Appendix 4

Draft Initial Environment Examination

Project Number: 42094-075
September 2013

Islamic Republic of Afghanistan: Energy Sector Development Investment Program (Tranche 5) – 500 kV Dashte Alwan Substation Project

Prepared by Fichtner GmbH for Da Afghanistan Breshna Sherkat of the Government of Afghanistan for onward submission to the Asian Development Bank

CURRENCY EQUIVALENTS

(as of 2 September 2013)

Currency unit	–	Afghani (AF)
AF1.00	=	$0.01765
1.00	=	AF56.63

ABBREVIATIONS

ACEP	– USAID-supported Afghanistan Clean Energy Program
ADB	– Asian Development Bank
AEIC	– Afghan Energy Information Center
AERA	– Afghanistan Energy Regulatory Authority
AIS	– Air Insulated Station
ANDS	– Afghanistan National Development Strategy
AP	– Affected Persons
AP1, AP2	– Angle Point 1, Angle Point 2
AT	– Angle Tower
AWEC	– Afghanistan Wildlife Executive Committee
CC	– Construction Contractor
CEO	– Chief Executive Officer
COI	– Corridor of Influence
DABS	– Da Afghanistan Breshna Sherkat (National Power Utility)
EA	– Environmental Assessment
EHS	– Environment, Health, and Safety
EHS-MS	– Environment, Health and Safety Management System
EIA	– Environmental Impact Assessment
EL	– Environmental Law
EMF	– Electric and Magnetic Fields
EMP	– Environmental Management Plan
GoA	– Government of Afghanistan
GRM	– Grievance Redress Mechanism
IA	– Implementing Agency
ICIMOD	– International Centre for Integrated Mountain Development
IEE	– Initial Environmental Examination
IUCN	– International Union for Conservation of Nature
kV	– Kilovolt
KWh	– Kilowatt-hour
LARP	– Land Acquisition and Resettlement Plan
LARPF	– Land Acquisition and Resettlement Policy Framework
MACCA	– Mines Action coordination Center for Afghanistan
MDG	– Millennium Development Goal
MEW	– Ministry of Energy and Water
MFF	– Multi-Tranche Financing Facility
MIC	– Ministry of Industry and Commerce
MOE	– Ministry of Economy
MoPH	– Ministry of Public Health
MRRD	– Ministry of Rural Rehabilitation and Development
MWh	– Megawatt-hour
NEPA	– National Environmental Protection Agency
NEPS	– Northern Electric Power System
NGO	– Non-Governmental Organization

OHL	– Overhead Line
PA	– Protected Area
PAP	– Project Affected Person
PCR	– Physical Cultural Resources
PIC	– Project Implementation Consultant
PMO	– Project Management Office
PMU	– Project Management Unit
PUE	– Transmission Line Standard for Soviet Union (*pravila ustroystva electrostanovok*)
ROW	– Right of Way
SEA	– Strategic Environmental Assessment
SPS	– Safeguard Policy Statement
SS	– Substation
STD	– Sexually transmitted diseases
TL	– Transmission Line
TOR	– Terms Of Reference
UN	– United Nations
UNEP	– United Nations Environment Program
USD	– United States Dollar
WB	– World Bank
WWF	– World Wide Fund for Nature

NOTES

(i) The fiscal year (FY) of the Government of Afghanistan ends on 21 December. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2012 ends on 21 December 2012.

(ii) In this report, "$" refers to US dollars

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1. Executive Summary

1. The Project comprises construction of a new 500 kV substation at approximately 25 kilometers (km) north-west of the city of Pul-e-Khumri, along the main highway connecting Pul-e-Khumri and Mazar Sharif. The project site (0.45 km X 1.2 km) is adjacent to the existing 220 kV overhead line (OHL) between Naibabad and Pul-e-Khumri. This Project is part of a pool of several projects which have the objective of importing electricity from Central Asian countries to Afghanistan.

2. The Project component in Afghanistan has been classified by the ADB as a Category B Project, for which an Initial Environmental Examination (IEE) has to be carried out. This IEE study assesses the environmental impacts (ecological and social impacts) of the Project in accordance with the requisite ADB guidelines. The investigation area covers the proposed substation site that is 100% owned by the Government of Afghanistan, is outside the municipal limits of the city Pul-e-Khumri in district Dashte Khoja Alwan in Baghlan province, and is barani (rain-fed) with biennial cultivation by some 10 families and does not have any settlements or structures.

3. Geography: The investigation area is greenfield site catered to facilitate future expansion program under subsequent financing facilities by Afghanistan's international development partners, including construction of back to back convertor stations for import of power from Central Asia.

4. Geology and Soil: The site 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. It is an earthquake hazardous area with assumed 6.0 local magnitude (ML) on Richter scale, meaning posing medium risk. The site is composed of several soil types, however sandy soils predominate.

5. Landscape: The landscape comprises general features of the Afghan semi-desert and grass steppe. The site is not a touristic area and is characterized by a continental dry climate. The last few years have brought very little rain. The winds generally blow from northern direction in winter and from the south-west in summer. The major source of air and noise pollution is the heavy traffic load on adjacent the ring road.

6. Water Resources: The groundwater in site is located relatively deep and the water table (as stated by local communities) can be found at below 100 meters (m) depth. The vegetation is negligible and rain fed. Not many wild animals are found in site due to the degraded habitat and sparse vegetation. Mammals, birds, reptiles, amphibians, fresh water fish and insects are the main animal groups in the province. There is no endangered plant or animal species in site area. Not does the site have any Protected Area. There is no population and settlements at the site area.

7. In summary, the results of the investigation demonstrate that the Project will have no high to medium impacts but mostly very low impacts on the environment if the proposed EMP is implemented and all proposed mitigation measures are accomplished.

8. No Project Alternative: This alternative would not cause any resettlement, but would also prevent electricity import from Central Asia to the province and to Afghanistan. If no substation is constructed, there will be no power for some 4 million new households in north eastern, and southern Afghanistan including Kabul. The substation will also act as bedrock for export of power to Pakistan and Tajikistan.

9. The ADB safeguard policies foresee meaningful consultation with affected people, if any, and other concerned stakeholders, including civil society, and facilitate their informed participation. The current security situation makes it difficult to undertake effective community consultations without compromising the safety of staff and consultants. The public consultations will be conducted, and the IEE and EMP updated prior to construction activity. An appropriate grievance mechanism will be prepared and implemented to avoid lengthy court procedures, but does not limit the citizen's right to submit the case straight to the court of law just in the first stage of grievance process.

10. The Environmental Management Plan (EMP) includes both an Environmental Mitigation Plan and a Monitoring Plan in tabular form for the design, construction, operation and decommissioning phases of the Project. Adequate mitigation measures and monitoring actions including action parties, costs, and dates for implication are given. The costs for the implementation of the EMP are expected to be of 135,000 USD.

11. 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. The detailed monitoring program will be subject to review and approval by ADB. In addition, construction site audits shall be performed by an international expert to ensure that all requirements as stipulated in this EMP to the Project are fulfilled.

12. The Project site has been moved out of municipal limits of the city of Pul-e-Khumri in a barren site with no population, therefore minimal social safeguards impacts are envisaged. The site for the substation in Dashte Alwan has been selected such that the construction equipment, materials and personnel will by-pass the built up areas of Pul-e-Khumri City. However, there will be expected short term interruption in the main highway connecting Pul-e-Khumri and Mazar Sharif when the heavy equipment and transformers are delivered to project site.

13. The Project will improve the reliability of the electricity supply in Dashte Khoja Alwan district. The Project is expected to improve agricultural yield since most of the irrigation pumps in the area are electricity driven, improve the delivery of critical services such as hospitals and food storage and preservation, and improve performance of electronic equipment that are dependent on reliable electricity supply

2. Introduction

2.1 Project Background

1. The Project consists of construction of a new 500/220 kV substation connected by a new 500 kV transmission line traversing the Hindu Kush mountains via the Salang Pass route. The 500/220 kV substation will be sited at Dashte Alwan, some 25 kilometers (km) north west of Pul-e-Khumri at the northern end of the 500 kV transmission line. The site is a new green field location outside the municipal limits of the city of Pul-e-Khumri to minimize any land acquisition and resettlement impacts. The site dimensions are 1.2 km X 0.4 km, located along the national highway and the 220 kV transmission line between Pul-e-Khumri with Mazar Sharif. The land is 100% owned by the Government of Afghanistan. No space constraints exist at the proposed substation location. The estimated cost of the Project is $53 million.

Location of New 500 kV Dashte Alwan Substation

2. The Project will enable evacuation of additional 1000 MW to power from northern Afghanistan to eastern and southern parts of the country. This would cover some 70% of the population of country. The Project has upward and downward linkages with other ADB assisted project including (i) construction of a 500 kV transmission line from this substation to Kabul ($220 million), (ii) construction of distribution networks ($100 million), and (iii) construction of back to back convertor stations to import power from Central Asian countries (Turkmenistan, Uzbekistan and Tajikistan -- $400 million) into energy starved Afghanistan and Pakistan. The Project is the first phase of consolidating Afghanistan's national power grid from islanded mode into a coherent unified grid.

3. This is assessed to be a Category B Project according to ADB's SPS 2009 for which an Initial Environmental Examination (IEE) is required. The main objective of this study is the identification of significant environmental and social concerns that may interfere with the planned project. The study was carried out in compliance with the ADB's Safeguards Policy Statement, as

well as the environmental and social laws and regulations of the Islamic Republic of Afghanistan. International conventions, as ratified by the country, were also taken into account when applicable. A pre-feasibility study was conducted by FICHTNER in 2013 and an IEE has been prepared at the request of the Government of Afghanistan.

2.2 Scope of the Study

4. Within the scope of this IEE, FICHTNER investigated the potential environmental impacts of the planned 500kV substation site at Dashte Alwan. On the basis of the existing environmental situation in the Investigation area (Chapter 4.1) and the technical planning (Chapter 4.2), FICHTNER determined the potential environmental impacts of the project during design (Chapter 6.1), construction (Chapter 6.2), operation (Chapter 6.3) and decommissioning (Chapter 6.5) and also regarded downstream impacts of the Project (Chapter 6.4). Appropriate mitigation and monitoring measures (see EMP Chapter 10) were considered to reduce possible adverse impacts.

5. This IEE was conducted during the Project preparation stage from May to June 2013. The objective of preparing the IEE for the Project is mainly to identify the potential environmental impacts, to recommend the mitigation measures (avoid, and minimize), and to recommend effectively implementation of mitigation measures throughout the project implementation and operation period. The main info on proposed measure is presented in Environmental Management and Monitoring Plans.

2.3 Methodology

6. For preparing this IEE study, FICHTNER set up a multi- disciplinary team of International Environmental and Ecological Expert; International Socio-Economic Expert; and National Environmental and Socio-Economic Experts. One basis for the study consisted of intensive field surveys conducted by the national environmental and socio-economic experts in May 2013.

7. Regarding the environment, a project site was investigated on either side of the planned transmission line during the field survey. 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.

8. Due to the fact that there is no official international consensus on an agreed approach for assessing the significance of impacts on the environment, FICHTNER 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.

9. The evaluation scale applied is as follows: Extent of impact:

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

10. For the judgment, international standards like standards from the World Bank, World Health Organization (WHO) etc. are used supported by Afghan standards (see Chapter 3.1).

3. Institutional and Legislative Framework

3.1 Institutional Framework and National Requirements

3.1.1 Institutional Framework

1. 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.

2. 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.

3. 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)".

4. 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.

5. Province administration of Baghlan, provinces is under the provincial (*wolayat*) there are:

- districts (*uluswali*) – with each province containing between five and 20 districts;
- provincial municipalities (*sharwali wolayat*) – with each province in principle containing one provincial municipality and two rural

municipalities (*sharwali uluswali*) and with each district containing at most one rural municipality, but some with none.

6. Although provinces and districts are legally recognized units of sub-national administration, they are not intended to be autonomous in their policy decisions other than through some flexibility in implementing centrally determined programs (source: DPADM / UN (2006): Public Administration Country Profile).

7. 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 (source: Afghanistan’s Fourth National Report to the Convention on Biological Diversity (2009).

3.1.2 National Legal Framework

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

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.

Table 3-1: National acts/laws of Afghanistan

Relevant regulations, guidelines and policies are named in Table 3-2 on the basis of ADB's Environmental Assessment and Review Framework (EARF), prepared by DABS, July 2008 and updated by Fichtner in August 2012.

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.
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.

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

Framework for EIA (Environmental Act):

9. 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 shall 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 shall review the appeal application and thereafter make an appropriate decision. Should the appellant wish to appeal the Director-General's final decision, the matter shall be referred to the relevant court.

Land Code

11. 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 shall be safe from violation, no one shall 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 (Alden Wiley, 2003; GIRoA, 2004; Gebremedhin, 2007; EMG, 2010).

12. 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"ain some areas (GIRoA 2008b). 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 (Alden Wiley 2003; Gebremedhin 2006).

13. 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.

14. 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

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

3.2.1 International Agreements ratified by the Islamic Republic of Afghanistan

16. 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.

17. 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.

18. 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.

19. 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.

20. 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.

21. 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.

22. 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 (source: Fourth National Report to the CBD Secretariat, 2009).

3.3 International Requirements

3.3.1 ADB Safeguards

1. The Environmental Policy of the Asian Development Bank (ADB) is grounded in ADB's Safeguards Policy Statement (SPS 2009) and ADB's Strategy 2020. The poverty reduction strategy recognizes that environmental sustainability is a prerequisite for economic growth and efforts to reduce poverty. In this context, environmental sustainability is one core issue of ADB's environmental policy.

2. 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 SPS 2009 Guidelines:

- Safeguard Policy Statement (SPS), June 2009, effective since January 2010;
- Environmental Assessment and Review Framework (EARF), prepared by DABS in July 2008 and updated in September 2012;
- Operations Manual (OM) with relevant Bank Policies (BP), March 2010.

3.3.2 Other relevant international guidelines include

- 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.

3.4 Gap Analysis

3. 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.

4. 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 Investigation Area

1. The Investigation area covers the substation site at Dashte Alwan in Baghlan province of Afghanistan. The Investigation area is shown in Figure 4-1. The new Pul-e-Khumri SS site is located at the boundary areas of two alluvial fans, in a sparsely vegetated sediment area, which is widely used as agricultural land (which can be seen in **Error! Reference source not found.**). There is also no indication that it has a significant natural habitat value. Two alluvial fans are coming from the west and the location of the site has been optimized in order to avoid eventual flooding events.

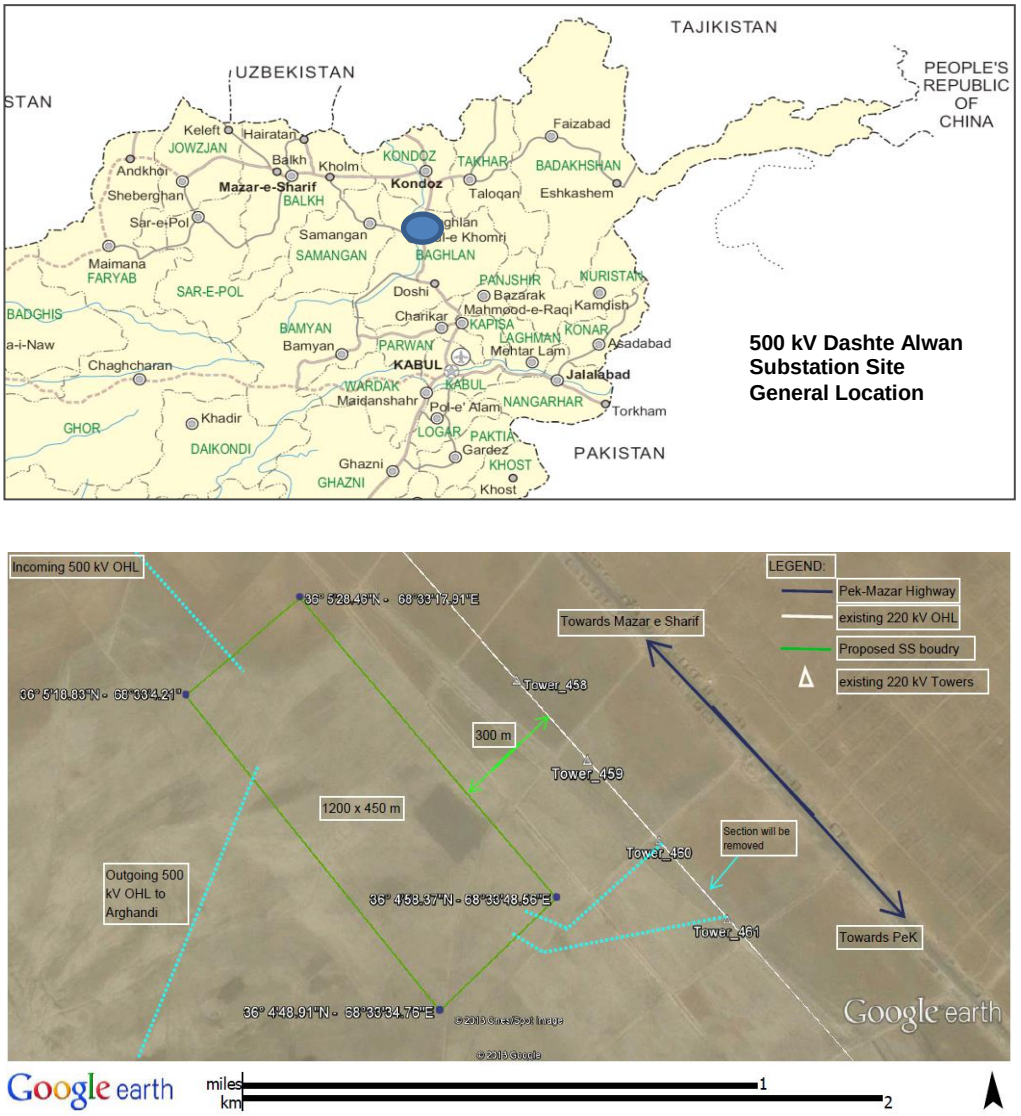


Figure 4-1: Substation Site

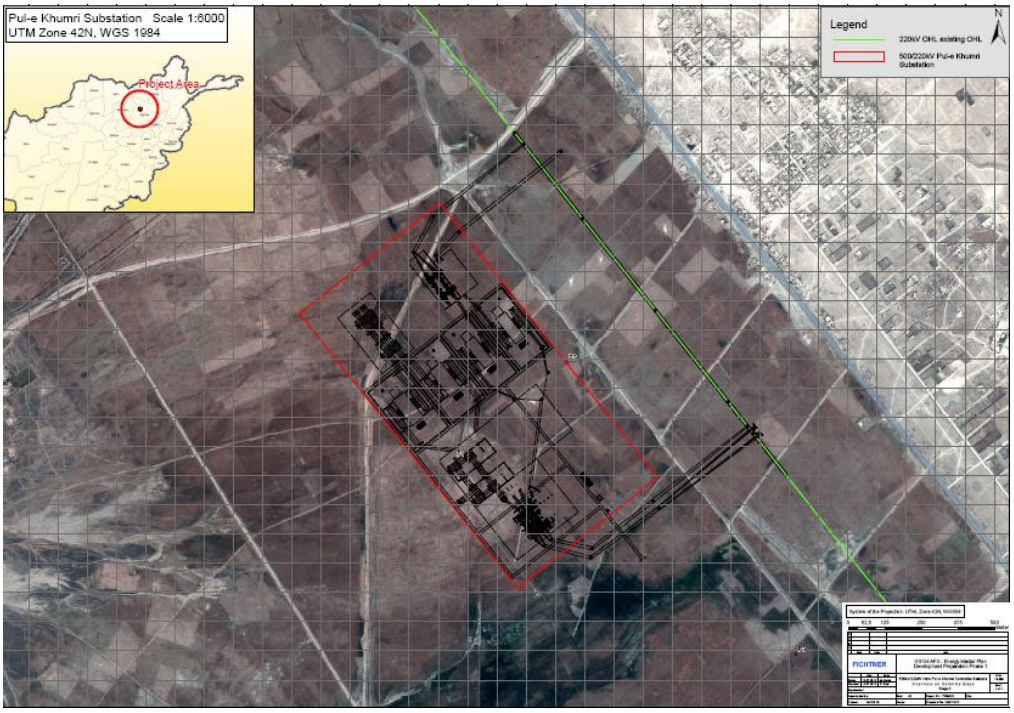
4.2 Technical Description

4.2.1 Substation Siting

2. The project site was determined regarding technical and economic aspects as well as environmental and social aspects. Considered environmental and social aspects are (FICHTNER, 2013):

- Avoiding siting of developed urban areas, densely populated areas, settlements, schools, public buildings and market places;
- Avoiding siting of shrine, historical places, national parks and protected areas;
- Avoiding siting of forest and water catchment zones;
- Keep electrical field, magnetic field, audible noise and TV interference as far as possible below national/ international accepted levels;
- Keep impact on flora, fauna, nesting places, animal trails, migration zones and sensitive ecological areas to a minimum:
- Apply selected bush clearing, minimize access tracks.

The detailed design including final land survey is shifted to the construction contractor and will be part of the tender documents.



3. The construction of the Dashte Alwan substation is similar to constructing a small building except that there will be extensive network of conduits to accommodate the wires and communication cables. Additional excavation and foundations will be required for the control panels and backup generator engine. Outside the control room and office, the yard will be leveled and unsuitable soil; normally the top soil will be removed. The location of heavy equipment such as the transformers, towers, water tank and oil storage tanks will be identified and the foundation excavated. Depending on the

results of the geotechnical investigation, piling may be carried out to improve the soil bearing capacity to support the heavy equipment and structures. Steel reinforcement and formworks will be put in place and later concrete will be poured. Once the concrete has cured, the equipment and towers are installed. Drainage system will be dug and at the end of the drainage line, an oil interceptor with screens will be installed to remove any oil and grease that could be carried by the rain or melting snow. Excavated materials from the foundation and drainage will be used to fill the area above the existing grade. Sand and gravel will be spread out and compacted. The road and the switchyard (the space for the transformers and switches) will be concreted. To protect the equipment from possible flooding, concreting is done from 0.2 to 0.4 m higher than the existing elevation. The area is then fenced and security monitoring cameras and alarms are installed.

4. The topsoil removed during site preparation will be piled in the area that will not be used for the building or the switchyard. When construction is completed, the piled topsoil will be used for landscaping and gardening. Of the 540,000 sq. meters allocated for the substation, approximately 10% will be landscaped. The main environmental concerns during construction of the substation are noise, dust, and air pollutant emission from the construction equipment and earth moving equipment.

5. The substation will be designed as AIS open terminal substation. The Dashte Alwan 500/220 kV substation in later years will become the focal point for interconnection with the neighboring countries of Turkmenistan, Tajikistan, and Uzbekistan. This substation site at Dashte Alwan is also identified by the Afghanistan's Power Sector Master Plan for direct current (DC) back-to-back convertor stations to permit synchronization between the different sources of imported power.

6. The new Dashte Alwan 500 kV substation shall include the construction and commissioning on turn-key basis of a 500/220 kV substation with one 500/220/20 kV, 3 x 133 MVA transformer bank at Pul-e-Khumri, placed in the north of Afghanistan. This substation shall be built adjacent to the 220 kV line connecting Naibabad switching station with existing Pul-e-Khumri 220/20 kV substation. The 500 kV substation will be connected – loop-in and loop-out to the existing 220 kV Naibabad-Pul-e-Khumri transmission line. This substation shall have a key role inside the Turkmenistan to Afghanistan interconnector, in fact it will be the future hub for the converter station to be financed under Energy MFF 2. Due to the necessity to have high reliability, the proposed substation has been selected the 1 ½ breaker arrangement for 500 kV and 220 kV switchyards. The 500/220 kV transformers have been specified as single phase units. Single phase units were selected to (i) reduce transport weights, thus reducing road or bridge reinforcement requirements; (ii) permit easier replacement in the event of a unit failure; and (iii) the 220 kV switchgear at Dashte Alwan substation will be designed as breaker and half configuration for enhanced reliability, and to prevent a potential for system collapse in the event of a single breaker failure.

5. Description of the Environment

1. The district of the project location in Dashte Khoja Alwan in Baghlan province in north eastern Afghanistan, This chapter presents a brief description of the physical, biological and social characteristics of the project area. Dash-e-Alwan is a dry land located in North West of Pul e-Khumri city about 25 km of existing Puli-Khumri substation. Alwan is located along Mazar-e-Sharif-Puli-Khumri road. North of the road is a settlements called Dasht-e-Alwan refuges city and south of the road is an open area, dried rain-fed land belongs to government. The land gets cultivated on biyearly basis (once per two year) which gives less production as it is totally dependent on the level of rain fall during the year.

2. The land has been operated by individuals as lease and contract for the past 35 years. People from the neighboring villages and other people from Pul e-Khumri can get the contract depending on the local government and social government system decision. Mostly relatives of Maliks (head of specific tribe of place) can get the contract. There has not been a single person holding the contract so with acquisition of this land no long term specific adverse effects are perceived on any specific family or household.

3. There are clear evidences that the land belongs to government the necessary influence of government does exist to occupy the land for any development intervention purposes as they have been able to change the contract in yearly base this shows the level of government influence and ability to occupy the land with no problem and whenever they want.

Geography

4. Baghlan province, situated in the northern Afghanistan, borders in the north with Samangan, in the east with Kunduz and Panjshir, and in the South with Bamyan provinces. This province covers an area of 18,225 km^2. The elevation of project site is 700 meters approximately.

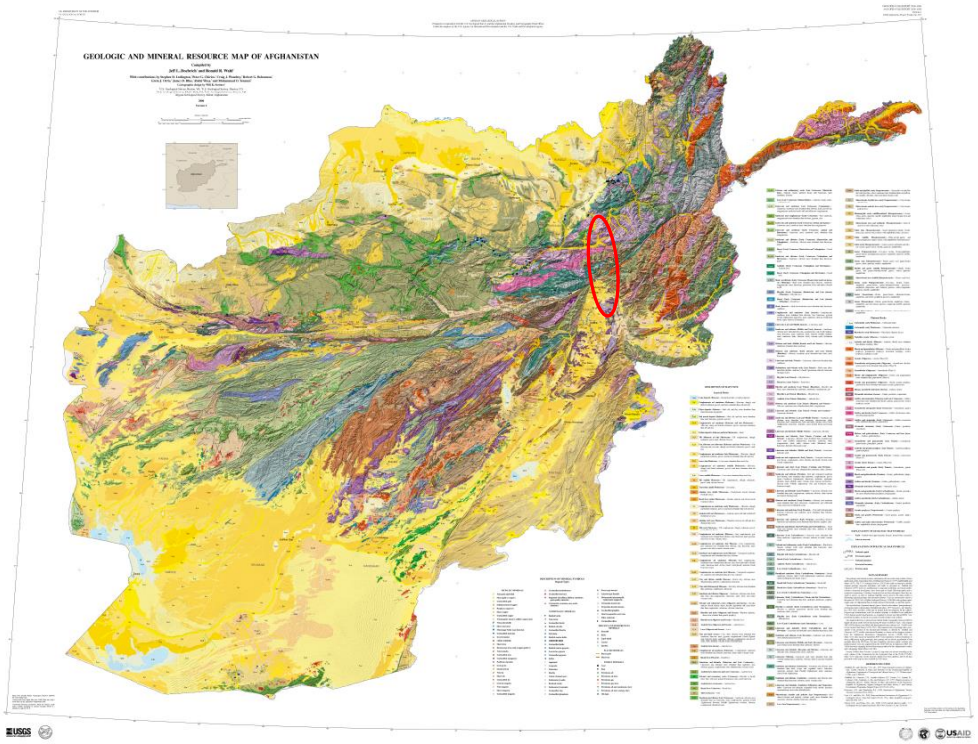
5. Baghlan province is situated 250 km north of Kabul. The recently constructed main North-South road links Baghlan with Kabul and a number of other major cities in Afghanistan, providing good access to markets. Pul-e-Khumri, the provincial capital and urban centre of Baghlan Province, and towns like Doshi are today established marketplaces. The infrastructure connection to main regional and national market places indicates good potential for future economic growth. Rural Baghlan has broad ecological diversity that feature large areas of fertile land through permanent irrigation and big canal systems stretching along the Baghlan River and include parts of the Kunduz River Basin that extends from Khenjan in the South to the edges of Kunduz Province in the North. The majority of the population in Baghlan belongs to a middle class. Sporadic factional fighting flares up in a few Districts but does not impede economic growth in the Province. The sectors with main growth potential include agriculture, medium-sized industries, and small and medium enterprises.

Physical Environment

5.2 Geology and Soil

5.2.1 Geology

6. Afghanistan has some of the most complex and varied geology in the world (Figure 5-1). The oldest rocks are Archean succeeded by rocks from the Proterozoic and every Phanerozoic system up to the present day. The country also has a long and complicated tectonic history, partly related to its position at the western end of the Himalaya. This diverse geological foundation has resulted in a significant mineral heritage with over 1400 mineral occurrences recorded to date.



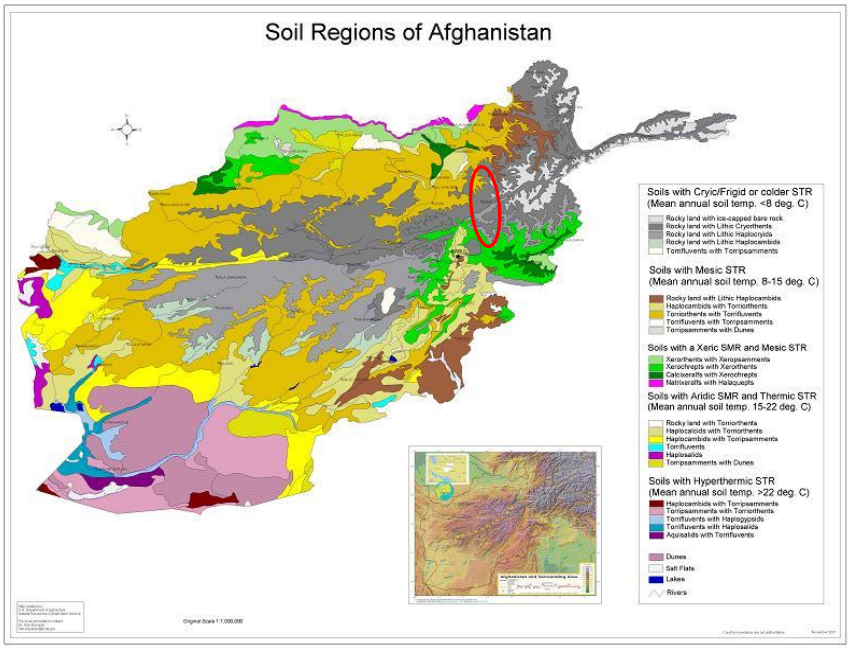
Source: United States Geological Survey (1997)

Figure 5-1: Geological and Mineral Resources Map of Afghanistan (with Investigation area)

7. The Tadjik block of northern Afghanistan formed the southern margin of the Eurasian continental plate during Permo-Triassic times. The Palaeozoic basement was intruded by Triassic granitoids as a result of subduction related to the first stages of the closure of the Tethys Ocean during the Cimmeride Orogeny. Subsequent to this, a Jurassic clastic sequence was deposited, which changes upwards to Cretaceous carbonate platform sedimentation. This area is now the prime target for hydrocarbon exploration, although the exposed granitoids in the northeast of the block are prospective particularly for precious (and base) metal mineralization. The geological situation of the Investigation area is marked by quaternary sediments, quaternary sands and dunes.

5.2.2 Soil

8. The Northern side of the Central Highlands gets substantial snow during the winter months. Heavy spring and summer snowmelt runoffs from the surrounding mountain range comprising more than 400km feed into the central Baghlan River through valleys. Yearly flooding causes frequent damage along the river banks, though this is the only serious form of erosion in the area. The Baghlan River plain between Khenjan and Baghlan Jadid Districts has large irrigation canal systems that are currently being rehabilitated under the Kunduz River Basin Programme (KRBP). Fertile soils enable a double-cropping agriculture showing a good growth potential that is only limited by extensive frost periods during the harsh winter season. The River plains are fertile, and there are comparatively few areas affected by water logging and high salinity that decrease productivity. The mainly loess-covered, soft hillsides are depleted of soil nutrients with low pasture quality and a carrying capacity of less than 0.1 UBL. The landscape features rolling slopes with high skeleton, water permeability and erratic vegetation along the high-altitude mountains of the Central Highland Range (CHR) in the southern part of the Province. The soil in the mountains is rubble and loam rubble and sandy loam 0.5-5 thick and underline by rock. The soil in the intermountain basins is loam and sandy loam and in the river valleys, sand and gravel (Figure 5-2).



Soils with a Xeric SMR and Mesic STR

- Xerorthents with Xeropsamments
- Xerochrepts with Xerorthents
- Calcixeralfs with Xerochrepts
- Natrixeralfs with Halaquepts

Soils with Mesic STR (mean annual soil temp. 8-15°C)

- Torripsamments with Dunes

Soils with Aridic SMR and Thermic STR (mean annual soil temp. 15-22°C)

- Torripsamments with Dunes

Figure 5-2: Soil Regions of Afghanistan (Map with Investigation area)

9. Areas with gentle slopes bear their primary soils, which are course textured admixed without stones. Valleys contain alluvial soils, mixed with gravels and pebbles deposited by storm water channels and drains. These soils are of generally coarse nature. They are moderately to strongly calcareous and well drained. The soils occupying plains to gentle slopes are from pediment materials with medium to textured structure (very fine sand and very fine sandy loam). Soils of these plain areas having access to water are fertile and suited for agriculture. Other plain areas are rain fed. The semi-desert areas are characterized by moving sands.

i. Mineral Resources

10. Afghanistan's mineral sector has been identified as a significant potential source of revenue for the country's economy. Coal, gemstones, and quarry materials are often produced outside the control of the central government and the government has not received royalties for the exploitation of the mineral resources. Almost all of Afghanistan's minerals have been extracted by artisanal and small-scale operations. The country has little experience with commercial mining industry and lacks the mining infrastructure necessary for the exploration and exploitation of its mineral resources. The government has recently undertaken efforts to capture the potential for economic growth in the mineral sector by revising the legal framework–including adopting a new Minerals Law in 2010 – to attract private investment and strengthen mining institutions. The discovery of the enormous extent of Afghanistan's mineral resources will put pressure on the country to move quickly to develop the sector. The country will be challenged to make use of its vast mineral wealth in a manner that promotes transparency and ensures that social and environmental objectives are met (Risen 2010; World Bank 2006). According to the mineral resource map shown, in the investigation area there are deposits of coal and marble in the vicinity of Pul-e-Khumri.

a. Seismicity

11. 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 5-3 shows the seismic hazard map for Afghanistan.

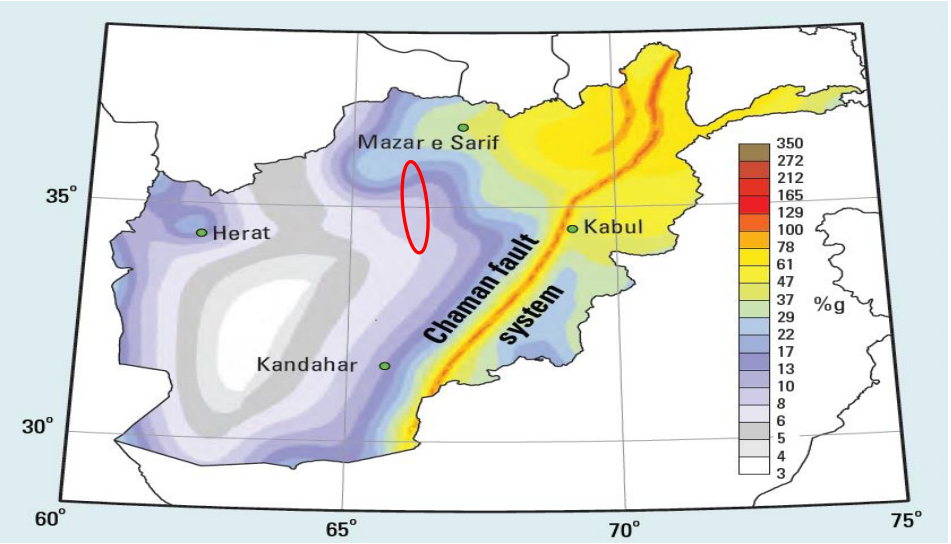
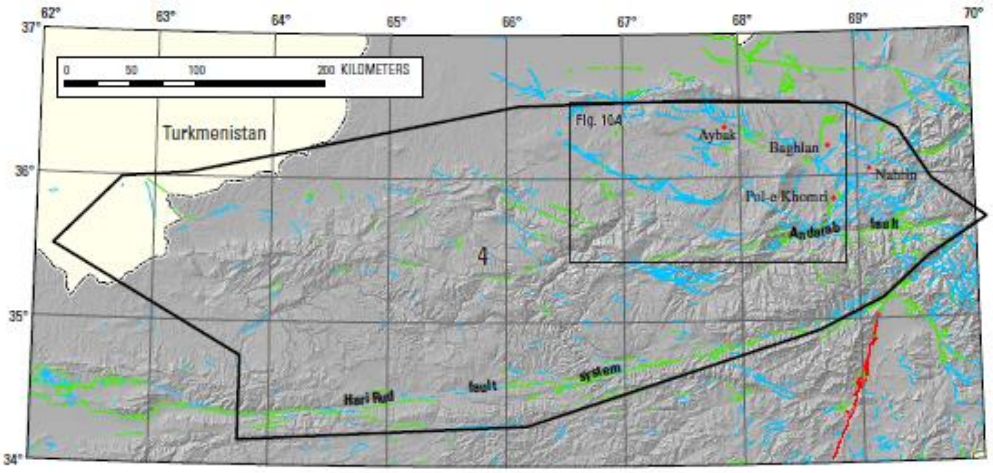
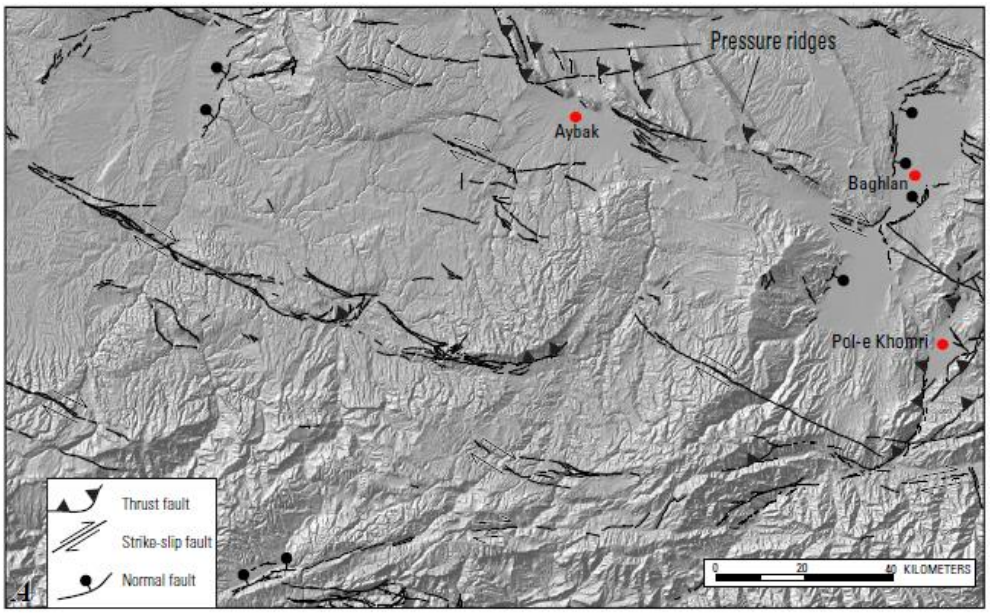


Figure 5-3: Generalized seismic-hazard map of Afghanistan with indication of the project area (USGS, 2007)





12. Along much of eastern Afghanistan and particularly in the northeast, where the project area is located, faults and background seismicity both contribute to seismic risk (USGS, 2007). In comparison to the Investigation area, there are other areas in Afghanistan where the seismic risk is considerably higher. 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 (FICHTNER, 2012).

a. Landscape

13. Afghanistan is an arid country, much of which is mountainous or of desert land. Agricultural land accounts for 58 % of the total land area, but only 12 % is useable farmland, with the balance pastureland, which supports the country's large nomadic and semi-nomadic population and its livestock. Forests make up 1.3 % of the country's total land area. Deforestation is occurring at a rate of 3 % per year. Roughly 0.3 % of the total land area is designated as protected (source: USAID Country Profile). 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 Project site, the vegetation is very sparse.

a. Climate and Air

i. Climate

14. The climate in the central-eastern part of Afghanistan is dry continental and varies according to elevation from moderately warm in the valleys to cold above 3,000 m. The winter in the valleys (from December to February) is mild and clear weather predominates, the spring lasts from March through April in the valleys and basins. From May to mid-June the spring weather in the mountains is typically unstable and wet with most of the annual precipitation falling as brief heavy rain during this period. The days are warm, the nights are cold. The summer in the valleys (May through September) is hot (24 to 30 °C) and the weather is clear and dry. In the mountains summers (mid June-August) are cool (10 to 15°C) in the day time and snow is possible on the mountains tops. Autumn begins dry but turns relatively wet. Winds are predominantly southerly and northerly throughout the year.

Figure 5-2 shows a precipitation map for Afghanistan.

Figure 5-4: Precipitation on the territory of Afghanistan (map with Investigation area)

i. Air Quality and Noise

15. Air pollution is evident in Afghanistan's urban centers. The main causes are dust and vehicle emissions. During autumn and winter, the air quality is reportedly worsened due to the domestic emissions from an increased use of ovens, stoves and open fires. Electricity shortages and lack of fuel-wood result in households burning packaging materials, which causes toxic fumes emission. A combination of drought and loss of vegetation along with a rapidly growing vehicle density are contributing to a worsening of the air quality in the country. Furthermore, in rural Afghanistan the roads are frequently degraded or unsealed which gives rise to a significant dust nuisance form passing traffic. Not only does the dust affect the air quality of rural communities and agricultural areas close to the roadside, but it also presents a major visibility hazard for traffic. An on-going program of rehabilitation of the main traffic routes is currently underway, which should result in a reduction of dust impacts from traffic.

Biological Environment

a. Water resources

i. Water resources in Afghanistan

16. Water is Afghanistan's most precious natural resource, although water management systems country wise have been severely damaged during years of internal conflict. The need for integrated water resource management to balance the competing demands is a key priority for the country. Competing water demands include:

- Water supply, drainage and wastewater management in urban areas;
- Rural water supply for domestic purposes;
- Agricultural water use;

- Generation of hydropower;
- Industrial water uses;
- Water to support natural systems (forest, rangelands and wetlands).

17. Most Afghans do not have access to safe drinking water. This, in combination with a lack of sanitation and hygiene has serious consequences for the health and well-being of the population. An estimated 99% of developed water resources of the country are used for irrigation. Groundwater has traditionally been utilized for irrigation purposes through the use of *karezes mer*, springs and shallow 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 (source: http://www.cawater- info.net/Afghanistan/afg7_e.htm). Groundwater resources and recharge re rates throughout the country are poorly understood, which has resulted in depletion of deep aquifers and pollution of shallow groundwater resources. Demands on surface and groundwater resources are likely to grow substantially due to the large number of returning refugees and internally displaced people.

i. Project area water resources

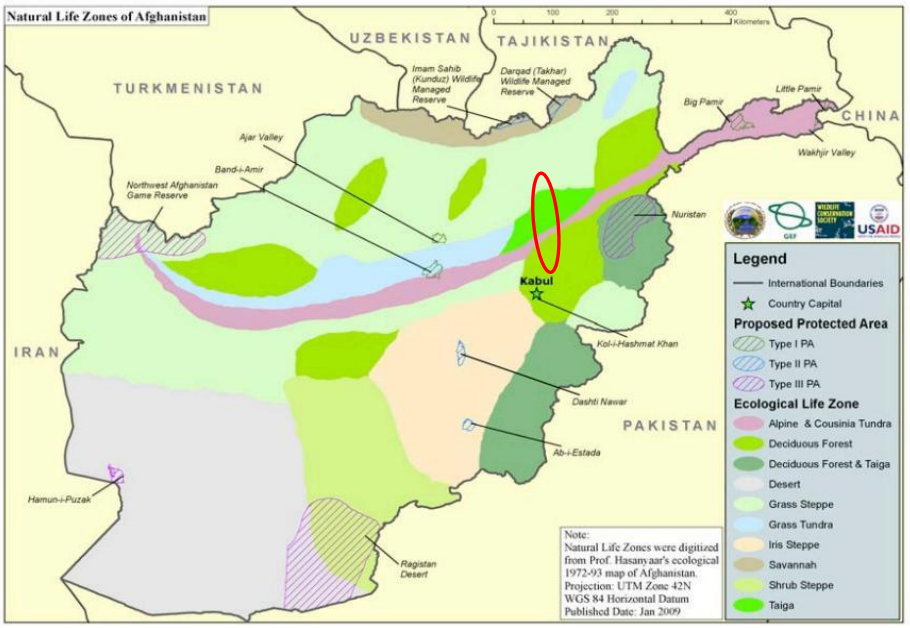
18. The water resources of the central eastern region are entirely derived from rainfall and the seasonal melting of snow in the surrounding mountains. In general the peak flow of melted water occurs in spring. During summer the flow is sporadic or non-existent in many water courses. The project site has no nearly streams and ground water is below 100 m the ground level. Water pools to preserve water for days of need are installed in the area of Chrikar and Pul-e-Khumri. Extraction of underground water by electric or diesel pumps is quite expensive. There are no pumping stations for collection and supply of drinking water along the corridor.

b. Flora and Fauna

19. Afghanistan is not a global biodiversity "hotspot". On the Index of Biodiversity, which is based on the number of mammals, birds, reptiles, amphibians, vascular plants and endemic species (Groombridge and Jenkins (1994)), Afghanistan has relatively low score results, largely from the lack of vertebrate endemics.

20. The desert and semi-desert biome comprises 252,044 km² or about 39% of the country's land area. The WWF classifies 73% of the desert and semi-desert biome in Afghanistan as globally vulnerable and 27% as globally endangered. Virtually no information is available on Afghanistan's biodiversity in this biome. However, it is clear that biodiversity in the Badghyz and Karabil semi-desert is much reduced in both Afghanistan and Turkmenistan with the loss of the tiger (*Panthera tigris virgata*), cheetah (*Acinonyx jubatus venaticus*) and wild goat (*Capra aegagrus*) (WWF, 2010).

A map of the natural life zones of Afghanistan is shown in Figure 5-5.



Source: USAID (2009)

Figure 5-5: Natural Life Zones of Afghanistan (Map with Investigation area)

21. According to Figure 5-5, the transmission line corridor traverses a grass steppe zone of the Eco region Badkhys-Karabil-Semi-Desert extending through Afghanistan's North-Western region along the border of Turkmenistan, Uzbekistan and Tajikistan.

i. Flora

22. Afghanistan shows a big variety of vegetation types and a high biodiversity due to floristic influence from various neighbor regions. In most parts the vegetation depends on the winter rain. **Figure 5-6** shows the natural vegetation zones of Afghanistan and indicates the Investigation area.

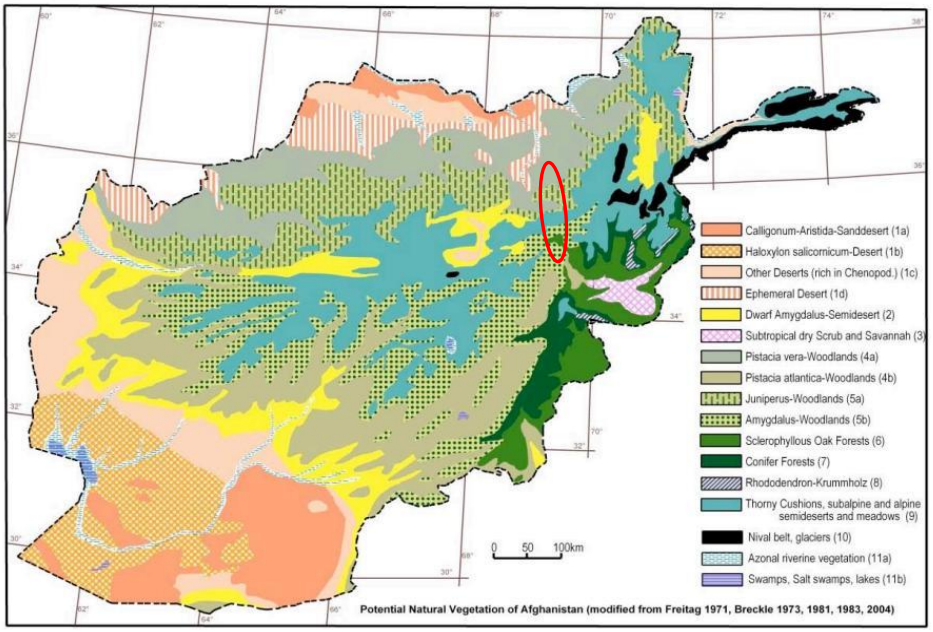


Figure 5-6: Natural Vegetation of Afghanistan (Map with Investigation Area)

23. 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 facing a serious state of reduction. No reserved forest exists in the Investigation area even up to 5 km from the proposed transmission line corridor.

24. 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.

Birds

25. The Investigation area is not very rich regarding the avifauna and its diversity due to the lack of suitable habitats. The only places where a number of birds can be found are vegetation areas in the center of Pul-e-Khumri and between Baghlan and Parwan provinces.

Reptiles and Amphibians

26. 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.

Insects

27. 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 and 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.

Socioeconomic Environment

c. Population

i. Population and Settlements

28. The Baghlan Province has a total population of 848,900 habitants. There are 119,378 households in the province with an average have 7 members each (source: *"Provincial Development Plan" Ministry of Rural Rehabilitation and Development (MRRD), 2007). T*he 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. Based on the field survey, the size of most of the households located along the line corridor is between 10 to 30 persons, while the average family size is to the extent of 26 persons. The gender composition reveals that the proportion of males and females is of 57% and 43%, respectively.

ii. Land Ownership

29. The land along and at the project site is 100% owned by the Government.

iii. Economic Conditions of Project Area

30. The project site is located close to Pul-e-Khumri, capital of Baghan province. It is a major economic center on the ring road that is very well connected to all major cities of Afghanistan. This connectivity flourishes regional and national trade.

iv. Education

Baghlan Province

31. The overall literacy rate in Baghlan province is 21%, however, while nearly one third of men are literate (29%), this is true for just a little over one tenth of women (12%). However, in the population aged between 15 and 24 the situation for men is significantly better with 40% literacy, whereas for women the figure shows little change (13.5%). The Kuchi population in the province has particularly low levels of literacy, with just 6.6% of men and 0.3% of women being able to read and write.

32. On average, 29% of children between 6 and 13 are enrolled in school; however, again the figure is around one third of boys (35%) and one fifth of girls (22%). Amongst the Kuchi population, one in four boys (26%) and one in eight girls (16%) attend school in Baghlan during the winter months. No Kuchi children attend school in the province during the summer.

v. Occupations and sources of income

33. The main source of income in Afghanistan is agriculture. Industry is also based on agriculture and pastoral raw materials. More than 80% of Afghanistan's population is involved in farming and/or herding.

d. Health Situation

i. Diseases and health problems

34. Food or water-borne diseases occurring in Afghanistan are e.g. bacterial and protozoal diarrhea, hepatitis A, and typhoid fever. This is due to the extremely poor sanitation throughout the country. Local food and water

sources are heavily contaminated with pathogenic bacteria, parasites, and viruses. A risk to obtain such food or water-borne diseases is given countrywide, including major urban areas. From May to November large populations of arthropod vectors, including mosquitoes, ticks, and sand flies can be found in the country. Malaria, which is acquired through the bite of an infected female Anopheles mosquito is the major vector-borne risk, which exists countrywide (including urban areas) below 2,000 meters elevation. Regarding the Investigation area, malaria risk is mainly given along the rivers.

35. Other diseases in Afghanistan are measles, diphtheria, meningitis, influenza, tuberculosis, and acute respiratory infections. The biggest concern is the high mortality among the 5 and under age group and the low vaccination.

36. Ensuring the availability of basic health and hospital services and developing human resources in the health sector is essential to reduce the incidence of disease, increase life expectancy and enable the whole population to participate in sustainable development. A basic infrastructure of health services exists in Kabul province. In 2005 there were 63 health centers and 23 hospitals with a total of 3,203 beds. In total there are 426 health posts in the 14 districts of the province. 36 Basic Health Centres (BHC) and 24 Comprehensive Health Centres (CHC) are supported by different NGOs.

37. The exact number of Afghans living with sexually transmittable diseases (STD) like HIV/AIDS is unknown, but the Ministry of Public Health (MoPH) estimates that at least 3,000 people might have been infected by the virus. Most are undiagnosed and lack adequate awareness about the risks of HIV/AIDS. Easy access to cheap drugs and limited access to drug treatment, combined with three decades of war-related trauma have resulted in drug use among almost 1 million Afghans, roughly 8% of the population between 15 and 64 years old (source: http://www.unodc.org/documents/data-and-analysis/Studies/Afghan-Drug-Survey-2009-Executive-Summary-web.pdf). As the Investigation area is located on the main drug route from Afghanistan to Turkmenistan, the presence of such problems in the area cannot be excluded.

ii. Health Infrastructure

Baghlan province

38. A basic infrastructure of health services exists in Baghlan province. In 2005 there were 23 health centers and 5 hospitals with a total of 236 beds. There were also 65 doctors and 147 nurses employed by the Ministry of Health working in the province, which represented a decrease of about 15% in the number health service personnel compared to 2003. The province also has 156 pharmacies of which 154 are owned privately and 2 are run by the government. The majority of communities do not have a health worker permanently present in their community. Eighty four percent of men's *shura* and 72% of women's *shura* reported that there was no community health worker present, and both groups most commonly said that they did not know what their closest health facility was. Out of 1,365 villages, only 38 have a

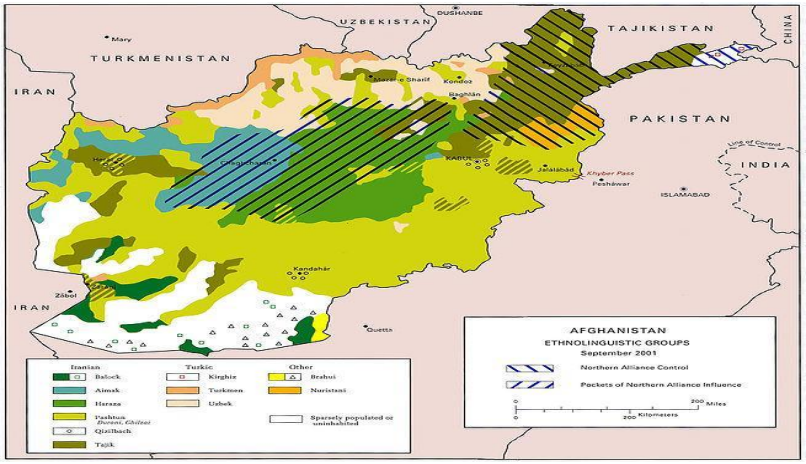
health centre within their boundaries, and only 48 have a dispensary. Access to health care is difficult for many people in the province with four out of five people having to travel more than 5 km to reach their nearest health facility. More than half the population has to travel over 10 kms to get medical attention – 54% for health centers and 50% for dispensaries.

iii. Access to Safe Drinking Water

39. In **Baghlan Province**, on average only 19% of households use safe drinking water. This rises to 35% in the urban area, and falls to 16% in rural areas. Nearly three quarters of households have direct access to their main source of drinking water within their community, however one in five households has to travel for up to an hour to access drinking water, and for 4% travel to access drinking water can take up to 6 hours. On average only 2% of households have access to safe toilet facilities. The situation is better in the urban area where 9% of households have safe toilets, but this is true for only 1% of rural households.

e. Ethnic Groups/Minorities

40. Afghanistan is a multi-ethnic country; the north-western region is inhabited by several ethnic groups (Figure 5-7). Tajiks are the majority and make up 55% of the population, followed by 20% Pashtuns, 15% Hazaras, 9% Uzbeks, and the remainder is Tatar. In another source Tajiks along their sub-groups like Aimaks and Sayyid-Tajiks make more than 70% of the provincial population. In addition, a significant number of Hazaras are also counted as part of the Persian-speaking people which stating Persian language as overwhelming speaking language, followed by Pashtu-speaking Pashtuns, Uzbeks and some Tatars. Baghlan is also home to a small community of Ismaili Muslims of Tajik stock, led by the Sayeds of Kayan.



Source: US Army 2001-2009

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

f. Gender Aspects

41. 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. (source: Afghan Toll, CASAREM Phase 2, Baseline Study). Men are the main responsible for agriculture activities (cultivation, irrigation, harvests). 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.

g. Agriculture and lands ties

42. Afghanistan is essentially an agrarian country with around 80% of the population involved in farming or herding or both a combination of war civil conflict exploration and enforced neglect have resulted in degradation of rangelands and/or un-maintained irrigation system and fragmented rural institution these problems have been exacerbated by the resent serve drought resulting in a halving of crop production and heavy depletion of livestock herds. Land cultivation is concentrated in oases and valleys and livestock breeding is generally nomadic in character. Two basic farming patterns exist including a mixed crop and livestock system, and the kuchi pastoral (nomadic) system.

43. More than half of the irrigated arable land lies north of the Hindu Kush mountain range in the drainage systems of the Amu dray River. It is estimated that about 3.3 million ha (5% of the total land area)is irrigated and regularly cropped while 4.4 million ha is rain-fed and cropped depending on rainfall .of the remaining area about half (57 million half) is rangeland used for extensive livestock grazing. The rest has little or on vegetative ground cover. Wheat is the main crop cultivate on both irrigated and rain fed land throughout the country. Cropping and rotational systems show considerable regional variation depending on climate precipitation and the availability of irrigation water and altitude traditional crop rotations are practiced in many places including a combination cereals crops with a variety of pulses and fodder crops. A wide variety of vegetables including onions and potatoes are cultivated for subsistence and as commercial crops. Other high value crops such as cumin, sesame, linseed and sugarcane are cultivated where appropriate. Afghanistan is also noted for many kind of fruits (including apricots, apples, pomegranates and grapes) and nuts (almonds, walnuts, and wild pistachios). In the 1970s dried fruit, raisins and nuts contributed more than 40% of the country's foreign exchange earnings. The years of conflict result in a loss of production and formers market niches however rapid expansion of orchard plantation and the adoption of modern systems and varieties occurred between 1989and 1999.

44. Small-scale industries exist in the main centers, primarily producing goods for domestic consumption i.e.) wheat , flour, bread, meat, preserved fruits, sugar, salt, plastic bags, toilet paper, etc. natural gas has been a valuable export commodity in the past and potential exists for further exploitation including mineral deposit such as iron ,barites, talc, mica, and copper, and semi-precious stones. Some small to medium scale manufacturing enterprises exist such as leather working and carpet making. In recent years Afghanistan has earned notoriety as the world's largest producer of opium contributing some 75% of the global illegal supply. During the years of conflict opium poppy has increasingly replaced wheat as the most significant autumn-sown cash crop in the southwest and eastern provinces.

45. Enhancing licit agricultural productivity, creating incentives for non-farm investment, developing rural infrastructure, and supporting access to skills development and financial services will allow individuals, households and communities to participate licitly and productively in the economy. As agriculture represents the major source of income for nearly half the households in the province, rural development will be a key element of progress in Baghlan. The most important field crops growing in Baghlan province include wheat, barley, rice and maize, rapeseeds and flax. The most common crops growing in garden plots include fruit and nut trees (50%), vegetables (12%) and produce such as grapes, potatoes, beans and alfalfa, clover or other fodder. Rapeseed (15%) and wheat (5%) is also frequently gown in garden plots in the province.

46. Three quarters of households with access to fertilizer use this on field crops (76%) and to a much lesser degree on garden plots (6%), although nearly one fifth of households use fertilizer on both field and garden (18%). On average 62% of households in the province have access to irrigated land, whereas three quarters of rural households and 14% of urban households have access to rain fed land as shown in the table below:

Household access to irrigated and rain-fed land			
	Rural	Urban	Average
Access to irrigated land	61	71	62
Access to rain-fed land	75	14	74

h. Electricity and Transport Infrastructure

i. Baghlan Province

Electricity

47. On average 15% of households in Baghlan 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 65% of households have access to electricity; however this figure falls to just 4% in rural areas, and

only half of these (2%) have access to public electricity. The North East Power System brings power from Uzbekistan and Tajikistan into Pul-e-Khumri for onward transmission to Mazar Sharif and Kabul. Baghlan province plays a central role in acting as a hub to import and transmit/distribute power across Afghanistan.

Transportation

48. The transport infrastructure in Baghlan is reasonably well developed, with 42% of roads in the province able to take car traffic in all seasons, and 32% able to take car traffic in some seasons. However, in a quarter of the province there are no roads at all. The main ring road of Afghanistan connects Pul-e-Khumri with Mazar Sharif which is the main trade route linking Uzbekistan and Tajikistan with Afghanistan and onto Pakistan.

i. Physical Cultural Sites

49. There is no potential cultural site in the vicinity of the PROJECT SITE.

6. Screening of Environmental Impacts and Mitigation

a. Impacts during Design Phase

i. Substation Siting

1. Dasht-e-Alwan is a dry land located in North West of Puli-Khumri city about 25 km of existing Puli-Khumri substation. Alwan is located along Mazar Sharif-Puli-Khumri highway. North of the road is a settlements called Dasht-e-Alwan refuges city and south of the road is an open area, dried rain-fed land belongs to government. The land gets cultivated on biyearly basis (once per two year) which gives less production as it is totally dependent on the level of rain fall during the year.

2. The land has been operated by individuals as lease and contract for the past 35 years. People from the neighboring villages and other people from Puli-Khumri can get the contract depending on the local government and social government system decision. Mostly relatives of Maliks (head of specific tribe of place) can get the contract. There has not been a single person holding the contract so with acquisition of this land no long term specific adverse effects are perceived on any specific family or household.

3. There are clear evidences that the land belongs to government the necessary influence of government does exist to occupy the land for any development intervention purposes as they have been able to change the contract in yearly base this shows the level of government influence and ability to occupy the land with no problem and whenever they want. Under consideration of the above mentioned facts and mitigation possibilities, the extent of impact regarding line routing is assessed to be low.

Impact of/on	**Extent of impact**
Substation siting	■ = low

ii. Access Roads

4. The site is adjacent to main the highway (ring road) linking Pul-e-Khumri to Mazar Sharif. There will be little need, if any, for constructing access roads, as the area is flat to project site there is a fair road that allows getting the material to the site with little improvements in some places.

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

b. Impacts during Construction Phase

i. Soil and Erosion

5. The project site is characterized by flat semi-desert section with no major risk for erosion during construction. 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).

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

ii. Landscape and Visual Aspects

6. There is no requirement for mitigation of landscape or visual aspects.

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

iii. Air Quality and GHG Emissions

7. 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 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 shall be reduced.

Sulfur Hexafluoride (SF_6)

8. 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".

7. 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. However, new transformers of international standard do not contain SF_6. Switchgears containing SF_6 shall not be installed. In view of this, the impact of SF_6 is considered to be insignificant.

Impact of/on	**Extent of impact**
Climate	○= nil
Air quality	■ = low

iv. Water Resources

8. There is a general risk of surface water and groundwater pollution by e.g. oil/ fuel of machines and trucks. This can be avoided by proper maintenance and construction site control. The groundwater table in the future line corridor is assumed to be at minimum 100 m depth so the risk of groundwater pollution is zero. There is no river or water system nearby. If properly done (air stringing) the stringing procedure does not create a big environmental impact. The negative impacts (especially related to vehicle movements) can be minimized by standard mitigation measures. The avoidance of water pollution will be treated in a detailed EHS- Management Plan, elaborated by the Construction Contractor and shall be implemented during the construction phase.

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

v. Flora and Fauna

9. 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 substation sites and tower foundations). 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

vi. Protected Areas

10. The construction sites are not located in or near a declared or planned protected area, important biodiversity conservation area or important wetland (Ramsar Wetland).

Impact of/on	**Extent of impact**
Protected areas	○ = nil

vii. Waste Management

11. 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 OHL and substations 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.;
- General refuse.

12. In detail, it is expected that the waste consists of:

- Soil and rocks from foundation activities;
- Plant debris from tower site clearance and PROJECT SITE;
- 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.

13. In order to handle the waste in a proper manner during construction, the Construction Contractor shall develop a Waste Management Plan (within the EHS 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.

14. Generally, 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 shall be fitted with functional sanitary equipment (proper toilets, lavatories, liquid and solid waste treatment, hygienic conditions in lavatories and other sanitary infrastructure etc.).

All products used for the transmission lines and substations shall be PCB free.

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

viii. Workers and Community Health & Safety

15. Direct impacts on health and safety of the workers during construction of the planned substation may result from various factors as potential work accidents (e.g. electrocution,), 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.

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

17. Regarding the sanitary situation, it is assumed that the construction sites and camps are fitted with functional sanitary equipment. Health and Safety Trainings shall 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. 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.

18. For impact avoidance, the construction contractor shall develop an appropriate Environment, Health, and Safety Management System (EHS-MS) and implement it during the construction phase. A proper EHS Management

Plan shall address the health and safety of workers. Alcohol and drugs shall be strictly forbidden at the construction site. Indirect health and safety impacts for workers and community may result from land mines. The development of EHS Management System shall 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.

Impact of/on	**Extent of impact**
Workers Health and safety	■ ■ = medium
Community Health and Safety	■ ■ = medium

ix. Infrastructure and Traffic

19. The site is some 30 meters off the main highway.

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

c. Impacts during Operation Phase

i. Soil and Water Resources

20. During operation of the new substations pollution of soil and water through oil leakage is possible. Such impacts can be avoided by fitting transformers with oil pits beneath to collect leaking oil. These oil pits shall be connected to a drainage system. The oily wastewater shall be lead into separate storage tanks for further treatment. Sanitary waste water at substations will need to be treated. Water resources are scarce in the area and water consumption will need to be minimized during operation of the substations and maintenance of the transmission lines. Water pollution during maintenance works (operation phase) shall be avoided with similar mitigation measures as for construction phase.

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

ii. Landscape and Visual Impacts

21. The project site is on a barren semi desert land with no landscape or visual value. Planting trees/ bushes around the new substations can reduce their visual impacts partly.

Impact of/on	Extent of impact
Visual impacts/ landscape	■ = low

iii. Climate

22. The construction of new sub-station and transmission line may have a positive impact regarding climate change as the energy efficiency will be increased for the new line. Nonuse of SF_6 transformers and switchgears will be ensured during construction.

Impact of/on	Extent of impact
Climate	**+** = regionally positive (increased energy efficiency)

iv. Flora

23. As there are no trees growing in project site, 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

v. Fauna

24. Fauna is not considered to be impacted significantly by the project. Disturbance of animals shall be minimized during maintenance work by e.g. respecting breeding seasons.

Impact of/on	Extent of impact
Avifauna	■ = low

vi. Waste Production

25. The substations need to have a waste management concept and removal of waste to a disposal site needs to be assured. If such a waste management is warranted, the impact of waste production during the operation phase is low.

Impact of/on	Extent of impact
Waste Production	■ = low

vii. Workers and Community Health & Safety

Natural disasters

26. As the substation and accompanying high voltage transmission line is forming the backbone of electricity supply into the south-eastern region of the country, it is necessary to consider the risk of possible earthquakes. In general, substations are more vulnerable to earthquake damages than OHLs, as there are e.g. porcelain component and possibility of leaking gaskets. Construction of substations 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. However, it has to be said that there are other areas in Afghanistan where the seismic risk is considerably higher than in the Investigation area.

Noise emissions

27. Noise emitted by the new substations will be minimal and will not affect the population, if any, outside the fence. For the population, the limit values shown in Table 6-1 are valid according to the General IFC HSE Guideline:

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

Table 6-1: Limit values for noise regarding population

28. Noise levels for workers within the substations will also not be exceeded. As stipulated in the General IFC EHS Guidelines of the World Bank Group, "no employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection". Such high noise levels are not to be expected to occur within a substation designed as state-of-the-art during regular operation. Noise emitted by the new substations or by the conductors (corona effect) will be minimal. Specific mitigation measures are not necessary.

Electric and magnetic fields

29. Electric and magnetic fields are invisible lines of force that surround any electrical device. Power transmission lines, electrical wiring, and electrical equipment all produce EMF. There are many other sources of EMF as well. Electric fields are produced by voltage and increase in strength as the voltage increases. The electric field strength is measured in units of volts per meter (V/m). As a precautionary measure, other projects have adopted an internationally accepted standard PROJECT SITE width of 60 m along their 500 kV transmission lines and of 40 m along the 220 kV TL. All habitation and structures are excluded from the PROJECT SITE to ensure safety of people and animals from EMFs, as well as from direct electric shocks and "flashover". No permanent human presence shall be allowed within the PROJECT SITE.

30. With regard to substations, in general, the strongest EMF around the outside of a substation comes from the transmission lines entering and leaving the substation. The strength of the EMF from equipment within the substations, such as transformers, reactors, and capacitor banks, decreases rapidly with increasing distance. Beyond the substation fence or wall, the EMF produced by the substation equipment is typically indistinguishable from background levels.

31. 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 a 60 m PROJECT SITE of a 500 kV line. Reference levels for exposure of the general public have been obtained from those for occupational exposure by using various factors over the entire frequency image. These factors have been chosen on the basis of effects that are recognized as specific and relevant for the various frequency ranges. Generally speaking, the factors follow the basic restrictions over the entire frequency range, and their values correspond to the mathematical relation between the quantities of the basic restrictions and the derived levels as described below:

35. In the frequency range up to 1 kHz, the general public reference levels for electric fields are one-half of the values set for occupational exposure. The value of 10 kV m^{-1} for 50 Hz or 8.3 kV m^{-1} for a 60 Hz occupational exposure includes a sufficient safety margin to prevent stimulation effects from contact current under all possible conditions. Half of this value was chosen for the general public reference levels, i.e. 5 kV m^{-1} for 50 Hz or 4.2 kV m^{-1} for 60 Hz, to prevent adverse indirect effects for more than 90% of exposed individuals. From similar projects it can be stated that the relevant internationally accepted limit values for the public will not be exceeded if the minimum safety distance of 8 m to the nearest conductor is kept as recommended. Regular EMF measurements are recommended.

Risks of Electrocution

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

Possible transformer fires

37. Fire walls will be installed between the transformers to prevent fire expansion in case of a transformer fire. The installation of a sprinkler system around the transformers is foreseen but is under discussion because of its limited advantage. It has to be pointed out that transformer fires are absolutely rare events and in case of proper maintenance of the substations practically excluded. Within control buildings, mobile fire extinguishers will be provided and checked regularly. Fire protection measures will follow international

requirements. The staff will be trained on how to handle a fire within a substation. If adequate mitigation measures are implemented, the extent of impact by possible transformer fires is low.

Impact of/on	**Extent of impact**
Health and Safety:	
- Noise emissions	■ = low
- Electric and magnetic fields	■ = low
- Risks of electrocution	■ ■ = medium
- Possible transformer fires	■ = low

viii. Land Use

38. The project will be constructed far from the populated area and on the government land. 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

ix. Electricity Supply

39. 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.

40. Once the substation is operational, there is little activity that will create any environmental problem. The main concern will be the humming noise from the transformers. Sulfur hexafluoride circuit breakers, defined by low noise levels compared with air and oil circuit breakers, will be used. In addition, noisy equipment such diesel generators will be enclosed to reduce the noise. The main activity will be in the control room as power is received and dispatched from the substation to other areas of the grid. Routine maintenance to check the structural conditions of the towers, tanks and foundations will be needed. If rust is noted in the tanks and towers, the rust will be removed and the surface painted.

41. However, once every 15 years, the oil in the transformer will be drained and replaced with new oil. The oil will be drained to the oil pan. When all the oil has drained out, the transformer is filled with new oil and the old oil is placed in drums for long term storage or sent to toxic and hazardous incineration facility for ultimate disposal. The used oil has a high heating

value and nominally toxic so that incineration facilities including cement plants are willing to pay for the disposal rather than the other way around.

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

x. Impacts during Decommissioning Phase

43. In order not to create a long-lasting permanent visual impact, the substation equipment will have to be completely dismantled after the life-span of minimum 50 years. Also substations will have to be dismantled completely when they are out of function. 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. Recycled metal parts could be sold as scrap metal having a locally positive economic impact.

Impact of/on	**Extent of impact**
Decommissioning	■ = low **+** = locally positive

7. Analysis of Alternatives

No Project Alternative:

1. No Project Alternative. This alternative would not cause any construction and resettlement, but would also prevent electricity import from Central Asia. If this substation and line is not constructed, other lines will have to be connected to the existing overloaded substations in the near future. The Project will provide power to some 4 million new households and businesses in eastern and southern parts of Afghanistan. This would provide economic opportunities, cut poverty and reduce insecurity. Moreover, the Project is the first step to export power to Pakistan and Tajikistan to strengthen regional trade and cooperation.

2. Location Alternative: Two alternative locations for the substation near Pul-e-Khumri were considered. The first location is within the existing 220 kV substation in the middle of huge settlements. However significant land acquisition and resettlement impacts were discovered. The advantages of this site are its proximity to the major users and it is already classified as industrial zone. The disadvantages are (i) the available land is limited; and (ii) during construction the traffic, noise and movement of trucks and equipment will affect the surrounding areas especially the residents of Pul-e-Khumri City. The second alternative site was semi-desert area on the northeastern direction of Pul-e-Khumri city. While site construction activities will not impact the built up areas of, the movement of heavy equipment and construction materials will pass close to or cross through. With the selected site, no equipment, materials and machinery will pass close or cross Pul-e-Khumri. Residents of Pul-e-Khumri will not be affected in any way. The only people to be affected for short period of time are those who intend to travel along national highway when large equipment is being hauled. The following table provides pros and cons of both locational alternatives:

Pul-e-Khumri Site (in city)	**Dashte Alwan Site (25 km NE)**
Lesser cost as site uses existing substation facilities	Greenfield site with higher cost of construction
Future expansions constrained	Hub for future back to back convertor stations
Higher pollution	Outside city municipal limits
Electromagnetic radiations inside city zone	500 kV line will not enter city limits

3. Technology Alternative: – Humming noise could be generated from the circuit breakers. The choice is between air, oil and sulfur hexafluoride circuit breakers. While sulfur hexafluoride circuit breakers are more expensive, this is the circuit breaker type to be used in the Project to reduce the humming noise to almost close to background level.

8. Public Consultation and Information Disclosure

4. The ADB safeguard policy (SPS 2009) foresees meaningful consultation with affected people and other concerned stakeholders, including civil society, and facilitates their informed participation.

5. This IEE was updated with the results of the field survey and the referring Public Consultations for sample populations settled along the line corridor. The surveyor team faced considerable challenges and security threats during the survey. Due to the problematic security situation, public consultations could not be made.

6. Public Consultations will be conducted at pre-construction stage under responsibility of the DABS-PMO with assistance of the Project Implementation Consultant (to be spelled out in PIC TORs).

9. Grievance Mechanism

7. In the course of the construction process, people affected by the project may suffer from accidental negative impacts or feel treated unjustly. This might happen for various reasons: the contractor does not adhere to sound construction principles, health hazards were incidentally produced, working conditions are found unacceptable, unexpected downstream impacts / environmental pollution were incidentally produced, damages to individual property are not paid for or misunderstandings have arisen and so forth.

8. In the case of individual grievances or disagreement with procedures of consultation, notification or valuation, people are encouraged to lodge their complaints with the responsible grievance redress mechanism within the Implementing Agency (DABS-PMO). In case of accidental environmental pollution the local / national environmental authority will have to be directly informed and legal procedures started.

9. The rationale behind is that people can get their problems solved and grievances redressed in a timely and effective manner without directly addressing the court. During consultation procedure the AP shall be notified orally or in a written form about their rights and the procedure of complaints introduction. The grievance mechanism has to be locally implemented at the level of village institutions and municipality.

10. Distribution of leaflets as well as putting up information boards are an effective way of distributing information including contact addresses and telephone numbers to be contacted.

11. A professional attitude to accept complaints in a friendly manner and offering all possible help is a crucial qualification for the staff charged with grievance collection. Lodging complaints and grievance resolution must be cost free for APs.

12. In a first step complaints resolution will be attempted at the community level in a negotiation procedure with an informal mediator and community authorities. If the grievance persists, a grievance form can be submitted at the responsible committee under the responsibility of the authorized body / DABS. The committee then decides whether to settle or go to court. The decision has to be taken within 15 days. In case of failure of the grievance redress system, the APs can submit their case to the appropriate court of law. Members of the grievance committee will be the constructor, DABS-PMO, local administration, the environmental authority in charge, a lawyer and NGO representatives.

13. The constructor is obliged to carry out the work in accordance with the contractual requirements that include:

- a provisional sum for grievance redress;
- a person of staff responsible for grievance procedure (including first contact, periodical site visiting of mitigation measure to be

implemented by contractor, record keeping of filed complaints and follow up, periodic reporting);
- a telephone line, e-mail address and contact name on project information boards;
- communication of contacts and grievance procedure to all affected Villages

14. The constructor, together with the IA, will be responsible to include a social and gender specialist to:

- Coordinate the grievance redress procedure;
- Arbitrate grievances with contractor, AP and local administration /Community leader
- Liaison with DABS
- Liaison with court
- Documentation of all grievances and resolution procedures

9. Community leaders will act as informal mediators in case of complaints. However, APs have the option to choose a different representative or directly liaison with the IA staff designated for grievance redress. All grievances and their resolution process shall be documented. The aggrieved person (AP) is encouraged to proceed in the following way (Figure 8-1):

a) Contact the constructor's designated grievance staff /committee representative during periodical site visits in person or via designated telephone number or via the community leader or NGO staff.
b) Lodge the complaint and provide information on the case.
c) Agree with the construction contractor on specific mitigation measures.
d) Agree with the contractor on a time limit for the grievance settlement.
e) Grievances have to be settled within two weeks, or as otherwise specified in scheduled agreement.
f) Sign if the mitigation measure has been implemented as agreed.
g) Seek redress from DABS if not satisfied with above mentioned procedure.
h) Involve appropriate local authorities to liaison with DABS and constructor.
i) Involve NGOs or the construction supervision consultant to liaison with DABS and the constructor.
j) Seek redress from ADB if not satisfied with response by DABS.
k) Seek redress from court if all else fails.

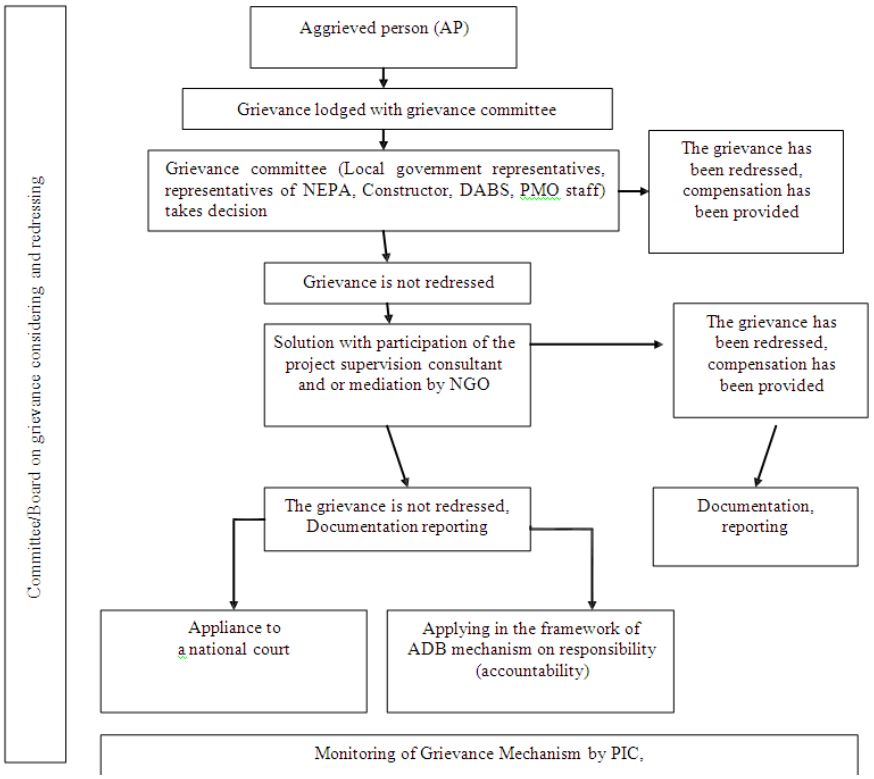


Figure 9-1: Grievances Redress Chart

ADB = Asian Development Bank;
IA / PMO = Implementing Agency / DABS-PMO; NGO = Non-governmental Organizations;
NEPA= National Environment Protection Agency

10. The grievance mechanism is designed to avoid lengthy court procedures, but does not limit the citizen's right to submit the case straight to the court of law just in the first stage of grievance process. The Asian Development Bank (ADB) is not directly a part of the Grievance procedure but shall receive reports on which complaints were received and how they have been followed up/mitigated. The provisions for the grievance mechanism shall be included in the construction budget.

11. The grievance mechanism shall be implemented by the PMO in cooperation with the constructor. The PMO shall ensure the availability of GRM staff and make information about GRM (telephone number, contact persons etc. (see above) publicly available and free of charge. The PIC consultant will monitor the functioning of GRM.

10. Environmental Management Plan

10.1.1 Mitigation Measures for the Design Phase

Issue	Potential Impact	Mitigation Measures	Implementing Agency	Costs [USD]	Date for implementation
Substation Siting (Chapter 6.a.i)	Land acquisition and resettlement Surface sealing Pollution through effluents	• Substation to be designed in order to minimize resettlement and land acquisition issues • Sealing of surface to be minimized • Planning of sufficient sanitary structures for employees • Fire-Safety equipment to be planned for substations • Construction of oil separators for maintenance of vehicles	PIC	Included in PIC Contract	During final routing of incoming and outgoing lines
Access Roads (Chapter 6.a.ii)	Land Acquisition Damage of Physical Cultural Sites	• Minimization of the number and length of access roads. • Careful selection of location of access roads. • Use of existing roads/ tracks wherever possible. • Design consideration will include protection using retaining structures such as gabions.	DABS and PIC	Included in PIC Contract	During final routing of incoming and outgoing lines

Classification of the impact					
High	Medium	Low	No impact	Locally positive	Regionally positive

10.1.2 Mitigation Measures during Construction Phase

Issue	Potential Impact	Mitigation Measures	Implementing Agency	Costs [USD]	Date for implementation
Soil and Erosion (Chapter 6.b.i)	Erosion and pollution of soil Sand deflation	• Loss of topsoil will be avoided by stripping and storing topsoil prior to construction (where appropriate i.e. on productive lands) • Installation of drainage systems • Sand deflation prevention structures in sensitive areas and where vegetation (grass) is removed and bare soil exposed/ land cover diminished . • Use of existing roads/ tracks wherever possible	PIC/CC/ /DABS	Included in construction costs	During construction
Landscape and Visual Impacts (Chapter 6.b.ii)	Permanent visual impact on the landscape	• Planting trees/ bushes around the new substation. • Reduction of routing and loop-in and loop-out of incoming and outgoing lines	DABS/CC	Included in operational costs	Before operation
Air Quality (Chapter 6.b.iii)	Emissions from vehicles Emissions through burning of waste Dust emissions	• 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 shall be maintained to a good standard and idling of engines discouraged. • Machinery causing excessive pollution (visible smoke) shall be banned from construction sites. • Despite its dust reduction potential, access roads shall only be sprayed in exceptional cases due to scarcity of water	CC	Included in construction costs	During construction period
Climate (Chapter 6.b.iii)	Emissions of SF_6	• Follow the IEC Guidelines and the recommendations of the ICLES for handling of SF_6	CC	Included in construction costs	During construction period

Surface Water (Chapter 6.b.iv)	Pollution of Surface water	• All liquid materials and lubricants shall be stored in closed containers or barrels. • Construction material as bags of cement etc. shall be stored in containers in order to avoid rinsing out. • Temporary sewage treatment facilities shall be provided for the construction sites and worker's 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 materials containing fine particles, e.g. limestone will be stored in an enclosure such that sediment laden water does not drain into the soil. • Vegetation stripping should occur in parallel with progress of construction in order to minimize erosion and run off.	CC	Included in construction costs	During construction period
Groundwater (Chapter 6.b.iv)	Pollution of Groundwater	• Regular maintenance of all vehicles and machines used on site is mandatory. Maintenance activities of the vehicles shall be performed in regular service stations. • Maintenance and re-fuelling of the construction equipment shall 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 shall 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 (Chapter 6.b.v)	Destruction / disturbance of Flora and Fauna	• Respect of minimal ground clearance (8 m) • 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; • All contraction and maintenance activities should be conducted in accordance with best environmental practices to cause minimum disturbance to any habitat	CC / DABS-PMO	Included in construction costs	During final land survey and construction phase
Waste Management (Chapter 6.b.vii)	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. • Provision of construction sites and workers camps 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.	CC	Included in construction costs	Prior start of construction and during construction phase

		• 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 shall be emptied regularly. • After completion of construction the site shall be properly cleaned and properly rehabilitated or re-vegetated.			
Liquid Waste (Chapter 6.b.vii)	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 (Chapter 6.b.vii)	Environmental pollution by toxic, harmful and inflammable chemicals	• Toxic, harmful and inflammable chemicals (paints, fuel, lubricants, oil and explosives) shall 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 (Chapter 6.b.vii)	Environmental pollution by PCB	• All products used for the transmission lines and substations shall 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 (Chapter 6.b.viii)	General Health and Safety impacts	• Development of an EHS Policy for the construction phase. Development of an EHS Management Plan for construction (shall 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 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.	CC	Included in construction costs	Prior start of construction
Health and Safety (Chapter 6.b.viii)	Work accidents	• Installation of warning signs stating the “Danger of Electrocution” towers, substations etc. • All construction workers shall be fitted with personal protection equipment (PPE). • Alcohol and drugs shall be strictly forbidden at the construction site.	CC	Included in construction costs	During construction

Health and Safety (Chapter 6.b.viii)	Noise emissions	• Optimization of transportation management to avoid needless truck drives; avoidance of truck movements in residential areas at least during night-time. • 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 to meet noise control requirements • Special attention shall be given to regular maintenance of construction equipment for their best working condition. • Work hours should be decided in consultation with local community and should avoid prayer times. •	CC	Included in construction costs	Before starting construction and during construction period
Health and Safety (Chapter 6.b.viii)	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 (Chapter 6.b.viii)	Operational and Community Health and Safety Risks	• 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
Infrastructure and Traffic (Chapter 6.b.ix)	Traffic disturbance Minimization of power cuts	• Ensure that traffic is not disturbed by construction through proper traffic management and signalization.	CC	Included in construction costs	During construction

10.1.3 Mitigation Measures for Operation and Decommissioning Phases

Issue	Potential Impact	Mitigation Measures	Implementing Agency	Costs [USD]	Date for implementation
Soil and Water Resources (Chapter 6.c.i)	Soil and water pollution	• Fitting transformers with oil pits connected to a drainage system. • Provision of separate storage tanks for further treatment of the oily wastewater.	DABS	Included in operational costs	Before operation
Landscape and Visual Impacts (Chapter 6.c.ii)	Permanent visual impact on the landscape	• Complete dismantling of the old transmission line and substations without function. • Planting trees/ bushes around the new substations.	DABS	Included in operational costs	Before operation
Climate and Energy Efficiency (Chapter 6.c.iii)	Change in environment and energy efficiency	• Grid connected power will obviate the need for diesel generators, kerosene oil, biomass and wooden raw material used for lightening and cooking	DABS	Included in Project cost	During and after operation
		•			
		•			
Waste production (Chapter 6.c.vi)	Environmental pollution by solid and liquid wastes	• Development of a Waste Management Plan for substations. • Waste water generated from staff quarters will be discharged into septic tanks. • Reduction of waste quantity. Recycling as much as possible. Proper dumping of remaining waste. • Adequate site drainage shall be performed.	DABS	Included in operational costs	Before/ during operation
Health & Safety (Chapter 6.c.vii)	Noise emissions	• Using state-of the art conductors. • EHS Management System/ Plan shall be developed and implemented during operation of the substations to prevent health and safety risks from noise emissions.	DABS	Included in operational costs	During design/ operation

Health & Safety (Chapter 6.c.vii)	Electric and Magnetic fields	• Training for workers and resident population with regard to EMF	DABS	Included in training costs	During operation
Health & Safety (Chapter 6.c.vii)	Electrocution risks for maintenance workers and local people	• Installation of warning signs at towers and substations. • Training of substation workers • Implementation of Operational Health and Safety (OHS) • and Community Health and Safety (CHS) Plans • Awareness raising activity among population and especially maintenance workers	DABS	Included in maintenance / operational costs	During construction/ operation
Health & Safety (Chapter 6.c.vii)	Possible transformer fires	• Proper maintenance of the substation. • Installation of fire walls between transformers. Installation of a sprinkler system. • Provision of a fire water collection system for the new switchyard. This system shall be separated from the waste water collection and treatment system of the substation. • Provision of mobile fire extinguishers, checked regularly. • Adequate training of the staff how to handle a SS fire	DABS	Included in design/ operational costs	During construction/ operation
Land Use (Chapter 6.c.viii)	Restrictions on land use	• Compensations for damaged crops during maintenance. No herbicides will be used for ROW clearing Compensation for crop damages during maintenance	DABS	Included in operational costs	During operation
Electricity Supply (Chapter 6.c.ix)	Increase in grid connection electrification rate	• Sustainable and regular supply of grid connection cheap power	DABS	Included in project cost	During operation
Impacts during Decommissioning Phase (Chapter 6.c.x)	Visual impact on the landscape Efficient resource use	• Complete dismantling/upgradation of the substation 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

CC = construction contractor, DABS = Da Afghanistan Breshna Sherkat (EA), PIC = project implementation consultant

Classification of the impact					
High	Medium	Low	No impact	Locally positive	Regionally positive

b. Monitoring Measures

i. Design Phase

1. Monitoring activities during design phase or pre-construction phase shall ensure that the process of final substation and line routing complies with the following mitigation measures:

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

2. A strict monitoring by an external expert of re-routing to avoid resettlement and cultural sites is recommended for project. 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.

ii. Construction Phase

3. Internal environmental monitoring will be conducted by DABS-PMO. Monitoring of 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.

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

5. Tasks during 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. The detailed monitoring program will be subject to review and approval by ADB.

iii. Operation Phase

6. Environmental monitoring during operation phase will be performed by DABS. 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.

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

8. During operation, when the substations 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 (especially in case where houses are located within the PROJECT SITE). The objective is to show that the internationally accepted permissible limits of 5 kV/m and 100 µT are not exceeded.

9. Operation phase environmental monitoring will include regular substation and transmission line inspections to verify compliance with EMP requirements and with relevant laws and regulations.

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

11. DABS, the executing agency, has established a dedicated full-time PMO. The PMO will administer all consulting and procurement contracts on behalf of DABS. It will be responsible for preparing project plans, bid evaluation reports, progress reports, and applications for withdrawal of funds, and any other required reports to ADB. PMU will hire Safeguards Specialist who will be responsible for the following:

a. Ensure that project each bidding documentation and contract document particularly for construction of sub-stations, and other civil works associated with project, includes environmental requirement as stated in the EMP;
b. Work closely with contractor to update EMP if necessary, and disseminate to the relevant parties to ensure implementation of updated EMP;
c. Assist to Consultant in organizing trainings on EMP implementation and topics;
d. Monitor the implementation of EMP and prepare environmental monitoring reports for quarterly submission during the first year of construction activity and semiannually during the next years to ADB;
e. Coordinate with the nature Protection Committee, the Environmental Engineer of NEPA within DABS, and relevant civil society organizations, if any, to undertake join monitoring at least 1 time/year during the construction phase prior to preparing the annual environmental monitoring reports.
f. Work closely with Contractor's Supervisor Company/Engineer will monitor (cross check) and supervise the contractor in implementing EMP.
g. Organize conducting of air, water , soil quality analysis and EMF measurements in accordance with EMP requirements;
h. Monitor implementation of GRM. Organize mediation meetings between the complainant and the contractor.

12. DABS will recruit a Project Management Consultant (the Consultant) to review existing designs, supervise the works of the suppliers and contractors and ensure successful commissioning. The Consultant will be responsible for review of the designs and will assist the PMO in planning, as well as developing and implementing comprehensive project management plans, to ensure the most efficient, timely, and economical implementation of the project. In terms of environmental protection during project implementation the Consultant will be for the following:

- ensure that the Environmental Management and Monitoring Plan (EMMP) for the project submitted by the contractors is adequate and are in accordance with the initial environmental examination (IEE)
- Identify any problem areas during project implementation, proposing remedial actions, and promptly report any outstanding issues to the executing agency;
- Coordinate safety measures between live components in operation and components under construction. Giving advice and, when required, provide training to the executing agency on safety planning and safety measures;
- For this Project, the implementation of EMMP has to be carried specifically following the Project implementation schedule. Contractors and Project Engineer will be responsible for ensuring compliance with the requirements of the IEE and EMP implementation on the construction sites. The Project Engineer field books, construction log book, minutes of the weekly meetings, and periodic reports are important documentation on the implementation of the EMMP.
- Also Project Engineer is responsible for conducting necessary water, air, soil quality monitoring during construction site. The Bank and the project owner may field inspection team from time to time to check the implementation of the EMMP but they could not be expected to be on the construction site all the time. The Bank and the project owner may require periodic reporting on the implementation of the EMMP.

Reporting of Environmental Monitoring Results

13. The format for the quarterly and semiannual environmental monitoring report will be prepared during project implementation by the Safeguards Specialist (PMU) in accordance with template recommended by Consultant and approved by PMU. The format may have to be refined during implementation to incorporate all monitoring findings and lessons learned.

14. Consultant will prepare the quarterly progress reports that will include EMMP implementation status.

15. Environmental Monitoring Report should include results of measured parameters defined in EMP with indicating sampling locations;

16. DABS was established in 2009 and has been implementing ADB assisted and USAID assisted power projects. There is capacity development support provided by development partners in area of environment management. However, there is considerable need to improve EMP monitoring capacity which is being taken care of by ADB and USAID training support components.

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs [$]	Monitoring and Reporting Responsibility	Date for Implementation
Substation Siting	• Compliance with ADB SPS • Minimization of resettlement needs • Compensation payments (see LARP), • Access road design	• Avoidance of environmental and social impacts during site demarcation, • Avoidance of resettlement requirements, • Equipment shall be located with minimum local environmental impact • Construction activities shall be restricted to as small an area as possible (incl. access roads).	Substation site	Visual control (Field visit) of final substation demarcation including selected deviations by independent expert	One time, before start of physical works	Included in EHS Audit	EHS Consultant	During design phase, before the start of physical works
Soil and Erosion	• Construction standard of access road • Re-planting activities	• Control of low impact construction standards • Visual control of re-planting activities	Substation site	Visual control of record keeping of construction and decommissioned after Project completion.	Periodically during construction	Included in EHS Audit	EHS Consultant	During construction
Landscape and Visual Aspects	• Complete dismantling of redundant construction equipment and material • Recycling of metal and ceramic parts	• Visual inspection of site • Records of recycling and disposal procedures	Substation site	Visual control, control of records	Once at the end of construction period	Included in EHS Audit	EHS Consultant	Before start of operation
Land Acquisition and Resettlement	• Compensation payments and Resettlement actions (see LARP)	• Visual control and photo-documentation of resettlement activities and re- installation including GPS data (See LARP).	Entire substation site	Visual control, records, survey	After final design	See LARP document	LARP consultant	Before construction

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs [$]	Monitoring and Reporting Responsibility	Date for Implementation
Air Pollution	• Construction standards	• Monitoring of good construction standards; • Monitoring of correct implementation of construction manual, especially related to vehicle use and maintenance	Work areas	Visual control	Periodically during construction	Included in construction cost/ EHS Audit	EHS Consultant / PIC	During construction
Pollution of Surface Water	• Location of equipment and buildings no closer than 50 m to flooding areas • No pollution sources near rivers	• Visual control of downstream water quality (turbidity), if any • Regular measurements of up-downstream basic parameters, • Plan for detailed analysis (e.g. for hydrocarbons) if pollution/ spills are suspected. • Control of EMP measures	Entire substation site	Visual Control, Measurements and Analysis of basic surface water parameters (ph, COD, BOD, oil grease etc.) , sampling upstream and downstream of stream crossings and substation sites	Periodically during construction	Included in construction cost/ EHS Audit	EHS Consultant / PIC	During Construction
Pollution of Groundwater	• Appropriate sewage treatment of workers camps • Appropriate groundwater protection measures	• Visual inspection of pollution sources • Visual control of oil absorbers at SS and good construction practices during stringing and construction • Analysis and measurements of basic groundwater parameters.	Substations, tower sites, work camps	Visual control, water analysis in wells	Periodically during construction	Included in EHS Audit	EHS Consultant / PIC	During construction

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs [$]	Monitoring and Reporting Responsibility	Date for Implementation
Flora and Fauna	• Extent of lay down areas and routing of new access roads •	• Monitoring of final design, including specifications of substation and equipment and access road. • Monitoring of tree cutting, enforcement of prohibition, •	Substation site	Regular visual inspection during construction Complete line survey after construction	Periodically during construction General survey after construction	Included in EHS Audit	EHS Consultant / 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 / PIC	Before, during and after construction
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; Substations; Lay-down Areas	Design compliance, Visual control	Regular monitoring during construction process; EHS Audit	Included in EHS Audit	EHS Consultant / PIC	During construction

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs [$]	Monitoring and Reporting Responsibility	Date for Implementation
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	All work areas, Workers camps, Substation sites	Visual Control of EHS Management Plan implementation	Yearly during construction	Included in EHS Audit	EHS Consultant / 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 / PIC	During design phase, before the start of physical works
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 / 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 work site	Visual Control	Quarterly during construction	Included in EHS Audit	EHS Consultant / PIC	During construction

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs [$]	Monitoring and Reporting Responsibility	Date for Implementation
Physical Cultural Resources	Implementation of chance find procedure	• Photo-documentation of key sites close to site 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 / PIC	Before, during and after construction
Grievance Mechanism (Chapter 9)	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 Baghlan	Survey	3 times during construction process	Included in EHS Audit	EHS Consultant / PIC	During Construction

Monitoring Measures for the Operations and Decommissioning Phase

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Costs [$]	Monitoring and Reporting 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.	• 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 redundant structures without function. • Planting trees/ bushes around the new substations	• 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 entering SS	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 [$]	Monitoring and Reporting Responsibility	Date for Implementation
Fauna (Avifauna and other fauna)	• Disturbance of animals during maintenance work • Prohibition of hunting	Supervision of maintenance procedures	Entire work site	Periodical Inspection	Yearly during operation	Included in operation cost	DABS ED / NEPA	During operation
Waste Production	• Development of a Substation Waste Management Plan • Reduction of waste quantity, recycling as much as possible. • Proper dumping of remaining waste • Regular sewage treatment.	Monitoring of Waste Management Plan and control of implementation	Substation Sites	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 Substation operation	Monitoring of Implementation of EHS Management Plan	Substation Sites, Maintenance locations	Periodical Inspection, Regular EHS Audits	Yearly during operation	Included in operation cost	NEPA / DABS ED EHS Auditor	During operation
Health and Safety	• Electric and Magnetic fields • Natural Disasters • Noise Emissions • Electrocution • Transformer Fires	• Regular EMF measurements (after purchase of EMF meters and related training for handlers) • Control of encroachment of safety zone • Training to DABS field staff	Substation Sites	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 [$]	Monitoring and Reporting Responsibility	Date for Implementation
Impacts during Decommissioning Phase		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, all substation sites	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

a. Costs of EMP Implementation

A preliminary cost estimate of the EMP is given in Table 10-1:

No	Measure	Costs [$]
1	Mitigation measures during design	10,000
2	Mitigation measures during construction	To be included in the construction cost
3	Mitigation measures during construction for compensations and resettlement needs	See LARP
4	Mitigation measures during construction including waste management and temporary sewerage drains at worker sites	10,000
5	Planting of trees and other landscaping activities	5,000
6	Mitigation measures during construction including construction of storage tank for oil	5,000
7	Mitigation measures during operation and maintenance	To be included in operation budget
8	Monitoring Measures EHS Audit	50,000
9	Monitoring Analysis of Water, Noise,	20,000
10	Training for DABS EHS staff	20,000
	Sub-Total	**120,000**
	Contingency 12%	**15,000**
	Total Cost	**135,000**

Table 10-1: Cost of the EMP implementation (preliminary estimation)

The costs for the implementation of the EMP will be financed by the Government of Afghanistan as the counterpart financing.

11. Implementation Arrangements and Capacity Building

b. Institutional Arrangements and Responsibilities

1. The environmental assessment and review procedure involves distinct processes, dynamics and agencies. The agencies involved in the planning and implementation of resettlement and rehabilitation program are DABS as the EA and the Provincial and District government. 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 the community *shura*.

2. 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 out as a turnkey contract by an external Construction Contractor (CC) in two lots: one for the transmission line component and one for the substations.

ii. DABS

3. 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).

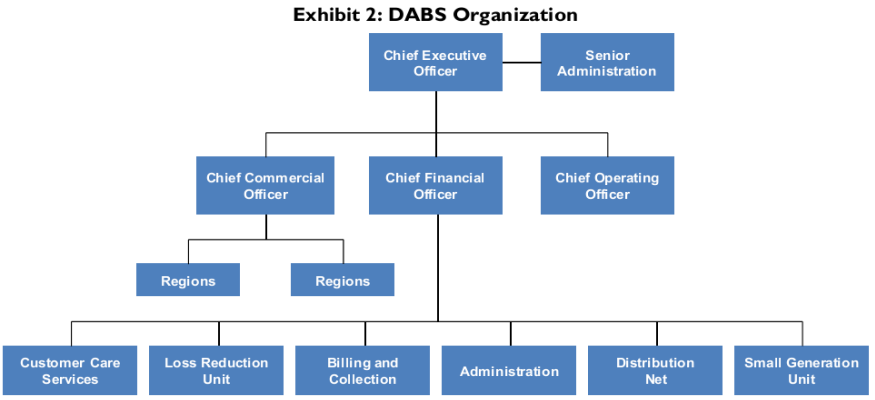


Figure 11-1: Organizational structure DABS

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

DABS-PMO's Responsibilities

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

6. The DABS-PMO will be responsible for the overall technical supervision and execution of the project. The staffing of DABS-PMO will include experts in project management, electrical transmission engineering, institution and finance, environment, socioeconomic, land acquisition and resettlement. The mitigation measures that are incorporated into the design will be verified by the DABS-PMO before providing technical approvals.

iii. NEPA

7. 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 shall either grant or refuse a permit. A granted permit 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.

iv. ADB

8. ADB is responsible for screening sub-projects to specify its safeguard requirements, undertaking due diligence, and reviewing the project /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.

9. ADB shall further determine the feasibility of ADB financing; helping the client in building capacity to fulfill the safeguards; and monitor and supervise the project siteer'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.

10. If a 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

client to bring it back into compliance. If the 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.

v. Construction Contractor (CC)

11. 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 and the guidelines construction manual according to international best practice.

12. The CC shall also prepare monthly reports including the progress of the implementation of the EMP. The report shall 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.

vi. Project Implementation Consultant

13. The PIC will be responsible for monitoring the EMP implementation. An external EHS-Auditor subcontracted by PIC will monitor the correct implementation of the EMP according to international best practice. The environmental audit will take place three times during the construction process. The mitigation measures that are incorporated part of the contract documents will also be verified by PIC consultant before getting the contract signed between the DABS- PMO and the contractor. PIC will assist PMO in supervising the EMP implementation and compiling reports on environmental performance as well as in conducting training for building capacity on EMP implementation.

c. Capacity Building

14. At DABS there is no Social/Environmental Department. The creation of a Social/Environmental Department in DABS and training of qualified staff are therefore highly recommended.

15. Staff needs to be educated in health (e.g. electric and magnetic fields), 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 shall be responsible for monitoring during the operation phase.

16. 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 and dealing with complaints (GRM). In general, the EHS staff of DABS shall be trained "on-the-job" how to implement the EMP during mitigation and monitoring actions performed by internationally experienced experts.

17. Training on how to use an EMF meter and how to interpret the results shall 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 20,000 USD.

12. Overall Findings and Recommendations

1. In summary, the results of the investigation demonstrate that the Project will have mostly low impacts on the environment if the proposed EMP is implemented and all proposed mitigation measures are considered. Some medium impacts remain regarding substations (design phase), 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.

2. Careful site selection the final design will help to minimize resettlement needs. Involuntary displacement and relocation shall 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.

3. The proposed substation will not be in Protected Areas.

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

- Avoidance of assets in the project site, if any to minimize resettlement, if possible to zero;
- Avoidance of historical and cultural sites;
- Avoidance of ecological sensitive areas.

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

6. Within DABS an Environmental and Social Department does not currently exist. It is recommended to establish 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 and their associated substations.

7. 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 client's social and environmental assessments and plans to ensure that safeguard measures are in place in accordance to ADB's safeguard policy (SPS 2009) principles.

8. 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. without affecting cultural heritage sites. Also quite often, design options are able to reduce environmental as well as social impacts at the same time. It is recommended to bring the IEE to the attention of the selected construction contractor and to include EMP/ LARP as integral part of the tender documents. A review of the final design by independent social and environmental experts is recommended.

13. Conclusion

1. It can be concluded that, all impacts are site specific and with appropriate implementation of all proposed mitigation measures, the project can be implemented without any adverse effects. No further environmental assessment is required.

2. The site for the substation in has been selected such that the construction equipment, materials and personnel will by-pass the built up areas of Pul-e-Khumri City. However, there will be expected short term interruption in the main highway connecting Mazar Sharif and Pul-e-Khumri when the heavy equipment and transformers are delivered to project site. The impact could be reduced by proper notification to commuters for them to advance or delay their trips by a day or two.

3. One of the key recommendations of the IEE and the provisions of the EMP are that no SF_6 containing equipment should be used for transformers and switchgears in the Dashte Alwan substation.

4. The Environmental Management Plan has been prepared in accordance with the Bank's SPS Policy Statement of 2009 to address the environmental concerns. The mitigating measures, monitoring requirements, responsible authorities and personnel, reporting requirements and cost are defined in the EMP.

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United Nations Environment Program (UNEP): Biodiversity Profile of Afghanistan; June 2008

15. Annexes

d. Rapid Environmental Assessment (REA) 2012

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to Environment and Safeguards Division (RSES) for endorsement by Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:	**AFG: North South Power Transmission Enhancement Project including Substations**
Sector / Division:	Energy

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?		x	
▪ Cultural heritage site		x	**Line Routing near Silk Road. Historical Sites may be present. Chance find Procedure to be implemented.**
▪ Protected Area		x	
▪ Wetland		x	
▪ Mangrove		x	
▪ Estuarine	x		
▪ Buffer zone of protected area		x	
▪ Special area for protecting biodiversity		x	
B. Potential Environmental Impacts Will the Project cause…			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		x	**Most of the T-line is replacement of old T-line, landscape already impacted,**
▪ **encroachment on precious ecosystem (e.g. sensitive**		x	

Screening Questions	Yes	No	Remarks
or protected areas)?			
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?	**x**		**3 river systems are crossed by the planned transmission line, construction of temporary bridges, avoidance/ mitigation possible**
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		**x**	
▪ **deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?**	**x**		**Short term workers camps to be constructed, EHS Management required to prevent pollution of rivers**
▪ increased local air pollution due to rock crushing, cutting and filling?	**x**		**Construction of access roads, tower foundations, temporary impact**
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	**x**		**Especially risks of electrocution and work accidents during construction and maintenance**
▪ chemical pollution resulting from chemical clearing of vegetation for construction site?		**x**	**Herbicides shall not be used for corridor clearance**
▪ noise and vibration due to blasting and other civil works?		**x**	**T-Line crosses mostly flat land no mountain areas, no steep slopes, no rocky terrain**
▪ dislocation or involuntary resettlement of people?	**x**		**T-line is potentially crossing settlement areas**
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		**x**	
▪ social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?		**x**	
▪ hazardous driving conditions where construction interferes with pre-existing roads?	**x**		**T-Line crosses existing road and is located is near to road;** **Signalization of construction sites necessary, changes of construction site during progress of construction work**
▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?		**x**	
▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?	**x**		**Resettlement of all people from 60m PROJECT SITE required**
▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		**x**	**No existing vegetation higher than 2-3 m, mostly desert landscape**

Screening Questions	Yes	No	Remarks
▪ facilitation of access to protected areas in case corridors traverse protected areas?		x	
▪ disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height?		x	
▪ large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)?		x	**Special workers camps to be constructed, short time of construction in each place**
▪ social conflicts if workers from other regions or countries are hired?	x		**Social conflicts between workers and local population cannot be excluded**
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?	x		**EHS Management System including training for workers required**
▪ risks to community safety associated with maintenance of lines and related facilities?	x		**Risks of electrocution, safety measures for operation phase required**
▪ community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization?	x		**No permanent human presence within PROJECT SITE shall be allowed due to EMF**
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		x	**No particular increase of safety risks with normal construction principles**
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	x		**Risks of electrocution to be considered during operation phase, no self-made local connections to the T-Line possible**

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)?	x		**General earthquake risk in the country, but no particular risk for the Project area**
Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost?		x	
Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?	x		**High incidence of vulnerability and tense social relations between different population groups**
Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)?		x	

Appendix I: Environments, Hazards and Climate Changes

Environment	Natural Hazards and Climate Change
Arid/Semi-arid and desert environments	Low erratic rainfall of up to 500 mm rainfall per annum with periodic droughts and high rainfall variability. Low vegetative cover. Resilient ecosystems & complex pastoral and systems, but medium certainty that 10–20% of dry lands degraded; 10-30% projected decrease in water availability in next 40 years; projected increase in drought duration and severity under climate change. Increased mobilization of sand dunes and other soils as vegetation cover declines; likely overall decrease in agricultural productivity, with rain-fed agriculture yield reduced by 30% or more by 2020. Earthquakes and other geophysical hazards may also occur in these environments.
Humid and sub-humid plains, foothills and hill country	More than 500 mm precipitation/yr. Resilient ecosystems & complex human pastoral and cropping systems. 10-30% projected decrease in water availability in next 40 years; projected increase in droughts, heat waves and floods; increased erosion of loess-mantled landscapes by wind and water; increased gully erosion; landslides likely on steeper slopes. Likely overall decrease in agricultural productivity & compromised food production from variability, with rain-fed agriculture yield reduced by 30% or more by 2020. Increased incidence of forest and agriculture- based insect infestations. Earthquakes and other geophysical hazards may also occur in these environments.

River valleys/ deltas and estuaries and other low-lying coastal areas	River basins, deltas and estuaries in low-lying areas are vulnerable to riverine floods, storm surges associated with tropical cyclones/typhoons and sea level rise; natural (and human-induced) subsidence resulting from sediment compaction and ground water extraction; liquefaction of soft sediments as result of earthquake ground shaking. Tsunami possible/likely on some coasts. Lowland agri-business and subsistence farming in these regions at significant risk.
Small islands	Small islands generally have land areas of less than 10,000km2 in area, though Papua New Guinea and Timor with much larger land areas are commonly included in lists of small island developing states. Low-lying islands are especially vulnerable to storm surge, tsunami and sea- level rise and, frequently, coastal erosion, with coral reefs threatened by ocean warming in some areas. Sea level rise is likely to threaten the limited ground water resources. High islands often experience high rainfall intensities, frequent landslides and tectonic environments in which landslides and earthquakes are not uncommon with (occasional) volcanic eruptions. Small islands may have low adaptive capacity and high adaptation costs relative to GDP.
Mountain ecosystems	Accelerated glacial melting, rock falls/landslides and glacial lake outburst floods, leading to increased debris flows, river bank erosion and floods and more extensive outwash plains and, possibly, more frequent wind erosion in intermountain valleys. Enhanced snow melt and fluctuating stream flows may produce seasonal floods and droughts. Melting of permafrost in some environments. Faunal and floral species migration. Earthquakes, landslides and other geophysical hazards may also occur in these environments.
Volcanic environments	Recently active volcanoes (erupted in last 10,000 years – see www .volcano.si.edu). Often fertile soils with intensive agriculture and landslides on steep slopes. Subject to earthquakes and volcanic eruptions including pyroclastic flows and mudflows/lahars and/or gas emissions and occasionally widespread ash fall.

e. Electric and Magnetic Fields

i. General Considerations

Considering low frequent (50 Hz) alternative currencies (AC) as used in power transmission, not electromagnetic waves are of interest but we have to look at the strength of the generated electric and the magnetic field separately. A short calculation shows that in case of a 50 Hz alternative currency the wavelength of the electromagnetic wave is 6,000 km.

$c = \lambda \times f \quad \Rightarrow \quad c / f = \lambda \quad \Rightarrow \quad 300{,}000\ \text{kms}^{-1} / 50\ \text{Hz} = 6{,}000\ \text{km}$

c = speed of light, λ = wavelength, f = frequency

Such wave lengths are not of relevance for men. An electromagnetic wave of such a length cannot interfere with a human body that is only about 1.80 m.

However, considering mobile phones, using frequencies in the range of GHz, the associated wavelengths are of some mm and have to be considered as electromagnetic fields.

Being in operation the strength of electric and magnetic fields is one of the permanent effects on the environment especially for people living e.g. along transmission lines or working in substations (mainly open air substations). These fields can have effects on organism but can also interfere with other technical installations.

Because at present extensive discussions take place about effects of electromagnetic fields on the health all over the world especially related to the use of mobiles, this issue should be considered comprehensively in HSE studies to such projects. Doing so, it has to be clarified that we are talking about electromagnetic fields only in high frequency ranges as used by mobiles.

In power transmission 50 Hz (low frequency) is used. Here, the generation of electromagnetic fields is not relevant because of its large amplitude. Using 50 Hz we have to consider both electric fields and magnetic fields separately. The electric field exists permanently if voltage is impressed, whereas the magnetic field only results if actual current is flowing.

In Annex 0 some results of recent scientific researches concerning biological and health effects of electric and magnetic fields are given. Annexes 0 describes internationally used standards and limit values and in Annex 0 an excerpt is given about the guideline of the internationally accepted International Commission on Non-Ionizing Radiation Protection (ICNIRP).

Regarding the Project, it has to be stated very clearly that the selected design of the proposed GIS indoor substations is directed to reduce

electric and magnetic fields to an absolute minimum. Through their metal-clad construction, GIS substations

Effectively shield the electrical field from the surroundings. Thus, the electrical field outside GIS substations is practically negligible. There is no exceeding in electric and/or magnetic field, as discussed in the Annexes, expected. According to measurements in other similar projects the fields around the substations will be far below any internationally excepted standard. The standards stipulated below, however, can become relevant in case of high voltage overhead lines if, settlement are closely bypassed and within high voltage substations for workplaces.

Internationally used standards/limit values concerning electric and magnetic fields (50 Hz) for the public and at working places

Source	**El. Field strength [kV/m]**	**Magn. Flux density [µT]**
ICNIRP recommended 50/60 Hz Reference levels for exposure to time-varying electric and magnetic fields (unperturbed r.m.s. values) occupational exposure general public exposure	10	500
Limit values according to the European Directive 2004/40/EC	10	500
Limit (r.m.s) value as per 26. BimSchVer 12/96 general public up to 24 hours /day		
Limit values as per VDE V 0848 Part 4/A3 at 50 Hz r.m.s. values for equivalent field strength in exposure range 1 for exposure times up to 1 h/d r.m.s. values for equivalent field strength in exposure range 1 for exposure times up to 2 h/d r.m.s. values for equivalent field strength in exposure range 1 for continuous exposure r.m.s. values for equivalent field strength in exposure range 2	30 30 21.32 6.67	4,240 2,550 1,360 424

r.m.s. = root mean square (value)

Exposure range 1 includes monitored areas, e.g. operating zones, areas monitored by operators generally accessible areas, in which, owing to the operating mode or the length of stay, it is guaranteed that exposure only occurs for a short period of time.

Exposure range 2 includes all areas in which not only short-term exposure can be expected, for example: areas containing residential and social buildings, individual residential sites, parks and facilities for sport, leisure and relaxation, operating zones where a field generation is not expected under normal conditions

(ICNIRP=International Commission on Non-Ionising Radiation Protection, BimSchVer=German Bundesimmissionsschutzverordnung, VDE=Verband Deutscher Elektrotechniker e.V., Cenelec=European Committee for Electrotechnical Standardization)

As it can be seen from the data given above, limit values arising from different organizations and used in different countries can vary. The core problem is that up to now nobody knows exactly what the effects of electric and magnetic fields on the biology are and what the best limit values are to protect human health as discussed in Annex 0.

However, some generally accepted recommendations can be given. At the moment, it is internationally agreed that for the public and for permanent exposure, the electric field must not exceed 5 kV/m and the magnetic flux density must not exceed 100 µT. This means, outside the fence of substations 5 kV/m and 100 µT respectively is the limit. The same is valid for settlements/houses along transmission lines. The corridor for transmission lines has to be wide enough that the electric and magnetic field strength at the edge of this corridor is less than the limits mentioned above.

ii. ICNIRP Guidelines and Statements (Excerpt)

Guidelines for Limiting Exposure to Time-varying Electric, Magnetic, & Electromagnetic Fields

In 1974, the International Radiation Protection Association (IRPA) formed a working group on non-ionizing radiation (NIR), which examined the problems arising in the fields of protection against the various types of NIR. At the IRPA Congress in Paris in 1977, this working group became the International Non- Ionizing Radiation Committee (INRC).

In co-operation with the Environmental Health Division of the World Health Organization (WHO), the IRPA/INIRC developed a number of health criteria documents on NIR as part of WHO's Environmental Health Criteria Program, sponsored by the United Nations Environment Program (UNEP). Each document includes an overview of the physical characteristics, measurement and instrumentation, sources, and applications of NIR, a thorough review of the literature on biological effects, and an evaluation of the health risks of exposure to NIR. These health criteria have provided the scientific database for the subsequent development of exposure limits and codes of practice relating to NIR.

At the eighth International Congress of the IRPA (Montreal, 18-22 May 1992), a new independent scientific organization – the International Commission on Non- Ionizing Radiation Protection (ICNIRP) – was established as a successor to the IRPA/INRC. The functions of the Commission are to investigate the hazards that may be associated with the different forms of NIR, develop international guidelines on NIR exposure limits, and deal with all aspects of NIR protection.

Biological effects reported as resulting from exposure to static and extremely low frequency (ELF) electric and magnetic fields have been reviewed by UNEP/WHO/IRPA. Those publications and a number of others provided the scientific rationale for the Guidelines for limiting Exposure to time varying Electric, Magnetic, and Electromagnetic Fields.

The main objective of the guidelines is to establish the limiting of EMF exposure that will provide protection against known adverse health effects.
An adverse health effect causes detectable impairment of the health of the exposed individual or of his or her offspring; a biological effect, on the other hand, may or may not result in an adverse health effect.

Studies on both direct and indirect effects of EMF are described; direct effects result from direct interaction of fields with the body, indirect effects involve interactions with an object at a different electric potential from the body. Results of laboratory and epidemiological studies, basic exposure criteria, and reference levels for practical hazard assessment are discussed, and the guidelines presented apply to occupational and public exposure.

The guidelines will be periodically revised and updated as advances are made in identifying the adverse health effects of time-varying electric, magnetic, and electromagnetic fields. In establishing exposure limits, the Commission recognizes the need to reconcile a number of differing expert opinions. The validity of scientific reports has to be considered, and extrapolations from animal experiments to effects on humans have to be made.

There is insufficient information on the biological and health effects of EMF exposure of human populations and experimental animals to provide a rigorous basis for establishing safety factors over the whole frequency range and for all frequency modulations. In addition, some of the uncertainty regarding the appropriate safety factor derives from a lack of knowledge regarding the appropriate dosimetry.

The restrictions in the guidelines were based on scientific data alone; currently available knowledge, however, indicates that these restrictions provide an adequate level of protection from exposure to time-varying EMF. Two classes of guidance are presented:

Basic restrictions
Restrictions on the effects of exposure are based on established health effects and are termed basic restrictions. Protection against adverse health effects requires that these basic restrictions are not exceeded.

Reference levels
Reference levels of exposure are provided for comparison with measured values of physical quantities; compliance with all reference levels given in these guidelines will ensure compliance with basic restrictions. If measured values are higher than reference levels, it does

not necessarily follow that the basic restrictions have been exceeded, but a more detailed analysis is necessary to assess compliance with the basic restrictions.

Basic restriction
Basic Restrictions on exposure to time varying electric, magnetic, and electromagnetic fields are based directly on established health effects.

Depending upon the frequency of the field, the physical quantities used to specify these restrictions are current density (J), specific energy absorption rate (SAR), and power density (S). Only power density in air, outside the body, can be readily measured in exposed individuals.

Different scientific bases were used in the development of basic exposure restrictions for various frequency ranges. For electric power transmission and distribution only the low frequency (50 Hz) fields are relevant which are indicative of much more slighter biological effects than fields caused by high-frequency energy. This is the reason that the basic restrictions for the range of frequencies between 1 Hz and 10 MHz are provided exclusively on current density to prevent effects on nervous system functions. The basic restrictions for current densities, whole body average SAR, and localized SAR for frequencies between 1 Hz and 10 GHz are presented in **Error! Reference source not found.**.

The occupationally exposed population consists of adults who are generally exposed under known conditions and are trained to be aware of potential risk and to take appropriate precautions. By contrast, the general public comprises individuals of all ages and of varying health status, and may include particularly susceptible groups of individuals.

In many cases, members of the public are unaware of their exposure to EMF. Moreover, individual members of the public cannot reasonably be expected to take precautions to minimize or avoid exposure. It is these considerations that underlie the adoption of more stringent exposure restrictions for the public than for the occupationally exposed population.

Table 15-1: Basic restrictions for time-varying electric and magnetic fields for frequencies up to 10 GHz

Exposure Characteristics	Frequency Range	Current Density f. Head and Trunk ($mA\ m^{-2}$) (rms)	Whole-Body average SAR ($W\ Kg^{-1}$)	Localized SAR (Head + Trunk) ($W\ Kg^{-1}$)	Localized SAR (limbs) ($W\ Kg^{-1}$)
Occupational	up to 1 Hz	40	-	-	-
Exposure	1 – 4 Hz	20/f	-	-	-
	4 Hz – 1 KHz	**10**	-	-	-
	1 -100 KHz	f/100	-	-	-
	100 KHz-10MHz	f/100	0.4	10	20
	10 MHz- 10 GHz	-	0.4	10	20
General Public	up to 1 Hz	8	-	-	-
Exposure	1 – 4 Hz	8/f	-	-	-
	4 Hz – 1 kHz	**2**	-	-	-
	1 –100 kHz	f/500	-	-	-
	100 kHz-10MHz	f/500	0.08	2	4
	10 MHz- 10 GHz	-	0.08	2	4

*** Notes:**

1. f is the frequency in hertz.

2. Because of electrical inhomogeneity of the body, current densities should be averaged over a cross- section of 1 cm2 perpendicular to the current direction.

3. For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by 2 (1,414). For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as f = 1/(2t).

4. For frequencies up to 100 kHz and for pulsed magnetic fields, the maximum current density associated with the pulse can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.

5. All SAR values are to be averaged over any 6-min period.

6. Localized SAR averaging mass is any 10 g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure.

7. For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as f = 1/(2tp). Additionally for pulsed exposures in the frequency range 0.3 to 10 GHz and for localized exposure of the head, in order to limit or avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that the SA should not exceed 10 mJ Kg-1 for workers and 2 mJ kg-1 for the general public, averaged over 10 g tissue.

Reference levels

These levels are provided for practical exposure assessment purposes to determine whether the basic restrictions are likely to be exceeded. Some reference levels are derived from relevant basic restrictions using measurement and/or computational techniques, and some address perception and adverse indirect effects of exposure to EMF.

The derived quantities are electric field strength (E), magnetic field strength (H), magnetic flux density (B), power density (S), and currents flowing through the limbs (l).

Quantities that address perception and other indirect effects are contact current (lc) and, for pulsed fields, specific energy absorption (SA). In any particular exposure situation, measured or calculated values of any of these quantities can be compared with the appropriate reference level.

Compliance with the reference level will ensure compliance with the relevant basic restriction. If the measured or calculated value exceeds the reference level, it does not necessarily follow that the basic restriction will be exceeded. However, whenever, a reference level is exceeded it is necessary to test compliance with the relevant basic restriction and to determine whether additional protective measures are necessary. The reference levels are intended to be spatially averaged values over the entire body of the exposed individual, but with the important proviso that the basic restrictions on localized exposure are not exceeded.

Reference levels for exposure of the general public have been obtained from those for occupational exposure by using various factors over the entire frequency image. These factors have been chosen on the basis of effects that are recognized as specific and relevant for the various frequency ranges. Generally speaking, the factors follow the basic restrictions over the entire frequency range, and their values correspond to the mathematical relation between the quantities of the basic restrictions and the derived levels as described below:

In the frequency range up to 1 kHz, the general public reference levels for electric fields are one-half of the values set for occupational exposure. The value of 10 kV m-1 for 50-Hz or 8.3 kV m-1 for a 60-Hz occupational exposure includes a sufficient safety margin to prevent stimulation effects from contact current under all possible conditions. Half of this value was chosen for the general public reference levels i.e. 5 kV m-1 for 50 Hz or 4.2 kV m-1 for 60 Hz, to prevent adverse indirect effects for more than 90% of exposed individuals.

Table 15-2 shows the related reference levels for occupational and for general public exposure. ICNIRP notes that the industries causing exposure to electric and magnetic fields are responsible for ensuring compliance with all aspects of the guidelines.

Table 15-2: Reference levels for occupational and general public exposure to time- varying electric and magnetic fields (unperturbed rms values)

	Frequency Range	E-FIELD Strength ($V\ m^{-1}$)	H-FIELD Strength ($A\ m^{-1}$)	B-FIELD Strength (μT)	Equivalent plane wave power density S_{eq} ($W\ m^{-2}$)
Occupational	up to 1 Hz	-	1.63×10^5	2×10^5	-
Exposure	1 – 8 Hz	20000	$1.63 \times 10^5 / f^2$	$2 \times 10^5 / f^2$	-
	8 – 25 Hz	20000	$2 \times 10^4 / f$	$2.5 \times 10^4 / f$	-
	0.025 – 0.82 kHz	**500/f**	**20/f**	**25/f**	-
	0.82 – 65 kHz	610	24.4	30.7	-
	0.065 – 1 MHz	610	1.6/f	2.0/f	-
	1 – 10 MHz	610/f	1.6/f	2.0/f	-
	10 – 400 MHz	61	0.16	0.2	10
	400 – 2000 MHz	$3f^{1/2}$	$0.008f^{1/2}$	$0.01f^{1/2}$	f/40
	2 – 300 GHz	137	0.36	0.45	50
General Public	up to 1 Hz	-	3.2×10^4	4×10^4	-
Exposure	1 – 8 Hz	10000	$3.2 \times 10^4 / f^2$	$4 \times 10^4 / f^2$	-
	8 – 25 Hz	10000	4000/f	5000/f	-
	0.025 – 0.8 kHz	**250/f**	**4/f**	**5/f**	-
	0.8 – 3 kHz	250/f	5	6.25	-
	3 – 150 kHz	87	5	6.25	-
	0.15 – 1 MHz	87	0.73/f	0.92/f	-
	1 – 10 MHz	$87/f^{1/2}$	0.73/f	0.92/f	-
	10 – 400 MHz	28	0.073	0.092	2
	400 – 2000 MHz	$1.375f^{1/2}$	$0.0037/f^{1/2}$	$0.0046f^{1/2}$	f/200
	2 – 300 GHz	61	0.16	0.20	10

1. f is the frequency in hertz..
2. Provided that basic restrictions are met and adverse indirect effects can be excluded, field strength values can be exceeded.
3. For frequencies between 100 kHz and 10 GHz. Seq, E2, H2, and B2 are to averaged over any 6-min period.
4. For peak values at frequencies up to 100 kHz see Table 13-1, note 3.
5. For peak values at frequencies exceeding 100 kHz see Figs.1 and 2. Between 100 kHz and 10 MHz, peak values for the field strengths are obtained by interpolation from the 1,5-fold peak at 100 kHz to the 32-fold peak at 10 MHz. For frequencies exceeding 10 MHz it is suggested that the peak equivalent plane wave power density, as averaged over the pulse width does not exceed 1000 times the Seq restrictions, or that the field strength does not exceed 32 times the field strength exposure levels given in the table.
6. For frequencies exceeding 10 GHz, Seq, E2, H2, and B2are to be averaged over 68/f 1.05–min period (f in GHz).
7. No E-field value is provided for frequencies <1 Hz, which are effectively static electric fields.
Electric shock from low impedance sources is prevented by established electrical safety procedures for such equipment.

Perception of surface electric charges will not occur at field strengths less than 25 kVm-1. Spark discharges causing stress or annoyance should be avoided.

iii. Biological and Health Effects of Electric and Magnetic Fields

In precise physical terms when speaking about electrical facilities, a distinction has to be made between two types of fields: the electric and the magnetic field.

The **electric field** denotes the difference in electric potential measured as a voltage between two points one meter apart. If an electric current flows in a conductor, a magnetic field will always build up around it. The electric field is generated by the line voltage on the conductors. The electric field of power lines depends on the voltage, on the circuit numbers, on the design of the circuits and on the design of the cable itself. Its strength lessens rapidly according to the distance. Normally, the field is strongest in the middle of the line span where the phase conductors have the greatest slag. The strength of the electric field is expressed in volts per meter, and in the power-line context usually in kV/m. Strong 50 Hz electric fields occur mainly in high voltage installations, i.e. inside switchyards and below transmission lines. Electric fields are shielded by objects which are earthed, such as trees, buildings etc.

The magnetic field around a power line is generated by the current in the conductors. Since the current is proportional to the line's load, the magnetic field often varies both over 24 hours and from one season to another. The magnetic field under a power line is strongest in roughly the same areas as the electric field.

The magnetic field is expressed in terms of teslas [T] (1 T = 1 Vs/m2), which is a measure of the field"s flux density. In the context of power lines, microteslas [µT] are used. An older unit, Gauss [G], is used in e.g. USA (1 mG = 0.1 µT). Magnetic fields are not shielded by walls and roofs. Around power lines they are often weaker than those one may come into contact with in many other context in everyday life at work.

There follows a brief discourse on the status of knowledge concerning the influence of 50 Hz electromagnetic fields on the environment. Investigations and research on these effects of low frequency electromagnetic fields have been more intensive worldwide since the early seventies.

In the Federal Republic of Germany, with the establishment of the subcommittee "Electric and magnetic fields" in the Association of German Electricians (VDE), a forum for discussions has been created, in which an intensive exchange of experience and ideas takes place.

The International Radiation Protection Association (IRPA), a body working under the auspice of the World Health Organization (WHO), has initiated activities concerned with non-ionizing radiation by

forming a working group in 1974. At the IRPA Congress in Paris in 1977, this working group became the International Non-Ionizing Radiation Committee (INRC). An excerpt of the "Guidelines for limiting exposure to time varying electric, magnetic, and electromagnetic fields" is given in Annex 0**.**

Magnetic fields have the property of penetrating the human organism. Low- frequency fields which arise in connection with 50 Hz alternating current can cause tissues and cells to enter into an excited state due to energy absorbed by the human body. If fields are intense, this can result in stimulation of nerves, muscles and organs.

The above effects are felt especially in the higher frequency range.

The general rule is the higher the cycling rate of the alternating electromagnetic field, the more its effects become relevant to health. High-frequency fields in the range above 30,000 Hz, which occur, for example in communications in the form of radio waves, have a disproportionately high significance for the human organism, as these give rise to heating effects.

The biological effects of electric and magnetic fields depend primarily on their field strengths. Greater biological impact is ascribed to magnetic fields than to electric fields. Electric fields can be screened relative easily, whereas magnetic fields are highly penetrating. Though electricity has intensively been used in industry and household for more than a century, as shown above, thorough scientific research on biological effects of electromagnetic fields have been conducted only in the last 25 years.

Today, among scientists there is still a considerable difference of opinion as to the degree of possible detrimental health influence caused by these fields. There are several investigations and publications reporting a severe influence of electromagnetic fields, but the discussion about biological and health effects is still going on. The International Council on Large High Voltage Electric Systems (CIGRE), a permanent non-governmental and non-profit-making international association based in France, publishes from time to time summaries of latest researches on bio- and health effects of electric and magnetic fields. An excerpt of the actual results is given below:

Cancer

In October 1996 a large-scale evaluation was published in the U.S. (U.S. National
Research Council EMF Committee, 1996) reviewing more than 500 studies from 1979 on. The report came to the conclusion that „no clear, convincing evidence exists to show that residential exposures to electric and magnetic fields (EMF) are a threat to human health".
The same conclusion was drawn by WHO (Radiation and Environmental Health Department of Protection of the Human Environment) in 2002 as discussed in the publication „Establishing a Dialogue on Risks from Electromagnetic Fields"

Some other epidemiological studies have demonstrated statistical associations between childhood cancer, especially leukemia, and proximity to power lines. However, childhood leukemia is a rare illness and the number of cases is very small, what makes statistical statements very difficult. In addition, a statistical association is not synonymous with proof that a causal connection exists.

Although several studies show that leukemia and brain tumors are more common in „electrical occupations", animal-experiment studies have failed to link exposure to electric or magnetic fields with an elevated cancer risk.

However, electric and magnetic fields have an influence on melatonin rhythm. Melatonin is a hormone formed in the pineal gland of the brain and from that hormone it is known that it plays a role in the development of certain hormone- dependent types of cancer, such as breast cancer.

Reproduction
There is no evidence that electric or magnetic fields have any impact on fertility, miscarriage, malformations or other reproduction parameters in either animals or human beings.

Effects on nervous system
Soviet and Swedish studies suggest various symptoms, such as headache, tiredness, insomnia, mild depression, etc. arise among male switchyard workers. A possible mechanism can be the proven influence of electric and magnetic fields on melatonin excretion. Melatonin also controls sleep, wakefulness, and mood. One entirely new research field is the possible connection of magnetic fields and certain forms of dementia, such as Alzheimer's disease. However, no actual direct influence of magnetic and electric fields on the diseases in human beings noted above has yet been demonstrated in scientific experiments or investigations.

Conclusion
The descriptions given above show that much research has been undertaken with contradictory results and results that are often hard to interpret. However, some large scale research is now underway in Germany, USA, Canada, UK, and Sweden, and it is expected that knowledge in this field will be growing substantially over the next few years.

دفتر مرکزی شرکت برشنا،
کابل
Da Afghanistan Breshna Sherkat
Headquarters in Kabul

Ref: 460

Date: 31 August 2013

Mr. Rune Stroem,
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Central and West Asia Department,
Asian Development Bank,
Manila. – Philippines
Tel (632) 632-6457

Sub: MFF 0026-AFG: Energy Sector Development Investment Program - Project 5 (500 kV Dashte Alwan Substation Project)

Dear Mr. Stroem,

DABS endorses the following documents related to social safeguards prepared for the subject Project:

1. Land Acquisition and Resettlement Framework (LARF)
2. Draft Land Acquisition and Resettlement Plan (LARP)
3. Environment Assessment Review Framework (EARF)
4. Initial Environment Examination (IEE)

We also attach the mentioned documents in softcopy for your review and approval.

Thanking you,

Yours Sincerely,

Abdul Razique Samadi
CEO, DABS

CC

Dr. Waheedullah Popalzai- PMO Director, DABS
Mr. Alex Culver – FICHTNER Team Leader