Initial Environmental Examination

October 2015

AFG: Energy Supply Improvement Investment Program – Tranche 1

Prepared by Da Afghanistan Breshna Sherkat of the Government of Afghanistan for the Asian Development Bank.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

ADB	Asian Development Bank
AFG	Afghanistan
AWEC	Afghanistan Wildlife Executive Committee
DABS	Da Afghanistan Breshna Sherkat
EARF	Environmental Assessment Review Framework
EMF	Electric and magnetic fields
EMP	Environmental Management Plan
IEE	Initial Environmental Examination
IUCN	International Union for the Conservation of Nature
kV	Kilovolt
PREVIOUS MFF	Multi-tranche Financing Facility
ROW	Right-of-way

1. EXECUTIVE SUMMARY

1.1 Introduction

The present IEE covers the following sub-projects of Stage B of the Tranche 1 of Afghanistan Energy Sector:

- Subproject 1: 500 kV Single Circuit line built in Stage A from TKMN border via Andkhoy to Sheberghan, will be extended for ca. 308 km to Dasht-e-Alwan;
- Subproject 2: 220 kV Double circuit line Andkhoy to Sheberghan (64.5 km).

The sub-projects are expected to increase the power transmission capacity on the north-south route which conveys power from imports and domestic power plants in the north to the load centers at the southern end of the transmission line.

On the basis of the existing environmental situation in the Investigation area, the technical planning and the Environmental Assessment Review Framework (EARF), DABS determined the potential environmental impacts of the proposed sub-projects during design, construction, operation and decommissioning. Alternative routings and options, as well as appropriate mitigation and monitoring measures were considered to reduce possible adverse impacts.

For preparing the IEE study, DABS set up a multi-disciplinary team composed of one International Environmental and Ecological Expert and one National Environmental Expert. The work made by two International Social Experts and one National Social Safe-guards Expert (in the context of the LARP (Land Acquisition and Resettlement Plan) for this project) was also taken into consideration for the present IEE.

The national team, together with male field surveyors and technical surveyors conducted intensive field work in some of the subproject areas between the 12th and the 20th of October 2014. Socio-economic surveys of the affected households were conducted as part of the LARP preparation. The environmental team preparing the IEE surveyed the physical and biological conditions of the areas.

1.2 Institutional and Legislative Framework

The Executing Agency (EA) will be DABS, the National Power Utility. Other Central Government institutions potentially linked to the Project and the implementation of the EMP include the Ministry of Energy and Water (MEW); the National Environmental Protection Agency (NEPA); the Department of Meteorology; etc.

Other stakeholders are the Province administration of Faryab, Jawzjan, Balkh, Samangan and Baghlan Provinces; and Civil Society Organizations.

National acts, laws, regulations, guidelines and policies relevant to the project are, among others: Environmental Act, 2007; Mineral Law, 2010; Water Law, 2009; Draft Forest Law, 2009; Interim Environmental Impact Assessment Regulations, draft 2.3.

Afghanistan has in addition ratified a number of international agreements and conventions relating to the protection of the environment and biodiversity.

This IEE was carried out in accordance with applicable international Guidelines. The legal framework of the Islamic Republic of Afghanistan does in the essence correspond with the

international regulations and safeguards. Gaps however do exist in enforcement of the regulations. There is still a considerable lack of institutional capacities for implementation, monitoring and evaluation.

1.3 Description of the Project

The 500 kV single-circuit line from the close vicinity of the Sheberghan substation to the Dasht-e-Alwan converter station (sub-project 1) would, for the most part, be located close to existing lines and pass through predominantly flat terrain. The line length is ca. 308 km.

The 220 kV double-circuit line from Andkhoy to the Sheberghan substation (sub-project 2) will be 64.5 km long. Throughout its length it will be aligned with the Phase-A 500 kV single-circuit line between Andkhoy and Sheberghan, on average at 100 m offset. The terrain is flat, semi-desert, and neither access nor other construction difficulties are expected.

The RoW is 60 m wide for the 500 kV line and 40 m wide for the 220 kV line. Of the total combined length of lines of 372.5 km, only about 45 km are not aligned with other existing or planned high voltage overhead lines.

1.4 Baseline Description

Tranche1 has 2 physical subprojects comprising 500-kV transmission line package and a 220-kV transmission line package. The preparation of IEE, the 500-kV transmission line package has been split into 2 sub-components (i) sections between Shaberghan and Mazar city, and (ii) sections between Mazar city and Dashte Alwan.

Sub-project 1 (part 1): between Sheberghan and Mazar-e-Sharif

This section of the transmission line crosses the provinces of Jawzjan and Balkh. The main physical and biological characteristics of the project area in this section are:

- There are important oil and natural gas reserves, as well as sulphur, sand and gravel deposits.
- The Investigation area is presently not a touristic area.
- The Investigation area is characterized by a continental dry climate.
- The Safid and the Balkh rivers, as well as small rivers and creeks are crossed by the line.
- No water storage facility is present in the Investigation area.
- The groundwater table is assumed to be found at minimum 15 m depth.
- The area is marked by alternate grassland savanna and sandy desert
- Woodlands are not crossed by the line corridor
- There are some plantations, trees, bushes and grassland, as well as fruit trees.
- The Investigation area is not rich regarding fauna.
- No protected areas are crossed by the transmission line corridor or are located near to it.

In relation to the human environment, the project area for Sub-project 1 (part 1) can be generally classified as follows:

- Jawzjan Province has a total population of 426,987. Balkh Province has a total population of 1,123,948.

- Along the line corridor, the majority of the population lives as a joint/extended family system. The size of most of the extended households located along the line corridor is between 10 to 30 persons.
- The overall literacy rate in Jawzjan Province is 31%. The overall literacy rate in Balkh Province is 44%.
- The Investigation area has no industrial or major commercial activities.
- Partly the household income is also supplemented through the sale of livestock (especially goat/ sheep).
- According to the field survey, 30% of the population living along the line corridor has access to health facilities.
- Safe drinking water is not available to the population in the Investigation area. According to the field survey, the main ethnic groups/ tribes living along the line route are Uzbeks (53%).
- About one half of the population is female. In the tribal area, the women have a limited role in decision-making process at household level.
- Agricultural cultivation or farm forestry is found at isolated areas. A big portion of land in the line corridor is unused, barren and un- vegetated .
- More than 60% of the population residing along the line corridor has access to electricity.
- Access to roads is to the extent of 30%.

Sub-project 1 (part 2): between Mazar-e-Sharif and Dasht-el-Alwan

This transmission line component crosses the provinces of Balkh, Samangan and Baghlan. Punctually Balkh, Naebabad and Dasht e Alwan which are separate locality of these provinces are crossed by the line corridor.

The main physical and biological characteristics of the project area in this section are:

- Sandy soil and dune, somewhat loam. The area is a dry desert, without any water sources.
- There are no valuable protected or touristic areas.
- This area is characterized by arid and semi-arid continental climate. Since many years this area is exposed to periodic drought.
- Two major rivers – Shulgar river and Polemamocry river are crossed by the line corridor.
- Drinking water is scarce, found approximately 60 m below ground. The underground water close to the surface of the earth is salty.
- Generally ground cover is less than 15% and wild trees are absent.
- Because of the past 40 decades of war, drought and continuously irregular hunting, the number of animal species has severely declined.
- Only a relative small part of the land area along the line corridor is suitable for arable farming for horticulture including both irrigated and rain fed farming. Only here and there some small gardens are observed.

In relation to the human environment, the project area for Sub-project 1 (part 2) can be generally classified as follows:

- The majority of the population is farmers, business men, laborers, and unemployed persons.
- Almost 50% of the population has access to schools and health clinics.
- Some of the villagers along the line route live far away from maternity hospitals, therefore the risk of child and mother mortality is very high.
- Access to safe drinking water from wells is limited

- The main road between Dah Dady and Balkh districts and between Mazar and Kabul is crossed by the line corridor in several points.
- The new established university of Moulana Jalaludin Balkhy is situated in a distance of 200 m from the investigation area.
- Non-functioning gas pipelines are located in a distance of 50 m from the transmission line.
- There are several petrol stations close to the line corridor.
- Close to the line route in the Hayratan desert, there are new Hayratan Custom and Railway.

Sub-project 2: between Andkhoy and Sheberghan

This section of the transmission line crosses the provinces of Faryab and Jowzjan.

The main physical and biological characteristics of the project area in this section are:

- Faryab Province covers an area of 20,293 km2. Jawzjan Province covers an area of 10,326 km2. Sheberghan is the capital of this province.
- There are important oil and natural gas reserves as well as sulphur, sand and gravel deposits.
- Near Andkhoy and the other villages and around the rivers the vegetation is fairly dense with cultivations, some plantations, few trees, bushes and grassland.
- The Investigation area is presently not a touristic area.
- The Investigation area is characterized by a continental dry climate.
- The Shirin Tagab River, which faces major water shortage problems, is crossed by the line corridor. Small rivers and creeks are also crossed by the line corridor.
- Andkhoy and its few other villages are always in a severe semi-drought situation.
- The groundwater between TKM border and Sheberghan can be found at 15 to 20 m depth in valley areas (minimum 10 m) and 80-100 m depth in desert areas.
- Water quality is salty in major areas from Aqina to Andkhoy.
- The area is marked by alternate grassland savanna and sandy desert. Occasional trees and small patches of "forest" can be found in the vicinity of houses and rivers.
- There are some plantations, trees, bushes and grassland, as well as fruit trees.
- The Investigation area is not rich regarding fauba
- No protected areas are crossed by the transmission line corridor or are located near to it.

In relation to the human environment, the project area for Sub-project 2 can be generally classified as follows:

- The Faryab Province has a total population of 833,724. The Jawzjan Province has a total population of 426,987.
- Along the line corridor, the majority of the population lives as a joint/extended family system. The size of most of the extended households located along the line corridor is between 10 to 30 persons.
- The overall literacy rate in Faryab Province is 27%. The overall literacy rate in Jawzjan Province is 31%.
- The Investigation area features no industrial or major commercial activities
- The major occupations in the Investigation area are service, business, and labour.
- Partly the household income is also supplemented through the sale of livestock.
- In Faryab Province 18 health centers and 5 hospitals could be found in 2005. In 2005, there were 10 health centers and 6 hospitals in Jawzjan Province.

- Safe drinking water is not available to the population in the Investigation area, particularly around Andkhoy.
- The main ethnic groups/ tribes living along the line route are Uzbeks (53%).

- In the tribal area, the women have a limited role in decision-making process at household level.
- A big portion of land in the line corridor is unused, barren and un- vegetated due to shortage of water availability.
- More than 60% of the population residing along the line corridor has access to electricity.
- Access to roads is to the extent of 30%.
- One historical cultural site (Aquina Huzi) is located near the planned transmission line corridor, in 200 m distance from the ROW.

1.5 Screening of Environmental and Social Impacts and Mitigation

In summary, the results of the investigation demonstrate that the Project will have mostly low impacts on the environment if the Environmental Management Plan (EMP) proposed in the IEE Report is implemented. The following aspects decisively contribute to this assessment:

- The landscape of the investigation area is mostly flat so that tower and access road construction do not pose a risk regarding soil erosion and sand deflation.
- The groundwater in the Investigation area is located relatively deep.
- The Project is situated in a (semi-)desert and woodlands are not crossed by the transmission line.
- The transmission lines are not located in or near a protected area or an area that is of outstanding importance for flora, fauna and biodiversity.

The following medium negative impacts will be highlighted:

- During the design phase:
  - Impacts of the line routing on biological, human and physical features of the area.

- During the construction phase:
  - Surface water pollution and riverbed destruction due to river crossings;
  - Impacts on workers and community health and safety, e.g. regarding work accidents, noise emissions, sanitary conditions, risks of electrocution, and presence of landmines;
  - Impacts on historical and cultural sites;
  - Damages to crops and trees during land survey, construction of access roads, construction of towers and conductor stringing;
  - Land acquisition for towers;
  - Relocation of houses/ households from the new ROW including impacts on women and other vulnerable people.

- During the operation phase:
  - Impacts on workers and community health and safety regarding natural disasters and risk of electrocution

Positive impacts are expected to be generated from the project, namely:

- An increased stability of the electricity supply;
- An increased efficiency/ reduction of transmission losses in electricity network;
- Generation of local employment.

A careful final design will be able to balance the impacts, avoiding resettlement as the highest priority, without increasing environmental impacts i.e. by long access roads or crossing protected areas and without affecting cultural heritage sites. Also quite often, design options are able to reduce environmental as well as social impacts at the same time.

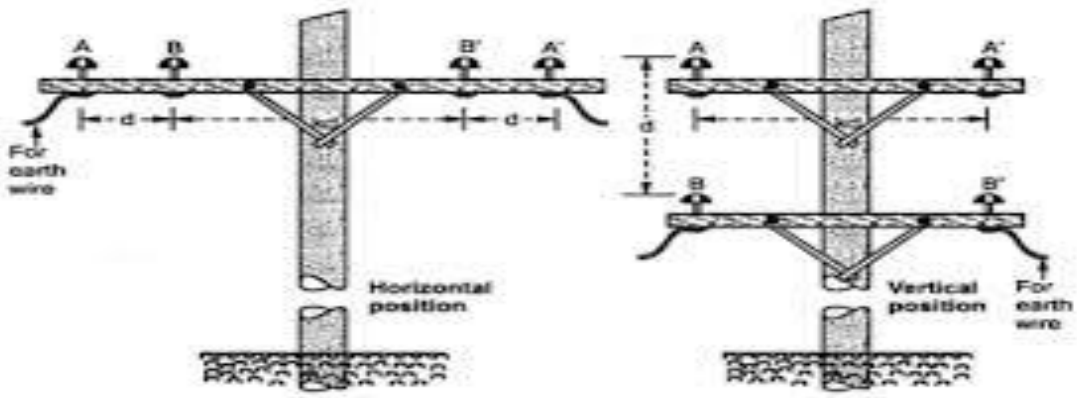
The EMP and the LARP have to be part of the tender documents and construction contracts. A review of the final design by independent social and environmental experts is recommended.

1.6 Analysis of Alternatives

No-project alternative:
Not constructing the sub-projects would not cause any resettlement, land acquisition and other social and environmental impacts. However, it would also prevent the achievement of the broad objectives of the Tranche 1 of the Afghanistan Energy Sector and of the particular objectives of its Stage B. This alternative is, as therefore, not considered acceptable.

Line routing alternatives:
Beginning with first rough power line route options and based on recent high-resolution satellite scenes the line route has been optimized step by step and section for section in order to avoid settlements and single houses and to reduce the impacts on the environment e.g. by following already existing power line corridors, existing roads or by circumventing sensitive locations.

500 kV towers' design:
From an environmental point of view it is preferable to have the conductors/phases of the 500 kV towers arranged horizontally. This avoids impacts on the avifauna, as it reduces the height of the towers and the chances for collision.



(b) Single phase double circuit

1.7 Public Consultation and Information Disclosure

During the field survey, various meetings were held with regional and local stakeholders. The meetings focused on the collection of information with regard to the socio-economic conditions in the wider areas of the planned line corridor. At the same time, information on the project was provided to those stakeholders who, until that point, had not been informed.

During the focus group discussions (FGD), the main issues were:

- The quality of the electricity supply;
- The high costs per kWh when using generators;
- The low level of coverage in the rural areas;
- The possibility that the future supply will not be fair;
- Fear that compensation payments would not be made at all or that the compensation money would not cover losses adequately;
- Pointing of vulnerable households living in their communities.

Nobody expressed concern as to possible damage and losses through the construction of the HVTL.

The implementation of the land acquisition and resettlement process requires an improved gender approach.

1.8 Grievance Redress Mechanism

According to the ADB safeguards, great care is taken in the project to prevent grievances. The situation in the conflict-marked Afghanistan requires special attention in order to avoid any additional development of conflicts.

Prevention of grievances will mainly be effected through careful land acquisition design and implementation, by ensuring full DP participation and consultation and by establishing extensive communication and coordination between the community, the PMO and their consultants and coordinators and the local governments. In order to include women, the team for the implementation of the land acquisition and resettlement (and compensation) process will be gender-sensitive and culturally-adapted.

This notwithstanding, complaints are sometimes unavoidable if, for example, a different understanding of the value of losses and consequently of compensation payment arises. Therefore, a grievance redress mechanism is being adopted for the project to allow the DP the opportunity to appeal against any contested decision, practice or activity arising from the valuation of losses and the compensation/rehabilitation process. Efforts to make DPs fully aware of their rights and of the procedures for addressing complaints will continue during the updating of the LARP and at the time of compensation.

1.9 Environmental and Social Management Plan

The IEE and the LARP define measures to mitigate or prevent the negative impacts from the sub-projects. In this Chapter, an Environmental and Social Management Plan (ESMP) is presented for the design phase, construction phase and the operation and decommissioning phases covering the description of the measures, their location, the time frame and the responsible for their implementation.

Mitigation and monitoring measures are included.

1.10 Implementation Arrangements and Capacity Building

Internal environmental monitoring will be conducted by DABS-PMO, DABS Environment Department. Monitoring of EMP implementation will be performed by an EHS Consultant hired within the contract of the Project Implementation Consultant during the construction phase. Monitoring results will be included in the Project's quarterly progress reports, semiannual environmental reports during the construction phase and annual reports after commissioning. The detailed monitoring program will be subject to review and approval by ADB.

In addition, construction site audits will be performed by an international EHS External Auditor to ensure that all requirements as stipulated in the EMP of the Project are fulfilled. Such an EHS Construction Site Audit will be performed three times a year with special focus on the period of performing the detailed land survey.

Environmental monitoring during the operation phase will be performed by DABS and NEPA. The PMO will no longer exist after construction. Monitoring results will be included in annual environmental reports during the construction phase and in annual reports after commissioning. The detailed monitoring program will be subject to review and approval by ADB.

1.11 Overall Findings and Recommendations

In summary, the results of the investigation demonstrate that the sub-projects will have mostly low impacts on the environment if the proposed EMP is implemented and all proposed mitigation measures are accomplished. Some medium impacts remain regarding the land acquisition and land use, involuntary resettlement and vulnerable people during construction (see separate LARP document), as well as visual impacts and natural disasters during operation.

Careful line routing during the final design will help to minimize social and environmental impacts.

The overall construction will be supervised by an independent international expert.

ADB will be responsible to undertake due diligence. It will review the borrower's/client's social and environmental assessments and plans to ensure that safeguard measures are in place to avoid, wherever possible, and minimize, mitigate, and compensate for adverse social and environmental impacts in compliance with ADB's safeguard policy principles.

The EMP and the LARP have to be part of the tender documents and construction contracts. A review of the final design by independent social and environmental experts is recommended.

1.12 Conclusions

If all proposed mitigation measures are implemented, the transmission lines can be constructed with a minimum of adverse effects on the natural and human environment.

AFG: Energy Supply Improvement Investment Program – Tranche 1 Projects

LEGEND

300 km of 500 kV Transmission Line (Sheberghan to Dashte Alwan)

65 km of 220 kV Transmission Line (Andkhoy to Sheberghan)

2. INTRODUCTION

The present reports respects the Initial Environmental Examination (IEE) for the 2 sub-projects below described. The present IEE has been prepared based on the indications of the Environmental Assessment Review Framework (EARF), available in Annex 6A to this report.

2.1 Project Background

Afghanistan is a net energy and electricity importer and reliable interconnections with neighboring countries are the prerequisite to manage importation. The development of a unified Afghanistan grid is planned installing asynchronous inter-connections with neighboring countries using High Voltage Direct Current (HVDC) technology.

This project is the Stage B of the Tranche 1 of Afghanistan Energy Sector. It is part of the Multi-tranche Financing Facility, with the objective to enable power trade between Afghanistan and Turkmenistan by provision of a 500 kV overhead line connecting the Turkmenistan electricity network with a new back to back converter station in Dasht-e-Alwan. In the Stage B that this project covers, the above stated objective will be achieved by implementation of the following sub-projects:

- Subproject 1: 500 kV Single Circuit line built in Stage A from TKMN border via Andkhoy to Sheberghan, will be extended for ca. 308 km to Dasht-e-Alwan;
- Subproject 2: 220 kV Double circuit line Andkhoy to Sheberghan (64.5 km).

The direct 500 kV single circuit link from Turkmenistan to the Converter Station in Dasht-e-Alwan is a part of the wider Energy Development 2014 - 2023 program. In addition, the 220 kV double circuit line connecting Andkhoy and Sheberghan substations is required in order to substitute for the Stage A section that is incorporated into direct 500 kV link going directly from Turkmenistan to the converter station Dasht-e-Alwan.

The sub-projects are expected to increase the power transmission capacity on the north-south route which conveys power from imports and domestic power plants in the north to the load centers at the southern end of the transmission line. The existing 220 kV north-south transmission line across the Hindukush Mountains has reached its capacity limits, thus severely restricting the supply to the load centers in Kabul and south of Kabul. The project serves to lift these supply constraints.

2.2 Scope and Objectives of the IEE

Within the scope of this IEE, DABS investigated the potential environmental impacts of the planned sub-projects. On the basis of the existing environmental situation in the Investigation area (Section 5) and the technical planning (Section 4.1), DABS determined the potential environmental impacts of the proposed sub-projects during design (Section 6.1), construction (Section 6.2), operation (Section 6.3) and decommissioning (Section 6.4). Alternative routings and options (Section 6.5), as well as appropriate mitigation and monitoring measures (Section 0) were considered to reduce possible adverse impacts.

The planned transmission lines traverse a semi-desert area characterized by cultivated lands, several houses, settlements and towns. The ecological impacts of the transmission line are considered to be mostly low if the mitigation measures are correctly implemented. The socio-economic impacts will have to be evaluated depending on the detailed line routing (see also LARP document). During the investigation, focus was put on finding a

line routing that is feasible from a technical point of view which a) avoids ecologically sensitive zones, b) avoids the need of resettlement actions to the greatest extent possible and c) prevent crossing of cultural and historical sites as much as possible. Wherever impacts cannot be avoided, mitigation measures are suggested. Their implementation will have to be closely monitored.

2.3 Methodology

For preparing the IEE study, DABS set up a multi-disciplinary team composed of one International Environmental and Ecological Expert and one National Environmental Expert. The work made by two International Social Experts and one National Social Safeguards Expert (in the context of the LARP (Land Acquisition and Resettlement Plan) for this project) was also taken into consideration for the present IEE.

The national team, together with male field surveyors and technical surveyors conducted intensive **field work** in some of the subproject areas between the 12th and the 20th of October 2014. Socio-economic surveys of the affected households were conducted as part of the LARP preparation. The environmental team preparing the IEE surveyed the physical and biological conditions of the areas.

The surveys were undertaken exclusively for the line portion between Mazar-e-Sharif and Dasht-el-Alwan (part of sub-project 2 and sub-project 1). The main reason for this was a pressing time restriction. DABS made this decision based on the fact that previous studies have been undertaken for the areas where the remaining components of the project will be built. In preparing the final IEE, it will be ensured that any assumptions made due to absence of field data are clearly set-out, and that conclusions regarding impact significance are based on the precautionary principle. The EMP will include and undertake environmental monitoring to complete the gaps in baseline data during detailed design and before construction work begin. In summary, the information was obtained as indicated in Table 2-1.

Table 2-1: Basis for the IEE and LARP reports

Sub-project 1: 500 kV Single Circuit overhead line between Sheberghan and Dasht e Alwan			
Parts	**Sub-sections**	**Existing environmental/social studies**	**Basis for the IEE and LARP**
Part 1	Between Sheberghan and Mazar-e-Sharif	IEE for the PREVIOUS MFF 0026-AFG, October 2012 Draft LARP for Afghanistan, September 2012 *plus* Attachment B (Socio-Economic Set-Up of the Project Areas, Social Impact and Gender Analysis) LARP for the Turkmenistan: TA-7853 REG: Afghanistan and Turkmenistan: Regional Power Interconnection, September 2012	The existing studies
Part 2	Between Mazar-e-Sharif and Na'ebabad	NONE	Field surveys
	Between Na'ebabad and Dasht el Awan	NONE	Field surveys

Sub-project 2: 220 kV Double Circuit overhead line from Andkhoy to Sheberghan		
Sub-sections	**Existing environmental/social studies**	**Basis for the IEE and LARP**
Between Andkhoy and Sheberghan	IEE for the PREVIOUS MFF 0026-AFG, October 2012 Draft LARP for Afghanistan, September 2012 *plus* Attachment B (Socio-Economic Set-Up of the Project Areas, Social Impact and Gender Analysis) LARP for the Turkmenistan: TA-7853 REG: Afghanistan and Turkmenistan: Regional Power Interconnection, September 2012	The existing studies

It is in addition to say that all new line sections run parallel to existing transmission lines, except for the strip between Mazar-e-Sharif and Na'ebabad. This means that the baseline description of the existing studies for the remaining line (prepared in 2012) is valid for the present planned project.

Regarding the environment, a **corridor of 500 m was investigated on both sides** of the planned transmission line during the field survey. **Socio-economic baseline surveys** were carried out for sample populations settled along the corridor of influence (COI, 1-1.5 km). Additionally, an evaluation of possible ecological and social impacts was performed by interpretation of satellite maps and other available maps and data for the Investigation area.

Due to the fact that there is no official international consensus on an agreed approach for **assessing the significance of impacts** on the environment, DABS uses an own evaluation procedure. The focus of the used evaluation procedure is to decide whether the Project is likely to cause significant adverse environmental effects resulting from the design, construction, and operation and decommissioning.
The evaluation scale applied is as follows:

Extent of impact:

■ ■ ■	=	high
■ ■	=	medium
■	=	low
○	=	no impact
+	=	locally positive
++	=	regionally positive

For the judgment, international standards like standards from the World Bank, World Health Organization (WHO) etc. are used and supported by Afghan standards. Afghanistan does not have any transmission lines grid codes or environmental standards and relies upon standards pursued by donor organizations.

3. INSTITUTIONAL AND LEGISLATIVE FRAMEWORK

The past five years have seen several important achievements in the field of environmental governance. The National Environmental Protection Agency (NEPA) was established in 2005 as Afghanistan's environmental policy-making institution, tasked with regulation, coordination, monitoring and enforcement. With technical assistance from the United Nations Environment Program, Afghanistan's first Environment Law was drafted further to a consultative process and signed by the President in late 2005. It was then reviewed and amended by the (then newly-established) National Assembly, and the final version was promulgated in early 2007 (Official Gazette No. 912, 25 January 2007). In addition, with support from the international community, several projects targeting various aspects of capacity building and environmental assessment, clean-up and restoration have been implemented, and important international environmental conventions and cross border cooperation agreements signed.

In 2008 the Afghanistan National Development Strategy (ANDS) was adopted, which among priority issues and sectors lists environmental management and conservation, will be an essential step forward. Within ANDS, NEPA is expected to play an important role in environmental protection. However its mandate extends further: under the Environment Law it is responsible for fulfilling 18 key functions related to the environment and natural resources. In the years to come NEPA will consequently be one of the central institutions dealing with management of Afghanistan's environment for the benefit of all Afghan people, alongside other sectoral ministries such as the Ministry for Agriculture, Irrigation and Livestock (MAIL), the Ministry of Energy and Water (MEW), and the Afghanistan National Disaster Management Authority (ANDMA).

The new Environment Law of Afghanistan is based on 13 fundamental principles. It consists of nine chapters and 78 articles addressing all the main environmental concerns. For example, chapter 4 addresses the regulatory provisions for pollution control and waste management; chapter 6 focuses on biodiversity, conservation and management of natural resources. Overall, the law defines the functions and powers of NEPA and reflects the role of the agency as the apex body for the formulation, implementation, regulation and monitoring of Afghanistan's environmental policies and also as the coordinator for international environmental cooperation. To promote further integration and coordination of environmental matters with other government agencies, the Environment Law has established Afghanistan's Committee for Environmental Coordination and the National Environmental Advisory Council.

Afghanistan's environmental policies are steadily improving. The National Capacity Needs Self-Assessment for Global Environmental Management (NCSA) and National Adaptation Program of Action for Climate Change (NAPA) projects, completed in February 2008, provide an excellent overview of Afghanistan's progress towards implementing UNFCCC (Climate Change Convention), UNCBD (Biodiversity Convention), and UNCDD (Desertification Convention), and its overall position in the international environmental arena. The National Environmental Strategy of Afghanistan, developed by NEPA in 2007 as part of the ANDS process, clearly demonstrates the cross-sectoral perspective of environmental management.

It also proposes specific activities and considerations to meet national targets for the Millennium Development Goals (MDGs). Assessment of ozone-depleting substances has helped to define the weight of Afghanistan in the global impact on Earth's ozone layer. Very comprehensive work has been carried out to assess Afghanistan's biodiversity, ecological hotspots and conservation potential, while developing recommendations for strengthening the network of protected areas and supporting community-based natural resource management.

The new approach to environmental policy is designed to address the cross-sectoral character of the use of natural resources, as well as the underlying causes of environmental degradation.

3.1 Institutional Framework and National Requirements

3.1.1 Institutional framework

The EA send the revised IEE to National Environmental Protection Agency (NEPA) of Afghanistan for its review and concurrence before physical works could be initiated by contractor. . They may require and advise certain additional measures in the environmental management plan. A non-objection from NEPA is required before contractor can begin the works. NEPA does not prepare its own EIA or other documentation for any project prepared and funded by donors. The no-objection letter is provided to the contractor and copied to ADB.

Da Afghanistan Breshna Sherkat (DABS):
DABS is an independent and autonomous company established under "The Corporations and Limited Liabilities Law of the Islamic Republic of Afghanistan (IROA)". DABS is a limited liability company with all its equity shares owned by the Government of Afghanistan (GoA). The company was incorporated on 4th May 2008 (15 Saur 1387) and replaces Da Afghanistan Breshna Moassassa (DABM) as the national power utility. DABS will operate and manage electric power generation, import, transmission, and distribution throughout Afghanistan on a commercial basis. DABS is the Implementing Agency (IA) of the Project.

Ministry of Energy and Water (MEW):
In supporting the socio-economic growth of Afghanistan, the MEW is responsible for preparing and managing national policies of the energy sector with the exception of those management or implementation policies that are assigned to the yet-to-be established Afghanistan Energy Regulatory Authority (AERA) by the Electricity Law. The guiding and development direction of the planned energy sector of Afghanistan is subject to the policies under this law.

National Environmental Protection Agency (NEPA):
NEPA's goal is "to protect the environmental integrity of Afghanistan and support sustainable development of its natural resources through the provision of effective environmental policies, regulatory frameworks and management services that are also in line with the Afghanistan Millennium Development Goals (MDGs)".

Other Central Government institutions potentially linked to the Project and the implementation of the EMP include the following:

- Ministry of Rural Rehabilitation and Development;
- Ministry of Agriculture, Irrigation and Livestock;

- Ministry of Energy and Water;
- Ministry of Information and Culture;
- Ministry of Mines and Industry;
- Ministry of Frontiers and Tribal Affairs;
- Afghanistan National Disaster Management Authority;
- Central Statistics Office;
- Department of Meteorology.

Civil Society Organizations:

Save the Environment Afghanistan (SEA) is Afghanistan's only major grassroots and Afghan-managed conservation organization. SEA (then SAVE) was active in environmental issues during the civil war when there was no active government involvement in environmental issues. SEA's mission is protection of the environment, sustainable resource utilization, conservation of biodiversity and integrated development of natural resources. SEA is member of IUCN, IUFRO (The Global Network for Forest Science Cooperation) and APAFRI (Asia Pacific Association of Forestry Research Institutions) and works closely with the International Crane Foundation, the World Wide Fund for Nature (WWF), the International Centre for Integrated Mountain Development (ICIMOD), the International Snow Leopard Trust and other environmental organizations (MAIL, 2009).

3.1.2 National requirements

Table 3-1 lists all national acts/ laws relevant to the Project.

Table 3-1: National acts/laws of Afghanistan

Act/ Law	Year	Key areas
Environmental Act	2007	This act has been promulgated to give effect to Article 15 of the Constitution of Afghanistan and provide for the management of issues relating to rehabilitation of the environment and the conservation and sustainable use of natural resources, living organisms and non-living organisms.
Minerals Law	2010	The Minerals Law of 2010 governs the ownership, control, prospecting, exploration, exploitation, extraction, marketing, sale, and export of minerals in the territory of Afghanistan. The law provides that all deposits of minerals on or under Afghanistan or in its water courses are the exclusive property of the state. A surface land interest does not include right to minerals. The Ministry of Mines is authorized to grant mineral rights in accordance with the provisions of the law (GIRoA, 2010; Kuo, 2007) (source USAID, 2010).

Act/ Law	Year	Key areas
Water Law	2009	Afghanistan's new Water Law became effective in April 2009 and is one component of the country's strategy to integrate its water systems and institutions. The Water Law adopted a river basin approach under which natural river basin boundaries (versus administrative boundaries) govern all aspects of natural resources management and planning (Wegerich 2009; GIRoA, 2007b). Customary law tends to govern the use of water on private land and in private systems, the resolution of conflicts over water, and water resource conservation. Customary law generally governs allocation of water through the kaerez system, which is constructed and maintained on a community basis (McMurray and Tarlock, 2005) (source USAID, 2010).
Law on Managing Land Affairs	2008	The 2008 Law on Managing Land Affairs sets out definitions for various land types and classifications, requirements for land deeds, and principles governing allocations of state land, land leasing, land expropriation, settlement of land rights, and restoration of lands.
Draft Rangeland Management Law	Draft 2009	The Rangeland Law is currently under development. Its purpose is to create a framework for community custodianship and management of rangeland resources to provide for sustainable use and management of the rangeland resources, to maximize productivity of rangeland resources and to maintain ecological functions and evolutionary processes of Afghan rangelands, conserve soil and water resources, maintain biological diversity, and combat desertification.
Draft Forest Law	Draft 2009	The Draft Forest Law reflects the principles of community based natural resource management enshrined in the Cabinet-endorsed National Strategy for Forests and Rangeland. The draft is currently with the Ministry of Justice for processing.

Relevant regulations, guidelines and policies are described in Table 3-2.

Table 3-2: NEPA's National regulations, guidelines and policies

Regulation/ Guideline/ Policy	Date	Key areas
Interim Environmental Impact Assessment Regulations	Draft 2.3	These regulations govern the process of environmental impact assessment in Afghanistan on an interim basis pending the establishment of the EIA Board of Expert in terms of Article 20 of the Environmental Law and issuing of final regulations. These regulations provide the detailed process of EIA and list the projects into category A and B based on potential impacts.
Administrative Guidelines for the Preparation of Environmental Impact Assessments	Draft 2 March 2007	These guidelines are in draft form and have been prepared by NEPA in coordination with UNEP. The purpose of guidelines is to provide guidance to proponents while undertaking a development project that may have a potential impact on the environment. The guidelines also provide guidance on how public should be consulted and defines the roles and responsibilities of various stakeholders in the process.

Regulation/ Guideline/ Policy	Date	Key areas
Environmental Impact Assessment Policy – "An Integrated Approach to Environmental Impact Assessment in Afghanistan"	November 2007	NEPA with the assistance from UNEP has developed the EIA Policy of Afghanistan. The policy stipulates energy sector guidelines to the project proponents to integrate EIA in the process of development and the procedures to address environmental consequences and involve necessary institutions in the process of project implementation.

Framework for EIA (Environmental Act)

The Government's regulation on environmental impact assessment is based on the Environmental Act of Islamic Republic of Afghanistan (Gazette No. 912) dated 23 Jadi, 1384 (25 January, 2007). The National Environmental Protection Agency (NEPA), as an independent institutional entity, is responsible for coordinating and monitoring conservation and rehabilitation of the environment, and for implementing this act.

Article 16 and 17 of Chapter 3 of the Environmental Act describes the process of preparing a preliminary assessment, an environmental impact statement and a comprehensive mitigation plan to be conducted by the proponent of each project.
Article 21 mentions public consultation is required for all the projects.

Article 18 describes the approval procedure of environmental impact assessment. The NEPA will appoint an EIA Board of Experts to review, assess and consider applications and documents submitted by the proponent. Acting on the advice of the EIA Board of Experts, NEPA will either grant or refuse to a grant permit in respect of the project. A permit granted will lapse in the event that the proponent fails to implement the project within three years of the date of which the permit was granted.

Article 19 describes the appeal procedure. Any person may, within thirty (30) days of the granting or refusal of a permit, appeal the decision to the Director-General of the NEPA. The Director-General will review the appeal application and thereafter make an appropriate decision. Should the appellant wish to appeal the Director-General's final decision, the matter will be referred to the relevant court.

Land Code

The legal framework governing land rights is a collection of laws including formal (constitutional and civil law), religious and customary law. However, the government is making progress toward creating a cohesive framework. The 2004 Constitution of Afghanistan provides that property will be safe from violation, no one will be forbidden from owning and acquiring property except by law, and private property can only be confiscated by legal order.

In 2007, the Cabinet of Ministers approved a new Land Policy that allows for the formalization of land rights in informal settlements, and addresses bottlenecks in land rights administration as well as the overlap in different institutions' authority over questions of land rights (USAID, year unknown).

The 2008 Law on Managing Land Affairs sets out definitions for various land types and classifications, requirements for land deeds, and principles governing allocations of state land, land leasing, land expropriation, settlement of land rights, and restoration of lands. The law recognizes Shari'a, and defers to applicable principles of Shari'a in some areas (GIRoA2008b). Issues that are not covered by the Law on Managing Land Affairs are governed by the country's Civil Code, which in large measure reflects the Hanafi school of

Islamic law (Shari'a). Islamic law governs when the Civil Code is silent on an issue (USAID, year unknown).

Customary law dominates in Afghanistan, and the Civil Code recognizes the application of customary law with regard to land rights. The Ministry of Justice estimates that, due to lack of trust and confidence in formal judicial institutions, 90% of Afghans rely solely on customary law.

National Environment Strategic Documents

Afghanistan's national environmental strategies are contained within the fabric of four interlocking national-level planning documents:

- the Millennium Development Goals: Vision 2020;
- the Afghanistan Compact;
- the Afghanistan National Development Strategy (ANDS 2008-2013) and
- the National Environment Strategy.

3.2 International Agreements

Afghanistan has ratified a number of international agreements and conventions relating to the protection of the environment and biodiversity.

The Ramsar Convention on Wetlands, signed in Ramsar, Iran in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Afghanistan is currently not a Contracting Party to the Ramsar Convention.

The World Heritage Convention (WHC) is an international agreement that was adopted by the General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1972. It is based on the premise that certain places on earth are of outstanding universal value and should therefore form part of the common heritage of mankind. The Convention seeks to identify and safeguard the world's most outstanding natural and cultural heritage. Afghanistan became a Party to the Convention in March 1979.

The objective of the Convention to Combat Desertification (UNCCD, Paris, 1994) is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/ or desertification. Afghanistan signed the UNCCD in 1995 and the Convention entered into force in December 1996.

The United Nations Framework Convention on Climate Change (UNFCCC) sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. Afghanistan signed the UNFCCC in June 1992. The Transitional Authority ratified the Convention in September 2002 and the Convention entered into force in December 2002. The Kyoto Protocol is an extension to the Convention adopted in 1997 that outlines legally binding commitments to emission cuts. Afghanistan has yet to accede to the Kyoto Protocol.

The Convention on International Trade in Endangered Species (CITES) is an international agreement between governments which came into force in 1975. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Afghanistan acceded to CITES on 30 October 1986 but has not been actively implementing the Convention.

Afghanistan signed the Convention on Biological diversity (CBD) in 1992 and ratified it in 2002. Afghanistan submitted the Fourth National Report to the CBD Secretariat in 2009.

Afghanistan is not a Party to the Cartagena Protocol on Biosafety, a supplementary agreement to the CBD. Afghanistan does not currently consider biosafety to be a significant issue relative to others challenges facing the country (MAIL, 2009).

3.3 International Requirements

3.3.1 ADB safeguards

ADB's Environment Operational Directions 2013–2020 identifies 4 environment operational directions to promote the transition to green growth, and address the causes and consequences of climate change. ADB's Safeguard Policy Statement (2009) is a consolidated policy framework setting out policy objectives, principles and requirements for 3 safeguard areas: environmental, involuntary resettlement, and indigenous people.

The ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, financial intermediation loans, and private sector investment operations. Environmental assessment is a process rather than a one-time report, and includes necessary environmental analyses and environmental management planning that take place throughout the project cycle.

This IEE was carried out in accordance with the following relevant ADB Guidelines:

- Safeguard Policy Statement (SPS), June 2009, effective since January 2010;
- Operations Manual (OM) with relevant Bank Policies (BP), 2013.

3.3.2 Other relevant international guidelines

- IFC Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution, April 2007;
- ICNIRP Guidelines for Limiting Exposure to time-varying Electric, Magnetic, and Electromagnetic Fields (UP TO 300 GHz) (International Commission on Non-Ionizing Radiation Protection);
- CIGRE 1998: High Voltage Overhead Lines – Environmental Concerns, Procedures, Impacts & Mitigation.
- General EHS Guidelines (covering construction work) as well as the transmission sector guidelines

3.3.3 Gap analysis

The legal framework of the Islamic Republic of Afghanistan does in the essence correspond with the international regulations and safeguards. Gaps however do exist in enforcement of the regulations. There is still a considerable lack of institutional capacities for implementation, monitoring and evaluation.

There is a lack of specific Social and Environmental (S&E) qualification of staff and a specific S&E department does not exist within the implementing institution (DABS), partly the existing structures are overloaded with work and staff is not sufficiently remunerated. To some extent, the number of highly qualified staff is not sufficient to cope with the amount of work to guarantee an effective enforcement of the regulations.

The lack of access to legal support and lack of trust in the institutions, especially for weaker sections of the society may create further gaps concerning implementation of compensation and resettlement.

Additional training would be a necessary component to improve implementation and monitoring performance. Compliance with international safeguards could be increased with independent monitoring by internationally experienced auditors/ consultants.

Putting environmental and social compliance under the responsibility of the construction contractor should be clearly defined in contractor's Terms of Reference (ToR) and credible monitoring measures should be implemented.

4. DESCRIPTION OF THE PROJECT

4.1 Technical Description

The project consists of the following sub-projects:

- Subproject 1: 500 kV Single Circuit line built in Stage A from TKMN border via Andkhoy to Sheberghan, will be extended for ca. 308 km to Dasht-e-Alwan;
- Subproject 2: 220 kV Double circuit line Andkhoy to Sheberghan (64.5 km).

Of the total combined length of lines of 366.5 km, only about 45 km are not aligned with other existing or planned high voltage overhead lines.

4.1.1 Sub-project 1: 500 kV Single Circuit Line

The entire 500 kV S/C line from the Turkmenistan border to Dasht-e-Alwan will consist of the existing (Stage A) 500 kV single circuit line leading from Turkmenistan border to Sheberghan, and of the new 500 kV S/C line leading from Sheberghan to Dasht-e-Alwan Converter Station (Stage B, subject of this Project).

The section between SD1 to SD13 (74 km) is located in Jawzjan province. Section SD13 to SD 35 (121 km) is in Balkh province. Section SD35 to SD72 (92 km) is mainly in Samangan province, and SD72 to SD75 (15 km) is located in Baghlan province.

The new line (portion between Sheberghan and Dasht-e-Alwan) will connect to Stage A 500 kV line just west of Sheberghan substation (in order to bypass the substation). The adjustment of the existing 500 kV line will also be done at Andkhoy substation, in order to bypass it. Once completed, the line will provide the direct link from Turkmenistan border to Dasht-e-Alwan.

The overall length of the proposed route is 308 km, maximum altitude is 1,960 m, and minimum is 332 m. Average altitude is 725 m.

Full 166 km of the corridor of this proposed line is shared with other overhead lines - two under procurement (Stage A 500 kV Andkhoy to Sheberghan; Stage A 220 kV Sheberghan to Mazar-e-Sharif). There is sufficient space and the construction seems feasible.

The central 176 km of the line (Aybak to south of Balkh) passes for ca 50 km along the river valley (south of Mazar-e-Sharif e Sharif), and turning east toward Aybak it goes for 126 km through rugged and rocky terrain, but of relatively moderate slopes.

The route map and corresponding list of angle points is presented in Annex 7-1 of the Pre-design Report.

4.1.2 Sub-project 2: 220 kV Double Circuit Line

Once the Stage A 500 kV line is incorporated into link to Dasht-e-Alwan, Andkhoy will need to be connected with Sheberghan with a 220 kV Double Circuit line.

The route overview is presented in Annex 7-2 of the Pre-Design Report.

The new proposed line will share the extended corridor with the Stage A 500 kV Single Circuit line from Andkhoy to Sheberghan. It will follow the same route as the Stage A 500 kV line. The Stage A route had been approved for the construction and there is sufficient room to extend the corridor in order to accommodate this line.

This line represents part of the 220 kV D/C link between Andkhoy, Sheberghan and Mazar-e-Sharif.

The proposed 220 kV Double Circuit line will be positioned south and west of the Stage A 500 kV line. While the distance between two lines (center line to center line) may be reduced to ca 50 m, for practical reasons of constructability and maintenance the lines will be between 80 and 100 m apart. We have not identified any particular space constraints along the route.

The line will be 64.5 km long. For the most part it is close to state highway and no access difficulties are anticipated. It will pass through flat, semi-desert terrain of predominantly sandy soils, in long, straight sections. The average altitude is 320 m, with marginal deviations - minimum altitude is 275 m, maximum 374 m.

No major obstacles need to be over-sailed and no particular constructability issues have been identified along this route. Tranche 1 subprojects will be built in the same corridor as existing and projected transmission lines, therefore a Cumulative Impact Assessment is deemed necessary at least on quantitative level with regards to land take and operational impact, after detailed design.

4.1.3 External clearances

External clearances impose minimum allowable distances to ground, vegetation, roads, other power lines and telecommunication lines and recreational areas. No existing residential buildings will be left in the ROW of the transmission lines. Remaining in line with previous studies and specifications, the external clearances as per Table 4-1 have been proposed in the pre-design report for the sub-projects.

Table 4-1: External Clearances

Clearance Case	Minimum clearance 500 kV [m]	Minimum clearance 220 kV [m]
To ground in unobstructed countryside normal ground profile rockface or steep slope	 8.5 5.5	 6.7 3.7
Vegetation under the line (vertical) Vegetation beside the line (horizontal) Trees under the line (vertical) Trees beside the line (horizontal)	3.5 3.5 5.0 5.0	1.7 1.7 3.2 3.2
Residential and other buildings Line above buildings (vertical distance) Line adjacent to buildings (horizontal dist.)	 10.0 7.0	 7.0 5.0
Antennas, street lamps, flag poles, signs, other urban obstacles	5.5	3.7
Roads Crossings (vertical) to road surface	9.5	8

Clearance Case	Minimum clearance 500 kV [m]	Minimum clearance 220 kV [m]
Adjacent to roads (horizontal)	5.0	4.0
Power lines or telecommunication lines Crossing of lines (vertical dist.) Adjacent to lines (horizontal dist.)	 4.0 3.5	 2.0 1.7
Playgrounds, sports areas	12.0	10.5

4.2 Investigation Area

The 500 kV single-circuit line from the close vicinity of the Sheberghan substation to the Dasht-e-Alwan converter station (**sub-project 1**) would, for the most part, be located close to existing lines and pass through predominantly flat terrain. The line length is ca. 308 km. Some difficulty is expected in a section of ca. 10 km long passing through the mountain chain south-west of Khulm, and in the section bypassing the city of Mazar-e-Sharif on the north side. Figure 4-1 shows some pictures of the project area for this sub-project (October 2014).




Figure 4-1: Overview of the investigation area of sub-project 2: from top to bottom, from left to right: SD 2, Sheberghan area; SD 20, Sheberghan area; SD 31, Mazar-e-Sharif area; SD 27, Mazar-e-Sharif area; SD 36, Samangan area ; SD 58, Samangan area; SD 73, Dashte-el-Alwan area; SD 74, Dashte-el-Alwan area.

The 220 kV double-circuit line from Andkhoy to the Sheberghan substation (**sub-project 2**) will be 64.5 km long. Throughout its length it will be aligned with the Phase-A 500 kV single-circuit line between Andkhoy and Sheberghan, on average at 100 m offset. The terrain is flat, semi-desert, and neither access nor other construction difficulties are expected. The design will maintain compatibility with 220 kV double-circuit lines as specified in Stage-A of PREVIOUS MFF Tranche 1.

The RoW is 60 m wide for the 500 kV line and 40 m wide for the 220 kV line. Most of the designated lines (293 km out of the 386 km in total) are located parallel to either existing lines or those procured in stage A effectively showing one joint corridor. The route described above can be seen on Figure 4-2.

Figure 4-2: Satellite picture showing the Project Area

As a principle, in order to minimize impact on land acquisition and usage, the new 500 kV line is aligned as close as possible to the existing 220 kV lines between Sheberghan and Mazar-e-Sharif, and further south from vicinity of village of Sayyad all the way to Dasht-e-Alwan.

The accessibility to future work areas is maintained by relative proximity to the main road. The anticipated minimum required corridor width for the new lines is assessed to be 60 m for 500 kV and 40 m for 220 kV. Outside this strip, but still inside the RoW all vegetation above 3 m height needs to be cleared. In-span land plots within the RoW corridor can still be used by the land owners but under restriction of the plantations growth height.

5. BASELINE DESCRIPTION

Two social safeguard specialists, one environmental specialist, male field surveyors, and technical surveyors conducted field work in the subproject areas between the 12th and the 20th of October 2014. Socio-economic surveys of the affected households were conducted as part of the LARP preparation. The environmental team preparing the IEE surveyed the physical and biological conditions of the areas. Gaps in baseline information collected will be addressed after detailed design stage.

This Section presents a summary of the socio-economic, physical and biological characteristics of the project areas.

5.1 Baseline features of the overall project area

Figure 5-1 shows the geological features which can be found in the overall project area. It indicates the predominant presence of conglomerates, pebbles, sand, loams, travertines and salt. Other features such as sandstone, siltstone, clay, maris, gypsum, conglomerates, and limestone are also present, although with less expression.

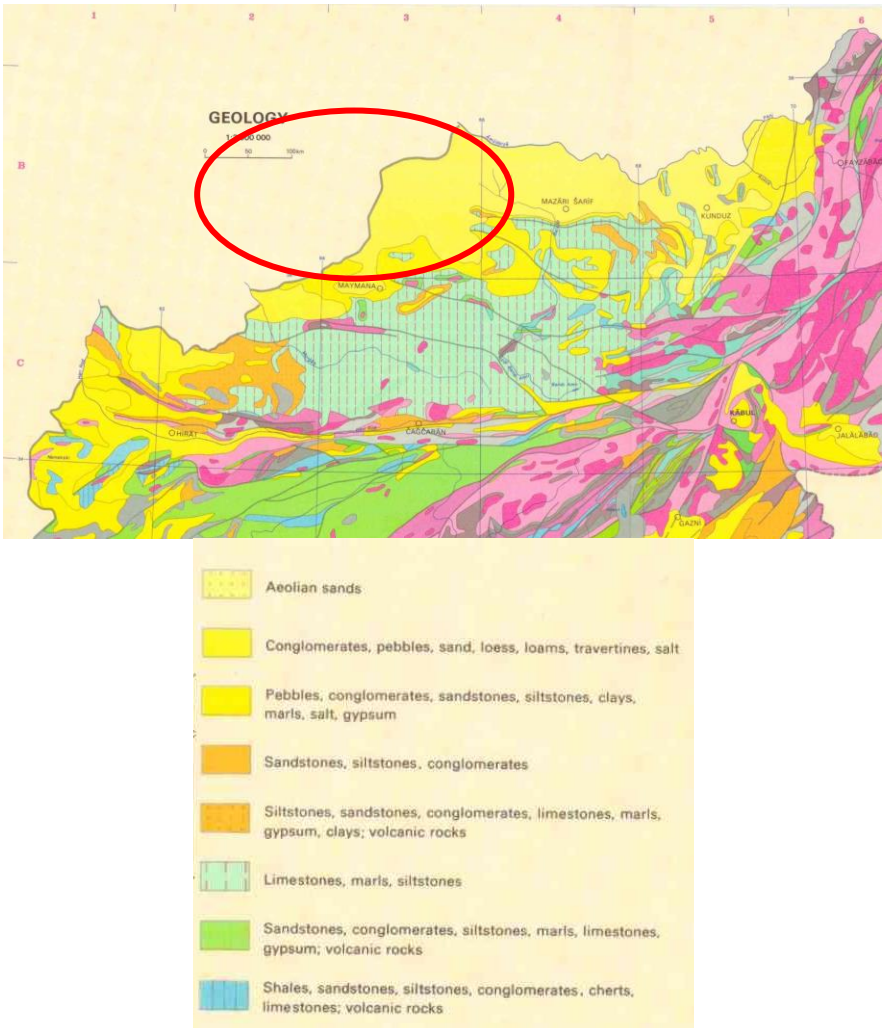


Figure 5-1: Geology of Afghanistan (with investigation area)

Afghanistan is located in a tectonically active region where earthquakes have historically caused damage, not only from strong ground shaking and surface rupture, but also from

liquefaction and extensive land sliding in mountainous areas. Figure 5-2 shows locations and magnitudes for earthquakes.

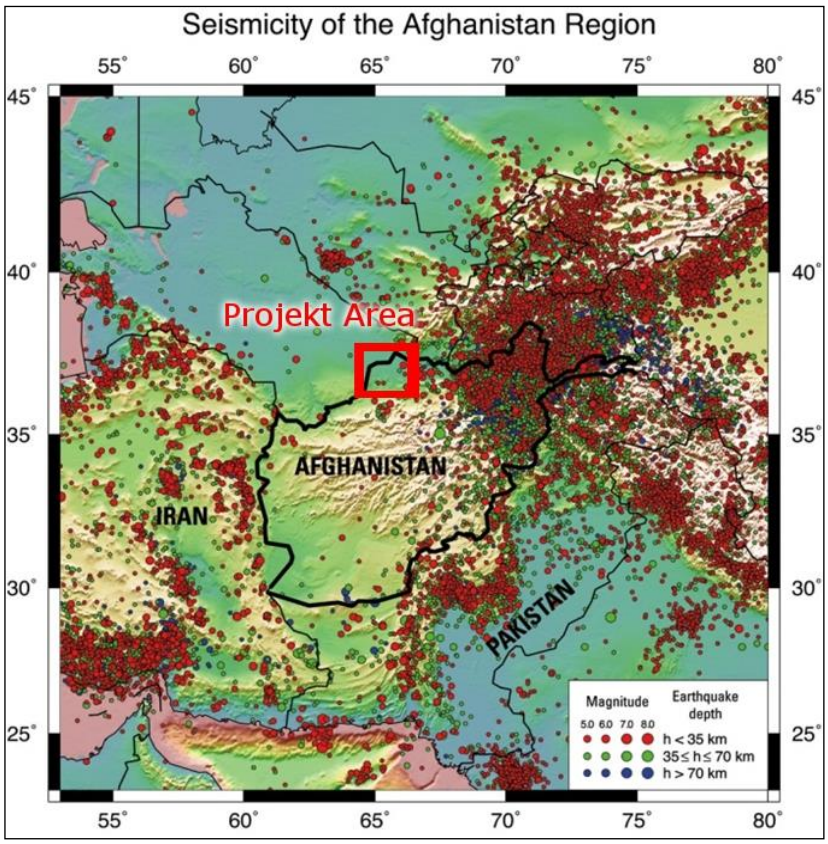


Figure 5-2: Seismicity in Afghanistan (with investigation area) (Engdahl, van der Hilst, and Buland, 1998)

In comparison to the investigation area, there are other areas in Afghanistan where the seismic risk is considerably higher.

The investigation area is characterized by a continental dry climate. As shown in Figure 5-3 the mean annual precipitation in the project area is around 250 mm per year and mean temperature around 18°C. The dryer zones receive below 100 mm average yearly rainfall (typically in spring) with high variability in between. The last few years have brought very little rain to the Investigation area, which has made the area dry.

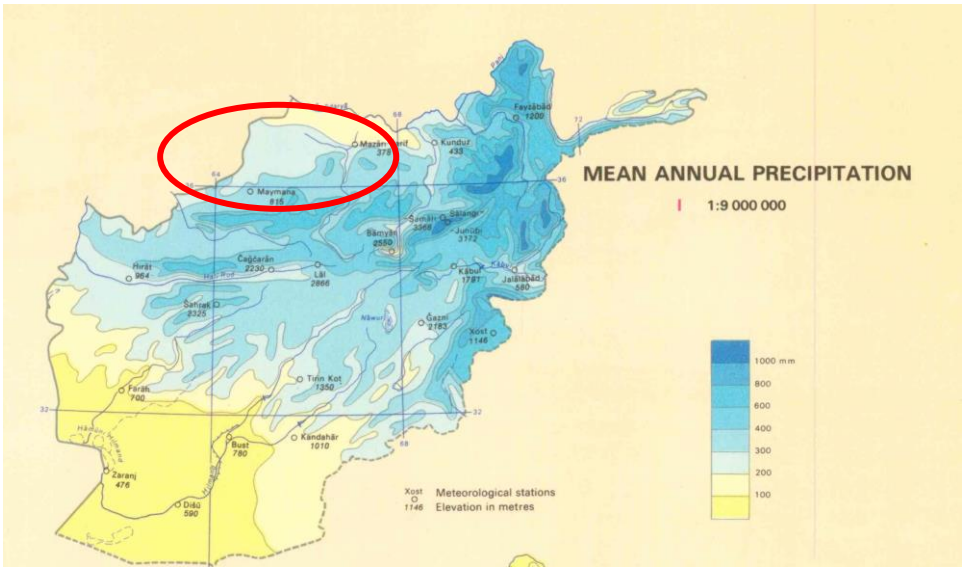


Figure 5-3: Mean annual precipitation in Afghanistan (with investigation area)

According to Figure 5-4 (map of the natural life zones of Afghanistan), the transmission line corridor traverses a grass steppe zone of the ecoregion Badkhys-Karabil-Semi-Desert extending through Afghanistan`s North-Western region.

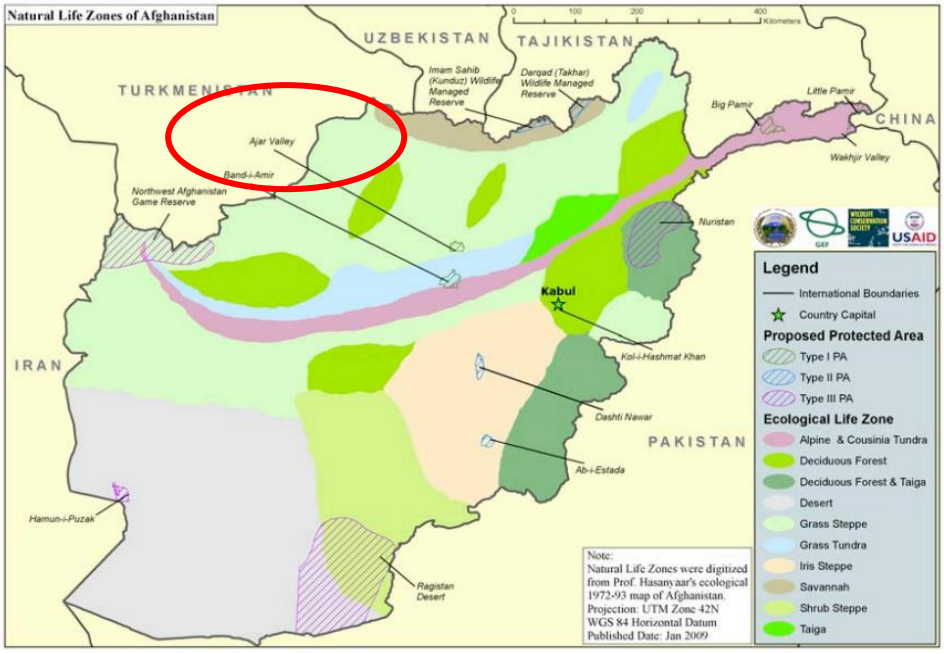


Figure 5-4: Natural Life Zones of Afghanistan (with investigation area) (USAID, 2009)

Natural vegetation in Afghanistan (Figure 5-5) has been severely influenced by man and only a few high mountain and very dry desert areas retain a quasi-natural vegetation cover. In the cultivated areas, natural vegetation was cleared long ago. The severe and uncontrolled usage of natural vegetation has totally changed the vegetation type and has deteriorated its quality and density. At present, practically all grasslands and grazing types of Afghanistan are in a serious state of reduction.

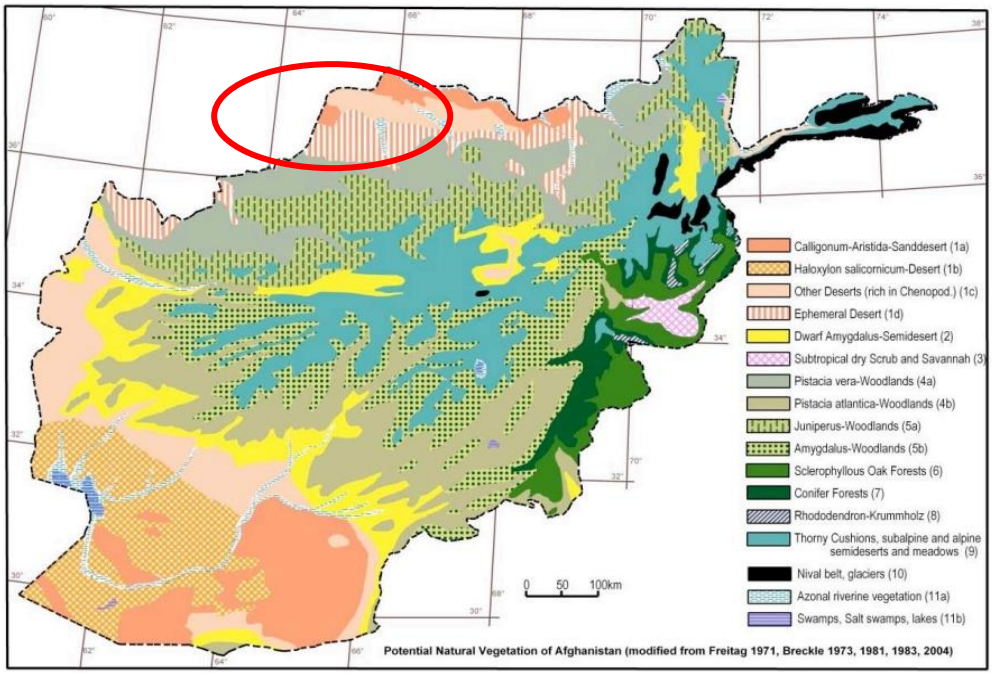


Figure 5-5: Natural Vegetation in Afghanistan (with investigation area)

The following Figure 5-6 shows that the investigation area does not cross any protected area or important biodiversity conservation area. The transmission line corridor is neither located near a declared or proposed protected area nor near an Important Bird Area (IBA)[1]. It is further not situated within a major bird migration corridor. Neither important wetlands (Ramsar Wetlands) nor wildlife sanctuaries can be found in the investigation area.

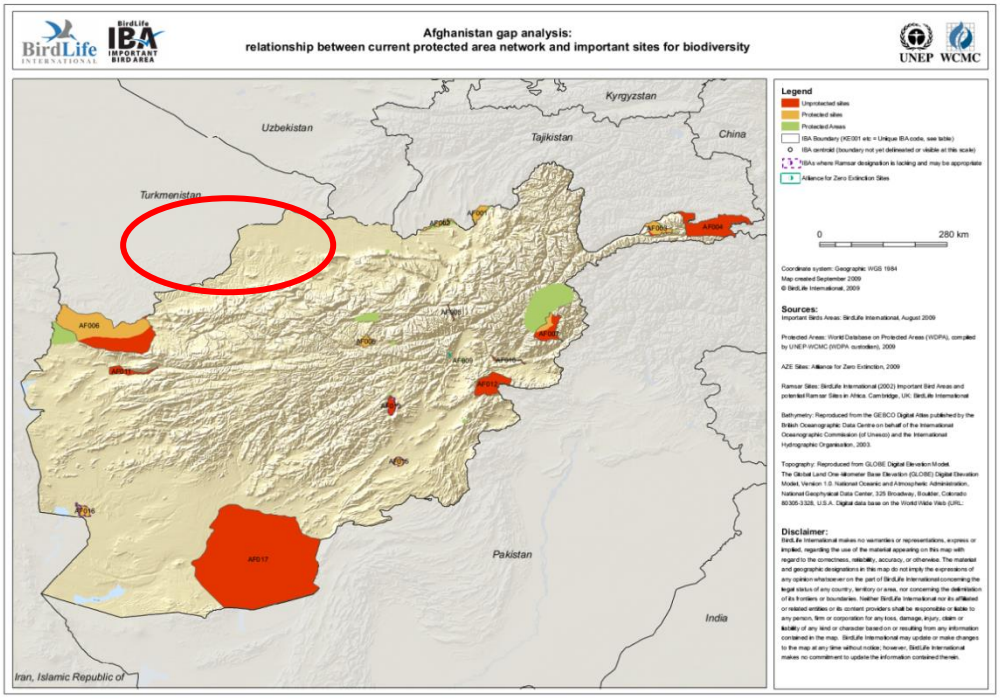


Figure 5-6: Protected Areas and Important Sites for Biodiversity in Afghanistan (with investigation area)

[1] The closest IBA is located in approximately 45 km to the north from Andkhoy.

Figure 5-7 shows that the most common ethno-linguistic groups in the investigation area are Uzbeks and Turkmen, followed by Tajik and Pashtun.

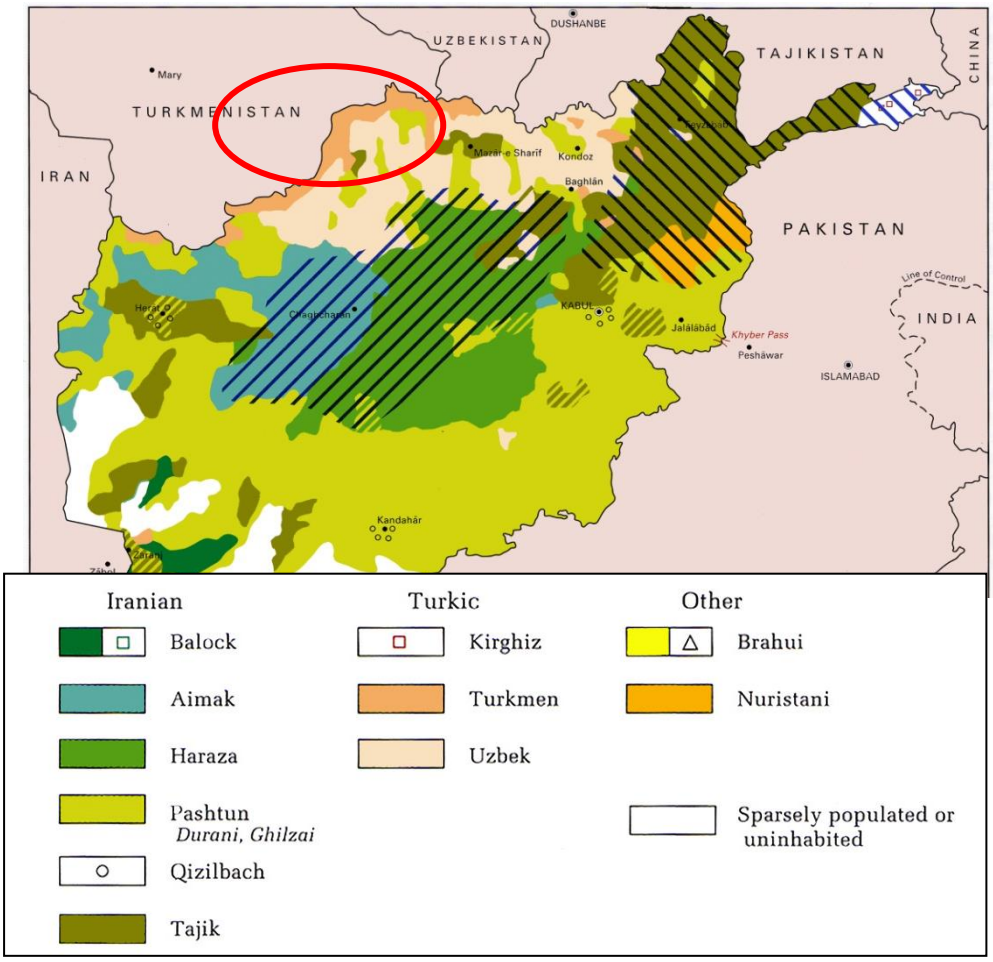


Figure 5-7: Ethno-linguistic groups in Afghanistan (with investigation area)

5.2 Sub-project 1 (part 1): Between Sheberghan and Mazar-e-Sharif

This section of the transmission line crosses the provinces of **Jowzjan** and **Balkh**.

5.2.1 Physical environment

Geology and seismicity:
The geological situation of the Investigation area is marked by quaternary sediments, and quaternary sands and dunes. There are important oil and natural gas reserves as well as sulphur, sand and gravel deposits.

According to the Scale of Richter, the earthquake hazard is assumed to be 6.0 local magnitudes (ML) in the Investigation area, meaning a medium risk.

Landscape:
The landscape of the Investigation area is marked by the general features of the Afghan semi-desert and grass steppe. The river valleys are characterized by settlements and agricultural fields. The vegetation varies according to the fertility by mineral content of the local soil and rainfall pattern and project impact on the patches of grass land savannah

that does not remain in the corridor will not be significant and with respect to its use for grazing will not cause issues with grazers. This will be reconfirmed at after detailed design stage. Generally, vegetation is sparse in the Investigation area (Figure 5-8).

Figure 5-8: Semi-desert with very poor pastures (only after wet years) along the line corridor near Sheberghan

After Sheberghan SS the line corridor traverses three rivers and two grouped settlements. From there, it leads through semi-desert savanna along the road and the existing 110 kV transmission line before crossing a river to reach Mazar Power Plant and the outskirts of Mazar town. The terrain is mainly flat and semi-desert (sandy, deleterious, dusty sediment). After angle point SD17 the line passes through swathes of agricultural land trough a gentle sloped terrain climbing into the highest elevation of 470 m. The area is practically flat until SD32 where it begins to climb. From SD33 to SD38 the line passes through rocky and mountainous terrain, difficult to access and prone to runoff erosion. The area is interspersed with erosion gullies. After point SD38 the line continues parallel to existing lines, offset west or south of them for about 100 m. Generally it remains close to highway A-76. The terrain varies from flat valleys to mildly hilly and rocky.

Scenic Areas are located between Sheberghan and Mazar-e Sharif, where the Transmission line leads between settlements and main-road on the Northern Side and the Mountain Range on the Southern Side. However, in this section the Transmission line will run parallel to an existing one, so that no additional visual impact will be created.

The Investigation area is presently not a touristic area.

Climate and air:

The Investigation area is characterized by a continental dry climate. Rainfall is below 250 mm per year and mean temperature around 18°C. The dryer zones receive below 100 mm average yearly rainfall (typically in spring) with high variability in between. The last few years have brought very little rain to the Investigation area, which has made the area dry. The mean temperatures in the Investigation area range from 3°C in January to 38°C in July.

Being a land locked country, the international trade of Turkmenistan passes through Aqina and Turkmen borders. Hence, the major source of air and noise pollution is heavy traffic load on Aqina – Sheberghan, Sheberghan and Kabul roads. Use of fuel wood for cooking purposes and fugitive dust from quarries also contribute to air pollution in the Investigation area. Noise is caused by quarrying actions. The area is not concerned with industrial air pollution. All in all, there is not much air pollution and noise caused in the line corridor or its vicinity.

Water resources:
Despite being situated in the semi-desert and endowed with scarce water resources, two major rivers can be found in the Investigation area, which are crossed by the line corridor: Safid River (seasonal) and Balkh River (perennial).

Safid River (Sheberghan): The Safid River is a river in northern Afghanistan originating in southwestern Sar-e Pol Province. It flows north and is joined by a major tributary from the east just south of the provincial capital, Sar-e Pol. The river continues north past the town of Sar-e Pol and into Jowzjan Province. It flows past Sheberghan into the edge of the Karakum Desert where it dries up. There are irrigation canals that spread the water out around Sheberghan.

Balkh River (Mazar-e Sharif): The Balkh River rises in the Band-e Amir lakes in the Hindu Kush. In its upper reaches the river is known as the Band-e Amir River (Rud-e Band-e Amir). The river flows west, then north, and terminates in irrigation canals in the area of the cities of Balkh and Mazar-e Sharif or in the desert. In times of exceptional flood the river drains into the lowlands of Turkmenistan. In ancient times it terminated in a delta at the Amu Darya, but has not reached that river since irrigation canals were developed centuries ago.

Here and there, small rivers and creeks are crossed by the line corridor. No water storage facility is present in the Investigation area hence most of the water is received either from rainfall or snow. The drought during the last few years resulted in most of the perennial flood streams remaining dry during most part of the year. There is only a low probability of flooding in the proposed transmission line corridor.

Although there is no actual information on the groundwater depth in the corridor of the Line Section from Sheberghan to Mazar-e Sharif it can be assumed, that the groundwater table can be found at minimum 15 m depth there.

The majority of Afghans use groundwater as their prime and often only source of drinking water. Groundwater has traditionally been utilized for irrigation purposes through the use of karezes, springs and willow hand dug open wells. In more recent years, deep drilled wells have become a more common means of extraction. Today, all traditional groundwater irrigation systems have reduced or dried up completely. The groundwater levels continue to fall.

5.2.2 Biological environment

Flora:
Natural vegetation has been severely influenced by man and only a few high mountain and very dry desert areas retain a quasi-natural vegetation cover.

In the cultivated areas, natural vegetation was cleared long ago. The severe and uncontrolled usage of natural vegetation has totally changed the vegetation type and has deteriorated its quality and density. At present, practically all grasslands and grazing types of Afghanistan are in a serious state of reduction.

The vegetation along the line route varies according to the fertility and humidity of the local soil. The line corridor crosses a semi-desert landscape for most of its length. The area is marked by alternate grassland savanna and sandy desert (Ephemeral desert; Caligonum Aristida Sand Desert; Other Deserts). Only at crossings of river valleys, there are patches of azonal riverine vegetation (Shirin River, Safid River, Balkh River). Woodlands (Juniperus or Pistacia Vera/ Atlantica Woodlands) are not crossed by the line

corridor. In the lowlands, especially near Andhkoy and the other villages and the perennial/seasonal rivers, all arable surfaces are cultivated lands. There are some plantations, trees, bushes and grassland.

Fruit plants growing in different locations of the line corridor include melon, watermelon and zegher. It is not expected that any endangered plant species grow in the line corridor.

There is hardly any forest in the entire Investigation area. Occasional trees and small patches of "forest" can be found in the vicinity of houses and rivers (Figure 5-9). The only identified "forest" patches are located in river bends and are not crossed by the transmission line corridor. No reserved forest exists in the Investigation area even up to 5 km from the proposed transmission line corridor.

Figure 5-9: Forest in Safid River Valleys

Fauna:

Due to the degraded habitat and sparse vegetation not many wild animals live in the Investigation area. Mammals, birds, reptiles, amphibians, fresh water fish and insects are the main animal groups there.

Jackals, foxes, cats and different species of bats are commonly found in the desert and semi desert area, whereas wolves are rare.

The Investigation area is not very rich regarding the avifauna and its diversity due to the lack of suitable habitats.

The semi-desert area of the line corridor is a typical biotope for snakes, scorpions and lizards, which are the common reptiles in the Investigation area. Regarding snakes, mostly non-poisonous species like Rat eaters can be found. Black and soil colored scorpions are in abundance. Concerning lizards, agamas, geckoes and monitor lizards live in the Investigation area. Goh (Varanus monitor) is the largest lizard there. Frogs and toads are common amphibians in the Investigation area.

Due to the scanty vegetation not many insects are found in the Investigation area. However, flies and mosquitoes are very common. The surface waters of the line corridor are typical biotopes for sand flies. A variety of butterflies can be found on shrubs and herbs. Millipedes, centipedes, bugs and beetles are also found in the area.

It is not expected that any endangered wildlife species (based on IUCN categories and AWEC) live in the line corridor.

Protected Areas:

No protected areas (National Parks, Waterfowl Sanctuaries and Wildlife Reserves) are crossed by the transmission line corridor or are located near to it. The transmission line corridor is neither located near a declared or proposed protected area nor near an Important Bird Area (IBA). It is further not situated within a major bird migration corridor. Neither important wetlands (Ramsar Wetlands) nor wildlife sanctuaries can be found in the Investigation area. The distance to nearest protected area from line corridor will be confirmed after detailed design stage.

One historical cultural site (Aquina Huzi) is located near the planned transmission line corridor, in 200 m distance from the ROW.

5.2.3 Human environment

Population:

Jawzjan Province has a total population of 426,987. The province comprises 50,900 households. Balkh Province has a total population of 1,123,948. There are 119,378 households in the province and households on average have 7 members.

Along the line corridor, the majority of the population lives as a joint/extended family system. The elder of the house is responsible for all social matters and other activities of the house including income and expenditure, etc. The size of most of the extended households located along the line corridor is between 10 to 30 persons, while the average total extended family size is to the extent of 26 persons. The gender composition reveals that the proportion of males and females is to the extent of 57% and 43% respectively.

Literacy and education:

The overall literacy rate in Jawzjan Province is 31%, however, while two fifth of men are literate (40%), this is true for just over two tenths of women (21%). In the population aged between 15 and 24 the situation for men is slightly better with 46% literacy, whereas for women the figure shows little change (22%). The Kuchi population in the province has particularly low levels of literacy with just 1.6% of men and 0.1% of women being able to read and write. On average 40% of children between 6 and 13 are enrolled in school, however, again the figure is around half of boys (45%) and one third of girls (33%). Amongst the Kuchi population, one in fifty boys (2%) and no girls (0%) attend school in Jawzjan during the winter and summer months

The overall literacy rate in Balkh Province is 44%, however, while more than half of the men are literate (54%), this is true for just about one-third of the women (32%). However, in the population aged between 15 and 24 the situation for men is slightly better with 58.3% literacy, and there is a smaller improvement for women (35.4%). The Kuchi population in the province has particularly low levels of literacy with just 6.1% of men and none of women able to read or write. On average 58% of children between 6 and 13 are enrolled in school, including around two-thirds of boys (66%) and almost half of girls (48%). Amongst the Kuchi population, nearly half of the boys (47%) and one in five girls (20%) attend school in Balkh during the winter months, however, only a quarter of the boys (25%) and about one in ten girls (9%) attend school in the province during the summer.

40% of the population living along the line corridor has access to schools.

Occupation and Sources of Income:

The Investigation area features no industrial or major commercial activities except for activities in a few urban areas (e.g. Sheberghan Topping Plant). The major occupations in the Investigation area are service, business (e.g. transport, shops, hotels), and labour (skilled/unskilled). Carpet waving is mostly done by females. Also, a significant proportion of the population is engaged in daily wage labour. Other people are working abroad or are involved in farming. Partly the household income is also supplemented through the sale of livestock (especially goat/ sheep).

Health situation:

In 2005, there were 10 health centers and 6 hospitals with a total of 264 beds in Jawzjan Province. 178 doctors and 299 nurses were employed by the Ministry of Health working in the province, which represented a 50% increase in the number of doctors and a 69% increase in the number of nurses compared to 2003.

In Balkh Province 39 health centers and 7 hospitals with a total of 477 beds could be found in 2005. There were also 280 doctors and 270 nurses employed by the Ministry of Health working in the province, which represented an increase of about 9% in the number of nurses and 18% increase in the number of doctors in the province compared to 2003.

According to the field survey, 30% of the population living along the line corridor has access to health facilities.

Access to Safe Drinking Water:

In Jawzjan Province, on average for only 24% of households safe drinking water is available. This amounts to 64% in the urban area, and declines to just 6% in rural areas. Almost nine in every ten households have direct access to their main source of drinking water within their community (88%). But, for around one in ten households travel to access drinking water takes up to an hour (8%), and 3% of households have to travel up to 6 hours to drinking water access.

In Balkh Province, on average only 31% of households use safe drinking water. This rises to 67% in the urban area, and falls to 12% in rural areas. Four of five households (80%) have direct access to their main source of drinking water within their community, however almost one in five households (18%) has to travel for up to an hour to access drinking water, and for 1% of households travel to access drinking water can take up to 6 hours.

Safe drinking water is not available to the population in the Investigation area. However, in some places, the women are involved in fetching drinking water from nearby water source (a reservoir which exist in the town center), where the community is fetching water for domestic purposes. Stream and wells water is reasonable for some domestic purposes such as washing dishes. Generally, the minority of the households (20%) has access and availability of a drinking water facility nearby their residence. The major sources of drinking water observed in the Investigation area are streams, wells along the streams/ springs, and lift pumps installed at nearby water sources.

Ethnicities:

The major ethnic groups living in Jawzjan Province are Uzbek and Turkmen followed by Tajik, Pashtoon and Arab. Uzbek is spoken by the largest proportion of population (39.5%). Turkmen comes second with 28.7% of population. Pashtu and Dari are spoken by 17.2% and 12.1% of the total population, respectively.

Jawzjan Province also has a population of Kuchis or nomads whose numbers vary in different seasons. In winter 76,850 individuals, or 3.2% of the overall Kuchi population, stay in Jawzjan living in 20 communities which are all settled.

The major ethnic groups living in Balkh Province are Tajiks and Pashtuns followed by Uzbek, Hazaras, Turkmen, Arab and Baluch. Dari is spoken by about 50% of the population and 58% of the villagers. The second most frequent language is Pashtu, spoken by the majorities in 266 villages representing 27% of the population, followed by Turkmen (11.9%) and Uzbek (10.7%). Balkh Province also has a population of Kuchis or nomads whose numbers vary in different seasons. In winter 52,929 individuals, or 2.2% of the overall Kuchi population, stay in Balkh living in 80 communities (source: World Food Program (2008), Afghanistan Provincial Profiles Faryab, Jawzjan, Balkh).

According to the field survey, the main ethnic groups/ tribes living along the line route are Uzbeks (53%), followed by Tajiks (27%-30%). Others are Pashtuns (13%) and Turkmen people (4%-6%). Each tribe has own traditions and customs and is furthers divided into sub-tribes/ clans. The political administration is supported by tribal elders (Arbabs/ Maliks), man and women (Shuras), of different clans who are recognized by the government. The Arbabs/ Maliks supervise and coordinate the implementation of law and order and exercise their functions as mediators and as members of special tribal councils (Jirga/ Shura), which are organized when required. Generally, they are organized in order to take some decisions on certain major types of disputes/ conflicts. The FCR provides legal cover to the local council (Jirga/ Shura) to settle disputes arising out of blood feuds, relating to women, wealth and land disputes. The Jirga/ Shura are represented by the Arbabs/ Maliks, who also serve as a medium of communication for the public participation.

Gender aspects:

In the COI, about one half of the population is female. In the tribal area, the women have a limited role in decision-making process at household level.

Women in rural areas/ villages along the transmission line corridor are involved in several activities such as fetching of drinking water from streams/ wells as well as tube wells located at the edge of stream; collecting fire wood in the nearby hilly area; washing clothes and household utensils; child rearing; livestock rearing especially goat/ sheep, livestock grazing etc.

Men are the main responsible for agriculture activities (cultivation, irrigation, harvest).

Women help the men of their family mostly in cultivating and harvesting and also process the products. However, in some families in the tribal area, the extent of women's involvement remains limited to domestic matters only. In most of the cases men sell the agricultural products and spent the income for their families, including women.

Land Use Pattern and Agriculture:

Agriculture is a major source of revenue for 48% of households in Jawzjan province, including 67% of rural households and 8% of households in the urban area. 40% of rural households and 9% of urban households own or manage agricultural land or garden plots. However, almost three quarters of households in the urban area (74%) and one quarter of households in rural areas (26%) derive some income from trade and services. Around a third of households in both urban (32%) and rural (38%) areas earn income through non-farm related labour. Livestock also accounts for income for one-sixth of rural households (16%) (NRVA, 2007).

The most important field crops grown in Jawzjan Province include wheat and barley, melon, watermelon and maize. The most common crops grown in garden plots include grapes (73%) and vegetables (23%). Almost all households with access to fertilizer use this on field crops (97%) and to a much lesser degree on garden plots (2%), although a very small number of households use fertilizer on both field and garden (2%).

On average 74% of households in the province have access to irrigated land, whereas almost one third of rural households (30%) and 38% of urban households have access to rainfed land. The town of Sheberghan is surrounded by irrigated agricultural land (NRVA, 2007).

The most important field crops grown in Balkh Province include wheat, barley, maize, flax and melon/ water melon. The most common crops grown in garden plots include fruit and nut trees (67%), grapes (13%) and vegetables (4%). Melons/ water melons (6%) and cotton (2%) are also frequently gown in garden plots in the province. Mazar-e Sharif is located in one of Afghanistan's most fertile regions, extensively irrigated by the Balkh River and producing cotton, grain, and fruit. The town's industries include flour milling and the manufacturing of silk and cotton textiles.

Agricultural cultivation or farm forestry is found at isolated areas only where spring, surface or underground water is available. A big portion of land in the line corridor is unused, barren and un- vegetated due to shortage of water availability. Some areas can be cultivated during rainfall. Scanty scrub vegetation along slopes and other uncultivated areas are used as grazing land and fuel wood gathering grounds (e.g. low mountainous areas).

Around Sheberghan barren land can be found in the line corridor until passing Safid River. East of the river there is irrigated land with the highest yield on provincial level. Wheat, corn, potatoes, tomatoes and onions are the main products here. Barren and rain fed lands follow along the line route to the east. Here, wheat, melons, water melons and sesame are cultivated before the land changes to semi-desert.

Infrastructure:

Averaged 42% of the households in Jawzjan Province have access to electricity with the majority based on public electricity. 99% of the households in the urban area have access to electricity, falling to just 25% in rural areas. 45% of roads in the province can be used by car in all seasons, and 42% in some seasons.

On average 49% of households in Balkh Province have access to electricity with the great majority of these (41%) relying on public electricity. Also in this province access to electricity is much greater in the urban area where 95% of households have access to electricity. However, this figure falls to just 26% in rural areas, and a little more than half of these (14%) have access to public electricity. The transport infrastructure in Balkh is also reasonably well developed, with 38% of roads in the province able to take car traffic in all seasons, and 34% in some seasons. However, in more than a quarter (27.5%) of the province there are no roads at all.

Following main electricity and transport infrastructures can be found in the Investigation area from Sheberghan to Mazar-e Sharif SS:

- Sheberghan Substation;
- 110 kV TL Sheberghan SS to Mazar SS;
- Mazar-e Sharif Substation.

More than 60% of the population residing along the line corridor has access to electricity. Access to roads is to the extent of 30%. Electricity is accessible but is very weak since the 110 kV capacity was estimated only for Andkhoy while now it is extended to Faryab and Sheberghan as well.

5.3 Sub-project 1 (part 2): Between Mazar-e-Sharif and Dasht-el-Alwan

This sub-section contains a summary of the description of the environment of line corridor between SD 19 and SD74. This description is made based on the field surveys undertaken in October 2014.

5.3.1 Main features of the investigation area

- Koshkak, Tochta, Mashi, Negari, Kaza paz kodo Bark villages in the realm of Dehdady and Balkh districts;
- Mazar city;
- Pule Mamokri and Shulgar and Nahre shahi rivers;
- Crossing of road from Kabul to Mazar;
- Mazar substation;
- Sandy desert and rangeland crossing along roadside;
- 110 and 120 kV transmission line from Mazar to Naeb Abad;
- Pistachio, almond and grapes garden and woodlands crossing line route;
- Investigation area crossing some new established private city ship and the Mulana Jalaludin Balkhy University;
- Several petrol stations.

5.3.2 Physical environment

This transmission line component crosses the provinces of **Balkh**, **Samangan** and **Baghlan**. Punctually Balkh, Naebabad and Dasht e Alwan which are separate localities of these provinces are crossed by the line corridor.

Soil:
Sandy soil and dune, somewhat loam. In deserts soil consists of sand – loam and gravel. It is a dry desert, without any water sources.

Landscape:
The area just east of Sheberghan and on the approaches to Mazar-e-Sharif is irrigated land which has the highest yield on provincial level. Beyond this the land is barren, scarcely in-trespassed with patches of non-irrigated farmland.

After Sheberghan S/S the line traverses couple of minor watercourses (SD03 to SD07), along with irrigated agricultural land. Grouped settlements are generally avoided. From there, it leads through barren or cultivated land and semi-desert steppe along the road A-76 and the existing transmission line before crossing Balkh River to reach the outskirts of Mazar-e Sharif. Only at crossings of river valleys, there are patches of azonal vegetation. Woodlands are not crossed by the line corridor. In the lowlands, all arable surfaces are cultivated lands, which are irrigated or rain-fed.

Between SD7 and SD13 line the vegetation thins out to grassland and desert-like areas. Near SD8 and SD9 there are gas fields with mined areas in vicinity

Climate and air:
This area is characterized by arid and semi-arid continental climate (cold winter and warm to hot summer). Since many years this area is exposed to periodic drought. Traffic, construction of new small cities and population density are the main source of air and noise pollution.

Water resources:
The two major rivers – Shulgar River and Polemamocry River are crossed by the line corridor. Drinking water is scarce, found approximately 60 m below ground. The underground water close to the surface of the earth is salty. Because of drought the underground water level is continuously falling down. Semi desert vegetation crossing by transmission line is a consequence of the low precipitation levels (below 250 mm/yr.). Generally ground cover is less than 15% and wild trees are absent.

It is to be noted that the line corridor (SD 33 – 34) could not be investigated because of topographical and security problems.

5.3.3 Biological environment

Flora and fauna:
The deserts situated close to the investigation area contain active sand dune areas and dunes fixed by open vegetation. The flora of the investigation area represents mostly the representatives of genera Holoxilon, Colligunum, Aristida, Salsola artemesia poa, etc. They are annuals or perennial plants, using for livestock grazing. They prevent soil erosion as well. Because of overgrazing they are reduced to minimum.

On the higher slopes, far away or close to the investigation area, some wood lands of Amygdalis and Pistachio are found. These woodlands are heavily used and badly degraded.

The area between SD 31- SD34 is entirely desert, barren, without any vegetation. However scattered annual and perennial plants are seen here and there, which are completely degraded by overgrazing.

In the surroundings of the investigation area the following wildlife species can be found: Hemichinus megalotis, canis jupus, canis aureus, Vulpes vulpes, Vulpes rueppellii, herpestes auropunctatus, Lepus capensis, Musmusculus felis spp. Fresh water fish, insects etc. Because of the past 40 decades of war, drought and continuously irregular hunting, the number of these species has severely declined.

It should be stated that some plants and animals are exposed to extinction. Close to the investigation area man has strongly influenced fauna, both directly by hunting and indirectly by damaging its habitat, by grazing livestock, burning practices and fuel collection. In addition the prolonged war has taken its toll on more than the human population.

5.3.4 Human environment

Agriculture:
Only a relative small part of the land area along the line corridor is suitable for arable farming for horticulture including both irrigated and rain fed farming. The main crops growing near the line corridor are wheat, barley, seasem, cotton, annual clover, alfalfa, some vegetables such as onions, melons, water melons and potatoes.

Fruit and non-fruit trees in small tracts are seen here and there. These orchards consisted of almond, pistachio, apples etc. irrigated by Shulghar and Polemamocry rivers. Where irrigation water is not available, rain fed cropping is practiced.

Close to the investigation area between SD 22 and 31 no important agricultural activities exist. Only here and there some small gardens are observed. This line corridor is entirely crossed by semi – desert area of Mazar and Hayratan. Sand dunes, which are blown by strong wind, create problems to the agricultural land and human health.

Rangeland in the surrounding of investigation area is defined legally as government ownership, but it is used by nearby located settlements. Some almond and pistachio trees are under risk of being abated because of the transmission line.

Population:
Villages located along the transmission line are Koshak, Tochta, Mashi Negary, Kaza paz and kodo Bark. They are situated in the realm of Balkh and Deh Dady districts. They range from 100 – 200 houses including 500 – 1000 persons. The majority of the population is farmers, business men, laborers, and unemployed persons. Almost 50% of them have access to schools and health clinics.

Some population live close to the line corridor are langar khana kamerband – e – Balkh , new city of eng mehdy , Alam khan construction project , Walju village, first part of Hussain abad, and Ali abad , new established Wali zada city and Naeb abad side track . All these villages consist of some scattered houses, which are constructed by private sector. According to the Mazar city plan the number of the houses and settled population could not be estimated. Most of population are government officials and have access to school and health clinics.

Health situation:
Some of the villagers along the line route live far away from maternity hospitals, therefore the risk of child and mother mortality is very high.

Access to safe drinking water from wells is limited and is suspected to be contaminated with biological and chemical elements, probably causing diarrhea in the rural population.

Along the line corridor some new small towns exist that are situated close to the Mazar city hospitals, therefore they can easily be provided with health care services. Access to safe drinking water is questionable.

Infrastructure:
The main road between Dah Dady and Balkh districts and between Mazar and Kabul is crossed by the line corridor in several points.

The new established university of Moulana Jalaludin Balkhy is situated in a distance of 200 m from the investigation area. Non-functioning gas pipelines are located in a distance of 50 m from the transmission line. The new transmission line follows the old 220 kV and 110 kV line.

There are several petrol stations close to the line corridor. The north sub - station is located in a distance of 4 km from the line route. Close to the line route in the Hayratan desert, there are new Hayratan Custom and Railway.

5.3.4.1 Census of affected households

The socio-economic census survey undertaken in October 2014 in the project areas included questions about the socio-economic characteristics of the affected households (AHs) in order to obtain necessary information about their livelihood conditions. 44 affected heads of HHs were interviewed.

Demographic details of the APs were assessed such as age, educational level, relationship with the household head, number of household members, occupation and category of the respondents.

The major proportion of the respondents (43.20%) are in the 36-50 age group and 27.27% are between 20 and 35. 20.45% of the respondents are between 51 and 60 while 11.34% were over 60 years of age. The HHs have an average family size of 9. The affected population is 46% male and 54% female. 95.45% of the respondents were illiterate. The survey revealed that the affected population is comprised of Pashtuns, Uzbeks and Tajiks.

The main economic activity of the AHs is agriculture. The second most important activity is either businesses or labour.

The affected area is mainly a wheat, cotton and vegetable growing area. The main crops during the winter season are wheat, vegetables and fodder. Summer crops in all affected locations are cotton, vegetables and watermelons.

None of the respondents had borrowed money from any source.

5.4 Sub-project 2: Between Andkhoy and Sheberghan

This section of the transmission line crosses the provinces of **Faryab** and **Jowzjan**.

5.4.1 Physical environment

Faryab Province is situated in the western part of the northern region of Afghanistan, bordering Turkmenistan in the West and North, Jawzjan and Sar-e-Pul Provinces in the East, Ghor Province in the South and Badghis Province in the South-West. This province covers an area of 20,293 km^2.

Jawzjan Province is situated in the northern part of Afghanistan, bordering Turkmenistan in the North, Balkh Province in the East, Sar-e Pul Province in the South and Faryab Province in the West. This province covers an area of 10,326 km^2. Sheberghan is the capital of this province.

Geology and seismicity:
The geological situation of the Investigation area is marked by quaternary sediments, and quaternary sands and dunes. There are important oil and natural gas reserves as well as sulphur, sand and gravel deposits.

According to the Scale of Richter, the earthquake hazard is assumed to be 6.0 local magnitude (ML) in the Investigation area, meaning a medium risk.

Landscape:
Between Andkhoy and Sheberghan, the line runs alongside the main asphalt road. The terrain is mainly flat semi-desert.

The landscape of the Investigation area is marked by the general features of the Afghan semi-desert and grass steppe. The river valleys are characterized by settlements and agricultural fields. The vegetation varies according to the fertility by mineral content of the local soil and rainfall pattern. Generally, vegetation is sparse in the Investigation area.

Near Andkhoy and the other villages and around the perennial/seasonal rivers the vegetation is fairly dense of cultivations, some plantations, few trees, bushes and grassland. Further south-eastern across the plains and from Andkhoy in northern direction, the bush and cultivation thins out to grassland savanna and sandy desert without vegetation. The Investigation area is presently not a touristic area.

Climate and air:

The Investigation area is characterized by a continental dry climate. Rainfall is below 250 mm per year and mean temperature around 18°C. The dryer zones receive below 100 mm average yearly rainfall (typically in spring) with high variability in between. The last few years have brought very little rain to the Investigation area, which has made the area dry. The mean temperatures in the Investigation area range from 3°C in January to 38°C in July.

Being a land locked country, the international trade of Turkmenistan passes through Aqina and Turkmen borders. Hence, the major source of air and noise pollution is heavy traffic load on Aqina – Sheberghan, Sheberghan and Kabul roads. Use of fuel wood for cooking purposes and fugitive dust from quarries also contribute to air pollution in the Investigation area. Noise is caused by quarrying actions. The area is not concerned with industrial air pollution. All in all, there is not much air pollution and noise caused in the line corridor or its vicinity.

Water resources:

Despite being situated in the semi-desert and endowed with scarce water resources, one major river can be found in the Investigation area, which is crossed by the line corridor: Shirin Tagab River (seasonal).

Shirin Tagab River (Oasis Andkhoy): Andkhoy (as entire Faryab Province) is facing serious water shortage problems. The major sources of irrigation are rivers, canals and springs.

Cisterns are important sources of drinking water. The town Andkhoy is located in a plain in the vicinity of the Shirin Tagab River, which irrigates the town and surrounding areas. There is a constant water problem as the waters are used upstream during the summer. The town itself and its few other villages are always in a severe semi-drought situation. Although the distance between Sheberghan and Andkhoy is not more than 70 km, the town is extremely remote and isolated from the mainstream developments of the region.

The groundwater between TKM border and Sheberghan is located relatively deep and the water table (as stated by local communities) can be found at 15 to 20 m depth in valley areas (minimum 10 m) and 80-100 m depth in desert areas, depending mainly on the lateral distance from a river or stream.

Water quality is salty in major areas from Aqina to Andkhoy but the degree of the salty water is decreasing when moving to Sheberghan.

5.4.2 Biological environment

Flora:

Natural vegetation has been severely influenced by man and only a few high mountain and very dry desert areas retain a quasi-natural vegetation cover. In the cultivated areas, natural vegetation was cleared long ago. The severe and uncontrolled usage of natural vegetation has totally changed the vegetation type and has deteriorated its quality and density. At present, practically all grasslands and grazing types of Afghanistan are in a serious state of reduction.

The vegetation along the line route varies according to the fertility and humidity of the local soil. The line corridor crosses a semi-desert landscape for most of its length. The area is marked by alternate grassland savanna and sandy desert (Ephemeral desert; Caligonum Aristida Sand Desert; Other Deserts). Only at crossings of river valleys, there are patches of azonal riverine vegetation (Shirin River, Safid River, Balkh River). Woodlands (Juniperus or Pistacia Vera/ Atlantica Woodlands) are not crossed by the line corridor. In the lowlands, especially near Andhkoy and the other villages and the perennial/seasonal rivers, all arable surfaces are cultivated lands. There are some plantations, trees, bushes and grassland. Fruit plants growing in different locations of the line corridor include melon, watermelon and zegher. It is not expected that any endangered plant species grow in the line corridor.

There is hardly any forest in the entire Investigation area. Occasional trees and small patches of "forest" can be found in the vicinity of houses and rivers. The only identified "forest" patches are located in river bends and are not crossed by the transmission line corridor. No reserved forest exists in the Investigation area even up to 5 km from the proposed transmission line corridor.

Fauna:

Due to the degraded habitat and sparse vegetation not many wild animals live in the Investigation area. Mammals, birds, reptiles, amphibians, fresh water fish and insects are the main animal groups there. Jackals, foxes, cats and different species of bats are commonly found in the desert and semi desert area, whereas wolves are rare. The Investigation area is not very rich regarding the avifauna and its diversity due to the lack of suitable habitats.

The semi-desert area of the line corridor is a typical biotope for snakes, scorpions and lizards, which are the common reptiles in the Investigation area. Regarding snakes, mostly non-poisonous species like Rat eaters can be found. Black and soil colored scorpions are in abundance. Concerning lizards, agamas, geckoes and monitor lizards live in the Investigation area. Goh (Varanus monitor) is the largest lizard there. Frogs and toads are common amphibians in the Investigation area.

Due to the scanty vegetation not many insects are found in the Investigation area. However, flies and mosquitoes are very common. The surface waters of the line corridor are typical biotopes for sand flies. A variety of butterflies can be found on shrubs and herbs. Millipedes, centipedes, bugs and beetles are also found in the area. It is not expected that any endangered wildlife species (based on IUCN categories and AWEC) live in the line corridor.

Protected Areas:

No protected areas (National Parks, Waterfowl Sanctuaries and Wildlife Reserves) are crossed by the transmission line corridor or are located near to it. The transmission line corridor is neither located near a declared or proposed protected area nor near an Important Bird Area (IBA). It is further not situated within a major bird migration corridor.

Neither important wetlands (Ramsar Wetlands) nor wildlife sanctuaries can be found in the Investigation area.

5.4.3 Human environment

Population:

According to the Provincial Development Plan, Faryab Province has a total population of 833,724. There are 121,625 households in the province, and households on average have 7 members. Around 89% of the population of Faryab lives in rural districts while 11% lives in urban areas. Around 51% of the population is male and 49% is female. Jawzjan Province has a total population of 426,987. The province comprises 50,900 households.

Along the line corridor, the majority of the population lives as a joint/ extended family system. The elder of the house is responsible for all social matters and other activities of the house including income and expenditure etc. Based on the field survey, the size of most of the extended households located along the line corridor is between 10 to 30 persons, while the average total family size is to the extent of 26 persons. The gender composition reveals that the proportion of males and females is to the extent of 57% and 43% respectively.

Literacy and Education:

The overall literacy rate in Faryab Province is 27%, however, while nearly one third of men are literate (31%), this is true for just over one fifth of women (22%). In the population aged between 15 and 24 the situation for men is a little lower with 28% literacy, and also for women the figure shows a decrease to 17%. The Kuchi population in the province has particularly low levels of literacy with just 0.8% of men and 0.1% of women able to read and write.

The overall literacy rate in Jawzjan Province is 31%, however, while two fifth of men are literate (40%), this is true for just over two tenths of women (21%). In the population aged between 15 and 24 the situation for men is slightly better with 46% literacy, whereas for women the figure shows little change (22%). The Kuchi population in the province has particularly low levels of literacy with just 1.6% of men and 0.1% of women being able to read and write. On average 40% of children between 6 and 13 are enrolled in school, however, again the figure is around half of boys (45%) and one third of girls (33%). Amongst the Kuchi population, one in fifty boys (2%) and no girls (0%) attend school in Jawzjan during the winter and summer months.

40% of the population living along the line corridor has access to schools. There are many schools for girls and boys not only in the town of Andkhoy.

Occupation and Sources of Income:

The Investigation area features no industrial or major commercial activities except for activities in a few urban areas (e.g. Sheberghan Topping Plant). According to the field survey, the major occupations in the Investigation area are service, business (e.g. transport, shops, hotels), and labour (skilled/unskilled). Carpet waving is mostly done by females. Also, a significant proportion of the population is engaged in daily wage labour. Other people are working abroad or are involved in farming. Partly the household income is also supplemented through the sale of livestock (especially goat/ sheep).

Health situation:

In Faryab Province 18 health centers and 5 hospitals with a total of 162 beds could be found in 2005. There were also 97 doctors and 214 nurses employed by the Ministry of Health working in the province, which represented 70% increase in the number of doctors

(up from 57) and over three and a half times the number of nurses (up from 59) since 2003. About two third of communities do not have a health worker permanently present in their community. 77% of men's shura and 70% of women's shura reported that there was no community health worker present. Only 1% of the population has a health center in their district and 4% has a dispensary. Around one fifth (20%) of the population have a health center or a dispensary within 5 km. Sometimes, people seeking medical attention have to travel more than ten kilometers to get it, 63% for health centers and 58% for dispensaries.

In 2005, there were 10 health centers and 6 hospitals with a total of 264 beds in Jawzjan Province. 178 doctors and 299 nurses were employed by the Ministry of Health working in the province, which represented a 50% increase in the number of doctors and a 69% increase in the number of nurses compared to 2003.

Access to Safe Drinking Water:

In Faryab Province, on average around a quarter (23%) of households use safe drinking water. This rises to half (50%) of households in the urban area, and falls to around one fifth (21%) in rural areas. Nearly two thirds (65%) of households have direct access to their main source of drinking water within their community, however just over one household in five (22%) has to travel for up to an hour to access drinking water, and for 4% of households travel to access drinking water can take up to 6 hours.

In Jawzjan Province, on average for only 24% of households safe drinking water is available. This amounts to 64% in the urban area, and declines to just 6% in rural areas. Almost nine in every ten households have direct access to their main source of drinking water within their community (88%). But, for around one in ten households travel to access drinking water takes up to an hour (8%), and 3% of households have to travel up to 6 hours to drinking water access.

Safe drinking water is not available to the population in the Investigation area, particularly around Andkhoy. However, in some places, the women are involved in fetching drinking water from nearby water source (a reservoir which exist in the town center), where the community is fetching water for domestic purposes. Stream and wells water is reasonable for some domestic purposes such as washing dishes.

Generally, the minority of the households (20%) has access and availability of a drinking water facility nearby their residence. The major sources of drinking water observed in the Investigation area are streams, wells along the streams/ springs, and lift pumps installed at nearby water sources.

Ethnicities:

The major ethnic groups living in Faryab Province are Uzbeks and Pashtuns followed by Tajiks and Turkmens. Uzbek is spoken by over half (53.5%) of the population and 49% of the villagers. The second most frequent language is Dari, spoken by the majorities in 311 villages representing 27% of the population. Pashtu is spoken by 17% of the villagers and 13% of the population. Faryab Province also has a population of Kuchis or nomads whose numbers vary in different seasons. In winter 98,220 individuals, or 4% of the overall Kuchi population, stay in Faryab living in 28 communities; in summer the population is 101,460 individuals.

The major ethnic groups living in Jawzjan Province are Uzbek and Turkmen followed by Tajik, Pashtoon and Arab. Uzbek is spoken by the largest proportion of population (39.5%). Turkmen comes second with 28.7% of population. Pashtu and Dari are spoken by 17.2% and 12.1% of the total population, respectively.

Jawzjan Province also has a population of Kuchis or nomads whose numbers vary in different seasons. In winter 76,850 individuals, or 3.2% of the overall Kuchi population, stay in Jawzjan living in 20 communities which are all settled.

The main ethnic groups/ tribes living along the line route are Uzbeks (53%), followed by Tajiks (27%-30%). Others are Pashtuns (13%) and Turkmen people (4%-6%). Each tribe has own traditions and customs and is furthers divided into sub-tribes/ clans. The political administration is supported by tribal elders (Arbabs/ Maliks), man and women (Shuras), of different clans who are recognized by the government. The Arbabs/ Maliks supervise and coordinate the implementation of law and order and exercise their functions as mediators and as members of special tribal councils (Jirga/ Shura), which are organized when required. Generally, they are organized in order to take some decisions on certain major types of disputes/ conflicts. The FCR provides legal cover to the local council (Jirga/ Shura) to settle disputes arising out of blood feuds, relating to women, wealth and land disputes. The Jirga/ Shura are represented by the Arbabs/ Maliks, who also serve as a medium of communication for the public participation.

Gender aspects:

In the COI, about one half of the population is female. In the tribal area, the women have a limited role in decision-making process at household level. Women in rural areas/ villages along the transmission line corridor are involved in several activities such as fetching of drinking water from streams/ wells as well as tube wells located at the edge of stream; collecting fire wood in the nearby hilly area; washing clothes and household utensils; child rearing; livestock rearing especially goat/ sheep, livestock grazing etc.

Men are the main responsible for agriculture activities (cultivation, irrigation, harvest). Women help the men of their family mostly in cultivating and harvesting and also process the products. However, in some families in the tribal area, the extent of women's involvement remains limited to domestic matters only. In most of the cases men sell the agricultural products and spent the income for their families, including women.

Land Use Pattern and Agriculture:

The most important field crops grown in Faryab Province include wheat, barley, maize, potatoes and flax. The most common crops grown in garden plots include grapes, fruit and nut trees, vegetables, potatoes, alfalfa, and clover or other fodder. On average 37% of households in the province have access to irrigated land and four-fifths (81%) of rural households and more than half (57%) of urban households have access to rain fed land. Seventy percent of rural households, 98% of Kuchi households and 41% of households in urban areas in the province own livestock or poultry. The most commonly owned livestock are donkey, sheep and goats.

Agriculture is a major source of revenue for 48% of households in Jawzjan province, including 67% of rural households and 8% of households in the urban area. 40% of rural households and 9% of urban households own or manage agricultural land or garden plots. However, almost three quarters of households in the urban area (74%) and one quarter of households in rural areas (26%) derive some income from trade and services. Around a third of households in both urban (32%) and rural (38%) areas earn income through non-farm related labour. Livestock also accounts for income for one-sixth of rural households (16%) (source: NRVA, 2007).

The most important field crops grown in Jawzjan Province include wheat and barley, melon, watermelon and maize. The most common crops grown in garden plots include grapes (73%) and vegetables (23%). Almost all households with access to fertilizer se this on field crops (97%) and to a much lesser degree on garden plots (2%), although a very small number of households use fertilizer on both field and garden (2%). On average 74% of households in the province have access to irrigated land, whereas almost one third of rural households (30%) and 38% of urban households have access to rainfed land. The town of Sheberghan is surrounded by irrigated agricultural land.

Infrastructure:

On average 17% of households in Faryab Province have access to electricity with the majority of these relying on public electricity. Access to electricity is much greater in the urban area where 64% of households have access, however this figure falls to just 12% in rural areas, and only three quarters of these (9%) have access to public electricity. The transport infrastructure in Faryab is reasonably well developed, with 43% of roads in the province able to take car traffic in all seasons, and around a third (35%) able to take car traffic in some seasons. However, in nearly a quarter (22%) of the province there are no roads at all.

Averaged 42% of the households in Jawzjan Province have access to electricity with the majority based on public electricity. 99% of the households in the urban area have access to electricity, falling to just 25% in rural areas. 45% of roads in the province can be used by car in all seasons, and 42% in some seasons. The following main electricity and transport infrastructures can be found in the Investigation area from Andkhoy to Sheberghan:

- Andkhoy Substation;
- TL to Maimana;
- Sheberghan Substation.

More than 60% of the population residing along the line corridor has access to electricity. Access to roads is to the extent of 30%. Electricity is accessible but is very weak since the 110 kV capacity was estimated only for Andkhoy while now it is extended to Faryab and Sheberghan as well.

Physical Cultural Resources:

One historical cultural site (Aquina Huzi) of national value is located near the planned transmission line corridor at 37° 1'29.19"N / 65° 8'22.05"E. The site is a cistern building and historically used to be a stopover for caravans on their way to Buchara. The cupola Abdulla Shaibanis is visible from far. However, the site is located in 200 m distance from the ROW (Figure 5-10). Ministry of Culture and provincial government is responsible for protection

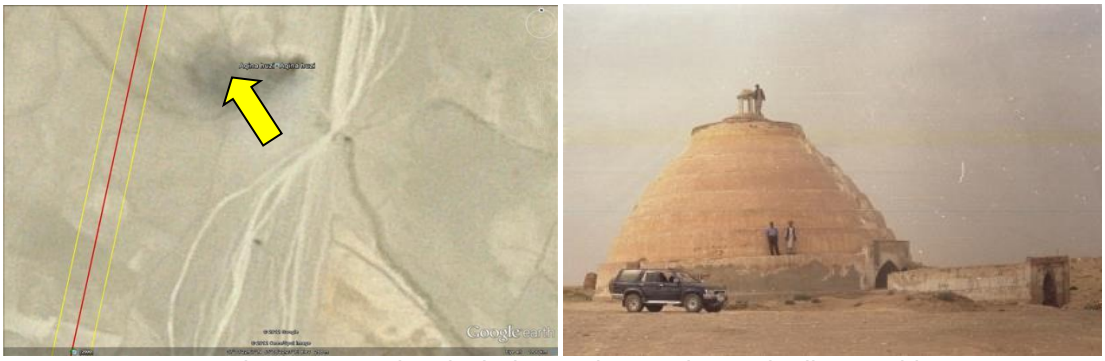


Figure 5-10: Historical Site Aquina Huzi near the line corridor

6. SCREENING OF ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION

This Section presents the screening of the impacts expected from the design, construction, operation and decommissioning phases of the sub-projects. It contains a description of the applicable mitigation measures, but these are detailed further in Section 0, the Environmental and Social Management Plan.

6.1 Impacts during the Design Phase

6.1.1 Line routing

The present design of the transmission line routing is still preliminary (a pre-design report has been prepared). This design took, however, into consideration environmental and social aspects, namely:

- Keeping the new line as close as possible to the existing overhead lines in order to minimize land loss and environmental impacts, and facilitate operation and maintenance of both lines;
- Avoiding inhabited areas, villages and individual houses wherever possible;
- Avoiding protected, sensitive or otherwise restricted areas;
- Remaining in proximity of the existing roads so that reasonable access for construction, inspection and maintenance is provided;
- Avoiding areas prone to flooding and erosion, intermittent water courses and run-off areas, areas of alluvial sediment;
- Avoiding agricultural land;
- Avoiding mountain slopes running parallel to line;
- Avoiding erosion prone areas.

A refining of line routing will be done during the final design in order to avoid resettlement and environmental impacts to the greatest extent possible. As the detailed design is shifted under the responsibility of the construction contractor, a careful monitoring will be necessary.

The following mitigation measures of the EMP have to be part of the EPC contract:

- Towers will not be erected too close to rivers and creeks and fragile river banks will not be damaged.
- Selection of a transmission line corridor that bypasses settlements so that only minimum resettlement actions/ relocation of households are required.
- Cultural and religious relics will be protected and respected; a chance find procedures will be in place.

Under consideration of the above mentioned facts and mitigation possibilities, the extent of impact regarding line routing is assessed to be medium.

Impact of/on	**Extent of impact**
Line routing	□□= medium

6.1.2 Access roads

The line routing was and will further be selected with focus on minimizing the need to build new access roads by design along existing paved roads or tracks. In the area of mountain pass south of Khulm where difficult terrain could not be avoided, additional access roads will need to be built. In other areas the lines are never more than ca 1 km from main roads.

Due to the procedures of:

- minimization of the number and length of access roads;
- careful selection of location of access roads;
- use of existing roads/ tracks wherever possible.

the impact of the construction of access roads is assessed as low.

Impact of/on	**Extent of impact**
Construction of access roads	= low

6.1.3 Health and safety

The design and location of the transmission lines will take into consideration the prevention of health and safety risks.

To avoid impacts of natural disasters, the infrastructure needs to be constructed respecting earthquake safety standards suited for the seismic risk level in the Investigation area.

To avoid EMF impacts, the minimum safety distances (as per Table 4.1 and as set out in IFC EHS Guidelines) from houses to the conductors will be respected and has been included in the pre-design considerations. The maximum possible distance between the TL and the settlements has been studied and considered.

Impact of/on	**Extent of impact**
Health and Safety	= low

6.2 Impacts during the Construction Phase

The construction phase will imply the most important impacts in the physical environment, namely:

- Emission of air pollutants and noise from traffic and operation of machines and other vehicles associated with the construction activities;
- Emission of dust from earthworks;
- Generation of large quantities of waste by earthworks and vegetation removal;
- Risk of pollution of groundwater and / or water due to leaks of oil from the machines, vehicles, temporary workshops, and temporary storage facilities;
- Aggravation of the erosion.

The impacts of the construction activities on the biological environment are not expected to be important due to the desert-like nature of the area and its present strong degradation.

The socio-economic and human impacts of the project will be mostly felt during the construction works, namely due to:

- the need to displace land/agricultural plots for installation of the towers;
- the damages to crops due to the installation of the towers, the stringing of the lines and the movements of workers, vehicles and machinery;
- the risk of accidents resulting from the movement and operation of heavy machinery and other vehicles;
- the risk of community health and safety problems (transmission of diseases, air and noise emissions nuisance, social conflicts for jobs, etc.) and accidents (falls, trips, and injuries inside the construction areas).

Since the construction of a power line is a linear work, the project area will be affected only locally and temporary in its different sections. For this reason, no section will be affected for the entire duration of the construction period, which significantly reduces the negative impacts of this phase.

6.2.1 Impacts on the physical environment

6.2.1.1 Soil and erosion

The section between points SD31 and SD33, in vicinity of Naibabad passes through an area of potentially unstable sediment deposits, susceptible to runoff and erosion. Further data is being collected and this section of the line might need to be revised.

In general, the deserted areas where the transmission line passes are prone to erosion, due to the characteristics of the landscape and the climate (dry climate and little vegetation). In this sense, erosion prevention measures such as drainage systems and road-side plantation with bushes (in view of the operation phase) will have to be implemented.

Additional reinforcement or protection of towers due to exposure to erosion and runoff flooding will be thought. The crossing of rivers implies particular risks of erosion of the river banks, for what replanting of grass in the banks will be undertaken.

A risk of accelerated sand deflation occurs during the construction process. This can be mitigated by construction of sand deflation prevention structures in sensitive areas and where vegetation (grass) is removed and bare soil exposed/ land cover diminished (dust suppression). This impact will be mitigated on a case to case basis of tower location once detailed design and precise location of towers is finalized.

Impact of/on	**Extent of impact**
Erosion	□ = low
Sand deflation	□ = low

6.2.1.2 Landscape and visual aspects

The construction activities will have an impact on the landscape and the aesthetics of the area, due to the presence of machinery, piles of excavated soil, construction materials, noise and dust emissions, etc. However, since no natural reserve or park and no area of touristic importance will be affected, these impacts will be minor, local and only short term.

As soon as the construction activities end, all the construction equipment will be removed and all the debris will be collected. Measures to restore the landscape like re-cultivation of deposition and passage areas will additionally be taken.

Impact of/on	**Extent of impact**
Visual aspects/ landscape	□ = low

6.2.1.3 Air quality and GHG emissions

The construction activities will cause air pollution through gaseous emissions (mainly NO_X, SO_2 and PM) of the construction vehicles and machines and dust resulting from vehicle movements and earth works. The impacts of the air pollution caused by the construction works might be locally considerable as several housing areas will be crossed by the TL. Like for the noise impacts, the air pollution caused by the construction activities will also affect the construction workers.

Due to the limited time of the construction period, the impacts on ambient air quality by vehicle exhausts will be low. Machines and vehicles will be checked regularly to minimize exhausted pollutants. The ambient air quality standards and community and worker noise standards as per IFC EHS guidelines standards will be met. The project is not expected to generate more than 100,000 t of carbon dioxide equivalent per year as per SPS 2009 requirement.

The creation of dust during construction works is also a short term impact and could be mitigated by sprinkling dusty access roads, especially in densely populated areas. However, in locations where water is scarce, it should be considered to use the water for irrigation instead. If construction works are carried out in spring, dust creation will be reduced.

Impact of/on	**Extent of impact**
Climate	□ = low
Air quality	□ = low

6.2.1.4 Water resources

During construction there is a threat of groundwater contamination due to the following activities:

- vehicles with tank/motor oil leakage;
- gas refilling of construction vehicles in unpaved areas;
- dumping of hazardous construction waste or wastewater from the workers camps.

- Storage of fuels and oils in bundled containers

This can be avoided by proper maintenance and construction site control.

The groundwater table in the future line corridor is assumed to be at 15 m depth between Andkhoy and Mazar-e-Sharif and 60 m between Mazar-e-Sharif and Dasht-el-Alwan, so the risk of groundwater pollution is low, even under sandy soils. For impact avoidance, especially in view of accidental oil/fuel spills, a selection of existing wells for analysis of basic groundwater parameters as well as measurements during the construction period and after completion has to be carried out.

Direct impacts of the transmission line route on surface water resources will be mainly confined in time to the construction phase and in space to the crossing locations. The project traverses 5 rivers (Safid, Balkh, Shulgar, Polemamocry and Shirin Tagab) and other small water courses. The towers will not be placed close to these rivers and creeks (i.e. avoid flooding areas) and river banks will not be damaged.

Soil run-off with oil/ fuel during construction could pollute surface waters. In order to avoid impacts from construction of the towers, the tower sites will be located as far as possible from rivers, creeks, water pools and wells, which are especially important regarding future line crossings. Avoidance of soil run-off is necessary.

Also, the construction of temporary bridges (if riverbeds are not dry) may cause deterioration of river beds and banks. This is the reason why construction has to be carried out carefully and a regular control of the construction site is necessary. Existing bridges will be used wherever possible. Bridges to be constructed will be temporary and bridges which are not needed anymore will have to be dismantled.

Pollution of rivers by vehicles and waste will be forbidden and controlled, (e.g. no car washing in the rivers, no oil spills, etc.).

Impact of/on	**Extent of impact**
Groundwater	□ = low
Surface water	□□ = medium

6.2.1.5 Waste management

An environmental problem often associated with construction works is improper waste disposal at the construction sites and at workers camps. Indiscriminate waste disposal is not only aesthetically objectionable but also ultimately capable of polluting soil, surface water, groundwater and habitats. Decomposing waste gives rise to odor and attracts disease vectors.

The main solid waste generated during the construction of the proposed TLs can be generally classified as follows:

- Domestic wastes generated by the workers;
- Excavated inert material;
- Construction and demolition waste;
- Chemical waste like fuel, oils etc;
- Biological waste (from the removed vegetation);

- General refuse.

In detail, it is expected that the low impact waste will consists of:

- Soil and rocks from foundation activities;
- Plant debris from tower site clearance and ROW;
- Construction waste like unused/ unusable construction material, wood from framework, maintenance waste, packaging material, empty containers, etc.;
- Soil polluted by fuel, engine oil and lubricants;
- Drums and containers from fuel, engine oil and lubricants;
- Garbage from the workers like paper, plastic, drinks containers, food waste, etc.

In order to handle the waste in a proper manner during construction, the Construction Contractor will develop a Waste Management Plan that contains the following principles:

- A waste management hierarchy of avoidance, minimization, reuse, recycling, treatment and disposal;
- All waste will be segregated by category on site, based on their nature, and ultimate disposal sites;
- Staff training to increase awareness of waste minimization issues.

There are no landfills available at project locations. The generated construction waste will be recycled as much as possible on site. Together with the measures listed above the impacts caused by solid waste during the construction phase of the proposed project will be reduced to a minimum. If the Waste Management Plan is in place, the impact of solid waste on the environment will be minimal.

Construction sites and workers camps will be fitted with functional sanitary equipment (proper toilets, lavatories, liquid and solid waste treatment, hygienic conditions in lavatories and other sanitary infrastructure etc.).

Impact of/on	**Extent of impact**
Solid waste	= low
Liquid waste	= low

6.2.2 Impacts on the biological environment

6.2.2.1 Flora and fauna

The vegetation within the construction corridor is directly affected by removing plants, cutting shrubs and felling of trees. Additional indirect effects on vegetation consist in raising dust, emissions from construction equipment and soil action. Plants growing on areas outside the way leave for storing materials will also be affected. The access to the tower sites by vehicles and equipment will also cause more loss of vegetation. If the soil subsequently erodes, this destruction will be permanent.

The vegetation along the access roads/tracks (in the area of mountain pass south of Khulm where difficult terrain could not be avoided, additional access roads will need to be built) will be destroyed permanently. The RoW corridor is 60 m wide for 500 kV line and 40 m wide for 220 kV line. Complete clearing will be required in the center strip of 25 m.

Outside this strip, but still inside the RoW all vegetation above 3 m height needs to be cleared. In the remaining area, the plantations lost due to the construction activities can be restored after the construction works are finished as long as the minimum clearance distance is respected (Table 4-1). The replanting of trees should be encouraged.

Due to the location of the Project in open grasslands of a semi-desert area without forest cover, the environmental impacts are much localized (i.e. at the tower foundations). Felling of fruit trees in the future ROW might be necessary, but the soil sealing leading to a loss of vegetation and habitats is very limited.

Mostly affected land is already heavily influenced by human activities and is mainly used for agricultural and pasture purposes. It is very unlikely to find any threatened or endangered species of flora and fauna and the project does not traverse protected areas.

It is suggested that an additional reforestation program in areas that do not have a conflict with height limitations of the ROW is carried out. In areas where no trees can be re-grown, compensation will be paid to the owner of the removed trees.

As the natural habitats are not very densely populated by plant and animal species, the impacts of the construction process on flora and fauna are not expected to be significant.

Impact of/on	**Extent of impact**
Flora and fauna	□ = low

6.2.3 Impacts on the human environment

6.2.3.1 Workers health and safety

Direct impacts on health and safety of the workers during construction of the planned transmission line may result from various factors as potential work accidents (e.g. electrocution, falling from height, blasting of rocks), noise emissions, sanitary situation, contaminated drinking water or food. Modest issues may also arise from dust generation, vehicle emissions, construction waste and regarding traffic/ pedestrian safety.

For avoidance/ mitigation of noise impacts on workers, all construction workers will be fitted with personal protection equipment (PPE) as ear plugs. Due to the limited time of the construction period and the sparsely populated area for the largest part of the transmission line route, impacts of noise on the population during the construction activities will be low.

Regarding the sanitary situation, it is assumed that the construction sites and camps are fitted with functional sanitary equipment. Health and Safety Trainings will be implemented to inform workers about hygienic behavior as well as risks of transmission of STDs.

As the construction will be undertaken in an environment where other functioning transmission lines are present, the risk of electrocution may be increased in some areas, especially those where the distance between the OHL is small or where crossing of existing lines is planned.

Indirect health and safety impacts for workers may result from land mines. The development of EHS Management System will also include a mine clearance statement that assesses that the area is free of mines. Before the start of physical works, the assessment needs to be provided. According to the EARF, clearance assessment is provided by MACCA (Mine Action Coordination Centre of Afghanistan).

For impact avoidance, the construction contractor will develop an appropriate Environment, Health, and Safety Management System (EHS-MS) and implement it during the construction phase. A proper EHS Management Plan will address the health and safety of workers.

Necessary training regarding safety aspects to the personnel working at the line will be provided by the contractor. Personal protective equipment like safety gloves, helmet, mufflers etc. will be provided. First aid facilities will be made available with the labor gangs and doctors called in from nearby towns when necessary. Workers are also covered by the statutory Workmen Compensation Act by the contractor. Alcohol and drugs will be strictly forbidden at the construction site.

Impact of/on	**Extent of impact**
Workers Health and safety	□□ = medium

6.2.3.2 Community health and safety

Due to the tense social situation in parts of the area, the influx of workers needs to be handled with great care in order to avoid social conflicts with the resident population. The general security situation needs to be carefully assessed before starting of civil works. However, due to the limited time of construction a specific area and the regular shifting of workers camps; the impact is assessed to be limited.

Moving construction vehicles constitute a permanent potential risk. A strict speed limitation of construction vehicles outside major roads to 10 km/h and an intense supervision of the access roads are essential to reduce the risk of accidents.

During construction, the crossing of roads will be unavoidable. This will interfere with traffic only marginally and for a very short time. To avoid traffic accidents, proper signalization must be placed to warn the users of the road from disturbances in or near construction areas.

Preventive guards should be installed around the towers to be erected in the human settlements to prevent children's entrance to the towers and climbing on it.

Impact of/on	**Extent of impact**
Community Health and Safety	□□ = medium

6.2.3.3 Infrastructure and traffic

During construction the crossing of roads and existing transmission lines will be unavoidable. Crossing of roads will interfere with traffic only marginally and for a very short time. Crossing of the present transmission lines will be conducted without need of power disruption. A sufficient distance of the new conductors to the existing TL will be respected.

Impact of/on	**Extent of impact**
Infrastructure and traffic	□ = low

6.2.3.4 Physical cultural resources

One historical cultural site (Aquina Huzi) is located in a short distance from the ROW near the planned 220 kV transmission line. Although not inside the ROW, this site could be affected by passing vehicles and workers. Proper awareness will be made to the workers to avoid vandalization and even entering the site.

As for the rest of the line, despite not having encountered evidence of cultural sites within the line corridor, there may be possibilities for chance finds during the construction phase within the investigation area, as not all sites are known or excavated.

During final design and construction, sites of historical relevance and cultural sites (i.e. cemetery, graveyards) will be avoided or over-spanned. Historical sites and graveyards will be avoided via by-passing or over-spanning, e.g. in case of archaeological sites located below the surface. The same procedure will be applied for location of needed new access roads.

In case of chance finds, the construction has to be stopped immediately and the Ministry of Culture has to be informed to agree on further steps. A Standard “Chance Find Procedure” must be referred to as standard provisions in construction contracts, when applicable. During Project supervision, the site engineer will monitor the regulations relating to the treatment of any chance find encountered are observed.

Standard “Chance Find Procedure”:

a) stop the construction activities in the area of the chance find;
b) delineate the discovered site or area;
c) secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard will be present until the responsible local authorities and the equivalent;
d) take over;
e) notify the supervisory Engineer who in turn will notify the responsible local authorities and the Ministry of Culture / Department of Historical and Cultural Sites immediately (within 24 hours or less);

f) responsible local authorities and the Ministry of Culture / Department of Historical and Cultural Sites would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the Ministry of Culture / Department of Historical and Cultural Sites (within 72 hours). The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;
g) Decisions on how to handle the finding will be taken by the responsible authorities and the Ministry of Culture / Department of Historical and Cultural Sites. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;
h) implementation for the authority decision concerning the management of the finding will be communicated in writing by the Ministry of Culture / Department of Historical and Cultural Sites and
i) Construction work could resume only after permission is given from the responsible local authorities and the Ministry of Culture / Department of Historical and Cultural Sites concerning safeguard of the heritage.

Impact of/on	**Extent of impact**
Historical and cultural sites	□□ = medium

6.2.3.5 Socio-economic conditions

The construction of the transmission lines will generate local employment, as a certain number of unskilled labors (men/women) will be required. Local employment during this period will increase socio-economic standards.

Impact of/on	**Extent of impact**
Socio-economic conditions	**+** = locally positive

6.2.3.6 Land acquisition and resettlement

The impacts related to land acquisition and resettlement (LAR) are treated in a separate LAR Plan (LARP) prepared for the sub-projects. In summary, it is expected that the impact from the transmission line component will be include the permanent acquisition of land for the 500 kV towers (54,225 m² of land), temporary land acquisition during construction, damage and possible relocation of 19 houses, damage to around 1500 m of walls, fences and irrigation channels, damage to around 1600 fruit-bearing trees, 800 grapevines and potential damage to standing crops during construction. No land will be required for 220 kV line's right of way which has already been acquired by DABS.

The impacts from the transmission line can be minimized through adjustments to the route and the location of towers and the proper timing of construction activities so as not to impact on standing crops.

Impact of/on	**Extent of impact**

Land acquisition and resettlement	□□ = medium

6.3 Impacts during the Operation Phase

6.3.1 Impacts on the physical environment

6.3.1.1 Soil and water resources

Water resources are scarce in the area and water consumption will need to be minimized during operation and maintenance of the transmission lines.

Water pollution during maintenance works (operation phase) will be avoided with similar mitigation measures as for construction phase.

Impact of/on	**Extent of impact**
Soil and water resources	□ = low

6.3.1.2 Landscape and visual impacts

The new OHL partly traverses scenic areas, where towers are going to be visible from far. Due to the character of the present landscape there will be a good visibility of the new towers and it will be possible to see several towers from almost every point on the main road. In the section between Mazar-e-Sharif and Na'ebabad the OHL is a new construction leading to an additional visual impact.

In order to reduce the visual impact of towers, any old towers and substations without function should be completely dismantled. Visual impacts of the new towers can hardly be mitigated. Disguising towers as palms (as done i.e. in the USA for mobile-phone towers) is not considered an option, as there are other priorities for the local population. The visual impact of a complete OHL can only be mitigated by underground construction, which would raise the cost considerably.

Impact of/on	**Extent of impact**
Visual impacts/ landscape	□□ = medium

6.3.1.3 Climate

The 500 kV and the 220 kV AC circuit breakers will be outdoor type, SF_6 insulated.

Sulfur hexafluoride is an effective gaseous dielectric that allows the safe transmission and distribution of electricity. SF_6 provides excellent insulation and arc quenching performance. The gas itself is an inert gas which has no influence on humans, animals or plants. On the other hand, SF_6 is a very highly effective and persistent greenhouse gas and has to be handled very properly following guidelines as:

- IEC (DIN EN)1 60376 „Specification and acceptance of new sulfur hexafluoride";
- IEC (DIN EN) 60480 „Guide to the checking of sulfur hexafluoride (SF_6) taken from electrical equipment";

- IEC 61634 „High-voltage switchgear and control gear – Use and handling of sulfur hexafluoride (SF_6) in high-voltage switchgear and Control gear".

Following these guidelines and considering the recommendations of the International Council on large Electric Systems (CIGRE: SF_6 Task Force: Handling and given Recycling of SF_6 Mixtures) (www.cigre.org) will ensure that the amount of released SF_6 into the atmosphere is reduced to an absolute minimum.

Impact of/on	**Extent of impact**
Climate	□ = low

6.3.1.4 Waste production

Generally, the amount of waste generated by maintenance of the transmission line is negligible. If a proper waste management is warranted, the impact of waste production during the operation phase is low.

Impact of/on	**Extent of impact**
Waste Production	□ = low

6.3.2 Impacts on the biological environment

6.3.2.1 Flora

Most of the land within the ROW is grassland, sand desert or agricultural land that can be cultivated as before, except for the tower sites. There are some trees growing in the transmission line corridor, which, in order to keep the safety clearance between vegetation and the conductor cables cannot be replanted. Herbicides will not be used for corridor clearance.

New access roads will promote access by cars in formerly little disturbed places. However, no forest areas occur in the Investigation area and no rare or endangered species are expected to be found in the line corridor. Thus, the impact of the proposed Project on the flora during the operation phase is assessed to be low.

Impact of/on	**Extent of impact**
Flora	□ = low

6.3.2.2 Fauna

The risks for avifauna related to the operation of a transmission line are electrocution and collision, both leading to serious injuries and, in most cases, to dead. Big and heavy birds are in special risk, because of their reduced ability to avoid suddenly appearing power lines, especially in times of reduced sight distances (fog, rain, et.) or strong winds.

The risks of bird electrocution and collision can already be avoided or mitigated by an adequate design of the poles, conductors and insulators and arrangement of all conductor cables at one height.

The new transmission line does not run close to any sensitive habitat. There is no IBA located in its vicinity and the future OHL is not situated within a major bird migration corridor. Therefore, the impact of the transmission line on birds is assessed to be low. Other fauna is not considered to be impacted significantly by the Project. Disturbance of animals will be minimized during maintenance work by e.g. respecting breeding seasons.

The impact of the transmission line on birds is assessed to be low if measures are taken.

Impact of/on	**Extent of impact**
Avifauna	□ = low
Other fauna	□ = low

6.3.3 Impacts on the human environment

6.3.3.1 Workers and community health and safety

Natural disasters
Damages at transmission lines caused by earthquakes may occur as a result of tangled wires.

Construction of the transmission line according to earthquake safety standards suited for the seismic risk level in the Investigation area is assumed to reduce the risk as far as possible.

Noise emissions
The intensity of the corona noise emitted by transmission lines is influenced by weather conditions. Wet weather, fog or rain increases the noise level but these weather conditions are not frequent in the Investigation area.

For the population, the limit values shown in Table 6-1 are valid according to the General IFC HSE Guidelines:

Table 6-1: Limit values for noise regarding population

Receptor	One Hour LA_{eq} (dB(A))	
	Day time 7:00 – 22:00	Night time 22:00 – 7:00
Residential; institutional; educational	55	45
Industrial; commercial	70	70

Electric and magnetic fields
Electric and magnetic fields (EMF) are invisible lines of force that surround any electrical device. Power transmission lines, electrical wiring, and electrical equipment produce EMF.

The permissible intensity of electric field is defined as maximum values of:

- 5 kV/m in populated areas and
- 10 kV/m in the rest of line

In the pre-design report, the maximum Electric field at 1.70 m above ground and 10 to 15 m ground clearances in the 500 kV HVAC line corridor was determined. The conclusions are:

a) The 2 kV/m condition is fulfilled at the edge of the Right-of-way for all considered ground clearances;
b) The 5 kV/m condition is fulfilled in case of 12 m ground clearances;
c) The 10 kV/m is fulfilled for all considered clearances and can extended up to 8 m.

As a precautionary measure, other projects have adopted an internationally accepted standard ROW width of 60 m along their 500 kV transmission lines and of 40 m along the 220 kV lines. All habitation and structures are excluded from the ROW to ensure safety of people and animals from EMFs, as well as from direct electric shocks and “flashover”. No permanent human presence will be allowed within the ROW.

Based on a recent in-depth review of extensive scientific literature (World Health Organization's International EMF Project), the WHO has concluded that "despite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health". The low levels referred to by the WHO are levels expected to be found outside of the ROW.

From similar projects it can be stated that the relevant internationally accepted limit values for the public will not be exceeded if the safety distances to the nearest conductor are kept as recommended. Regular EMF measurements are recommended.

Risks of Electrocution

The resident population will be made aware during the construction process that the transmission line is a high voltage line and that individual household connections are impossible. Masts will be equipped with explanatory boards explaining the risks of electrocution and warn against attempts to individually connect to the line. Maintenance workers will also be made aware of electrocution risks.

Impact of/on	**Extent of impact**
Health and Safety:	
- Natural disasters	□□ = medium
- Noise emissions	□ = low
- Electric and magnetic fields	□ = low
- Risks of electrocution	□□ = medium

6.3.3.2 Land use

Maintenance works are not expected to have a major environmental and social impact if herbicides are not used. Minor impacts, as damages to crops during maintenance works will have to be compensated (see LARP).

Impact of/on	**Extent of impact**
Land use	□ = low

6.3.3.3 Electricity supply

An increased stability of the electricity supply, especially if a raising demand is expected, is a locally positive impact of the Project. An increased efficiency/ reduction of transmission losses in the electricity network will be regionally positive.

Impact of/on	**Extent of impact**
Electricity supply	□ = locally positive □□ = regionally positive

6.4 Impacts during the decommissioning phase

In order not to create a long-lasting permanent visual impact, the towers and conductors of the TL will have to be completely dismantled after the life- span of minimum 50 years.

Recycling of metal parts (towers, conductors), waste management and disposal according to national and international standards will have to be planned for the decommissioning phase. If adequate recycling and waste management procedures are respected, the Project impact is assessed to be low.

Impact of/on	**Extent of impact**
Decommissioning	□ = low

6.5 Cumulative impacts

Of the total combined length of lines of 372.5 km**,** only about 45 km are not aligned with other existing or planned high voltage overhead lines. The entire 220 kV line will be parallel to the 500 kV line of Stage A (Andkhoy to Sheberghan). The majority of the 500 kV line will share the corridor with the Stage A 220 kV line (Sheberghan to Mazar-e-Sharif) and with the older 220 kV line Pul-e-Khumri to Naibabad.

Cumulative impacts may be expected due to the alignment of the majority of the line length with existing transmission lines, namely:

- During construction:
  - the project areas have been in the past subject to LAR impacts, i.e., the land owners and residents have lost some land, agricultural crops, pastures, houses and other assets due to the construction of the existing lines. With Stage B of Tranche 1 project, further land and assets will be lost. Due to the physical proximity of the existing and future projects, there is a chance that the same land owners and residents are affected. However, if the LAR process is undertaken as described in the LARP report prepared for the project, these impacts will be reduced to a minimum.

- During operation: the effects on the community health and safety during operation which are presently felt due to the existing transmission lines may be exacerbated by the operation of the new project. These respect the corona effect (noise) and the EMF.
  - Noise: the noise derived from the corona effect during wet or humid weather are not expected to be significant for the Stage B projects, but there is a risk of a cumulative impact in the areas where the line runs parallel to existing ones. The noise outside the ROW, and especially in the neighboring living areas will be regularly monitored during operation (please refer to Section 10 for details).
  - EMF: low levels of EMF are expected to be found outside the ROW, when the future projects are considered separately from the existing ones. In order to assess the potential impacts on the EMF outside the ROW in the areas where the new line runs parallel to existing lines, it is necessary to regularly monitor these radiations once the project is in full load operation (please refer to Section 10 for details).

Mostly affected land is desert-like and already heavily influenced by human activities. As therefore, no cumulative impacts on biodiversity or water features are expected.

7. ANALYSIS OF ALTERNATIVES

7.1 No Project Alternative

Not constructing the sub-projects would not cause any resettlement, land acquisition and other social and environmental impacts. However, it would also prevent the achievement of the broad objectives of the Tranche 1 of the Afghanistan Energy Sector and of the particular objectives of its Stage B, namely:

- development of a unified Afghanistan grid;
- enable power trade between Afghanistan and Turkmenistan;
- fulfill the Energy Development 2014 - 2023 program;
- substitute for the Stage A section that is incorporated into direct 500 kV link going directly from Turkmenistan to Dasht-e-Alwan (through the construction of the 220 kV double circuit line connecting Andkhoy and Sheberghan substations);
- increase the power transmission capacity on the north-south route which conveys power from imports and domestic power plants in the north to the load centers at the southern end of the transmission line.

Given the crucial importance of the sub-projects for the achievement of the above listed regional and national objectives, the no-project alternative is not considered acceptable and will not be further studied in this IEE.

7.2 Line Routing Alternatives

Beginning with first rough power line route options and based on recent high-resolution satellite scenes the technical and the environmental line survey experts together optimized the line route step by step and section for section in order to avoid settlements and single houses and to reduce the impacts on the environment e.g. by following already existing power line corridors, existing roads or by circumventing sensitive locations. The following aspects were considered in the optimization process:

- Avoid traversing or close by-passing of urban areas, densely populated areas, settlements, schools, public buildings and markets;
- Avoid traversing or close bypassing of religious or cultural sites, mosques, cemeteries, historical places, and protected areas;
- Avoid traversing of forests and surface waters;
- Keep electrical field, magnetic field, audible noise and TV interference as low as possible by staying away from settlements or houses;
- Keep impact on flora, fauna, nesting places, animal trails, migration zones and sensitive ecological areas to a minimum;
- Consider accessibility in order to avoid new access roads;
- Avoiding areas prone to flooding and erosion, intermittent water courses and runoff areas, areas of alluvial sediment.

In the next stages of the project, the line will be further refined. One revised routing has been submitted with the Final Pre-design Report. The final routing (detailed design) will be undertaken by the contractor and will have in mind the objective of reducing the impacts to an absolute minimum.

7.3 500 kV Towers' Design

The pre-design report states that for the 500 kV single circuit towers, the phases can be arranged in one horizontal plane ("Y" type) or, alternatively, in a more narrow design, with phases in vertical plane ("pine" type).

The ROW would, for both cases, be of 60 meters, for what the impacts on the social component are the same whichever option is chosen. However, from an environmental point of view it is preferable to follow the first alternative, i. e, having the phases arranged horizontally. This avoids impacts on the avifauna, as it reduces the height of the towers and the chances for collision.

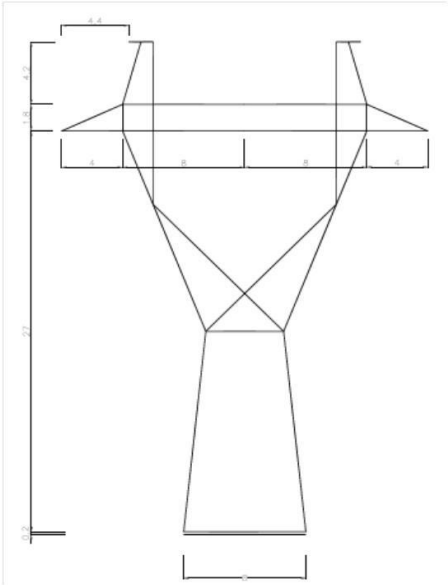


Figure 7-1: 500 kV towers' design with horizontal arrangement of the phases („Y" type)

8. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

The consultation process was carried out with the wider population in general, and with potentially displaced people/public to share information related to the project planning and execution activities, in particular. The information shared included project activities and their expected impacts on the physical, biological and socio-economic conditions. Accordingly, the concerns/issues of the affected population/locals associated with the project were documented and understood.

In this respect, a series of consultations were made with the local population / those affected and other stakeholders concerned. The public consultations, conducted in October 2014, included scoping sessions with stakeholders and focused group discussions with local communities.

8.1 Identification of Stakeholders

Apart from the Ministry of Energy and DABS, stakeholders in the provinces affected by the project are the Ministry of Agriculture, Irrigation and Livestock, the Ministry of Rural Rehabilitation and Development, the World Food Program, the National Solidarity Program working with Community Development Councils, the National Area Based Development Program developed by District Development Assemblies.

The NGOs in the area are active mainly in the water and sanitation sector, in health care, education, women‘s empowerment, agricultural development, human rights, child care, socio-economic development, cultural and community development. Most are run by local politicians. In all four provinces they can be more involved in development works but most of them are based in the city itself with limited access to the districts.

Local government, local electricity departments, and the Departments for Women’s Issues at provincial level are quite active and it would be possible to involve them in supporting the project.

Local units of DABS and the Ministry of Energy are the overall responsible organizations for all electricity-related issues: planning, development and operation of the existing properties. They are also key players when addressing supply issues and conflicts.

In general, when it comes to the impacts of the project the primary stakeholders are the people in the provinces which are affected in different ways according to the type of losses to be expected and by the construction works themselves. Most negative impacts are small and short term so that the positive impacts of the project will most probably compensate the people for the nuisances caused by the civil works (apart from the compensation payment for losses).

8.2 Stakeholder Consultation

During the field survey, various meetings were held with regional and local stakeholders. The meetings focused on the collection of information with regard to the socio-economic conditions in the wider areas of the planned line corridor. At the same time, information on the project was provided to those stakeholders who, until that point, had not been informed. A list of interviewed persons can be found in Annex 7D of the LARP Report.

With regard to the primary stakeholders, apart from many individual interviews, 20 focus group discussions (FGD) were held in various districts (Dehdadi, Mazar e Sharif, NahriShahi, FirozNakhchir, Hazra e Sultan, Ayback, DahanaGhuri, and Pul-e-Khumri).

Figure 8-1: Focus group discussions and individual interview situation during the social survey in October 2014

During the FGD, the main problem pointed is not the electricity connection rate, but the quality of the supply. Many villages, and especially areas with low population density, are cut off from the public grid. Where generators are used as an alternative, people complain about the high costs per kWh. The consequence is that both groups would be happy if the project not only supplied urban areas but also linked the rural areas to the new HVTL or, where the networks already exists, provide 24/24 hour supply with a stable voltage.

People consider themselves poor, or at least not wealthy, but every group member immediately agreed to pay the tariffs and connections costs themselves and only very few people were not willing and/or able to use electricity if it were available in sufficient quantity. One strong argument in favor of regular payment of the public supply is the current high costs for power produced by generators.

When asked who should organize the valuation of losses and fix the compensation, or at least who should conciliate in the case of grievances, most people favored either the traditional (tribal) shura or the new government-established shura. In three cases Community Development Councils were also mentioned.

Nobody expressed concern as to possible damage and losses through the construction of the HVTL. The only two predominant concerns were that the future supply would not be fair (i.e. that their village would not be included in the public network [as it had been left out once before]) and seven groups expressed the fear that compensation payments would not be made at all or that the compensation money would not cover losses adequately.

The majority of the people would not have any problems with land acquisition and compensation procedures. However, they all pointed out that there were vulnerable households living in their communities. In seven focus groups poor or extremely poor people were mentioned and all 20 groups referred to handicapped and women-headed households as vulnerable. In order to show the relation between the three vulnerable groups: participants mentioned 180 poor households, 50 households depending on handicapped people and 65 women-headed households.

8.3 Conclusions and further Proceedings

One conclusion from the social survey and the consultation procedures is that the implementation of the land acquisition and resettlement process requires an improved gender approach. As far as security conditions allow for the integration of female staff members into the contractor‘s and the consultant‘s teams, contacts with women as land owners and women as heads of households in general should be made by female social experts.

With regard to the next steps after the initial consultations with various stakeholders and especially with members of the possibly affected communities, the following activities will be carried out:

- After agreement of the LARP between DABS and ADB, both reports will be put onto the homepage of the organizations concerned (concerned organizations are worried organizations).

- DABS will in parallel also provide a translation of the summary of the principles of the LARP, the land acquisition and compensation process to the district administrations concerned for further distribution to the communities possibly affected.

- With the start of the final TL design and during the Detailed Measurement Survey, a leaflet will be elaborated and printed with a summary of the land acquisition and compensation process (including the grievance redress mechanism and all addresses of the institutions concerned) and distributed to all persons identified as owners of affected land and other properties.

The involvement of the affected population and their representatives respectively will be ensured by their participation in the Provincial Valuation and Compensation Committees (PVCC) and in the Grievance Redress Committees (GRC).

Apart from the institutional participation of representatives of the population, all affected persons are invited at any time to apply to the PMO and their Due Diligence Team (DDT). Phone numbers and other information about the institutions concerned will be provided in the project leaflet mentioned above.

9. GRIEVANCE REDRESS MECHANISM

In accordance with ADB safeguards, great care is taken in the project to prevent grievances. The special situation in conflict-torn Afghanistan requires special attention in order to avoid any additional development of conflicts.

Prevention of grievances will be achieved mainly through careful land acquisition design and implementation, by ensuring full DPs participation and consultation; and by establishing extensive communication and coordination between the community, the PMO and their consultants and coordinators, and the local governments. In order to include women, the team for the implementation of the land acquisition and resettlement (and compensation) process will be gender-sensitive and culturally-adapted.

This notwithstanding, complaints are sometimes unavoidable if, for example, a different understanding of the value of losses and consequently of compensation payment arises. Therefore, a grievance redress mechanism is being adopted for the project to allow the DPs the opportunity to appeal against any contested decision, practice or activity arising from the valuation of losses and the compensation/rehabilitation process. Efforts to make DPs fully aware of their rights and of the procedures for addressing complaints will continue during the updating of the LARP and at the time of compensation.

The various queries, complaints and problems likely to be generated among the DPs which might require mitigation include:

- DP not listed as affected;
- Losses not identified correctly;
- Compensation/assistance considered inadequate or not as provided by the entitlement matrix;
- Dispute about ownership;
- Internal dispute amongst owners, leaseholders, and /or sharecroppers;
- Delay in disbursement of compensation payments/assistance;
- Improper distribution of compensation payments/assistance in the case of joint ownership of land and other properties;
- Rehabilitation work not properly performed by contractor;
- etc.

Complaints and grievances will be addressed through the following steps and actions. However, such steps will not prevent a complainant to seek redress of his or her complaint directly to the court. These are only offered as an alternative complaint resolution:

First Step: A Grievance Redress Committee (GRC) will be established for each district concerned. It includes:

- Two members of the community along the HVTL corridor (preferably one DP and one non-directly affected person from two different villages concerned) to be elected by the regional jirga;
- One representative of the district governor with juridical experience;
- One representative of the district DABS office concerned, and one representative of a regionally active NGO, preferably with experience in mediation/conflict management.

The committee is to be chaired by the representative of the concerned district governor. Grievances should be sent in written to the committee and must be heard and resolved within 21 days of submission of the complaint.

Second Step: If the district-level GRC is not able to resolve the grievance within a 21-day period, the complaints should be presented via the local DABS representative to the DABS General Manager at central level. The elected representatives of the DP at provincial level will have the opportunity to mediate by providing their written comments and proposals to the manager. A final decision will be made by the Director of DABS after the assessment of the case and a careful preparation of the decision by the PMO/Due Diligence Unit representative. Grievances should be sent in written form and must be heard and resolved within 14 days of submission of the complaint.

Third Step: If no solution is reached within 14 days at DABS central level, the DP can further submit their case to the appropriate court of law.

While applying the Grievance Redress Mechanism, the DP can seek support from the representative of the coordinator who may also be assisted by the national and international consultants. The contact addresses/phone numbers will be disseminated via the project in-formation leaflet to be distributed amongst all possibly affected households.

Should the cause of grievance be the contradiction between traditional law and modern legislation, the DP may also seek support from the local jirga and/or from elders who may hear the legal position of the DP.

Should the issue or complaint remain unresolved through the grievance redress mechanism, the case can be referred to the appropriate court for resolution.

The PMO will design a pro-forma letter to be used for filing complaints. A representative of the coordinator or a member of the DDT will help filling in the form and forwarding it to the appropriate committee/authority and will assist the DP at every stage of the com-plaint process.

If grievances cannot be resolved at local level, the DABS will nevertheless pay the amount laid down by the PVCC (Provincial Valuation and Compensation Committee) to the DP. Additional compensation may be paid later upon decision of the DABS general manager or the court appealed to in accordance with the final entitlements of the DP.

10. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The IEE and the LARP define measures to mitigate or prevent the negative impacts from the sub-projects. In this Chapter, an Environmental and Social Management Plan (ESMP) is presented for the design phase (Table 10-1), construction phase (Table 10-2) and the operation and decommissioning phases (Table 10-3), covering the description of the measures, their location, the time frame and the responsible for their implementation.

Mitigation and monitoring measures are included.

10.1 Mitigation Measures

10.1.1 Mitigation measures for the design phase

Table 10-1: Environmental Mitigation Plan for the Design Phase

Issue	Potential Impact	Mitigation Measure	Implementing Agency	Costs in $	Date for Implementation
Line Routing	• Resettlement and land acquisition • Damage of Physical Cultural Sites • Damage and losses of agricultural plantations • Erosion	• The new TL will follow closely existing infrastructure. • Towers are not placed on hilltops • Towers will not be erected too close to rivers and creeks and fragile river banks will not be damaged. • Selection of a transmission line corridor that bypasses settlements so that only minimum resettlement actions/ relocation of households are required. • Protection of cultural and religious relics and graveyards. • Prior information of APs during the design phase / land survey that plantations in ROW are likely to be affected	DABS	Included in FICHTNER's contract	Before and during pre-design phase / first land survey
			PIC	Included in PIC Contract	During final routing

Issue	Potential Impact	Mitigation Measure	Implementing Agency	Costs in $	Date for Implementation
Access Roads	• Land Acquisition and resettlement • Damage of Physical Cultural Sites • Damage and losses of agricultural plantations	• Minimization of the number and length of access roads; • Careful selection of location of access roads; • Use of existing roads/ tracks wherever possible.	DABS	Included in FICHTNER's contract	Before and during pre-design phase / first land survey
			DABS-PMO and PIC	Included in PIC Contract	During final design
Health and Safety	• Natural disasters	• Infrastructure needs to be constructed respecting earthquake safety standards suited for the seismic risk level in the Investigation area	PIC	Included in PIC Contract	During final design
Health and Safety	• Impact of Electric and Magnetic Fields	• The minimum safety distances from houses to the conductors have to be respected. • Maximize distance between TL and human settlements.	DABS	Included in FICHTNER's contract	Before and during pre-design phase / first land survey
			PIC / DABS-PMO	Included in PIC Contract	During final land survey

10.1.2 Mitigation measures for the construction phase

Table 10-2: Environmental Mitigation Plan for Construction Phase

Issue	Potential Impact	Mitigation Measure	Implementing Agency	Costs in $	Date for Implementation
Soil and Erosion	Erosion of soil Sand deflation	• Minimization of removing topsoil at tower sites. • Loss of topsoil will be avoided by stripping and storing topsoil prior to construction (where appropriate i.e. on productive lands). • Bringing back the topsoil to its original place after having finished erection of the tower. • Installation of drainage systems. • Replanting of grass at tower sites, river banks, access roads and other work areas that are not needed anymore. • Careful selection of locations for access roads. • Sand deflation prevention measures at tower foundations and access roads. • Use of existing roads/ tracks wherever possible.	CC / DABS-PMO	Included in construction costs	During construction
Soil and Erosion	Soil damage by quarries Blasting of rocks	• If there is a need to use filling material for access roads or tower foundations existing certified and properly managed quarries will be used • If quarries are needed, they will be redeveloped as per standard procedure. Rehabilitation will be undertaken immediately after excavation to prevent soil erosion. • Redevelopment will include replacing stockpiled soil cover, replanting grass, shrubs, and trees, and installing sediment runoff control devices.	CC	Included in construction costs	During construction
Landscape and Visual Aspects	Impacts on the landscape of the area by construction debris, excavations, and deposit of materials	• Re-establishing of the conditions of the landscape before construction • Removal of all construction debris	CC / DABS-PMO	Included in construction costs	After construction

Issue	Potential Impact	Mitigation Measure	Implementing Agency	Costs in $	Date for Implementation
Air Quality	Gas and dust emissions from construction vehicles and burning of waste Dust emissions from earthworks	• Limitations of size, weight or axle loads of vehicles using particularly difficult roads. • Reduction of speed and limited movement of vehicles. • Optimized transportation management to avoid needless truck trips. • Routine service and regular maintenance of vehicles and machines to reduce engine emissions. • Burning of rubbish on site must be strictly forbidden. • Construction equipment will be maintained to a good standard and idling of engines discouraged. • Machinery causing excessive pollution (visible smoke) will be banned from construction sites. • Despite its dust reduction potential, access roads will only be sprayed in exceptional cases due to scarcity of water	CC	Included in construction costs	During construction period
Surface Water	Pollution of Surface water	• All liquid materials and lubricants will be stored in closed containers or barrels. • Pulverulent construction material will be stored in containers in order to avoid rinsing out. • Temporary sewage treatment facilities will be provided for the construction site and the workers' camps. • Avoidance of soil run-off. All necessary measures will be taken to prevent impeding cross drainage at rivers/ streams and canals or existing irrigation and drainage systems. • Construction of towers in distance from river banks (min 50 m is recommended) • Avoidance of water pollution at temporary bridges at river crossings. • Where new access roads are to be constructed, they should not disturb the natural drainage patterns of the areas • Vegetation stripping should occur in parallel with progress of construction in order to minimize erosion and run off. • Prohibiting construction and maintenance vehicles from	CC	Included in construction costs	During construction period

Issue	Potential Impact	Mitigation Measure	Implementing Agency	Costs in $	Date for Implementation
		driving in water ways • Dismantling of bridges that are not needed after construction.			
Groundwater	Pollution of Groundwater	• Regular maintenance of all vehicles and machines used on site is mandatory. Maintenance activities of the vehicles will be performed in regular service stations. • Maintenance and re-fuelling of the construction equipment will be done only on sealed and enclosed areas (careful handling and maintenance, especially of the fuel tanks). • On site storage of fuel, engine oil and lubricants in locked tanks and on sealed and shadow roofed areas. • All wastes generated through the use of fuel, engine oil and lubricants like drums and containers will be collected and disposed of properly. • Staff training to increase awareness of waste minimization and appropriate waste disposal.	CC	Included in construction costs	During construction period
Flora and Fauna	Destruction / disturbance of Flora and Fauna	• Respect of minimal ground clearance • Skillful selective clearing towards tower location to further reduce vegetation clearing. • Minimizing and marking of the extent of lay down areas and the routing of new access roads in order to minimize impacts on vegetation and habitats. • Minimization of number and length of access tracks. • A tree cutting and planting scheme will be prepared during the design phase. During the construction phase appropriate training will be provided to the workers and penalties will be imposed for the contractor for cutting down trees for firewood • Rehabilitation of access roads not needed anymore after having finished the construction. • Instruction of the employees not to disturb animals; hunting will be prohibited in general. • All contraction and maintenance activities in any natural habitat along the route should be conducted in accordance with best environmental practices to cause minimum	CC / DABS-PMO	Included in construction costs	During final land survey and construction phase

Issue	Potential Impact	Mitigation Measure	Implementing Agency	Costs in $	Date for Implementation
		disturbance to any habitat			
Waste Production	Environmental pollution through waste	• Development of a Waste Management Plan within the HSE Management Plan considering following principles: (i) waste management hierarchy of avoidance-minimization-reuse-treatment-disposal; (ii) segregation of waste; (iii) minimization of construction waste by good technical planning; (iv) training of staff. • Implementation of a Waste Management System. • Provision of construction sites and workers' camps with functional sanitary equipment. • Training of workers regarding proper waste and waste water handling according to environmental management requirements. • All construction materials will be reused, recycled and properly disposed of. All worn out parts, equipment and empty containers must be removed from the site to a proper storage location designated by DABS-PMO. • Solid waste and garbage will be collected in bins and disposed of daily, according to a brief and basic waste management plan prepared by the contractor and approved by DABS-PMO, prior to commencement of civil works. • There will be no site- specific landfills established by the contractors. All solid waste will be collected and removed from the work camps and disposed of in local waste disposal sites • Any spoil generated by the construction activity should be disposed at an approved location. • Littering should be prevented by providing adequate number of containers which will be emptied regularly. • After completion of construction the site will be properly cleaned and properly rehabilitated or re-vegetated.	CC	Included in construction costs	Prior start of construction and during construction phase

Issue	Potential Impact	Mitigation Measure	Implementing Agency	Costs in $	Date for Implementation
Liquid Waste	Sewage production at construction sites and workers' camps	• Prior to work initiating the contractor will present a simple sewerage management plan to DABS-PMO for approval • Sewerage to be discharged into soak pits or municipal sewers and construction camps to be located away from rivers. • Septic tanks must be provided at each construction campsite • All work sites to be equipped with latrines. All toilet facilities will be located at least 300 m from water sources or existing residence.	CC	Included in construction costs	During construction period
Liquid Waste	Environmental pollution by toxic, harmful and inflammable chemicals	• Toxic, harmful and inflammable chemicals (paints, fuel, lubricants, oil and explosives) will be stored in designated sites. • Vehicle maintenance and re-fuelling will be confined to areas in construction sites designed to contain spilled lubricants and fuels. • Spill waste will be disposed of at approved disposal sites, according to NEPA requirements.	CC	Included in construction costs	During construction period
Waste Production	Environmental pollution by PCB	• All products used for the transmission lines will be PCB free. It is highly recommended not to re-use any of the old PCB contaminated material.	CC / DABS-PMO	Included in construction costs	Before starting construction and during construction
Health and Safety	General Health and Safety impacts	• Development of an EHS Policy for the construction phase. • Development of an EHS Management Plan for construction (will include a Waste Management Plan). • Installation of an EHS Management System (EHS-MS) during the construction phase. • Clean work environment including good drainage around campsites will be provided to avoid creation of stagnant water bodies • Provide adequate sanitation and waste disposal facilities at campsites • Provide education to the workforce on prevention of communicable diseases, protective measures and disease	CC	Included in construction costs	Prior start of construction

Issue	Potential Impact	Mitigation Measure	Implementing Agency	Costs in $	Date for Implementation
		control • Provide construction personnel with required self-protection devices such as safety helmets, belts, air plugs and other protection devices. • General operational and community safety measures for blasting activities to be detailed in construction EHS management plan.			
Health and Safety	Work accidents	• All construction workers will be fitted with personal protection equipment (PPE). • Alcohol and drugs will be strictly forbidden at the construction site.	CC	Included in construction costs	During construction
Health and Safety	Noise emissions	• Optimization of transportation management to avoid needless truck drives; avoidance of truck movements in residential areas at least during night-time. • Reduction of speed of trucks crossing residential areas. • Utilization of low sound power mechanical equipment like bulldozer, air compressor, concrete pumps, excavator, concrete mixer etc. whenever possible. • Regular maintenance and service of building machinery and other during construction works. • Shut down or throttling down of noisy machinery to a minimum. • Utilization of ear protection devices by the workers if they are exposed to high noise levels (included in the construction site HSE Management Plan). • All equipment will fulfill noise control requirements of the project. • Special attention will be given to regular maintenance of construction equipment for their best working condition. • Construction activities will be scheduled to avoid school and late night hours. • When construction takes place within 500 m from villages or within 150 m from sensitive areas such as health centers,	CC	Included in construction costs	Before starting construction and during construction period

Issue	Potential Impact	Mitigation Measure	Implementing Agency	Costs in $	Date for Implementation
		construction will be stopped from 21:00 to 06:00 hours. This will reduce night-time noise levels. • Work hours should be decided in consultation with local community and should avoid prayer times. • Blasting will be carried out only with the permission of NEPA. • Noise protection regarding blasting activities to be detailed in construction EHS management plan • Work should be restricted to specific hours within some of settlements and 150 m from sensitive receptor s (schools, hospitals, and places of religious importance).			
Health and Safety	Injuries and death by explosion of mines	• Provide special assessment of mine clearance by Mine Action Coordination Centre of Afghanistan MACCA before any physical works	CC / DABS-PMO	Included in construction costs	Before starting construction
Health and Safety	Operational and Community Health and Safety Risks Transmission of diseases	• Development of Operational Health and Safety (OHS) and Community Health and Safety (CHS) Plans • Provision of HIV/AIDS protection equipment for workers. • Implementation of health and safety workshops for construction workers. • Put in place sufficient sanitation facilities for workers. • Implementation of health and safety workshops for construction workers. • Accommodation of workers in adjacent towns has the first priority. In the case that construction camps are necessary these will be located in accordance with relevant municipal authorities.	CC	Included in construction costs	Before starting construction and during construction period
Land Acquisition and Land Use	Resettlement Losses and damages to crops	• see LARP	CC / DABS-PMO	Included in construction costs	Before Construction
Gender Aspects and Vulnerable People	Gender disparities Sexual harassment	• see LARP • Implementation of a special livelihood program for vulnerable APs	CC / DABS-PMO	Included in construction costs	During construction

Issue	Potential Impact	Mitigation Measure	Implementing Agency	Costs in $	Date for Implementation
Local Workforce	General Health and Safety risks Social conflicts due to influx of workers	• Measures to prevent and sanction irregular behavior of the workers • Training of workers on Health and Safety measures in workers camps • Conflict mitigation / mediation training	CC	Included in construction costs	At the beginning of construction
Infrastructure and Traffic	Traffic disturbance Minimization of power cuts	• Ensure that traffic is not disturbed by construction through proper traffic management and signalization. • Respect of minimal ground clearance • Ensure power supply for the population during construction. If necessary, power cuts will be done only at day time with duration reduced to an absolute minimum.	CC	Included in construction costs	During construction
Physical Cultural Resources	Damage and destruction of cultural sites	• Identification of cultural sites and sensitive areas for unknown historical sites (together with local experts of the Ministry of Culture during final routing / land survey. • No construction of access road near Aquina Huzi. • Existing roads/ tracks in the vicinity of Aquina Huzi will be used for material transport. • Reduction of vehicle movements as far as possible. • Towers will be placed in the maximum possible distance to Aquina Huzi. • Shifting AP 3 about 100 m in direction of AP 2 thereby maximizing the distance to the site • By-passing or over-spanning of historical sites and graveyards. • Training of the construction workers to stop earth or foundation works immediately if there are any signs for historical or cultural sites. • Report of chance finds immediately to the Ministry of Culture, Implementation of chance find procedure.	CC / DABS-PMO	Included in construction costs	During detailed land survey and during construction process

10.1.3 Mitigation measures for operation and decommissioning phases

Table 10-3: Environmental Mitigation Plan for Operation and Decommissioning Phase

Issue	Potential Impact	Mitigation Measure	Implementing Agency	Costs in $	Date for Implementation
Soil and Water Resources	Soil and water pollution	• Provision of separate storage tanks for further treatment of the oily wastewater. • Minimize the usage of water.	DABS	Included in operational costs	Before operation
Landscape and Visual Impacts	Permanent visual impact on the landscape	• Complete dismantling of the old transmission line and substations without function.	DABS	Included in operational costs	Before operation
Climate	Release of SF_6	• Handle SF_6 used for isolation of the circuit breakers following international guidelines	DABS	Included in operational costs	During operation
Flora	Losses of flora inside the ROW	• For ROW clearing measures no herbicides will be used.	DABS	Included in operational costs	During operation
Fauna	Disturbance of animals during maintenance works	• Disturbance of animals will be minimized during maintenance work by e.g. respecting breeding seasons.	DABS	Included in operational costs	During operation
Waste Production	Environmental pollution by solid and liquid wastes	• Reduction of waste quantity. • Recycling as much as possible. • Proper disposal of remaining waste. • Adequate site drainage will be performed.	DABS	Included in operational costs	Before/ during operation
Health and Safety	Natural disasters	• Creation and implementation of an Emergency Response Plan	DABS	Included in design costs	During operation
Health and Safety	Electric and Magnetic fields	• Training for workers and resident population with regard to EMF • Respect of the safety distances.	DABS	Included in training costs	During operation
Health and Safety	Electrocution risks for maintenance workers and local people	• Installation of warning signs at towers. • Installation of explanatory boards at towers that individual connection is not possible at the TL • Implementation of Operational Health and Safety (OHS) and Community Health and Safety (CHS) Plans • Awareness raising activity among population and	DABS	Included in maintenance/ operational costs	During construction/ operation

Issue	Potential Impact	Mitigation Measure	Implementing Agency	Costs in $	Date for Implementation
		especially maintenance workers			
Land Use	Restrictions of land use	• Land within the ROW can further be used for agriculture. • Compensations for damaged crops during maintenance. • No herbicides will be used for ROW clearing	DABS	Included in operational costs	During operation
Impacts during Decommissioning Phase	Visual impact on the landscape Efficient resource use	• Complete dismantling of the transmission line after the life-span of minimum 50 years. • Recycling of metal parts and selling as scrap metal. • Waste management procedures and disposal according to national and international standards	DABS	Included in operational costs	During decommissioning

10.2 Monitoring Measures

10.2.1 Design phase

Monitoring activities during the design or pre-construction phase will ensure that the process of final line routing complies with the following mitigation measures:

- Avoidance of protected or ecological sensitive areas;
- Avoidance of settlements in ROW to minimize resettlement activities;
- Avoidance of historical and cultural sites;
- Minimization of construction of access roads.

Due to the nature of the Project, the detailed line routing and selection of the tower sites will be performed by the PIC (Project Implementation Consultant). A strict monitoring by an external expert of re-routing to avoid resettlement and cultural sites is recommended for all line sections.

Monitoring includes further a control if the EMP is adequately updated during detailed design phase and if EMP implementation is included in tender documents and contracts.

10.2.2 Construction phase

Internal environmental monitoring is the responsibility of DABS-PMO. Monitoring of the EMP implementation will be performed by an EHS Consultant within the PIC contract during construction phase. Monitoring results will be included in the project quarterly progress reports, semi-annual environmental reports during the construction phase and annual reports after commissioning. The detailed monitoring program will be subject to review and approval by ADB.

In addition, external construction site audits will be performed by an international expert (EHS External Auditor) to ensure that all requirements as stipulated in this EMP are fulfilled. Such an EHS Construction Site Audit will be performed three times a year with special focus to the period of performing the detailed land survey.

Tasks during the construction phase are the monitoring of environmental performance of contractors with regard to control measures to pertaining to erosion material storage, sitting of work site, noise, waste disposal, traffic management, workers safety, protection of physical cultural resources etc. (see Table 10-4).

10.2.3 Operation phase

Environmental monitoring during the operation phase will be performed by DABS and NEPA.

The PMO will no longer exist after construction. Monitoring results will be included in annual environmental reports during the construction phase and in annual reports after commissioning. The detailed monitoring program will be subject to review and approval by ADB.

Operation and Maintenance (O&M) practice and environmental effects include soil erosion, soil contamination, surface water and EMFs.

During operation, when the transmission line is under full load, it is recommended to measure the electric and magnetic fields under the lowest clearance and at housings located nearby the line. Objective is to show that the internationally accepted permissible limits are not exceeded.

Operation phase environmental monitoring will include regular transmission line inspections to verify compliance with the EMP requirements and with relevant laws and regulations (see Table 10-5).

A budget provision for monitoring of the decommissioning after the life-span of the transmission line (min. 50 years) will be included in the operation cost

Table 10-4: Monitoring Plan for Design Phase and Construction Phase

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs in $	Monitoring and Reporting Responsibility	Date for Implementation
Line Routing	• Compliance with ADB SPS, • Minimization of resettlement needs, • Avoidance of cultural sites, • Compensation payments (see LARP), • Access road design, • Design of river crossings	• Avoidance of environmental and social impacts during line routing, • Avoidance of resettlement requirements, • Towers will not be located near river banks and flooding areas • Towers will be located with minimum local environmental impact • Construction activities will be restricted to as small an area as possible (incl. access roads).	Entire line corridor	Visual control (Field visit) of final line routing including selected deviations by independent expert	One time, before start of physical works	Included in EHS Audit	EHS Consultant (from PIC)	During design phase, before the start of physical works
Soil and Erosion	• Construction standards of access roads, • Temporary bridges, • Re-planting activities	• Control of low impact construction standards • Visual control of river crossings • Visual control of re-planting activities	Entire line corridor	Visual control of record keeping of length built and length rehabilitated/ decommissioned after Project completion.	Periodically during construction	Included in EHS Audit	EHS Consultant (from PIC)	During construction
Landscape and Visual Aspects	• Re-establishing of the conditions of the landscape before construction • Removal of all construction debris	• Visual inspection of line corridor	Line corridor	Visual control	Once at the end of construction period	Included in EHS Audit	EHS Consultant (from PIC)	Before start of operation
Land Acquisition and	• Compensation payments • Information	• Visual control • Photo-documentation of resettlement activities and	Entire line corridor	Visual control, records, survey	After final design	See LARP document	Due Diligence Team (see LARP	Before and during construction

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs in $	Monitoring and Reporting Responsibility	Date for Implementation
Resettlement	sessions • Grievance mechanism • Resettlement actions	re-installation including GPS data • Grievance mechanism documents					document)	
Air Pollution	• Construction standards	• Monitoring of good construction standards; • Monitoring of correct implementation of construction manual, especially related to vehicle use and maintenance	All work areas	Visual control	Periodically during construction	Included in construction cost/ EHS Audit	EHS Consultant (from PIC)	During construction
Pollution of Surface Water	• Good construction principles at river crossings • Location of towers no closer than 50 m to flooding areas • No pollution sources near rivers	• Visual control of downstream water quality (turbidity), • Regular measurements of up-/ downstream basic parameters, • Plan for detailed analysis (e.g. for hydrocarbons) if pollution/ spills are suspected. • Visual control that any temporary bridges are properly constructed, do not cause deterioration of river bed and are dismantled after completion • Control of Implementation of EMP measures	Line sections with river crossings	Visual Control, Measurements and Analysis of basic surface water parameters (ph, COD, BOD, oil grease etc.), sampling upstream and downstream of river crossings	Periodically during construction	Included in construction cost/ EHS Audit	EHS Consultant (from PIC)	During Construction

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs in $	Monitoring and Reporting Responsibility	Date for Implementation
Pollution of Groundwater	• Appropriate sewage treatment of workers' camps • Appropriate groundwater protection measures	• Visual inspection of pollution sources • Analysis and measurements of basic groundwater parameters.	Tower sites, work camps	Visual control, water analysis in wells	Periodically during construction	Included in EHS Audit	EHS Consultant (from PIC)	During construction
Flora and Fauna	• Respect of minimal ground clearance in design • Extent of lay down areas and routing of new access roads	• Monitoring of final design, including specifications of tower locations and height of towers, location and length of access roads • Monitoring of tree cutting, enforcement of prohibition	Entire line ROW	Regular visual inspection during construction Complete line survey after construction	Periodically during construction General survey after construction	Included in EHS Audit	EHS Consultant (from PIC)	During construction
Waste Production Waste Management	• Economic land use, • Proper topsoil management, • Erosion control and post construction	• Visual control of economic land use, proper topsoil management, erosion control and post construction site restoration. • This should be reviewed in the final design and also checked in the field for design compliance.	All work areas	Design compliance, Visual control	One time before start of works, yearly during construction, at end of construction phase	Included in EHS Audit	EHS Consultant (from PIC)	Before, during and after construction

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs in $	Monitoring and Reporting Responsibility	Date for Implementation
Liquid Waste	• Implementation of Sewerage Management Plan • Septic tanks at each construction campsite • Measures to prevent spills of liquid wastes (i.e. oil change of construction vehicles)	• Visual control of construction sites and workers camps, especially sanitary facilities, Waste Management Plan and Sewerage Management Plan facilities	Work camp sites; Lay-down Areas	Design compliance, Visual control	Regular monitoring during construction process; EHS Audit	Included in EHS Audit	EHS Consultant (from PIC)	During construction
Health and Safety	• Compliance with EHS Management Plan (Work Safety / Sanitation, Noise)	• Construction Site/ EHS Audit. • Monitoring of noise level, protective equipment, workers camp sanitation, safe handling of hazardous materials (explosives at quarries etc.) and electrical accidents prevention, prevention of work accidents etc. during construction	All work areas, Workers camps	Visual Control of EHS Management Plan implementation	Yearly during construction	Included in EHS Audit	EHS Consultant (from PIC)	During construction
Health and Safety	• Clearance of all work areas from mines	• Clearance Report of Mine Action Coordination Centre of AFG (MACCA)	All work areas	Clearance status	One time before start of works	Included EHS Audit	EHS Consultant (from PIC)	During design phase, before the start of physical works

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs in $	Monitoring and Reporting Responsibility	Date for Implementation
Local Workforce	• Monitoring of Training of workers on Health and Safety measures in workers' camps • Conflict mitigation / mediation training	• Monitoring of measures to prevent and sanction irregular behavior of the workers • Monitoring of Implementation of Construction Manual • Grievance Mechanism related to conflicts and complaints	Workers camps, construction sites	Site visits and interviews No. of trainings conducted, content, participants Grievance Mechanism Settlement records	Yearly during construction, during EHS Audit visits	Included in EHS Audit	EHS Consultant (from PIC)	During construction
Infrastructure and Traffic Safety	• Traffic Safety Plan included in EHS Plan • Implementation of measures to enhance traffic safety, road signs	• Short term impact during construction, no specific monitoring necessary.	Entire line corridor	Visual Control	Quarterly during construction	Included in EHS Audit	EHS Consultant (from PIC)	During construction
Physical Cultural Resources	• Implementation of chance find procedure	• Photo-documentation of key sites close to alignment before start and after completion of construction, • Visual control that sensitive areas are fenced off and secured against unintended damage during construction.	All work areas	Visual Control, Records	Yearly during construction	Included in EHS Audit	EHS Consultant (from PIC)	Before, during and after construction
Physical Cultural Resources	• Material transport	• Recording of kinds of materials and routes of transport	Entire line corridor and roads/ tracks near Aquina Huzi	Visual Control, Records	Regular monitoring during construction process	Included in EHS Audit	EHS Consultant (from PIC)	During construction

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs in $	Monitoring and Reporting Responsibility	Date for Implementation
Grievance Mechanism	• Implementation of an accessible grievance mechanism for APs to address complaints at the local level	• Social survey by independent expert to find out if grievances have been settled.	Community level in all provinces	Survey	3 times during construction process	Included in EHS Audit	EHS External Auditor	During Construction

Table 10-5: Monitoring Plan for the Operation and Decommissioning Phase

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs in $	Monitoring Responsibility	Date for Implementation
Soil and Water Resources	• Removal of temporary infrastructure • Replanting of unneeded access roads, lay down areas, and other work sites • Fitting transformers with oil pits connected to a drainage system. • Provision of separate storage tanks for further treatment of oily wastewater at SS	• Visual control of downstream water quality (turbidity), • Regular measurements of upstream / downstream basic water parameters, • Plan for detailed analysis (e.g. for hydrocarbons) if pollution / spills are suspected. • Visual control that any temporary bridges are properly constructed, do not cause deterioration of river bed and are dismantled after completion.	All work areas	Visual inspection	Once after construction	Included in operation cost	NEPA	After construction
Landscape and Visual Impacts	• Complete dismantling of the old TL and SS without function.	• Visual Inspection • Control of planning and implementation of re-plantation sites and activities	All work areas	Visual inspection	Once after construction	Included in operation cost	DABS Environment Department (ED)	After construction
Flora	• No use of herbicides for ROW clearing	• Supervision of maintenance procedures	Entire ROW	Periodical Inspection	Yearly during operation	Included in operation cost	DABS Environment Department / NEPA	During operation

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs in $	Monitoring Responsibility	Date for Implementation
Fauna	• Disturbance of animals during maintenance work • Prohibition of hunting	• Supervision of maintenance procedures	Entire ROW	Periodical Inspection	Yearly during operation	Included in operation cost	DABS ED / NEPA	During operation
Waste Production	• Reduction of waste quantity, recycling as much as possible. • Proper dumping of remaining waste.	• Monitoring of Waste Management Plan and control of implementation	All work areas	Periodical Inspection	Yearly during operation	Included in operation cost	DABS ED/ NEPA	During operation
Health and Safety	• EHS Management System/ Plan development and implementation during operation	• Monitoring of Implementation of EHS Management Plan	Maintenance locations	Periodical Inspection	Yearly during operation	Included in operation cost	NEPA / DABS ED	During operation
Health and Safety	• Electric and Magnetic fields	• Regular EMF measurements (after purchase of EMF meters and related training for handlers) • Control of encroachment of safety zone	Entire line ROW	Regular measurements under full load	Yearly during operation	Included in operation and training cost	DABS ED	During operation
Health and Safety	• Noise (corona effect)	• Regular noise measurements (after purchase of noise monitoring equipment and related training for handlers)	Entire line ROW (especially in the neighboring living areas)	Regular measurements under full load	Yearly during operation	Included in operation and training cost	DABS ED	During operation

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs in $	Monitoring Responsibility	Date for Implementation
Land Use ROW clearing and maintenance	• Further agricultural land use in the ROW, • Use rights and use practices • Compensation payment for damaged crops during maintenance. • No use of herbicides for ROW clearing	• Monitoring of land use possibilities, compensation payments, grievance mechanism	Entire line ROW	Periodical Survey	Yearly during operation	Included in operation cost	DABS ED	During operation
Impacts during Decommissioning Phase	• Complete dismantling of the transmission line after the life-span of minimum 50 years. • Recycling of metal parts and selling as scrap metal. • Waste management procedures and disposal according to national and international standards	• Visual control that all project related infrastructure is deconstructed, metal parts are recycled, wastes disposed and hazardous materials treated according to national and international best practice	Entire line ROW	Visual control, review of records	One time after life span of the project (50 years)	Provision for decommissioning included in operation costs	DABS	After life span of the project

11. IMPLEMENTATION ARRANGEMENTS AND CAPACITY BUILDING

11.1 Institutional Arrangements and Responsibilities

The environmental assessment and review procedure involves distinct processes, dynamics and different agencies. The agencies involved in the planning and implementation of resettlement and rehabilitation program are DABS as the EA and the Provincial and District governments. The DABS with the support of the management consultant and the implementation consultant will co-ordinate all activities related to the preparation, implementation and monitoring of the environmental management. All activities will be coordinated with the relevant local government agencies and community shura.

The Implementing Agency for the construction and operation of the transmission line will be DABS. As such, DABS will also have the task to internally monitor the implementation of the EMP. The construction will be carried by an external Construction Contractor (CC).

11.1.1 DABS

DABS is the national, yet commercialized, electric utility, which operates and manages electric power generation (units of over 100 kW), imports, and T&D throughout Afghanistan on a commercial basis. The company remains in a precarious financial state, and in 2008 it had to be rescued from collapse by donors. Improvements in collections and reductions in fuel costs due to higher imports have also contributed to an improvement in its finances. The utility is now organizing itself along the lines of a commercial company (Figure 11-1):

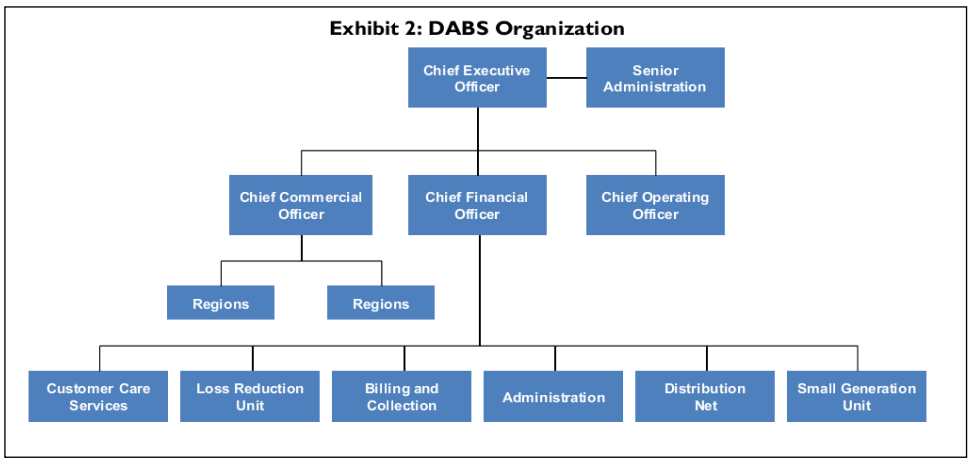


Figure 11-1: Organizational structure of DABS

DABS will be responsible for the maintenance of the line and partly for the construction supervision.

The Project management office (PMO) will comprise an executive committee, an integratory working group, a project management organization in the DABS (DABS–CEO).

The DABS-PMO will be responsible for the overall technical supervision and execution of the project. The staffing of DABS-PMO will include expertise in project management,

electrical transmission engineering, institution and finance, environment, socioeconomic, land acquisition and resettlement aspect.

The mitigation measures that are incorporated into the design will the verified by the DABS-PMO before providing technical approvals.

11.1.2 NEPA

The National Environmental Protection Agency (NEPA), as an independent institutional entity, is responsible for coordinating and monitoring conservation and rehabilitation of the environment. NEPA will appoint an EIA Board of Experts to review, assess and consider applications and documents submitted by the proponent. Acting on the advice of the EIA Board of Experts, NEPA will either grant or refuse to grant a permit. A permit granted will lapse in the event that the proponent fails to implement the Project within three years of the date of which the permit was granted. NEPA should also be consulted if complicated issues arise during construction and operation stages.

11.1.3 ADB

ADB is responsible for screening sub-projects to specify ADB's safeguard requirements; undertaking due diligence; and reviewing the borrower's/client's social and environmental assessments and plans to ensure that safeguard measures are in place to avoid, wherever possible, and minimize, mitigate, and compensate for adverse social and environmental impacts in compliance with ADB's safeguard policy principles.

ADB is further determining the feasibility of ADB financing; helping the borrower/client in building capacity to deliver the safeguards; and monitoring and supervising the borrower's/client's social and environmental performance throughout the project cycle. ADB discloses safeguard plans and frameworks, including social and environmental assessments and monitoring reports, on its website.

If a borrower/client fails to comply with legal agreements on safeguard requirements, including those described in the safeguard plans and frameworks, ADB will seek corrective measures and work with the borrower/client to bring it back into compliance. If the borrower/client fails to re-establish compliance, then ADB may exercise legal remedies, including suspension, cancellation, or acceleration of maturity, that are available under ADB legal agreements. Before resorting to such measures, ADB uses other available means to rectify the situation satisfactory to all parties to the legal agreements, including initiating dialogue with the parties concerned to achieve compliance with legal agreements.

11.1.4 Construction Contractor (CC)

The Construction Contractor will have the responsibilities to implement the EMP during the construction phase and control workers and subcontractors to respect the environmental guidelines according to international best practice. The CC will also prepare monthly reports including the progress of the implementation of the EMP. The report will contain all discrepancies from the EMP and list all EHS relevant incidents and accidents that occur during the implementation of the construction and implementation of mitigation measures. Based on these reports and on own regular construction site audits the CC together with the PMO will prepare annual performance reports and submit them to ADB.

11.1.5 Project Implementation Consultant (PIC)

The PIC will have the responsibility of directly overseeing the CC's efforts with regards to environmental and social impact management, i.e., it will be responsible for monitoring the EMP implementation. This will be made by hiring an EHS Consultant. The PIC will assist the PMO in supervising the EMP implementation and compiling reports on environmental performance as well as in conducting training for building capacity on EMP implementation.

The mitigation measures that are incorporated as part of the contract documents will also be verified by the PIC consultant before getting the contract signed between the DABS-PMO and the contractor.

11.1.6 EHS External Auditor

An EHS External Auditor will monitor the correct implementation of the EMP according to international best practice. Environmental audits will take place three times during the construction process.

11.2 Capacity Building

At DABS there is no Social/Environmental Department. The creation of a Social/Environmental Department in DABS and a training of qualified staff are therefore highly recommended. Staff needs to be educated in health (e.g. electric and magnetic field), safety (e.g. working in height, working under high voltage conditions) and environmental issues (e.g. preserving areas of ecological value). Such a department should also deal with social issues and will be responsible for monitoring during operation phase.

The PIC will assist the PMO in designing and implementing the capacity building program and conducting trainings to enhance the EMP implementation capacities.

On the local administration level there is a need to review capacities of local administration staff to handle public consultation, expropriation, compensations, dealing with complaints (GRM).

In general, the EHS staff of DABS will be trained on-the-job on how to implement the EMP during mitigation and monitoring actions performed by internationally experienced experts.

Training on how to use an EMF meter and how to interpret the results will also be given to DABS staff.

One of the main needs during implementation of the Project regarding environmental aspects is the monitoring of the implementation of all requirements stipulated in the EMP.

Trainings should focus on the application of ADB Safeguard Policy and monitoring procedures. Provision for training requirements is approximately 50,000 USD.

12. OVERALL FINDINGS AND RECOMMENDATIONS

In summary, the results of the investigation demonstrate that the sub-projects will have mostly low impacts on the environment if the proposed EMP is implemented and all proposed mitigation measures are accomplished. Some medium impacts remain regarding the land acquisition and land use, involuntary resettlement and vulnerable people during construction (see separate LARP document), as well as visual impacts and natural disasters during operation.

Careful line routing during the final design will help to minimize resettlement needs. Involuntary displacement and relocation will be mitigated to an absolute minimum. If the priority to avoid involuntary displacement is respected by the construction contractor and bypasses are carefully designed, involuntary displacement is likely to be totally avoided. The impact on physical cultural resources (historical and cultural sites) will be minimized. Especially, the construction of access roads and the final location of towers have to be implemented very carefully to avoid any sensitive historical and cultural area, making future excavation activities possible. In case of chance finds of historical artifacts the construction process has to be stopped immediately and the local representative of the Ministry of Culture has to be contacted.

The proposed transmission line including the suggested bypasses will not cross Protected Areas or other areas of outstanding importance for flora, fauna and biodiversity. At river crossings special care must be exercised in order to avoid water pollution and river bank erosion.

The overall construction will be supervised by an independent international expert. The duty of such an EHS Audit will be to ensure that the requirements stipulated in the Environmental and Social Management Plan to this Project are fulfilled. Focus will be put on:

- Avoidance of houses in the ROW to minimize resettlement, if possible to zero;
- Avoidance of historical and cultural sites;
- Avoidance of ecological sensitive areas.

These extensive supervision activities are necessary because the elaboration of detailed design features including detailed line routing is not known yet. The determination of the details is shifted to the construction contractor and could therefore not be covered by this study.

Within DABS an Environmental and Social Department does currently not exist. It is recommended to implement such a department and train the staff regarding all health, safety and environmental aspects including social aspects that will invariably arise during construction and operation of overhead lines.

In cooperation with the ADB and the design monitoring experts, DABS will give the directive to redesign sections that have been identified within the EIA or are identified during the course of the design process.

ADB will be responsible to undertake due diligence; and reviewing the borrower's/client's social and environmental assessments and plans to ensure that safeguard measures are in place to avoid, wherever possible, and minimize, mitigate, and compensate for adverse social and environmental impacts in compliance with ADB's safeguard policy statement (ADB, 2009).

It is argued that a careful design will be able to balance the impacts, avoiding resettlement as the highest priority, without increasing environmental impacts i.e. by long access roads or crossing protected areas and without affecting cultural heritage sites. Also quite often, design options are able to reduce environmental as well as social impacts at the same time.

The EMP and LARP have to be part of the tender documents and construction contracts. A review of the final design by independent social and environmental experts is recommended.

13. CONCLUSIONS

Due to an elaborate line routing in close cooperation between the technical and the environmental survey experts, and based on recent high-resolution satellite scenes, most significant impacts, especially resettlement, could be widely avoided in these early planning stages. If the contractor who conducts the detailed design follows this approach, resettlement could be further diminished.

The impact mitigation measures are proposed to minimize social and environmental impacts. If all proposed mitigation measures are implemented, the transmission line can be constructed with a minimum of adverse effects on the natural and human environment.

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