Initial Environmental Examination

May 2014

UZB: CAREC Corridor 2 Road Investment Program II – Tranche 3

Prepared by Project Management Unit under Republican Road Fund, Ministry of Finance for the Asian Development Bank.

Initial Environmental Examination Report

Initial Environmental Examination Report
Project Number: 44483-027
May 2014

Road Investment Program–Project3
Bukhara-Gazli km 228 -315

Prepared by Project Management Unit under Republican Road Fund, Ministry of Finance for Asian Development Bank (ADB).

CONTENT

ABBREVIATIONS

ADB	Asian Development Bank
AP	Affected Person
CAREC	Central Asian Regional Economic Cooperation
CSC	Construction Supervision Contractor
dBA	decibel
EA	Executing Agency
EARF	Environmental Assessment Review Framework
EMP	Environmental Management Plan
EMoP	Environmental Monitoring Plan
ES	Environment Specialist
ESO	Environment Safety Officer
GOST	a set of technical standards maintained by the Euro-Asian Council for Standardization, Metrology and Certification (EASC), a regional standards organization operating under the auspices of the Commonwealth of Independent States (CIS)
GoUz	Government of Uzbekistan
GRC	Grievance Redress Committees
GRM	Grievance Redress Mechanism
Hokimiyat	Town Mayor Office
IEE	Initial Environmental Examination
km	Kilometer
LARP	Land Acquisition and Resettlement Plan
L_{eq}	Energy-averaged sound level commonly usedtodescribetrafficnoise
MFF	Multi-tranche Financing Facility
NGO	Non-governmental organizations
PIEE	PreliminaryInitial Environmental Examination
PMU	Project Management Unit
RoW	Right of Way
RUz	Republic of Uzbekistan
RRF	The Republican Road Fund (the Road Fund)
TPM	Total Particular Matter
TSS	Transport Sector Strategy
SEMP	Site Environmental Management Plan
ShNK	Construction norms of Uzbekistan
SNPC	State Nature Protection Committee
SEE	State Ecological Expertise
SPS	Safeguard Policy Statement

A. EXECUTIVE SUMMARY

1. Background

1. Uzbekistan is a key transit country in Central Asia for trade among themselves, as well as with the rest of Asia and Europe. Transport plays a key role in promoting regional and internal trade. The proposed investment program (the investment program II) reconstructs the Uzbekistan section of CAREC Corridor 2, which connects Uzbekistan to Kyrgyz Republic, Afghanistan, Kazakhstan, Tajikistan, and Turkmenistan. This reconstruction will improve connectivity, road safety, and boost domestic and international trade. The investment program II fits with ADB's Strategy 2020, is included in the country operations business plan (2011–2013), and is aligned to the UN Decade of Action for Road Safety 2011–2020. The proposal is in line to the proposed Uzbekistan Transport Sector Strategy (2006–2020) and road map, as well as the CAREC Transport and Trade Facilitation Strategy and Action Plan.

2. The Multitranche Financing Facility (MFF) for the proposed CAREC Corridor 2 Road Improvement Program II comprises 3 tranche projects. ADB's investment for reconstructing of A-380, A-373 and A-373/4R112 highways will help the Government accelerate completion of the overall investment program. The Investment Program will cover about 87 km of A380 highway in Bukhara provinces, 74 km of A-373 highway and 75 km of A-373/4R112 highway in Tashkent and Namangan provinces. ADB's Multitranche Financing Facility (MFF) with 3 tranches will be applied for the Investment Program.

3. The ADB funded portion will involve: (i) expansion of highway road from 2-lane to 4-lane road, withas much as possible using the existing RoW, (ii) the replacement of old asphalt pavement with concrete, and the paving of all shoulders, and (ii) expansion of replacement of culverts, but no construction of new culvert is anticipated.

4. ADB classified this project as a B project in accordance to the ADB Safeguard Policy Statement (SPS), 2009, and therefore the IEE covers the upgrading and reconstruction of highway A380 km 228–315 needs to be prepared. The rapid environmental assessment has guided the scope of the IEE study, in terms of boundary and environmental impacts to be assessed. Data and information used to prepare the IEE are mostly secondary data; however field observation was also being carried out. The IEE study was prepared from April 15, 2014 to July 01, 2014. The assessment of impacts is based on the preliminary design of the Project. The IEE identify the likely impacts during the planning, reconstruction and to a much lesser extent operations, prepare also environmental management plan (EMP) to avoid and minimize potential impacts, and prepare also monitoring plan to ensure EMP and monitoring environmental quality are implemented. The IEE has been prepared in accordance to the ADB SPS 2009, and by taking into account the requirement of Government of Uzbekistan on environmental impact assessment.

2. Project Description.

5. The Project/Tranche 3 of the Second MFF CAREC Corridor 2 Road Investment Program involves upgrading from 2-lane road to 4-lane road, rehabilitation and improvement, and widening of some existing RoW of 87 km stretch of A-380 upgrading from km 228 to 315. The pavement of the project road will use concrete cement not asphalt. This road section begins at a suburb of Bukhara city and end in km 315 where this road is connected with road improvement has been funded also by ADB loan (L 2868). Almost all the land clearing was completed, and no acroachment was occurred in cleared project areas. The subgrade material for this road in a 10-14 m wide had been completed for some section of the road. The existing two lane asphalt pavement was not in good

conditions, riding is not smooth, and some road section showed more cracks and broken pavement surface. Most the shoulders along the road were covered with sand and no slopes or drainage system existed. In some road section, the gas pipeline, and power poles mark the boundary of the RoW. There is one bridge over the Zarafshan River that had been completely reconstructed, and therefore no reconstruction or construction of big bridge will be involved. Nonetheless, there are about 54 culverts and small bridges (less than 30 meter) that needs to be rehabilitated and reconstructed, the civil works for construction of culvert will be done, while the existing culvert and small bridge will continue to be used for traffic, the existing culverts and small bridges will be rehabilitate and upgrade after the new culverts and small bridges are ready for traffic.

Map 1: Project Area Map

3. Potential Environmental Impacts and Mitigation Measures

6. During the reconstruction period, various temporary environmental impacts will occur. These could include: potential air pollution especially dust and noise; surface and groundwater; temporary impairment of traffic safety due to traffic diversions and materials transport; disruption of access for pedestrians, non-motorized and agricultural vehicles and livestock. There are also potential impacts associated with contractor's yard, work camps, storage of construction materials and machineries. With regard to the workforce, there will be also potential impacts related with health issues e.g. HIV/AIDS, although most of the construction workers will be requited locally.

7. All the environmental impacts are temporary in nature, which occurs mostly during construction stage, and they are reversible impacts. The proposed mitigation measures have been defined with clear responsibilities of parties involves in the projects (PMU, supervision consultant/engineer,and contractor) and described in the environmental management plan (EMP).

8. The impacts to hydrology and waterways are mostly due to reconstruction of culverts because the design includes modification of the existing irrigation/drainage network. Where the highway crosses major irrigation/drainage channels to span channels, the contractor will be required to maintain irrigation/drainage flows and accommodate irrigation channel cleaning activities.

9. Large quantities of water will be required during reconstruction works. Water supplies and watercourses must be protected from over- abstraction and also from pollution. The contractor will be required to interceptand contaminated water to avoid release of pollutants into the watercourses. All the contaminated water from construction works have to be treated prior disposing into any watercourse.

10. Although not much vegetation clearance, any clearance on vegetation along the road alignment should be limited to the minimum required for works. Topsoil should be removed, stored and reused. Construction and use of appropriately sited haul roads will be required to minimize compaction and loss of agricultural land. The spoiled materials from the demolishing existing asphalt surface will need to disposed in the manner that accepted by local regulation, therefore, consultation with local authorities on where and how to disposed these spoiled materials is required.

11. Both solid and liquid waste will be produced from the reconstruction of the highway. Where possible, surplus materials will be reused or recycled. Where wastes (inactive e.g. concrete and masonry or active/special e.g. paint, oil, batteries and bitumen) are generated they should be segregated and stored appropriately in covered containers or tanks with bunds until they are safely removed from site by a licensed waste carrier. The waste management plan need to be prepared by contractor to handle and storage of any wastes from reconstruction of the highway.

12. During the construction and reconstruction stage, dust will cause the largest air quality impact. Dust generation will be minimized through good working practice, e.g. water sprinkle, transportation of construction materials will use vehicle with cover. There will be no blasting required, therefore, dust and vibration associated with blasting would not occur. These mitigation measures havebeen included in the EMP.

13. Plantation of appropriate tree and bush species along the embankment, particularly in loops of interchanges and in areas between settlements and the project highway, is

recommended to compensate for any loss of trees and shrubs during site clearance, and to increase the biodiversity and visual appeal of surrounding areas. Once established, the plantations may have a role in reducing the spread of dust and other air-borne pollutants from the highway. The highway fence will be located as close to outer limits of the plantation and the embankment as practicable, in order to both protect the growing trees and to minimize loss of grazing land.

14. The project will not affect protected areas, forest areas or areas with ecological sensitive. Around 51km out of 87 km of the highway will pass through dessert areas.The modified/natural habitat will not be lost along the 87 km corridor). Nonetheless, there will be some scrubs affected by land clearing, but since there are only few trees located mostly outside the RoWs, all the earth works will avoid cutting trees[1].Therefore, No potential environmental impact is expected in these areas.

15. The project is not expected to bring significant labour force, because only few numbers of skill workers will come from abroad, and most of construction workers and engineer will be recruited locally. Therefore, it is not expected that the Project will create a conflictwith local communities.

16. The number and locations of construction camps (i.e., facilities to house administrative facilities, resident workers, storage of materials, fuel storage and refueling facilities, etc.) have not been determined and will be left to the discretion of the Contractors. Based on similar projects, Project are likely to require one construction camp in the range of approximately 100 residents. Such camps are environmentally sensitive due to demands for water, wastewater and other disposal practices, potential impacts on nearby communities needs to be considered in selecting the location of these facilities, and it has to comply with the local requirement.

17. The existing Right of Ways (RoW) could cater almost all the need for expansion of highway from 2-lane to 4-lane road. However, land acquisition will still be required, especially to construct new bus stations, to provide clear view for road user, and also for some rest areas. Therefore, this Project will be the subject of a separate Land Acquisition requirement. Separate report on land acquisition has been prepared.

4. Public Consultation.

18. As part of the preparation of IEE report, consultation with affected people and with local authorities were carried out during the survey and collecting preliminary environmental data. Official public consultation was carried out in Jandor, Peshkun, Bukhara and Romitan districts, on 28 May, 2014. The public consultation was attended by local authorities, and also affected people. The consultation was started with providing information about the proposed project, the project scheduled, and information of potential environmental impacts and mitigation measures. The discussion revealed that participants have no objection on the project. The public consultation summary is attached in Appendix4. During the consultation, the grievance redress mechanism was also explained to the participants to ensure that they have information on the procedure to submit a complaint, in case they have one.

5. Conclusions and Recommendations

19. The Executing Agency, the Republic of Road Fund has no special unit to address their environmental management concerns. However, the PMU has environmental

[1] Source - LARP

consultant in its team in long term contract. Therefore, the EMP has been designed by taking into account that PMU on behalf of the EA will be able to implement the EMP.

20. The examination of potential impacts of the proposed project showed that the environmental impacts associated with the project are mostly occurred during construction stage. There is no environmentally sensitive area or protected area involved in this proposed Project. The environmental impacts are temporary and reversible. The proposed mitigation measures have been recommended and presented in the EMP with clear guidance on whose parties responsible for. The IEE shows that no further study will be required. However, if there is changing on project scope, an additional environmental assessment will be required.

B. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

21. The proposed Tranche 3 has to be implemented within the requirement of ADB safeguards policy that has been well reflected in the Environmental Assessment Review Framework (EARF). The EARF was formulated by taking into account all the regulation of the Government of Uzbekistan on Environment. On this basis, theTranche 3 was categorized as a B project in accordance to ADB SPS 2009, and Class 2 project in accordance to the Government EIA requirement.

1. Institutional Framework for Environmental Management

22. The key environmental institution in Uzbekistan is the State Nature Protection Committee of the Republic of Uzbekistan (SNPC). SNPC was established by Oily Majlis Decree in 26 April 1996 from the former State Committee for Ecology and Natural Resources Utilization. SNPC's activities are sub-divided into the following main areas:

- Environmental policy development
- Environmental protection
- Water monitoring and management
- Protection of marine (Aral Sea) bio-resources
- Forest management
- Bioresources and protected areas management

23. In Uzbekistan, under its Environmental Protection Law, 1992 requires that any project funded by the state is a subject for the environmental impact assessment process. The GlavGosEcoExpertiza, the State Ecological Expertise (SEE) Department of the State Committee for Nature Protection (SNPC), reviews environmental impact reports, prepares and implements ecological regulations and standards, coordinates environmental programs, and environmental monitoring. The SEE also responsible to approve or issues permits for pollutant emissions and also has an authority to stop projects and reconstruction works that do not comply with environmental legislation. The role and responsibility of SNPCis based on the Regulation on the State Environmental Committee of the Republic of Uzbekistan (1996).

24. The Law on Ecological Expertise dated from May 25, 2002, No. 73-11 governs the Environmental Assessment and defines procedure and requirement for environmental impact assessment. Preparation of the review reports and approval of projects on environmental grounds is regulated by the Resolution of the Cabinet of Ministers No. 491 of 31 December 2001. Annex 1 of Resolution 491 describes four categories of projects and the environmental assessment requirements. Category I Projects require a preliminary IEE (PIEE) defining how and to what extent the required IEE will be conducted, followed by a complete IEE. Category I and II are undertaken and evaluated at the central level only.

25. The Environmental Impact Assessment and the permitting system ('Environmental Certificate') are an inherent component of the environmental legislation. Under Uzbekistan law the Preliminary Environmental Impact Assessment (PEIA) is a mandatory document in the scope of the environmental assessment program and passes a number of expertises carried out during the Feasibility Studies development stage. The PEIA follows the format and requirements laid out in the *'Instruction on the assessment of the impact of proposed activities on the environment in the development of pre-planning, design and project documentation* for ultimate approval of the SNPCof the Rep. of Uzbekistan.

26. The main objective of the PEIA is to determine all likely environmental and social impacts associated with the proposed economic activity, and to make recommendations on

how to avoid environmental degradation and other adverse impacts. In the context of road reconstruction projects, the PEIA is required to incorporate information and examine the measures to address technical aspects and outputs such as:

- (calculated) air pollution from motor vehicles;
- predicted/modeled pollution on local water sources;
- Protection of settlements from the impact of (modeled) traffic noise;
- Soil protection and rational use of land;
- Conservation and protection of flora and fauna;
- Avoidance of road impacts on the socio-economic conditions of the local population;
- Retrieval of Environmental Impact Statement Certificates on the stage of Feasibility Studies ('Expertises').

27. The PEIA is a mandatory document on the pre-feasibility study design stage. It defines the main mitigation and monitoring actions for predicted environmental impacts. According to Article 36 of the Environmental Code the *"Development of an Environmental Impact Assessment is obligatory for all types of activities that can have a direct or indirect impact on the environment or health of the people".* Permits for the proponents are now valid for three years rather than only one year as was the case before the Code entered into force.

28. Category III projects are completed in two stages by the State level agency, with the Region level agency actively involved. As with Category III projects, these IEE involves:

Step 1. Preparation of a completed Preliminary Environmental Impact Statement (same as IEE);
Step 2. Review and Approval of IEE by National and Regional entities;
Step 3.Implementation of mitigation and monitoring measures by proponent with regional SNPC oversight.

29. At Stage 3 SNPC, working at both the state and region levels, defines the pollution limits the project is permitted to reach.

30. The assessment of Category I is under central jurisdiction with Glavgosekoexpertiza involvement. The Category III is most similar to ADB's IEE and Category IV projects are exempted from any IEE requirements, other than the submission of a project description and proof of Category IV status. Uzbekistan allows SNPCa maximum of 30 days to review Category I and II projects and 20 days for category III and 10 days for Category IV projects.

31. One year into the operating period there is a final inspection and contractor's final payment is released only after a fully compliant audit is recorded. Any issues arising during the audit must be addressed before release of final payment.

32. Concerning Right of Way aspects, the Republic of Uzbekistan has an acknowledged "protection" zone along national motorways (equaling a restricted RoW zone). For the planned categories of the rehabilitated highway this corresponds to 25m extending from the centre line of the carriageway. Within this zone no land use such as settlement, construction of buildings, farming, animal grazing, vending stalls or small business operations is permitted. Other reasons why the GoUz has launched such 'protection zone' is to reduce accidents (fatalities and injuries) and limit health and environmental risks resulting from accidents followed by spillage of hazardous pollutants.

2. National Environmental Policies

33. The constitution of the Republic of Uzbekistan defines principles for environmental protection and ownership of natural resources along with regulations for their use. The legislative framework relating to the environment consists of:

- Parliamentary legislation that establishes the State regulation of strictly protected natural areas, and the protection and use of the environment and biodiversity;
- Presidential Decrees and orders and the resolutions of the Cabinet of Ministers that ensure the implementation of the major provisions of the laws;
- By-laws of the executive authorities (Ministries and Committees) that specify the activities to implement the laws;
- International Agreements and Conventions to which Uzbekistan is a signatory.

3. Other Regulations relating to Environment and Road Reconstruction

34. A legal basis in the sphere of protection and the use of environment has been established in Uzbekistan, which is aimed at guaranteeing rights and duties stipulated by Articles 50 and 55 of the Constitution of the Republic of Uzbekistan. These are over than 20 laws, approximately 50 decrees of the President and of the Cabinet of Ministers of the Republic of Uzbekistan as well as other subordinate acts and normative documentation.

35. With regard to the present project, the following basic legal acts are acting at present in Uzbekistan that are directed to provide environment protection, guaranteeing public healthcare as well as managing the environment protection sector, namely Laws of the Republic of Uzbekistan:

Table B-1 Major Legislation for Environmental Protection

Legislation	YearPassed (Amended)	Purpose / Content
Constitution of the Republic of Uzbekistan		Land, subsoil, air waters, forest, wildlife and other natural resources shall be utilized and, at same time, protection shall be give
« Law on Environmental Protection»	1992	The general legal framework for comprehensive environmental protection and for the use of them, including environmental standards setting, legal regime of specially protected area, rules and procedures for the use etc
«Law on Ecological Expertise»	2000	About the use of public ecological expertise and environmental assessment procedures
«On the State sanitary epidemiological supervision in the Republic of Uzbekistan»	1992	public relations on ensuring sanitary and epidemic wellbeing and radiation safety of the population
Law on Specially Protected Area and Biosphere Territory	30.08.93	It establishes legal requirement of for the protection and use of all natural objects within certain areas.
«Law on Protection and Management of Flora»	Approved in December 26 1997/ New Laws of the Republic of Uzbekistan. 18th Edition, p.2	About protection, use, and reproduction of flora.
«Law on Wildlife Protection	dated 26 December	About protection of wildlife habitats.

and Management»	1997	
«Law on Forest No. 770-1»	15.04.1999	About regulation of the forest relations for ensuring conservation, protection, rational use, reproduction and increase of efficiency of the woods.
«Law on Atmospheric Air Pollution»	1999.	Including ambient air quality standards, emission standards and Guidelines for Application (#469-1999)
«Law on Water Pollution»	1999	
«Law on Mineral Resources»	October 23, 1994	borrow areas and quarries
«Law on Health Safety and Environment»	May 6, 1993	Occupational Health and Safety
«Law on Protection Archeological Monuments»	October 13, 2009	
«Law on the Protection of Ambient Air»	dated 27 December 1996	
«Law on Waste»	dated 05.04.2002	About waste management
«On protection of the population and areas from emergency situations of natural and anthropogenic character»	Dated 20.08.1999	

36. In addition to the 1992 Law in Environmental Protection, the country environmental management is governed by the following regulatory framework:

i. Law on Protection and Management of Flora Approved in 26.12.07, No. 543-1
ii. Law on Introduction of Amendments into the Law on Nature Protection and On Specially Protected Environmental Areas. Approved in May 5-6 1994// New Laws of the Republic of Uzbekistan. 10th Edition, p.242. (Biodiversity)
iii. Law on Ecology Security (Safety), 2005
iv. KMK (Standard) 301012-2000, —Health Safety in construction
v. Rules and Norms developed by Road Research Institute in December 2008 on health protection while working in asphalt making plant and other quarries used in road construction

4. International Environmental Agreements

37. Uzbekistan is a signatory to most international agreements and conventions relating to the environment, as indicated in Table B-2.

Table B-2: International Agreements and Conventions

International Convention
Framework Convention on ClimateChange, UN FCCC (joined in 1993)
Kyoto Protocol to UN Framework Convention on Climate Change
Vienna Convention for the Protection of the Ozone Layer
Montreal Protocol on Substances that Deplete the Ozone Layer
London and Copenhagen Amendments to the Montreal Protocol on Substances that Deplete the Ozone Layer
Convention on Biodiversity
UN Convention to Combat Desertification
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and theirDispo sal
Convention on International Trade in Endangered Species of Wild Fauna and Flora Endangered
Convention on the Conservation of Migratory Species of Wild Animals

5. Construction Permits

38. Prior to starting reconstruction, permits from the following organizations will be required:

- Cabinet of Ministers
- Ministry of Economy of the Republic of Uzbekistan,
- Ministry of Finance
- State Committee of the Republic of Uzbekistan for Architecture and Construction
- Uzavtoyul
- State Nature Protection Committee of the Republic Uzbekistan (SNPC)
- Territorial road and operational organization
- Local Executive Power

39. Operation of a new borrow pit for extraction of aggregate requires a permit from SNCP's Department of Geology. The application requires an Ecological Passport. The major environmental company in Uzbekistan which prepares the ecological passports is SNCP's Ecological Centre. Details required include location of borrow pit and proposed volume and rate of extraction. SNCP's Department of Geology will undertake a geological assessment of the site of the proposed borrow pit. Once approved, the site is registered by SNCP's regional branch. SNCP will undertake regular checks to confirm the volumes extracted do not exceed those in the permit.

40. Operation of asphalt or concrete batching plant requires a permit from SNCP. Again the application requires an Ecological Permit which provides details of location, production and emission rates. Once approved, the site is registered by SNCP's regional branch. SNCP will undertake regular checks on sources of materials, appropriate use of technology and environmental impacts such as air quality and spillages.

6. Required RUz Environmental Approvals & Permits

41. The central executive body for environmental protection in the Uzbekistan Administrative Framework is the:

- **State Nature Protection Committee of the Republic Uzbekistan (SNPC).** SNPC's responsibilities include developing and pursuing national environmental policy, enforcing laws, and administering State supervision and State ecological expertise. It also controls emissions and discharges of pollutants, issues permits of certain categories (discussed below) and determines the maximum volumes and composition of pollutants. At the local level, SNPC has territorial environmental protection offices. They also determine, within certain limits, the pollution charges paid by enterprises. They allocate natural resources, including mountain and woodland pastures and grasslands, and establish and administer local specially protected areas, and also issue nature resource-use regulations within their competencies.

42. The other State bodies within the Uzbekistan Administrative Framework with environmental responsibilities for the media indicated are as follows:

- **State Committee of the Republic of Uzbekistan on Geology and Mineral Resources** coordinates permissions to drilling of wells to water and permissions to special water use (underground waters);

- **Ministry of Agriculture and Water Resources of the Republic of Uzbekistan** issues technical specifications for water intake from irrigation systems, reconstruction of water intake and water release structures on them, crossing of water flows by the engineering communications, as well as carry out the control during their design and construction. It also provides conclusions on water resources availability and agreements having an obligatory force during reconstruction of new facilities and reconstruction of existing ones which use water resources and gives out permission to special water use or water consumption of basin management of irrigational systems, management of the main channels (systems), control of reservoir maintenance, maintenance of cross-border water objects, water objects of interregional value, large and especially important water facilities, to control pump stations, makes offers into nature protection bodies about grant of permission for special water use and water consumption from natural superficial water objects;

- **Ministry of Emergency Situations of the Republic of Uzbekistan.** The Emergency Management Agency is responsible for environmental disaster management and prevention (e.g., fires).

- **Hydro meteorological Center at the Cabinet of Ministers of the Republic of Uzbekistan**is responsible for air, surface water (natural watercourses), soil pollution monitoring and background monitoring (data collection, processing, analysis and preparation of information), forecasting of air pollution level and monitoring of climate change and presentation of the approximate forecasts, as well as contribution to the assessment of its impact to the measures and variants of reaction to climate change.

43. The contractor must obtain a clearance permit to carry out any work where environmental effects are likely, such as tree removal, vegetation clearing, removal of soils, culvert replacement, deviation of natural water ways, etc. These permits can only be issued once the contractor has prepared an environmental work plan or Construction SEMP showing how the mitigation and monitoring actions defined in the EMP will be implemented. The preparation of the SEMP requires a licensed person or company, thus the contractor must retain expertise to do this work and must keep that person/company to oversee the operation throughout the contract period. Compliance monitoring is undertaken by the Inspection Unit of the Oblast Environment Department, which has enforcement and fining powers. Inspection occurs once per year and the contractor must receive at least a two-week notice prior to the inspection visit.

C. DESCRIPTION OF THE PROJECT

1. Need For the Project

44. The project forms a part of the Central Asia Regional Economic Cooperation (CAREC) Program, initiated in 1997 to improve living standards and to reduce poverty in CAREC countries through more efficient and effective regional economic cooperation. A sound and well connected transport network is necessary to link Central Asian nations to each other and to sea ports as well as to allow affordable carriage of natural resources and industrial products from their source to the centers of demand. The Project aims to develop strategic international highways and improve road sustainability in Uzbekistan. It will have two major components: (i) road development, and (ii) road sector sustainability.

45. The CAREC Corridor II, Road Improvement Program has been funded by ADB through the ADB‘s Multitranche Financing Facility (MFF) loan modality. The detailed design for the Tranche 3 road rehabilitation has been completed and approved by the government.

46. Summing up, the principal structural defects and inadequacies of the existing road of Tranche 3 include:

- Most of the upper pavement layer is heavily deteriorated; at places there occurs subsidence, rutting, patching, edging, and mesh cracks;
- Steep slopes making many sections impassable or extremely difficult and risky, especially for heavy vehicles, and under rainy or icy conditions;
- Much of the embankment subgrade does not meet the parameter requirements of the technical specifications for a national motorway of category II;
- The existing junctions and intersections do not meet technical requirements, and are viewed as 'black spots';
- Poor traffic signage all along the entire road corridor;
- No provision for a local bus transport system.

47. Upgrading of the project road sections will, on their own, have little socioeconomic effect and will generate few direct benefits, other than during reconstruction when some people from local communities will be employed. As more and more sections are upgraded and the highway has a uniform level of service along its entire length, benefits in terms of reduced travel time, more reliable transport service, greater passenger comfort and generation of jobs stemming from greater traffic-induced commerce may be realized. These changes will, over the long term, gradually lead to an improved standard of living for those local families who will take advantage of new income generating opportunities. It will be better access to services such as health, schooling and markets that will be felt immediately once a section of road is improved.

48. It is argued that the project will result in many ways to the regional development and economic opportunities. Above all, the project actions will contribute to address poverty issues in the region.

2. Main parameters of the designed road

49. The start of the alignment of the section A-380 km 228-315 was accepted 228 km, the end of alignment – 315km of the road A-380 Guzar – Buhara – Nukus-Beineu. The total length of the section is 87km and the section is located in Buhara region.

50. The design will allow maintenance unit, equipment and material to access the network on a daily basis. This will include winter maintenance, emergency interventions and

diversion of traffic when necessary. Although no toll gate will be installed at this stage, the highway may be tolled in future. The average right-of-way width for the highway is 60 m (i.e. 30 m either side of the centre line).

51. All geodetic base stations (all benchmarks, tops of rotation angles) were restored by Design Institute from 04-07 August, 2014. Working marks remained without changes, according to the project.

52. The condition of the existing two lane asphalt pavement was generally good but some areas showed more cracks and broken pavement surface. The shoulders were covered with sand and no slopes or drainage system existed.

Road characteristics

- Number of lanes - 2 each direction
- Lane width - 3.75 m;
- Carriageway width - 7,5 м x 2
- Bank of carriageway - 15 o/oo
- Bank of outer road shoulder - 40 o/oo
- Width of margin strips - 0,75 m
- Inclination of fill slope - 1,5:1.3
- Inclination of outer cut slope - 1:1.5; 1:4
- Distance between edges of road bed of backwards directions - 12,5m and more
- Fencing along the itinerary

3. Road pavement

53. Road way at all sections has two lanes with cement-concrete pavement. On the section 238-240km where the road rehabilitation works had been carried out, the pavement is in satisfactory condition. At the sections 230-236km, 241-31 km there are cracks, fracturing pattern, corrugation, and tracing ruts.

4. Bridges and Culverts

54. The project area is crossed with a network of Zarafshan River and numerous irrigation and drainage channels. Reconstruction of the project highway will inevitably impact on these channels. Temporary or permanent restriction or obstruction of watercourses could lead to flooding and impair the operation of the irrigation and drainage system, and thus agricultural activities, in this area.

55. Controlled drainage in this area is required not only to protect the surface and groundwater quality and maintain existing drainage patterns, but also to avoid over-wetting the underlying soil and materials from which embankments are reconstructed, which could lead to slope instability.

56. The design includes modification of the existing irrigation/drainage network. Where the highway crosses major irrigation/drainage channels, bridges will be built to span channels, maintain irrigation/drainage flows and accommodate irrigation channel cleaning activities. Minor channels will be culverted.

57. There are 2 bridges on the section 228-265km. Characteristics of the bridges are stated in the Appendix 1.

58. In detailed design based on thorough survey of each pipe it is possible to use part of old pipe elements. There are 14 box culverts on the section 228-265 km. which allows water

to flow under a road, railroad, trail, or similar obstruction. There are also 54 pipe culverts of irrigation and drainage networks. Characteristics of all culverts are stated in the Appendix 1 Table C-2 and 3.

59. On A-380 km 228-315 the project envisages reconstruction of reinforced concrete pipes on the road with the diameter of 1,2 meters in the quantity of 42 pieces, with the diameter of 1.5 in the quantity of 1 piece, with the diameter of 2x2m in the quantity of 1 piece.

60. Embankment slopes (vertical: horizontal):

- 1:3 – up to 2.5 m height of embankment slope
- 1:2 – > 2.5 m to 4.0 m height of embankment slope
- 1:1.5 – > 4.0 m height of embankment slope

61. For embankments higher than 6.0 m, a berm of 2.0 m width is proposed.

62. Overall, the height of the embankment will be kept to a minimum and steepness of slope maximized to reduce the requirement for fill and associated extraction, processing and transportation costs.

63. Design speed – the design speed of 120 km/h for flat terrain will be used for design purposes.

64. Highway furniture and markings – Highway furniture (e.g. traffic signs, crash barriers, reflective road markers, fencing, lighting) and markings will conform to national standards for a Category I (highway standard) road.

5. Crossings and junctions

65. On A-380 km 228-315 the project envisages reconstruction of interchange ramps,total 41, including sections:

- 228-237 km – 9
- 237-265 km – 25
- 265-280 km – 4
- 280-315 km – 3

66. Crossings and junctions of the roads must provide maximum safety and comfort of car driving within the interchange. The planning of the crossing must point out the advantages of driving along the main road.

67. Independently of the crossing layout, it is recommended to reconstruct the interchange under right angle or close to it. The smallest radius of the curves in the road intersections is 5 meters.

6. Traffic management and road facilities

68. On the road A-380 km 228-315 technical facilities of traffic engineering include carriageway marking, road signs, road guards and retroleflective warning signs. Carriageway marking is made on some sections. On other sections there is no carriageway marking, in the best case, there is only longitudinal marking. On section 236-274 km at some places side guards made of curved bars are installed in the locations of high banks. There is no road illumination at populated localities.

69. Bus stops, petrol stations, traffic safety posts, meal and trade facilities, road repair points are located along the road. Communication lines, power supply lines, gas pipeline and water pipeline are located along the road. In more than 20 places the road is crossed by other roads.

70. Road facilities are in accordance with the requirements of ShNK 2.05.02-07 “Automobile roads". In order to regulate road traffic it is envisaged to install road signs, guard rails and carriageway market. The allocation of the signs is done based on the condition that the signs must be visible, that the possibility to damage them with vehicles must be excluded, in accordance with GOST 23457-86 “Technical means of traffic management”. In combination with road signs the road will have carriageway marking in accordance with GOST 23457-86.

71. On A-380 km 228-315 along the axis of central reserve on the section 228-274km it is envisaged to install there will be guards made of reinforced concrete blocks BDO-5.

72. In the project it is envisaged to construct 15 U-turns of “pear” type with the radius of 15-30m, including section 228-265 – 9 U-turns, section 265-315 – 6 U-turns. Structure of a road pavement of combined acceleration-deceleration lanes at U-turns are the same as the structure of adjoining to them traffic lanes. On the section 228-258 passing nearby population centers it is envisaged to construct pedestrian footpaths.

73. The drivers are informed about the presence of dangerous sections of road direction changing with reinforced concrete warning poles CC-1 installed on the roadside at the distance of 0,35 m from the edge of the roadbed.

7. Supply of local road construction materials

74. Requirement in material resources under the project is determined based on existing norms. During rehabilitation there will be used developed, operational quarries of calcareous rocks, and crushed rocks and sand produced out of them at rock-crushing and screening plants. Materials from local reserves and quarries will be used for strengthening of road shoulders. The project road is closely located to several local construction material sites and quarries which will ease supply and transportation of gravel and crushed-stone materials. Use of local supply materials as much as possible for the project purposes are supported and appraised by stakeholders and local businesses and keenly anticipated for improved cooperation.

75. Aggregate inventory of operational quarries in Bukhara region fully meet the requirements and there be no necessity to establish new quarries.

76. During rehabilitation works on A-380 km 228-315 there will be problems with the insufficiency of fine aggregates of high strength. For reconstruction of upper layers of the road base and production of concrete mixes there will be required to use the crushed stone with the strength of 800 to 1200, which will be necessary to transport from nonmetallic quarry in Tashkent region and from Ziyaddin quarry in Samarkand region. At that, it is required to strengthen production bases of those quarries by means of installation of new rock crushing and screening plants with the capacity not less 100 m3/hour.

Tables C-1, C-2, C-3 show the availability of material resources.

Table C-1 Availability of material resources

No	Location and name of quarry	Name of organization	Name of material	Capacity of quarry, thousand m3

1	Ziadin	“Buharagranit”	Crushed stone	**700**
2	Severniy collector	Ramitan RPREPDH	Sand mix	**80**
	Total			**780**

Table C-2 Availability of material resources

No	Location and name of quarry	Name of material	Capacity of quarry, thousand m3
1	Aktash	Crushed stone	50
2	Sumsar	Crushed stone	40
3	Pop-Gavsay	Crushed stone	100
4	Chodak	Crushed stone	100
	Total		**290**

Table C-3 Availability of material resources

№	Name of organization	Name of material
1	Kuiluk reinforced concrete production plant	Reinforced concrete products
2	Fergana oil refinery plant	bitumen
3	Bekabad metallurgical plant	armature
4	Bekabad cement production plant	cement
5	Navoi cement production plant	cement

77. Recalculation of Feasibility Study in current prices is planned in 2014. Due to the lack of not sufficient stocks of gravel and sand mix in "Shimoliy" borrow pit which was provided in the Feasibility Study, it was decided to use "Zhangeldi" borrow pit. Earlier range of sandy gravel transportation was 35 km according to the project. With change of the borrow pit, the average range of sandy gravel transportation to project site (228-265 km) will make 154 km, and it will be 121 km for site km 265-315.

78. Road bed of the project sections will be constructed of road side reserves and local soil or stone quarries. Cement-concrete mixes will be used for covering the structure of road pavement. Capacities for production of cement-concrete mixes by ancillary support productions of road enterprises taking into account complexes to be procured will be sufficient for meeting the demand for the road construction.

8. Construction Activities

79. Pre-construction activities are likely to include:

- Establishment of site offices, contractor’s yards and work camps;
- Establishment of borrow pits and quarries including stockpile sites and rock crushing facilities;
- Site clearing will be very minimal, almost none of demolition of structures will need to be done, but some bus stations will be demolished. Removal of vegetation (in general bushes and saxaul) and topsoilwill also very minimal, because almost 3/4 length of the total road has already clear right of ways for reconstruction of 4-lane road.

80. The reconstruction works involve all above works explained in detailed above, which include preparation of road bed, construction of concrete pavement, construction of culvert and bridge, and construction of road accessories.

D. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA).

1. Introduction

81. This chapter describes the environmental and socio-cultural baseline conditions found along the approximately 87 km proposed highway alignment starting at Bukhara and extending to Gazli.

2. Physical Environment

a. Topography, Geology, and Soils

82. The topography of the land through which the road passes includes mostly desert and slightly undulating terrain as found at the boundary of the Amudarya River valley. Nearly all towns and villages in the vicinity of the road are located in the irrigated river plain and the delta of the Amudarya, leaving the project roadsides almost totally uninhabited.

83. The geology of the area consists of a mixture of sandstone and limestone, overlain with sand. The Amudarya plain has fertile soils deposited over the millennia by the river on its journey to the Aral Sea. The low levels of precipitation require that the area be irrigated, a practice ongoing for more than 2000 years, but only recently during the Soviet period, practiced to extremes with massive diversions of fresh water, leading to the demise of much of the western basin of the Aral Sea. The project road section does not pass across or close to the Amudarya agricultural lands.

84. The project is using materials of the earlier geological studies and the studies of the surface relief, background materials and the preliminary results made by the design institutes covering detailed design activities.

85. As far as geological and lithological and geomorphologic characteristics the territory of A-380 228-315 km is formed by gaunt landscapes with significant ground waters. It is also necessary to note unstable condition and timely transformation of geological and geomorphological processes due to vegetation typical for desert areas.

b. Climate

86. Territory, through which the road A-380 km 228-315 alignment goes, is located in the area of arid climate, in the middle of the continent with the plenty of heat and sunshine, far away from mountain ranges, characterized by strongly continental climate, and extreme dryness. Indicators of monthly, annual temperatures, direction and speed of winds, and characteristics of precipitation were received from the meteorological station Bukhara.

87. The project area has a southern temperate continental desert climate, with extremely hot summer temperatures exceeding 45^{o}C and virtually no rain. Average monthly temperature in July is 27-28,4 ^{o}C, in January -8,2 ^{o}C, annual 9.1-14,4 ^{o}C, maximum -46-47 ^{o}C, minimum – 29-31 ^{o}C.

88. Temperatures begin to climb in March, accompanied by occasional rain, with not more than 100-200 mm falling, sometimes accompanies by flash-flooding. In dry desert conditions the daily temperature fluctuations can be as much as 30^{o}C.

89. These fluctuations have affected the stability of the roadway and engineering countermeasures will be designed to reduce the problems now being encountered during these extreme shifts. Frequent dust storms occur during the summer when winds exceeding

100km/hr generate large disturbances, significantly raising the levels of Total Particulate Matter (TPM) in the project area.

90. Snow cover depth is 4 cm, duration – 10 days. Depth of soil freezing 40 cm. Quantity of rain precipitation 14,4cm, maximum daily precipitation 3,5cm. Main direction of winds is north-west, frequency of winds – 37. Ground waters, within the limits of the road section 265-315, are absent. Ground waters on the section 228-315, in the areas of irrigated lands, are located at the depth of 2-3m.

91. There are seasonal surface waters appearing in the form of snow or rain, accumulated at the lowlands. Soil covering is formed with gray-brown desert soils with sandy desert soils. There are following types of soils: gray-brown desert soils, takyrs and washedout soils, salt marshes, sandy gypsum soils. Seismicity is 7 as per КМК 2.01.03-96.

c. Water Resources

92. Water resources in the Project area are very limited. There is only one river Zarafshan located near the beginning of the section (km 236), is flowing throughout the year; its water is slightly to moderate salty and unfit for agricultural or drinking purposes. Otherwise, the entire road corridor has no surface freshwater resources.

93. Aside from the occasional rainfall and flash flooding, there is no surface water over which the area the road passes. The shallow groundwater aquifer >25m below the surface, is saline and polluted. Due to the intensive pesticide and fertilizer use in Bukhara, groundwater to a depth of 100-150m is also contaminated. Groundwater for human consumption is scarce in the project oblast, with only 22,000 and 33,000 m_3/day available (2008 data). Between 7,000 and 10,000 m_3/day have been allocated for industrial use in Bukhara, thereby seriously restricting the water use for concrete production$_3$. While neither surface nor groundwater quality will be affected, the local extraction of groundwater during the reconstruction period could have serious local impacts.

d. Air Quality and Noise

94. Due to the fact that the road alignment runs almost completely through uninhabited desert and steppe terrain, traffic or reconstruction-related impacts affecting both the air quality and the acoustic environment are of little concern. At present and mainly due to the poor condition of the Project Road, air pollution created by dust development is more a nuisance than a real pollution threat, as the existing traffic volume is rather low and poor road conditions do not allow speeding.

95. In Uzbekistan air quality data are collected at 17 observations centers, operated by the Service of Air, Surface Water, and Soil Pollution Monitoring of the Committee on Hydrometeorology of the RUz (Uzgidromet). Results of the monitoring at 17 observation stations located throughout the country are published in a confidential annual report —Review of Air Pollution Condition and Pollutant Emissions in the Cities and Territories of Uzbekistan".

96. According to the multiyear dataset, intensity of dust-storms with wind speeds of 80-100 kph, increase as one drives NE from Bukhara to Urgench. The average wind speed remains about 17 km/hr. Wind is very significant for air quality since for many months of the year the project area has elevated TPM levels due to the constant wind-related dust in the air.

97. Aside from dust-storm induced air pollution, the air quality near the road is well within the RUz standards since no industrial or commercial emission source exist anywhere and traffic is at low levels.

98. Over a nearly 25 year projection period, traffic is expected to increase from 1109 in 2010 to 8348 PCE/d by 2030. Overall, these traffic volumes are not enough for serious air pollution problems, particularly when viewed in relation to emission control technology improvements as well as the introduction of cleaner fuels. They do suggest a very significant change over existing conditions in an area that has barely any traffic throughout the day. In terms of diverted traffic from other means, diversion for 2030 was estimated to be only around 10% of the PCE estimate, thus marginally contributing to traffic volume increases. These data would suggest that levels of NO_2, TSP and CO_2 will be high within the project COI.

99. Given the vastness of the ambient and mostly uninhabited nature, noise is actually not an issue anywhere along the road alignment. The EMP proposes measures to address potential residual impacts, if any, after the completion of the road rehabilitation.

3. Biological Environment

a. Fauna

100. The prevailing land use has caused the loss of most natural terrestrial habitats characteristic to the region and significantly impaired the habitat potential of the natural streams. Thus, the terrestrial fauna encountered in the rural areas of the study corridor mainly consists of rather common species.

101. The following information is based on fieldwork conducted in May 2014 and complemented by expert-knowledge and literature data.

102. Wildlife along this road corridor is typical for a steppe-desert ecosystem. Among mammals, the most common species are rodents such as ground squirrels, hamsters, voles, rabbits, and jerboa. Of the carnivorous species like bats, foxes, badgers and ferrets are commonly are sighted at various places in or adjacent. These studies confirm that some specified habitats are frequented by species of turtles, lizards, snakes, scorpions and arachnids. The same (cliff rock and erosion trenches) habitats are preferred nesting places of birds of prey, such as the golden eagle, steppe eagle, vultures, harriers, kestrels, and of wild partridge. Larks and sparrows mainly inhabit the desert plain areas and are found in the vicinity of human settlements.

103. A number of ground-dwelling and insectivorous birds commonly gather where large herds of domestic animals like cattle, horses and camels concentrate, such as doves, grouses, bee-eaters, desert warblers, wheatears, nightingales, larks and sparrows.

b. Flora.

104. The ecological zone through which the road passes is the Kyzylkum desert and boundary of the fertile Amudarya floodplain, much of it significantly modified by past irrigated agriculture and livestock over-grazing. The ecology of the project area is dominated by the desert, with different regions having variable amounts of vegetative cover.

105. There is no sensitive wild flora in the vicinity of the proposed reconstruction sites. The proposed project reconstruction / rehabilitation works will not have any significant impact on flora of the Bukhara provinces as they take place within already existing occupied and disturbed areas, e.g., on the city territory and along existing road routes.

4. Socio-cultural Environment

a. Population

106. Uzbekistan is administratively divided into 12 oblasts (provinces). The Bukhara-Gazli Project is located and entirely contained within one of them, in Bukhara Oblast in the western central part of the country.

107. Bukhara Province is divided into 11 administrative districts. The capital is the city of Bukhara (estimated population 270,400 inhabitants). Other major cities include Alat, Karakul, Galaasiya, Gazli, Gijduvan, Kagan, Romitan, Shafirkan, and Vabkent.

108. The road corridor is located in four administrative districts: Bukhara, Romitan, Peshkun and Jandor districts. The administrative centre of Bukhara district is Galaasiya. The administrative centre of Peshkun district is Yangibazar. The administrative centre of Romitan and Jandor districts are Romitan and Jandor towns.

109. The population is estimated to be around 1.756 mln.with 61.7% of the population living in rural areas.Most of the urban population resides in Bukhara.

110. Men account for 49,9 % percent of the Oblast population and women 51,1% percent. More that20 nationalities live in the region. Uzbeks represent 91 percent of the total.

Table B-1: Area and population of Bukhara Province (01.01.2014)

Thousands, men

Total territory km^2	Population (thousand)			Share in%		Population density People per km^2
	Total	Including		Including		
		Urban	rural	urban	rural	
40.300	1756.4	672.9	1083.05	38.3	61.7	43.56

Table B-2: Gender population of Bukhara Province (01.01.2014)

Thousands, men

	All population		Urban population		Rural population	
	Men	Women	Men	Women	Men	Women
Bukhara Province	**876,0**	**880,4**	**337,5**	**335,4**	**1083,5**	**538,5**
districts						
Bukhara	74,1	72,9	33,7	17,3	113,3	56,8
Romitan	54,4	55,1	14,2	7,1	95,3	47,3
Peshkun	64,1	62,9	32,7	16,6	94,3	47,5
Jandor	76,5	78,6	30,2	15,0	124,9	61,5

Table B-3: Population of Project Area Rayons(01.01.2012)

Administrative Unit	Born (2012)	Died (2012)
Bukhara	2864	567
Peshkun	2284	391
Romitan	2613	473
Jandor	3365	563

Source: Department on Statistics of Bukhara Oblast.

b. Land Use, Sources of Income

111. In all centres of population, a variety of businesses have been established along the roadside ranging from temporary sales points for fruit and vegetables through open-air restaurants and shacks selling vehicle lubricants to more “permanent” bakeries, shops and restaurants, general stores, petrol stations, vehicle repair yards and construction materials yards.

112. The household is generally headed by the male, who makes the major decisions concerning its economic undertakings. The household size ranges from 2–8 members. Family members often include the household head and his wife, grown up children with/without their husband/wife, and their grandchildren. The household head’s age ranges from 38–72 years. The highest educational attainment of the household head is usually secondary level but occasionally one has a university degree. Migration of family members seems to be high as a number of adult male members of households in the village usually find work outside, normally in Tashkent, but are not reported as having migrated.

113. The average size of land owned by the household ranges from about a hectare to almost 2 hectares, depending on the village and the region where the household lives. Some households have no land allocated to them. Land is cultivated to grain, cotton or other horticultural, or used as a grazing area for livestock such as cattle or sheep. Some land allocated to households is not used due to any one or a combination of the following factors: (i) distance from the house; (ii) lack of money for inputs, such as tools, seeds and fertilizer, or transport of workers/produce to/from the field. Alternatively, it may be hired out to others.

114. Basic social infrastructure is generally available within the village or a nearby urban centre. Schools and polyclinics are located within walking distance. Most roads to or within villages are unpaved or in such a poor state of repair that they are effectively unpaved. Such roads are a source of dust nuisance for villagers in the dry summer months. During the wetter autumn, winter and spring months they are a source mud and related inconvenience (difficult to drive or walk over, mud carried into houses on people’s shoes). Public transport system is only available in major roads and railway networks: people use them for special needs (e.g. hospital visits) or occasions (e.g. visiting relatives, weddings) for going to major urban centres or Tashkent.

115. Gazli has 1 hospital with 40 beds. There is also one Polyclinic for adults and children with the capacity to serve 100 people a day. There are few private pharmacies in the town. In case of serious diseases, people attend the central regional hospital or specialized hospitals in Bukhara. Survey respondents indicated that the proposed road upgrade will assist in improved and rapid connection for people in the remote areas of Romitan to access the health facilities of Gazli.

5. Environmental conditions along the road line

116. The project section (228 km) starts at the border of Bukhara where construction of traffic intersection is planned with the crossing of Bukhara ring road and goes through developed lands of Bukhara and Romitan regions (raions). The road section finishes at the approach to Gazli city (315 km). Detail description of the environmental condition along the road alignment is summarized in the table below:

Description of the environmental condition along the road alignment		**Section (km)**
Right side	**Left side**	
Irrigational channel	Irrigational channel	228,305

Farm (agricultural, irrigated land)	Private business (bakery,canteen)	228-229
Farm (agricultural, irrigated land)	Farm (agricultural, irrigated land)	229-232
Farm (agricultural, irrigated land)	Private business (canteen) and bus station	232
State land (waste ground, not cultivate the land)	Farm (agricultural, irrigated land)	233
State land (waste ground, not cultivate the land)	Petrol station	233
Farm (agricultural, irrigated land)	Farm (agricultural, irrigated land)	233-235
Bridge (Zarafshan river)	Bridge (Zarafshan river)	236
Irrigational channel along the road	State land (waste ground, not cultivate the land)	236
Irrigational channel Hayrabad	Irrigational channel Hayrabad	237,295
State land (waste ground, not cultivate the land)	State land (waste ground, not cultivate the land)	236-239
Irrigational channel Varaksha	Irrigational channel Varaksha	238,181
Khasinobod collector	Khasinobod collector	239,442
Private business (shops, barber's shop, canteen) and private houses	Private business (shops, barber's shop, canteen) and private houses	239-242
Chelongu collector	Chelongu collector	242,346
Chavkar channel	Chavkar channel	243,717
Private business (shops, barber's shop, canteen) and private houses	State land (waste ground, not cultivate the land)	242-245
State land (waste ground, not cultivate the land)	Private business (shops, barber's shop, canteen) and private houses	246
Irrigational channel Yangiarik	Irrigational channel Yangiarik	247,723
State land (waste ground, not cultivate the land)	State land (waste ground, not cultivate the land)	246-247
Private houses	State land (waste ground, not cultivate the land)	247-248
Collector Hudzhaboncha	Collector Hudzhaboncha	249,165
Irrigational channel Marziya	Irrigational channel Marziya	250,7
State land (waste ground, not cultivate the land)	State land (waste ground, not cultivate the land)	248-265
Collector Khudjayavon	Collector Khudjayavon	253,252
Collector YukoriPiyezkor	Collector YukoriPiyezkor	254,280
Irrigational channel	Irrigational channel	257,881
State land (desert, waste ground, not cultivate the land)	State land (desert, waste ground, not cultivate the land)	265-315

E. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

1. Introduction

117. This chapter discusses the environmental impacts – positive and negative, direct and indirect, and immediate and long-term – associated with construction and operation of the proposed Bukhara-Gazli Highway between km 228 and km 315 and proposes mitigation measures to minimize or reduce these impacts.

2. Impacts on the Physical Environment

a. Geology and Soils

118. The main direct and permanent impacts on geology and soils will occur during the construction phase. Usually, the impacts will relate to loss topsoil during site clearance, extraction of materials for road construction, physical works such as embankment construction, and disposal of surplus/unsuitable for reuse within the works.

119. Reconstruction of the highway usually will have a permanent impact on the geomorphology of the area. A great volume of earthworks, including road bed/road base filling, is required. Borrow pits and materials disposal sites may have permanent visual and physical impacts on the environment, including changes in land and river geomorphology, loss of vegetation and loss of agricultural land. Borrow pits and quarries must be designed and worked with the short- and long-term safety of construction workers and the public in mind.

120. Site preparation will involve removal of vegetation and topsoil, establishment of site offices, contractor's yards and work camps, and construction of haul roads (for movement of construction vehicles and machinery, and transport of materials). Haul routes should follow established transport corridors/rights-of-way.

121. **Potential Impacts and Recommended Mitigation**. This project will not construct a new road but reconstruction of the existing road, therefore. The potential impacts to geologic characteristics would not be significant. However, the potential impacts and mitigation measures are outline below:

Potential Impact	Mitigation Measure
- Detailed Design Phase-	
Impacts to geological resources such as gravel and other quarried materials will occur due to extraction for use in the road construction and the transport of those materials to the job site. A review of the proposed sources of materials indicates that all are licensed facilities and no potential impacts related to depletion of these resources has come to light.	To mitigate potential impacts to and/or those resulting from the area's geologic characteristics and resources, the Project must: • Ensure that all design parameters appropriate to the seismic risk inherent in the Project Area have been fully taken into account in the design of bridges, overpass and other structures. • Adopt contract provisions specifying that only licensed facilities in compliance with all applicable regulations and industry standards will be used as the sources of quarried materials. The bid and contract documents must state that selection of the quarries requires the review and written approval of the CSC to ensure that

	avoidable adverse impacts are minimized.
- Construction Phase-	
Impacts associated with extraction quarry materials and borrow pits	The selection and operation of borrow pits needs to be carried out with all due considerations to avoid any impact on the existing natural and human environment, and to make provisions that no secondary impacts such as soil and aquifer pollution will occur. Borrow pits should not be located within core or buffer zones of the existing or proposed specially protected areas. Irrespective of which borrow sites are used/developed, it remains the Contractor's responsibility to source the construction materials through obtaining and adhering to all necessary licenses and statutory environmental management requirements associated with the operation and rehabilitation of such sites. The construction contract will require the contractor to comply with all necessary permits and licenses associated with the use and operation of borrow areas
No impacts to overall geological conditions are anticipated in the Construction Stage.	Assuming that the recommended contract provisions are put in place, no adverse impacts to geological conditions are anticipated in the Construction Stage of the Project and no mitigation action (other than the conditions that apply to the transport of all construction materials) is considered warranted for this parameter in this stage. Routine documented monitoring of the quarry operations and transport practices is a responsibility of the CSC.
Impacts associated with haul route is expected, especially for placement of construction materials and equipment	A plan of permitted haul routes should be included in the tender documents. Prior to commencement of construction, the actual state of all haul routes (existing and planned) should be assessed and photographed (possibly by PMU Safeguards Specialist in cooperation with the Design and Supervision Consultant). Where required, appropriately sited haul roads should be constructed and used to minimise soil compaction and loss of agricultural land. The Contractor should be required to return all temporarily used haul roads/construction traffic routes to their original state. In cases where hauling roads pass through intensively used pasture land, protective animal fences need to be set up along such roads to prevent collisions with local livestock.
Localized impacts could occur due to quarry operations and transport.	Recommended contract provisions specify that licensed and in compliance with applicable regulations and industry standards.
No adverse impacts to the area's seismology are expected due to reconstruction activities.	No mitigation action is considered warranted for this parameter in this stage. The area's

Construction procedures and safeguards, however, must be cognizant of the seismicity of the area.	seismic conditions have been taken into account in the design of bridges and other structures.
-Post-Construction/Operational Stage -	
The extraction of sand and quarry materials will be completed at the operational stage. However, proper management of post extraction needs to be adopted to avoid unexpected impact in the future.	The contract document for contractor has to include its obligation to require all supplier for sand and quarry materials has to carry out reclamation of all quarry areas. Penalty should be included for non compliance with this requirement.
No adverse impacts to the area's seismology are expected due to Post-Construction/Operational Stage condition.	No mitigation action is considered warranted for this parameter in this stage. The Project documentation indicates that the area's seismic conditions have been taken into account in the design of bridges and other structures.

b. Air Pollution

122. The air quality in the study area, generally, is perceived to be good. There are no industrial activities within the vicinity of alignment. In general, the main source of air pollution is dust eroded from flat, dry, un-vegetated agricultural or barren land soil surfaces by the wind.

123. Construction Stage. Earthworks, pavement improvement operations, quarry operations, and the operation of construction vehicles will all release aerial contaminants with potential effects on air quality. Impacts from dust emissions at quarry sites may be mitigated by using water sprinklers at crushing plant. Emissions from vehicles can be minimized by ensuring all vehicles and plant is properly maintained.

124. The most sensitive receptors for construction-related impacts on air quality are the inhabitants of the near-by villages. In several locations the project alignment will be in the immediate vicinity of residential areas, e.g. in the case of Chelongurural gathering of citizens(km 239-243), Bogiturgonrural gathering of citizens (km 247), Shurcharural gathering of citizens (km 253 and km 255-257), in other cases the distance will be less than 1 km.

125. During construction stage air quality impacts are mainly associated with the movement of vehicles on unpaved haul roads. Mud tracked onto public roads will dry out to generate dust. Dust is the major air quality problem from construction sites. Dust is airborne solid matter up to about 2 mm dia. Particle sizes vary considerably depending on their origin: the smallest particles can be breathed in. Some dust, such as limestone dust, is chemically active.

126. Monitoring air pollution during construction will be carried out in accordance to the Government requirement as stated in the environmental clearance from SNCP. However, for parameters of air pollution that is not covered by the Government requirement the World Bank Environmental Health and Safety (EHS) and the World Health Organization (WHO) standards will be used as reference.

127. Dust is a problem for a variety of reasons, as outlined below:

- Inconvenience to local people. For example, people may have to re-wash laundry that has been put outdoors to dry, and wash windows, curtains and vehicles. Dust can contaminate meat hanging up in open-air butchers and other food that is exposed to it in homes, shops and open-air restaurants, giving food a gritty texture.

- Health and safety problems. Dust may affect health by irritating eyes and worsening the health of people with asthma. Dust can reduce visibility for drivers on roads. It can also be blown for long distances by the wind.
- Crop damage. Even low concentrations of dust can affect plant and fruit growth as far away as 1 km from a construction site. Plant growth is particularly susceptible to dusts that are highly alkaline, for example limestone and cement dust. Dust deposited during light rainfall can cause the soil surface to form a crust increasing run-off.
- Impact on ecology. Dust blowing onto watercourses may damage ecology by increasing sedimentation, reducing sunlight and suffocating fish. It may also affect plant growth and change the species of plants growing in an area. Dust may also damage trees and other vegetation planted as part of the construction contract.

128. Sources of air pollution nuisance include:

- the transportation of aggregates and other fine-grained materials in uncovered trucks;
- loading/unloading of materials;
- wind erosion of stored aggregates.

129. Dust from construction works can be minimized by adopting good working practice to suppress dust by sprinkle water. It is necessary to plan working methods to avoid the generation of dust. Mitigation measures – for minimizing dust production are listed in Table E-1.

130. Table E-2 lists other potential sources and solutions for construction-related air quality issues.

Table E-1: Mitigation measures – for minimizing dust impact during construction

Source	Mitigation measure
Haul routes	• Select suitable haul routes away from sensitive sites, if possible • Provide a length of haul road before the exit(s) from the site • Reduce the width of haul roads (while still allowing two-way traffic movements) to minimise the surface area from which dust may be produced • Sweep paved access roads (while still allowing two-way traffic movements) and public roads regularly • Limit vehicle speeds – the slower the vehicles, the less the dust generated • Spray unpaved work areas subject to traffic or wind with water regularly and frequently, particularly during warm and sunny weather
Earthworks/ excavation	• Re-vegetate or seal temporary or completed earthworks as soon as possible • Keep earthworks damp by sprinkle water
Materials handling and storage	• Locate stockpiles out of the wind or provide windbreaks • Keep stockpiles to the minimum practicable height and use gently slopes • Compact and bind stockpile surfaces; re-vegetate long-term stockpiles • Minimise the storage time of materials on site • Store materials away from the site boundary and downwind of sensitive areas • Ensure all dust-generating materials transported to/from the site are covered by tarpaulin • Minimise the height of fall of materials • Avoid spillage and clear up spills as soon as possible • Damp down sand, spoil and aggregate stockpiles

Concrete batching and pouring	• Mix large quantities of cement concrete in enclosed/shielded areas • Before concrete pours, vacuum dirt in formwork rather than blowing it out

Table E-2: Mitigation Measures – for minimizing Emissions and Odours

Source	Mitigation measure
Vehicles	• Keep vehicles used on site well-maintained and regularly serviced • Ensure that all vehicles used by contractors comply with vehicle emissions standards at all times • Control deliveries to site to minimize queuing, or place strict rule for delivery car to turn off the engine while waiting in queing • Ensure that engines are switched off when they are not in use • Keep re-fuelling areas away from the public
Fires on site	• Avoid burning waste materials/tires on site
Waste materials	• Use covered containers for organic waste and remove frequently • Remove organic waste before it start to decompose
Chemicals on site	• Store fuels, chemicals and other dangerous substances in an appropriate manner • Take account of the wind conditions when arranging activities that are likely to emit fumes, odors and smoke • Position site toilets away from public areas

131. Operation Stage. The main source of air pollution during the operational phase will be vehicles moving on the highway. The main pollutants are carbon monoxide (CO), nitrogen oxides (NOx), hydrocarbons (HC), sulphur dioxide (SO_2), lead (Pb), carbon dioxide (CO_2), ozone (O_3), polycyclic aromatic hydrocarbons (PAH), particulate matter (PM) and trace metals. Some of these compounds can damage health and/or the environment. The concentration of pollutants generated by vehicles depends on factors such as the number, type and speed of vehicles. The effect of air pollution on local people depends on the distance between them and the road, wind direction, topography and other factors. The main direct effects are in the area closest to the road as the rapid dispersion and dilution of exhaust gases quickly reduces their concentrations to levels at which risks are minimal.

132. Modern vehicles generally emit less air pollutants than older ones. However, emission levels from vehicles do not remain at design levels, especially if the vehicle is poorly maintained. The specification of fuels has also changed over the years.

133. The most effective mitigation measures to reduce emissions from a road scheme are to either reduce emissions at source by reducing the traffic flow, in particular the number of heavy goods vehicles (HGVs), to improve the flow of traffic and/or to relocate the road away from the local population.

134. One of the reasons for reconstructing the Bukhara-Gazli Highway is to reduce traffic congestion and associated impacts (including noise, air pollution and traffic accidents) on the more densely populated areas in Bukhara region. The alignment of the project highway has been selected to minimize overall impacts on the local population. A road project may increase air pollution in some area whilst reducing it in others. Vehicles operate most efficiently and produce least pollution when they are driven in freely flowing traffic at moderate speeds, rather than in stop- start driving conditions (associated with congested urban areas). If traffic is re-routed from more populated to lightly populated rural areas, the overall effect of the project road on air quality may be considered beneficial.

135. It should also be noted that existing and predicted traffic volumes are relatively low and the wind conditions and flat terrain are conducive to rapid dispersion of any air pollutants. Nonetheless, monitoring air pollution during operation will be carried to comply with the Government requirement.

c. Hydrology

136. Construction Stage. During reconstruction and operation of the project, it is important to protect existing water supplies and water courses from over-abstraction, disruption or pollution.

137. Reconstruction works require large amounts of water, both for supply of drinking water for the labor forces and the operation of the camp sites, and for all technical purposes relating to construction activities. Since the required amounts may attain tangible volumes that may interfere with local water resources, and thereby bear the potential for interference with communal livelihood and needs, all Contractors have to submit a plan for type, location and quantity of both drinking and technical water extraction. Non-approved extraction of large amounts of water from the local aquifer may also result in a number of secondary impacts, most of them prone to cause ecological issues and social conflicts, as well as delays for the project. Therefore, the extraction plans need meticulously be observed and monitored, and require prior approval from local authorities and theResident Engineer. Any extraction of ground water will only be allowed after obtaining a permit as required by Uzbekistan Law and regulations.

138. The project area is crossed with numerous secondary and tertiary irrigation and drainage channels. Rehabilitation ofthe highway will inevitably impact on these channels. Temporary or permanent restriction or obstruction of watercourses could lead to flooding and impair the operation of the irrigation and drainage system, and thus agricultural activities, in this area. Therefore, during the placement of new culverts, the rerouting of irrigation and drainage channels needs to be done, and if necessary temporary pumping equipment need to be operated to avoid flooding. The most important is consultation with representatives from relevant local drainage boards, to inform the construction time, and to obtain advice when the right time to replace the culvert to minimize impacts to agricultural activities in surroundingareas where culverts have to be replaced.

139. Since the road in some areas will be parallel with the main irrigation and main drainage, it is required to ensure that no construction works will disposed any debris from land clearing or any waste from construction works to the irrigation and drainage channel but also to avoid over-wetting the underlying soil and materials from which embankments are constructed, which could lead to slope instability.

I. Wetlands, irrigation and drainage system

140. Since this civil works will only involve rehabilitation and modernization of road but not constructing the new highway, the impacts on irrigation and drainage would not be significant. The project road will involve only replacement of existing culverts. However, the following mitigation measures are proposed:

- All channels crossed should be culverted to a depth of at least as high the top of bank (plus freeboard), and to a similar width of the channel at the point of crossing. A freeboard of 300mm would be appropriate. This will allow continued routing of flow through the channel at baseline rates, whilst making provision for a degree of passage of floodwater and debris.
- All road drainage should be routed through sediment traps and oil interceptors. This will reduce contaminant levels outfalling to the irrigation system and wetland.
- A suitable concrete mix should be established by the contractor, taking into account saline attack issues.

- The road crossing of the wetland should match its through-culvert capacity as a minimum, and in the same approximate chainages. This will allow exchange of water seasonally from north to south at least the same rate as currently occurs.

II. Surface waterand river

141. For the extraction of water for construction purposes, the intake from natural surface waters like the Zarafshan River (km 236) will require prior permission of the District Authorities in charge. Therefore, contractor will need to obtain permit priorto using the water from this river

142. Potential impacts on the quality of surface water from construction activities include pollution from construction vehicles, equipment and materials stores, and poor sanitation at work sites, the release of soil where earthworks take place adjacent to water bodies, improvements or replacements of culverts, or work on bridge pier foundations that takes place in the river bed.

143. In order to prevent pollution from construction activities, the following measures will be taken and should form part of the contract conditions and specification of the works:

(i) all toxic and hazardous materials required for construction, fuel and caustic substances shall be stored at secure and managed sites, sited away from water bodies
(ii) vehicles and equipment shall be maintained in good operable condition, ensuring no undue leakage of oil or fuel
(iii) vehicles and equipment will be serviced at properly managed and equipped workshops, with suitable facilities to collect and dispose of waste oil,
(iv) sanitation arrangements will be made at worksites and any accommodation facilities provided for workers' accommodation, ensuring that no raw sewage is released into drains or water bodies,
(v) where earthworks take place adjacent to water bodies, silt traps shall be installed prior to the commencement of earthwork activity and
(vi) bridge and improvement works involving work in the river bed shall be confined to the dry season and where necessary, channels in the river bed will be diverted away from the work sites. For these measures, site specific plans shall be prepared by the Contractor and submitted for approval prior to commencement of the works.

d. Management of hazardous and toxic substances

144. Oils, fuels and chemicals (including bitumen, bridge deck waterproofing agents and concrete) are substances which are hazardous to human health. During reconstruction they need to be stored properly in correctly labeled containers. Bitumen, oil and fuel should be stored in tanks with lined bunds to contain spillage. Proper storage and handling of hazardous materials reduces wastage and reduces the risk of spillage which could lead to pollution of groundwater and/or watercourses; some (e.g. concrete) may have serious impacts on freshwater fauna. Each construction site should have a spill contingency plan. Proper storage and management reduces the risk of vandalism and theft.

145. Designated and confined sites for vehicle maintenance, fuelling and washing should be provided. Appropriate security procedures for fuelling vehicles should be used. Washing of vehicles and equipment in or adjacent to watercourses should be prohibited.

e. Waste Management

146. Road construction will inevitably generate waste products, such as uncontaminated rocks and soil, concrete, masonry and brick rubble. There are usually also other wastes such as acids and alkaline solutions, waste oils and oily sludge, batteries, timber, plastics and bitumen. Although there are sites for domestic waste disposal in km 265 near Severniy quarry, there are no sites designated for the disposal of industrial or construction wastes. Therefore, the Contractor will have to obtain permit from local authorities on dispose construction waste. The permit should be obtained for location to dispose and the quantity and type of waste that allow being disposed in the allocated areas. The supervision consultant should ensure that contractor will dispose wastes only in the areas where permit has been obtained.It is also recommended that where possible, surplus materials will be reused or recycled.

147. Sewage and “grey” water (e.g. from washrooms and canteens) produced at site offices and work camps should be appropriately managed, so that it does not produce odours or pollute watercourses. In the absence of functioning sewerage and sewage treatment facilities in most of Uzbekistan, it is recommended that the Contractor is required to provide his own on-site wastewater treatment facilities. For sites servicing a small number of employees (less than 150), septic tanks may be used. For larger sites, liquid wastes should as a minimum receive primary treatment in anaerobic tank or pond preceded by a bar screen to remove large solid objects (e.g. sticks, rags). Primary treatment (also referred to as clarification, sedimentation or settling) is the process where wastewater is allowed to settle for a period (around 2 hours) in a settling tank. This leads to separation of a liquid effluent which includes oils and grease and liquid-solid sludge. Primary treatment leads to reduction in suspended solids, biological oxygen demand and removal of floating material (e.g. faeces). There will be no direct discharge of untreated sanitary or oily wastewater to surface water bodies.

f. Waste from Cut and Fill

148. The proposed project is located in the flat areas, and therefore no significant work related with cut and fill. However, soilfor filling will be required for road widening, in locations where the road is formed on an embankment, and this will use some of the cut material, which is very much minimal, and there will be need to import from borrow pits outside project areas. A schedule of suitable deposit sites and a plan for the distribution and imported fillingmaterial will be made during detailed design. As for the transport of filling materials, sand and aggregate, it is recommended only by using truck with adequate cover to avoid dusts, and it should be done at the timing where communities social activities would not be affected, such as night time if it has to pass through urban areas

g. Waste from scrapping out asphalt (road bed)

149. Although there will be not much activities related with clearing, but the construction phase will start with scrapping out the existing asphalt road bed. The amount of this type of wastes will be very significant. There will be need to have an approved locations to disposed these wastes. It is recommended that the contractor will prepare a proper plan to deal with these wastes and the plan needs to be approved by the construction supervisor on behalf of the PMU.

150. **Potential Impacts and Recommended Mitigation.** Potential impacts associated with wastewater and solid waste disposal are assessed and actions to mitigate them are recommended as follows:

Potential Impact	Mitigation Measure
- Detailed Design Phase-	
Decisions made in the Pre-Construction Stage in regard to the sites and conditions (or lack of conditions) imposed on wastegenerating aspects of the Project such as construction camps, and the disposal of solid waste generated by the Project will have a significant effect on the impacts of the Project.	Sites for the disposal of large volumes waste must be determined in the Pre-construction Stage. Specific contract provisions ensure that construction camps and other potential sources of secondary impacts are properly sited and provided with drainage and wastewater facilities. The following provisions are stipulated in regard to: **Construction Camp Wastewater Disposal and Site Drainage Systems.** The following conditions must apply: – Explanations of Proposed Site Drainage Systems. Locations likely to be subject to water quality impacts or significant runoff (construction camps, staging areas, etc.) and an explanation of the proposed site drainage system must be indicated on the Site Environmental Management Plan (SEMP). – Wastewater. Wastewater arising on the site must be collected, removed from the site via a suitable and properly designed temporary drainage system and disposed of at a location and in a manner that will cause neither pollution nor nuisance. The site plan required by SEMPs must indicate the system proposed and the locations of related facilities in the site, including latrines, holding areas, etc. There must be no direct discharge of sanitary or wash water to surface water. Disposal of materials such as, but not limited to, lubricating oil and onto the ground or water bodies shall be prohibited. Liquid material storage containment areas must not drain directly to surface water. Liquid material storage containment areas equipped with drains must be valved, and the valve must be maintained locked in the closed position with supervisory control of the key. Lubricating and fuel oil spills must be cleaned up immediately and spill clean-up materials must be maintained at the storage area. – Drainage. The site plan must be devised to ensure that rain run-off from the construction sites is not deposited directly into any watercourse, stream, or canal and shall indicate the system proposed, including the locations of retention ponds and other facilities. There must be no direct discharge of sanitary wastewater, wash water, chemicals, spoil, waste oil or solid waste to surface water bodies. Fuel, lubricating oil and chemical spills must be contained and cleaned-up immediately. Spill clean up equipment must be maintained on site. **Locations of Fueling Operations and Liquid and Toxic Material Storage Areas.** The site plans must

	specify the locations for the storage of liquid materials and toxic materials. The following conditions to avoid adverse impacts due to improper fuel and chemical storage. – Fueling operations shall occur only within containment areas. – All fuel and chemical storage (if any) must be sited on an impervious base within a bund and secured by fencing. The storage area must be located away from any watercourse or wetlands. The base and bund walls must be impermeable and of sufficient capacity to contain 110 percent of the volume of tanks. – Filling and refueling must be strictly controlled and subject to formal procedures and will take place within areas surrounded by bunds to contain spills / leaks of potentially contaminating liquids. – All valves and trigger guns must be resistant to unauthorized interference and vandalism and be turned off and securely locked when not in use. – The contents of any tank or drum must be clearly marked. Measures shall be taken to ensure that no contaminated discharges enter any drain or watercourses. – Disposal of lubricating oil and other potentially hazardous liquids onto the ground or water bodies must be prohibited. – If accidental spills occur immediate clean up must be undertaken and all cleanup materials stored in a secure area for disposal to a site authorized to dispose of hazardous waste. – Locations Relative to Watercourses. The site plans must be devised to ensure that, insofar as possible, all temporary construction facilities must be locate at least 50 meters away from a water course, stream, or canal.
- Construction Phase-	
Impacts related to wastewater and solid waste disposal could occur in the Construction Stage due to a failure to properly plan or implement the safe guards required by the SEMP or because of unanticipated circumstances or accidents. Potential impact from improper disposal for waste materials from scrapping asphalt road bed	Mitigation action of potential impacts related to wastewater and solid waste disposal during construction requires strict application of all conditions to the review of the SEMP by the CSC prior to approval and strict supervision during the course of the work. Unannounced site inspections must be undertaken as a routine part of supervision activities. Plan for disposing these wastes needs to be prepared by the contractors and has to be approved by supervision consultant
-Post-Construction/Operational Stage -	
Impacts related to wastewater and solid waste disposal could extend into the Post-Construction/Operational Stage due to improper discharges from site facilities or because of unanticipated circumstances or	To mitigate potential impacts related to wastewater and solid waste disposal extending into the Post-Construction/Operational Stage, contracts stipulate that one year into the operating period a final inspection is required and Contractor's final

accidents.	payment is released only after a fully compliant audit is recorded. Any impacts to related to wastewater and solid waste disposal are part of the final inspection process and final payments will not be made until outstanding issues are resolved.

h. Run-off and Spills

151. During operation, the uncontrolled discharge of polluted road runoff has the potential to impact on water resources in terms of increased local and downstream flooding and pollution. The chemical nature of road surface runoff is variable, but typical potential pollutants are:

- Suspended solids – from mud, corrosion, metal particles, grit, tyre and road surface wear;
- Lead – from petrol;
- Zinc and cadmium – from deterioration of exhaust pipes and brakes;
- Organics – including rubber, bitumen, grease and oil;
- Iron – from corrosion;
- Herbicides and pesticides – for maintenance of road verges

152. Careful consideration should be given to the design of all road surface and slope drainage to ensure that:

- Damage to embankments and structures from flooding and/or erosion is avoided;
- the highway will not cause flooding of adjacent land;
- additional pollution of the drainage channels and water courses crossed by, or adjacent to, the highway is avoided.

i. Noise Impact

153. Noise is often explained as sound that is unwanted by the listener. Sound is a wave motion carried by air particles between the source and the receiver, usually the ear. Sound, pressure and noise are measured in units of decibel (dB) using a logarithmic scale. If a sound is increased by 10 dB, it is perceived as a doubling in loudness. Changes in a sound by 3 dB(A)33 is barely perceptible to the human ear.

154. Noise is said to cause more off-site complaints than any other topic. Reconstruction activities causing the greatest noise problems are: piling; use of pneumatic tools; demolition; earthmoving; scabbling (roughening of concrete surfaces); concrete pours; blasting and maintenance works.

155. Excessive noise levels on site represent a major hazard to site workers. If people are having to shout to make themselves heard over background noise from a site, then the background noise is likely to be about 75-80 dB(A). Continued exposure to noise levels of 90 dB(A) can permanently damage hearing. Sudden or continuous noise early in the morning or late at night, on rest days and holidays, during school examination periods and entertainment performances, can be particularly annoying to local residents. Other potential sources of annoyance relate to the behavior of workers: shouting, bad language and the use of radios.

156. There are two ways to avoid reconstruction noise problems on site: to reduce the level of noise generated; to increase the tolerance of the people subjected to temporary reconstruction noise nuisance. Three factors influence noise levels at any given point: site

management and construction methods, plant used and screening. A variety of practical noise mitigation measures are outlined in Table E-3.

Table E-3: Mitigation Measures – Construction Noise

Issue	Mitigation Measure
Worker's behaviour	• Raise awareness of workers and encourage noise reduction/minimisation activities
Working hours	• Minimise night-time and public holiday working hours near to settlements • Limit construction working hours to between 6.00–22.00 hours in or near residential areas and schools • Disruptive activities e.g. piling, blasting to be tightly controlled and during daylight hours only • Arrange delivery times to suit the areas e.g. daytime for residential areas
Vehicle operation	• Keep noisy as far away as possible from public areas • Avoid use of vehicles with excessive noise emissions • Install, use and maintain effective silencers • Regularly maintain construction vehicles and plant including adequate lubrication, tightening of loose nuts and bolts • Avoid simultaneous operation of noisy equipment, where possible • Minimise drop height into hoppers, lorries or other plant
Vehicle movements	• Operated designated haul roads and keep haul roads well maintained • Minimise/regulate construction traffic movement in residential areas and near schools • Limit the speed of vehicles on unpaved haul roads • Design traffic routes to avoid reversing; ensure that audible warning systems(e.g. reversing alarms) are set to the minimum required setting • Pave roads in residential areas and near schools as soon as possible • Use rail transport for bulky materials where feasible
Noise screens	• Strictly enforce a maximum noise level of 70 dB(A) at the boundary of the site in the direct vicinity of residential and other noise-sensitive areas (e.g. hospitals, schools) • Where using noisy equipment close to residential areas and schools consider using noise screens: almost any solidly built screen is better than none
Increasing community tolerance	• Inform the community about the project, the activities that will be taking place on site and the planned duration of those activities • Operate a 24-hour complaints/comments hotline: keep complaints/comment record book, review any activities causing complaint, take any necessary/feasible remedial actions and respond to plaintiff detailing reason for situation causing complaint and any remedial actions which have been taken

157. Noise associated to the operation of a highway has the following main sources:

- *Vehicle noise*: the engine, transmission, exhaust and suspension. Vehicle noise is greatest during acceleration, when climbing gradients, during braking, on rough roads, and in stop- start driving conditions. Poor vehicle maintenance is a contributing factor to this noise source.
- *Road noise:* the noise level depends on the type and condition of both tyres and road pavement.
- *Driver behaviour:* drivers contribute to traffic noise by using their vehicles‟ horns, by playing loud music, by shouting at each other, revving their engines and by causing their tyres to squeal as a result of sudden braking or acceleration.
- *Road maintenance:* use of heavy machinery to repair and repair roads generates noise on an intermittent and localized basis.

158. The traffic noise level at a receptor, such as an observer at the roadside or residents within a property, is influenced by a number of factors including traffic flow, speed,

composition (particularly % HGVs), gradient, type of road surface, distance from the road and the presence of any obstructions between the road and the receptor.

159. Maximum and ambient noise standards for different land uses are defined in the Sanitary Norms “Occupational safety standards system. Noise. Admissible levels of noise in houses and public building ”GOST 12.1.036–81. In Uzbekistan, traffic noise is only measured in response to complaints, and tends to be more troublesome in summer, when windows are kept open. For potential nuisance of residents through operational noise from the project highway, a simple noise calculation has been made for the period 2005–2030 by taking into account also the impact on the existing road, from which traffic would transfer onto the reconstructed highway, has been considered, to identify the noise level inside the road corridor. The calculation was referred only to the standard for residential areas. The future noise level would exceed the relevant day and night standards. However, since there is no sensitive receptors along the road corridor (see para 116), therefore at this stage when IEE was prepared, there was no noise barrier will be required. Nonetheless, after the construction when the new café and new residential areas are permanently established, the noise barrier will need to be established in the residential areas where monitoring found that noise level exceed the Government noise standard (The matrix Environmental Management Plan and Monitoring Plan have included the requirement to monitor noise level along the road especially in the residential areas by the contractor to identify sensitive receptors along the road)

j. Petrol Stations and Rest Areas

160. The preliminary design does not specifically include sites for petrol stations or rest areas. However, the engineering and environmental teams have discussed the general location of these facilities along the road. It is likely that the sites would be within the road reserve and sold/leased to private operators.

161. Environmental impacts from petrol stations are mainly:

- Soil and Groundwater Contamination – from petrol, diesel and oils (from underground storage tanks, spillages around tank filling point, spillage from pump area, leakages from underground pipelines, drains and oil interceptor); organic lead (from leaded petrol); detergents and other compounds;
- Waste Management – waste oils, waste oil sludge (from interceptors, tanks), solid wastes (such as petrol/diesel contaminated cartons, rags, paper, sand used for clearing spillages);
- Water Supply/Wastewater Management – forecourt and workshop cleaning (car wash drainage should be separate from oil interceptor);
- Air Quality Impacts – odour
- Fire Risks – from accidental spillages

162. Sites for petrol stations will be reconstructed and operated in line with national/international oil industry guidelines. The sanitary protection zone will be strictly applied.

163. Bus stations, rest facilities, including restaurants and toilet facilities, will be reconstructed and operated in line with national industry guidelines.

k. Utilities

164. Some overhead telephone and power cables will need to be moved and will be vulnerable to accidental damage by reconstruction work and will need to be moved. Where

necessary, utilities will be relocated. Effects of severance during relocation can be mitigated by providing information to the affected public stating when services will be disrupted, and minimizing to the extent practicable, the duration of severance of services in each case. Risks of accidental disruption can be reduced by ensuring that project reconstruction facilities such as excavators are operated by trained personnel, and that operations are adequately supervised.

165. Potential Impacts and Recommended Mitigation. Potential impacts related to electrical power, pipelines and other utilities are assessed and actions to mitigate them are recommended as follows:

Potential Impact	**Mitigation Measure**
- Detailed Design Phase-	
Potential impacts to other infrastructure (i.e., other than transport infrastructure) include impacts to irrigation systems and utilities (such as electricity and pipelines) and an inherent part of road reconstruction projects. Networks are indicated by maps of the area and preliminary designs. Potential adverse impacts to these facilities in the subsequent stages of the work will be avoided by ensuring complete documentation and by anticipating circumstances that are bound to arise in the construction process.	Potential adverse impacts to other area infrastructure will be mitigated by due diligence and strict enforcement of the contract provisions. Future pipeline construction planned for the area must be coordinated with road reconstruction to minimize successive disruptions.
- Construction Phase-	
Impacts to electrical power, pipelines and other utilities in the Project Area could occur due to inaccuracies in data used for planning purposes, accidents of other unforeseen events.	Potential adverse impacts to the area infrastructure networks in the Construction Period will be mitigated by due diligence and strict enforcement of the contract provisions outlined therein.
-Post-Construction/Operational Stage -	
Impacts to electrical power, pipelines and other utilities in the Project Area in the Post-Construction/Operational Stage if these systems are not properly restored.	To mitigate potential impacts extending into the Post-Construction/Operational Stage, contracts stipulate that one year into the operating period a final inspection is required and contractor's final payment is released only after a fully compliant audit is recorded. The audit must include verification that any impacts to infrastructure are part of the final inspection process and a final payment is not made until outstanding issues are resolved. Other than the enforcement of applicable laws, no mitigation of impacts to the area infrastructure networks in the Operation Period is considered warranted.

I. Disruption of Traffic

166. During construction stage, the existing traffic flows will be impeded by improvement works on the road pavement, widening operations, and construction or reconstruction of drainage structures. In addition, vehicles involved in construction will increase traffic flows. These will result in congestion, delays and increase in noise and exhaust emissions. In built up areas, the pedestrian traffic will need to be given special attention to ensure safety of road user. The following mitigation measures will need to be adopted:

(i) providing advance information to the public about planned reconstruction works,

(ii) planning reconstruction activities to minimize disruption and maintaining at least one open lane where there is no viable alternative route;
(iii) signing of temporary traffic diversions in close coordination with local authorities;
(iv) use of flagmen and temporary traffic lights to control traffic flows at constricted sites, including safe crossing for pedestrians and
(v) limiting, to the extent practicable, the movement of large trucks tooff-peak traffic times.

m. Decommissioning Work Sites

167. The EMP makes particular reference to prescribe good practices for the decommissioning of work sites, both the construction sites, the work camp, storage and stockpiling facilities, and the borrow pits. To achieve proper decommissioning of all work sites, the Contractors will be obliged to present their activities and solutions on the proper execution of such tasks as outlined in the SEMP. It is also strongly recommended that both the Supervision Engineer and the Resident Engineer keep photographic records of each work site before commencement of works. These photographic evidences shall serve as basis for the later approval that the respective sites have been re-instated to satisfactory conditions. As and if necessary, the Contractor may be requested to include additional enhancement activities, such as slope compaction and stabilization with recommended plants, landscaping, special protection of local water resources, and safe disposal of all hazardous material, including the excavation of soil patches contaminated with fuel and lubricants. In case where borrow pits are to be left with steep cut slopes, fencing of such areas are recommended toavoid further accident risks.

168. The decommissioning of work camp sites requires particular attention. Tidy clearing of all sanitary and waste management facilities, grade the soil to natural ground levels, re-establishment of natural vegetation and waterways are the focal points as these are often a source of environmental pollution and a public eyesore. Options need to be explored which would allow the use of workers dormitories, fuel station, workshops, drainage facilities etc. for other purposes as suggested by local leaders. Good landscaping is required to re-install former work camp sites into places where the local communities would meet the desired landscape aesthetics.

3. Impacts on the Biological Environment

a. Flora

169. This section outlines the general environmental impacts from reconstruction of the proposed highway and measures to minimize their impacts. Operational impacts are not considered as they are considered to be minimal.

170. The vegetation of undisturbed portions of the Project Area consists mainly of low diverse meadow vegetation with predominantly germanous plants and herbs and halophytic-germanous vegetation. There are no known reports of threatened or endangered plant species or habitats. The dominant indigenous flora species in the surviving and regenerating unplowed habitat areas are compact turf or cushion-like plants which adapt to droughts, strong winds, frost with little snow cover, fires, and grazing. Another dominant life form is "perekati pole" (tumbleweed). Inflorescent form a shape of resilient strong lattice spheres, which allow the plant to snap off easily in heavy wind and roll over many kilometers, disseminating seeds.

171. During reconstruction, it should be ensured that clearing and grubbing of vegetation will be minimized. The Contractor should be instructed to minimize vegetation losses in the

construction corridor through appropriate measures (e.g. demarcation of any critical sites prior to construction; instructions to the workforce).

172. In accordance with the relevant regulations, arrangements should be made for suitable topsoil material to be stored and reused for landscaping works, such as provision of soil cover for the embankments and verges. Heaping-up of and soil other and material should be avoided in the vicinity of local trees/inside tree plantation strips to avoid unnecessary damage.

173. The use of timber for site fencing, shuttering and any other means of construction including heating, processing or preparation of any materials on site should be banned. Collection and use of timber from the tree plantation strips is prohibited.

Table E-4: Mitigation Measures – Impacts on Flora

Potential Impact	Mitigation Measure
- Detailed Design Phase-	
Preliminary assessments did not indicate the presence unique plant habitat within the area of influence. Most plants are ubiquitous native species, which are highly tolerant of grazing, compaction, and other physical disturbances.	Mitigation will require action to ensure that losses are kept to a minimum. Bid/contract documents will specify roadside plantings and replacements as part of the road design and contain enforceable provisions in contract specifications to minimize plant loss.
- Construction Phase-	
Unavoidable impacts to area vegetation will occur due to construction activities.	Clearing vegetation will be strictly done in selective basis. The instructions to minimize tree cutting or clearing vegetation should be described very clear in the contract document
-Post-Construction/Operational Stage -	
No significant adverse impacts to flora are expected in the Post-Construction / Operational Stage of the Project.	To mitigate potential impacts extending into the Post-Construction/Operational Stage, contracts stipulated that one year into the operating period a final inspection is required and contractor's final payment is released only after a fully compliant audit is recorded. The audit must include verification that required re-vegetation has occurred and the plants are established. Any failures in this regard must be part of the final inspection process and final payments cannot be made until outstanding issues are resolved. No additional mitigation actions to offset impacts to flora in the operational period are considered warranted.

b. Fauna

174. The roads do not pass through any protected areas or ecologically sensitive areas. There are no known populations of threatened species in the immediate vicinity of the road. Impacts on ecology and wildlife due to road improvements will not be significant.

175. During reconstruction, wildlife may be affected through direct physical impact on their natural or secondary terrestrial and aquatic habitats, e.g. during site clearance, construction of structures on watercourses and through noise and disturbance from moving machinery and workforce throughout the construction corridor. Some sensitive species (e.g. birds, mammals) are likely to temporarily avoid and leave their present habitats as construction noise and vibration as well as moving machinery and people would be new disturbing factors in the area. After a period of time, however, it is assumed that there will be the effect of familiarization and most affected species would return to the area.

176. Road construction can also have a significant impact on breeding birds.However, it is observed that along the project roadthere are no areas identified as bird nesting areas, or migration of bird.

177. During operation, adverse impacts on wildlife will be related to habitat fragmentation and the potential pollution of sensitive habitats from polluted surface runoff. However, since the road already exists and function, it is therefore, no fragmented habitat is expected. There is no rare and endangered species in the project areas, therefore, no impacts is expected.

178. The road is located in flat areas and road has very little left and right turn, therefore, cattle underpasses will not be important. The road will have speed limit and clear sign for the user to indicate areas for cattle crossing. However, during operation, the sensitive factor with regard to wildlife will be the protection of the water quality and the preservation of the existing hydrological dynamics.

179. The following table summarizes the measures proposed to minimize adverse impacts on wildlife.

Table E-5: Mitigation Measures – Impacts on Wildlife

Potential Impact	**Mitigation Measure**
- Construction Phase-	
Haul routes, unloading-facilities (railway) and temporary storage of material can destroy or adversely affect local wildlife habitats	The Contractor will be advised not to use the temporary wetlands located next to the existing road for the construction of haul routes or unloading facilities in the case of railway transport. Where this is inevitable, physical interventions in these areas should be restricted to summer period or minimized to the practically possible extent.
Non-special status wildlife, particularly rodents and reptiles likely to be found along the rivers will be displaced during the Construction Period. Most are likely to relocate to neighboring undisturbed areas and no significant adverse impacts are anticipated.	Maintenance of accidents involving wildlife during construction, including recordation of the types of species and locations, is recommended.
Clearance of tree plantation strips and other trees and shrubs may adversely affect local bird populations	To minimize the potential impact related to the clearance of vegetation the Contractor will be required not to carry out clearance operations (felling of trees and shrubs) during the sensitive breeding period between mid April and mid July.
Inappropriate fence installation could minimize safety effects and lead to wildlife being killed on the highway.	The new fence should installed such as not to leave a gap between the bottom of the chain-link fence and the ground surface to minimize the risk of animals passing under it.
-Post-Construction/Operational Stage-	
No significant adverse impacts to wildlife during the Operational Period are anticipated. The potential for vehicular accidents and accidental kills in the Operational Period is not expected constitute a significantly adverse impact.	Maintenance of accidents involving wildlife during Post-Construction/Operational Stage, including recordation of the types of species and locations, is recommended.

4. Impacts on the Socio-economic Environment

a. Population Impact

180. The Right of Way (RoW) Bukhara-Gazli Highway has mostly been available for 4 lane road; therefore, the need to acquired land will be very minimal. The land acquisition and resettlement plan has been prepared to address impacts associated with land acquisition.

181. At present, the size of the labour force and location of work camps is unknown. The number of workers will be approximately around100 people or more that consist of office and domestic staff, truck drivers and construction workers. Of these, about 80–95% is likely to come from Uzbekistan. As discussed below, this is expected to provide employment opportunities for the local population. The construction works are expected to provide work opportunities over a period of two years for the local population, particularly for truck drivers, labourers and office staff. Most of the (relatively small number of) skilled jobs, including the operation of equipment, are likely to be undertaken by expatriate and regional staff hired by the successful international Contractor.

182. In order to minimize the impact of construction workers on the local area, and to protect the health and safety of members of the public and the workers themselves, the following mitigation measures outlined will need to be implemented.

183. During reconstruction activities, each construction site will allocate a well-marked space for first-aid kits with medical supplies, stretchers, bandages and other means for first aid to victims. Adequate training in first aid is also an essential requirement all constructors have to observe.

184. During the operational phase, it is likely that petrol stations and recreational areas will be established at various locations along the Bukhara-Gazli Highway. These too will provide employment opportunities.

185. The road expansion for Bukhara-Gazli Highway will provide an efficient and faster road network that is foreseen to have the immediate positive impact of improving international trade. In the medium- long term, faster and cheaper transportation of people and goods resulting from

186. Measures should be implemented to maintain safe vehicle movement within and around the project-affected area. The Contractor will be required to develop and implement traffic management plans based on prior consultation with the traffic police and local authorities, and to coordinate reconstruction traffic and reconstruction activities with them. Appropriate lighting and signalization must be provided at the construction site, e.g. at site entrances/exits and on public roads, where lane closures or diversions are required. Information to the public should be provided as appropriate.

b. Public Health and workers' health and safety

Workers' health and safety

187. The Contractors will be required to meet the Government standard for providing basic sanitation, general health and HIV/AIDS training (including provision of free condoms) for their local and non-local workforce. Aside from the Government standard health and safety, the international standard practice such the WB Environmental Health and Safety (EHS) will also be used as a reference. On these basis the contractor will develop a Plan for health and safety at work, including: risk assessment of workplace; measures and requirements for safety and health performance of construction works, risk factors, personal protective

equipment, safe work instructions, plans for fire prevention and fire-fighting, emergency and evacuation plans for workers and occupants of the site, on-site contractor coordinator of health and safety and other requirements arising from legislation on labor protection.

188. All special works requiring permit/license (e.g. electric installation works, operating construction machinery, works at height, etc.) must be performed by a certified personnel who have had passed designated training on occupational health and safety. National and international regulations on health and safety at work will be followed. Specifically, safety to workers and the general public will be enhanced through:

- proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others,
- All the workers (including sub-contractor workers if any) will need to be provided with safety worker equipment, and enforcing them to wear safety equipment. The contractor has also to prepare health and safety plan to ensure the workers are protected.
- provision to workers of protective clothing including hard hats, protective footwear, and high visibility jackets for use when reconstruction activity is to take place at night,
- arranging for first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital with accident and emergency facilities, and allocation of responsibility for ensuring that these arrangements are permanently in place,
- arranging for regular safety checks of vehicles and material, and allocation of responsibility to a suitably qualified Health and Safety officer for this,
- provision of hazard warning signs around construction sites, and directing vehicle and pedestrian traffic away from work sites and
- Awareness training for health and safety needs to be regularly scheduled.

Table E-6: Mitigation Measures – Construction Workers

Issue	**Mitigation measures**
Minimisation of nuisance for local communities	• Minimise night-time and public holiday working hours in the vicinity of settlements; • Strict enforcement of a maximum noise level of 70dB(A) at the boundary of the construction site in the vicinity of residential and other noise-sensitive areas (e.g. hospitals, schools); • Ban the use of vehicles and machinery which lack proper noise and exhaust emission control; • Maintain existing patterns of movement and continued use of existing modes of transport and communications. Safe access to local communities, facilities and agricultural land for people and animals should be provided throughout the reconstruction period.
Work Camp Management	Contractor to provide: • Waste management plan for their work camps (e.g. solid and liquid waste, sewage); • Statement on the source for the drinking water supply for workforce; • Description of the living and eating areas for non-local workforce.
Contractor's Yard Management	Contractor to provide: • Detailed method statement on the design and organization of yard, including materials/fuel storage sites and servicing sites, • Details of security measures to prevent access by non-workforce personnel, e.g. children, and livestock.

Worker's Health and Safety	Contractor to provide: • Drinking water for workforce in accordance with national quality standards; • Method statement on health and safety provisions for workforce; • Appropriate personal protective equipment for workforce; • Training in the safe construction techniques, including use of equipment; • Provision of, and training in use of, first aid materials and equipment; • Development of, and training in implementation of, an appropriate and comprehensive emergency response plan, e.g. for accident, fire, oil/chemical spill; • HIV/AIDS training and provision of prophylactics for the local and non-local workforce; • Keep records of all accidents and other Health and Safety incidents.
Traffic Safety	Contractor to provide: • Contractor to manage traffic disruption, inconvenience to the public, and road safety hazards through development and implementation of a traffic management plan in consultation with the traffic police and local authorities, including public information, temporary traffic diversions, one-way working, and all necessary temporary traffic signals, warning signs, lighting and watching (guards/signal men); • Contractor to provide appropriate lighting and signalization at the construction site, e.g. at site entrances/exits and on public roads, where lane closures or diversions are required; • Contractor to provide information to the public as appropriate; • Contractor to coordinate reconstruction traffic and construction activities with the local traffic police.

Health protection

189. The proposed project will be under reconstruction for a considerable time, which may increase the potential risk of diseases such as infectious diseases, tuberculosis, malaria venereal diseases and HIV/AIDS.

190. The following should be included to minimize the impact of disease

- Preferential employment policies for local people
- HIV/AIDS and other infectious diseases awareness programmes for contractors and local people
- Government–level action together with the transit industry to educate truckers about the issues of HIV/AIDS
- Conduct of preventive and periodic medical inspections for protecting workers' health
- Conduct of complex preventive and epidemic actions for prevention of malaria disease

191. Road provision and increasing human movement have emerged as key factors influencing the HIV epidemic in many regions of the world. Of particular concern is the movement of the HIV virus from urban areas of higher infection concentration to rural communities. In addition, the acceleration of social and economic change in rural areas associated with a rise in itinerant construction workers, the demand for commercial sex and the creation of transport hubs that sustain this trade are further areas of concern.

192. Transport corridors and hubs, together with the lifestyle of truck drivers and other land transport workers have emerged as driving forces of the epidemic in many low-income regions. These factors are also associated with increasing vulnerability of women living near truck stops and activity hubs along roads.

193. Areas under the influence of the Bukhara-Gazli Highway project are likely to be highly vulnerable to HIV infection. The primary reason for this is the combination of poverty, migration. Road reconstruction might be expected to increase human movement and associated HIV risks, which is of particular concern given the existing poor state of HIV services at designated centres in the district hospitals of Bukhara and Gazli. Two streams of activities are proposed in this report through which the project might reduce HIV risks to local communities and construction workers, and contribute to the national HIV response.

194. Direct activities proposed to be undertaken by the project, PIU to mitigate identified risks include: (i) HIV/AIDS mainstreaming of all project partners and (ii) adoption of an HIV/AIDS awareness raising policy, to ensure that all construction staff have appropriate information to enable them to adopt protective behaviours. The use of peer-counselling in the workplace would also strengthen the project's role in HIV risk reduction and response for construction workers, their families and partners. The project should also adopt policies of non- discrimination of HIV positive workers and gender equity in project business. To reduce the risk of creating demand for transactional sex, the project should encourage the employment of local workers. The majority of workers are likely to be local truck drivers involved in the transportation of materials. Information will be provided at rest stops for truck drivers and construction workers.

c. Visual Impact

195. Visual impact is the result of the combination of physical features, both natural (e.g. morphology, vegetation, water and sky) and artificial (e.g. buildings, slope stabilization works, landscaping works), with psychological elements (e.g. unity/disunity, picturesqueness/ugliness, harmony/disharmony) relating to the landscape in question.

196. Construction works will inevitably cause visual impact, the scale of which depends on the distance between the visual receptor and the activities viewed. Intrusions into the existing landscape will include borrow pits and quarries, site offices, equipment and materials storage areas, movement of vehicles. Evening and night-time working, if permitted, will require the use of lighting: security lighting may also be required around site offices and equipment yards. Clearing and grubbing of strips of vegetation will occur during site preparation. The careless handling and disposal of construction waste – from surplus and damaged materials to chemicals and „domestic" waste – can also create a visual nuisance.

197. Construction of a four-lane highway will inevitably have an impact on the landscape in question. However, its impact is unlikely to be severe due to the baseline conditions (see pictures in Appendix 5) and the flatness and generally barren appearance of the existing area.

198. Restricting the extent of vegetation clearance, particularly of any shrubland or individual trees, to the minimum required for the works will help screen and soften the view of the works. Although the highway will be fenced, this is likely to be with chain link fencing, which will not provide a visual barrier. The highway will not be lit, so night time light pollution – beyond that generated by passing vehicle – is unlikely to be a problem.

199. Mitigation measures to reduce temporary reconstruction-related impacts include:

- Good site management: keeping a tidy site;
- Regular surface cleaning of roads adjacent to site;
- Regular removal of litter and waste adjacent to site even if not works-related;
- Restrict clearing and grubbing of shrub- and tree plantation strips to minimum practical extent.

200. For those locations where the distance is very close with road, but it is still in accordance of the sanitary protection zone such as. Chelongurural gathering of citizens (km 239-243), Bogiturgonrural gathering of citizens (km 247), Shurcharural gathering of citizens (km 253 and km 255-257) appropriate landscaping measures will be needed by planting trees. These plantations have the multiple benefit of improving the appearance of the highway, compensating for any shrubland habitats or individual trees destroyed during site clearance and of filtering air pollutants from highway traffic.

201. Signage should be clear so as to inform vehicle drivers but ideally the number of road signs should kept to the minimum.

202. Prompt removal of fly-tipped waste and accident debris on and in the vicinity of the highway will be required to maintain the safety of traffic, limit visual nuisance and discourage further illegal dumping of material.

d. Cultural Heritage

203. The project areas has no particular areas that protected due to any cultural heritage refers to both physical cultural resources and traditions and customs passed down through the generations. Although not identified in the preliminary survey, there is always a risk that earth works may encounter or damage existing structures of cultural, historical or archaeological value. In such cases the Contractor needs immediately inform the Engineer respectively representatives of the Archaeological Expertise Institute of Uzbekistan who then will advise on further and appropriate actions. Reconstruction works are to be resumed only after written approval from this agency.

F. ANALYSIS OF ALTERNATIVES

1. The “No- Project” Alternative

204. With the anticipated increase in traffic levels resulting from forecast economic growth, the overall consequence of the “No-Project” scenario is an increase in road accidents. In addition, increased traffic congestion is likely where the existing highway passes through settlements: this will lead to detrimental local noise and air quality impacts, especially through the increase in particulates.

205. The option of "No-Project" has been considered and found to be neither reasonable nor prudent in light of the Transport Sector Strategy (TSS) developed by the RUz to improve and expand the network over the short to medium term. The Project is an important element within this overall TSS which identifies priority investments and failure to improve the road section could seriously undermine the financial underpinnings of the strategy.

206. The Project is an important element within this overall TSS which identifies priority investments such as Bukhara-Gazli Project and failure to improve the road section could seriously undermine the financial underpinnings of the strategy. As also noted in the introductory section, Bukhara-Gazliis an important element in the overall MFF Program and its goal of providing an updated east-west transport corridor to serve Uzbekistan's current and future needs. Accordingly, the "No-Project" Alternative has been determined not to be in the best interest of Uzbekistan’s transport sector strategy.

2. Paving Alternatives

207. Cement-concrete with bituminous treated base (Btb) meeting Uzbekistan technical standards was selected as the road surface in accordance with the need for pavement with enhanced heavy-duty road surfacing. The selection was made based on:

- Lower construction and transport costs; Better adaptability to the sometimes harsh local winter conditions, thus reducing repair and maintenance costs; and
- Less maintenance costs

G. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

1. Public consultation

208. Prior to 28 May 2014 public consultation and disclosure of IEE findings were undertaken with communities and government in relation to upgrading the road between Bukhara and Gazli. Most feedback received from communities related to land compensation and access matters with little comment on environmental issues. At a meeting with local biodiversity experts some concerns were expressed over potential impacts on ecology and a number of design mitigation measures were agreed to be considered. Consultations were undertaken for Bukhara, Jandor, Romitan and Peshkun districts. The purpose of the consultation was to:

- Advise communities of updated project information on the proposed road upgrade project in respect of the section from Bukhara to Gazli;
- Disclose the main findings of the IEE and EMP;
- Engineering details for the road, prospected schedules, expected benefits and anticipated impacts, including proposed mitigation measures. It was also disclosed that there will be a mechanism in place where local citizens and stakeholders affected will have a chance to forward their concerns, complaints at specified offices, and advance compensation claims for lost assets or business opportunities, as applicable.
- Seek comments from community on any further environmental concerns associated with the project

209. It was also disclosed that there will be a mechanism in place where local citizens and stakeholders affected will have a chance to forward their concerns, complaints at specified offices, and advance compensation claims for lost assets or business opportunities, as applicable. The public discussions involved all registered participants. In specific, the latter were invited to forward suggestions and/or concerns pertaining to the near-future planning and implementation of the project.

210. Twenty nine people participated in the consultation including village, district and municipality representatives. There were also four women attended the consultation. The list of participants is attached in Appendix 4.

2. Issues Discussed and Suggestions Forwarded

211. In specific, the following issues have been raised by individual participants in the first Romitan Meeting:

- Detailed time schedule for planned diversion of traffic, scheduled priorities andlikelihood of hindrances for public movements;
- Detailed technical parameters for carriageway (allowable axle load, width, durability);
- Suitability of the road to alleviate traffic congestions;
- Inclusion of rest areas for road users.

212. No concerns have been forwarded with respect to environmental impacts or competitive issues affecting the local resources or the social setting. All participants agreed to a speedy execution of the Project.

213. In the Peshkun Meeting, the following issues have been raised by individual participants:

- Likelihood of ecological damage generated by this road reconstruction
- Means and schedule of delivery for construction materials to the work sites;
- Allocation of responsibilities for controlling the work's performance and quality;
- Financial control mechanisms planned;
- Diversion of traffic, scheduled priorities and likelihood of hindrances for public movements in the bypass area.

214. The participants shared the hope that this Project will not only result in improving the livelihood of many local residents, but will also bring a number of job opportunities to the region which is marred with high rates of unemployment and lack of business.

3. Use of Consultation Results and Information Disclosure

215. All protocols (minutes) of the public meetings were done. Therein it was stipulated that all forthcoming environmental assessment reports shall be accessible to all interested and concerned/affected parties at the Hokimiyat. The information disclosure included information on contact officers, persons and telephone numbers for anyone who wants to obtain further information or who intends to forward personal claims associated with this Project. All disclosure of information has been given in local language.

216. The Environmental Management and Monitoring Plan of this IEE take all suggestions forwarded in the Public Consultation events into full consideration.

H. GRIEVANCE REDRESS MECHANISM

217. ADB requires that RRF establish and maintain a grievance redress mechanism to receive, facilitate and resolve grievances of affected people concerning the delivery of environmental safeguards at the project level, as defined in the assessment documents (primarily the EMP). The grievance redress mechanism will be scaled to the risks and impacts of the project.

218. The RRF's PMU, in cooperation with regional authorities and impacted district authorities, will establish Grievance Redress Committees (GRCs) at both levels. At the regional level these will be comprised of the Hokimiyat's representative, a representative of RRF and one member from the Regional Environment Department. One member of the committee will be a woman. One person on the committee will be identified as the focal point for any grievance claims. At district level it will consist of a government official and two no-government members, one being a woman. GRCs established in each district affected by the road will be the most important. The GRCs will be in place before the start of the construction period.

219. Grievances can be filed in writing or orally with the GRC's district-level focal point or contact person. The committee will have 15 days to respond with a resolution. If unsatisfied with the decision the complainant will be able to resubmit the grievance with the regional GRC for final resolution, and at the same time submit a copy of the letter to the ADB project officer in charge. The regional GRC will have a further 15 days to issue a decision, and if no ruling is forthcoming the grievance will be automatically decided in favour of the complainant and all compensation will be provided, within 30 days of that decision.

220. To be effective, the composition and operation of the GRC will be announced to stakeholders in the region and districts in the project area via a letter as part of the implementation of the EMP. This will be in addition to the fully translated IEE going to be distributed to regions and districts, as promised during the consultation sessions.

I. ENVIRONMENTAL MANAGEMENT PLAN

221. The Environmental Management Plan (EMP) has documented the impacts identified in the IEE report, the actions required to mitigate those impacts to acceptable levels in accordance with the laws of Uzbekistan and the ADB safeguard policy, and the monitoring activities that are to be undertaken as part of the project to confirm that the mitigation actions have been effective in achieving their objectives or to initiate changes in the actions required.

222. The EMP also details the institutional arrangements and capacities that currently exist, or that will be put in place as part of the project implementation, to ensure that the environmental due diligence (including the EMP) has comprehensively considered both Uzbek and ADB requirements for environmental protection, has identified all likely environmental impacts and proposed appropriate mitigation measures, and has the systems in place to ensure that effective procedures for environmental monitoring and control of the project impacts and mitigation measures are implemented throughout the life of the project

223. The RRF's PMU will strengthen and continue to improve its capacity by implementing environmental programs for its managers and staff well before the start of construction, to make them better aware of the required mitigation actions before the contractors mobilize.

1. Environmental Mitigation Plan

224. An environmental management plan (EMP) has been prepared (See Appendix 2) and will be updated during detailed design. RRF will ensure that the contractors prepare a site-specific EMP based on this EMP and the actual situation on-site. RRF will monitor the implementation of the EMP, and will report twice a year on EMP compliance.

225. The environmental impacts associated with project have been detailed above in the relevant sections of this IEE. Mitigation measures required to address the impacts identified in the IEE have been summarized in each of the relevant sections covering the physical, biological and socio-economic environment affected by the project. The impacts identified and the specific mitigation measures proposed to address them have been consolidated into the environmental mitigation plan presented in Appendix 2, which includes time frames, responsibilities and where applicable, estimated costs for each measure.

226. During reconstruction, mitigative measures focus in assuring that contractors undertake all their work in an environmentally responsible manner, properly disposing of wastes, controlling the use of fuels and lubricants, revegetating any sites cleared during reconstruction, carefully managing the use of water and being aware that reconstruction dust must be managed as it can travel long distance. RRF will be the lead for this work, with its PMU and CSC completing the mitigative and monitoring actions.

227. Operating period mitigative actions focus on ensuring that key mitigative measures are carried over from the reconstruction into the operating period and that a spill contingency protocol and plan be considered after 2020 when traffic volumes begin to rise above 10,000 PCEs/day. Uzavtoyul will be in charge of the safeguard actions during the program's operating period.

228. The RRF will ensure the following: (i) the contractor's obligation to undertake environmental mitigation measures as specified in the EMP, and these requirements will be included in the bidding document and later in the contract document; (ii) the cost for the recommended environmental mitigation measures will, where possible, be made separate items in the Bill of Quantities. Such allocation of a separate budget for carrying out

environmental mitigation measures will be crucial to assure their implementation. During procurement, contractors will be specifically encouraged to include these costs in their rates and present the mitigation cost as a line item in the Bill of Quantities; (iii) explicitly require the contractor to assign staff to be responsible for implementing environmental mitigation measures during construction, and reporting to RRF's PMU, (iv) the contractor will be required to prepared Site Environmental Management Plan (SEMP)to implement the EMP with providing specific sites where the mitigation measures will need to be implemented. This SEMP could be presented as part ofSite Environmental Management Plan (SEMP) and Health Safety and Environmental Plan for which the contractors have a contractual obligation. In addition, all the plan to disposed wastes, to plant the trees, to extract water have also be prepared for approval of supervision consultant on behalf of PMU, and (v) the contractor, in coordination with RRF's PMU, will have the responsibility to address any complaints and grievance related with construction activities

2. Site Specific Environmental Management Plan (SEMP).

229. Following the award of the contract and prior to reconstruction commencing the Contractor will review the EMP and develop this into a number of detailed Site Environmental Management Plans (SEMPs) for specific site areas that amplify the conditions established in the EMP for the particular site and tasks involved. The SEMPs will identify persons who will be responsible for supervising the work within the contractor's team. The SEMPs will include a matrix of mitigation measures corresponding to specific site activities. This information will be presented on a series of site plans covering the whole project site showing all environmental management requirements for all activities in the construction phase.

230. The SEMPs will also include a monitoring plan and a reporting program corresponding to the requirements of the EMP. SEMPs will be submitted to PMU and ADB for review and approval prior to the Contractor taking possession of any work site.

3. Site Induction.

231. Following approval of the SEMP by the PMU, the Contractor will be required to attend a site induction meeting with the Contractor Supervision consultant whereby the SEMP is confirmed with the Contractor to ensure that all compliance conditions are clearly understood.

232. The Contractor will be responsible for ensuring that all sub-contractors abide by the conditions of the SEMP.

Table G-1: Indicators of Unacceptable Environmental Effects during Reconstruction

Environmental Effect	Objectively Verifiable Indicators	Sources of Verification
Deteriorating condition of temporary roads used by construction traffic	Physical degradation of hauling/access roads, pavement cracks, embankment subsiding, increased number of accidents	Field inspections, photos, traffic police, Site Environmental Management Plan (SEMP)
Excessive delays to normal traffic	Local delays (hrs) as compared with previous travel time for same distance	Field survey, interviews, traffic police
High frequency and severity of work accidents	Records of number and nature of accidents, compared with records of similar construction works in Uzbekistan	Field survey, interviews,traffic police, SEMP
Excessive airborne dust	Direct measurements of dust particle concentration; reports on increase of	Field survey, photos, interviews, traffic police, local

	respiratory problems among local communities and labourers	hospitals, SEMP
Poor health of labour force, sanitary conditions at work sites and camps	Records and reporting of diseases among labour force, compared with local health statistics Number and types of latrines and waste deposit sites as per number of users; occurrence and frequency of diseases associated with poor sanitation;	Interviews, Medical check reports, hospitals, Contractor's Ambulance Station, SEMP
Public health problems	Medical care and implications on public health services; STD statistics	Spot checks, medical reports, hospitals, photos, Sanitation & Epidemiological Control Department, SEMP
Drinking water problems	Lowering of groundwater table, bacterial counts in drinking water samples, organoleptic and hydrochemical tests	Laboratory tests, medical reports, hospitals, photos, Sanitation & Epidemiology Control Department
Complaints from and poor relations with local communities	Crime records of Rayon; number of conflicts associated with violence; no. of cases involving theft, poaching, harassment of women, etc.	Hokimiyat, Police, interviews, photos Interviews with Local Police

4. The Environmental Monitoring Plan (EMoP)

233. An **environmental monitoring plan** is presented in Appendix 3 which outlines the activities and responsibilities associated with monitoring the effectiveness of the proposed mitigation plan and ensuring compliance with the recommendations of the IEE.

234. During construction, compliance monitoring will be completed as the work is carried out by RRF's PMU. The construction monitoring will be reported every 3 months in the Project quarterly report. This monitoring report will also include record on the monitoring of environmental quality. During the construction period, a stand-alone environmental monitoring report to record the implementation of EMP and EMoP will be submitted biannually to ADB and nature Protection Committee.

235. **Monitoring of Construction Impacts**. Construction environmental monitoring is a function of supervision, and the essential purpose is to ensure adherence to the EMP. The monitoring is a day to day process, which ensures that departures from the EMP are avoided or quickly rectified, or that any unforeseen impacts are quickly discovered and remedied.

236. **Monitoring of Impacts of Operation of the Road.** Environmental Monitoring during operation will focus on maintaining the mitigation measures begun during construction, and on monitoring air quality and noise levels. Annual environmental reports during the operating period will be prepared by RRF and submitted to Nature Protection Committee.

5. Implementation Arrangements

a. Institutional Arrangement

237. RRF has established safeguard unit under the PMU, and this unit will continue to carry out the obligation of RRF to comply with environmental requirement of the Government of Uzbekistan and requirement of ADB. The unit was established in 2010 and as of now (October 2012) has one social development specialist responsible to oversee the

implementation of social safeguards and 1 environment specialist (ES) responsible to oversee the implementation of environmental safeguards within the project.

238. At the design stage, the ES of PMU environmental specialists will ensure that environmental protection is incorporated into the design. During bidding preparation, the ES will be responsible to ensure that all EMP requirements for contractor is included in the bidding document.

239. The **PMU** (Environment Specialist) responsibilities in respect of implementation of the EMP are as follows:

i. Ensure that all relevant EMP requirements (including environmental designs and mitigation measures) are duly incorporated into the project bidding documents.
ii. Obtain necessary permits and/or clearance, as required, from SNPC and other relevant government agencies, ensuring that all necessary regulatory clearances are obtained before commencing any civil work on the project.
iii. Ensure that contractors have access to the EMP and IEE report.
iv. Ensure that contractors understand their responsibilities to mitigate environmental problems associated with their construction activities and facilitate training of their staff in implementation of the EMP.
v. Approve the Site Specific Environmental Management Plan (SEMP) before Contractor takes possession of construction site
vi. Monitor the contractor's implementation of the SEMP in accordance with the environmental monitoring plan.
vii. Submit six monthly Environmental Monitoring Reports to ADB.
viii. In case unpredicted environmental impacts occur during the project implementation, prepare and implement as necessary an environmental emergency program in consultation with SNPC, any other relevant government agencies, and ADB.

240. The PMU will appoint an environment specialist (ES) of CSC, who will be responsible for overseeing the construction and monitoring all works and activities undertaken by the Contractor(s) and ensuring compliance with the specification and contractual requirements. During construction, the contractors will ensure that mitigation measures are implemented and sustained throughout the construction period. In turn, environmental specialist(s) will be hired to join the construction supervision consultant team and to oversee and monitor the implementation of all mitigating measures required by the EMP in accordance with ADB's SPS, 2009, and the Government Uzbekistan Environmental Assessment Requirement. It is recommended, that RRF to invite the Nature Protection Committee to join field monitoring at least one time per year during the construction period. The responsibilities of the ES of CSC include:

i. Supervise the implementation of the environmental protection and impact mitigating measures by the contractors. The construction may only be ordered to start after the review is completed and ES of CSC is satisfied with the environmental arrangement
ii. Supervise construction activities to ensure minimum impact on the natural and socioeconomic environment,
iii. Regularly monitoring the performance of the Contractor(s) environment staff, verifying monitoring methodologies and results. In case the ES of CSC considers that the Contractor(s) environment staff fail to discharge duties or fail to comply with the contractual requirements, instruct the Contractor(s) to replace the their environment staff;

iv. Review of the construction design to ensure compliance with project engineering design and the EMP with regard to environmental protection and impact mitigation;
v. Prepare the necessary remedial actions for any unforeseen impacts, and
vi. Instructing the Contractor(s) to take corrective actions within timeframe as determined by the ES of CSC. If there is breach of contract or strong public complaints on contractor environmental performance, the ES of CSC will order contractor to correct, change or stop the work and reporting to the relevant agencies and the EA;
vii. Address complaint related with environmental aspect o the project through GRM;
viii. Supervision of the Contractor(s) activities and ensuring that the requirements in the EMP and contract specifications are fully complied with;
ix. Instructing the Contractor(s) to take actions to reduce impacts and follow the required EMP procedures in case of non-compliance / discrepancies identified;
x. If the contractor discovers cultural relics by chance, the ES of CSC will order site protection and report to the relevant authorities and the EA;
xi. Monitoring Contractor(s) performance to ensure that they cut trees in strict accordance with the pre-determined area, numbers, and species set out in the permits and comply with wildlife and plant protection requirements during construction;
xii. Monitoring Contractor(s) compliance with the project grievance redress mechanism.

241. The **Contractor** should appoint a full time **Environment Safety Officer** (ESO) to be a senior member of the construction management team based on site for the duration of the contract. The ESO shall have a university degree (preferably at Masters level) in Environmental Science or related discipline and have at least 10 years work experience in environmental management of infrastructure projects with specialist expertise in ecology.

242. Key responsibilities of the Contractor (through the ESO) are as follows:

i. Preparing the site specific environmental management plan (SEMP) for approval by the Employer (PMU) prior to the Contractors taking possession of the construction site (see below)
ii. Strictly implement the measures identified in the EMP;
iii. Verify that all construction materials suppliers have valid operating licenses and any necessary environmental permits;
iv. Ensuring the SEMP is implemented effectively throughout the construction period.
v. Coordinating community relations issues through acting as the Contractor's community relations focal point (proactive community consultation, complaints investigation and grievance resolution)
vi. Establishing and maintaining site records of:

- weekly site inspections using checklists based on SEMP,
- environmental accidents/incidents including resolution activities
- environmental monitoring data,
- Corrective action plans issued to the DSC in response to non-compliance notices.
- Community relations activities including maintaining complaints register
- Monitoring reports
- Routine reporting of SEMP compliance and community liaison activities (see below).

- Adhoc reporting to the Employer's Engineer of environmental incidents/spillages including actions taken to resolve issues

vii. In case of non-compliance or discrepancies with respect to EMP implementation, carry out investigation and submit proposals on mitigation measures, and implement remedial measures;
viii. Adhere to grievance redress mechanism procedures.

b. ResourceAllocation

243. The RRF has experience in implementing EMP and undertaking monitoring. This Project is the 6th project financed by ADB. Therefore, RRF has capacity and adequate resource to support the implementation of EMP for this project. The environmental costs for the Project has been incorporated in the project costs, and will comprise the following: (i) costs to fund the study, consultation, and disclosure for updating IEE including EMP and Monitoring Plan after detailed design, (ii) costs to engage environmental consultants to work at the safeguard unit of RRF's PMU, to work with CSC, and Contractor, (iii) costs to implement mitigation measures, including tree planting, and (iv) cost to fund the environmental monitoring and reporting. Table below summarizes the costs required for environmental mitigation measures and monitoring.

Table 8. Environmental Costs for Mitigation and Monitoring

o.	**Cost Items**	**Amount Required**
1	Engage environmental consultant for PMU	PMU's budget
2	Engage Environmental consultant for CSC	CSC's budget
3	Engage Environmental consultant for Contractor	Contractor's budget
4	Costs Mitigation Measures (all mitigation related with construction works will be part of construction cost)	Contractor's budget
5	Planting and maintaining trees	This costs will be incorporated in the contractor's budget
6	Environmental Quality Monitoring Costs (including data sampling and analysis): (3 years during construction period, including cost for data sampling and analysis)	PMU's budget

c. Reporting

244. Prior to commencement of civil works, the environmental monitoring report has to be submitted to ADB to describe the progress on (i) recruitment of environmental consultant, (ii) incorporating the environmental concerns into detailed design, and (iii) incorporating environmental concerns into bidding document for supervision consultant and contractor, as well as the inclusion on environmental requirement into contract document for both supervision consultant and contractor.

245. The implementation of the EMP has to be reported routinely in biannual basis after commencement of civil works. The report will include the implementation of EMP or SEMP, which described: (i) organizational set up to address environmental concerns by contractor and supervision consultant, (ii) obtaining all required permit related with environmental concerns associated with construction activities e.g extraction of water, borrow pit, deviating route, etc; (iii) environmental impacts occurred during the reporting period and how the mitigation measureshave been implemented; (iv) any unpredicted impacts that occurred during the reporting period and its mitigation measures; (v) any accident related with

construction e.g. leakage, spillage of hazardous substance and other accident, and (vi) any complaint on environmental concerns file by affected people or by other parties.

J. CONCLUSION AND RECOMMENDATION

246. In general, theecological conditions along the alignment of Tranche 3 give little reason for concerns ofbecoming potentially damaged by the foreseen Project activities. The vast majority of terrain adjacent to the road alignment is semi-desertanddesert often withonly sparse vegetation due to the high salt content of the soil and absence of sufficientrainfall. The terrain shows little if any anthropogenic impacts, being mainly caused byintensive grazing of local livestock. Archaeological and historical monuments do not appear within the RoW. Due to therather uniform and unspectacular environmental and social setting the anticipatedreconstruction works are likely to cause only short-term and locally confined impacts -mainly associated with the preparation of concrete slabs, earth works,stockpiling and movement of heavy construction vehicles.

247. **Evaluation of the Anticipated Direct, Indirect and Cumulative Impacts:** All site preparation works, excavation works, particularly at quarrying sites, will generate potential impacts that are local, temporary, and reversible. Precautionary measures are sufficiently described in the EMP. Emissions from vehicle movements and speeding will be of local concern, particular in the vicinity of human settlements near the bypasses. However, in most localities the annual wind conditions are suited to carry exhaust and other emission gases away from human settlements before any public health concern would arise. The EMP addresses problems associated with air, dust and noise pollution, and provides a number of mitigation solutions. Other impacts associated with supporting facilities for construction works such as problem associated with construction worker havebeen addressed also in the EMP. None of the identified impacts are appraised to have unmanageable dimensions.

248. **General Assessment, Conclusion, and Recommendations:** Given the vastness of the area, the relative absence of air humidity, the remoteness of construction sites, and the absence of strong winds carrying reconstruction-related dust and other emissions into nearby settlements it is anticipated that none of the above temporary impacts will affect human settlements to serious dimensions. There are no intensively croplands near the road alignments that could be affected by fallout pollutants originating from road traffic. It is suggested that most if not all of the predicted impacts relating to air pollutants, noise and vibration will be sufficiently mitigated as long as the EMP is implemented and environmental supervision is in place. Disciplining driving behavior, compliance with traffic rules and good vehicle maintenance will play important roles in this respect.

249. The road rehabilitation works are unlikely to change any geomorphologic parameters entailing to habitat degradation. In contrast, the project will result in a number of positive environmental impacts being (i) improvement of air quality by reducing dust development and vehicular emissions, (ii) rising public environmental awareness by the installation of environmental signboards relating to roadside protected areas and biodiversity values, and (iii) decreasing road safety risks by substantially improving the road conditions.

250. As long as there is no changing on environmental conditions in the project areas, and no change on project design, the overall conclusion of this IEEant its recommended mitigation measures,recommended supervision, and monitoring activities, are sufficient and appropriate to fully ensure the protection of the environmental .

251. The major findings of the IEE are as follows:

(i) The Project will not have any considerable negative impacts to theenvironment due to the following considerations:

a. Project activities will be limited to reconstruction;

b. Impacts of the project are site-specific and reversible;
c. The alignment does not run through ecologically sensitive areas, specially protectedareas, critical habitats or biodiversity refuges.

(ii) The anticipated negative environmental impacts are manageable and can be mitigatedthrough proper engineering design and realization of proposed mitigation measures.
(iii) The anticipated positive impacts can be summarized as follows:

a. contribution to economic growth of Bukhara Oblast;
b. reduced vehicle operating costs;
c. improvement of road safety;
d. new employment opportunities for local community, and
e. avoidance of air quality impacts from earth road and elimination of fugitive dustemission.

252. The following recommendations are proposed based on the findings of the IEE:

i. **Environmental Provisions in Bid and Contract Documents**. Specific environmental provisions are recommended for inclusion in bid and contract documents including provisions related but not limited to:
   a. erosion control, air and water quality, and noise control,
   b. location of construction camps and other facilities (not in environmentally sensitive areas or close to settlements),
   c. borrow pit restoration,
   d. safety provisions,
   e. baseline and routine monitoring of air quality around quarries, and
   f. local communities relations.
ii. **Environmental Monitoring and Control**. Baseline and routine noise and air quality monitoring is recommended in project area.
iii. **Capacity Building for Environmental Management**. Training program for selected staff and addressed to the goals and techniques of environmental management activities in road projects is recommended.

253. The CAREC Corridor 2 Investment Program – Tranche 3 is located in Bukhara Oblast of Republic of Uzbekistan (km 228-315). The proposed Project activities will have both positive and negative impacts to the environment. The IEE findings clearly show that Project will have socio-economic benefits and, provided that the mitigation and monitoring actions defined in the EMP are fully implemented during the reconstruction and operation periods, the **Project will not have significant adverse environmental effects.** An environmental management and environmental monitoring plans have been prepared and responsibilities for implementation assigned. A full Environmental Impact Assessment (EIA) under ADB policy safeguards is not required.

APPENDIX 1: TECHNICAL CHARACTERISTICS

Table C-1. Characteristics of the bridges

	Name	Location of bridge, km	Material of bridge	Length of bridge	Dimensions of bridge
1.	Zarafshan river	236,651	Reinforcedconcrete	66,21	Under reconstruction
2.	Shimoliy collector	258,154	Reinforced concrete	45	14,50

Table C-2. Characteristics of box culverts

	Name	Location of culvert, km	Material of the culvert	Length of culvert	Dimensions of culvert
1.	Djaiykhun	228,305	Reinforcedconcrete	36,0	23,75
2.	Khayrobod	237,295	Reinforcedconcrete	18,20	22,68
3.	Varaksha	238,181	Reinforcedconcrete	17,94	17,24
4.	Khasinobod	239,442	Reinforcedconcrete	8,66	11,63
5.	Chelongu	242,346	Reinforced concrete	18,25	13,24
6.	Chavkar	243,717	Reinforced concrete	6,91	9,92
7.	Yangiarik	247,723	Reinforcedconcrete	6,0	15,27
8.	Collector	249,165	Reinforcedconcrete	26,0	12
9.	Marziya	250,748	Reinforcedconcrete	8,64	14,70
10.	Collector	251,551	Reinforcedconcrete	26,88	10,0
11.	Khudjayavon	253,252	Reinforced concrete	6,32	17
12.	YukoriPiyezkor	254,280	Reinforced concrete	27,0	12,0
13.	Shimoliy collector	257,881	Reinforced concrete	6,0	14,30
14.	Kokishtuvon	278	Reinforced concrete	30	12,50

Table C-3 Characteristics of pipe culverts

No	Location of the culvert, km	Diameter of pipe, m	Length of pipe, running meters	Material of pipe
1.	228,535	1.25	20.07	Reinforced concrete
2.	228,896	1.0	16.50	Reinforced concrete
3.	229,175	1,0	19,14	Reinforced concrete
4.	229,398	1.0/0.30	14/4	Reinforced concrete
5.	229,521	1,0	22.25	Metal
6.	230,328	0,75	15.17	Reinforced concrete
7.	230,640	0,75	14.18	Reinforced concrete
8.	230,996	0,75	14.50	Reinforced concrete
9.	231,020	1,5	29.91	Reinforced concrete
10.	231,757	1,0	15.17	Reinforced concrete
11.	232,300	1,0	14.42	Reinforced concrete
12.	233,198	0.75	13.65	Reinforced concrete
13.	233,798	1.0	13.35	Reinforced concrete
14.	234,254	0.50	14.79	Reinforced concrete
15.	234,765	2.0	28.31	Reinforced concrete
16.	235,561	0.50	14.63	Reinforced concrete
17.	237,554	1,0\0,53	21,36	Reinforced concrete
18.	238,260	1,0	40,03	Reinforced concrete
19.	239,420	1,22	26.29	Metal
20.	239,954	1,02	19,0	Metal
21.	240,240	1,02	27,21	Metal
22.	240,850	1,0	14,18	Reinforced concrete
23.	241,434	1,25	20,66	Reinforced concrete

24.	241,710	0,75/0,53	16,66	Reinforced concrete
25.	240,032	1,0/Лр-6	15,67	Reinforced concrete
26.	240,058	0,75	18,27	Reinforced concrete
27.	243,283	0,75	15,38	Reinforced concrete
28.	243,518	0,75	15,00	Reinforced concrete
29.	243,791	1,0	16,87	Reinforced concrete
30.	244,733	0,50	17,59	Reinforced concrete
31.	244,941	1,02	21,24	Metal
32.	245,728	0,50	17,84	Reinforced concrete
33.	246,920	0,50/0,53	18,0	Reinforced concrete
34.	247,539	0,50	14,47	Reinforced concrete
35.	248,065	0,50	17,08	Reinforced concrete
36.	252,755	0,72	19,21	Reinforced concrete
37.	254,800	0,75	15,47	Reinforced concrete
38.	255,545	0,53/1,0	19,56	Reinforced concrete
39.	255,757	0,50/0,82	16,55	Asbestos/metal
40.	256,089	1,0	14,60	Reinforced concrete
41.	256,343	0,82/0,75	19,17	Metal/concrete
42.	256,805	0,82/0,75	17,67	Metal/concrete
43.	257,179	1,02/0,75	22,46	Metal/concrete
44.	257,700	0,5	15,00	Reinforced concrete
45.	259,317	0,29	20,50	Metal
46.	259,687	0,29	21,52	Metal
47.	260,567	1,02	19,23	Metal
48.	261,139	0,29	21,00	Asbestos
49.	261,568	1,02	22,52	Metal
50.	263,196	0,29/0,40	20	Metal
51.	263,596	0,40	26,80	Metal
52.	264,240	0,40	18,53	Metal
53.	264,651	0,20	16,37	Metal

APPENDIX 2: ENVIRONMENTAL MITIGATION PLAN

Impact/Issue	Mitigation Measure & Related Links	Cost (in US $)	Institutional Responsibility	Comments
PRE-CONSTRUCTION STAGE:				
Impacts associated with all quarries.	• Ensure that all design parameters appropriate to the seismic risk inherent in the Project. • Adopt contract provisions specifying that only licensed facilities in compliance with all applicable regulations and industry standards will be used as the sources of quarried materials. • Licensed quarrying operations for material sources must be used and all uses sources require the prior approval of the CSC. The potential impact of transport of quarried materials must be considered in the approval process. • Plans for quarry operations must be included in the required SEMP submission.	Inspections to ensure compliance are discussed below as part of the Construction Stage activities.	RRF/PMU (the environment consultant of the PMU and CSC) must be responsible for day-to-day issues of environmental management such as proper quarry operations. Compliance assurance must be the responsibility of the CSC.	Compliance with all applicable contract provisions and quarry regulations. Quarry-related issues as reported in weekly and monthly reports. Complaints as received through the grievance redress mechanism.
Material sources and transport	Tenderer to identify sources of materials, state methods of transportation and provide a realistic breakdown of rates. This should include for on-going maintenance (including drainage, where necessary) and, at the end of their Contract, reinstatement of access routes, haul routes and borrow sites.	Included in design,no additional cost Cost to tenderer in bid preparation	Design engineers	Design process; Contract documents Contract documents/ tender process
Fueling Operations and Liquid and Toxic Material Storage Areas.	The site plans must specify the locations for the storage of liquid materials and toxic materials. The following conditions to avoid adverse impacts due to improper fuel and chemical storage. • Fueling operations shall occur only within containment areas. • All fuel and chemical storage (if any) must be sited on an impervious base within a bund and secured by fencing. The storage area must be located away from any watercourse or wetlands. The base and bund walls must be impermeable and of sufficient capacity to contain 110 percent of the volume of tanks. • Filling and refueling must be strictly controlled and subject to formal procedures and will take place within areas surrounded by bunds to contain spills / leaks of potentially contaminating liquids. • All valves and trigger guns must be resistant to unauthorized interference and vandalism and be turned off and securely locked when	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)	

	not in use. • The contents of any tank or drum must be clearly marked. Measures shall be taken to ensure that no contaminated discharges enter any drain or watercourses. • Disposal of lubricating oil and other potentially hazardous liquids onto the ground or water bodies must be prohibited. • If accidental spills occur immediate clean up must be undertaken and all cleanup materials stored in a secure area for disposal to a site authorized to dispose of hazardous waste. • Locations Relative to Watercourses. The site plans must be devised to ensure that, insofar as possible, all temporary construction facilities must be locate at least 50 meters away from a water course, stream, or canal.			
Permanent loss of property and land, including agricultural and grazing land	Avoidance of resumption / demolition of land /property as far as possible; Development of Land Acquisition and Resettlement Plan; Highway fence to be located as close to the road embankment as possible, to minimise loss of agricultural and grazing land.	Included in design, no additional cost	Design engineers/ PMU's Land Acquisition Department	Route selection/analysis of alternatives phase Land Acquisition and Resettlement Plan
Infrastructure	Avoid damage to existing infrastructure and interference with planned infrastructure, e.g. high voltage electricity lines, water pipelines, oil and gas pipelines	As above	Design engineers	Consult with utility authorities; Contract documents
Culvert design general	Designer to provide appropriate numbers of suitably sited and designed culverts and bridges;	Included in design, no additional cost	Design engineers, hydrology / hydraulic experts	
Need for proper drainage and re-vegetation.	Mitigation of potential adverse impacts due to earth-moving, cut and fill and similar requirements must include contract stipulations which require: • Selection of less erodible material, placement of gibbons and riprap and good compaction, particularly around bridges and culverts. • Specification that final forming and re-vegetation must be completed as soon as possible following fill placement to facilitate regeneration of a stabilizing ground cover. • Trenching where necessary to ensure successful establishment of vegetation. • Seeding with a fast growing crop and potential native seed mix immediately after fill placement to prevent scour and to encourage stabilization. • Placement of grass sods where applicable. • Stabilization of embankment slopes and road cuts by revegetation with grazing resistant plant species, placement of fiber mats, riprap, rock gabbions, or other appropriate technologies. • Completion of discharge zones from drainage structures with riprap to reduce erosion when required. • Down drains/chutes lined with rip-rap/masonry or concrete to prevent erosion.	Contract preparation costs currently budgeted as part of project preparation (including consulting services) Contract compliance Supervision must be a budgeted activity for the CSC.	RRF/PMU (the environment consultant of the PMU and CSC) must be responsible for day-to-day issues of environmental management such as proper quarry operations. Compliance assurance must be the responsibility of the CSC.	Compliance with all applicable Contract provisions. Issues as reported in weekly and monthly reports. Complaints as received through the grievance redress mechanism.

	• Side slopes adjusted in the range based on soil and other conditions as specified by the Project Specifications to reduce erosion potential. It is recommended that steep slopes be stabilized, covered with riprap or other material to prevent soil erosion.			
Impacts to existing transport infrastructure	To mitigate potential impacts to the existing transport network, a Traffic Control Plan must be submitted to explain the means and methods to be taken for proper and adequate control of traffic during the course of the Works. This Plan must include but not be limited to: • The traffic control equipment the Contractor proposes to use for the Works; • Traffic control signage including location and sign descriptions; • How and when the Contractor proposes to use traffic control flag • men; • Traffic control means during no-working periods; • Traffic control means and devices for night and off-hour periods. To mitigate and ensure that potential impacts to the area transport network are avoided in the subsequent stages of the Project, the COPA stipulates a very specific and detailed set of requirements in regard to general traffic management, traffic control, safety provisions that apply to temporary traffic ramps, vertical clearance, signage, temporary fencing, warning lights and other details.	Contract preparation costs currently budgeted as part of project preparation (including consulting services) Contract compliance supervision must be a budgeted activity for the CSC.	RRF/PMU (the environment consultant of the PMU and CSC) must be responsible for day-to-day issues of environmental management and safety, including theimplementation of the Traffic Control Plan. Oversight supervision is the responsibility of the CSC with full participation by the appropriate offices of RRF.	
Potential impacts to irrigation systems	To mitigate potential impacts to irrigation systems bid and contract documents state that to avoid potential adverse impacts to irrigation systems, the Contractor must ensure irrigation channels diverted during the construction phase must be returned to their original status. Where this is not possible, or where channels are irrevocably altered, consultation must be held with landowners to ensure that an adequate redesign is undertaken to ensure that irrigation channels are returned as closely as possible to their former layout. The Contractor must undertake all necessary works to achieve this status, including provision of labor.	Contract preparation costs currently budgeted as part of project preparation	RRF/PMU (the environment consultant of the PMU and CSC) is responsible for day-to-day issues of environmental management and safety, including periodic site visits to assess issues associated with impacts to irrigation networks.	Compliance with all applicable contract provisions. Irrigation issues as reported in weekly and monthly reports. Complaints as received through the grievance redress mechanism.
Noise – including construction noise on the jobsite and adjacent areas and	To mitigate potential noise impacts, the recommended contract conditions stipulate that: • Off-site noise levels due to reconstruction activities must not exceed a Leq* of 75 dBA at any time and, insofar as possible, must not exceed	Contract preparation costs currently budgeted as part of project preparation	Appointment and approval of an ES of CSC is required before work can	Compliance with all applicable noise standards. Noise –related issues as reported in weekly and

noise generated along any transport routes used by the Project.	an indoor Leq of 55 dBA during the day (6:00to 8:00 PM) and 40 dBA at night (8:00 PM to 6:00 AM. • The maximum acceptable jobsite noise level (Lmax) must not exceed 85 dBA unless protective equipment is supplied. To avoid potential adverse noise and vibration impacts, there commended COPA provisions state that the Contractor must: • Be responsible for repairing any damage caused as the result of vibrations generated from or by the use of his equipment, and machinery. • Erect temporary noise barriers where schools are within 50meters of reconstruction activities. • Provide public notification of construction operations prior to reconstruction works. • Ensure that sensitive receptors must be avoided as possible (i.e., aggregate crushers, operators, etc.). • Ensure that all exhaust systems must be maintained in good working order; properly designed engine enclosures and intake silencers must be employed; and regular equipment maintenance must be undertaken. • Ensure that stationary equipment must be placed as far from sensitive land uses as practical; selected to minimize objectionable noise impacts; and provided with shielding mechanisms where possible. • Schedule operations to coincide with periods when people would least likely be affected; work hours and work days must be limited to less noise-sensitive times. Hours-of-work must be approved by the site engineer having due regard for possible noise disturbance to the local residents or other activities. Reconstruction activities must be strictly prohibited between 10 PM and 6 AM in the residential areas. • The Contractor must also note and record the condition of the structure being monitored and any change in condition from the time of the previous round of monitoring. * Notes: Leq is defined as an energy-averaged sound level that includes both steady background sounds and transient short-term sounds commonly used to describe traffic noise levels that tend to experience hourly peaks. L10% - the sound level exceeded 10 percent of the measurement period and represents the peak sound levels. L90% - the sound level exceeded 90 percent of the measurement period and is commonly used to represent background sound levels. Lmax - the maximum sound level.	(including consulting services) Monitoring and reporting costs must be part of the Contractor's bid. Contract compliance supervision must be a Budgeted activity for the CSC.	commence.	monthly reports. Complaints as received through the grievance redress mechanism.
Air quality impacts in later stages are	Furnaces, boilers or equipment using any fuel that produce air pollutants must not be installed without prior written consent of the CSC. Burning of	Contract preparation costs currently	Appointment and approval of an	Air-related issues as reported in weekly and monthly reports.

largely determined by decisions taken (by design or default) in the Pre-Construction Stage, particularly the stipulations of the Project's bid and tender documents and contract specifications.	debris or other materials must not occur on the Site. Dust suppression measures including but not limited to the following must be implemented: • Stockpiles of sand and aggregate greater than 20 cubic meters for use in concrete manufacture must be enclosed on three sides, with walls extending above the pile and two (2) meters beyond the front of the piles. Locations must be indicated by the SEMP. • Effective water sprays must be used during the delivery and handling of all raw sand and aggregate, and other similar materials, when dust is likely to be created and to dampen all stored materials during dry and windy weather. • Areas within the Site where there is a regular movement of vehicles must have an acceptable hard surface and be kept clear of loose surface material. Locations must be indicated by the SEMP. • Conveyor belts must be fitted with wind-boards, and conveyor transfer points and hopper discharge areas must be enclosed to minimize dust emission. All conveyors carrying materials that have the potential to create dust must be totally enclosed and fitted with belt cleaners. Locations must be indicated by the SEMP • Cement and other such fine-grained materials delivered in bulk must be stored in closed silos fitted with a high-level alarm indicator. The high-level alarm indicators must be interlocked with the filling line such that in the event of the hopper approaching an overfull condition, an audible alarm must operate, and the pneumatic line to the filling tanker must close. Locations must be indicated by the SEMP Plan. • All vehicles, while parked on the Site, must have their engines turned off. • All equipment and machinery on the Site must be checked at least weekly and make all necessary corrections and or repairs to ensure compliance with safety and air pollution requirements. • All vehicles must be properly cleaned (bodies and tires are free of sand and mud) prior to leaving the site areas. The necessary cleaning facilities must be provided on site to ensure that no water or debris from such cleaning operations is deposited offsite. • Locations must be indicated by the SEMP Plans. • All trucks used for transporting materials to and from the site must be covered with canvas tarpaulins, or other acceptable type cover (which must be properly secured) to prevent debris and/or materials from falling from or being blown off the vehicle(s). • Construction walls must be provided in all locations where strong winds cause the blowing of dust and debris.	budgeted as part of project preparation (including consulting services)	Environment/ Safety Officer (ESO) is required before work can commence.	Complaints as received through the grievance redress mechanism.
Potential impacts to ethnic and/or vulnerable groups	No impacts to ethnic and/or vulnerable groups are anticipated other than those identified and addressed by the Project's Land Acquisition and Resettlement Report (if any).	See the Project's Land Acquisition And Resettlement	See the Project's Land Acquisition and	

		Report.	Resettlement Report.	
Impacts to water resources in later stages are largely determined by decisions taken (by design or default) in the Pre-Construction Stage, particularly stipulations the Project's bid and tender documents and contract specifications.	To mitigate potential impacts to area waterways, the following conditions must apply to the Contractor's Construction Camps and work staging areas: • **Waste Disposal.** All water and waste products arising on the site must be collected, removed from the site via a suitable and properly designed temporary drainage system and disposed of at a location and in a manner that causes neither pollution nor nuisance. The site plan required as part of the SEMP must indicate the system proposed and the locations of related facilities in the site, including latrines, holding areas, etc. There must be no direct discharge of sanitary or wash water to surface water. Disposal of materials such as, but not limited to, lubricating oil and onto the ground or water bodies must be prohibited. Liquid material storage containment areas must not drain directly to surface water. Liquid material storage containment areas equipped with drains must be valved, and the valve must be maintained locked in the closed position with supervisory control of the key. Lubricating and fuel oil spills must be cleaned up immediately and spill clean-up must be materials be maintained at the storage area. • **Drainage.** The site plan required as part of the SEMP must be devised to ensure that rain run-off from the construction sites is not deposited directly into any watercourse, stream, or canal and must indicate the system proposed, including the locations of retention ponds and other facilities. There must be no direct discharge of sanitary wastewater, wash water, chemicals, spoil, waste oil or solid waste to surface water bodies. Fuel, lubricating oil and chemical spills must be contained and cleaned-up immediately. Spill clean up equipment must be maintained onsite. • **Fueling Operations.** Fueling operations must occur only within containment areas. • **Relationship to Watercourses.** The site plans required as part of the SEMP must be devised to ensure that, insofar as possible, all temporary construction facilities are locate at least 50 meters away from a water course, stream, or canal. • **Wheel Washing Facilities.** If determined warranted by the CSC, the Contractor must provide a wash pit or a wheel washing and/or vehicle cleaning facility at the exits from the sites. If so requested, the Contractor must ensure that all vehicle are properly cleaned (bodies and tires are free of sand and mud) prior to leaving the site areas. The Contractor must provide necessary cleaning facilities on site and ensure that no water or debris from such cleaning operations is deposited off-site.	Contract preparation costs currently budgeted as part of project preparation (including consulting services) Monitoring and reporting costs must be part of the Contractor's bid. Contract compliance Supervision must be a budgeted activity for the CSC.	Appointment and approval of an Environment/ Safety Officer (ESO) is required before work can commence. The Contractor must not undertake any works on the Site until the ESO has commenced duties on Site unless specifically agreed in writing by the CSC.	Compliance with all applicable water quality standards. Water-related issues as reported in weekly and monthly reports. Complaints as received through the grievance redress mechanism.

	• **Other Water-Related Facilities.** The Contractor is required to construct, maintain, remove and reinstate as necessary temporary drainage works and take all other precautions necessary for the avoidance of damage by flooding and silt washed down from the Works. Site Plans must indicate adequate precautions to ensure that no spoil or debris of any kind are allowed to be pushed, washed down, fallen or be deposited on land or water bodies adjacent to the Site. Other water quality provisions applying to construction camps and work sites must include but must not be limited to the following: • All existing stream courses and drains within, and adjacent to, the Site must be kept safe and free from any debris and any excavated materials arising from the Works. Chemicals, sanitary wastewater, spoil, waste oil and concrete agitator washings must not be deposited in the watercourses. • All water and waste products arising on the Site must be collected, removed from the Site via a suitable and properly designed temporary drainage system and disposed of at a location and in a manner that must cause neither pollution nor nuisance. • Drainage works must be reconstructed, maintained, removed and reinstated as necessary and all other precautions necessary for the avoidance of damage by flooding and silt washed down from the Works must be taken. Adequate precautions must be taken to ensure that no spoil or debris of any kind are allowed to be pushed, washed down, fallen or be deposited on land adjacent to the Site. • In the event of any spoil or debris from reconstruction works being deposited on adjacent land or any silt washed down to any area, then all such spoil, debris or material and silt must be immediately removed and the affected land and areas restored to their natural state by the Contractor to the satisfaction of the Engineer. • Downstream slopes must be stabilized with concrete, rock gabions or walls to avoid erosion where warranted. • Contractor must ensure that construction camps and other potential sources of secondary impacts are properly sited and provided with drainage and wastewater facilities. • Downstream slopes must be stabilized with concrete, rock gabions or walls to avoid erosion where warranted. • Contractor must ensure that construction camps and other potential sources of secondary impacts are properly sited and provided with drainage and wastewater facilities.			
CONSTRUCTION STAGE				
Borrow pits and quarries	• The selection and operation of borrow pits needs to be carried out with all due considerations to avoid any impact on the existing natural	Included in Contractor's	Design engineer (specification)	

	and human environment, and to make provisions that no secondary impacts such as soil and aquifer pollution will occur. • Borrow pits should not be located within core or buffer zones of the existing or proposed specially protected areas. • Irrespective of which borrow sites are used/developed, it remains the Contractor's responsibility to source the construction materials through obtaining and adhering to all necessary licenses and statutory environmental management requirements associated with the operation and rehabilitation of such sites. • Contractor to avoid excavating borrow pits or quarries on agricultural land to the extent possible;	General Costs	Contractor (construction)	
Haul routes	• Select suitable haul routes away from sensitive sites, if possible • Provide a length of haul road before the exit(s) from the site • Reduce the width of haul roads (while still allowing two-way traffic movements) to minimise the surface area from which dust may be produced • Sweep paved access roads (while still allowing two-way traffic movements) and public roads regularly • Limit vehicle speeds – the slower the vehicles, the less the dust generated • Spray unpaved work areas subject to traffic or wind with water regularly and frequently, particularly during warm and sunny weather	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)	
Materials handling and storage	• Locate stockpiles out of the wind or provide windbreaks • Keep stockpiles to the minimum practicable height and use gently slopes • Compact and bind stockpile surfaces; re-vegetate long-term stockpiles • Minimise the storage time of materials on site • Store materials away from the site boundary and downwind of sensitive areas • Ensure all dust-generating materials transported to/from the site are covered by tarpaulin • Minimise the height of fall of materials • Avoid spillage and clear up spills as soon as possible • Damp down sand, spoil and aggregate stockpiles	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)	
Fuel and chemical pollution control	Contractor to develop and implement a method statement on spillages including the use of lined spillage bunds for bitumen, oil and fuel storage tanks, and impermeable compounds for the storage of chemicals; Contractor to provide designated and confined sites for vehicle maintenance, refuelling and washing, and appropriate security procedures for refuelling vehicles. Location to be agreed with local executive and environmental authorities. Sites to be 500 m from the nearest water sources/irrigation and drainage channel; Contractor to submit a statement on showing the location of fuel storage,	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)	Method statement on spillages Statement on fuel storage, handling and vehicle washing

	filling station and vehicle washing site to local executive and sanitary authorities; Contractor to treat maintenance workshop wastewater to national discharge standards; Contractor to be prohibited from washing of vehicles and equipment in rivers and/or wetland areas. No storage of oils and chemicals in the wetlands areas will be permitted and if unavoidable they shall be held within specifically constructed bunded areas			
Waste management	• Location for the disposal of waste should be agreed with the local executive and environmental authorities before the start of reconstruction. • Contractor to store, handle and dispose of waste oil, tyres, etc. at designated sites in accordance with SNPC's requirements; • Contractor to regularly remove litter and waste adjacent to the worker camps and contractor's yard even if not works-related. • No waste storage areas shall be permitted in the wetlands areas • Use covered containers for organic waste and remove frequently • Remove organic waste before it start to decompose	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)	
Surface water and river	• all toxic and hazardous materials required for construction, fuel and caustic substances shall be stored at secure and managed sites, sited away from water bodies • vehicles and equipment shall be maintained in good operable condition, ensuring no undue leakage of oil or fuel • vehicles and equipment will be serviced at properly managed and equipped workshops, with suitable facilities to collect and dispose of waste oil, • sanitation arrangements will be made at worksites and any accommodation facilities provided for workers' accommodation, ensuring that no raw sewage is released into drains or water bodies, • where earthworks take place adjacent to water bodies, silt traps shall be installed prior to the commencement of earthwork activity and • bridge and improvement works involving work in the river bed shall be confined to the dry season and where necessary, channels in the river bed will be diverted away from the work sites. For these measures, site specific plans shall be prepared by the Contractor and submitted for approval prior to commencement of the works.	Included in Contractor's General Costs	The ESO must be responsible for day-to-day issues of environmental management and compliance with air quality requirements. Insurance of contract compliance is the responsibility of the CSC.	Compliance with all established water quality standards.
Topsoil preservation/soil management	Each construction site should have a spill contingency plan. Proper storage and management reduces the risk of vandalism and theft Contractor to remove, store and reuse of topsoil in accordance with best practice; long-term stockpiles to be protected to prevent erosion or loss of fertility; Contractor to construct and use appropriately sited haul roads to minimize soil compaction and loss of agricultural land.	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)	

Worker camp management	Contractor to agree location and facilities of worker camps with local authorities including Ministry of Health's Central Disinfection Centre and District Disinfection Centre; Location for the disposal of waste should be agreed with the local executive and environmental authorities before the start of reconstruction. Contractor to provide: • Statement on the source for the drinking water supply for workforce; • Description of the living and eating areas for non-local workforce. • Before worksite operations start, the Contractor must seek approval on the source of drinking water from the local competent authority.	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)/ Ministry of Health	
Noise control	Contractor to minimise night-time and public holiday working hours within 500m of settlements; normal working hours to be restricted to 06:00-20:00 hours; Contractor to strictly enforce a maximum noise level of 70dB(A) at the boundary of the construction site within 500m of residential and other noise-sensitive areas (e.g. schools, hospitals) by scheduling of work to avoid simultaneous use of multiple items of noisy equipment at the same location and the use of noise screens; Minimise night-time and public holiday working hours near to settlements; Operated designated haul roads and keep haul roads well maintained; Where using noisy equipment close to residential areas and schools consider using noise screens: almost any solidly built screen is better than none; Limit the speed of vehicles on unpaved haul roads; Contractor to properly maintain vehicles and equipment to minimise noise pollution on the construction site. After completing the construction work, and prior to handling over the project to the EA, the contractor needs to carry out noise monitoring along the road where settlement is located. The noise level in the residential/settlement should not exceed the Government noise standard	Included in Contractor's General Costs Construction's costs	Design engineer (specification) Contractor (construction) Contractor	Noise Control Plan To identify the need of noise barrier in the residential/settlement areas
Air quality impacts	All contract stipulations established in the Pre-Construction Stage as outlined above must apply. Additional mitigation measures warranted in the event of unanticipated conditions or in response to accidental spills or volatile materials or significant accidental air pollutant emissions must apply as determined warranted by the CSC. Periodic unannounced site visits are required to verify air quality and all other environmental compliance.	Monitoring and reporting costs must be part of the Contractor's bid.	The ESO must be responsible for day-to-day issues of environmental management and compliance with air quality requirements. Insurance of contract compliance is the	Compliance with all established air quality standards.

			responsibility of the CSC.	
Dust control	Contractor to water down/clean haul routes in residential and other air quality sensitive areas during dry weather. Before worksite operations start, the Contractor must seek approval on the source of dust suppression water from the local competent authority; Contractor to pave areas in residential and other air quality sensitive areas as soon as possible; Contractor to control vehicle speed on unpaved haul routes; Contractor to cover trucks carrying dust-producing materials; Contractor to properly maintain vehicles and equipment to minimize air pollution on the construction site; Vehicle exhausts to be vented upwards;	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)	
Public hindrances due to traffic diversions and hauling routes	Provision of a site-specific traffic diversion management plan, including precautionary measures such as signage, working hours, publicawareness, preparation of emergency plans, and proper decommissioning of such temporary roads.	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)/ Police/local authorities	
Traffic safety	Contractor to manage traffic disruption, inconvenience to the public, and road safety hazards through development and implementation of a **traffic management plan** in consultation with the traffic police and local authorities, including public information, temporary traffic diversions, one-way working, and all necessary temporary traffic signals, warning signs, lighting and watching (guards/signal men); Providing advance information to the public about planned reconstruction works, Planning reconstruction activities to minimize disruption and maintaining at least one open lane where there is no viable alternative route; Signing of temporary traffic diversions in close coordination with local authorities; Use of flagmen and temporary traffic lights to control traffic flows at constricted sites, including safe crossing for pedestrians and limiting, to the extent practicable, the movement of large trucks to off-peak traffic times.	Minimised by design; mainly applies to areas of interchange construction; included in Contractor's General Costs	Design engineer (specification) Contractor (construction)/ Police/local authorities	
Site clearance	Contractor to carry out demolition works safely; Contractor to avoid damage to or loss of trees outside the limits of site and to preserve trees within the limits of site where specifically designated in the Contract; Contractor to minimise vegetation losses in the construction corridor through appropriate safeguard measures (e.g. demarcation of critical sites prior to reconstruction; instruction of workforce).	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)	
Minimisation of impacts on flora and	Contractor to avoid damage to or loss of trees outside the limits of site and to preserve trees within the limits of site where specifically	Included in Contractor's	Design engineer (specification)	

fauna and their habitats (General)	designated in the Contract; Contractor to minimize vegetation losses in the construction corridor through appropriate safeguard measures (e.g. demarcation of critical sites prior to construction; instruction of workforce); To minimize the potential impact related to the clearance of vegetation the Contractor will be required not to carry out clearance operations (felling of trees and shrubs) during the sensitive breeding period between mid April and mid July Contractor to avoid vegetation clearance during the bird breeding season in areas with nests (May-July).	General Costs	Contractor (construction)	
Minimization of impacts to wildlife.	Reports of accidents or other incidents involving wildlife in the Project Area must be monitored. Areas affected by the Project must be routinely observed to minimize the potential for avoidable impacts to wildlife.	Monitoring is part of the Contractor's bid. Contract compliance supervision is a budgeted activity for the CSC.	Contractors are responsible for their operations. The CSC has Primary supervision responsibility.	
Access to Information/ Public Relations	Design and supervision consultant /PMU to convene a public consultation meeting (including the Contractor) prior to contractor's mobilization to: • provide basic project information and construction scheduling • discuss and agree farm access arrangements during the construction period • establish and explain the grievance redreas mechanism including proactive arrangements for keeping the public informed of reconstruction activities Contractor to implement obligations as per the Grievance Redress Mechanism	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)	
Potential impacts to ethnic and/or vulnerable groups	Mitigation of potential impacts to ethnic and/or vulnerable groups must be in compliance with the recommendations of the Project's Land Acquisition and Resettlement Report.		As determined by the Project's Land Acquisition and Resettlement Report.	
Cultural heritage/ archaeological finds	Contractor to development a **cultural / archaeological find plan** for the conservation/protection of cultural heritage/archaeology in case of unexpected finds; If an cultural/archaeological artefact is found, the Contractor is to stop work immediately in that location and notify the appropriate authorities; Contractor is to cooperate with the appropriate authorities during the excavation, examination, and recording of such finds, and to not restart works in that location until permission is given.	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)	

Health and Safety	Contractor to provide drinking water for workforce in accordance with national quality standards. Before worksite operations start, the Contractor must seek approval on the source of drinking water from the local competent authority Septic tanks, mobile toilets and other sanitary facilities to be cleaned daily to prevent outbreaks of disease; Contractor to provide basic sanitation, general health and HIV/AIDS training (including provision of condoms) for the local and non-local workforce; Contractor to provide training in use of, first aid materials and equipment; Contractor to provide appropriate personal protective equipment (PPE) for workforce, e.g. safety boots, reflective vests (summer), reflective jackets (winter), helmets, ear protection, goggles, gloves, etc. and to replace it when damaged; Contractor to provide training in the safe construction techniques, including use of equipment; Contractor to provide details of security measures to prevent access to the site by the public/non-workforce personnel, e.g. children, and livestock.	Included in Contractor's General Costs	Design engineer (specification) Contractor (construction)	Provision of HIV/AIDS training, information and condoms to be a separate costed item in the contract
POST-CONSTRUCTION - OPERATIONAL STAGE				
Borrow pits and quarries	The extraction of sand and quarry materials will be completed at the operational stage. Proper management of post extraction needs to be adopted to avoid unexpected impact in the future.			
Air quality impacts due to vehicular use of the highway.	Management of vehicles transporting bulk materials will best rengthened and explicit requirements will be raised to make sure such vehicles are covered with tarpaulins or otherwise enclosed. The planning authority will be advised to restrict construction of residential houses, schools, hospitals and other sensitive buildings adjacent to the highway when developing and approving urban construction plans Inspection and maintenance programs will be implemented including training programs focusing on emission testing, data analysis, and reporting. Annual air quality monitoring program will be conducted.	RRF Annual budget.	RRF	
Hydrology and water quality issues as a result of unresolved reconstruction impacts.	Contracts stipulate that one year into the operating period a final inspection is required and contractor's final payment is released only after a fully compliant audit is recorded. This includes the decommissioning of construction camps and other ancillary aspects of the Project with significant environmental implications. Any impacts to hydrology and water quality are part of the final inspection process and final payments can not be made until outstanding issues are resolved.		After the completion of the final inspection to the satisfaction of RRF, operational monitoring of environmental parameters (if any)becomes the responsibility of	

			RRF.	
Impacts to hydrology and/or water quality as a result highway operations.	Operational impacts such as spills of hazardous materials resulting from accidents are mitigated by emergency response procedures of the responsible agencies.		RRF	
Noise impacts due to vehicular use of the highway.	Potential impacts due to the use of the highway are the purview of RRF and other national agencies charged with protection of the environment. If noise monitoring at the end of construction period found that there is residential areas with noise level exceeding the Government's noise standard, the noise barrier will be constructed .	RRF Annual budget. RRF budget	RRF RRF	
Flora and Fauna	Trees and grass should be planted on the separation belts and areas outside the roads. Species of native and local provenance, in-keeping with the natural landscape should be used for landscaping works. Adequate aftercare and maintenance should be provided for landscaping to ensure plant survival.		RRF	
Adequacy of erosion prevention features and revegetation.	Erosion prevention and re-vegetation aspects of the Project must be part of the final inspection.		After the completion of the final inspection to the satisfaction of RRF, operational monitoring of environmental parameters (if any) becomes the responsibility of RRF.	
Minimization of Impacts to plant diversity	Require observation of the operational characteristics of highways to identify problem areas and avoidable impacts to wildlife.		After the completion of the final inspection to the satisfaction of RRF, operational monitoring of environmental parameters (if any) becomes the responsibility of RRF.	
Concerns related to general traffic safety	Recommended actions include: Appropriate road signage, traffic monitoring and control, human capacity development, review of the	partly in Env. Budget	RRF and Traffic Police	

	driving license issuing system and a wise application of penalties seem to be the most likely responses. Evaluate the introduction of publicly accessible, well-marked posts containing both an emergency (pay-free) telephone and a first-aid box with medical supplies, stretchers, bandages and other means for first assistance to road victims. To avoid mis-uses, these boxes shall be equipped with an electronic lock that can only be opened by prior telephone contacting to a nearby police station.			
Increased risk of pedestrian accidents within settlement areas due to improved roads, faster speeds and greater traffic volume	To manage these problems the operator will enforce speed limits through increased 'radar' surveillance, better and more frequent signage and increased speeding fines. In villages at crossing the owner will improve the signage and include amber lights were possible. As many town bypasses as possible are planned and should reduce project generated traffic through towns and villages.	partly in Env. Budget	RRF and Traffic Police	

APPENDIX 3: ENVIRONMENTAL MONITORING PLAN

Issue	Mitigation Measure	Effectiveness Indicator	Means of Verification	Frequency	Institutional Responsibility	Cost (in US $)
PRE-CONSTRUCTION STAGE						
Permanent loss of property and land, incl. agricultural and grazing land	Resumption/demolition minimized Land Acquisition and Resettlement Plan (LARP) developed Highway fence at edge of proposed plantations, where practicable	Route avoids major settlements LARP exists Location of fence	Check preliminary design and maps	Once	PMU's Land Acquisition Department	N/A
Community access	Access maintained for local communities, incl. pedestrians, non- motorized vehicles, livestock	Access not severed/ alternatives provided	Check preliminary design and maps	Once or more, depending on design review	PMU	N/A
Infrastructure	Avoid interference with existing/ planned infrastructure	Infrastructure avoided	Check preliminary design and maps	Once	PMU	N/A
Embankments/ structures	Design of embankments, bridges, culverts, etc.	Embankments, etc. conform with requirements	Check preliminary design and maps	Once	PMU	N/A
Noise barriers	Noise barriers reviewed in design process	Noise barriers included where deemed practical/ effective	Check preliminary design and maps	Once	PMU	N/A
Material sources and transport	Ban on extraction of materials and/or disturbance of protected areas Tenderer to identify materials sources, states methods of transportation, provides realistic breakdown of rates, including on- going maintenance and reinstatement of access routes, haul routes and borrow sites	Contract requirement Contract requirement Tenderer provides information	Check	Once or more, depending on result	PMU	N/A
Highway pollution control	Approach to pollution control measures	Measures included in design	Check	Once or more, depending on result	ES of PMU	N/A
Access to Information/ Public Relations	Public informed of construction progress Grievance Redress Mechanism established and operating effectively Complaints logged, responded to quickly	Publicity material produced Grievance Redress Mechanism documented, Grievance Focal Points and Grievance Redress Committee identified Complaints log exists and up-to-date	Spot checks, feedback from local residents/ NGOs, feedback from Engineer	Approx. monthly, throughout construction phase, more frequently when public complaints	Environmental specialist of CSC reporting to PMU	Included in DSC budget for Env Supervision
CONSTRUCTION STAGE						
Minimisation of nuisance for local communities	No noisy working near settlements between 20:00-06:00 hours and on public holidays Maximum noise level 70 dB(A) at site boundary Construction machinery/equipment with noise and exhaust emission control fitted and in use Access maintained for local communities, incl. pedestrians, non- motorised vehicles, livestock Litter and waste removed from around work camp/contractor‟s yard	Minimal complaints	Spot checks, feedback from local residents/ NGOs, feedback from Engineer	Approx. monthly, throughout construction phase, more frequently when public complaints	Environmental specialist of CSC reporting to PMU	As above
Worker camp management	Worker camp facilities agreed with Ministry of Health (MOH)	MOH permit(s) exist(s) Waste Management Plan	Spot checks, feedback from local	Approx. monthly, throughout	Environmental specialist of CSC	As above

	• Drinking water supply • Living/eating areas	exists and in operation Sewage Management Plan exists and in operation	residents/ NGOs, feedback from workers and Engineer	construction phase, more frequently when complaints from public/ workers	reporting to PMU	
Environmental Manager (Contractor)	Contractror to employ full time Environmental Manager, qualified and experienced as an ecologist.	Regular environmental reviews/audit reports	Reports submitted	See under mitigation measure	Environmental specialist of CSC reporting to PMU	N/A
Environmental Specialists	DSC to have full time national environmental specialist supported by parttime international environmental specialist on team to assist PMU in supervising Contractors implementation of EMP/SEMP on site. Both international and national environmental specialists must have qualifications and experience in ecology:	Regular environmental reviews/audit reports	Reports submitted	See under mitigation measure	PMU	US$270,000
Health and Safety	Drinking water Toilets, washroom and canteen facilities Health and HIV/AIDS training First aid equipment and training Personal protective equipment and training Safe construction techniques training Emergency response training Accident Book Public safety measures	Clean drinking water provided Facilities provided and clean All workers have basic health and HIV/AIDS knowledge, condoms provided First aid kits provided; all workers have basic first aid knowledge PPE equipment provided and used All workers given training relevant to their activities All workers trained in emergency response Accident Book exists and up-to-date No accidents for members of public	Spot checks, training records, accident reports, feedback from workers and Engineer	Approx. monthly, throughout construction phase, more frequently when complaints from public/ workers	Environmental specialist of CSC reporting to PMU	Included in DSC budget for Env Supervision
Site clearance	Damage to trees Clearance of vegetation	No trees damaged/ felled outside limit of works No vegetation cleared unnecessarily	Spot checks, feedback from workers and Engineer	Approx. monthly during site clearance	Environmental specialist of CSC reporting to PMU	As above
Infrastructure	Damage to infrastructure	No damage reported	Spot checks, feedback Engineer	Approx. monthly during reconstruction	Environmental specialist of CSC reporting to PMU	As above
Drainage control	Site Drainage Plan Settling ponds Oil interceptors Stagnant Water	Site Drainage Plan exists and in operation No silty/ muddy water running off site into water courses No oil film on water courses near site No stagnant water on /near site	Spot checks, feedback from local residents/ NGOs, feedback from Engineer	Approx. monthly during reconstruction	Environmental specialist of CSC reporting to PMU	As above

Fuel and chemical pollution control	Method statement on Spillages Statement on fuel storage, handling and vehicle washing Ban vehicle washing in rivers/ wetland areas No storage of oils and chemicals in the wetlands areas will be permitted and if unavoidable they shall be held within specifically constructed bunded areas	Method statement on spillages exists and in operation No uncleared works- related oil/ bitumen/ cement/ concrete spills on site/in maintenance area Statement on fuel storage, handling and vehicle washing exists and in operation Workers aware of ban No vehicle washing in rivers/wetland areas. Any unavoidable storage of oils and chemicals in the wetland area will beheld in a specifically constructed buded area	Spot checks, feedback from local residents/ NGOs, feedback from Engineer	Approx. monthly during reconstruction; more frequently when complaints from public	Environmental specialist of CSC reporting to PMU	As above
Waste management	Litter and waste in/around worker camps and contractor's yard removed. No waste storage areas shall be permitted in the wetlands areas	Waste Management Plan exists and in operation Litter and waste cleared up. No waste storage areas within wetland area	Spot checks, feedback from local residents/ NGOs, feedback from Engineer	Approx. monthly during reconstruction; more frequently when complaintsfrom public	Environmental specialist of CSC reporting to PMU	As above
Borrow pits and quarries	Ban on disturbance of protected areas Borrow Pit/Quarry permit/operating licence Spoil dumps	Workers aware of ban No borrow pits/quarries in protected areas Borrow Pit/Quarry permit/ operating licence exists and in operation No spoil dumps on agricultural land	Spot checks, feedback from local residents/ NGOs, feedback from Engineer	Approx. monthly during reconstruction; more frequently when complaints from public	Environmental specialist of CSC reporting to PMU	As above
Maintenance of local highway network	Haul routes • Prior to the beginning of reconstruction, the actual state of all haul routes should be assessed and photographed (possibly by ARS PIU in cooperation with the Engineer). • Requirement to return all temporarily used haul routes to their original state.	Haul routes photographed Routes pre- strengthened where necessary Damage repaired Routes rehabilitated to original condition after use	Spot checks, feedback from local residents/ NGOs, feedback from Engineer	Approx. monthly during reconstruction; more frequently when complaints from public	Environmental specialist of CSC reporting to PMU	As above
Traffic safety		Traffic Management Plan exists and in operation No increased traffic accidents No unnecessary traffic disruption	Spot checks, feedback from local residents/ NGOs, feedback from Engineer	Approx. monthly during reconstruction; more frequently when complaints from public	Environmental specialist of CSC reporting to PMU	As above
Noise control	No noisy working near settlements between 20:00-06:00 hours and on public holidays Maximum noise level 70 dB(A) at site boundary	Noise Control Plan exists and in operation No exceptionally noisy	Spot checks, feedback from local residents/ NGOs, feedback from	Approx. monthly during reconstruction – including night	Environmental specialist of CSC reporting to PMU	As above

	After completing the construction work, and prior to handling over the project to the EA, the contractor needs to carry out noise monitoring along the road where settlement is located. The noise level in the residential/settlement should not exceed the Government noise standard	equipment/vehicles on site Workers working with noisy equipment/ procedures use appropriate PPE No exceptional, to identify the need of noise barrier	Engineer Spot check and local resident feedback, and Government noise standard	time and public holidays; more frequentlywhen complaints from public 24 hours noise measures in residential areas	Reporting to PMU	Will be determined in consultation with engineer
Air pollution control	Air Pollution Control	Workers working with air polluting equipment/ procedures use appropriate PPE	Spot checks, feedback from local residents/ NGOs, feedback from Engineer	Approx. monthly duringreconstruction; more frequently whencomplaints from public	Environmental specialist of CSC reporting to PMU	As above
Dust control	Dust Control Haul routes in residential areas watered down/cleaned to reduce dust Dust-producing materials to be covered during transportation No construction equipment/vehicles producing black smoke on or off site	Dust Control Plan exists and in operation No clouds of dust on haul routes in residential areas No clouds of dust from construction vehicles transporting materials No black smoke from equipment/vehicles	Spot checks, feedback from local residents/ NGOs, feedback from Engineer	Approx. monthly duringreconstruction; more frequently whencomplaints from public	Environmental specialist of CSC reporting to PMU	As above
Cultural heritage/ archaeological finds	Cultural/Archaeological Find Plan	Cultural/ Archaeological Find Plan exists and in operation Workers aware of plan	Spot check	Once	Environmental specialist of CSC reporting to PMU	As above
Landscaping	Felled trees to be replaced	Trees planted and surviving	Spot check	Once, end of reconstruction	Environmental specialist of CSC reporting to PMU	As above
POST-CONSTRUCTION/OPERATIONAL STAGE						
Impacts on biodiversity	Design measures to minimise impacts on biodiversity effectively implemented.	Minimal change to baseline biodiversity	Post construction and Operation biodiversity monitoring reports	Suggested twice yearly (summer and winter seasons) biodiversity monitoring reports for first year following construction . Twice yearly (summer and winter) monitoring to be repeated five years after commissioning of highway.	RRF / local NGOs with support from ADB.	Included in PMU annual operation and maintenance budget
Management of traffic generated	Noise is an existing problem in roadside communities,particularly during the peak traffic	Parameters to be monitored are in line with the norms		Suggested twice yearly during peak	RRF incooperation with Ministry of	

noise	season from aboutApril through October. The improvements are expectedto marginally affect noise levels and in some casesreduce noise through the use or bypasses andenforcement of speed limits for trucks and buses. Asmoother road will also reduce noise. However noise will be monitored at sensitive sites	andcodes of the national environmental legislation.		traffic periods	Health's Sanitary and Epidemiological Service	
Environmental Monitoring	Spill contingency plan Maintenance of measures to minimise the risk of ground and surface water pollution Vehicle speed control Noise monitoring programme Air quality monitoring programme Water quality monitoring programme Waste management monitoring programme: regular removal of wastes including litter and wrecked vehicles Incident book Record of complaints from the public (appointment of a public liaison officer)			Regular (monthly/ annual) reporting	PMU	Vehicle hire, travel allowance

Issue	Mitigation Measure	Effectiveness Indicator	Means of Verification	Frequency	Institutional Responsibility	Cost (in US $)

The Environmental Monitoring Plan prepared and implemented during the construction phase should be subject to on-going revision based on that experience. The monitoring plan for the operational phase should also include post-construction monitoring, during the first year of operation, so that action may be taken if any detrimental effects occur.

APPENDIX 4: SUMMARY OF THE PUBLIC CONSULTATION AND LISTS OF PARTICIPANTS

Public Consultations were carried out on May 28, 2014 in Jandor and Peshkun districts on May 28, 2014 at 10:00 and Bukhara and Romitan districts on May 28, 2014 at 14:00. Information about Public Consultations was published in Hokimiyats. Public consultations were organized with sufficient place to sit. All attendants were recorded. Public consultations were chaired by local Hokimiya officials together with Environmental Consultant. All participants were free to ask questions, give comments, express their opinions.

The responses and issues raised were similar from both government officials and the villagers. Both sets welcomed the project and felt that it would contribute to the national and local economies in a number of ways. The villagers felt the highway offered good prospects for increasing trade in farm produce by allowing them to access markets further afield.

None of the participants was opposed to the project.

Summary of Public Consultation

Issues Discussed	Participants' Opinion, Comments and Suggestions	Significance
General perception about theproject and the awareness about the proposed project.	Most of the participants are in favor of theproject and have been made aware of theproposed project through the varioussurveys that have taken place	Acceptance of the project
Support of local people for theproposed project?	The vast majority support the project.Some participants mentioned that they areready to work on the project as unskilledlaborers.	Acceptance of the project Availability andwillingness to work onthe project
Any critical issue or concern bythe local people regarding theproject? Or any criteria you wouldlike to see considered duringproject design, construction andoperation stage?	Preference to identify suitable alignmentthat avoids as many structures as possibleis the major concern.	Wish to minimize effectson property
Do you have any problem with theexisting road?	High costs and long journey times for travel	Dissatisfaction withexisting condition of theroad
In your Opinion If the road has to be expanded, which side shouldthe expansion take place andwhy?	Most of the participants mentioned thatdepending on the design either side of theroad may be widened.	Acceptance of the project
What is the Mode of Transport	People usually travel by taxi or privatelyowned minibuses. Some people have theirown means of transport such as cars andbicycles.	A number of communitymembers own a car orother means of transport,or operate taxi or minibusservices. These peoplewill benefit from reducedoperating costs
How is the Frequency of Public Transport	Public transport is limited in the area.	This indicates a highreliance on small taxi andminibus services, orprivately owned vehicles

Do you sell your agriculturalproduct in the market, if yes, Howdo you transport them? How muchmoney is spent on transportationout of your total expenditure inagriculture	Generally, most of people sell theiragricultural products in their home locality.They usually transport the produce byprivate transport. But some of peoplesell their agricultural products in Nukus and Tashkent. In some cases traders comeand purchase the yield at source from thefield. Typical costs of transportation ofproduce is 15% of total productionexpenditure.	High dependence onreliable links toBukhara to get theirproducts to market
Will you be willing to pay road tax if the road is built in a good way?	Road tolls are not a familiar concept.	Awareness raising on road maintenance needs and costs may be necessary if road tolls are to be introduced
Is the proposed project going to reduce accidents and provide better traffic system?	All the participants felt that the proposed road development project will facilitate a better traffic system. However, it was felt that accidents might increase in number if a high standard of engineering design is not followed. Participants mentioned that safety measures are especially important for social institutions like schools, hospitals etc.	Some concerns over safety, supporting design measures such as increased signage
General socio-economic Condition: What are the mean economic activities, and maincrops grown?	The general economic activities in theproject vicinity area are agriculture,industry and trade. The usual crops grownin the area are wheat, vegetables, fruit andcotton. There are two planting seasons(autumn and spring).	The local economy ishighly dependent onsales of perishableproduce
Employment Status: Percentage of employment/ unemployment/ underemployment	Unemployment is common in the project area.	Currently concerned about levels of earning opportunities
Perceived benefits from the project	The proposed project will contribute to the improvement of local livelihoods and reduce poverty by facilitating better traffic.	Communities perceive long and short term economic benefits from the project
Perceived losses from the project	According to theparticipants, this can be mitigated through proper compensation and assistance to the affected persons.	No major concerns provided adequate compensation is provided
Any Other Issues you may feel to share	None	No unforeseen concernsrelated to the project
Is this consultation useful? Comments	All respondents were of the opinion that the consultation is very useful and they expect continued consultation in the future.	Keen to continue to be consulted on road improvements

Will there be likely involvement of local people in the implementation of the project?	The majority of the participants mentioned that road rehabilitation as a good opportunity for the local population to be employed especially during the current financial crisis, when there is lack of jobs abroad (mainly Russia)	Usually dependent on jobs elsewhere in the region but these are now in shorter supply
Are there birds and animals of interest in the area?	None	No concerns over natureconservation, the nearestsites of interest are farfrom the road
Are there remains of ancienttemples, mosques or homes in thearea?	None	No concerns overarchaeological sites
If this road is improved, there may be large groups of workers livingtemporarily in the area, andconstruction operations thatgenerate noise and dust. Arethere any other issues aboutreconstruction, including noise anddust that might worry you?	The respondents strongly welcome theroad rehabilitation and reconstructionactivities. Many observed that themeasures are temporary and besides therewill be more chances for local communitiesto be employed during reconstruction,providing both skilled and unskilled labor. Participants did not mention any otherproblems which might bother them otherthen following basic safety rules.	Residents understandthat reconstruction impactscan be expected and donot have an issue withthese, provided safetymeasures are taken.
If a group of road workers livesnear your home temporarily, doyou have any concerns and if so,what are they?	None of the participants expressedconcern about groups of road workerstemporarily living close to their houses.	No issues with temporaryworker populations.
Given that the project road will bewider and smoother, enablinghigher driving speeds, what RoadSafety Issues/measures wouldyou propose?	Participants suggested signage (speedlimits, warnings etc.), pedestrian crossingsin front of social institutions and to ensurethat there are footpaths along the road.	Pedestrian crossings aswell as signage

LIST OF PARTICIPANTS OF PUBLIC CONSULTATIONS

Name of the District/Rayon: Jandor and Peshkun districts
Number of Participants: 11
Date: 28/05/2014
Time: 10:00

№№	Name of participant	Organization and position	Contact phone
1.	TurayevNazir	Chief specialist of road construction department, Bukhara Regional Hokimiyat	Tel.: 8 365 223 99 79, Mob.: +99898 774 66 06
2.	TurdiyevAkbar	Chief of Bukhara Regional Administration on for land resources and cadastre	Mob.: +99891 444 53 47
3.	Nurmukhammedov Husnutdin	Deputy HokimofPeshkun district	Mob.: +99898 274 84 24
4.	Reimov Karamboy	Peshkuncadastre	Mob.: +99894 241 71 10
5.	Ergashev Ikhter	Deputy Hokim of Jandor district	Mob.: +99898 774 54 01
6.	Nemonov Gaokhir	ChiefofcadastreinJandor district	Tel..: 8 365 582 33 85, Mob.: +99891 4060910
7.	Oziyev Kamolon	Nature Committee of Bukhara city	Mob.: +998945432159 Tel.: +83652253104
8.	Xusenov Ergash	Farmer (Jandor district)	
9.	Saidov Abdumalik	Farmer (Jandor district)	
10.	Xodiev Gani	Farmer (Jandor district)	
11.	Djalmurzayev Nisanbay	Farmer (Peshkun district)	

Name of the District/Rayon: Bukhara and Romitan districts
Number of Participants: 20
Date: 28/05/2014
Time: 14:00

№№	Name of participant	Organization and position	Contact phone
1.	Turayev Nazir	Chief specialist of road construction department, Bukhara Regional Hokimiyat	Tel.: 8 365 223 99 79, Mob.: +99898 774 66 06
2.	Tokhirov Zoir	Deputy Hokim on construction of Bukhara district	Mob.: +99893 682 20 00
3.	Turdiyev Akbar	Chief of Bukhara Regional Administrationon for land resources and cadastre	Mob.: +99891 444 53 47
4.	Shukurov Davlat	Chief of Romitan Administration on for land resources and cadastre	Tel.: 8 365 223 72 65, Mob.: +99893 686 30 05
5.	Khakimov Furkat	Deputy Hokim of Romitan district	Tel.: +99898 774 29 22
6.	Khatamov Khoshim	Romitan cadastre	Mob.: +99890 5116036
7.	Abduvakhidov Abdurakhmon	Chief Project Engineer "Bukhoroyulloyikha"	Tel..: 8 365 224 10 84, Mob.: +99893 960 31 44
8.	Oziyev Kamolon	Nature Committee of Bukhara city	Mob.: +998945432159 Tel.: +83652253104
9.	Narzullaev Fayzul	Farmer (Bukhara district)	
10.	Mavlonov Ma’mur	Farmer (Bukhara district)	
11.	Hamraev Halim	Farmer (Bukhara district)	
12.	Nabiev Sanokul	Farmer (Bukhara district)	
13.	Ahadova Hafiz	Inhabitant (Bukhara district)	
14.	Odilov Zarif	Businessmen (Bukhara district)	
15.	Jalolov Gayrat	Farmer (Romitan district)	
16.	Murodov Xayrullo	Farmer (Romitan district)	
17.	Safoyev Jamshid	Businessmen (Romitan district)	
18.	Botirova Oliya	Businessmen (Romitan district)	
19.	Axmedova Jamila	Inhabitant (Romitan district)	
20.	Usmonova Sharifa	Inhabitant (Romitan district)	

APPENDIX 5. PHOTOS FROM THE PROJECT SITE

Beginning of the project road (km 228)

Drainage channel (km 229)

Along the project road (km 229)

Drainage channel (km 234)

Petrol station (km 233)

River Zarafshan (km 236)

Collector (Chalanga/romitan) 242 km

Salted lands along the project road (km 249)

Desert (km 262)

Desert vegetation (km 266)

Wetland (km 266)

Grazed herd of rams (km 277)

Cemetery along the project road (km 260)

End of the project road (km 315)