

# Environmental Assessment Report

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Summary Initial Environmental Examination  
Project Number: 42399-01  
April 2009

## KGZ: Proposed CAREC Transport Corridor 1 (Bishkek-Torugart Road) Project 2

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

The summary initial environmental examination 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.



## SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

### A. Introduction

1. **Purpose of the Project.** The main purpose is to rehabilitate part of the Bishkek–Torugart road, which is 500 kilometers (km) international road linking the Kyrgyz Republic with the People’s Republic of China (PRC). The Kyrgyz Republic’s Country Development and Road Sector Development strategies for 2007–2010 identified rehabilitation of the Bishkek–Torugart road as one of the priority tasks in transport sector. Therefore, the Government of the Kyrgyz Republic, acting through its Ministry of Transport and Communications (MOTC), has requested the Asian Development Bank (ADB) and other donors to provide financing for upgrading the road corridor in order to improve road safety, achieve shorter travel times, lower vehicle operating costs, enhance the welfare of poor people, and increase trade and transit links between the Kyrgyz Republic and the PRC.

2. Rehabilitation will be done in phases. The first phase will include the section between the Dolon Pass and Ak Beit Pass (Km 280 to km 480). The sections from Ak Beit to the border with the PRC and from the Dolon Pass to Bishkek will be included in the subsequent phases.

3. **Summary Initial Environmental Examination.** An initial environmental examination (IEE) of the first phase was made in 2008 following ADB’s *Environmental Assessment Guidelines*.<sup>1</sup> The IEE covered the sections to be improved under the CAREC Transport Corridor 1 (Bishkek-Torugart Road) Project 2 (the Project). These sections are located between Km 439 to Km 469, and between km 365 and km 400. This is the summary of the IEE report.

4. **Scope of the Initial Environmental Examination.** The scope included: (i) collection of information related to the environmental conditions along the proposed road section, (ii) assessment of potential environmental impacts, (iii) development of preventive and/or mitigation measures for significant impacts, (iv) assessment of alternative alignments and technologies, (v) elaboration of environmental management and environmental monitoring plans, and (vi) public consultation.

### B. Project Description

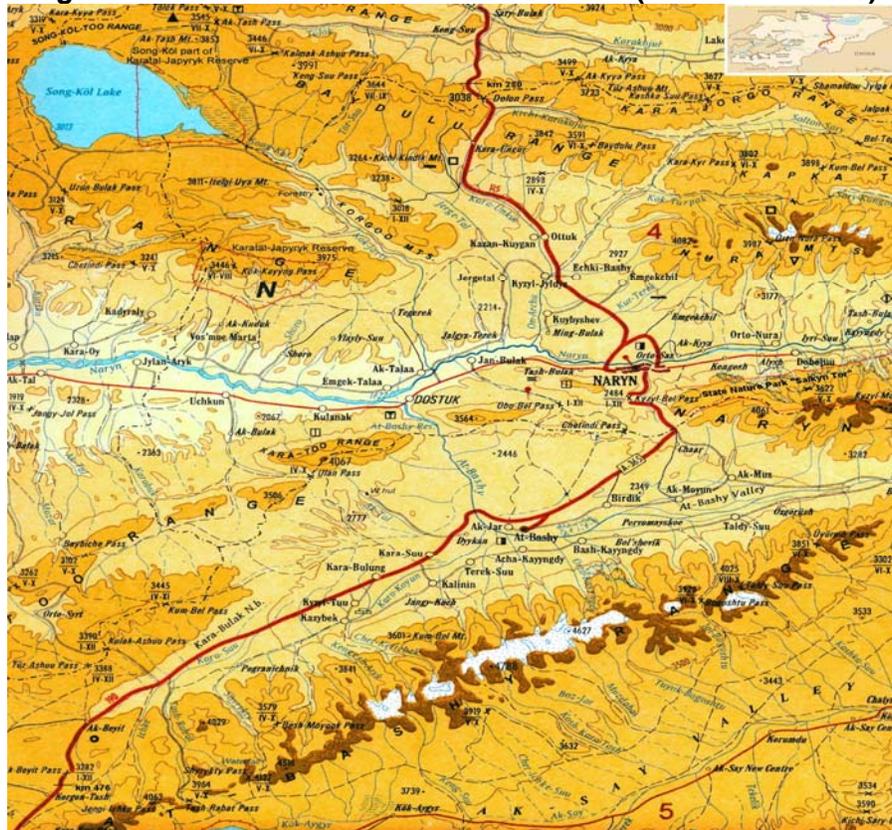
5. **Type and Category of Project.** The Project involves improvement of the existing road and construction of customs facilities. The main activities include (i) earthwork and erosion control, (ii) concrete and drainage works, (iii) asphalt concrete works, (iv) traffic safety measures, and (v) construction of inspection areas and buildings. No significant realignments or development of new alignments in previously undisturbed areas are expected. No construction and/or rehabilitation activities for feeder roads were included in the Project. The environmental classification for the Project is category B under the ADB environmental categorization requirements.

6. **Location.** The Bishkek–Torugart road is located in the east–central part of the Kyrgyz Republic and links its capital (Bishkek), Issyk-Kul and Naryn *oblasts* (provinces), and Xingjian Uygur Autonomous Region of the PRC. The road sections covered by IEE are located in Naryn and At-Bashi *rayons* (districts) of Naryn *oblast* as shown in Figure 1.

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<sup>1</sup> ADB. 2003. *Environmental Assessment Guidelines*. Manila.

Figure 1: Dolon Pass–Ak Beit Pass Section (Km 280–Km 480)



7. **Magnitude of Operation.** The road sections between the Dolon Pass and the Ak Beit Pass will be designed as a two-lane road with the carriageway width of 7 meters (m) and the road-bed width of 15 m (road category III, as per Kyrgyz Republic road standards SNIP 2.05.02-85).<sup>2</sup> The proposed improvement options are: (i) road upgrading on the existing alignment; (ii) road safety (road markings, road signs, and guide posts); and (iii) reconstruction of a number of bridges and culverts.

8. **Alternatives Considered.** If the no-action alternative is adopted, the existing road will continue to deteriorate, transportation costs and travel times will continue to increase, and access of local communities to markets in Bishkek will be affected. Alternatives on the location and the technology of improving the Bishkek–Naryn–Torugart road suggested in previous projects were:

- (i) **Providing a bypass of Naryn town from the west.** This alternative was determined not feasible as it runs through a residential part of the town for 6–7.5 km and can cause substantial noise and air pollution, and reduce road safety.
- (ii) **Landslide-prone area at Kyzyl-Bel Pass (Km 355–Km 357).** Three alternatives were examined: providing a bypass of the landslide-prone section, a viaduct solution,

<sup>2</sup> SNIP is a Russian abbreviation for “construction rules and regulations,” a standard that extends to the design of new roads and reconstruction of existing roads.

and using the existing route. The Design Institute defined using the existing route in combination with geotechnical measures towards landslide as the optimal alternative.

- (iii) **Providing a bypass of the At-Bashi Ridge from the east.** This would require construction of a long section of new road through a remote and relatively undisturbed area. Construction of a new road was determined to be beyond the scope of the Project.

## C. Description of the Environment

9. The potentially affected environment is described pursuant to ADB's *Environmental Assessment Guidelines* in terms of its physical, ecological, and socioeconomic resources, each of which is summarized below.

### 1. Physical Resources

10. **Topography.** The section is located within the mountain system of the Internal Tien-Shan. The section begins near the Dolon Pass (altitude 3,030 m) at Km 280. From the Dolon Pass the right-of-way (ROW) descends to the Karaunkur–Ottuk Gorge and continues to the Middle Naryn Valley, where it passes through the eastern part of Naryn town (altitude 2,100 m) and crosses the Naryn River. A few kilometers further on, the section ascends to the Kyzyl Bel Pass (altitude 2,500 m) and Char Pass (2,600 m), and crosses them to enter the At-Bashi Valley. The section traverses the At-Bashi Valley parallel to the At-Bashi Ridge, until it reaches the western part of the ridge. It then turns south and ascends to the Ak Beit Pass (altitude 3284 m), crosses the northern branch of the At-Bashi Ridge, and continues down to the Arpa Valley. The final point of the section is located passed the Ak Beit Pass in the Arpa Valley at Km 476.

11. **Geological and Seismic Characteristics.** Geologically, the section is located within the Middle Tien-Shan that is separated from the North Tien-Shan by so called “Nikolaev line”. The line (fault) crosses the section several kilometers to the south of the Dolon Pass. The whole section lies within the area where the probability of an earthquake is assessed as  $8_2$ , i.e., two seismic events with a magnitude of 8 points on the Richter scale over 100 years.

12. **Soils and Permafrost.** The Project area comprises a number of soils that belong to soils of mountain slopes and soils of intermountain valleys: mountain meadow steppe sub-alpine soil, mountain dark-chestnut soil, mountain light-chestnut soil, mountain valley light-chestnut soil, mountain light-chestnut soil, mountain valley light-brown soil, and mountain meadow steppe alpine soil. The top of the Dolon Pass (Km 282–Km 283) and the Ak Beit Pass (Km 464–Km 476) are located within island permafrost distribution areas.

13. **Climate and Air Quality.** The climate in the Internal Tien-Shan is continental with little rain, cool summers, and cold winters. Climatic conditions vary considerably with elevation. The average winter temperature ranges from  $-25^{\circ}\text{C}$  to  $-45^{\circ}\text{C}$  (the lowest may exceed  $-54^{\circ}\text{C}$ ), while in summer it varies from  $20^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ . In winter frosts occur in all regions. Rain and snow usually fall in autumn, winter, and spring. Average yearly precipitation is 230–560 millimeters. The air quality is generally good, except on unsurfaced sections where dust generated from passing vehicles was observed. There are no ambient air quality monitoring stations in proximity to the section.

14. **Hydrology.** The alignment crosses the River Naryn, the largest in the Kyrgyz Republic, as well as two other major rivers, the At-Bashi and the On-Archa. On descent from the Dolon

Pass it runs parallel to the Karaunkur and Ottuk rivers. High groundwater tables occur in Kara-Suu and Ottuk villages. An initial visual assessment suggests that water quality is good. This appears to be confirmed by reports that the rivers support a healthy and diverse population of fish and macroinvertebrates. Chemical analysis and analysis of macrozoobenthos in major rivers of the project area was carried out as part of the environmental assessment. The chemical analysis of samples from the Naryn, At-Bashi, On-Archa, and Karaunkur rivers was conducted in the laboratory of Kyrgyz Agency on Hydrometeorology. It was concluded that water quality of all the samples was good, and pollutant concentrations were within acceptable standards. The presence of a diverse range of macrozoobenthos species supports this finding.

15. **Natural Hazards.** Natural hazards related to the section include landslides, mudflows and seasonal flooding, rock falls, and avalanches. The section is susceptible to a massive landslide in the proximity of the Kyzyl-Bel Pass at Km 355–Km 356. The possibility of mudflow exists at Km 300, 306, 312, 451, and 455. At Km 460 the ROW is currently destroyed by a mudflow. Rock falls can pose a risk to the section at Km 285–Km 303, and Km 354–Km 355. Avalanche-prone areas are located in the Karaunkur–Ottuk Gorge at Km 287–Km 313, and the Kyzyl-Bel and Char passes at Km 353–Km 362.

16. **Noise and Vibration.** The majority of the alignment runs through areas with no settlements, but only mountains, hills, and open steppe. Rare settlements through which the road corridor runs are Naryn town and the villages of Karaunkur, Ottuk, Kara-Suu, and Karabulung. Although no sensitive receptors such as schools and hospitals were noted near the ROW, noise and vibration are the serious concern to the communities that were raised repeatedly during public consultations. Dwellings are typically made of clay brick. For those located close to the roadside, noise and vibration from heavy trucks have the potential to significantly impact the houses and their occupants. Also, it was noted during the field investigations that the actual speed of vehicles passing through the settlements rarely matches the speed limits. This contributes to safety and noise problems.

## 2. Ecological Resources

17. **Flora.** The distribution of flora in the project area fulfills the vertical zoning rule. Sub-alpine meadows are typical of the Dolon Pass; at lower altitudes they change to fescue steppe, artemisia deserts, and cropland near Naryn town; fescue steppe occurs to the south of Naryn. The At-Bashi Valley is largely cropland, which changes to fescue steppe in the western part of the valley. In the Ak Beit Pass area the flora is typical high-altitude meadow steppe. In the Karaunkur–Ottuk Gorge the road passes through areas of Naryn forestry with floodplain and slope forests.

18. **Fauna.** The faunal associations dominant in the project area are shown in Table 1.

**Table 1: Dominant Terrestrial Faunal Associations**

Area	Terrestrial Fauna			
	Amphibians	Reptiles	Birds	Mammals
Dolon Pass		lidless skink	red-mantled rose finch, rufous-backed redstart	Tien-Shan shrew, narrow-skulled vole
Karaunkur Gorge, Kyzyl-Bell Pass, east and west part of At-Bashi Valley	green toad	lidless skink	rock and white-capped bunting, linnnet, chukar	gray marmot, mouse, gray hamster
Ottuk Gorge	green toad	steppe runner	Isabelline and common chat, pink-billed lark	tolai hare, Siberian jerboa
Middle Naryn Valley, central part of At-Bashi valley	green toad	steppe runner, diced snake	white and yellow chat, red-headed bunting	house mouse, gray hamster
Ak Beit Pass	green toad	lidless-skink	Isabelline and common chat, Hodgson's rosy finch, snow finch	mole vole, marmot, narrow-skulled vole

Source: 1987. Natural Environment and Resources. *Atlas of the Kyrgyz Republic*. Vol. 1. Moscow.

19. **Ecosystems.** Twenty-two ecosystems are distinguished in the Kyrgyz Republic, and seven of them were found in the project area. An assessment of ecosystems health by biological indicators (in points, from 1 = poor to 3 = excellent) was undertaken as part of this IEE. Table 2 presents the results of the study.

**Table 2: Assessment of Ecosystem Health in the Study Area**

Ecosystem	Assessment ( 1= poor to 3 = excellent)
Alpine Sub-Alpine	2
Mid-mountain Herbaceous	1.5
Mid-mountain Spruce Forest	2.5
Mid-mountain Floodplain Forest	2.3
Mid-mountain Steppe (lower reaches of Karaunkur River)	1.5
Mid-mountain Steppe (middle reaches of Karaunkur River)	2
High-Mountain Meadow Steppe	2

Source: Asian Development Bank estimates.

20. Therefore, the condition of ecosystems can be assessed as “satisfactory”. Sensitive ecosystems identified by the survey are mid-mountain spruce forest, mid-mountain flood plain, alpine/sub-alpine and high-mountain meadow steppe. The survey reports also that the migratory routes of hoofed mammals pass near the Ak Beit (Km 473–Km 474) and Dolon passes (Km 283).

21. **Protected Areas.** The section does not run through any specially protected area. One protected area is found close to the project area; this is the Salkyn-Tor State Natural Park, several kilometers to the east of the road corridor (Figure 1). According to International Union for Conservation of Nature classification, a national park (category II) is a protected area managed mainly for ecosystem protection and recreation.

### 3. Socioeconomic Resources

22. **Industry and Agriculture.** Industry in the Naryn oblast is represented by the electric power industry, mining, food processing, and the construction materials industry. Naryn oblast is an important agricultural region, specifically in animal agriculture. It supports a large population

of sheep and horses. In 2005, industrial production of Naryn oblast was Som754.1 million and agricultural production was Som4,786.1 million.

23. **Tourism.** Naryn oblast has vast tourist potential that is presently not exploited. Major tourist attractions in Naryn oblast are Tash-Rabat (a caravanserai dating to the 15th century), the site of the ancient town of Koshoi-Korgon, and the high-altitude Song-Kul Lake.

24. **Land Use.** The Land Code of the Kyrgyz Republic specifies the following land-use categories: (i) agricultural land; (ii) settlement land; (iii) land of industry, transport, communication, defense, and other nonagricultural purposes; (iv) lands of specially protected natural territories; (v) forest fund; (vi) water fund; and (vii) reserve land. The land use in the project area is mostly agricultural; pasturelands are prevalent in mountain areas, while croplands are prevalent in the valleys. The Law on Highways specifies the category “land of road transport”.

25. **Nontransport Infrastructure.** Infrastructure within the section is represented by electric power lines, telecommunication lines, water supply systems, irrigation systems, and canalization systems. As the section crosses nontransport infrastructure in Naryn and other portions of the Project area, coordination with the relevant authorities will be required.

26. **Transport Networks.** The Bishkek–Naryn–Torugart road is an international road corridor and one of two roadways linking the Kyrgyz Republic and the PRC. On a larger scale, the road is a part of CAREC Transport Corridor 1 linking Kashi in the PRC to Almaty in Kazakhstan.

27. **Population and Communities.** Naryn oblast’s population was reported as 266,500 people (2006), the majority of whom (82.2%) live in rural areas. Communities served by the road include Karaunkur, Ottuk, and Naryn (in Naryn *rayon*), and At-Bashi, Kara-Suu, and Karabulung (in At-Bashi *rayon*) villages. Karaunkur (Km 295) is a small village comprising about 10 houses located in Karaunkur Gorge. There is one three-storey building and several clay-brick dwellings. Ottuk (Km 314–Km 316) is a larger settlement with a population of about 1300 people. Houses are mostly made of clay brick. Naryn town (Km 347–Km 352) with a population of about 40,000 is the largest settlement. This stretch has both multi-storey buildings and small dilapidated houses. At-Bashi (population 11,300) is a *rayon* center several kilometers from the alignment. Other settlements in the project area are Kara-Suu (Km 410) with a population of 4,540, and Karabulung (Km 417), with 1,508 inhabitants; the alignment runs through both villages. People usually use clay brick to build their houses. Ak Beit is a very small village of five houses at Km 464. The ethnic composition in the project area is homogeneous and consists of virtually only Kyrgyz people.

28. **Cultural and Historical Heritage.** According to the List of Historical and Cultural Sites of National Significance, there are 12 historical and archeological sites in Naryn *rayon* and 28 in At-Bashi *rayon*. Although none of the sites are located within the ROW, some of them are within several kilometers of it. There are also about 10 Muslim graveyards in the proximity of the road.

#### **D. Screening of Potential Environmental Impacts and Mitigation Measures**

29. Potential impacts have been identified by reviewing each relevant parameter and screening out insignificant impacts from those that can have significant adverse impacts in the construction and operation phases of the project. It was concluded, as will be shown below, that the implementation of the project will have significant social benefits and, if the prescribed

mitigation and management measures are fully implemented, it is unlikely to have major adverse environmental impacts.

## 1. Physical Resources

### a. Topography

30. **Impacts.** Topographic impacts could occur due to altered road embankments, borrow-pit excavations, and quarry operations.

31. **Mitigation.** No significant cut and fill operations are required; therefore no significant impacts to topographic characteristics are anticipated.

### b. Soil and Permafrost

32. **Impacts.** Soil impacts may occur due to altered road embankments, borrow-pit excavations, and quarry operations. However, no significant cut and fill operations are anticipated. Provided that erosion prevention measures in the construction and operation phases are taken, no substantial adverse impacts to soils are foreseen. No long-term impacts to area soils due to increased pollutant levels are anticipated. The permafrost island areas occur at altitudes of more than 3,000 m, therefore potential impacts to the permafrost areas are likely to occur during construction and operation phases near the Dolon (Km 282–Km 283) and Ak Beit passes (Km 364–Km 376).

33. **Mitigation.** Mitigation measures include integration of the geocryological considerations into the detailed design by surveying at the pre-project stage the current condition of permafrost at the Dolon and Ak Beit passes, identifying and mapping areas of concern (if any), and developing mitigation measures. The mitigation measures can include the avoidance of areas with degraded permafrost and engineering measures.

### c. Air Quality

34. **Impacts.** Air quality impacts could occur in both the construction and operation phases, but no significant violations of standards are anticipated amid the provisions noted below.

35. **Mitigation.** Contracts will require asphalt and hot-mix plants to be located at least 500 m from the nearest sensitive receptor (e.g., schools, hospitals, or communities), and they will not be located within sensitive ecosystems identified above. Operators will be required to install emission controls. Blasting (if any) will be carried out using small charges, and dust-generating items will be conveyed under cover. Road surfaces and excavation and construction sites will be sprayed with water to keep them moist for dust control. Trucks carrying earth, sand, or stone will be covered with tarpaulins to avoid spillage. Contracts will require pre-construction and routine air quality monitoring. Construction sites, asphalt plants, quarries, and transportation roads will be monitored for total suspended particles during the construction phase. An ambient air quality monitoring station will be set up in Naryn town to monitor pollution in the vicinity of the road corridor in the operation phase. (Currently there is no ambient air quality station in Naryn.) The upgraded road will improve air quality and reduce dust emissions, as the sections of road that do not have an asphalt surface will be upgraded and covered with asphalt.

#### d. Surface and Groundwater

36. **Impacts.** Surface water impacts could occur during construction period due to the erosion and construction activities. Provided that road drainage systems are improved, enhancement of water quality can occur at the operation phase. No impacts are anticipated to availability of water for domestic or agricultural use, except in Naryn town where water supply pipelines may be temporarily impacted during construction. Potential impacts to local water supplies include the possibility of temporary labor camps wastewater disposal during the construction period. No impacts to groundwater resources are anticipated as a result of the proposed activities in the road corridor in either the construction or operation phases.

37. **Mitigation.** The Project will install adequately sized drainage facilities to accommodate foreseeable flood levels and will stabilize downstream slopes with concrete or rock gabions or walls to avoid erosion. Potential adverse impacts to the surface hydrology in construction phase of the Project will be avoided through the enforcement of contract provisions. Contract provisions will ensure that construction camps and other potential sources of secondary impacts are properly sited and provided with drainage and wastewater facilities. Water quality will be monitored by chemical analysis and bioindicators during construction and operational phases. Monitoring points will be located at the Karaunkur, Ottuk, On-Archa, Naryn and At-Bashi rivers.

#### e. Natural Hazards

38. **Impact.** Landslides, rock falls, avalanches, and mudflows may be triggered by different natural and anthropogenic factors, pose hazards to people and infrastructure, and may block roads.

39. **Mitigation.** For the landslide-prone area (Km 355–Km 357) the Design Institute proposes using the existing road in combination with the geotechnical measures. Mitigation measures for rock fall-prone areas will include installation of rock fall retaining structures and rock fall warning signs as will be decided in the detailed design stage of the Project. Mudflows will be mitigated by installation of box culverts. Artificial release of avalanches with artillery (a commonly used method for avalanche control in the Kyrgyz Republic) will be used.

#### f. Noise and Vibration

40. **Impacts.** According to the local people from Karaunkur, Ottuk, Kara-Suu, and Karabulung villages living in proximity to the road, noise and vibration have an impact on their houses. Special concern is expressed over overloaded trucks transporting cargo to and from the PRC.

41. **Mitigation.** A survey that includes baseline instrumental measurements of noise and vibration levels and damage susceptibility study will be conducted, along with the inspection of the present condition of houses, at the preconstruction stage. In case of excessive noise or vibration levels, remedial measures—such as special road surface design, noise barriers, planting trees, or antivibration layers—will be used along with monitoring.

## 2. Ecological Resources

### a. Flora

42. **Impact.** No threatened or endangered plant species are located in the potentially affected ROW and no adverse impacts to such species are likely to occur due to the

rehabilitation activities. Plant species present within the ROW are either introduced species or ubiquitous native species, which are highly tolerant of grazing, compaction, and other physical disturbances. Construction activities will impact only a narrow band of vegetation adjacent to the existing road. No substantial removal of trees or other vegetation is anticipated.

43. **Mitigation.** The Project will include roadside planting to ensure slope stabilization. Existing trees and roadside plants will be retained. Topsoil from borrow-pit areas will be saved and reused.

#### **b. Fauna**

44. **Impact.** Habitat fragmentation as well as accidents involving wildlife can occur due to blocking wildlife migration routes near the Dolon and Ak Beit passes. Construction camp workers and drivers can contribute to poaching or hunting wildlife.

45. **Mitigation.** Mitigation will include an extended study of wildlife migratory routes during detailed design stage and providing findings on exact locations of routes and behavior of wildlife together with recommendations on specific mitigation measures to the project implementation unit. Clauses should be written into construction contracts resulting in immediate dismissal and prosecution of individuals involved in poaching and wildlife hunting.

#### **c. Ecosystems**

46. **Impact.** The field assessment of ecosystems conducted within the frame of the IEE shows that, whereas no significant impacts are anticipated for mid-mountain steppe and meadow ecosystems as they have already experienced broad-scale changes as a result of overgrazing, mid-mountain flood-plain and meadow ecosystems in the Karaunkur–Ottuk Gorge and sub-alpian ecosystems (Dolon and Ak Beit passes) are at a greater risk of degradation.

47. **Mitigation.** Mitigation measures to reduce risks posed to ecosystem health include siting of construction camps, asphalt plants, and other related facilities outside environmentally sensitive areas.

#### **d. Protected Areas**

48. **Impact.** No direct impacts to the Salkyn-Tor State National Park are anticipated. The Project could have an indirect impact on the national park by attracting more tourists. The potential impact is perceived as beneficial and within the environmental management capacities of the national park administration.

### **3. Socioeconomic Resources**

#### **a. International Trade**

49. **Impact.** The improvement of the road is anticipated to have positive impacts for international trade between the Kyrgyz Republic and the PRC and other countries by decreasing the transportation costs and travel time. Modernization of the customs infrastructure and complementary measures from the Government to improve customs procedures—such as enforcement of overloading regulations, longer hours of operation, and also introduction of one-window operation whereby all transactions are undertaken together—will facilitate border crossing and also result in decreased transportation costs and travel time.

### **b. Industry, Agriculture, and Services**

50. **Impact.** The improved road and modernization of customs facilities and procedures will enhance import and export opportunities for industries and facilitate connectivity and access of agricultural producers to Bishkek and Issyk-Kul oblast markets. It will have a positive impact on the construction materials industry. Agricultural producers will have better access to markets of Bishkek and Issyk-Kul oblast.

51. **Mitigation.** To gain the most benefit from the Project, training on the development of roadside businesses should be organized for the local population, and microcredit programs launched as complementary projects.

### **c. Tourism**

52. **Impact.** The improved road and modernized customs facilities and procedures will have a positive impact on tourism development. Tourists traveling from/to PRC will have more comfortable and faster travel, and local tourist attractions will be more accessible. The local population will benefit from increased activity such as hotel business, horse rental, handicraft trade, and entrance fees collected from tourists. Provided that the tourist season lasts only for 3–4 months, the potential of tourist attractions is still far from being fully exploited; even if increasing number of tourists visit the area, it can be concluded that no adverse impacts are anticipated in the foreseeable future.

53. **Mitigation.** In order to maximize benefits of the Project, the rehabilitation of the road corridor should be complemented with projects on facilitation of border-crossing procedures for tourists, and development of ecotourism ventures. Tourist-oriented road signage should be introduced.

### **d. Transport Networks**

54. **Impact.** Detours and traffic inconveniences will occur during construction. Following construction, the primary transport impact of the Project will be to improve the performance of the transport sector and greatly facilitate the flow of traffic, goods, and travelers.

55. **Mitigation.** Care will be taken during the construction period to ensure that traffic disruptions to road transport are minimized. Traffic management plans should be prepared.

### **e. Health and Road Safety**

56. **Impact.** Improvement of the road corridor will contribute to a safer journey and a reduction in the number of road accidents, and will facilitate access to advanced oblast and national health services. However, the improved road will increase vehicle operating speeds on the road and, if not controlled, accidents involving people and livestock may increase.

57. **Mitigation.** In Naryn, Karaunkur, Ottuk, Kara-Suu, and Kara-Bulung provisions should be made for paved shoulders, road signage and speed limits, and service roads for local traffic.

### **f. Population and Communities**

58. **Impact.** No adverse impacts on settlement patterns and communities are anticipated.

59. **Mitigation.** Opportunities for complementary actions to strengthen the community aspects of the project area are addressed by the social assessment. In summary, they include training for people (especially women) living along the road on new opportunities opened by improved road such as roadside trade, tourist accommodation, and microcrediting of roadside businesses.

#### **g. Cultural and Historical Heritage**

60. **Impact.** No impacts to archaeological and historic resources are anticipated, with the exception of a graveyard (Km 314) located close to the alignment that may be affected by vibration.

61. **Mitigation.** No mitigation related to known cultural resources is warranted. Contract provisions are recommended to ensure that construction works are suspended, local administration and state organizations on cultural heritage are informed, and all necessary measures to protect cultural resources are taken in the event of unexpected discoveries. The fencing of the graveyard located at Km 314 should be strengthened.

#### **E. Institutional Requirements and Environmental Management and Monitoring Plan**

62. **Legal and Institutional Framework.** According to the Law on Environmental Expertise, any project activities should be preceded by preparation and submission of OVOS (the Russian acronym for “assessment of environmental impacts”), and its approval by Ecological Expertise (State Environmental Review). The OVOS documentation should include endorsements from local administration, sanitary control bodies, Ministry of Agriculture, Water Resources and Processing Industry and other organizations, depending on environmental attributes affected by the Project.

63. **Institutional Requirements.** The Investment Projects Implementation Department (IPID) will be responsible for ensuring that environmental procedures are incorporated in each stage of the work—such as document tender and contract preparation, bid reviews and awards, and supervision of preconstruction baseline monitoring—as an integral part of construction supervision.

64. IPID will be responsible for overall contract administration and day-to-day project supervision including environmental management. An environment and/or social officer will be appointed within IPID to be responsible for ensuring the environmental management plan, including monitoring requirements, are implemented effectively. The construction supervision consultant will assist IPID in its responsibilities, including instrumental environmental monitoring of the Project.

65. **Environmental Monitoring Program.** The environmental monitoring program includes routine site inspections and reporting related to soil and erosion control; embankment and erosion protection; borrow-pit restoration; noise, vibration, air, and water quality monitoring (including baseline and routine periodic water quality monitoring); and terrestrial and/or river ecosystem health monitoring. Specific monitoring provisions include:

- (i) **Water quality.** Instrumented baseline and routine periodic water quality monitoring. It will be complemented with routine monitoring of water quality by macrozoobenthos (once a year for 2 years).

- (ii) **Air quality.** Instrumented baseline and routine periodic air quality monitoring.
- (iii) **Noise.** Instrumented baseline and routine periodic air quality monitoring.
- (iv) **Ecosystem degradation.** Routine roadside ecosystem monitoring by indicator bird species.
- (v) **Land use-related impacts.** Monitoring of quarry activities, siting of construction camps and related facilities, and siting of asphalt plants.

66. **Environmental Management Plan.** The summary plan is in Table 3.

**Table 3: Preliminary Environmental Management Plan**

Environmental Issue	Mitigation Measures	Estimated Cost (\$)	Location	Time Frame	Responsibility	
					Implementation	Supervision
<b>A. Construction Phase</b>						
1. Soil erosion	<ul style="list-style-type: none"> <li>• Preventive and erosion control measures to minimize soil clearance, use less erodible materials, and engineering measures</li> </ul>	Included in the main civil works cost	Throughout the section	Construction period	Contractor	PIU
2. Natural hazards: rock falls mudflows, and avalanches	<ul style="list-style-type: none"> <li>• Installation of rock fall retaining structures</li> <li>• Installation of box culverts</li> <li>• Artificial release of avalanches with artillery or explosives</li> <li>• Warning signs</li> </ul>	Included in the main civil works cost	Rock fall – Karaunkur–Ottuk Gorge, upgrade to Kyzyl-Bel Pass; mudflow – Karaunkur–Ottuk Gorge, west end of At-Bashi Valley; avalanche – Karaunkur–Ottuk Gorge, Kyzyl-Bal and Ottuk passes	Construction phase	Contractor, Design Institute. Anti-avalanche Department of MOES. Ministry of Defense	PIU
3. Air quality deterioration	<ul style="list-style-type: none"> <li>• Air quality control measures and monitoring</li> </ul>	Control measures are included in the main civil works cost; monitoring: 30,000	Construction sites, asphalt plants	Construction phase	Contractor	PIU
4. Water Quality	<ul style="list-style-type: none"> <li>• Water quality control measures and monitoring</li> </ul>	Control measures are included in the main civil works cost; monitoring: 50,000	Construction sites	Construction period	Contractor	PIU
5. Ecosystems degradation	<ul style="list-style-type: none"> <li>• Location of asphalt plants, construction camps, and other facilities outside sensitive ecosystems</li> </ul>	Included in the main civil works cost	Exclude Dolon Pass, Karaunkur–Ottuk Gorge, Ak Beit Pass from potential locations	Construction	Contractor	PIU
	<ul style="list-style-type: none"> <li>• Monitoring of sensitive ecosystems health</li> </ul>	5,000	Dolon Pass, Karaunkur–Ottuk Gorge, Ak Beit Pass	Post-construction	Local ecosystem specialists	PIU

Environmental Issue	Mitigation Measures	Estimated Cost (\$)	Location	Time Frame	Responsibility	
					Implementation	Supervision
6. Flora	<ul style="list-style-type: none"> <li>Landscaping (planting trees)</li> </ul>	Included in the main civil works cost	Throughout the section	Post-construction	Contractor	PIU
7. Noise/vibration	<ul style="list-style-type: none"> <li>Noise/vibration control mitigation measures and monitoring</li> </ul>	Mitigation measures are included in the main civil works cost; noise/vibration monitoring: 30,000	Construction sites and settlements (Naryn town, Karaunkur, Ottuk, Kara-Suu, and Karabulung)	Construction period	Contractor	PIU
8. Historical and archaeological heritage	<ul style="list-style-type: none"> <li>Halt of all construction activities and notification of the relevant authorities in case of historical and/or archaeological heritage being encountered during construction</li> </ul>	-	Project Area	Construction period	Contractor	Local administration, Academy of Sciences
9. Reinstatement of borrow pits and quarries	<ul style="list-style-type: none"> <li>Topsoil strip (where necessary) and re-topsoil</li> <li>Grassing the area</li> </ul>	Included in the main civil works cost	Identified quarries and borrow-pits along the road	After completion of construction works	Contractor	PIU
10. Construction camps	<ul style="list-style-type: none"> <li>Proper construction camp management in compliance with health and safety plan</li> </ul>	50,000			Contractor	PIU
11. Road safety	<ul style="list-style-type: none"> <li>Engineering to reduce the likelihood of accidents</li> <li>Education of users on the risks of high speeds</li> <li>Enforcement of traffic laws</li> </ul>	Activities ongoing	In all sections	Design, construction, and operation phases	Contractor, local traffic police	PIU
<b>C. Operation Phase</b>						
1. Monitoring of air quality, water quality, noise/vibration	<ul style="list-style-type: none"> <li>Ambient air quality monitoring station in Naryn town, water quality monitoring of major rivers, noise/vibration monitoring in Naryn town and settlements</li> </ul>	Air quality – 120,000; water quality, noise/vibration – cost of equipment is included in construction phase	Air quality – Naryn; water quality – Karaunkur, Ottuk, Naryn, On-Archa, At-Bashi; noise/vibration – Naryn, Karaunkur, Ottuk, Kara-Suu, Karabulung	Operation period	Kyrgyz Hydromet, Sanitary and Epidemiological Station	KHM, Department of Ecological Monitoring under SAEPF
2. Habitat fragmentation and wildlife corridor restriction	<ul style="list-style-type: none"> <li>Introduce crossing channels and traffic signs</li> </ul>	5,000	Wildlife migration routes	Operation period	MOTC in consultation with SAEPF	SAEPF

KHM = Kyrgyz Agency on Hydrometeorology; MOES = Ministry of Emergency Situations, MOTC = Ministry of Transport and Infrastructure; PIU = project implementation unit; SAEPF = State Agency for Environmental Protection and Forestry.

Note: List of proposals and/or method statements to be required from the contractor for approval through PIU: aggregate/borrow-pits management plan; spill management plan; construction camp management plan; reinstatement and/or revegetation management plan, and traffic management plans.

Source: Asian Development Bank estimates.

## F. Public Consultations

67. A number of public consultations with experts, local administrations, nongovernment organizations, and the general public were held in May–June 2008. Informal consultations with the local population in Karaunkur, Ottuk, Kara-Suu, and Karabulung villages, and with representatives of nongovernment organizations were held in Bishkek. A stakeholder workshop

for local administrations of Naryn and At-Bashi *rayons* was conducted on 16 June 2008. Also, consultations with experts from the Ministry of Emergencies, Ministry of Transport and Communications, and Academy of Sciences were held. The comments from previous large stakeholder workshops conducted in Naryn and Bishkek in 2006 were used to assess the actuality of the problem.

68. A summary of the opinions of the public consultations is as follows:

- (i) The local population supports the upgrading of the road corridor provided that it will bring more socioeconomic benefits to the local population.
- (ii) Feeder roads were proposed by locals to be included in the Project, specifically two roads connecting *rayon* center At-Bashi and EM-07, and the main street in Naryn that is a part of the road linking Ak-Talaa *rayon* and Tash-Bashat village.
- (iii) Due to safety and noise and/or vibration issues, it was proposed that consideration be given to bypasses of Ottuk, Kara-Suu, and Karabulung villages.
- (iv) Noise and vibration issues were the major concern in Ottuk, Kara-Suu, and Karabulung villages and Naryn town. The recent letter from the people of Ottuk to MOTC repeatedly raised these issues.
- (v) Local people should be involved in the road construction.

## **G. Findings and Recommendations**

69. The findings of the IEE are as follows:

- (i) Construction activities under the Project will be largely of a rehabilitation nature within the previously disturbed road corridor and no significant environmental impacts are anticipated.
- (ii) The Km 355–Km 357 (Kyzyl–Bel Pass) section is a landslide-prone area for which at least three alternatives were proposed: existing route, bypass, and viaduct. On the basis of information available, the Design Institute proposes the existing route in combination with geotechnical measures as the optimal alternative.
- (iii) The study of ecosystems health conducted in the frame of this IEE showed that there are ecosystems in the Project area that are more sensitive to environmental impacts, specifically: mid-mountain flood-plain and meadow ecosystems located in the Karaunkur–Ottuk gorge, and sub-alpine ecosystems (Dolon and Ak Beit passes).
- (iv) According to the local people from Karaunkur, Ottuk, Kara-Suu, and Karabulung villages living in proximity to the road, noise and vibration have an impact on their houses. However, visual examination showed that the houses are located outside the ROW, and the major problem is probably related to overloaded trucks and their noncompliance with the 30 km/hr speed limit.
- (v) The examination of baseline water quality in rivers of the project area by chemical analysis and bioindicators survey undertaken within the frame of the IEE showed that water quality is good.

70. The following recommendations are proposed based on the findings of the IEE:
- (i) **Environmental provisions in contract.** Specific environmental provisions are recommended for inclusion in contract documents including provisions related but not limited to: (a) erosion control and air and water quality control; (b) location of asphalt plants, construction camps, and other facilities (not in environmentally sensitive areas indicated above); (c) borrow-pit restoration; (d) quarry operations; (e) safety provisions; (f) baseline and routine monitoring of air quality, water quality, noise, and ecosystem health; and (g) community relations.
  - (ii) **Environmental monitoring.** Baseline noise, vibration and air quality monitoring is recommended at the preconstruction stage in settlements along the road.
  - (iii) **Capacity building for environmental management.** A training program for selected staff and addressed to the goals and techniques of environmental management activities in road projects is recommended.
  - (iv) **Recommended complementary projects.** A training program to ensure that local businesses and population will be able to use all the benefits provided by being adjacent to the international road corridor is recommended. A complementary project to increase attractiveness of the Salkyn-Tor State National Park for ecotourists is recommended.

## H. Conclusions

71. The Project will have significant social benefits and, if the prescribed mitigation and management measures are fully implemented, the Project is unlikely to have major adverse environmental impacts. An environmental monitoring plan has been prepared and responsibilities for implementation assigned. A budget has been allocated for environmental management and monitoring. A full environmental impact assessment under ADB guidelines is not required.