, agreement, approval of the design-estimate documentation for the construction of enterprises, buildings and structures. SNIP RK. 2.2-1 2001, Almaty

7 Instruction on the protection of environment when constructing, repairing and maintaining motor roads in the Republic of Kazakhstan PR RK 2 18-21-02

8 Instruction on assessing the impact of the planned economic and other activity on the environment when preparing of preplanned, pre-design and design documentation, Astana 2005.

9 Nature conservation. Atmosphere. Determination of the parameters of the emission of lead, zinc, copper and compounds, STRK 1052-2002, Astana

10 Concept of ecological safety of the Republic of Kazakhstan, Astana, 2003

11 Collection of sanitary rules and norms for utilities hygiene, Almaty, 1998
12 Collection of normative documents. Part 1 Protection of atmospheric air
13 Methodology for determining payments for the pollution of atmospheric air by mobile sources, Almaty, 1997
14 Soils of Kazakh SSR
15 Guidelines on designing restoration of the damaged soils and soils being damaged in the Republic of Kazakhstan, GosNPTszem, 1993
16 "General requirements on the restoration of soils" GOST 17.5.3.04 - 83
17 Requirements to determining standards for removal of the topsoil. GOST 17.5.3.06 - 85
18 Resolution of the Government of the Republic of Kazakhstan dated October 8 2003 "On approval of the norms for compensation of the losses of agricultural and forestry production, caused by withdrawal of agricultural and forest lands for their use for purposes, not related to agriculture or forestry and rules for compensation of the losses of agricultural production with the offset of the amounts spent of restoration of the lands.
19 Price list for separate works on land management and Land cadastre, Astana 2003
20 Requirements and guidelines for using environmental control system, GOST RISO 14001-98
21 Sanitary and epidemiological requirements to the protection of surface water from pollution. No 3.02.003.04
22 Sanitary and epidemiological rules and norms "Sanitary and epidemiological requirements to the design of the production facilities", No 3792 17.08.05
23 "Sanitary and hygiene requirements to the quality of water of drinking water supply", Almaty 2005
24 Organization of construction production SNIP 3.01.01.85. Moscow 1990
25 Recommendations for consideration of requirements to environment protection when designing motor roads and bridges passes, Moscow, 1995
26 Instruction for agreement and issue of permission for special water use in the Republic of Kazakhstan, 2004.
27 Water supply and external networks and structures SNIP RK 4.01.02-2001

Information on availability of software

for estimating the concentrations produced

CREDO - program set for processing engineering surveys, digital simulation of the locality, design of master plans and motor roads. Volume 5 CAD CREDO - design of motor roads, Book 1. Supplement to Book 1. Chapter 38 “Design of ecological measures”, Minsk 2000.

GND methodology (Voyeykova), Methodological instructions for estimating emissions of pollutants in the atmosphere of the enterprises of construction industry