Environmental Assessment Report

Initial Environmental Examination
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TKM: Proposed North-South Railway Project

Prepared by Ministry of Railway Transportation for the Asian Development Bank (ADB).

LIST OF ACRONYMS

ADB – Asian Development Bank
BOD – biochemical oxygen demand
CO – carbon monoxide
COD – chemical oxygen demand
EA – Executing Agency
EMMP – Environmental Management and Monitoring Plan
EMC – Environmental Monitoring Centre
GT – Government of Turkmenistan
IDFF – Institute for Deserts Flora and Fauna
IEE – Initial Environmental Examination
MNT – Turkmen New Manat
MoNP – Ministry of Nature Protection
MoR – Ministry of Railway Transportation
MPE – Maximum Permissible Emissions
MPL – Maximum Permissible Loads
NIDFF – National Institute of Desserts, Flora and Fauna
NO_x – nitrogen oxides
NO_2 – nitrogen dioxide
ROW – right-of-way
SO_2 – sulfur dioxide
TSP – total suspended particles

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EXECUTIVE SUMMARY

A. Project Description

1. Based on its 2007 Presidential Decree, the Government of Turkmenistan (GT) signed a multilateral agreement in 2007, with its neighboring countries to construct new railway tracks to develop the North-South railway corridor for promoting regional trade, cooperation and integration. This is the region's key route for transporting bulk goods, such as oil and oil products, mineral resources, agricultural products, and textiles.

2. The significance of the Project is that the proposed north-south railway line will improve Turkmenistan's accessibility to Kazakhstan, the Arabian Gulf countries, the Russian Federation, and South Asia; and increase regional trade. The Project will also contribute to sustainable economic growth in Turkmenistan and development of an integrated, efficient railway system in the region. The Project will reduce the transport cost, cut travel time, and improve accessibility to rural areas of the country. This will generate benefits beyond railway transport cost and time savings.

B. Description of the Environment

3. The proposed Project comprises of (i) power supply, signaling and telecommunication for the recently completed 311 km section of the railway between Bereket and Buzhun in Turkmenistan; (ii) procurement of equipment for track maintenance and other facilities for asset management; (iii) improving the institutional capacity of the Ministry of Railway Transportation (MRT); and (iv) consulting services for project design review, and implementation supervision services.

4. The Project is entirely located within the Balkan Province in the far west of the country, bordering Uzbekistan, Kazakhstan, the Caspian Sea, and Iran. The Province has an area of 139,270 square kilometers and a population of approximately 553,500 people. Its population density of 3.3 persons per square kilometer is the lowest in Turkmenistan.

5. Geographically, the proposed Project traverses the central north-south axis of the Balkan Province. The topography is characterized by an increasing altitude towards the north with elevations reaching over 500 m. The terrain is flat-to-rolling sandy desert with dunes and depressions found along the desert. The climate is characterized as extremely continental and dry; winters are very cold and summers are hot and dry with temperature differences between the two seasons being significant.

6. There are very limited water bodies and resources in the Project area. The Kara Kum canal supplies water to the Bereket area of the Project, which is used both for irrigation and for municipal water after it undergoes treatment. There are also some groundwater wells such as Chilmammed Well, Yaskha fresh-water plume, and Djummak Well.

7. Because of the area's natural and climate conditions, absence of water, heavy and saline soils, pasture husbandry is the dominant mode of agriculture. Pasture

zones include desert and semi-desert pastures suitable for karakul sheep and camel breeding and partly suitable for cattle breeding.

8. Some 2 Important Bird Areas (IBAs): Tekejik – Biynekyr and Ersarybaba – Akkyr are located in vicinity to the Project Area. Presently they do not have legally protected area status, and the Ministry of Nature Protection does not plan to assign such a status to them in near future. The avifauna of Tekejik – Biynekyr and Ersarybaba – Akkyr accounts 141 and 200 species of birds correspondingly.

C. Environmental Impacts and Mitigation Measures

9. In general, the Project alignment was selected in consultation with relevant government institutions to avoid critical locations and natural resources, and several amendments to the original alignment were made to avoid such resources. The impacts related to construction were typical of any major construction activity, but are mostly short-term and reversible. There are no significant long-term irreversible impacts resulting from the Project, especially if it is properly managed during the operation phase.

10. As the majority of the alignment passes through uninhabited areas of desert, there are no sensitive receptors in these areas. Human activity is concentrated around the southern end of the alignment and it is in these areas that the construction and operation of the rail line has been assessed for its possible impacts.

11. Overall, the results identified that there would be no impacts on water resources, ecological resources or physical and cultural heritage from the rail line along the alignment. The key impacts identified were noise, vibration and air quality issues associated with both the construction and operation of the rail line, but mainly in the areas with higher population densities. Issues associated with any construction camps were also identified as being potentially significant. Construction materials were initially transported by truck, and then by rail; therefore, such movements would also have resulted in some impacts.

12. During the construction phase, expected wastewater sources mainly entailed domestic sewage from construction camps and staff quarters, and to a lesser extent industrial wastewater from washing of construction equipment and vehicles. Construction camps adopted water-efficient construction practices and increased the awareness of construction workers to minimize the discharge of wastewater. The small quantities of domestic sewage from staff quarters have been discharged to local water sealed septic tanks and/or cesspools. For the permanent stations, it is recommended to utilize water tight reinforced concrete septic tanks, however, no significant impacts are anticipated given the limited quantities and the nature of such waste.

13. As the majority of the construction took place many kilometers away from the nearest sensitive receptors, and in mainly desert areas with very limited populated communities in the vicinity of the right-of-way, noise or vibration impacts were minimal.

14. The noise and vibration impacts during operation are expected to be minimal, as there will only be three or four trains a day using the line during the initial stages of operation. Operational noise mitigation measures proposed entail the establishment of greenbelts by planting bushes and evergreen trees with a height of over 5 m, along the rail tracks of all sensitive spots.

15. During operation, sand movement is expected to cause severe problems in terms of railway line coverage, and affecting the embankments. Several mitigation measures are planned to minimize sand movement. These mainly include re-vegetating and reforesting exposed areas and fixation of the sand in areas adjoining the tracks with vegetation, and conservation of the existing vegetation, which MRT is already performing. The main species of trees recommended for this is Saxaul; it is native to the Project area, and its water requirements are minimal.

16. Construction has been undertaken by the MRT using its own staff and resources. However, there has been some utilization of local labor during the construction and the provision of local employment opportunities and economic benefits, especially in the Bereket area. During construction, mobile construction camps were used and were sited on the railway line itself. This has helped eliminate nuisances to the local populations.

17. There are a number of species of flora and fauna in the various parts of the Balkan Province some of which are vulnerable and could be found in different parts of the Project Area. Mitigation measures include: (i) training of construction workers to raise awareness of environmental protection requirements, including penalties associated with any unnecessary destruction; (ii) site rehabilitation to previous condition; (iii) keeping all the camps confined to the railway tracks as has been the practice during construction of the 311-km section; (iv) implementation of a monitoring program designed to limit site specific impacts; (v) non use of fencing or any blockage structures in areas known to be part of migratory paths of some species, which should be clearly surveyed and marked along the alignment; and (vi) reduced operating speeds imposed during the migration season of such species.

18. The avifauna could cause damage and disruptions of the power lines, and also be affected, in many ways, depending on their size, type and habitat, which all contribute to the potential negative impact they can have on the power grid (transmission lines and outdoor sub-stations). Specifically it concerns areas where railroad is passing close to the Important Bird Areas. The proposed design of the power grid will minimize both impacts on the birds and on the grid.

D. Public Consultations

19. Two consultative meetings were organized in the format of one formal consultative meeting and an informal meeting with some of the construction workers and locally-hired employees supporting construction works, respectively. In addition, some informal individual discussions and conversations were held with a number of residents in one of the herding communities along the railway alignment.

20. The Project is viewed as one that will facilitate trade and the export of products from the new factories under construction in Bereket to other parts of Turkmenistan and/or neighboring countries; especially that the larger portion of the roadway corridor between Bereket and the main cities in Turkmenistan is in deteriorated condition. During construction, nuisance from the construction camps were minimal as those were mobile camps set up along the rail line itself.

21. Herders along the alignment expressed concern that as the Project is completed more traffic would result, and were worried about losing cattle due to accidents. An idea that appealed to them was to coordinate with the MRT on specifying the main herding areas in the various seasons and identifying cattle

crossing points that would have to be taken into consideration in the operational phase and incorporated into the train operations.

E. Environmental Management Plan

22. An Environmental Management Plan (EMP) has been prepared that identifies feasible and cost-effective measures to be taken to reduce potentially adverse impacts to acceptable levels. This EMP is site-specific, and is focused on the Project components.

F. Conclusions

23. The Project activities will have both positive and negative impacts to the environment. The IEE findings clearly show that the Project will have socio-economic benefits. If the prescribed mitigation and management measures are fully implemented, it is unlikely to have significant adverse environmental impacts. An environmental management and environmental monitoring plan has been prepared and responsibilities for implementation assigned. A full Environmental Impact Assessment (EIA) under ADB's SPP (2009) is not warranted.

I. INTRODUCTION

24. Based on its 2007 Presidential Decree, the Government of Turkmenistan (GT) signed a multilateral agreement in 2007, with its neighboring countries to construct new railway tracks to develop the North-South railway corridor for promoting regional trade, cooperation and integration. This is the region's key route for transporting bulky goods, such as oil and oil products, mineral resources, agricultural products, and textiles. The corridor connects Turkmenistan with Uzen (Kazakhstan) to the north and with Gorgan (Iran) to the south. These railway tracks were laid down through assistance from the Islamic Development Bank, Belarus, and the Government's own resources for completion by the end of 2011. The GT has requested ADB for the proposed project to only finance designing, procurement, and installation of signaling and telecommunication for the very recently completed 311 kilometers of the railway section between Bereket and Buzhun in Turkmenistan[1]. The impact of the Project will be greater economic development and increased trade between Turkmenistan and the region. The Project's outcome will be an efficient, safe, and reliable railway transport network developed and operated in north-south of Turkmenistan.

Figure 1: Turkmenistan Railway Network and Location of Proposed Project

25. The IEE has been prepared in accordance with ADB's requirements and format. Specifically, it was based on ADB requirements SPS 2009, and is based on (i) relevant project reports including the studies undertaken by the MoR; the project feasibility study report; comments of various experts from environmental organizations, government organizations, and community representatives; (ii) discussions with the principal authors of the above documents from MoR; (iii) field visits along the proposed right-of- way (ROW); (iv) discussions with and comments received from technical experts; and (v) findings of two consultation workshops. Two consultation meetings covering environmental and social issues were held in July 2010, in addition to a number of individual interviews with stakeholders in the project area.

[1] The corridor is divided into two parts: Part 1 (Uzen-Gyzylgaya-Bereket line) in north with 571 km length, of which 441 km pass through Turkmenistan and 130 km, through Kazakhstan; Part 2 (Bereket-Etrek-Gorgan line) in south from Bereket with 339 km length, of which 250 km pass through Turkmenistan and 82 km, through Iran, to be constructed through Islamic Development funds. The proposed project is related to the 311 km track from Bereket to north, already designed and constructed by the Government. The remaining northbound track from km 311 with signaling and telecommunication is being planned to be constructed by Belarus.

26. There was no single comprehensive environmental impact study report prepared for the Project. The State Ecological Expertise Law (equivalent to an EIA law) requests the view of expertise by specially authorized state bodies, expert groups and based on scientific, socio - environmental investigation, analysis and evaluation of projects, programs, design, and budget documentation. This is to ensure conformity to rules and regulations of environmental protection, environmental management and requirements. As such, what was done was an active involvement of relevant institutions in the selection of the alignment. A formal alignment committee was appointed and numerous criteria were taken into consideration in the alignment selection. In terms of environmental resources, the activities taken resembled a screening of resource locations as they relate to the alignment. For instance, modifications to the alignment were made based on certain water resources in the vicinity, especially in the Bereket area as described below. Other issues taken into consideration were wind erosion and the landscaping countermeasures, and the proper treatment of wastewater at the stations. The above, however, was never documented in a single report; except for where it appears in the Feasibility Study report prepared by the GT/MoR.

27. The scope of the report includes ecological environment and natural resources, noise pollution, air pollution, water pollution, solid wastes, public safety and health, and socioeconomic aspects, as well as mitigation measures, an environmental management plan, and a monitoring system. The IEE defines a corridor of about 200 meters (m) either side of the centerline of the right of way (400 m total width) for detailed investigation of impacts. The project area includes three inhabited communities; Bereket, Gyzylgaya, and Tuwer although the latter two are nearly 3 kilometers from the railway line. The overall project assessment encompasses the project area which is entirely located in the Balkan Province of Turkmenistan.

II. DESCRIPTION OF THE PROJECT

A. Project Scope

28. The proposed Project comprises of (i) power supply, signaling and telecommunication for the recently completed 311 km section of the railway between Bereket and Buzhun in Turkmenistan; (ii) procurement of equipment for track maintenance and other facilities for asset management; (iii) improving the institutional capacity of the Ministry of Railway Transportation (MoR) requiring change and support following assessment by PPTA consultants and ADB and request by Government/MoR; and (iv) consulting services for project design review, management, and supervision services. A description of some of those components is provided below.

29. **Power Supply Component:** the purpose of this component of the Project is to provide reliable power supply to stations, technical and service centers, housing, signaling and telecommunication equipment and systems being provided at stations and in block sections by constructing two 10.0 KV overhead lines along the track. This activity will entail the supply, installation, and commissioning of lead-in distribution transformers at 40-50 km spacing along the alignment with associated operating and protection equipment. This component will also include the re-construction of existing substations at Gyzylgaya and Bereket to draw 2000 KW power needed by railway through two 10.0KV overhead feeder lines. Other activities within this component of the Project include the supply, installation, and

commissioning of 10.0KV/0.4KV step down transformers, standby generators at each station, and a SCADA system for efficient monitoring and control of power supply equipment.

30. **Signaling Installation Component:** this includes the supply, installation, and commissioning of solid state interlocking, LED-lit color light signals, Audio-frequency track circuits on all running lines at 13 stations including re-signaling of the Bereket station. It also includes the provision of diagnostic-cum-maintenance panel at each station and in the dispatcher office maintenance unit in Ashgabat. Other sub-components include the supply, installation, and commissioning of automatic signaling, LED-lit color light signals and DC track circuits on 12 block sections; electrically operated lifting barriers, signals, warning boards with interlocking arrangements for level/surface crossings located within station limits and in the block section.

31. **Telecommunication Component:** the main purpose of this component is to supply, install, and commission a 24-fiber optical cable and SDH STM 16 equipment complete with all the associated equipment and accessories including software to provide a high capacity telecom link on the section to provide high speed voice and data channels, broad bandwidth, broad bandwidth applications and other IT-enabled services.

32. **Track Maintenance Equipment:** this will include acquisition of equipment for the longer term maintenance of track in the heavy sand areas such as a ballast cleaner for recurring periodic maintenance on the new line, and sand removal machines to be adapted to territory where sand regularly covers the track.

33. The 910-km corridor will connect Turkmenistan with Uzen (Kazakhstan) to the north and with Gorgan (Iran) to the south. Its longest segment spans 700 km passes through the territory of Turkmenistan. Parts of these railway tracks are to be laid down through assistance from the Islamic Development Bank, Belarus, and the Government's own resources for completion by the end of 2011. The GT has requested ADB assistance to finance design, procurement, and installation of the Project components listed above for the completed 311 kilometers of the railway section between Bereket and Buzhun in Turkmenistan. The Bereket station marks the beginning of the project and it is adjoint to the existing railway network

34. The significance of the Project is that the proposed north-south railway line will improve Turkmenistan's accessibility to Kazakhstan, the Arabian Gulf countries, the Russian Federation, and South Asia; and increase regional trade. The Project will also contribute to sustainable economic growth in Turkmenistan and development of an integrated, efficient railway system in the region. The Project will reduce the transport cost, cut travel time, and improve accessibility to rural areas of the country. This will generate benefits beyond railway transport cost and time savings. Experience in Europe and Africa indicate that transit traffic is usually a lucrative business for railways, the government, and the service sector including logistics. The new railway line could be helpful implementing the Awaza National Tourism Zone project in Turkmenistan, simplifying transport of construction materials and logistics support to the zone. The rail link is expected to be ready for service by 2012.

35. According to the MoR and the PTTA Team’s projections, up to an estimated 3 million tons of cargo per year could be transported via this railway in the first full year

of operations. In the future, the volume of freight traffic is expected to increase to 13 million tons per year. Resources in the Project Impact Area (PIA) include coal, kaolin, oil and gas, phosphate rock, and other minerals such as uranium and gold; all of which is expected to be developed once the railway is operational. It should also be noted that the PIA's mineral resources have not been fully identified and evaluated. The preliminary estimates of the initial railway freight volumes include about 1.6 million tons of coal and coke, 100,000 tons of oil products, 75,000 tons of phosphate rock, 40,000 tons of Kaolin, and over 75,000 tons of other commodities.

36. The MoR will be the executing agency (EA) and a Project Implementation Unit (PIU) to be established under MoR will function as the Implementation Agency (IA). Procurement and installation of equipment will be carried out through international competitive bidding. An international firm will be engaged to assist in design review and confirmation and implementation supervision. Individual international and national consultants for advisory services will be engaged for institutional capacity development. Advance action and retroactive financing to expedite project implementation will be considered in line with ADB's procurement and consulting services guidelines.

B. Project General Location

37. The Project is entirely located within the Balkan Province in the far west of the country, bordering Uzbekistan, Kazakhstan, the Caspian Sea, and Iran. The Province has an area of 139,270 square kilometers and a population of approximately 553,500 people. Its population density of 3.3 persons per square kilometer is the lowest in Turkmenistan. The Balkan Province is comprised of 6 districts (etraps); Bereket District (formerly Gazanjyk), Esenguly District, Etrek District (formerly Gyzyletrek), Magtymguly District (formerly Garrygala), Serdar District (formerly Gyzylarbat), and Türkmenbaşy District as shown in Figure 2. However, the Project passes through the districts of Bereket and Türkmenbaşy only.

Figure 2: Districts of Balkan Province

38. The significance of the Balkan Province is that it has large energy reserves, accounting for 94% of Turkmenistan's natural gas production and 12% of its petroleum production. It also generates 18% of the country's electric power. Due to the very low water supply, agriculture is negligible, and only 4.5% of Turkmenistan's arable lands are within the province. The Project's service region currently lags the remainder of the country in terms of economic development. This is despite the fact that it is home to abundant resources of coal, minerals including, gold, platinum, uranium, and semiprecious stones.

39. The Project's service region is defined by the natural geographical boundaries and other transportation routes/corridors. The service region extends north of the Bereket and northeast of Türkmenbaşy districts (etraps) lying to the north of existing

railway Ashgabat – Türkmenbaşy. All intra-region transport is currently made by road.

40. The total area of the Project's service region is approximately 271 thousand square kilometers. The population is extremely low and sparse with a population density estimated at an average of 0.3 persons per square kilometer. The livestock sector uses 70% of land as pastures, and arable lands are almost absent. The following Table gives existing and projected populations along the alignment in the different districts of Balkan.

Table 1: Population of the Project's Service Region

Etrap Name	Year	Total	Setting	
			Urban	Rural
Total	2010	5.2	-	5.2
	2015	5.6	-	5.6
	2020	6.1	-	6.1
Bereket	2010	2.8	-	2.8
	2015	3.0	-	3.0
	2020	3.3	-	3.3
Türkmenbaşy	2010	2.4	-	2.4
	2015	2.6	-	2.6
	2020	2.8	-	2.8

Source: Feasibility Study of North-South Railway, MoR

III. EXISTING ENVIRONMENTAL FRAMEWORK AND CONDITIONS

G. Environmental Framework

A.1 Administrative Framework

41. The Ministry of Nature Protection (MoNP) is the main governmental agency that pursues environmental policy, implements ministerial control and coordination of the activities of natural resource use and protection. The functions and objectives of the Ministry are:

- Development of proposals and implementation of uniform governmental environmental policy;
- Formulation of strategic guidelines and programs for environmental protection and national use of natural resources;
- Control over implementation of these programs, submission of proposals to resolve priority environmental problems;
- Implementation of the actions specified in programs of the President concerning preservation of natural resources and development of forests;
- Coordination of the activity of ministries, departments, local authorities and enterprises of non-state sector in the implementation of environmental measures.

42. It is also within the jurisdiction of the Ministry to coordinate the activities of other ministries and departments in fulfilling the commitments of Turkmenistan

arising from international conventions and programs, as well as to prepare relevant treaties and agreements. At the provincial level, there are departments of nature protection that conduct local control over the enforcement of environmental legislation.

A.2 Policy and Legal Framework

43. The Constitution of Turkmenistan guarantees the right of people to live in a favorable environment. The legislation of independent Turkmenistan defines the natural resources of the country as the national wealth. Protection and rational use of natural resources make the fundamental principle of the state policy.

44. One of the first laws adopted after gaining the independence was the Law on Nature Conservation (1991) that became the basic document regulating socioeconomic and environmental legal norms. Later, several documents for natural resources and environment protection were adopted. These include the “State Protected Areas" (1992), the “Mineral Resources" (1992), “Flora Protection and Management” (1993), and “Fauna Protection and Management" (1997). These laws stipulate the conservation of biological diversity, flora and fauna of Turkmenistan critically needed for the sustainability of ecosystems and biosphere, as well as the rational use of the natural resources of the country. The Law of Turkmenistan "On State Environmental Expertise" (1992) provides environmental security, environment protection and nature management.

45. For the protection of air, the prevention and elimination of harmful chemical, physical, biological and other impacts on the atmosphere the Law of Turkmenistan "On Air Protection" was adopted in 1996. In accordance with the laws of Turkmenistan, the available mineral resources are considered as the non-renewable national wealth; therefore, their rational use and protection in favor of future generations is one of the most important objectives of the state. This is specified in the Law of Turkmenistan "On Mineral Resources", according to which any legal and natural persons, residents of Turkmenistan, irrespective of their form of ownership, as well as legal persons representing other states, in order specified for them, can be the user of mineral resources. The mineral resource users have to guarantee security of these resources (together with air, land, water, forest and other resources) from harmful impact that can accompany their use along with nature protection measures. Turkmenistan’s environmental legal and institutional framework is similar to international practices and is structured as shown in Box 1.

Box 1: Basic Structure of Turkmenistan's Environmental Laws

Overall policy

Constitution

Guaranteeing the right of people to live in a favorable environment

International Cooperation for Protection of Environment

UN Framework Convention on Climate Change**,** Convention to Combat Desertification, Convention on Biodiversity, Vienna Convention for the Protection of Ozone Layer, Montreal Protocol on Substances that Deplete the Ozone Layer, Aarhus Convention on Access to Information, Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Disposal,

Approach on Environmental Protection

The state ecological expertise (equivalent of environmental appraisal or assessment) which is regulated by the Act of Turkmenistan "On the State Ecological Expertise" adopted on 15 June 1995, is mandatory in the course of investment, economic and other activities implemented on the territory of Turkmenistan and involving the transformation of the natural environment.
The state ecological expertise is based on the following principles:

- Maintenance of the environmental quality as an inseparable condition of the environmental well-being - of the citizens and environmental security of the appraised objects;
- Balanced environmental, economic and social interests;
- Territorial, sectional and environmental feasibility of implementation of the appraised projects
- Comprehensive survey of the public opinion as the conclusions of the state ecological expertise are prepared;
- Securing of the objectivity, complexity and scientific justification of the state ecological expertise:
- Lawfulness, democracy and public knowledge about expertise;
- Enforcement of the norms and rules of international agreements on the state ecological expertise.

Every year, specialized expert subdivisions of the Ministry of Nature Protection of Turkmenistan consider about 200 projects for construction, rehabilitation and updating of the economic objects. Of all considered projects and cost-estimate documentation, about 15 percent are rejected for inadequate project decisions on the protection and rational use of natural resources.

Relevant Legislation

Environmental Expertise Law (equivalent to EIA Law)	Protection of Fauna Law
Nature Protection Law	Atmosphere Protection Law
Protection of Historical Monuments Law	Water Code of TKMN
Protection of Natural Areas Law	Public Health Protection Law
Sanitary Code of TKMN	
Protection of Flora Law	

Source: National Environmental Action Plan of Turkmenistan, 2002.

46. The key laws and regulations that are relevant to the Project are briefly described in Box 2 below.

Box 2: Turkmenistan's Key Relevant Environmental Laws

EIA Law	Defines how projects are reviewed by authorized state bodies, expert groups and based on scientific, socio - ecological research, analysis and evaluation of projects, programs, design - budget documentation, export facilities, as well as existing enterprises. The purpose is to ensure conformity of their rules and regulations of environmental protection, environmental management and requirements - environmental security of the population.
Nature Protection Law	Set the legal framework for protection of nature from contamination, damage, injury, starvation, destruction, destruction, or other waste. This includes land and resources, minerals, forests, flora and fauna in all their species diversity, air, as components of natural ecological systems and the biosphere, and climate. It also specifies the relationships in the environmental field in Turkmenistan and how they are governed by the Constitution of Turkmenistan through the present Law, issued in accordance and other acts of legislation on nature protection.
Flora Law	This Law is aimed at creating conditions for the conservation of biological diversity of flora of Turkmenistan as a basis for sustainability and stability of ecological systems and the biosphere, as well as effective protection, rational use and restoration of vegetation to maintain and improve the environment for present and future generations.
Fauna Law	This law regulates relations in the field of protection and rational use of wild animals that Turkmenistan seeks to preserve the genetic stock and biodiversity of wildlife, providing conditions for their existence in the natural freedom on land, water, air and soil.
Air Law	This law regulates relations in the field of air protection to ensure its cleanliness and management, prevention and reduction of harmful chemical, physical, biological, and other impacts on the atmosphere, as well as to continue and strengthen the rule of law in the protection of atmospheric air.

Source: UNDP-Turkmenistan Office

A.3 Environmental Assessment Requirements

47. The Project will be subject to the environmental review and clearance requirements of both Turkmenistan and those of the ADB. These requirements are as follows.

A.3.1 Environmental Assessment Requirements of ADB

48. According to SPS (2009), the objectives of the safeguard requirement of ADB on the environment are "to ensure the environmental soundness and sustainability of projects, and to support the integration of environmental considerations into the project decision-making process".

49. Requirements to environmental assessment specify that:

- At an early stage of project preparation, the borrower/client will identify potential direct, indirect, cumulative and induced environmental impacts on and risks to physical, biological, socioeconomic, and physical cultural resources and determine their significance and scope, in consultation with stakeholders, including affected people and concerned NGOs. If potentially adverse environmental impacts and risks are identified, the borrower/client will

undertake an environmental assessment as early as possible in the project cycle. For projects with potentially significant adverse impacts that are diverse, irreversible, or unprecedented, the borrower/client will examine alternatives to the project's location, design, technology, and components that would avoid, and, if avoidance is not possible, minimize adverse environmental impacts and risks;

- The assessment process will be based on current information, including an accurate project description, and appropriate environmental and social baseline data;
- Impacts and risks will be analyzed in the context of the project's area of influence;
- Environmental impacts and risks will be analyzed for all relevant stages of the project cycle, including preconstruction, construction, operations, decommissioning, and post-closure activities such as rehabilitation or restoration;
- The assessment will identify potential transboundary effects as well as global impacts…
- Depending on the significance of project impacts and risks, the assessment may comprise a full-scale environmental impact assessment (EIA) for category A projects, an initial environmental examination (IEE) or equivalent process for category B projects, or a desk review.

50. Additionally, among other most important requirements of ADB are:

- *Environmental Management Plan.* The borrower/client will prepare an environmental management plan (EMP) that addresses the potential impacts and risks identified by the environmental assessment.
- *Consultation and Participation.* The borrower/client will carry out meaningful consultation with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation.
- *Information disclosure.* The borrower/client will submit to ADB the following documents for disclosure on ADB's website: (i) a draft full EIA (including the draft EMP) at least 120 days prior to ADB Board consideration, and/or environmental assessment and review frameworks before project appraisal, where applicable; (ii) the final EIA/IEE; (iii) a new or updated EIA/IEE and corrective action plan prepared during project implementation, if any; and (iv) the environmental monitoring reports.
- *Grievance Redress Mechanism.* The borrower/client will establish a mechanism to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance.
- *Monitoring.* The borrower/client will monitor and measure the progress of implementation of the EMP.

A.3.2 EIA Requirements of Turkmenistan

51. The EIA requirements of Turkmenistan are regulated by the Law on Environmental Impact Assessment (referred to as the Ecological Expertise Law which in Russian translates into the Environmental Appraisal Law). The purpose of the Law is to ensure compliance with the rules and regulations of environmental protection, environmental management and requirements, and environmental security of the population.

52. The Law states that a State ecological examination (EIA) is mandatory in the process of investment, economic and other activities on the territory of Turkmenistan, related to the transformation of the human environment. The specific objectives of the EIA are stated as:

- Prevention of possible negative impact objects in the environment and its constituent components, the living conditions and health;
- Maintenance of a dynamic and balanced natural balance, providing favorable environmental conditions during construction and operation of facilities;
- Providing options for achieving the projected favorable changes in environmental conditions during development and deployment of productive forces;
- Determination of the level of environmental hazards of proposed and existing business or other activities that may directly or indirectly have a negative impact on the environment, living conditions and public health;
- Assessment of conformity of the planned, projected economic and other activities with the requirements of environmental legislation;
- Determination of the sufficiency and validity of measures for the protection provided by the project construction or reconstruction.

53. The Law is based on the principles of (i) preserving the quality of the environment as an essential prerequisite environmental well-being and lifestyle of citizens and the environmental safety; (ii) Balancing environmental, economic and social interests; (iii) Mainstreaming public opinion in the preparation of the EIA; and (iv) Compliance with the rules and regulations of international treaties on the state ecological expertise (EIA).

54. The requirements for an EIA at sites subject to state environmental review is to support environmental safety and the complex ecological - economic evaluation of proposed (existing) impact on the environment, living conditions and health as a result of the project.

55. In the Law, the EIA process includes (i) the appointment of experts for the state ecological examination in the central office of the MoNP and its agencies in the provinces and the city of Ashgabat; (ii) monitoring the performance of experts and expert committees formed; (iii) demand from applicants additional documents, materials and calculations necessary for the EIA; (iv) the decision to dismiss submitted EIA if materials are not conforming to environmental standards and regulations, or with significant deviations from the environmental standards; (v) decision to suspend the activities of existing enterprises and other economic entities

in violation of the rules and regulations of environmental protection and the negative conclusion of EIA.

56. The Law specifies the following as offenses in the EIA process:

- Violation of the established law or the order of the EIA;
- Knowingly providing incorrect information about the environmental impact in the EIA;
- Provision of permits for special use of natural resources, financing and implementing projects and programs or activities that may have a negative impact on the environment and human health, without the positive conclusion of EIA;
- Failure to comply with the implementation of the object of examination requirements for the protection of the environment, natural resources and environmental security in accordance with the conclusion of the EIA;
- Unlawful interference with someone else in the conduct of government's environmental impact assessment;
- Failure to provide for legitimate public eco - expert bodies and forces necessary information and materials;
- Preparation of obviously false conclusion in EIA;
- Other offenses arising from the current legislation of Turkmenistan.

H. Environmental Conditions in the Project Area

B.1 Physical Environment

57. **Topography.** Geographically, the proposed Project traverses the central north-south axis of the Balkan Province. The topography is characterized by an increasing altitude towards the north with elevations reaching over 500 m. The terrain is flat-to-rolling sandy desert with dunes and depressions found along the desert. The lowest point in Turkmenistan, the Sarygamysh Lake, lies in the Balkan Province and its lowest point is close to 100 meters below sea level. The railway project traverses just east of the western edge of the lake's boundaries

58. **Climate.** The railway project is entirely located within Turkmenistan's Balkan Velayat (Province). The climate is characterized as extremely continental and dry; winters are very cold and summers are hot and dry with temperature differences between the two seasons being significant. The duration of the warm period is a distinctive feature of the area's thermal regime. July is the month of the absolute temperature peak with an average of 48^0C. The lowest temperature is usually in the month of January with an average of -29^0C, however, snow fall covering in the winter is insignificant and unstable in that part of the country. Comparing the annual mean air temperatures over the period 1950-2004 reveals that there was a small rise in air temperatures observed throughout the entire Republic with the average rise being 1.4^0C in the Balkan Province.

59. The total annual precipitation ranges from 124 mm to 180 mm mostly occurring between the months of October to March. After the drought-afflicted years of 1995, 1999 and 2001, a small increase in precipitation was noted. The highest

figures for total precipitation during the above-mentioned period (120-315mm) were observed in a number of provinces including the Balkan.

60. The prevailing wind direction is to the west as shown in Figure 3. Recent data on wind speeds are not available; however, historical data shows an average wind speed of 3-5 m/s. Given the rural setting of the province and the Project area, air quality meets Class I Standards.

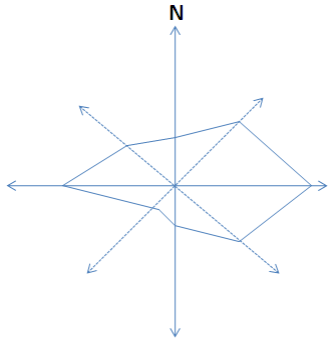


Figure 3: Windrose along the Alignment

61. **Mineral Resources.** The project region has a wide range of unique resources. There are large deposits of different resources such as coal, mineral resources, gold, uranium, phosphate rock, and others. The Tuarkyr coal region is the main such area, which is located to the south of Gyzylgaya village. The region's area is more than 10 thousand square kilometers with estimated reserves of 975 million tons.

62. In 1985-1991, a Turkmen geological exploration expedition documented the presence of commercial amounts of gas in two depressions; the West Amanbulak and Gyzylgaya. West Amanbulak has been studied the most and the commercial reserves are estimated at 25 million tons of oil equivalent. There are also metallurgical coals with mid-ash, low sulfur, and non-coking. The quality is comparable to what is currently being imported to Turkmenistan from Uzbekistan and Kyrgyz Republic. It is estimated that the coal reserves of West Amanbulak can secure Turkmenistan needs for 30 years.

63. Tuarkyr oxidized coal mine field is located 18 km to the south of Gyzylgaya village. The mine field has several separate coal outbreaks. The thickness of the coal seam is up to 10 m, the width is 20-200 m. The coal contains humic compounds, including humic acids and a wide range of bioactive micro- and macro-elements (potassium, magnesium, phosphor, iron, manganese, borax, cobalt, zinc, copper). The oxidized coal deposits at Amanbulak are estimated at 928 thousand tons.

64. In Tuarkyr there are two potential sites for gold and platinum – Gyzylgaya and Amanbulak. The Gyzylgaya site is the most promising and is located in 3-4 km from Gyzylgaya village. The gold content is close to commercial levels and varies from 0.1-4 g/ton. The platinum group metals content varies from 0.1 to 2 g/ton. As a benchmark, it is worth mentioning that deposits with gold content of up to 2 g/ton are exploited (Uzbekistan).

65. **Geotechnical Overview.** The railway project is located within Turan plate. Being a desert climate, wind erosion and physical weathering are the main formation forces. Within the site main land forms are denudation, accumulative, erosion-tectonic forms of different ages, shapes and dimensions; surface of the most of the land forms is changed by erosion. Denudation relief types are present by the closed depressions, slightly dissected stratal plains with the sand mass derived from the deflation of the bed-rocks. The region is characterized by the complex of present geological processes and phenomena of dry climate.

66. Deflation is widespread and especially active in arinaceous rocks' zone. There are 2 types of sand movements: oscillating movement and progressive movement. Oscillating movement is observed in barchan chains and groups; progressive movement is specific for barchan sands located at the edge of the desert.

67. The region lies in the 6-8 points seismic zone and the railway alignment crosses different morphogenetic formations. At the southern edge it starts in proluvial clayed plain of West Kopet Dagh. In the northern parts, there is a wide sand plain of low Kara Kum, formed by Low Pleistocene and Middle Pleistocene deltaic sediments of pre-Amu-Darya River. Peripheral parts experienced abrasion of lower-Khvalyn sea (ancient Caspian Sea). At the present time, as a result of long period of arid denudation the surface has multiple large ridges, hillocks, hollows and depressions.

68. **Water and Wastewater.** Almost 80 percent of the territory of Turkmenistan lacks a constant source of surface water flow. Main rivers are located only in the southern and eastern regions; a few smaller rivers on the northern slopes of the Kopetdag are diverted entirely to irrigation. The most important river is the Amu Darya, which has a total length of 2,540 kilometers from its farthest tributary, making it the longest river in Central Asia. The Amu Darya flows across northeastern Turkmenistan, thence eastward to form the southern borders of Uzbekistan and Tajikistan.

69. There are very limited water bodies and resources in the Project area. The Kara Kum canal supplies water to the Bereket area of the Project, which is used both for irrigation and for municipal water after it undergoes treatment. There are also some groundwater wells such as Chilmammed Well, Yaskha fresh-water plume, and Djummak Well, which are all located within a distance of 20 kilometers from Bereket. Along the alignment, there are also some intermittent streams which constitute parts of the tributaries of the once flowing Uzboy River.

70. In terms of non potable water resources, the once filled Sarygamysh Lake (saline) is currently a dry lakebed. Ground water tables vary from 0.5 to 50 m but with high salinity levels of 1 to 50 g/l.

B.2 Ecological Environment

71. **Biodiversity.** The fauna of invertebrates and vertebrates of Turkmenistan is extremely rich and diverse. In Turkmenistan there are more than 15 thousand kinds of invertebrates. Now 695 vertebrates inhabit the country (107 species of fish, 5 amphibious species, 82 reptile species, 397 species of birds, 103 species of mammals), representing 41 groups, 103 families and 319 geneses.

72. Volumes 1 and 2 of the Red Book (Data Book of Turkmenistan) capture 152 and 109 species of fauna and flora, respectively. Of those, four categories of endangerment were determined as per the IUCN definitions and categorizations. The following summarizes some of the key species that could be found in the Balkan Province, and/or in the Project vicinity, that would have to be taken into consideration in the operational phase of the project:

Selected Flora Species

Family/Species	Category	Location
Pottiace/entosthodon handelii	Cat III: Vulnerable	NW and SW of Balkan

Cupressaceae/Juniperus Turcomanica	Cat III: Vulnerable	W and NW of Balkan- usually in high altitudes but could be found at lower elevations
Chenipodiaceae/Salsola Chiwensis	Cat III: Vulnerable	Extreme north of Balkan in sandy areas
Polygonaceae/Calligonum Triste	Cat I: Threatened and critically endangered	Central Balkan region
Resedaceae/Reseda Dshebeli Czerniak	Cat III: Rare and Vulnerable	Central Balkan region
Euphorbiaceae/Euphorbia Oidorhiza	Cat II: Declining and endangered	Mali Balkan Mountain ridge
Peganaceae/Malacocarpus Crithmifolius	Cat II: Declining and endangered	Mali Balkan Mountain ridge
Liliaceae/Tulipa Micheliana	Cat II: Declining and endangered	Mali Balkan Mountain ridge
Asparaceae/Eremurus Kopetdaghensis	Cat III: Rare and Vulnerable	Karakum salty sand areas

Selected Fauna Species

Sauria (Varanidae Varanus Griseus-lizard) found almost anywhere throughout the Vilayat mainly affected by destruction and transformation of habitats.

Colubridae (Elaphe Quatuorlineata- Serpent) is a species that inhabits a small territory. It is known by 20 specimens and mainly found in the Kara Bogaz Bol Bay (Western Balkan)

Elapidae (Serpent) inhabits clay and sand deserts. The total number if the population in Turkmenistan is estimated at 120,000 specimens.

Accipitridae (Buteo Linnaeus- Falconiformes) rare and only found on the periphery of its nesting habitat. Mainly found in certain mountainous regions of the Vilayat.

Accipitridae (Circaetus Gallicus Gmelin-Falconiformes) is a migratory and wintering species spread over the territory ranging from Karakum and Bolshi Balkan and the area of the western Uzboy. It nests in Saxaul trees and on the juts of mountains.

Strigidae (Bubo Linnaeus- Strigiformes) is sporadically spread in the area across from the Caspian through the Karakum and inhabits fill edges and bushes in the desert.

Mustelidae (Mellivora Capensis Schreber- Carnivora) very rare species found in the territory from the Caspian to the Amu Dariya River. Inhabits all types of landscape including sand desert, semi-deserts, and mountainous foothills.

Felidae (Felis Caracal Schreber- Carnivora) has a natural habitat and population that is progressively declining. It is found in the less cultivated desert lands of the western region of the Karakum. It has an estimated population of nearly 300 specimens only.

73. **Important Bird Areas**. As a result of the joint project[2] of the Ministry of Nature Protection of Turkmenistan, Royal Society for the Protection of Birds (RSPB) and Birdlife International[3] 50 Important Bird Areas in Turkmenistan were identified. An Important Bird Area (IBA) are distinguished by one of the following (i) hold significant numbers of one or more globally threatened species; (ii) are one of a set of sites that together hold a suite of restricted-range species or biome-restricted

[2] Inventory of Important Bird Areas of Turkmenistan

[3] BirdLife International is a global partnership of non-governmental organisations (NGOs) with a special focus on conservation and birds

species; or (iii) have exceptionally large numbers of migratory or congregatory species.

74. Two IBAs are located in vicinity of the project area: Tekejik – Biynekyr and Ersarybaba – Akkyr, in 6-7 km and 40 km from the track correspondingly. None of them are legally protected areas of Turkmenistan. Consultations with the Ministry of Nature Protection

75. Tekejik – Biynekyr IBA[4] is located within the Tuarkyr-Ustjurts clay-rubble natural region. The IBA consists of a complex system of steep cliffs with dry gullies and closed depressions running parallel to the cliff. The cliffs can reach 20-40 m in height and are formed of a combination of stony-chalky strata cut by numerous eolations, jagged edges, ledges, niches, cracks and gullies, the last filling with water during rains. The soil-vegetation cover is varied and soils are of the grey-brown type. In deep saline depressions there is a sparse cover of halophytes, and between saltmarshes on gently sloping hilly sands with ephemerals and small shrubs.

76. The avifauna totals 141 species: 10 - non migratory, 27 - passage/nesting, 8 - wintering and 96 - passage. The first group includes *Falco cherrug*, *Buteo rufinus, Aquila chrysaetos, Alectoris chukar, Columba livia, Bubo bubo, Athene noctua, Corvus ruficollis* and *Scotocerca inquieta*. The second group includes *Circaetus gallicus, Neophron percnopterus, Falco tinnunculus, Apus apus* and *Apus melba*. Species listed in the Red Data Book of Turkmenistan (1999): *Circaetus gallicus, Aquila heliaca, Aquila chrysaetos, Aegypius monachus, Falco peregrinus, Falco naumanni, Falco cherrug* and *Bubo bubo*.

77. Ersarybaba – Akkyr IBA covers a 150 km section of the southwest scarp of the Ustyurt plateau, from Garabogazgol Bay and 50 km to the southeast along a low ridge known as “Ersary-baba mountain”. The avifauna of the IBA includes 200 species. Rare migrants listed in the Red Data Book of Turkmenistan (1999) are: *Aquila chrysaetos, Falco cherrug, Bubo bubo, Haliaeetus leucoryphus, Circaetus gallicus* and *Buteo buteo*.

78. **Protected Areas.** Although there are a number of specially protected areas and nature reserves throughout Turkmenistan, none of them are in the vicinity of the railway alignment.

C. Economic Development

79. **Agriculture.** Because of the area’s natural and climate conditions, absence of water, heavy and saline soils, pasture husbandry is the dominant mode of agriculture. Pasture zones include desert and semi-desert pastures suitable for karakul sheep and camel breeding and partly suitable for cattle breeding. In the long term, the GT is not planning on opening up of new lands in the Project area for grazing. Therefore, the Project’s service region agriculture will continue to specialize on animal husbandry. Sheep breeding for karakul wool and meat and camel breeding will continue to develop. The Livestock existing and projected populations are presented in Table 2.

Table 2: Livestock in the Project Area

[4] BirdLife International (2009) Important Bird Area factsheet: Tekejik - Biynekyr, Turkmenistan. Downloaded from the Data Zone at http://www.birdlife.org on 31/8/2010

Etrap Name	Year	Livestock Population (thousand heads)				
		Cattle		Sheep	Horses	Camels
Bereket	2010	0.6	0.1	82.5	0.1	1.3
	2015	0.7	0.2	94.8	0.2	1.4
	2020	0.9	0.2	109.1	0.2	1.7
Turkmenbashi	2010	-	-	37.0	0.1	0.4
	2015	-	-	42.6	0.1	0.5
	2020	-	-	48.9	0.1	0.6

80. Compared to 2010, regional organization of farming and further intensification of the industry will allow increase of meat production by 1.4 times and milk production by 1.3 times by 2020. Wool and karakul production is not expected to increase significantly.

81. Cotton and wheat farming is also found mainly in the Bereket area. The production is used both for meeting local demand and that of other regions.

IV. PROJECT ENVIRONMENTAL IMPACTS AND MITIGATIVE MEASURES

82. The IEE assesses two key environmental phases of the project; (i) the environmental impacts and the mitigation measures implemented as part of the construction phase of the railway section from station 0+00 to station 311+00, which has already been completed, and; (ii) the environmental impacts and needed mitigation measures for the Project when it becomes fully operational i.e., when the components of the proposed Project are completely installed with ADB financing under consideration. The first phase is more focused on impacts that resulted from the recently completed construction activities and mitigation measures used. The second phase, while entailing some installation of cable, communication equipment, etc., will mainly have environmental concerns as a result of the operation of the Project.

83. In general, the Project alignment was selected in consultation with relevant GT institutions to avoid critical locations and natural resources, and several amendments to the original alignment were made to avoid such resources. The impacts related to construction were typical of any major construction activity, but are mostly short-term and reversible. There are no significant long-term irreversible impacts resulting from the Project, especially if it is properly managed during the operation phase.

84. The potential impacts that could arise from the different phases of project have been assessed. The activities that have no potential to cause a significant environmental impact have been screened out, allowing the impact assessment and the development of mitigation measures to focus on the significant issues. As the majority of the alignment (from station 25+00 to station 311+00) passes through uninhabited areas of desert, there are no sensitive receptors in these areas. Human activity is concentrated around the southern end of the alignment and it is in these areas that the construction and operation of the rail line has been assessed for its possible impacts as can be seen in Figure 4 with population densities ranging from 0 to 2 and 3 to 10 inhabitants per square kilometer. The impacts on natural and other resources were assessed along the entire alignment, however.

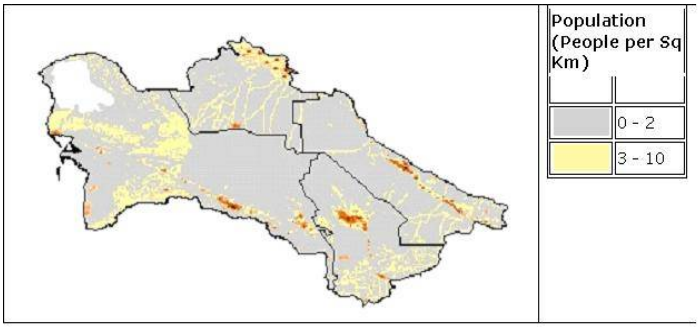


Figure 4: Population Density in Project Area

85. Overall, the results of the screening process identified that there would be no impacts on water resources, ecological resources or physical and cultural heritage from the rail line along the alignment. The key impacts identified were noise, vibration and air quality issues associated with both the construction and operation of the rail line, but mainly in the areas with higher population densities. Issues associated with any construction camps were also identified as being potentially significant. Construction materials were initially transported by truck, and then by rail, therefore such movements may also result in some impacts.

A. Air Quality

86. Like any major construction activity, the earthmoving and compaction requirements are likely to generate dust. The impacts associated with generated dust are significant only where work is taking place close to residential or populated areas. Although there are very few communities along the alignment, the majority of the works were in areas of desert or semi desert many kilometers from the nearest inhabited areas; therefore, dust generation is not a significant issue. Given its non-industrial nature, air quality in the region is good. The prevailing winds which are in the westerly direction are likely to disperse the dust to acceptable levels before it reaches any receptor.

87. Works that took place near Bereket, Chalyg, Tuwer, and to a much lesser extent Gyzylgaya[5], should have been monitored for the levels of dust being generated by the works. However, to the extent needed near populated areas, the MRT construction unit has implemented dust control measures mainly through spraying water to suppress dust. There is no documented information on how properly maintained were the diesel equipment used in the earth moving activities, however, observations in the field indicate that the MRT construction unit as part of its routine responsibility maintained such equipment properly; reduced dust and emissions generation by reducing speed limits; and continuous water spraying in work sites near populated areas to suppress dust. It must be mentioned that since the erection of the first section of the railway, most construction materials were transported by rail, which significantly reduced any emissions from trucks and other vehicles that would have been used to transport such materials. Proper coverage of wagons was used in transporting such materials.

88. To reduce reliance on fuels in the operational phase, solar water heaters may be used to supply hot water and heat to staff quarters, stations, and other relevant buildings, thus, minimizing air emissions. Given the conditions of the locomotive fleet in Turkmenistan (entirely diesel engines), the main atmospheric pollution will come from emissions of operating locomotives. Therefore, the MoR shall maintain their locomotives in good working conditions in order to minimize such emissions.

[5] Some scattered housing was seen during the field trip at approximately Km 164+00 and 177+00.

89. The conversion to railway traffic is expected to significantly reduce emissions when compared to road haulage. The distance between the beginning of the project (i.e., station 0+00) and the Kazakhstan border is 466 kilometers. Traveling from the same origin to the same destination would require traveling over roadway sections totaling 1,200 kilometers in length. This is demonstrated in the analysis included in Appendix III.

90. In consideration of the spread of the emissions from locomotives over long distances, and the prevailing wind speeds and directions coupled with the large absorptive capacity of the local air-shed, the residual impact on air quality is forecast to be slight; the railway operation is not expected to exceed acceptable ambient standards for the Project area detailed in Appendix IV.

91. A comparative analysis of the emissions between the new railway using the projected traffic and the trucking modes of transportation is presented in Appendix III. Generally, the conversion to railway traffic is estimated to reduce emissions of TSP, NO_x, PM10, SO_2, VOC, CH_4, and CO, in comparison with the "truck" alternative as shown in the Appendix.

B. Water and Wastewater

92. During the design phase of the railway Project and based on recommendations of the Institute of Geology under the Turkmen Academy of Science, several changes to the alignment were made in order to avoid some of the groundwater resources in the area such as the Yaskha fresh-water plume and the Djummak Well. Data collected during the field work indicated that there are 10 mineralized springs (drinkable only by wild animals) on the west side of alignment, and showed the migration routes. The 10 mineral springs are scattered between stations 249+00 and 466+00 (only 3 are within the scope of the Project). On average, those are located 5 to 7 kilometers west of the alignment as shown in Figure 6 below. The main migration paths are in the vicinity of these springs and mainly between east and west. The general locations of such crossings will be determined and train operating instructions in those areas specified in the operating manuals and standard operating procedures with speed orders during the migration season(s).

Figure 5: Surface Water Resources in Turkmenistan

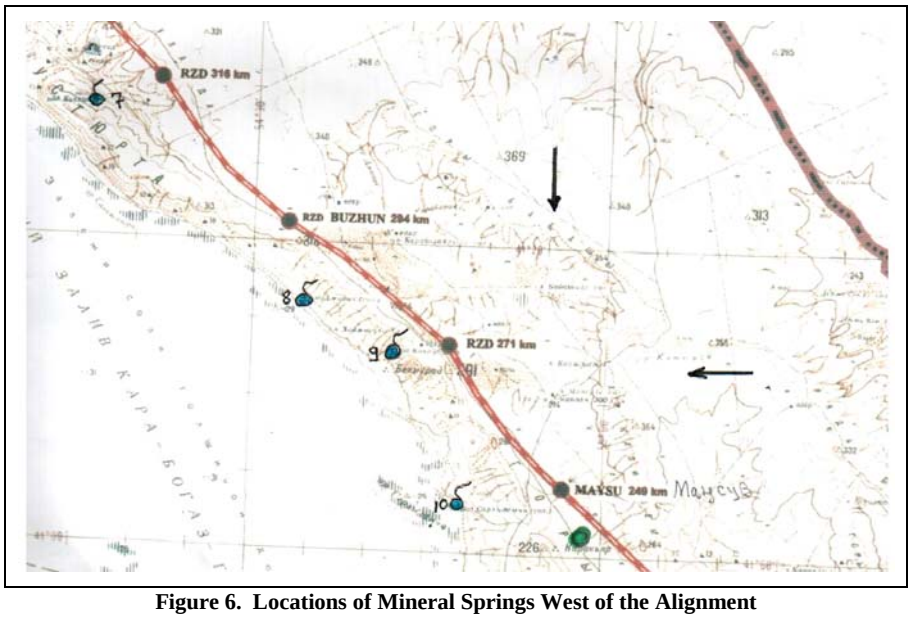


Figure 6. Locations of Mineral Springs West of the Alignment

93. Furthermore, in the Burgun area (station 107 km) there are lakes on both sides of the alignment, and from Gyzlgaya (km 180), there are seasonal water flows towards the Burgun lakes. The lake waters are potable; however, they are between 28-32 km from the alignment. There is a concern about impacts from a derailment during to the operational phase leading to oil and/or chemical spills. One mitigative measure is to impose a lower running speed at those sections, and/or have oil spill containment/clean up equipment available as described below.

94. During the construction phase, expected wastewater sources mainly entailed domestic sewage from construction camps[6] and staff quarters, and to a lesser extent industrial wastewater from washing of construction equipment and vehicles. Construction camps adopted water-efficiency construction practices and increased the awareness of construction workers to minimize the discharge of wastewater. The small quantities of domestic sewage from staff quarters have been discharged to local water sealed septic tanks and/or cesspools. For the permanent stations, it is recommended to utilize water tight reinforced concrete septic tanks (twin chambered for sedimentation and anaerobic treatment) with properly designed leach fields (with respect to both number and length) for the dual purpose of disposal of the anaerobic treated effluent and to irrigate the landscape in the station vicinity. The utilization of perforated piping system of durable material is also recommended. No significant impacts are anticipated given the limited quantities and the nature of such waste.

95. Being a water scarce region, water-saving technologies (e.g., low-volume flush toilets, automatic taps, and high-pressure train washing) will be adopted for staff quarters, stations, trains, and locomotive depots in the future. These measures, combined with new water reuse and recycling efforts, are anticipated to reduce water consumption by 30–40% compared to current consumption.

C. Noise and Vibration

[6] Construction camps were mobile and were set up using wagons on the railway itself, therefore, there was minimal civil works to set up such camps.

96. Operation of plant and equipment during the construction of rail lines generates noise and vibration. As the majority of the construction took place many kilometers away from the nearest sensitive receptors, and in mainly desert areas with very limited populated communities in the vicinity of the right-of-way, noise or vibration impacts were minimal. During the initial sections of construction (specifically from station 0+00 to station 26+00), materials for the construction for the rail line were brought to site by truck. This included sleepers, rails and ballast. Truck movement for such type of construction has the potential to generate significant noise and vibration, particularly when passing through villages and towns. However, this was a temporary activity with minimal disturbance. In addition, such transportation activity was limited to day hours, and there was no night disturbance. The area that was mainly affected by this was the town of Bereket. However, during the consultative meetings, which are covered in more detail below, local community representatives indicated that such disturbances were minimal.

97. There are three locations where construction activities took place close to inhabited communities; these are the construction of the rail line and stations in the vicinity of Bereket, Chlayg, Tuwer, and to a much lesser extent Gyzylgaya. Baseline information on noise levels was not available, and no noise monitoring has been undertaken during construction. However, given the rural nature of these locations, existing noise levels are low. For future maintenance works, the MoR will liaise regularly with community representatives and in the event that there are night time noise impacts the contractor will be required to limit such works to reasonable hours of the day (e.g., 7am to 7pm).

98. The main noise sources during the construction phase included blasting and heavy equipment. To minimize the impacts, construction activities with noisy equipment near inhabited areas were scheduled to avoid certain hours such as avoiding the use of noisy equipment at night. With such engineering practices and management measures, no significant disturbance to the very few local communities from construction-related activities has resulted.

99. The noise and vibration impacts during operation are expected to be minimal, as there will only be three or four trains a day using the line during the initial stages of operation. Even when train traffic increases as a result of improved signaling and telecommunications equipment considered under the Project, noise impacts from the locomotives will be short term and intermittent in nature and, as the line is located away from villages and towns it is likely that noise levels will be attenuated by the distance, except for the few locations identified above. The impact, however, will be insignificant given the anticipated number of trains per day and the distance between the railway line and those areas.

100. Operational noise mitigation measures proposed entail the establishment of greenbelts by planting bushes and evergreen trees[7] with a height of over 5 m, along the rail tracks of all sensitive spots, part of which the MoR has already started on in certain areas. In the future, locomotive operators will be instructed to avoid whistling when passing near the locations identified above, especially during late-night hours. With such proposed noise reduction measures, the daytime and nighttime noise levels of such spots will be within allowable limits detailed Appendix IV.

D. Soil and Materials

[7] This will also be helpful in mitigating the wind erosion problem described below.

101. Rail construction requires significant earthmoving and compaction to provide a suitable base and embankments for the track. Depending on the conditions of the equipment used for such activities, there is also the concern of contamination resulting from leaks, spills, and disposal of oil, lubricants or other chemicals. The impacts of such spills are usually confined to local contamination, thus, unlikely to be significant. The lack of any sensitive receptors along most of the alignment further reduces the likely significance (water resources and agricultural lands).

Figure 7: Sand-Covered Tracks as a result of Wind Erosion

102. Slight impacts on the area topography will likely occur due to construction of access roads. On the other hand, environmental factors (drifting sand) can also have a potential impact on the railway itself and the access roads (Figure 7). The construction activities that could have impacted the topography are mainly the cut and fill operations during construction of the railway itself and any access roads. They have negative impacts on the topography, but due to flat terrain and comparatively small area to be affected the magnitude of these impacts is low/medium. Intensification of soil erosion processes is the major consequence of cut and fill. Possible mitigation measures that could be used in such activities are presented in Table 3.

Table 3: Erosion Control Measures

Potential Erosion Problem	Mitigation Measures
Use of spoil and borrow pits	All available spoil must be used for structural fill for access roads, stations, and embankments before borrow pits are excavated.
Locating borrow pits	Borrow pits must be centrally located to serve more than one site.
Location of spoil and borrow pits	Spoil and borrow pits must be sited far from sensitive sites (e.g., inhabited areas, and historic or ecological sites).
Topsoil from borrow pits	Topsoil from borrow pits must be removed and set aside. When the Project is completed, the areas will be re-graded, the topsoil replaced, and the original ground cover restored. Intercepting ditches will be constructed on the high side of the restored pit to minimize erosion
Tunnel spoil	Spoil will be spread and dried before it is used for embankments. Spoil will be spread on the lowest yielding, least productive land available.
Soil disposal	When soil is spread on slopes for permanent disposal, it will be buttressed at the toe by a retaining wall. The surface of the slope will be stabilized, as necessary, prior to seeding.
Steep cuts	All steep cuts will be flattened and benched.
Natural watercourses	Watercourses will not be blocked, and temporary soil and rock stockpiles will be designed so that runoff will not induce sedimentation of waterways.

103. Even though the construction is complete, sand storms and drifting sands can still have impacts on the Project. The Project area is subject to intensive wind erosion and drifting sand can potentially affect the railway tracks by gradually covering it. An example of this process is the part that has been already constructed is sometimes substantially covered with sand by prevailing westerly winds (Figure 7 above).

104. During operations, sand movement is expected to cause severe problems in terms of railway line coverage, and affecting the embankments. In addition to covering the rails, operating trains under such conditions could increase the abrasion of the rails, cause trains to significantly reduce their speeds, and in case of excessive sand coverage cause derailments. Several mitigation measures are planned to minimize sand movement. These mainly include re-vegetating and reforesting exposed areas and fixation of the sand in areas adjoining the tracks with vegetation, and conservation of the existing vegetation, which MoR is already performing. Straw grids were installed in preparation of vegetation. Although recommended as a mitigation action, the extent of wind erosion observed during the field visit was high. It is considered that double stacked straw bales be used with stakes and vegetation in between. There would be a need for periodic maintenance and clean ups.

105. Given the conditions in the area, it is important to vegetate using low water consuming plants and shrubs (xeriscaping). The climax species of plants or species in common use in the area are best for the purpose. Careful management is necessary when stabilized sand-dune land is used. The planting of local shrubs are highly appropriate given their low water requirements, which is already being implemented by the MoR. The main species of trees recommended for this is Saxaul; it is native to the Project area, and its water requirements are minimal. In addition, it has the ability to store water due to its thick bark. It could range from a large shrub to a small tree. It has successfully been grown in the Project area as part of MoR's efforts to stabilize sand and wind erosion. Other possible mitigation measures include sand stabilization through the installation of double stacked straw bale grids and planning shrubs between the rows of bales as mentioned above.

Figure 8: MoR Installed Straw and Saxaul Planting

106. The risk of erosion was also present with the construction of embankments and other sloped structures such as box culverts. The MoR has successfully treated several locations to stabilize such slopes; additional works in some sections are planned especially in some of the cut sections of the alignment (see Appendix II).

107. The Project passes through some agricultural land in the initial sections, but the majority of the construction is in sandy desert in the central and northern parts of the Balkan Province. During construction, soil for the construction of the sub grade, stations, and yards was brought from licensed/certified quarries in the Bereket area and other areas east of it.

E. Hazardous Materials & Waste Management

108. Typical of any railway construction of this scale, substantial quantities of waste are generated. Any hazardous materials that are used will also need to be stored and handled correctly to prevent spills and pollution. The following measures were implemented during construction:

- Proper storage of fuels, oils, chemicals, and other hazardous liquids;
- Waste minimization and management strategies were practiced;
- Waste was only disposed in designated areas;
- Toilet facilities were provided for the duration of construction, with waste from these facilities subject to suitable treatment prior to discharge.

109. In order to minimize the likelihood of spills and to ensure proper clean up if a spill occurs, several measures are included in the EMP. Those include storage of all hazardous wastes and hazardous materials, lubricating oil, solvents and fuels, within a designated area that has the capacity of at least 110% of the largest container in the storage area. Oil spill clean-up materials (sorbent pads, loose sorbent material, etc.) are also made available. Any spill or leak shall be addressed immediately and the contaminated soil and material be disposed appropriately.

110. It is only normal that during the operation, different types of maintenance could result in spills of hazardous materials. Proper storage and handling of such hazardous materials will be mandated. In addition, it is the responsibility of the MoR to ensure that maintenance crews are well-equipped in terms of spill clean up kits, and undergo training for safe handling of hazardous materials and spill clean ups.

111. The source of construction materials such as cement, ballast, sleepers and track has been from sleeper factories in Ashgabat and barrow pits in Bereket. Ballast and cement were always obtained from licensed facilities. It is important that trains hauling such materials are covered to minimize dust and other similar nuisances especially in the few populated areas along the alignment.

112. The trains using the line are expected to carry bulk cargo, materials, wagons carrying bulk liquids, etc. The handling of bulk fuel carriers presents the risk of significant spills if not properly handled. At present, the freight handling facilities are still at the concept design stage; if bulk storage of fuel is included as part of the detailed design then the facilities will be designed in accordance with a suitable international standard for the storage and handling of flammable and combustible liquids.

F. Socioeconomic Environment

113. Construction has been undertaken by the MoR using its own staff and resources. However, there has been some utilization of local labor during the construction and the provision of local employment opportunities and economic benefits, especially in the Bereket area. It was revealed during the consultative meetings that the construction unit of MoR has communicated to the public through

the municipal government regarding the scope and schedule of construction, and the activities causing disruptions or access restrictions. Once a signaling and telecommunications system, which could significantly increase traffic, is in place, further coordination with the communities in the areas in the southern parts of the railway line will be undertaken.

114. During construction, mobile construction camps were used and were sited on the railway line itself. This has helped eliminate nuisances to the local populations. The following summarizes some of the mechanisms used with the construction workers:

1. Proper Construction Practices

To maintain quality control and ensure proper construction practices, the MoR did not use sub-contractors

2. Health, Safety and Hygiene

The construction sites are likely to have limited public health impacts due to their isolated location for the majority of the alignment. Field investigations and consultations revealed that no wastewater was discharged to local water bodies and other sites in the vicinity. Other relevant practices that were implemented included

- Provision of first aid kits within construction sites;
- Orientation of construction crews in basic sanitation and healthcare issues, general health and safety matters, and on the specific hazards of their work;
- Personal protection equipment for workers, such as safety boots, helmets, gloves, protective clothing, goggles and ear protection;
- Clean drinking water to all workers was periodically supplied;
- Adequate protection to the general public, including safety barriers and marking of hazardous areas;
- Safe access across the construction site;
- Adequate drainage at the mobile construction camp sites to ensure that disease vectors such as stagnant water bodies and puddles do not form; and
- Septics and waste collection set up in the construction sites, which was periodically cleared to prevent outbreak of diseases.

G. Protected Areas and Archaeological Sites

115. Although there are a number of protected areas and nature reserves throughout Turkmenistan, none of them are in the vicinity of the railway alignment. Figure 9 shows the alignment with respect to the various protected areas and natural reserves of Turkmenistan.

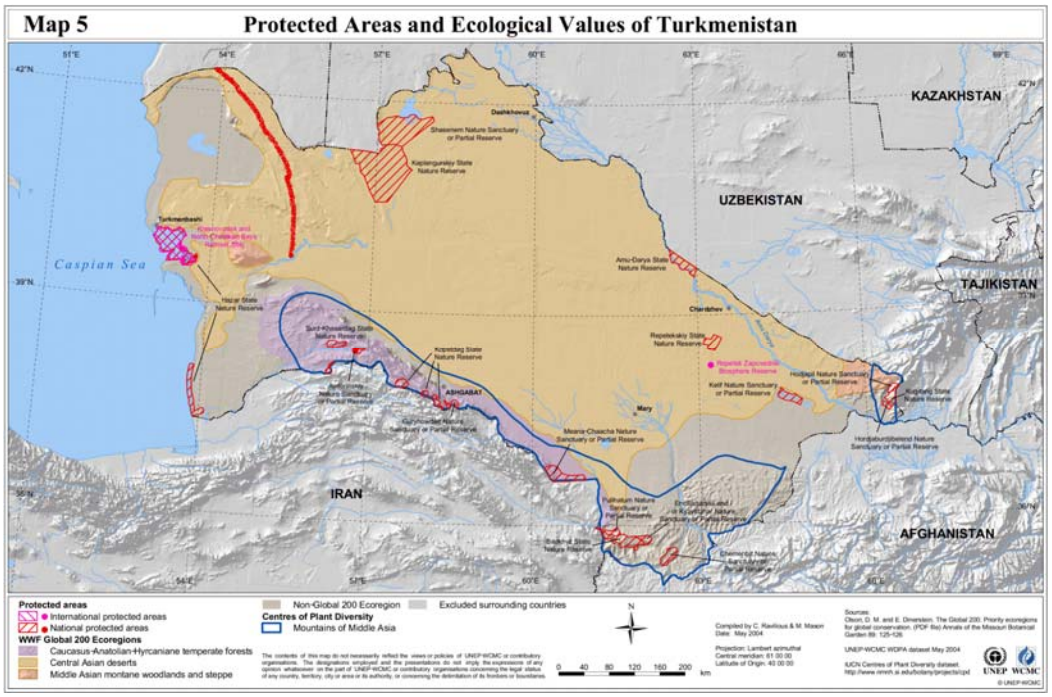


Figure 9: Turkmenistan Protected Areas with Respect to Alignment

116. In addition, there are several UNESCO heritage sites in Turkmenistan including Nisa, Merv, Kene Urgench, Daya-Khatyn, Kerki, Abiverd, Serakhs, Dekhistan, Geokdepe. Of those, the Dekhistan site which is a medieval oasis in the south-west Turkmenistan is the only one located in the Balkan Province. It is, however, over 100 kilometers southwest of Bereket where the Project starts; therefore, there are not anticipated impacts. The project is also at a significant distance from the Bactria–Margiana Archaeological Complex (also known as the Oxus civilization). This site is the modern archaeological designation for a Bronze Age culture of Central Asia, dated ca. 2200–1700 BC.

117. Discussions with some archeology professors in Turkmenistan revealed that there are no historic sites close to the alignment. There is a karst cave about 32 km west of the alignment that was probably used by humans many years ago but it has not been researched by the local authorities. Given the distance from the alignment, however, impacts are unlikely to happen. There is also a graveyard about 12 km west of Burgun, which is at a safe distance from the alignment. There are some shrines/marabouts along the alignment but all are at least 4-5 km from the alignment.

H. Flora and Fauna

118. As mentioned before, there are a number of species of flora and fauna in the various parts of the Balkan Province some of which are vulnerable and could be found in different parts of the Project area. Potential impacts to flora and fauna include (i) destruction of vegetation for earth works, and (ii) temporary habitat occupation which will disturb fauna movements at certain locations of the alignment.

The mineral springs described earlier on west side of alignment are part of the migration routes for some species. Wild goats, sheep, gazelles gather in deep ravines near these springs in the summer and then head to the mountains in the fall—this includes animals coming from Kazakhstan.

119. Mitigation measures include: (i) training of construction workers to raise awareness of environmental protection requirements, including penalties associated with any unnecessary destruction; (ii) site rehabilitation to previous condition; (iii) keeping all the camps confined to the railway tracks as has been the practice so far, (iv) implementation of a monitoring program designed to limit site specific impacts; (v) non use of fencing or any blockage structures in areas known to be part of migratory paths of some species, which should be clearly surveyed and marked along the alignment; and (vi) reduced operating speeds imposed during the migration season of such species..

120. Given the power component of the project, it should be mentioned that birds could cause damage and disruptions, and also be affected, in many ways, depending on their size, type and habitat, which all contribute to the potential negative impact they can have on the power grid (transmission lines and outdoor sub-stations). Large predatory birds (some of which exist in the Balkan Province as indicated earlier) may cause some of the more challenging problems to electric utilities. Usually towers and/or poles attract birds since these increase their range of vision and attack speed when hunting (i.e. provide good hunting and roosting platforms).

121. The contributing factors for raptors becoming electrocuted were identified as: species and age of large birds as well as the equipment which is mainly related to spacing (separation) and between conductors and conductors-to-ground. The latter is one of the leading causes of electrocutions, because heavy-bodied birds are frequently reported casualties due to their large wingspans and lack of agility. Many species are also vulnerable when flying at low altitudes because of their high flight speed. Flying in flocks also restricts maneuverability.

122. Birds can cause insulator flashovers due to their long streams of stringy, conductive and semi-liquid excrement. Contamination flashover of insulators occurs due to the accumulation of bird droppings and this also might be due to birds building nests in the gaps and on the structures in substations. Nesting causes outages in other ways as well, such as when birds drop nesting materials, contact live conductors while flying in and out of the nest, and attract predators and animals or bring large prey items to the nest, which bridges insulators.

123. In distribution networks (medium voltage), the tangent structures, without pole-top grounds or pole-mounted equipment, generally provide adequate separation for all. But for large raptors additional protection is required. Some dead-end structures have directional changes and lateral taps. These structures can be especially dangerous to birds due to the bare jumpers used between circuits. Insulating the jumper wires is the most common mitigation method but cover-up insulation can also be applied. Many of the poles require cover-up on the center phase jumper to allow safe perching. On some structures, jumper wires may need to be re-routed under cross arms to eliminate potential phase-phase contacts.

124. Transformer structures also can be lethal to birds due to exposed transformer bushings, jumpers, exposed grounds and cutout/arrester contact points. Mitigating

through retrofitting two- and three-phase transformer banks includes installing perch guards on the top cross arm, covers on the transformer bushings, insulated jumper wires, bird spikes between cutouts and arresters, and fusing tape on exposed connectors. For new outdoor substations, it is advisable to use metal clad switchgear and cable connections (i.e. transformer with cable boxes) instead of conventional systems.

125. Finally, applying perch management is appropriate to control where birds land or nest on structures. These devices include various designs of perch guards, elevated perching platforms, metal needle wire spikes, nesting platforms, insulated disk barriers and plastic bird spikes. Several devices are designed to discourage birds from landing at dangerous structure locations. It is important to note that perch guards do not always keep raptors off structures. Placing perch guards on the top of vertical construction can contribute to electrocutions since the birds may choose to roost lower on the pole, near energized conductors.

126. During operation of the railway it is proposed to organize a system of ecological monitoring of bird's mortality due to power component of the Project. Specifically, it relates to areas in the vicinity of the IBAs.

I. Land Acquisition and Resettlement

127. Some permanent land acquisition was needed for construction of the railway roadbed, of the operation points, buildings and facilities, engineering utilities in accordance with the requirements of the Construction Norms 468-74 "*Norms of Land Acquisition for the Railways*". Based on the location conditions of the railway roadbed, protective structures, and accompanying road, the minimum width needed is 50 m in both sides (within the station – 100 m on the both sides – 50 m on the passenger building, and 50 m on the other side). Land acquisition documents are issued by the Ministry of Agriculture. This is so because all land in Turkmenistan is owned by the state, however, people can lease and/or have use rights. The land is basically transferred from one ministry (e.g., Ministry of Agriculture) to another (in this case the Ministry of Railway Transport.

128. There is also temporary acquisition for construction activities, work camps, access roads, etc. Lands for borrow excavation for the local construction materials, construction of the storage grounds that are subjected to the reclamation are withdrawn for temporary usage within the construction period.

J. Induced Impacts

129. The Project is anticipated to expand economic activity in a range of industries at certain areas near the alignment, such as light manufacturing in the Bereket area. The railway Project may also lead to the establishment of mining industries in areas of Balkan with proven natural mineral resources. Although such increased activity may worsen a range of environmental impacts, including water and air pollution. However, in accordance with Turkmenistan environmental regulations, EISs will be required for each of these new facilities, detailing environmental mitigation measures. The Project will make transporting bulk commodities more efficient. Reduced transportation costs and streamlined commodity delivery efficiencies will encourage growth in some of these areas.

V. INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PLAN

A. Institutional framework for Environmental Management

130. Institutions responsible for executing and monitoring the environmental aspects of this Project are the following:

- Ministry of Railways is responsible for planning, constructing, operating and maintaining rail infrastructure in Turkmenistan. The MoR and its provincial units shall undertake routine and random monitoring of specific environmental plans addressed in this IEE. This would have to be done in cooperation with the Ministry of Nature Protection described in the following.
- Turkmenistan Ministry of Nature Protection. The structure of MoNP includes 5 Provincial Departments on Nature Protection, the National Institute of Desserts, Flora and Fauna (NIDFF), and Environmental Monitoring Centre (EMC) comprising of two chemical laboratories which are subordinate to NIDFF (Figure 10).
- The Ministry of Agriculture and the Ministry of Water Economy will be consulted if complicated issues arise during construction and operation stages.

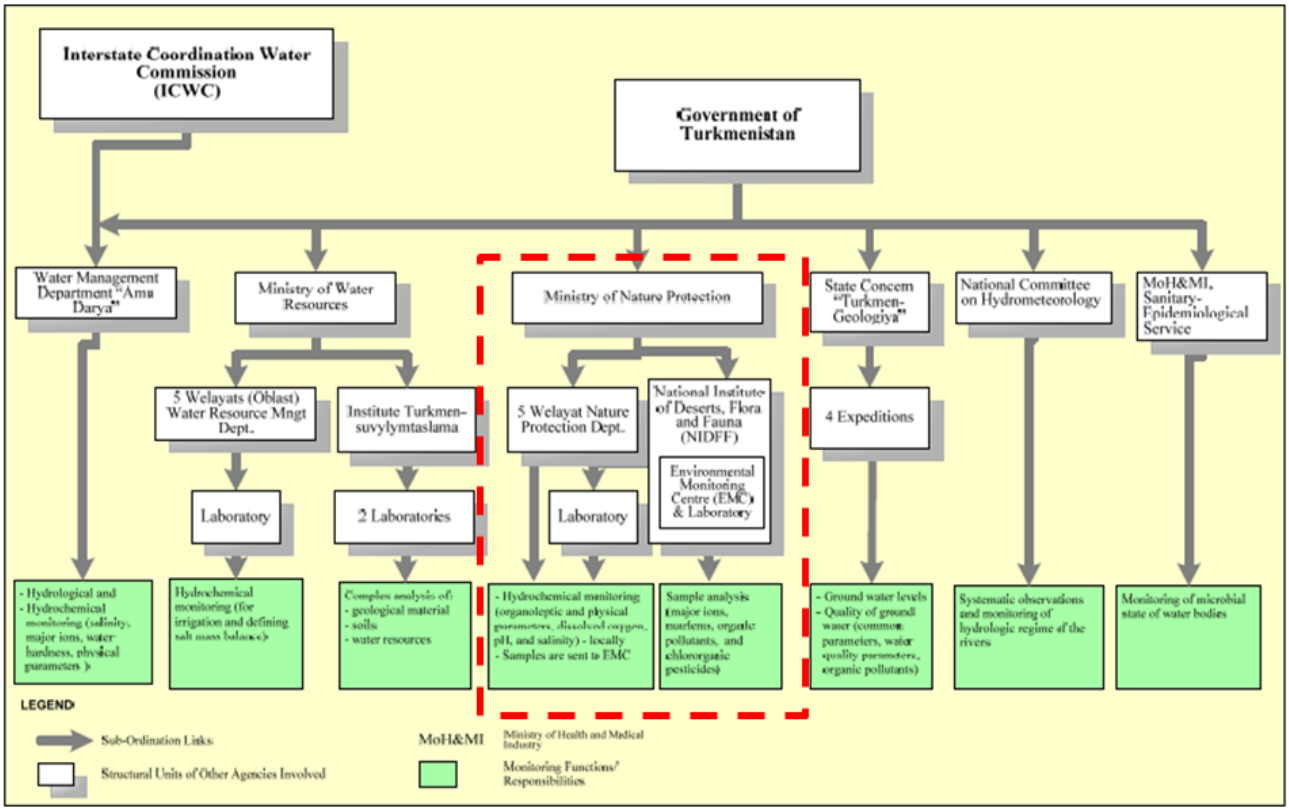


Figure 10: General Structure for Ministry of Nature Protection

131. Although not in a solid EMP per se, monitoring of mitigation measures so far has been the responsibility of the MoR. Given the nature of the project area (i.e., desert area significantly far from any resources and inhabited areas), this has been acceptable. However, once a signaling and telecommunications system is in place, and the utilization of the corridor is more active, there is a need to develop and monitor an operational EMP. The EMP is to also be used as a guiding document for the remaining sections of the railway line yet to be completed.

132. Furthermore, the future operation and maintenance activities of the line will be undertaken by MoR, so MoR will be the entity responsible for the development and implementation of the monitoring plan for the operational phase.

B. Environmental Monitoring Program Recommendations

133. Environmental monitoring is a vital tool to be used during the construction and operation stages of the project. This will ensure safeguarding the protection of environment and to ascertain that the negative environmental impacts can be controlled and mitigated effectively. Again, given that the operational phase is expected to have environmental impacts (especially with the improved signaling and telecommunications system), a detailed EMP is required. The anticipated environmental impacts presented in the previous section are summarized in Table 4 along with proposed mitigation measures. Table 5 presents a proposed monitoring plan.

134. The capacity of the MoR in terms of environmental monitoring is limited; therefore, it is advisable that the MoR cooperate closely with the Ministry of Nature Protection in this regard. Under the Ministry of Nature Protection, the NIDFF implements a complex of scientific research on nature protection, biological diversity and sustainable development. The NIDFF develops recommendations on the protection of the most important objects against unfavorable deserts factors. Under it, the Environmental Monitoring Centre has the following functions:

- Systematic monitoring of environment pollution (atmospheric air, surface waters, soil and radioactive pollution);
- Systematic analysis and assessment of the state of environment of Turkmenistan;
- Presentation of information on the state of environment to governmental, industrial, and other interested organizations, ensuring information exchange in emergency situations;
- Providing methodological support through the network of provincial chemical laboratories;
- Developing Maximum Permissible Emissions (MPE) and Maximum Permissible Loads (MPL);
- Issuing environmental passports for enterprises.

135. Given their capability, it is beneficial that the MoR cooperate with the MoNP on future monitoring, in cooperation with the Balkan Velayat Department of Nature Protection. Capacity building and training of MoR staff on aspects related to environmental management and monitoring is also included in the proposed Project. Under the Ministry, there is the subdivision of forest plantations. It is suggested that this unit's roles and responsibilities be re-assigned to mandate them with the

environmental monitoring for the Ministry's main projects. This will require that the unit recruit some experienced staff (2 or 3 experts) and undergo some capacity building. It is also planned that some of the staff to be stationed at the various locations of the railway undergo training on the collection of samples and observance of the "more obvious" environmental issues such as leaks, solid waste disposal, etc.

136. It is recommended that one of the local universities or outside consultants be contracted as an independent monitor. There may also be a need to procure some field monitoring equipment to be used during routine environmental activities in the operational phase of the project.

Table 4: Environmental Management Plan: Summary of Potential Impacts and Proposed Mitigation Measures

Environmental Issue	Mitigation Measures	Estimated Cost, $US	Location	Time Frame	Responsibility	
					Implementation	Supervision
I. Pre-Construction Phase						
1. Avifauna						
Potential conflicts of birds and 10-kv power lines including: risk of electrocution, risk of collision, reduction of availability of areas for birds as staging and wintering areas	• Design of the transmission lines is environmentally friendly for birds.	Costs of Design	In vicinity of Important Bird Areas (Tekejik – Biynekyr, and Ersarybaba – Akkyr) and other bird locations	Design period	Organization responsible for design of power component of the project	Ministry of Nature Protection
II. Construction Phase						
1. Air Quality						
Dust and emissions generated from Blasting, Construction machinery and vehicles, Movement of trains to transport materials	• Dust control measures such as spraying of construction sites and stock piles; covering vehicles and trains transporting construction materials, proper maintenance of construction equipment, fuel efficiency, and minimizing idling of machinery	Included in Table 6, Environment Protection Investment	Construction Sites and vicinities	Construction Period	Contractor	Ministry of Nature Protection
2. Water and wastewater						
TSS, COD, BOD, and petroleum resulting from Mobile construction camps ; Staff living quarters; Washing of construction equipment and vehicles	• Mobile construction camps located away from water bodies and agricultural lands; wastewater from equipment and vehicle washing treated biologically.	Included in Table 6, Environment Protection Investment	Work sites; staff quarters	Construction period	Contractor	Ministry of Nature Protection
3. Noise and Vibration						
Noise from Blasting and use of heavy equipment and vehicles including locomotives	• Scheduling operation to avoid late night hours; use of new and well-maintained equipment and vehicles	Included in Table 6, Environment Protection Investment	Construction sites; access roads; surrounding areas	Construction period	Contractor	Ministry of Nature Protection

4. Soil and Materials						
Earth excavation; Sediment concentration in surface run-off	• Vegetation and stabilization	Included in Table 6, Environment Protection Investment	Construction sites; borrow and disposal sites especially in southern parts of project	Construction period	Contractor	Ministry of Nature Protection
5. Hazardous Materials & Waste Management						
Excavation workers and staff daily living, Lubricant and oil leaks from machinery resulting in Lubricants and chemicals, Construction debris and waste; domestic waste	• Solid waste management plan and proper transport and disposal in designated areas and landfill sites. Maintaining equipment in good conditions to avoid leaks of oils and lubricants, and performing maintenance operations in designated sealed areas. Proper storage of oils, lubricants, and chemicals for machinery. Training and kits for handling any spills or waste of hazardous materials.	Included in Table 6, Environment Protection Investment	Construction sites; workers camp; staff Quarters	Construction period	Contractor	Ministry of Nature Protection
II. Operation Phase						
1. Air Quality						
SOx, NOx, Total Suspended Particles, and fuel emissions resulting from Locomotives used in construction hauling and those using the railway	• Improving the fuel efficiency of operation, keeping equipment and locomotives in good operational conditions, use of solar water heaters in supplying hot water to stations and depots	Included in Table 6, Environment Protection Investment	Rail corridor; stations, depots, living quarters and surrounding vicinity	Operation stage	Railway operator; Ministry of Railway Transportation	Ministry of Nature Protection
2. Water and wastewater						
TSS, COD, BOD, petroleum resulting from Staff living; Passenger areas; Offices; Washing of locomotives and trains	• Water saving and reuse and recycling adopted. Sewage and wastewater treated by anaerobic biological filter tank (water tight septic tanks)	Included in Table 6, Environment Protection Investment	Staff quarters; office buildings; stations; depots	Operation stage	Railway operator; Ministry of Railway Transportation	Ministry of Nature Protection
3. Noise and Vibration						
Noise from Train whistling, Wheel-track friction, stations	• Locomotive operators instructed to prevent whistling when passing near villages during night time; green belts as sound barriers near villages	Included in Table 6, Environment Protection Investment	Along the line; stations	Operation stage	Railway operator; Ministry of Railway Transportation	Ministry of Nature Protection
4. Soil and Materials						
Stability of sub-base, movement of sand in northern parts of the project	• Maintenance of vegetation and sand stabilization areas for the creating of wind breakers	Included in Table 6, Environment Protection Investment	Movement of sand	Operation stage	Railway operator; Ministry of Railway Transportation	Ministry of Nature Protection

5. Hazardous Materials & Waste Management						
Lubricants and chemicals, spoils; domestic waste resulting Locomotives hauling bulk liquids, Staff daily living; Waiting passengers; Traveling passengers	• Proper handling and equipment for the haulage of bulk liquids especially oils and flammable substances. Training and kits for handling any spills or waste of hazardous materials.	Included in Table 6, Environment Protection Investment	Staff quarters; stations; depots; office buildings; Trains	Operation stage	Railway operator; Ministry of Railway Transportation	Ministry of Nature Protection

Table 5: Proposed Environmental Monitoring Plan

Monitoring Parameters	Location and Frequency of Parameter Measurement	Location	Time Frame	Responsibility
1. Air Quality	**Monitoring parameter:** TSP, NOx, SOx, CO and visible dust using sticky pad measurements **Monitoring frequency:** Bi-annual **Monitoring Standard:** Local construction by-laws, international best management practice , Air quality standards (Appendix IV)	Near populated areas, namely Bereket, Gazalgaya, and Tuwer	Construction and operation	Ministry of Nature Protection and/or independent monitor
2. Water and wastewater	**Monitoring parameter:** TSS, COD, BOD, DO, pH, oil, phenol **Monitoring frequency:** Bi-annual **Monitoring Standard:** Water and Sanitation Code of Turkmenistan, Water quality standards (Appendix IV)	Effluent outlets and WW collection points; local drinking water supply sources; important water bodies feeding agricultural areas north of Bereket	Construction and operation	Ministry of Nature Protection and/or independent monitor, and Ministry of Water
3. Noise	**Monitoring parameter: dB** **Monitoring frequency:** Quarterly **Monitoring Standard:** International Best Management Practices and or WHO Noise Level Standards	Near populated areas, namely Bereket, Gazalgaya, and Tuwer and other populated areas	Construction and operation	Ministry of Nature Protection and/or independent monitor
4. Solid waste	**Monitoring parameter:** Slag, domestic refuse, metallic scraps, sludge **Monitoring frequency:** Annual	Disposal sites	Construction and operation	Ministry of Nature Protection and/or independent monitor and the local municipalities
5. Hazardous liquid waste	**Monitoring parameter:** Visual inspection and soil sampling if needed **Monitoring frequency:** Bi-annual	Main handling stations and locomotive maintenance locations	Construction and operation	Ministry of Nature Protection and/or independent monitor
6. Soil erosion and sand movement	**Monitoring parameter:** Visual inspection **Monitoring frequency:** Bi-annual	Entire railway line and inspection of vegetation sites	Construction and operation	Ministry of Nature Protection and/or independent monitor and the Ministry of Agriculture
7. Avifauna	**Monitoring parameter:** Mortality of birds **Monitoring frequency:** Every 6 months for 2 years	In vicinity of Important Bird Areas (Tekejik – Biynekyr, and Ersarybaba – Akkyr)	Construction and operation	Ministry of Nature Protection and/or independent monitor
8. Induced socioeconomic benefits	**Monitoring parameter:** Increased shipment of local products; increased number of tourists; increased local revenue; and increased income of locals **Monitoring frequency:** Year 2, 5 and 10 of railway operation	Near populated areas, namely Bereket, Gazalgaya, and Tuwer	Operation	
9. Induced socioeconomic benefits	**Monitoring parameter:** Increased shipment of local products; increased number of tourists; increased local revenue; and increased income of locals **Monitoring frequency:** Year 2, 5 and 10 of railway operation	Near populated areas, namely Bereket, Gazalgaya, and Tuwer	Operation	

10. Community participation	**Monitoring parameter:** Number of participants **Monitoring frequency:** Semi-annually	Near populated areas, namely Bereket, Gazalgaya, and Tuwer and other populated areas		

VI. ECONOMIC ASSESSMENT

137. The total investment in environmental protection is $1.74 million. Table 6 summarizes the environmental costs.

Table 6: Environment Protection Investment

Item	Unit	Quantity	Unit cost MNT	Unit cost (US$)	Cost MNT	Cost (US$)
A. Design						
Designing wind erosion comprehensive plan	lump sum		34,200	12,000	34,200	$12,000
				Sub-total	**34,200**	**$12,000**
B. Mitigation						
1. Air Quality						
Dust suppressants	Lump sum					$45,000
				Sub-total	**128,250**	**$45,000**
2. Water						
Biological wastewater treatment systems at main stations	Location	25	28,500	10,000.00	712,500.00	$250,000
Irrigation system at stations	Location	25	9,975	3,500.00	249,375.00	$87,500
				Sub-total	**961,875**	**337,500**
3. Ecology						
Procurement of seedlings	seedlings	350,000	3	$0.80	798,000.00	$280,000
Implementation of sand protection works	lump sum				1,852,500.00	$650,000
				Sub-total	2,650,500.00	**930,000**
4. Waste						
Used oil storage tank	pieces	25	7125	2,500.00	178,125.00	$62,500
				Sub-total	**178,125**	**62,500**
C. Environmental Monitoring						
Monitoring Consultancy					285,000.00	$100,000
Procurement of Monitoring Equipment					142,500.00	$50,000
				Sub-total:	**427,500**	**150,000**
D. Capacity Building						
Training in environmental monitoring					285,000.00	$100,000
Training in environmental management	lump sum				285,000.00	$100,000
				Sub-total:	570,000	**200,000**
				Total		**$1,557,000**
				Grand Total:	**4,950,450**	**$1,737,000**

Note: Exchange rate 1 $US = 2.85 MNT as of July 10, 2010

Source: Consultant, 2010

VII. PUBLIC CONSULTATION, INFORMATION DISCLOSURE AND GREVIENCE REDRESS MECHANISM

138. Two consultative meetings were held in Bereket and at Station 300+00 along the alignment in July 2010. The two meetings were organized in the format of one formal consultative meeting and an informal meeting with some of the construction workers and locally-hired employees supporting construction works, respectively. In addition, some informal individual discussions and conversations were held with a number of residents in one of the herding communities along the railway alignment.

139. The first meeting took place at the Bereket Railway Station. Five local residents, the Mayor of the city, and three local residents who work at the Bereket station participated in that meeting (see Appendix VI). The discussion was opened with some general inquiries about the local economic activities, their recollection of the period during which construction was taking place in the vicinity of Bereket, and what their views are in terms of the potential increased railway traffic that would result from the Project. All participants were aware of the railway project, which is mainly attributed to the fact that the initial construction took place in their vicinity. Moreover, all participants were aware of the Project's importance and its geographic scale in terms of connecting Iran with Kazakhstan through Turkmenistan. The major comments and feedback received from the participants in the consultative meeting can be summarized as follows:

- The City of Bereket currently has a population of 33,000 people. It has recently grown and there are a number of projects under construction that are expected to boost up the local economy. These include a new municipal building, a secondary school and a new sports school, a new health center, a hotel, a carpet factory, and a textile factory.

- A larger portion of the local population is involved in the agriculture; mainly farming and cattle growing. The main products are wheat and cotton, which are used for local consumption, and surplus is transported to other regions (under state-administered transactions) for consumption in other regions, and/or export to neighboring countries.

- The local community representatives think that the ongoing construction projects will help attract new residents seeking employment. Therefore, the city's population is expected to grow in the next few years. Connectivity of Bereket by rail will facilitate the transport of materials required for construction from a number of destinations as opposed to from the E-W axis only. Furthermore, once the new railway line is operational, Bereket will become at the cross roads of the E-W and N-S corridors, making it a primary station between Iran and Kazakhstan, and the Caspian with the remainder of the country.

- In addition to bringing in construction materials, the new railway line will facilitate trade and the export of products from the new factories under construction to other parts of Turkmenistan and/or neighboring countries; especially the larger portion of the

roadway corridor between Bereket and the main cities in Turkmenistan is in deteriorated condition.

- During construction, nuisance from the construction camps were minimal as those were mobile camps set up by the Project itself. Moreover, workers from the railway company often came to town for some of their groceries and basic needs.

- A number of residents were offered employment opportunities during construction. However, the exact number of the number of people employed was relatively small.

- There were some issues with noise of machinery during the initial works; however, those were usually from morning until sunset and never during night hours. Dust was also an issue on some days; however, it was for a brief period and has ended a long time ago.

140. The second meeting was held at the final stretches of the project. A total of 10 people participated in the meeting, which included manual laborers, superintendent, equipment operators, and drivers. The main theme of the meeting was to better understand the working conditions of the laborers and the adequacy of the facilities provided for them in the field. The major comments and feedback received from the participants in this meeting can be summarized as follows:

- The working conditions in general are harsh, but that is mainly due to the climatic conditions of the area. Summers are extremely hot and winters are very cold.

- The participants mentioned that the MoR does provide adequate transportation between the location of the camps (set up on the rail) and the actual construction site. Provisions for water, especially in the summer season, are also made.

- The lodging facilities are not air conditioned; however, the employees were aware of such conditions before becoming involved in the works. They are continuously reminded to consume a lot of fluids and to use head covers to avoid heat stroke and dehydration.

- Some of the workers have received training and orientation of first aid safety, and first aid kits are made available.

141. Along the alignment, discussions were held with some herders that had settled in the areas near station 170+00. The group indicated that they continuously move depending on the conditions of grazing lands. The main reason they had gathered in that area were recent rains that had occurred some weeks ago. Generally they were aware of the Project and understand that it is a trans-country railway that will connect Turkmenistan with Iran and Kazakhstan. They expressed that the railway line currently does not bother them due to the very low volumes of traffic. However, they were concerned that as the Project is completed more traffic would result. Their main concern was losing cattle due to accidents.

142. An idea that appealed to them was to coordinate with the MoR on specifying the main herding areas in the various seasons and specifying cattle crossing points

that would have to be taken into consideration in the operational phase and incorporated into the operational procedures such as stoppage, reduced speed, etc.

143. The purpose of the grievance redress mechanism is to receive and address grievances of stakeholders, and assist people in their appropriate resolution. Grievances include complains, concerns, comments, suggestions, queries about poor-performance of the project, poor quality of work, allegations of violations of safety regulations, conflicts among beneficiaries, etc. The potential stakeholders are people from the villages located in vicinity of the project

144. The grievance mechanism will include different levels:

- Project level: Contractor (Environmental/Social Officer), Construction Supervision Consultant (Environmental/Social Specialist), Project Implementation Unit (Environmental/Social Officer)
- Local level: rayon and province level (Environmental Specialist);
- Ministry and Bank level: MoR and ADB;
- Court at rayon or province level.

145. It is proposed that grievance intake points are located at the Project site and in local administrations. If a grievance can not be resolved at Project or local level it should be passed to a higher level. There should be time limits for consideration of grievances. The budget for grievance facilitation will include items for grievance processing, and organization of seminars.

VIII. FINDINGS AND RECOMMENDATIONS

146. The IEE shows that no major negative environmental impacts have occurred due to the construction of the railway line. This has been mainly attributed to the location of the Project in an area that is very far from any inhabited communities (with a very few exceptions at the southern portions of the Project), and non proximity to any resources. Moreover, there are no significant impacts that are likely to occur due to the operation of the line.

147. The Project will have some minor environmental impacts, which will be both positive and negative, including: (a) soil erosion, (b) potential impacts of power supply component on avifauna, (c) temporary effect on noise and air quality due to construction activities; (d) increased growth in the economy of the region; (e) income and employment opportunities; and (e) reduced poverty.

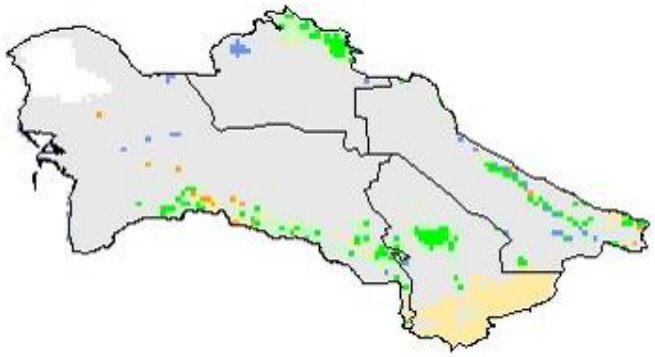
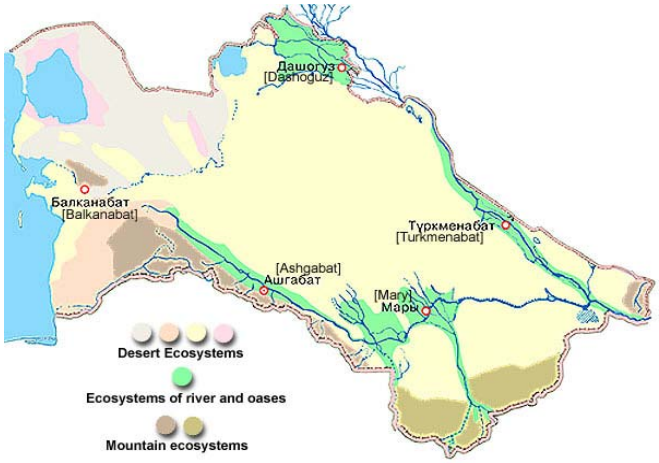
148. Implementation of appropriate mitigation measures during the construction and operation phases will minimize the negative impacts of the Project to acceptable levels. To ensure that these mitigation measures are implemented and negative impacts avoided, the measures should be incorporated in the operational phase. Environmental monitoring of the Project will be undertaken regularly through the first three years of its operation to ensure that the measures are being implemented properly.

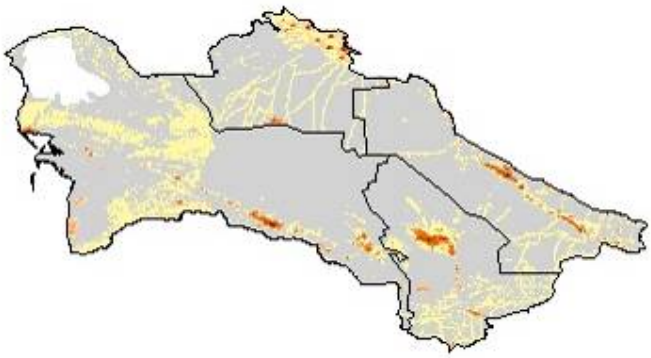
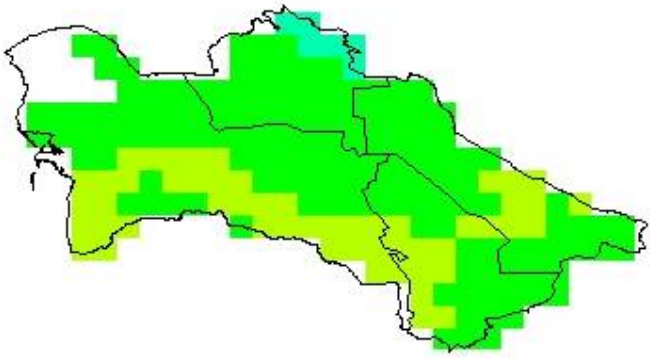
IX. CONCLUSIONS

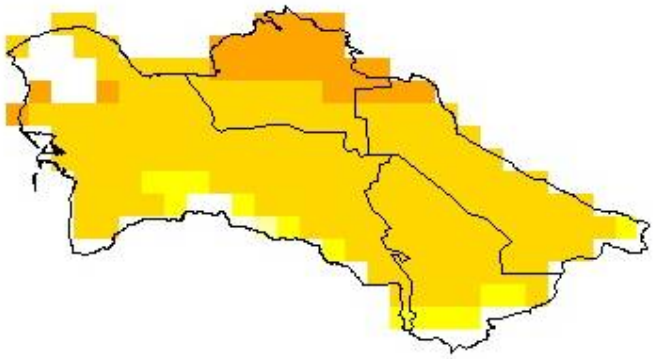
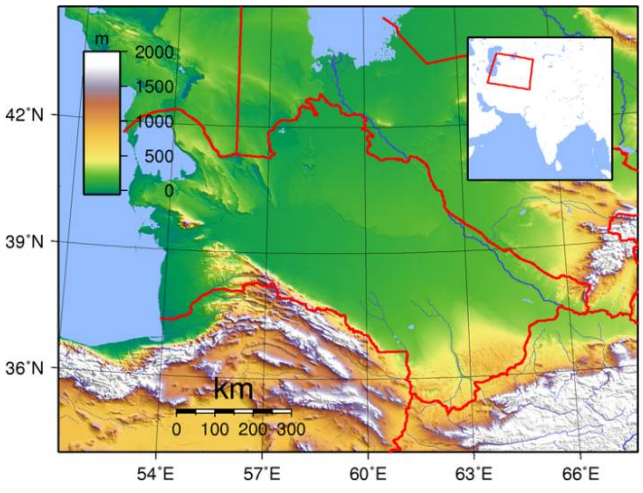
149. The project activities will have both positive and negative impacts to the environment. The IEE findings clearly show that the Project will have socio-economic

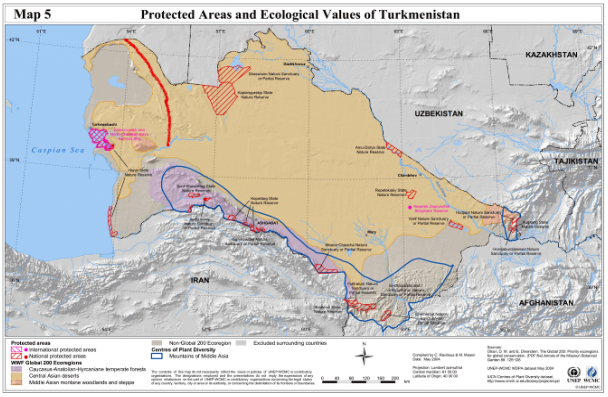
benefits. If the prescribed mitigation and management measures are fully implemented, it is unlikely to have significant adverse environmental impacts. An environmental management and environmental monitoring plan has been prepared and responsibilities for implementation assigned. A full Environmental Impact Assessment (EIA) under ADB's SPP (2009) is not warranted.

Appendix I: Maps and Other Relevant Environmental and Ecological Information

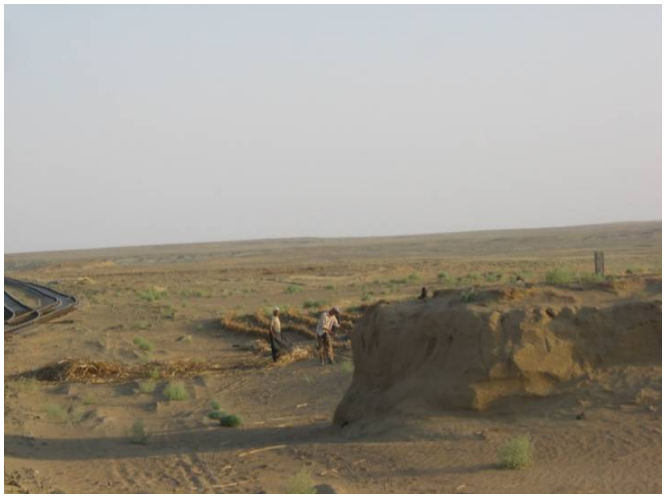
Indicator	Map	Legend
Agriculture Activity		**Farming Systems** 1. Irrigated 8. Pastoral 10. Sparse (arid) Water Bodies
Ground Cover		**Land Cover** Deciduous Needleleaf Forest Mixed Forest Water Wooded Wetland Barren Unclassified
Ecosystems		

Environmental Constraints		**Environmental Constraints** Dry and/or cold areas with low production potential Low soil suitability Erratic rainfall and cold stress risk
Population Density		**Population (People per Sq Km)** 0 - 2 3 - 10 11 - 20 21 - 50
Temperature Map		**Temperature (Ave Annual ⁵C)** 0.5 to 5.0 5.5 to 10.0 10.5 to 15.0 15.5 to 20.0 No Data

Precipitation Rates		**Precipitation Ave mm/year** 0 - 24 25 - 74 75 - 124 125 - 224 225 - 274 275 - 374 No Data
Slopes and Gradients		**Slope %** Undefined 0 - 2 % 2 - 5 5 - 8 8 - 16 16 - 30 30 - 45 > 45
Topography		

Water Resources		
Protected Areas		
Cultural Heritage Sites		

Appendix II: Selected Photos and Observations during the Site Visit

	Impacts of wind erosion mostly obvious between stations 23+00 and 46+00
	MoR implemented straw grids to control wind erosion
	MoR workers implementing straw grids along the alignment

	Saxaul planted by MoR
	Properly treated water structures
	Water structure prior to stabilization

	Construction crew being transported from station 136+00 to their camp
	Construction crew at station 300+00

Appendix III: Comparative Analysis of Energy Utilization

Basic Assumptions for Comparative Analysis of Emissions per 1 million tonnes of haulage

Train

1. No passengers, general freight only.
2. Goods available in two directions.
3. Average length of one-way trip is 311 km.
4. Average annual load factor is 75%.
5. Train load capacity is about 1500 ton (about 40 wagons).
6. There will be two round trip scheduled daily.
7. Average engine capacity is 2400 kW and each train has two locomotives.
8. Average engine loading (power utilization) factor is 50%.
9. Average annual available load is 1 million tons in each direction.
11. Employed emission factors based on the IPCC guidelines for GHG and Australian codes for criteria pollutants.
12. Average speed 50-60 km/hr

Trucks

1. Diesel powered trucks are used.
2. Average engine horsepower is 350 hp (255 kW).
3. Max. load capacity is about 30 tons.
4. Annual load factor is about 75%.
5. Average engine loading (power utilization) factor is 65%.
6. Diesel fuel will be used with an average S content of about 1% by weight.
7. Emission factors are based on IPCC guidelines for GHG and Australian codes for criteria emissions.
8. Average speed 40 km/hr

Calculations

Trip		
Distance	300	km
No. of trips per day	4	one-way trip = 0.5 round trip
Load factor	1	
Engine power	3200	kW
No. of engines	2	
Engine loading factor	0.5	
Annual load (one direction)	1,000,000	ton
Average load per trip	1500	ton
Average speed	50	km/hr
Trip duration	6	hrs
SFC	0.25	kg/kWh
No. of operating days	365	day/yr
Emission increase factor	1.2	
Annual fuel consumption	7,008,000	kg/yr
Annual energy consumed	28,032,000	kWh

Trip		
Distance	700	km
No. of truck trips required	33,333	
Load factor	1	
Engine power	255	kW
No. of engines	2	
Engine loading factor	0.65	
Annual load (one direction)	1,000,000	ton
Average load per trip	30	ton
Average speed	45	km/hr
Trip duration	15.6	hrs
Average fuel consumption	50	lit/100 km
No. of operating days	350	day/yr
Fuel density	0.835	kg/lit
Emission increase factor	1.2	
Annual fuel consumption	9,741,667	kg/yr
	8,134,292	lit/yr

Emissions

		g/kg fuel	Estimated Quantity kg/yr
IPCC Giudelines*	NO_x	74.3	624,833
	CH_4	0.25	2,102
	VOC	5.5	46,253
	CO	26.1	219,491
	N_2O	0.08	673
	CO_2	3188	26,809,805
		kg/kWh	
Australian code**	CO	0.0033	111,007
	NO_x	0.015	504,576
	PM10	0.00043	14,465
	SO_2	0.0049	164,828
	VOC	0.00038	12,783

Emissions***

		g/kg fuel	Estimated Quantity kg/yr
	NO_x	24.96	291,782
	CH_4	0.16	1,870
	VOC	3.55	41,500
	CO	15.71	183,650
	N_2O	0.08	935
	CO_2	3172.31	37,084,304
		EF kg/m^3 fuel	
	CO	8.5	82,970
	NO_x	22	214,745
	PM10	1.2	11,713
	SO_2	0.017	166
	VOC	1	9,761

* The UNFCCC approved methodologies include a methodology for mass transport (e.g. bus, light rail) but not for freight transportation

**It should be noted here that the Australian code does not include emission factors for trains and it is adopted from large diesel engines

*** The emissions multipliers are based on the US trucking industry, data for TKM was not found, thus, efficiency is expected to be much lower

Appendix IV: Water and Air Quality Standards

GOST 2974-82 "Drinking Water. Criteria for Pollution of Surface Water-Turkmenistan"

Parameters	MPC* (mg/l)
Dissolved oxygen	In winter under ice not less than 4.0 In summer (open) - not less than 6.0
BOD complete	3.0 mg O/l
Ammonium	0.5 (NH_4) = 0.39mg N/l
Nitrate-	40 (NO_3) = 9.0mg N/l
Nitrite	0.08 (NO_2) = 0.02mg N/l
Phosphate	3.5
Oil products	0.05
Phenols	0.001
DETERGENTS	0.1
Iron	0.5
Potassium	50.0
Calcium	180.0
Magnesium	40.0
Sodium	120.0
Sulfate	100.0
Chloride	300.0
Mineralization	1000.0
Suspended substances	Increase less than 0.75 mg/l
Pesticides	Absence (is conditional 0.01mkg/l)

* Maximum Permissible Concentrations.

Maximum Allowable Concentrations / Air Quality Limits in EECCA Countries

Parameters	MPC* ($\mu g/m^3$)
Sulphur dioxide, SO_2	
20 minutes	500
24-hour mean	50
Nitrogen dioxide, NO_2	
20 minutes	85
24-hour mean	40
TSP	
20 minutes	500
24-hour mean	150
Carbon monoxide, CO	
20 minutes	5000
24-hour mean	3000
Ozone, O_3	
20 minutes	160
24-hour mean	30
Benzene	
20 minutes	1500
24-hour mean	100
Lead	
20 minutes	1.3
24-hour mean	0.3
BENZO(A) PYRENE	
24 hour mean	0.001

* Maximum Permissible Concentrations.

Appendix V: Summary of Selected Environmental Laws of Turkmenistan

EIA Law	Defines how projects are reviewed by authorized state bodies, expert groups and based on scientific, socio - ecological research, analysis and evaluation of projects, programs, design - budget documentation, export facilities, as well as existing enterprises. The purpose is to ensure conformity of their rules and regulations of environmental protection, environmental management and requirements - environmental security of the population.
Nature Protection Law	Set the legal framework for protection of nature from contamination, damage, injury, starvation, destruction, destruction, or other waste. This includes land and resources, minerals, forests, flora and fauna in all their species diversity, air, as components of natural ecological systems and the biosphere, and climate. It also specifies the relationships in the environmental field in Turkmenistan and how they are governed by the Constitution of Turkmenistan through the present Law, issued in accordance and other acts of legislation on nature protection.
Flora Law	This Law is aimed at creating conditions for the conservation of biological diversity of flora of Turkmenistan as a basis for sustainability and stability of ecological systems and the biosphere, as well as effective protection, rational use and restoration of vegetation to maintain and improve the environment for present and future generations.
Fauna Law	This Law regulates relations in the field of protection and rational use of wild animals that Turkmenistan seeks to preserve the genetic stock and biodiversity of wildlife, providing conditions for their existence in the natural freedom on land, water, air and soil.
Air Law	This Law regulates relations in the field of air protection to ensure its cleanliness and management, prevention and reduction of harmful chemical, physical, biological, and other impacts on the atmosphere, as well as to continue and strengthen the rule of Law in the protection of atmospheric air.
Water Law	The water Law of Turkmenistan is aimed at increasing the value of rational use and protection of water resources. In conjunction with measures of organizational, legal, economic and educational impacts, this Law will contribute to the formation of water-environmental law and economic security of Turkmenistan. According to the Law, a set of water legislations were created to meet the increasing development of the public and private production, as well as urban development and growth. The objectives of the water legislations of Turkmenistan are to regulate water relations in order to provide science-based, rational use of water for human needs, economies and environment, water protection from pollution and depletion, the improvement of water bodies, prevention and eradication of harmful effects of water as well as protecting the rights of legal entities and individuals, and strengthening the rule of Law in the field of water relations in the country.
Sanitary Law	This Law defines the legal, economic and social conditions of sanitation-epidemiological welfare of the population, realization and protection of the rights of citizens to a healthy environment, and other related rights and lawful interests of citizens. It regulates relations in the field of health - well-being and radiation safety in order to preserve and strengthen the people's health from the adverse effects of environmental factors. The rights and duties provided by this Law arise from the fundamentals

	stipulated by the legislation of Turkmenistan, as well as from the actions of state bodies, local authorities, enterprises, institutions, organizations and citizens who are not prescribed by Law, but by virtue of general principles and sense of health legislation that generate rights and responsibilities to ensure sanitary epidemiological welfare.
Forest Law	The current Forest Law of Turkmenistan is the statutory forestry document that defines the principles and activities related to the sustainable forest management, the forest conservation as well as the increasing environmental, economic and social potential of Turkmenistan. The Law governs forest relations in Turkmenistan and aimed at creating conditions for sustainable forest management including the efficient protection of existing forest resources and vegetation cover and their biodiversity, ensuring the participation of various government organizations and local representatives as well as their communities in forestry activities related to the establishment of forest stands and a set of measures towards technical services, improving the cultivation practices in forests as well as increasing the production capacity in order to enhance the quality and quantity of seedlings.
Public Health Law	This Law specifies the issues and concerns in the field of health protection for citizens, classified in accordance with the legislation of Turkmenistan including the definition and implementation of a unified state policy, adoption of regulatory legal acts in the field of health protection, organization of the execution state budget of Turkmenistan in the field of health, in addition to the development of a network of health facilities and medical industry companies, and strengthening their logistical base.
Fire Safety Law	The Fire Safety Law concerned with the State fire control, a special kind of state oversight activities undertaken by Government officials and departments of the State Fire Safety Service in order to monitor compliance of the fire prevention and suppression of violations. Moreover, the Law specifies the responsibilities of the National Fire Safety Service which include implementing unified state fire supervision, conducting surveys and test areas, as well as monitoring the fire agitated in the forests, mountains, steppe and grazing areas.
Veterinary Law	This law defines the organizational and legal framework for veterinary affairs in Turkmenistan, establishes general veterinary and sanitary requirements and aims to protect animal health, protect people from diseases common to humans and animals. The Law also defines the responsibilities of the State Veterinary including the organization of veterinary affairs, implementation of methodological guidance and supervision of departmental veterinary services of enterprises, institutional and organizations, as well as veterinary experts of business, in addition to establishing a list of contagious diseases which imposed a group or individual quarantine restrictions.

Appendix VI: Participants in Public Consultation Meetings

Municipal Meeting at Bereket

1. Mr. Tahir Hydyrovich Gurbanov – Bereket city mayor
2. Mr. Kerven Orazmengliev – chief of Bereket railway station;
3. Mr. Tirkesh Kurbanov – Bereket station man on duty;
4. Mr. Bayesen Bayesenov – Bereket station ticket sales staff;
5. Mr. Bayram Ataev – resident of Bereket city;
6. Mr. Serdar Agaoyliev – resident of Bereket city;
7. Mr. Eziz Egriev – resident of Bereket city;
8. Mr. Bayram Orazkuliev – resident of Bereket city;
9. Mr. Nury Nuryev – resident of Bereket city;

Meeting at the end of the line with construction workers and locally hired support staff

1. Mr. Myrat Nazgulyev;
2. Mr. Sayat Danegulyev;
3. Mr. Tagan Kelov;
4. Mr. Arslan Gazakbaev;
5. Mr. Yazly Bayramov;
6. Mr. Agamyrat Mammetjanov;
7. Mr. Arslan Amanyazov;
8. Mr. Eziz Egriev;
9. Mr. Rejepmammet Hajyev
10. Mr. Annadurdy Hudayberenov