

Environmental Assessment Report

Summary Environmental Impact Assessment
Project Number: 41121
May 2009

Kazakhstan: Multitranche Financing Facility for the CAREC Transport Corridor 1 (Zhambyl Oblast Section) Investment Program—Tranche 2

Prepared by the Ministry of Transport and Communications for the Asian Development Bank (ADB).

The summary environmental impact assessment is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

CURRENCY EQUIVALENTS

(as of 22 May 2009)

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

ABBREVIATIONS

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

NOTE

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

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I. INTRODUCTION

1. The CAREC¹ Transport Corridor I Investment Program, also known as the Western Europe–Western People’s Republic of China (PRC) Transit Corridor Investment Program, aims to provide a year-round road transport link from the border of western PRC to western Europe. Work on about 100 kilometers (km) of this network—which passes through the South-West Corridor in Zhambyl Oblast, Kazakhstan—will be financed by the Asian Development Bank (ADB) through a multitranche financing facility approved in November 2008. Tranche 2 (the Project) has been classified as Category A in accordance with *ADB Environmental Assessment Guidelines* (2003). This summary environmental assessment impact (EIA) report was prepared, with the assistance of a technical consultant and a local team of experts; based on two field surveys, stakeholder consultations, evaluation of recent public consultation meetings, and other primary and secondary information.

2. The Project’s principal activities are to rehabilitate the existing alignment and to construct one new bypass in Kulan. Other components include institutional strengthening, creation of an intelligent transport system, and road maintenance system improvement. The Executing Agency (EA) is the Ministry of Transport and Communications (MOTC), with its Implementing Agency (IA) being the Committee for Roads in Zhambyl Oblast.

3. Initial assessment activities included (i) review of the legal and administrative framework for the Project, (ii) review of associated national standards and norms, (iii) review of national procedures for environmental assessment, (iv) screening of anticipated positive and negative impacts, and (v) review of existing documents. This report has taken the framework analysis of the August 2008 environmental assessment review into due consideration.

II. DESCRIPTION OF THE PROJECT

4. The needs and justifications for the Project are (i) political, concerning the completion and rehabilitation of the road transport link between western PRC and western Europe; (ii) technical, given the unsafe conditions of many road sections along this corridor; (iii) linked to the traffic volume prognosis for the next 5 years; (iv) economic, as it will boost regional development and provide more efficient means of transport for goods and people; and (v) overall benefits resulting from reliable connectivity to markets and facilities. The Project has other tangible benefits, such as employment opportunities for local population, improvement of the ambient air and noise climate, better road safety, savings in travel costs and times, and the strengthening of institutional capacity.

5. The Project involves road widening, carriageway strengthening, and bridge and culvert replacement along the aforementioned 100 km. Upgrading will be confined within the existing 40–60 meter (m) right-of-way, and the main working width will be 8–10 m, centered over the existing carriageway. Construction and movement of materials must connect to communities along the corridor and, therefore, several at-grade intersections. Four interchanges will be built. To ease traffic congestion near Kulan and adjacent settlements, a 21 km bypass will be added, involving 14.8 km of construction. Rehabilitation work will require 1.2 million cubic meters (m³) of earthworks for subgrade, shoulder, and carriageway repair. Site work is expected to commence in early 2010, with actual work progressing for 33 months.

¹ Central Asia Regional Economic Cooperation.

6. The Project has three nonphysical components: (i) development of an intelligent transport system, including traffic surveillance, traffic control, axle-load monitoring, road condition forecasts, and electronic signs; (ii) improvement of the road maintenance system; and (iii) capacity development for strengthening environmental safeguard provisions, involving institutional support and training programs to address all environmental protection aspects related to design, construction, and operation of the road network.

III. DESCRIPTION OF THE ENVIRONMENT

7. **Topography and Geology.** The topography of the land through which the road network will pass includes mostly flat steppe landscape and slightly undulating terrain in areas close to the foothills of the Tian Shan Mountains. The eastern road section is part of a broad alluvial plain following the Shu River, which flows to the northwest from Kyrgyz Republic. The steppe flatland soil consists of sandy loam and gravel, while dry riverbeds contain unconsolidated aggregate deposits. These materials are sufficient for the planned embankment rehabilitation. The absolute altitudes of the road corridor range from 594 to 736 m above sea level.

8. **Climate.** The climate in the project area is generally temperate and continental. Temperatures are hot in the summer, reaching past 30° Celsius (C); in winter, they fall well below freezing to as low as -25°C. Part of the corridor, close to the mountains, has unpredictable weather with severe rainstorms in the summer and blizzards in the winter, creating hazardous road conditions. Being at about 44° North latitude, the area has approximately 8 hours of daylight in the winter and 16 hours in full summer.

9. Springs are short and warm, with frequent cold spells and frost occurring until late May. The frost-free period lasts a minimum of 160 days, then autumn is dry and warm. The warmest months are July (with an average temperature of 23.8°C) and August (with an average temperature of 22.3°C), and the coldest month is January (with an average temperature of -6.6°C). Absolute peak values recorded over the past two decades are a summer maximum of 44°C and a winter minimum of -40°C. The average annual precipitation ranges from 360 to 465 millimeters (mm), whereby 187–252 mm falls during the warm period (April–September). Extended drought periods have been more frequent during recent years. At the end of winter, the soil freezes to depths of up to 1.3 m, strongly affecting local road conditions and maintenance.

10. Southerly winds prevail in the entire area. Wind speeds range from 3 to 7 m per second, with strong winds (i.e., greater than 10 m per second) occurring mostly during spring months. Winds frequently develop into dust storms, which considerably impact living and driving conditions. Occasionally hot dry winds, blowing from the south, can increase the ambient temperature up to 10°C within a few hours. During February and March, strong blizzards from the southwest and south frequently blow over the vast plains.

11. **Air Quality and Noise.** Air quality in the project area is not well documented. Modeling results from the preliminary EIA prepared by the MOTC indicate roadside levels of carbon monoxide, hydrocarbon, and soot within Kazakhstan norms, while nitrogen oxide and lead show levels that exceed them. These levels need to be verified and addressed during the project implementation. Lead, most likely concentrated in aerosols as well as in soils adjacent to road shoulders, were a concern in the environmental management plan (EMP), as highly contaminated air, water, and soil are detrimental to human health. Secondary risks need also to be addressed, as lead contaminates drinking water and enters the food chain through agricultural products originating from croplands near the road network. In addition, noise level

data need to be verified during EMP implementation. Traffic volume, high vehicle speed, fleet mix, and frequent accelerations and decelerations suggest higher values than those calculated in the preliminary EIA.

12. **Surface Water Resources.** The road section crosses many small creeks and three rivers. A wide net of irrigation channels is located in the project area, requiring the replacement of 108 culverts and four bridges. The Shu River is the largest river, and it crosses the road some 25 km west of the project start near Blagoveshchensk. It receives Bishkek's raw sewage in a large discharge canal as well as untreated industrial waste before flowing into Kazakhstan. Along the way to Kazakhstan, there is considerable diversion and intensive agriculture, reducing the flow and further contaminating the water. The water quality of the other slowly flowing creeks and rivers has been partly degraded, indicating pesticide use. These surface waters also show elevated concentrations of lead, phenols, and hydrocarbons, at times exceeding permissible levels. Many of the smaller surface waters dry up at the end of the summer.

13. **Groundwater Resources.** Groundwater aquifers occur at two levels. The shallow groundwater aquifer is 1–2 m below the surface and is affected by surface water contamination originating from storm water runoff and drain water from croplands. The deep groundwater aquifer, located 20–30 m below the surface, remains most likely unaffected by the planned road works since there will be no pile driving or deep excavation. However, groundwater quality data must be retested and verified during construction activities.

14. **Seismicity.** The road corridor is part of a tectonic depression. According to seismic risk zoning of Kazakhstan, regional seismicity can reach magnitudes of up to 8 on the open Richter scale. The most recent seismic event was on 24 May 2003, with its epicenter located near Kulan. Records show it reached about 8 on the Richter scale, destroying houses and utilities and spurring a series of local flood events.

15. **Ecological Resources.** Such resources are not highly developed in the project area due to the geomorphologic uniformity. Steppe habitats are prevailing, with scattered (seasonal) wetlands developing in depressions and along roads. The area is occasionally used by migratory birds (flyway to Siberia). Natural forests are absent, but their ecological function has been resumed by extensive roadside plantations. Ash, elm, and poplar are the predominant trees.

16. Wildlife is typical for a Central Asian steppe and grassland biotopes, with few rare or endangered species. According to the environmental department in the city of Taraz, no such species have been seen in the project area. The wetlands do have more enhanced biodiversity, mainly waterfowl and reed grasses. Local fish faunas seem well developed and are used in recreational fishing activities. Some fish are migratory, whose populations peak in May. No sensitive habitats or areas exist under criteria specified in the Ramsar Convention or as protected areas within a 100 km distance of the road.

17. **Economic Resources and Development.** Although Zhambyl Oblast is rich in minerals (e.g., phosphates, fluor spar, gold, and copper), there is no heavy industry along the road sections. Main local industries operate in the food and dairy product sectors and are located near the cities of Merke and Kulan. Electric power is supplied in sufficient quantities—but at irregular schedules—to the settlements in and near the road corridor. Drinking water is from piped sources tapping mountain spring waters or from deep communal or home wells (65%), which provides low-quality water.

18. **Transport.** The project area is well served by the national railway system, with almost every town and village having a railway station. Currently, most large volumes of dry goods and bulk items are shipped by rail. The passenger bus system needs improvement in terms of reliability, security, passenger bays, and connections. The regional road network is poorly developed. Feeder roads are commonly dirt tracks.

19. **Sewage Treatment.** Only government buildings in Kulan and Merke are connected to a communal canalization system leading to local treatment plants. The vast majority of sewage treatment is via pit privies and septic tanks, with much of the waste being disposed manually after cleaning the privy storage tanks. Sewage is usually buried, as there is no tradition of using these materials as fertilizer. About 90% of households in the road corridor rely on outdoor plumbing, and in winter, they must haul and heat water for consumption, cooking, and washing.

20. **Demography.** In 2007, the population of Zhambyl Oblast was about 1 million, with a density of about 7.0 people per square kilometer (km²). Turar Ryskulov District has a population of 61,000 people, with a density of 6.7 people per km². Merke has 73,300 inhabitants, with 10.4 people per km². The population comprises predominantly Kazakh ethnic groups (64.8%), with Russians (18.1%) being the next largest group, followed by Uzbeks (2.3%), Tatars (1.3%), and Germans (1.2%).

21. **Employment.** The employment situation in the project area is poor. Statistical information retrieved from local authorities also indicates a high level of poverty among the local population, showing that almost every fourth person in Zhambyl Oblast lives below the nationally acknowledged minimum subsistence level.

22. **Land Use and Life Quality.** The prevailing land-use form is livestock raising (e.g., cattle, sheep, and goats); herding of horses; and crop farming. Crops are mainly fodder plants, wheat, and maize. Almost all rural homesteads have small horticulture gardens, growing common vegetables for self-consumption. Private land ownership is rare; most rural residents have medium-termed land-lease agreements from the time when collective farms were dissolved.

23. Life in villages and towns within the road corridor is harsh. Food provision and quality is basic. Housing standards are medium to basic, depending on the area's remoteness. Heating is often done with collection of dry and green wood, which is often illegally obtained from roadside plantations. Most rural residences have outdoor latrine pits, and house roofs are covered with corrugated iron and/or asbestos sheets. During the winter, it is difficult to reach the main road and (school) bus services, with feeder roads often impassable due to ice and excessive mud.

24. No official records could be retrieved that would disclose the type and frequency of crime, drug use, smuggling, or trafficking.

25. **Health.** The project area reflects poor health care and associated facilities. The clinic in Merke has limited capacity, and there are chronic shortages of nurses and midwives at the village level. There is a relatively high level of deaths due to poor health conditions; tuberculosis and anthrax are common diseases. Alarming figures, derived from official statistics, reveal a high newborn mortality rate as well as high numbers of diabetes, heart attacks, and cancer. No information could be obtained on which type of cancer is the most common. There were no records of patients hospitalized due to typical symptoms of lead poisoning. There were also no official records available on HIV/AIDS cases in the region.

26. **Education.** Secondary education is mandatory for all children under than 18 years of age. In Zhambyl Oblast, there are 476 schools with 204,500 students; 28 colleges with 24,100 students; and 5 higher education institutions and universities with 37,300 students. Most higher education institutions are located in Taraz. Most rural residents cannot afford higher education due to high annual tuition fees.

27. **Cultural Assets.** No cultural relics or historically important sites or assets will be disturbed by the planned road improvements. There are about 10–14 roadside grave markers and graves of accident victims that need to be moved to accommodate the widening. While graveyards are visible from the road, they are more than 75 m from the edge of the carriageway.

IV. ALTERNATIVES

28. **The No-Project Option.** This option has been dismissed due to (i) it being against the prevailing political will, (ii) its incompatibility with the predicted increase in road traffic and transport volumes, (iii) the present poor condition of the road, (iv) various incremental disadvantages for the environment, local population, and economic development.

29. **Alternatives.** Alternatives were assessed, including those relating to railways, air travel, and other access roads. Given the infrastructure setting and enormous distances covered by the CAREC transport corridor, as well as traffic patterns and limited connectivity, a feasibility study prepared by the Government of Kazakhstan rejected the other transport modes as they appeared uneconomic. Road corridor development was given preference over the expansion and rehabilitation of the railway network, as it is more cost efficient; is faster to construct; serves local demands more flexibly; and is ultimately less complicated as the rail gage standards are not compatible among East Asian, Central Asian, Iranian and Central European systems, incurring much handling and processing of cargo. The railway alternative was also rejected due to the low quality of actual services and elevated risks for food cargo.

30. Alternative technical options were screened against costs and benefits, such as (i) retaining the same alignment, but upgrading the existing two-lane road into a four-lane dual carriageway by extending both sides from the center of the existing road; and (ii) constructing a completely new carriageway parallel to the existing road.

31. The first option has the advantage of enhanced safety during construction and operation, and less disruption to passing traffic during construction. This alternative would also minimize structure demolition, resettlement issues, and removal of trees and utilities. The construction of a new bypass at Kulan would facilitate traffic and improve the overall environment by reducing noise and air pollution. This option is also the most suitable for the anticipated increase in road-based traffic volume.² In comparison with the second option, the frequency and severity of anticipated environmental impacts were assessed to be lower and within acceptable and mitigable levels.

32. The second option was rejected by the planners due to the need for increased land acquisition, likely resettlement, and the relocation of an uncertain number of structures and

² The forecast model of cargo transport for the planned road network until 2020 indicated that traffic volume of the Project is likely to increase fourfold, while in the adjacent tranches, this increase is estimated to be even higher.

utilities. For this option, overall project costs would significantly increase, which was determined to be an unnecessary burden on the economy.

33. Concerning alternative solutions for the top structure of the new road, the planners followed the recommendation in the feasibility study and gave preference to asphalt concrete mix over pure asphalt topping, taken into account (i) reduced construction and transport costs; and (ii) better adaptability to the sometimes harsh local winter conditions, thus reducing repair and maintenance costs.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Potential Impacts during the Pre-Construction and Design Phase

34. After assessing the project corridor in regard to likely impacts, the EIA identifies several potential impacts related to the design phase of the Project. All identified aspects can effectively be averted or minimized by good planning practices, timely consultation with stakeholders and line agencies, and consideration of regional meteorological data and relevant statistics.

35. **Clearing of Roadside Vegetation.** Roadside shelterbelt trees often provide the only well-structured natural habitat in the project area. They act as natural barriers absorbing sandstorm and snowstorm impacts and, therefore, should be maintained to the maximum extent possible. These trees fall under the management of the Zhambyl Oblast territorial office of the Committee of Forestry and Hunting. During the detailed design stage, a cutting and replanting program will be developed and approved by the territorial office and included in contract specifications. Contractors will be required to limit cutting and to consult with the territorial office when necessary.

36. **Minimizing Land Acquisition.** A benefit analysis may reveal that existing neighboring junctions and access to the new bypass are sufficient and do not require extra expenditures for additional junctions in close vicinity.

37. **Formation Width, Embankment Height, and Animal Passages.** Engineering solutions may be flexible, taking into account possible habitat losses, blockage of canals and wetlands, and emergency bays. Where underpasses (for animal crossing and/or agricultural machinery) are planned, vertical profiling should be within the proposed limits to ensure road safety standards. Animal passage structures must be placed based on local consultations and observe sufficient dimensioning. Fencing of adjacent embankment sections also must be considered.

38. **Roadside Vending.** Special vending and parking bays must be included in the road design.

39. **Selection for Work Camps.** Site selection will avoid residential areas to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime).

40. **Impairment to Utilities and Services.** The Project may result in damages to utilities and disruption of services, inconveniencing local communities. Planning needs to address timely relocation and replacement of utilities and to ensure the unhindered continuation of services. Work camps must provide their own water supply, electricity, communications, and health care. In addition, a social mediator must be engaged, as special precautions and awareness campaigns will be needed regarding HIV/AIDS prevention.

41. **Cultural Assets.** To avoid any damage to sites of cultural or archaeological significance, an archaeological expert has been engaged to define any risks associated with such sites. All possible means to avoid interference have been included in the EIA.

42. **Indigenous Peoples.** The Project will not affect any ethnic minority that qualifies under ADB's definition of indigenous peoples.

43. **Change in Land Values.** The Project is expected to increase local land values, especially in the new bypass areas. Landowners will have an opportunity to sell their land at increased prices. This effect is estimated as a long-term, positive one.

B. Potential Impacts during the Construction Phase

44. **Traffic Hindrance and Congestion.** To address these problems and their multifold cumulative impacts, contractors will be responsible for good traffic management, i.e., providing suitable safety measures and signage, observing work hour restrictions, and consulting with local health facilities and traffic police. Temporary diversions will be announced in a timely manner and be furnished with all safety measures. A variety of provisions are included in the EMP to prevent and to mitigate any impacts on public services and utilities that may arise during construction activities. Care will also be taken to maintain the local market system and all religious, social, and cultural functions.

45. **Work Conditions, Health, and Safety.** The EMP includes comprehensive provisions for potential environmental, health, and safety concerns associated with work camps, borrow pits, earthworks, waste management, and communicable diseases. Special provisions relate to sanitation, health insurance, and health care. The health, safety, and environmental protection clauses will be an essential part of the technical specifications of bidding documents and work contracts. The contractors' construction environmental action plan will also detail the prevention of accidents involving the general public and propose adequate measures for rescue operations and medical care. The plan will also detail health and accident insurance for all workers. The contractors will be responsible for employing their own medical staff and for operating a small ambulance at the work sites. The contractors will implement safety measures to secure all installations from unauthorized intrusion and accident risks.

46. **Earthworks and Borrow Pit Operations.** Associated impacts and mitigative measures include proper handling and transport of materials, reuse of embankment fill and topsoil, aggregate site management, and prevention of water and soil pollution. Of concern are earthworks with potentially lead-contaminated soils. Special test programs have been devised to monitor such potential pollutants, and corrective measures will be provided in case such tests show lead concentrations exceeding permissible levels.

47. **Impacts Caused by Specific Construction Activities.** The EMP addresses particular environmental risks associated with the location and operation of asphalt mixing plants as well as work activities concerning bitumen and with concrete. Specific technical measures are detailed to contain or set off risks associated with asphalt mixing plants, such as siting in sufficient leeward locations of settlements, fitting filters and canvasses, and observing permitted operation periods. For bitumen works, impact control measures will include a variety of safety equipment and clothing, coat layering, and fire and spill prevention. Concrete works, particularly at bridge and culvert sites, will require observance of prescribed and environmentally safe use of spray waters, curing procedures, and additives, as well as the prevention of water pollution.

Stockpiling materials must be restricted in authorized and secured locations, preventing erosion, sedimentation, and spillage.

48. **Waste Management and Fuels.** Proper management of work camps and maintenance and storage areas is often a serious compliance issue. The contractors will ensure that no impacts occur associated with inadequate waste management, poor fuel handling, and insufficient site rehabilitation on completion. The contractors must ensure proper handling and management of all fuels and petroleum products, proper handling and disposal of sewage and garbage, and environmentally safe decommissioning of any temporary work area to near-preconstruction condition.

49. **Air Quality Management.** Air pollution and excessive dust are frequent complaints in construction work, caused by improper fleet maintenance, overloading of vehicles, poor dust suppression, waste burning, excessive speeding, and idling vehicles. To address these problems, an air quality monitoring schedule has been developed. In addition, contractors will be required to follow mitigative measures set forth in the EMP.

50. **Noise and Vibration Management.** Similarly, construction work often creates noise and vibrations from machinery. Health risks occur, particularly putting children and the elderly at risk. To minimize such effects, proposed measures include suitable site selection for noise and dust-producing machines like stone crushers; speed controls; regular service and maintenance; work hour and access restrictions at sensitive spots, such as schools and hospitals; and hearing protection devices for workers. If structures or private property are damaged by vibration effects, swift compensation and dispute settlement are recommended.

51. **Potential Impacts on Ecological Resources.** Construction activities may undeniably and irreversibly damage roadside habitats, wetlands, and other biological resources. Mitigation measures have been elaborated in the EMP to address habitat destruction and alteration through contamination with hazardous materials, blockage of channels with debris, excessive sedimentation, or disruption of drainage. Of concern is the development of waterlogged areas due to substandard execution of earthworks. Secondary and cumulative impacts, including those on public health, are diverse and discussed in the EIA. Meticulous preventive actions need be employed and monitored to avoid any impacts. Mitigation measures have been devised regarding bridge and culvert works. Of importance are regulations concerning transport, storage, securing, and application of such substances to be enumerated in the consultants' site and operational management plan. Any incidence of impacts on ecological resources needs to be immediately addressed and reported to local inspection departments.

52. **Sociocultural Conflicts and Crime.** Road construction work bears the risk of social tensions due to the influx of (foreign) workers, shortages in local amenities, increased crime rates, drug smuggling, and spread of sexually transmitted infections. Depending on the magnitude, most of these undesired effects could be permanent and cause various other impacts. The high employment rate, skills development, awareness campaigns, information leaflets for workers, regular check-ups, and a good relationship with local police are hoped to alleviate these issues.

53. **Gender Issues.** The contractors are obliged to observe gender equities in employment, particularly for unskilled labor. Special health care and maternity protection clauses must be incorporated in contracts for women. The contractors must also explore all means (e.g., awareness campaigns) to control prostitution and prevent human trafficking.

54. **Decommissioning of Sites.** Upon completion of work, the contractors will remove all structures, installations, and temporary diversions except where permitted otherwise. If and where directed by the engineer, the contractors will improve and reinstate the land used during their activities, remove all debris and contaminated soils, grade to natural ground levels, and reestablish natural vegetation where appropriate. All debris and contaminated materials will be disposed off-site as approved by an engineer and supervisor.

55. All safety provisions equally apply for subcontractors.

C. Potential Impacts during the Operation Phase

56. **Road Safety.** The improved carriageway and enhanced maintenance will result in both positive and negative impacts. Safety ranks among the principal concerns associated with the operation of the newly constructed road, due to speeding, overloading of trucks, and overtaking. If not properly fenced, the road may also be subject to considerable collision risks between road vehicles and crossing animals.

57. Additional measures to contain road accidents³ are proposed, such as road safety campaigns, traffic speed controls, electronic signage and warnings, improved winter service, introduction of a radio warning system on hazardous road conditions and congestion, and introduction of axle-load monitoring and control facilities.

58. Safe passenger crossings will be installed as and where necessary.

59. **Noise.** Due to increase in traffic volume, noise is expected to increase, an impact that is permanent and negative. Provision of adequate noise barriers such as hedges and indigenous trees will reduce the noise. Further improvements can be made by enforcing traffic laws to curb speeding and to test vehicles for noise emission, followed by mandatory technical clearance certificates.

60. **Ambient Air Quality.** The Project is likely to improve the overall air quality situation in the project area. After the completion of the Project, most of the settlements will be located at sufficient distance (e.g., less than 200 m) from the projected road alignment.

61. The generally improved road condition and smoother traffic flow will result in less wear and tear to vehicles. It will also result in less fuel consumption and emissions. However, in the longer term, increased traffic levels may lead to higher emissions.

62. **Economic Development.** The improved road conditions will promote better business opportunities such as new petrol pumps and several roadside facilities (e.g., hotels, restaurants, and shops). In addition, it will increase land value, benefiting local residents. These impacts are permanent and positive.

63. **Public Health and Social Integrity.** Highway construction and the development of long-term transit routes will likely lead to an increase in the transmission and spread of sexually transmitted infections, a potential impact that is permanent and negative. Public awareness

³ A fatality rate of 18 per 100,000 inhabitants was reported in 2004, caused by road accidents. The number of people killed between 2005 and 2007 has increased at an annual rate of more than 19%.

campaigns, information leaflets, and media programs focusing on HIV/AIDS transmission need to be considered as counteractive measures. These initiatives will be incorporated in the technical specifications and work contracts.

64. **Human Trafficking.** Kazakhstan is a source, transit, and destination country for human trafficking. Evidence of internal rural–urban trafficking is growing. The Project is not likely to affect current trafficking patterns, as it will not remove any significant transit barriers. However, once work on the entire corridor is completed, including Zhambyl Oblast, it may be seen by both human and drug traffickers as an attractive alternative to the prevailing south–north route. To deter such a transition, one element of the proposed public awareness program will focus on human and drug trafficking, encouraging civil society engagement to protect potential victims of trafficking and to aid efforts to detect traffickers.

D. Cumulative Impacts

65. The EIA analyzes the likelihood and severity of secondary and cumulative impacts stemming from those outlined previously, such as accident risks, air and noise pollution, lead-contaminated soil, disturbing the social fabric of roadside communities, biotope enhancement, and environmental awareness. The analysis indicates that none would be severe, as long as the proposed mitigation measures are observed.

VI. ECONOMIC ASSESSMENT

66. The Project will result in several tangible economic benefits, resulting from

- (i) lower vehicle operating costs and travel time due to improved road facility, reduced traffic congestion, and uninterrupted and smooth traffic flow;
- (ii) improved air quality in the project area as a result of fewer traffic jams and better road conditions due to upgrading the existing road and construction of a new bypass for Kulan and neighboring settlements;
- (iii) decreased detrimental effects on health, resulting in decreased medical costs and increased road safety;
- (iv) higher land values along the new road alignment; and
- (v) improved commercial activities in the project area, resulting in increased economic opportunities for residents, thus contributing to regional poverty alleviation.

VII. ENVIRONMENTAL MANAGEMENT PLAN

67. The EMP is attached as Appendix. It describes all measures and prevention activities corresponding to the anticipated impacts analyzed and summarized in the previous sections. For each activity, the EMP refers to the location of the main actions anticipated for the respective impact mitigation, and it identifies the respective location, time frame, and responsibilities for implementing and supervising the recommended actions. For each specific mitigation and monitoring activity, the EMP also provides the corresponding cost estimates.

68. The EA will employ supervision consultants and one liaison officer. These consultants will devise a site-specific monitoring program, using a set of objectively verifiable indicators against which actual observations and sampling results will be compared. These indicators will serve as the basis for appropriate countermeasures in cases of unacceptable conditions or effects.

69. The EMP proposed in the EIA will be made binding through inclusion as environmental clauses in the Loan Agreement between Kazakhstan and ADB, as well as in the technical specifications in the contract bid documents. The contractors will be responsible for implementing the identified mitigation measures during the construction stage and will be required to prepare construction environmental action plans, which may necessitate the employment of a short-term environmental safeguard specialist for assistance. This specialist will also review all mitigation and monitoring activities and ensure that they follow prespecified schedules and locations.

70. For specific management considerations and monitoring activities, it will be necessary to contract certified laboratories to carry out scheduled sampling programs for soil contamination (lead), water pollution, air quality, and noise development. In addition, a semigovernment agency (Kazakh AvtoDor) will be responsible for traffic count and compliance monitoring for the roadside tree replanting program.

71. Issues related to land acquisition and compensation for affected assets are not included in the EMP, as such activities are addressed by the land acquisition and resettlement plan.

72. **Institutional Capacity Building.** Institutional capacity building is an essential component of the EMP. Following a joint needs analysis with representatives from the Committee for Roads in Taraz, the Project will provide a training program to strengthen the staff's capacity in (i) environmental safeguard planning and monitoring, (ii) mitigation measures while addressing standard and specific issues and risks associated with road development programs, (iii) review of environmental planning documents, (iv) inclusion of protective measures and requirements into the technical specifications of work contracts, (v) inspection and supervision responsibilities and arrangements, (vi) environmental parameter sampling, (vii) verification indicators, (viii) addressing road safety issues, and (ix) environmental auditing and reporting.

73. The training program will include separate sessions of a few days' duration, and on-the-job training and visits to construction sites and work camps. The capacity building will include representatives from line agencies and the Project's winning contractors. As applicable, local traffic police and interested nongovernment organizations will also be invited to participate.

74. It is proposed that an initial orientation workshop will focus on policy and legal framework for including environmental safeguard procedures in road construction programs.

75. **Monitoring.** The monitoring plan has been prepared and the IA will undertake the monitoring system in line with the standard requirement of international financing institutions. Notwithstanding, the proposed mitigation measures will complement any monitoring and audits following internal rules, practices, and complaint and sanction mechanisms.

76. The monitoring plan is time-bound and oriented toward all ongoing construction work over a period of 30 months. Thereafter, in the operation phase, environmental management and monitoring will lay exclusively in the hands of the IA.

77. The prevailing techniques for both compliance and effects monitoring are based on a set of objectively verifiable indicators. Environmental monitoring will be carried out in close consultation with the environmental department's inspection unit in Taraz. Unannounced environmental inspections will occur and reports filed with the unit and IA if any issues appear.

78. Construction monitoring will deal mostly with (i) consultations (e.g., on access restriction, traffic congestion, and noise) with local residents prior to initiation of work that affects their livelihoods; (ii) execution and management of the tree replanting program; (iii) handling and delivery of construction materials; (iv) dust management at construction sites; (v) good housekeeping activities at construction sites, and (vi) potential damages to cultural, social, and environmental assets and values.

79. Operating period monitoring will concentrate on air quality in relation to the predicted traffic volume increase, noise level changes, and road safety. The sampling will be carried out by contracting a licensed laboratory in collaboration with the Zhambyl Oblast environmental department and will follow a prespecified schedule in selected locations.

80. An operational audit will be undertaken one year after work completion in a credible, transparent, and timely manner.

81. **Work Plan.** The EMP includes a work plan (bar chart) indicating the key activities for implementing the environmental safeguard requirements over the assumed construction period, including a staffing chart, proposed schedules, assigned responsibilities, and milestones such as reporting and delivery of training courses and awareness programs.

82. **Cost Estimates.** The total mitigation and monitoring cost, including additional costs related to recommendations forwarded to the designer, is estimated at \$1.45 million. This amount includes all mitigation, monitoring, and capacity-building activities, and all expenses related to environmental aspects during the project's implementation period.

83. **Reporting.** The project implementation unit will comply with ADB's reporting requirements, as shown in the work plan of the EMP, including one inception report, biannual progress reports, and one final report.

VIII. PUBLIC CONSULTATION AND DISCLOSURE

84. Several public consultation activities were carried out during project preparation. At the time of preparing the public consultations in January 2009, the detailed engineering design had been completed. Preparative steps for the venues included preidentification of stakeholders, public announcements in various media outlets, and invitation of key stakeholders, both from the Government and the private sector. Copies of the original announcements, invitations, and presentation materials are presented in the EIA.

85. The locations of the public meetings and the respective number of participants were

- (i) Merke, 12 January 2009, in Akimat House's conference room, with 29 participants; and
- (ii) Kulan, 13 January 2009, in Akimat House's conference room, with 40 participants.

86. The national experts hired for the public consultations took meeting minutes, including concerns raised and responses given. There was feedback to the designers, resulting in the redesign of safe and suitable cattle passages as requested by several participants. The results of the consultations were published in local newspapers, which are presented in the EIA.

87. The following concerns and comments were raised:
- (i) Public safety, especially relating to the safety of schoolchildren passing nearby construction sites and access roads. The EMP proposes appropriate mitigation measures, such as pedestrian crossings, overbridges, signage, and safety awareness programs.
 - (ii) Traffic and mobility hindrances during the construction, and the (permissible) continuation of roadside vending activities. The EMP provides for management of temporary diversions, signage, collaboration with traffic police, awareness programs, a set of precautionary measures to be forwarded to the technical specifications, and provision for sanitary installations at such vending localities.
 - (iii) Adequate cattle-crossing structures. The designer and engineers already reacted to these suggestions and provided an adequate number and dimensioning of animal passage tunnels and culverts in suitable locations. The EMP also recommends additional fences to prevent cattle from crossing the road.
88. Milestones of public involvement included
- (i) establishing publicly announced, fully accessible, and transparent meetings including the most important stakeholders and the public;
 - (ii) recording all concerns and suggestions from these meetings;
 - (iii) creating responsive actions stipulated by local authorities and followed up by the designers;
 - (iv) providing for further possibilities and facilities for the public to forward concerns and grievances;
 - (v) writing notifications and press releases; and
 - (vi) disclosing the public consultation results to the local media and on ADB's website.
89. The public consultations were in accordance with the regulatory requirements of Kazakhstan concerning planning for infrastructure construction programs. Methods and materials used in these consultations included
- (i) meeting minutes featuring all concerns and suggestions arising in these meetings, in addition to photos and videos taken during the events;
 - (ii) moderation done by specialists from the Committee for Roads with designers and national specialists;
 - (iii) speeches, PowerPoint presentations, design maps, technical drawing displays, and posters;
 - (iv) handouts (e.g., information on contacting the EA and engineers and on forwarding complaints or grievances);
 - (v) provision for further possibilities and facilities for the public to forward concerns and grievances;
 - (vi) open forum discussions involving participants, government officials, and engineers; and
 - (vii) disclosure of the results to local media and ADB's website.
90. The further planning for a second round of public hearings is expected, in line with ADB's environment policy and the operations manual⁴ (OM F1), and before appraisal, for early

⁴ ADB. 2008. *Operations Manual*. OM A1/BP: Classification and Graduation of Developing Member Countries. Manila.

September 2009. By that time, the results and safeguard provisions for the Project will be made available to all participants through a translated version of the EMP, which is the core of the EIA.

IX. CONCLUSIONS AND RECOMMENDATIONS

91. The benefits justify project implementation, including economic development; safe, fast connectivity on regional, national, and international levels; improved access to markets and facilities; improved transport conditions for passengers and goods; better road safety; ambient air quality improvement; and skills development. Given the environmental safeguard assurances by the Government and the relative uniformity of the environmental and social setting in the project area, the provisions made in the EIA sufficiently address, minimize, offset, or compensate identified adverse impacts, making the overall environmental performance of this Project acceptable. The Project is unlikely to result in significant additional negative impacts on the environment.

92. The EA's assurance that the mitigation and monitoring measures as defined in the EMP will be implemented and duly incorporated in the technical specifications of the contracts, as well as that the contractors will be liable for implementing environmental safeguard actions, gives the Project a good chance of being environmentally benign.

93. Recognizing the need for capacity building, the EA and IA will remain committed to attending the training program to ensure that environmental safeguards are implemented and management decisions are improved.

94. Although other significant and irreversible impact risks have not been identified, the EA and IA are expected to pay special attention to potential impacts commonly associated with construction activities such as establishment of access roads, temporary diversions, earthworks and aggregate borrow pit operation, work camp wastes and fuels, asphalt and concrete production, air and noise pollution, water pollution, and drainage congestion during bridge and culvert replacement.

95. The constant risk of seismic acceleration and consequences for both humans and structures remain inherent to this region and cannot be influenced. Comprehensive emergency planning is commendable to reduce major impacts following such events.

96. To ensure the Project's benefits and to emphasize environmental protection, several specific technical recommendations are considered in the EIA, such as

- (i) revising specific solutions for pedestrian crosswalks over the future highway;
- (ii) planning for protective fences along identified black spots and animal passages to avoid animals escaping to the carriageway and causing accidents;
- (iii) ensuring that the location of preselected sites for work camps, stockpiles, and hauling will not interfere with communities' life and health;
- (iv) addressing high accident rates on national highways with feasible and effective countermeasures (e.g., traffic control, speed limits, monitoring driving behavior, awareness programs, and vehicle inspection procedures);
- (v) ensuring that no interference occurs during any stage affecting the cultural, social, and economic activities and aspirations of the local population; this relates particularly to surveillance of conflicts and crimes, including strict control of prostitution and drug smuggling;
- (vi) initiating sampling and monitoring programs to test air and noise development;

- (vii) creating a sampling program on traffic-related pollutants and waste generation, and devising effective countermeasures;
- (viii) considering the inclusion and establishment of clearly visible and understandable boundary markers for the right-of-way; and
- (ix) ensuring that an effective post-commissioning audit occurs after the completion of construction works, i.e., before the transfer of work sites to the engineers and EA, and that final payments to the contractors and subcontractors are withheld until full compliance is confirmed.

ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

Table A.1: Preconstruction (Design, Preparation) Phase

Project Activities	Potential Environmental Impact and Issues	Mitigative Measures	Location	Time Frame	Responsibilities Implementing Supervision		Budget and Cost Estimate
1-1 Select alignment, decide on design solutions, plan for bypasses in congested sections.	Visual, topographic changes in the landscape Habitat destruction Traffic congestion, accident risks, nuisance Primary and secondary impacts associated with air pollution, noise development, and vibrations	Prescribe good planning and construction practices, avoiding negative impact on landscape due to unsatisfactory planning. Where necessary, conduct baseline studies to identify valuable ecological resources and sensitive areas. Provide for adequate bypass solutions, junctions, road signage, and safe pedestrian crossings.	Along the entire road alignment, especially at bypass sections	Planning period, field surveys	Designer	Ministry of Transport and Communications (MOTC) and Roads Committee Ecological Res. Department; Sanitary & Epidemiology Health Control Dept.	Included in MOTC budget
1-2 Plan for demolishing and removing structures.	Unsafe and unaesthetic deposit sites, health and safety risks associated with poor dumping practices Impact risks associated with using explosives in structure demolition	Provide for adequate and safe removal of demolished structures in certified dump sites. Control and prescribe use of explosives.	At specific locations	Planning period, field surveys	Designer	MOTC, Roads Committee Sanitary & Epidemiology Health Control Dept.	Included in the construction budget
1-3 Identify necessary land acquisition and establish right-of-way (ROW).	Demolition and dysfunction of existing structures and utilities Change in local land values, potential impacts on sociocultural and religious life. Damage to archaeologically or historically significant objects	Consult with the public, aiming at transparency and fair and adequate compensation to affected people, and good maintenance of the local social norms. Beneficial, no countermeasures required. Consult with and obtain mandatory certificates from archaeological institutions.	Along the entire road alignment At new bypass sections At selected sites	Planning period, field surveys. Before start of construction	MOTC, Roads Committee resettlement expert Archaeological expertise	MOTC, Roads Committee resettlement expert MOTC, Roads Committee, and archaeological experts	Included in MOTC budget
1-4 Prepare ROW.	Clearing of roadside trees, loss of habitats, and impact on environmental quality	Explore options to minimize felling of roadside trees, i.e., widen the carriageway on one side only, provide an adequate replanting scheme. Apply flexible solutions for embankment height, and provide for recommended	Wherever roadside vegetation will be cleared, or embankments will be	Before start of construction	Designer	MOTC, Roads Committee	Included in the construction budget

Project Activities	Potential Environmental Impact and Issues	Mitigative Measures	Location	Time Frame	Responsibilities Implementing Supervision		Budget and Cost Estimate
	Blockage of existing drainage structures. Change of the hydrological regime.	embankment vegetation solutions, suitable for slope protection and erosion prevention. Test groundwater availability and quality.	rehabilitated At sites with channels and surface water			Sanitary & Epidemiology Health Control Dept.	
1-5 Provide roadside structures and facilities.	Restricted road access, lack of parking facilities, and inadequate bus bays Sanitary problems	Provide for adequate (temporary or permanent) drainage structures, access, parking and toilet facilities, bus and vending bays for local producers. Observe safety and sanitary requirements.	Preselected sites in bypass sections of Merke and Kulan	Planning period	Designer	MOTC, Roads Committee Ecological Res. Sanitary & Epidemiology Control Dept.	Included in the construction budget
1-6 Provide for safe passage of animals and agricultural machinery.	Planning failure to include adequate road crossing facilities for animal herds and agricultural machinery	Conduct public hearings to define needs for animal passage. Explore options and sites to minimize risks caused by animal crossing or operation of farm machinery on the carriageway. Plan for additional traffic management options at those locations.	Where survey needs and requests are forwarded during public hearings	Planning period	Designer	MOTC, Roads Committee	Included in the construction budget
1-7 Plan for works in the vicinity of ecological importance and/or sensitive habitats, and built-up areas.	Potential changes in local flora and fauna, potential hydrological changes, potential soil changes, cumulative impact risks, degrading land values, biodiversity	Prescribe good planning and construction practices, avoiding habitat alterations and contamination due to unsatisfactory planning. Provide adequate planning for safety measures.	Along the entire road alignment, and in residential sections	Planning period, field surveys	Designer	MOTC, Roads Committee Ecological Res. Department; Sanitary & Epidemiology Health Control	Included in construction budget
1-8 Plan for large construction camps, near or within existing settlements (site selection criteria, inclusion of activities that have major environmental and health risks).	Possible social conflicts, impacts on public health, noise and air pollution due to suboptimal site selection for work camps. Hazards associated with specific equipment and material. Sociocultural imbalances due to foreign labor influx. Shortage of local resources, amenities, and services; increase of crime and spread of sexually communicable diseases	Ensure proper site selection, observing criteria that primarily protect the general public. Observe a minimum distance (buffer zone) between camp site and nearest residential area. The contractor is to specify work safety and environmental protection measures in a site management plan in Construction Environmental Action Plan (CEAP) before establishing the camps. Plan for an independent water and electric supply network and medical clinic at the site. Employ mediators to curb social conflicts.	At selected camp site locations and areas	Planning period	Designer	MOTC, Roads Committee Ecological Res. Department; Sanitary & Epidemiology Health Control Dept.	Included in construction budget

Project Activities	Potential Environmental Impact and Issues	Mitigative Measures	Location	Time Frame	Responsibilities Implementing Supervision		Budget and Cost Estimate
1-9 Plan for access roads and temporary diversions.	Traffic-related hindrances due to restricted access, impacts on local services and public utilities, and nuisances	Conduct due consultation with local authorities and traffic police, provide specific access and haulage roads to be well protected against interference from/to the public. Provide adequate signage and public awareness campaigns.	At specified locations: Public awareness meetings	Before construction works start	Designer, contractor	MOTC, Roads Committee	Included in construction budget
1-10 Select and prepare quarry site.	Environmental problems associated with location and selection of quarry sites, such as erosion, sedimentation, soil contamination, loss of habitats	Prepare site management plan, indicating rehabilitation options and requirements to observe environmental safeguards, especially for adjacent water resources and croplands.	At specified locations	Before construction works start	Designer, contractor	MOTC, Roads Committee	Included in construction budget
1-11 Review planning documents with regard to environmental safeguard precautions. Provide environmental supervision.	Lack of institutional capacity to understand and implement environmental mitigative measures Timely and adequate supervision relating to all environmental safeguards	Provide training workshops and institutional strengthening program, focusing on gaps identified by the environmental impact assessment (EIA). Employ international and national supervisory staff.	In Taraz, Merke, and/or Kulan <i>akimats</i> Supervision at all sites	Within 1–2 weeks of mobilizing the contractor Provide supervision throughout construction	Specialists of the project management consultant (PMC) or retained experts to plan and deliver such training	PMC and the MOTC Roads Committee	Included in construction budget
1-12 Develop environmental safeguard provisions, and allocate to responsible agencies and staff.	No provision for translation of the environmental management plan (EMP) including all safeguard requirements and precautionary measures available to oblast inspectors, and/or officials from the line agencies	MOTC Roads Committee will provide the successful contractor with the translated EIA , including the EMP, with instructions on how the mitigative measures and monitoring are to be undertaken, making provision for assistance to the contractor in preparing the construction environmental action plan (CEAP). The project director will provide the inspectors with the EMP and any supporting reports for use in their inspection process. MOTC and the PMC will organize a 1–2 day workshop in Taraz and provide special training on environmental compliance monitoring and reporting. Employ a safeguard expert.	Not applicable In context of activity 1-11, a workshop will be held in Taraz	Translate during detailed design stage and provide instructions prior to contractor field mobilization To be determined	MOTC Roads Committee MOTC Roads Committee PMC supervision engineer	MOTC Roads Committee, and supervision expert(s)	Included in construction budget Included in the environment budget

Project Activities	Potential Environmental Impact and Issues	Mitigative Measures	Location	Time Frame	Responsibilities Implementing Supervision		Budget and Cost Estimate
1-13 Prepare bid documents, include environmental safeguard clauses in the technical specifications of contracts.	Bid documents prepared without access to or use of this EMP	No bid documents will be prepared before the authors have read a copy of the mitigation and monitoring plans specified in the EIA, relating to mandatory environmental clauses and safeguard clauses to include in the contract specifications. Employ safeguard expert	In Taraz or Almaty	Before the bid documents for this Project are completed	Detailed design consultant and MOTC specialist	MOTC with advice from the Ministry of Economy and Planning (MOEP)	Included in environment budget for 1-12
1-14 Test soil to ensure that no lead-contaminated soils will get in critical contact with soil and water resources while executing excavation and stockpiling works.	Failure to carry out a roadside soil testing program to establish lead contamination	Carry out a comprehensive roadside sampling program to determine amount of lead contamination, establish the distance from the pavement edge and depth of dangerous contamination including a treatment and safe deposit plan. Recommend additional regular tests for local consumption products such as milk, lettuce, melons, and cucumbers derived from this area.	Anywhere where embankment material will be excavated. Contamination tests at regular intervals on both sides of the road.	Close to the start of earth works	Department;of Sanitary & Epidemiology, contracted laboratory	MOTC, Roads Committee and Sanitary & Epidemiology Health Control Dept. of Ministry of Health	Included in the environment budget for 1-12

Table A.2: Construction Phase

Project Activity	Potential Environmental Impact and Issues	Mitigative Measures	Location	Time Frame	Responsibilities		Budget and Costs Estimate
					Implementing	Supervision	
2-1 Prepare the construction environmental action plan (CEAP).	Contractor fails to retain an ecological expert to prepare the CEAP and to implement all mitigation and monitoring measures, leading to a failure to implement the environmental management plan (EMP). Contractor lacks capacity to prepare key CEAP and related materials.	As specified by law, the contractor will be required to retain an ecological expert with experience in environmental impact assessment (EIA) to prepare the CEAP and obtain all relevant permits. The contractor will not be permitted to mobilize the workers without an approved CEAP and the appropriate permits in place. Employ a safeguard expert to help with the CEAP.	For each contracted section	Prior to the start of construction, right after contracts being awarded	Contractor, with help of International safeguard expert	Ministry of Transport and Communications (MOTC) and project management consultant (PMC)	Included in environment budget for 1-12
2-2 Cut down roadside trees.	Planning provisions are not properly followed; contractor undertakes an excessive and unnecessary tree removal program damaging old trees and shelterbelt plantings along roadsides.	Provide detailed sketch maps indicating, location, number, species, and average height and diameter of trees along the roadside that are located within the area to be cleared. In areas where large trees form a green tunnel, designers will be contacted and alternative designs considered, such as narrowing the carriageway and transforming this area into a roadside rest area.	Along any section of the road where trees need to be cleared for widening the carriageway	Prior to any clearing taking place	Contractor, with advice from the oblast committee on forestry and hunting and Ecological Research Dept.	PMC and MOTC	Included in construction budget
2-3 Develop replanting scheme for ROW and embankments.	Irreversible loss of tree habitats if no adequate replanting scheme is in place Erosion impacts	Any tree removed will be replaced by a replanting scheme agreed and approved by the engineer.	Along any section of the road where trees were removed	End of works on each construction site	Kazakhavtodor, with advice from the oblast committee on forestry and hunting	PMC and MOTC	Included in construction budget
2-4 Establish work camp sites.	See 1-8 and 1-9	See 1-8 and 1-9 Employ environmental supervision experts (1 international, 1 national).	See 1-8 and 1-9	See 1-8 and 1-9	See 1-8 and 1-9	See 1-8 and 1-9	Included in construction budget and in environment budget: 1-11

Project Activity	Potential Environmental Impact and Issues	Mitigative Measures	Location	Time Frame	Responsibilities Implementing Supervision		Budget and Cost Estimate
2-5 Maintain clean and safe conditions and sanitary provisions at all work sites. Introduce health protection measures. Improve awareness of all risks associated with day-to-day construction works.	Failures relating to maintaining clean sites and sanitary practices while managing camp and work sites, leading to nuisances, health risks and cumulative impacts, risk of spreading sexually communicable diseases Work force partly ignorant of work safety specifications and regulations	Include adequate and necessary provisions in the contracts under technical specifications. Include special precautionary provisions in the CEAP relating to contamination risks of air, water, and soil; and work safety prescriptions. Specify layout and function of latrines or chemical toilets, and detail cleanup operations. Carry out regular awareness campaigns among work staff, including specific hazards associated with the spread of HIV/AIDS. The national environment expert will assist in work safety training programs for all work forces.	At all work camps, construction maintenance yards, and any construction sites	Immediately after contracts are awarded Regularly scheduled awareness campaigns, and on-the-job training	Contractor, with advice from the supervision engineer and local expert	PMC, supervision expert, and MOTC, Sanitary & Epidemiology Health Control Dept.	Included in construction budget Included in environment budget, 1-11
2-6 Operate the asphalt mixing plant (AMP).	Health risks for both the general public and site workers, related to smoke and air pollutants	Site the AMP far from residential areas, observing the local wind conditions and sensitive spots. Fit the AMP with suitable filters and canvasses. Observe permissible working hours.	At sites where AMPs are located	Throughout the entire construction period.	Contractor, with advice from the supervision engineer	PMC and MOTC Roads Committee, Sanitary & Epidemiology Health Control Dept.	Included in construction budget
2-7 Provide solid and liquid waste management, and handling and storage of hazardous material.	Environmental risks associated with inadequate solid and liquid waste management, lack of precautionary measures for transporting, handling, and safe storage of hazardous materials	Include special precautionary measures such as <ul style="list-style-type: none"> ▪ manage construction-related solid and liquid wastes; ▪ specify garbage collection service and schedule, and indicate disposal and recycling; and ▪ specify equipment lubricants and fuel, including management and collection of waste system for oils and hazardous liquids at workshops. The CEAP will follow all government norms and codes. Provide work safety training.	All work camps, construction maintenance yards, and any other areas operated by the contractor and involved in the Project.	Throughout the entire construction period	Contractor, with advice from the supervision engineer and the oblast committee on forestry and hunting	MOTC and PMC, Sanitary & Epidemiology Health Control Dept.	Included in construction budget, and environment budget, 1-11

Project Activity	Potential Environmental Impact and Issues	Mitigative Measures	Location	Time Frame	Responsibilities Implementing Supervision		Budget and Cost Estimate
2-8 Undertake fuelling operations.	Failure to properly manage petroleum products (fuel, lubricants), leading to spill and contamination Inadequate training of work personnel	Spill prevention measures include <ul style="list-style-type: none"> ▪ fuelling to be done on a concrete surface provided with a spill catch tank that can be cleaned and all spilled fuel recovered and safely deposited; ▪ all repair and maintenance work must either be done on a concrete surface with oil spill catch basin or oil catch pans must be provided at all service areas and training provided to all staff handling fuels; ▪ all fuel use areas where spills and leakage is possible, e.g., the generator, must have drip basins installed to prevent any leakage, and these recovered materials must be recycled; ▪ fueling equipment must be fitted with proper fuel nozzles and devices to avoid accidental spills; and ▪ provide work safety training. 	At all work camps, maintenance yards, and any other areas that the contractor or subcontractors use during construction	Throughout the entire construction period	Contractor, and all subcontractors as directed by the contractor	MOTC and PMC	Included in construction budget, and in environment budget, 1-11
2-9 Move construction machinery.	Elevated accident risks for local communities and road users	Develop a traffic management plan, devise precautionary measures to curb accident risks and especially to protect vulnerable groups (e.g., children). Provide for contingency planning and rescue operations. Conduct regular safety awareness campaigns for both the workforce and the general public, particularly focusing on local schools.	At temporary diversions	Throughout the entire construction period	Contractor and all subcontractors as directed by the contractor	MOTC and PMC	Included in construction budget

Project Activity	Potential Environmental Impact and Issues	Mitigative Measures	Location	Time Frame	Responsibilities Implementing Supervision		Budget and Cost Estimate
2-10 Develop general provisions for excavation works.	Side borrows operations leading to erosion, landslide, and destruction of landscape. Nonobservance of works specifications and safety provisions	Creating a landscape of craters will not be allowed. Borrow areas should not intrude visually on the road. Ensure good landscaping and erosion control practices, including proper site contouring and replacement of topsoil. Provide training.	All along the road corridor subject to embankment heightening, and at borrow pits	Throughout the entire construction period	Contractor, and all subcontractors as directed by the contractor	MOTC and PMC	Included in construction budget, and in environment budget, 1-11
2-11 Undertake earthworks, including the handling and reuse of possibly lead-contaminated soils.	Inadequate handling of lead-contaminated roadside soils, cumulative and secondary health risks associated with lead poisoning Nonobservance of works specifications and safety provisions	Carry out tests identifying lead concentrations in all soils to be excavated and reused. Should the tests during the preconstruction period indicate consistently contaminated soils and these need to be excavated, the contractor must treat these soils as hazardous materials, seek proper disposal permits, and get expert advice on how and where to dispose or decontaminate these soils. Provide training.	Any road shoulders where excavation is planned	Prior to any road shoulder excavation or clearing	Contractor, and subcontractors Special laboratory engaged in soil parameter testing	MOTC and PMC, MOEP Sanitary and Epidemiology Health Control Dept.	Included in construction budget, and in environment budget, 1-11
2-12 Undertake earthworks, general construction works, transport, and storage.	Improper management of earthworks Failure to maintain the earthworks and materials handling process, including aggregate sites, hauling roads to quarries and processing sites Transport and storage procedures, bearing the potential for dust and air pollution at stockpiling sites	Keep hauling roads in good condition, to prevent excessive dust development. Provide training. Enforce speed limits, and restrict operating hours through roadside villages and settlements (between hours of 0800 and 1730). Manage dust suppression, particularly on windy days, by daily use of watering trucks spraying hauling roads.	Throughout the construction period, on all access and hauling roads, especially at sections leading through or in close vicinity of settlements	Throughout the entire construction period	Contractor and all subcontractors as directed by the contractor	MOTC and PMC, MOEP Sanitary and Epidemiology Health Control Dept.	Included in construction budget, and in environment budget, 1-11

Project Activity	Potential Environmental Impact/Issues	Mitigative Measures	Location	Time Frame	Responsibilities		Budget/ Costs \$ Estimate
					Implementing	Supervision	
2-13 Undertake earthworks involving the transport of materials.	Excessive construction-related air pollution (dust) and noise development, nonobservance of prescribed precautionary solutions	Emissions will be kept to a minimum by <ul style="list-style-type: none"> ensuring that the contractor's fleet of vehicles is properly maintained; using acceptable fuel and haul loads within specified limits; prescribing vehicle idling time limits; ensuring proper equipment maintenance specifications, and regular reporting, controlling dust control watering, setting strict speed limits of no more than 30 kilometers per hour close to settled areas, and cleaning up paved haul roads; and including equipment such as the diesel generator in the emission control program and regularly tuning equipment to prevent excessive pollution. 	Anywhere at construction sites where vehicles of the contractor or under the contractors control (including paying for services), such as subcontracted trucks hauling materials	Throughout the construction period	Contractor and all subcontractors as directed by the contractor	MOTC and PMC, MOEP Sanitary and Epidemiology Health Control Dept.	Included in construction budget, and in environment budget, 1-11
2-14 Undertake embankment works, excavation, compacting, profiling, and revegetation.	Inadequate erosion control and slope stabilization leading to land slope failures, slips, and chronic erosion at cuts and water crossings	Contractor needs to develop site plans to prevent land slippage and erosion, particularly in the vicinity of surface waters and irrigation channels. At water crossings, where structures are to be replaced, recommend careful replacement and use of gabions with culverts and bioengineering methods. Ensure revegetation of slopes with specified plants suited for slope protection. Provide training.	Based on an analysis of soil conditions by the contractor and in consultation with the Ecological Research Department, Taraz	Throughout the entire construction period	Contractor, and all subcontractors Special laboratory engaged in soil parameter testing	MOTC, PMC Ecological Research Department	Included in construction budget and in environment budget, 1-11

Project Activity	Potential Environmental Impact and Issues	Mitigative Measures	Location	Time Frame	Responsibilities Implementing Supervision		Budget and Cost Estimate
2-15 Carry out bitumen and concrete works.	<p>Failure of contractor to manage properly and safely bitumen, asphalt, and concrete production facilities</p> <p>Spillage and contamination of soil and/or water, health risks</p> <p>Specific health risks and dangers associated with bitumen and concrete works</p>	<p>Precautions for bitumen works include the following:</p> <ul style="list-style-type: none"> ▪ All bitumen handling must not permit any material from leaking to the ground, including transfer areas and any areas where bitumen is transported in drums. ▪ Fire control devices must be always present at work sites. ▪ Workers must wear suitable safety clothing while handling bitumen. ▪ Bitumen drums must be stored in a dry covered secure place where no leakage to water or ground is possible. ▪ Drums must be recycled at least once a year. ▪ Any spills must be cleaned up according to government norms and codes. ▪ Concrete curing safeguards need to be included in work guidelines and training. 	<p>At bitumen storage area, particularly at mobile asphalt plants where bitumen is loaded into boiler and heated for mixing</p> <p>At sites involving concrete works, and concrete curing processes</p>	Throughout the entire construction period	Contractor and all subcontractors	MOTC and PMC, MOEP Sanitary and Epidemiology Health Control Dept.	<p>Included in construction budget</p> <p>and in environment budget, 1-11</p>

Project Activity	Potential Environmental Impact and Issues	Mitigative Measures	Location	Time Frame	Responsibilities Implementing Supervision		Budget and Costs Estimate
2-16 Undertake works with the potential to affect drainage structures and surface water regimes.	Modification of surface drainage during culvert and bridge replacement and raising of horizontal road alignment without repair and rehabilitation after construction is finished	<p>Size all culverts at or larger than the one being replaced and with care about slope and erosion protection at inflow and outflow. Remove all obstructive materials in the channel.</p> <p>Carry out culvert removal and replacement when flows are low or no water is in the channel, and during the dry months of the year. Avoid known periods for fish migration.</p> <p>Avoid degradation of rivers, river flow, and stream shore; and avoid excessive sedimentation.</p> <p>Stabilize disturbed crossing banks with gabions and preferably using bioengineering techniques.</p> <p>Where roadways are elevated to reduce flooding, ensure sufficient cross-road drainage facilities.</p> <p>Observe concerns and restrictions forwarded by local fisheries authorities and owners of local lakes and reservoirs.</p> <p>Provide on-the-job training.</p>	At all existing and planned sites, drainage, structures are to be built or rehabilitated	Throughout the entire construction period	Contractor and all subcontractors	<p>MOTC and PMC,</p> <p>Ecological Research Department,</p> <p>Sanitary and Epidemiology Health Control Dept.</p> <p>Fisheries Inspection Department</p>	<p>Included in construction budget</p> <p>and in environment budget, 1-11</p>
2-17 Decommission work sites.	Inadequate decommissioning of the sites, resulting in various and long-lasting environmental impacts	<p>Ensure the CEAP includes a comprehensive plan for decommissioning the sites, with special emphasis on waste removal and cleanup, and a revegetation proposal.</p> <p>Seek consent from all local line agencies and the <i>akimats</i>.</p>	All work camps, construction sites, any other construction sites (including pits)	At termination of site uses	Contractor and all subcontractors	MOTC and PMC	Included in construction budget

Project Activity	Potential Environmental Impact and Issues	Mitigative Measures	Location	Time Frame	Responsibilities Implementing Supervision		Budget and Cost Estimate
2-18 Undertake works with potential impacts on cultural assets.	Loss of cultural or archaeological heritage, including cemeteries and a number of roadside graves and markers of accident victims located within a few meters of the right-of-way.	<p>Any interference (removal) of known burial sites will require prior consultation with the local <i>akim</i> as well as the victim's family in order to move the grave to an appropriate site.</p> <p>When widening roads in villages and towns, contractors will have to meet with local <i>akims</i> to consult about any possible relics or historical structures along the road. Such findings must be reported, without delay, to the oblast cultural heritage department and/or the Archaeological Expertise Institute in Almaty.</p> <p>Immediately suspend all construction work until authorities have inspected the site and give clearance to proceed.</p>	At any (pre)identified gravesite close to or within the road alignment	<p>During the construction period and before excavation at any such site</p> <p>Prior to earth moving in these areas</p>	<p>Contractor</p> <p>Contractor and oblast cultural heritage experts</p>	<p>PMC, MOTC, and any needed help from the cultural heritage experts</p> <p>Archaeological experts</p>	Included in construction budget
2-19 Ensure compliance reporting.	The lack of technical capacity in CEAP implementation and reporting leads to collapse of the environmental safeguards tasks defined in the EIA and government norms and codes	MOTC will hire a consultant to deliver a 1.5 day training workshop to the oblast and rayons in Zhambyl oblast, government agencies involved, and the contractor. Focus will be on the complete understanding of the EMP; the mitigation, monitoring, and reporting tasks; and proper documentation.	Taraz and/or Merke <i>akimats</i>	Prior to the start of construction, after the contractor has been named and has appointed an ecological expert	MOTC-PMC and any specialized consultant delivering the planned workshop	MOTC and PMC	Included in construction budget

Table A.3: Operations Phase

Activity/Phenomena	Potential Environmental Impact/Issues	Mitigative Measures	Location	Time Frame	Responsibilities		Budget and Cost Estimate
					Implementing	Supervision	
3-1 Increased traffic volume leads to increased deterioration of ambient air quality.	Inadequate management of traffic-generated air pollution	The improvements of the road surfaces and widening will improve the flow of traffic, and reduce deceleration-acceleration cycles and idling periods, therefore leading to overall reduction in the emissions, despite an increase in overall traffic volume. The expected annual growth in traffic will be 6% after construction is completed, or a 2% increase over preconstruction levels, not enough to be significant project-related emission.	At identified black spots or sections	When necessity arises with increased traffic	Roads Committee	Ministry of Transport and Communications (MOTC), Ministry of Economy and Planning (MOEP) Sanitary and Epidemiology Health Control Dept.	Included in MOTC budget
3-2 Increased traffic volume leads to increased noise.	Inadequate management of traffic-related noise, health implications due to exposure to noise	Explore the establishment of suitable noise barriers at known black spots and sensitive areas (like schools, kindergartens, hospitals)	At identified black spots	When necessity arises with increased traffic	Roads Committee	MOTC, MOEP Sanitary and Epidemiology Health Control Dept.	Included in MOTC budget
3-3 Leaded fuel continues to be used.	Lead poisoning, resulting from illegal land uses and encroachment into the right-of-way Inadequate control of roadside farming products, especially relating to lead contamination	The Road Committee will undertake a heavy metal-testing program of grasses and crops grown within 50 meters of the carriageway and establish levels of lead and heavy metal. Ensure observation of a 50-meter buffer zone on national roads where farming restrictions apply. The road operator will enforce such regulation and take appropriate action.	At a specified number of sites with steady traffic volume, and where grazing and crops are within 50 meters of the carriageway edge	Devise suitable sampling schedule at random sites where traffic volumes are known	Roads Committee, in collaboration with KAZHYDRO-MET and qualified test laboratories	MOTC, MOEP, Sanitary and Epidemiology Health Control Dept.	Included in MOTC budget

Activity/Phenomena	Potential Environmental Impact and Issues	Mitigative Measures	Location	Time Frame	Responsibilities Implementing Supervision		Budget and Cost Estimate
3-4 Traffic volume and speed increase.	<p>Risk of accidents due to improved roads, faster speeds, and greater traffic volume</p> <p>Increased risks at sensitive spots</p> <p>Increased risks for vulnerable groups</p>	<p>To manage these problems the operator will enforce speed limits through</p> <ul style="list-style-type: none"> ▪ increased radar surveillance, ▪ better and more frequent signage, ▪ increased speeding fines, ▪ considering replacing passenger crossings with pedestrian overbridges, ▪ revising, as necessary, plans for establishing more bypass solutions, and ▪ exploring the need to establish safety barriers at known black spots. 	In every section, village and town identified as accident-prone black spots	Planned during the detailed design stage and installed during construction ,then completed at the start of operations	Kazakhavtdor, with advice from the traffic police	MOTC	Included in MOTC budget
3-5 Accidents involve transport of hazardous goods.	<p>Increased risk of spillage of hazardous materials due to increased traffic volume and provision of larger capacity bridges and stronger road surfaces</p> <p>Primary and secondary (accumulative) impacts to both environment and public health</p>	<p>The road operator and the traffic police are required to</p> <ul style="list-style-type: none"> ▪ ensure all trucks carrying hazardous materials are marked according to government norms and codes; ▪ enforce speed limits for trucks carrying such material to <= 85 kilometers per hour or according government norms and codes; ▪ restrict all trucks carrying hazardous goods from passage through towns and villages where bypasses exist; ▪ assist Zhambyl oblast to prepare a rapid spill response and cleanup protocol; and ▪ work out a general contingency plan in case of natural and technical calamities. 	In the entire road corridor	<p>Within the first year of the road being in operation.</p> <p>Review need for new bypass solutions and removal of black spots every 5 years.</p>	Kazakhavtdor, with advice from traffic police	<p>Road Operator,</p> <p>Ecological Research Department,</p> <p>Sanitary and Epidemiology Health Control Dept.</p>	<p>Included in MOTC budget</p> <p>and in environment budget</p> <p>\$15.000</p>

Table A.4: Monitoring Plan, including Schedules, Responsibilities, Budgets, and Costs

Recommended Mitigation Measure	Parameters to be Monitored	Schedule and Frequency	Executing Unit	Reporting Responsibility	Budget and Cost Estimate
1. Preconstruction (Design) Period					
1-1 Control lead contamination of roadside soil testing program.	Monitor to verify that soil and local food stuffs, particularly goats and sheep milk, is tested for lead contamination and that a management protocol is being developed	Shortly before commencement of works	Specialist consultant hired by the Ministry of Transport and Communications (MOTC)	MOTC and Sanitary & Epidemiology Health Control Dept. of Ministry of Health (MOH)	Included in budget for 2-4 in mitigation plan
2. Construction Period					
2-1 Employ ecological expert to prepare the construction environmental action plan (CEAP) and to implement all mitigation and monitoring measures with contractor.	Confirm the contractor has ecological expertise at the start of construction: obtain name, professional records, and curriculum vitae. If applicable, employ international safeguard expert.	At time of contractor appointment	Project management consultants (PMC) supervision expert	PMC, to MOTC	Included in budget for 1-12 in mitigation plan
Include safeguard specifications to help contractors prepare CEAP and monitoring protocol.	Confirm that international safeguards specialist is mobilized to site.	Shortly after contracts awarded	PMC	PMC, to MOTC	Included in budget for 1-12 in mitigation plan
2-3 Ensure good and healthy work conditions at camp and work sites.	Verify compliance with work safety and hygienic requirements at cooking facilities, toilets, washrooms, dormitories, transport facilities, social services, health insurances, and accident insurances. Consult with employers and employees. Employ international and national supervision experts.	Unannounced checks and inquiries, every 3 months	PMC supervision expert	PMC, to MOTC	Included in budget for 1-11 in mitigation plan
2-4 Observe gender issues concerning employment.	Verify compliance with gender-specific provisions concerning employment records, and observance of gender-restricted works. Consult with employers and employees.	Unannounced checks and inquiries, every 3 months	PMC, supervision expert	PMC, to MOTC	Included in construction budget

Recommended Mitigation Measure	Parameters to be Monitored	Schedule and Frequency	Executing Unit	Reporting Responsibility	Budget and Cost Estimate
2-5 Ensure adequate tree removal program does not damage the old trees and shelter belt plantings along roadsides. Ensure suitable slope plantations.	Ensure that tree removal is kept to an absolute minimum. Inspect the cutting plan and confirm and review. Record schedule, quantities, plantation maintenance, and regrowth success and survival rates relating to all revegetation efforts. Control for erosion problems.	Inspection and verification of survival rate of planted trees and grasses during construction (every 3 months)	PMC supervisor in cooperation with the committee on forestry and hunting of the oblast	PMC to MOTC	Included in construction budget
2-6 Ensure environmental protection.	Ensure, by consulting local authorities, that work force is not engaged in illegal poaching, fishing, hunting, or collection of protected or endangered plants and animals.	Unannounced inquiries, every 3 months	Supervision expert	PMC, to MOTC	Included in budget for 1-11 in mitigation plan
2-7 Earthworks: ensure adequate transport and storage.	Undertake, as part of the construction inspection, to ensure that earthworks are handled in an environmentally acceptable manner and dust control is undertaken at all times, including the use of tarpaulins by trucks hauling fine materials, as well as watering and use of chemical suppressants along the haul road sections for 1 kilometer at villages. Verify that maximum speed limits on access and hauling roads are observed and enforced.	Spot checks, throughout the construction period	PMC, supervision expert	PMC, to MOTC	Included in environment budget for 1-11 in mitigation plan
2-8 Ensure erosion control and slope stabilization.	Undertake regular inspections to confirm that slope stabilization and standard erosion protection methods (e.g., prescribed planting schemes) are used by the contractor for all works with clearing of topsoil, cutting, and filling.	Spot checks, throughout the construction period	PMC, supervision expert	PMC to MOTC	Included in budget for 1-11 in mitigation plan
2-9 Ensure side borrow operations will not lead to erosion, landslides, and/or landscape degradation.	Undertake inspections to determine the type of borrow operations the contractor is applying. and ensure that roadside borrowing is not taking place and is always out of the visual field from the road. Specify corrective measures.	Spot checks, throughout the construction period and monthly	PMC, supervision expert	PMC to MOTC	Included in budget for 1-11 in mitigation plan

Recommended Mitigation Measure	Parameters to be Monitored	Schedule and Frequency	Executing Unit	Reporting Responsibility	Budget and Cost Estimate
2-10 Ensure environmentally acceptable earthworks and material handling processes, including aggregate sites, haul roads to quarries and aggregate processing sites; manage dust, noise, drainage during haulage of materials.	<p>Using a checklist confirm the following:</p> <ul style="list-style-type: none"> ▪ haul road upgraded to an all-weather road; ▪ enforcement of speed limit of 30 kilometers per hour within 500 meters of any village and the use of chemical dust suppressants at least on road for 500 meters on either side of a village (use this approach if the other site is used); ▪ haulage through roadside villages and settlements is restricted to allowed hours; and ▪ aggregate sites are operating legally and contractors provide necessary security measures and have marked the boundaries. <p>Verify rehabilitation of all work sites is in accord with the decommissioning plan.</p>	<p>Spot checks, throughout the construction period and monthly</p> <p>At prescribed schedule for site decommissioning</p>	PMC, supervision expert	PMC to MOTC	Included in budget for 1-11 in mitigation plan
2-11 Follow protocol related to the excavation of roadside soils possibly contaminated with lead.	Review laboratory tests from sampling program with regard to actual levels of heavy metals. Confirm proper handling and treatment is in line with the site management plan.	At every shoulder excavation site, anywhere where lead contamination is shown to be high	PMC, supervision expert	PMC to MOTC	Included in budget for 1-11 in mitigation plan
2-12 Ensure good site maintenance practices at work sites, including solid and sanitary waste management.	Using a monitoring checklist, confirm that the management provisions specified in the site management plan are fully implemented. Verify work safety plan and observance.	Spot checks, throughout the construction period Half yearly	PMC, supervision expert	PMC to MOTC	Included in budget for 1-11 in mitigation plan
2-13 Prevent bitumen, asphalt, and concrete production spills and pollution.	Confirm that site and operating modes for both asphalt and concrete plants are according to norms and codes and with the site management plan. Check if bitumen storage and handling is done without spillage. Verify the work safety plan and observance.	Spot checks, throughout the construction period (bimonthly)	PMC, supervision expert	PMC to MOTC	Included in budget for 1-11 in mitigation plan
2-14 Ensure contractor and all subcontractors practice good management of petroleum products such as fuel, lubricants, and bitumen, without spills and contamination.	Using the monitoring checklist, assess and report on the specific spill and contamination prevention measures listed in item 2-8 of the mitigation table. Any noncompliance will be rectified immediately. Inspections will focus on all work sites, work camps, diesel generators, maintenance yards, and fuel and bitumen storage facilities.	As specified in the sampling schedule (bimonthly)	PMC, supervision expert	PMC to MOTC	Included in budget for 1-11 in mitigation plan

Recommended Mitigation Measure	Parameters to be Monitored	Schedule and Frequency	Executing Unit	Reporting Responsibility	Budget and Cost Estimate
2-15 Ensure sufficient surface drainage at construction area.	The project implementation unit (PIU) will inspect and verify that adequate consideration and drainage works and protection have been provided: specifically that the mitigative measures defined in 2-10 and 2-16 of the mitigation table are fully implemented in a timely manner.	During construction, conduct regular spot checks once to confirm that sites have been identified, and during each rainy season (bimonthly)	PMC, supervision expert	PMC to MOTC	Included in budget for 1-11 in mitigation plan
2-16 Control construction-related air pollution.	Using a monitoring checklist confirm that the mitigative actions (2-6) defined for mitigating impacts resulting from the asphalt mixing plant operation are correctly implemented. Arrange and/or assist with development of a roadside air quality monitoring program of selected air pollutants.	As specified in the sampling schedule	PMC, specialist laboratory hired	PMC to MOTC	\$22.000
2-17 Control construction-related noise pollution.	Using a monitoring checklist confirm that the mitigative actions (2-13) defined for mitigating impacts resulting from construction-related noise are correctly implemented. Arrange and/or assist with undertaking a roadside noise monitoring program.	As specified in the sampling schedule	PMC , specialist laboratory hired	PMC to MOTC	\$3.000
2-18 Resolve social conflicts related to overuse or impacts on public utilities and agricultural supplies.	Verify and conduct spot checks and interviews with line agencies, chiefly the local <i>akimats</i> . Explore suitable and feasible countermeasures where applicable.	As specified in the inspection schedule (half yearly)	PMC, supervision expert	PMC to MOTC	Included in budget for 1-11 in mitigation plan
2-19 Respond to social conflicts related to crimes associated with ongoing construction activities.	Verify and conduct spot checks and interviews with line agencies, chiefly the local police authorities. Explore suitable and feasible countermeasures.	As specified in the inspection schedule (half yearly)	PMC, supervision expert	PMC to MOTC police	Included in budget for 1-11 in mitigation plan
2-20 Respond to social conflicts related to severance of public amenities and market prices.	Verify and conduct spot checks and interviews with line agencies, chiefly the local <i>akimats</i> . Explore suitable and feasible countermeasures where applicable.	As specified in the inspection schedule (half yearly)	PMC, supervision expert	PMC to MOTC	Included in budget for 1-11 in mitigation plan
2-21 Decrease spread of sexually communicated diseases.	Verify and conduct spot checks and interviews with line agencies, chiefly the Sanitary and Epidemiology Control Department. Explore suitable countermeasures, including consultation with local authorities and police.	As specified in the inspection schedule (half yearly)	PMC, supervision expert	PMC to MOTC, hospitals	Included in budget for 1-11 in mitigation plan

Recommended Mitigation Measure	Parameters to be Monitored	Schedule and Frequency	Executing Unit	Reporting Responsibility	Budget and Cost Estimate
2-22 Address damage or loss of cultural heritage sites, including cemeteries and roadside graves and markers of accident victims.	Confirm that all roadside graves (based on an inventory of sites) are dealt with in a dignified and legal manner including viewing records of consultation with <i>akims</i> and family members. Review the process being taken to check the possible presence of cultural relics. As applicable, ensure due compensation payment for damage caused by construction activities.	Ongoing with specific checks each time a construction inspection takes place	PMC, resident engineer	PMC to MOTC	Included in budget for 1-11 in mitigation plan Included in construction budget

3. Operating Period					
3-1 Conduct the 1-year postconstruction audit of road operation.	The owner of the road must organize and undertake a complete audit of the Project. This audit is to be undertaken by the oblast officials and for the owner (MOTC will cooperate fully). Findings must be reported within 15 days of completion of the field inspection and actions to repair any noncompliance conditions started within 5 days of notification by the Inspection Department. All such actions must be completed or be well under way within 30 days.	No more than 13 months after the road operation has fully started	MOTC and MOEP	MOTC and oblast department of environment, Inspection Unit	To be included in budget of MOTC
3-2 Manage traffic-generated air pollution.	Should traffic growth rate exceed the projected 2%/year, a scheduled air quality monitoring program will be initiated at sensitive areas such as roadside towns and villages.	Monitoring once/year for two continuous 24-hour periods during the nonwinter season at selected stations	MOTC	MOTC	To be included in budget of MOTC
3-3 Manage traffic-generated noise.	Noise is an existing problem in roadside communities, particularly during the peak traffic season from about April through October. Improvements are expected to marginally affect noise levels and in some cases reduce noise through the use of bypasses and enforcement of speed limits for trucks and buses. A smoother road will also reduce noise. Noise will be monitored at sensitive sites.	Monitoring will take place once/year during peak traffic periods for two 24-hour continuous monitoring periods, at selected stations	MOTC in cooperation with Ministry of Health's Sanitary and Epidemiological Service	MOTC	To be included in budget of MOTC

Recommended Mitigation Measure	Parameters to be Monitored	Schedule and Frequency	Executing Unit	Reporting Responsibility	Budget and Cost Estimate
3-4 Control roadside farming to minimize the ingestion of lead in crop items and locally produced milk products.	Conduct a testing program to establish lead levels in products coming from roadsides in the corridor. Goat and cattle milk is to be tested as well as crops grown within 50 meters of the road, including lettuce, tomatoes, cucumbers, and melons. If the tests show dangerous levels, discuss the enforcement of the 50-meter rule with MOTC and ensure that this or similar measure are being undertaken.	Monitoring to be completed on milk and at least three products coming from plots within 50 meters of the road. Testing is to be done during the construction period at 10 roadside sites and for at least three animals in herds known to use roadside pasture	MOTC working closely with the Ministry of Health's Sanitary and Epidemiological Service to establish the sampling design for sampling program	MOTC	To be included in budget of MOTC
3-5 Decrease pedestrian accidents that could result from improved roads, faster speeds, and greater traffic volume.	Traffic volume increases of 2% per year due to the Project are not expected to affect the accident rate, however the increased speeding will affect the rate. Signage and enforcement will be essential. Bypasses will help considerably and restriction of bus speeds in towns will help. Aside from aggressive enforcement, the best method will be to significantly improve speed limit signage, highlight school and other high pedestrian use zones, and provide more cross-walk lighting.	Undertake annual safety check and review statistics of pedestrian and vehicle accidents, and address areas where problems occur	MOTC working with oblast and rayon authorities	MOTC	To be included in budget of MOTC
3-6 Decrease accidents involving spills of hazardous materials spills.	Identify, by help of a checklist, causes of accidents, and appropriate technically feasible and economic mitigation measures.	Undertake an annual audit of these conditions and actions	MOTC working with oblast and rayon authorities	MOTC	To be included in budget of MOTC