AFG: Energy Supply Improvement Investment Program

Ghazni-Sharana 220 kV Transmission Line Project

Initial Environmental Examination (IEE)

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Delivering Excellence

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1. Executive Summary

1. The Government of Afghanistan requested the Asian Development Bank (ADB) to finance the extension of the power network toward the Paktika Sharana City. Currently, the Sharana city is not connected to the power grid supply. This has badly impacted the economic growth and social life in the province. The Project is financed by ADB Tranche 5: Energy Supply Improvement Investment Program Multitranche Financing Facility (MFF) (Energy MFF 2) in Afghanistan. The tranche will finance construction and commissioning of a 68.5 km 220 kV transmission line (TL) between Ghazni substation and Sharana City capital of Paktika province.
2. The exact location of the towers will be selected at the detailed design stage by the turnkey contractor to be procured later on. Most of the project corridor is owned by the Government, but it is noticed that some families might settle on the government land during the course of implementation to receive compensations. The approximate number of towers considered for this transmission line is 247 (96 tension, 151 suspension towers). It is important to note that the location of 220-kV towers can safely be adjusted by 10 - 15 meters to minimize environmental impact as the average distance between two transmission towers ranges from 200-225 meters.
3. This project is assessed to be a Category B project according to the ADB Safeguard Policy Statement (SPS) (2009), for which Initial Environmental Examination (IEE) is required. The IEE and Environmental Management Plan (EMP) are prepared following the ADB SPS (2009) and the National Environmental Protection Agency (NEPA) guidelines. The purpose of this IEE is to assess environmental impacts of this transmission line project, including environmental legal framework, environmental baseline, project alternatives, its potential impacts and mitigation measures, the institutional requirements, Environmental Management Plan (EMP) and environmental monitoring plan for the project.
4. The line routing was assessed considering environmental and social aspects as well as technical and economic aspects. The detailed design of the transmission line and substation including the final land survey is shifted to the turnkey contractor and will be part of the tender documents. In the initial phase of the project preparation, the focus was on the line routing that is feasible from a technical point of view, avoids significant adverse and increase positive environmental and social impacts of the project, specifically:
    - Technically feasible route and avoid crossing other high voltage lines in the area to a possible extent;
    - Avoid ecologically sensitive zones as well as cultural and historical areas;
    - To a high extent possible avoid the need for resettlement actions;
    - Consideration of security and accessibility on the line route;
    - Less interference with other power and radio infrastructure;
5. However, not all impacts in the line routing can be avoided such as:
    - The line passes near Sardeh Band dam.
    - The line will cross agricultural land mainly near the Sardeh Band dam.
    - The line will pose visual effects to some extent on the topography of the area.

- Some land acquisition and resettlement activities are required in Sharana and Ghazni territory.

6. The starting point of the overhead transmission line (OHL) is the Ghazni Substation. Consultants' visited the substation and reviewed the existing configuration of the outgoing 220 kV feeder bays and discussed with the DABS team on the availability of the feeder bay for connecting the new 220 kV OHL. It is assumed, that spare bays are available at this substation to connect the OHL. DABS needs to shift the Kandahar line bay in order to avoid the OHL crossover.
7. This transmission line traverses through mountainous terrain, and hillsides at the start and then agricultural land and residential area at the middle portion near Sardeh Band dam. The new substation will be constructed in Sharana. The transmission line environmental impacts are expected to be mostly low if the mitigation measures are properly followed. The socio-economic impacts will be precisely evaluated depending on the detailed line routing and land acquisition measures.
8. As the transmission line route is passing mountainous terrain which contains several flooding runoffs, therefore, it is important for the turnkey contractor to prepare a detail survey report with consideration of storms water analysis. The towers must not be placed on any flood runoffs.
9. The Ghazni and Sharana (Paktika) provinces are located in degree 4 zone based on the earthquake intensity modified Mercalli scale and is potentially prone to earthquakes of over 7.3 on the Richter scale. Therefore, tower construction in the potential rock fall areas should be avoided and rock fall protection measures need to be considered in the detail design in case the route cannot be diverted.
10. The precise location of transmission towers will be determined at the detailed design stage by the turnkey contractor. It is relevant to note that the location of 220 kV towers can safely be adjusted by 10 - 15 meters to minimize the resettlement impact as the average distance between two transmission towers ranges from 200-225 meters.
11. Sharana municipality has allocated 20,000 m^2 land for the new substation construction near the Sharana City Kotwal village at (Lat: 33.113237°; Lon: 68.721979°). The area is government owned and is a free land with very little primary natural plants.
12. The Land Acquisition and Resettlement Plan (LARP) document which will be part of the tender package can provide further socio-economic information about the project affected people and properties.
13. The anticipated impacts and mitigation measures of this project have been discussed considering the following four key phases of the project:
    - Design Phase
    - Construction Phase
    - Operation Phase
    - Decommissioning Phase
14. There are two sensitive receptors schools located near the transmission line and construction noise will disturb the education process. These schools are mostly morning time (8 AM to 12 PM) therefore it is recommended to schedule the construction of the poles located in the 500-meter distance to these schools during off time in the afternoon.

15. There are two protected areas near the project area. This transmission line is located in 60 km and 104 km distance from Dashti Nawar and Ab-i Istada protected areas respectively and birds might pass by the TL route between these IBAs particularly because of the Sardeh Band dam located in between these IBAs. To minimize the risks to birds the mitigation measures have been considered in this IEE.
16. Consultation meetings were held with the potentially affected people along the transmission line route from Ghazni to Sharana. The objectives of the meetings were to share the project relevant information with communities and understand their concerns. The main concerns raised by the community elders were about the bad security condition of the project area and access to energy for those villages located near the line, job opportunities for the local people and the resettlement compensation.
17. The security condition through the route is alarming. It was very hard for our team to perform the surveys and we have faced several security challenges. In order for the project to be implemented successfully, the government must address the security issues of the area.
18. Ander district is located along the transmission line route and is highly insecure place. The Ander community members said that they will not allow the line to pass without providing them the electricity.
19. Impacts to ecological resources (wildlife, vegetation, aquatic biota, special status species, and their habitats) will be minimal and localized in all phases of the project because the line doesn't pass through ecological environmentally sensitive areas. It is worth mentioning that above-ground power lines pose three main risks to birds: risk of electrocution; risk of collision and risks and loss of habitat quality in staging and wintering areas. But as this transmission line does not pass through a protected area or on the bird's migration path this impacts on bird safety is considered as low. But for the safety of air traffic and for the minimization of fatal bird collision on power lines, the mentioned mitigation measures must be applied to the possible extent.
20. The study results suggest that overall the project will have low environmental impacts if the proposed mitigation measures and EMP are implemented properly. The transmission line work impacts such as site characterization, line path survey and monitoring are generally temporary and of relatively lesser magnitude. The possible impacts include ground clearing (removal of vegetative cover), vehicular and pedestrian traffic, borings for geotechnical surveys, fugitive dust, acoustic noise, visual and drilling to characterize subsurface conditions (e.g., soils, depth to groundwater). The mitigation measures mentioned in the report will help reduce and avoid these negative impacts.
21. The EMP covers all the potential impacts and mitigation measure during design, construction, operation and decommissioning phases of the project. The turnkey contractor will have the responsibility to implement the EMP during the design and construction phase. Da Afghanistan Breshna Sherkat (DABS or National Electricity Utility) Project Management Office (DABS-PMO) will supervise the EMP implementation and compile reports on environmental performance, as well as in conducting training. Environmental monitoring and implementation during the operation phase is the responsibility of DABS.
22. This IEE reveals that there will be both positive and negative impacts due to the construction activities and normal operations after the proposed construction. Mitigation measures have been discussed to mitigate the expected negative impacts. The major positive impact of the project will be economic development and access to energy. The industry will grow and will

create short and long-term job opportunities for people.

23. After analysis of all environmental and social aspects of the project, it can be concluded that the project will not have adverse environmental impacts in case all the mitigation measures mentioned in this IEE have taken into the consideration.

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ABBREVIATIONS AND ACRONYMS

°C	Degree Celsius
ADB	Asian Development Bank
AFG	Afghanistan
Afs	Afghani
ANDS	Afghanistan National Development Strategy
ANSA	Afghanistan National Standards Authority (ANSA)
AP	Affected Person
APA	American Psychological Association
ARAZI	Afghanistan Independent Land Authority
BPHS	Basic Package of Health Services
BSk	Cold Semi-arid Climate
CBs	Circuit breakers
COI	Corridor of Influence
CSO	Central Statistics Office
CTs	Current transformers
CVTs	Capacitor voltage transformers
DABM	Da Afghanistan Breshna Moassassa
DABS	Da Afghanistan Breshna Sherkat/National Power Utility
DBO	Design, Build and Operate
DC	During Construction
DEWATS	Decentralized Wastewater Treatment System
EA	Environmental Assessment
EC	Electrical Conductivity
EHS	Environment, Health, and Safety
EIA	Environmental Impact Assessment
EMF	Electric and Magnetic Fields
EMP	Environmental Management Plan
ERP	Emergency Response Plan
ES	Environmental Specialist
FDT	Field Density Test
GoA	Government of Afghanistan
GRM	Grievance Redress Mechanism
GW	Giga-watts
Ha	Hectares

HPP	Hydro Power Plant
IA	Implementing Agency
IBA	Important Bird and Biodiversity Area
IBAT	Integrated Biodiversity Assessment Tool
ICIMOD	International Centre for Integrated Mountain Development
IDPs	Internally Displaced Peoples
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
IUCN	International Union for the Conservation of Nature
KM	Kilometers
kV	Kilovolt
LARP	Land Acquisition and Resettlement Plan
LARPF	Land Acquisition and Resettlement Policy Framework
LPG	Liquefied Petroleum Gas
MDG	Millennium Development Goal
MEW	Ministry of Energy and Water
MFF	Multi-Tranche Financing Facility
MFF	Multi-tranche Financing Facility
MM	Millimeter
MoIC	Ministry of Information and Culture
MoPH	Ministry of Public Health
MoPW	Ministry of Public Works
MRRD	Ministry of Rural Rehabilitation and Development
MSDS	Material Safety Data Sheet
MSK	Medvedev Sponheuer Karnik
MVA	Megavolts Ampere
MW	Megawatts
MWh	Megawatts Hour
NEPA	National Environment Protection Agency
NGO	Non-Governmental Organization
NREL	National Renewable Energy Laboratory
O&M	Operation and Maintenance
OHL	Overhead Line
ORP	Oxidation-Reduction Potential
OSHA	Occupational Safety and Health Administration

PCB	Poly-Chlorinated Biphenyls
PCR	Physical Cultural Resources
PIC	Project Implementation Consultant
PM	Particulate Matters
PMO	Project Management Office
PMU	Project Management Unit
PO	Project Owner
POPs	Persistent Organic Pollutants
PPE	Personal Protection Equipment
PPM	Parts Per Million
ROW	Right of Way
SC	Supervision Consultant
SEA	Strategic Environmental Assessment
SIGAR	Special Inspector General for Afghanistan Reconstruction
SPS	Safeguard Policy Statement
SS	Substation
SWMP	Storm Water Management Plan
TDS	Total Dissolved Solids
TL	Transmission Line
TOR	Terms of Reference
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USD	United States Dollar
VTs	Voltage transformers
WWF	World Wide Fund for Nature

2. Introduction

2.1 Project Background

24. The Project is financed by ADB Tranche 5: Energy Supply Improvement Investment Program Multitranche Financing Facility (MFF) (Energy MFF 2) in Afghanistan. The tranche will finance construction and commissioning of a 68.5 km 220 kV transmission line (TL) between Ghazani substation and Sharana City capital of Paktika province.

25. The exact location of the towers will be selected at the detailed design stage by the turnkey contractor to be procured later on. Most of the project corridor is owned by the Government, but it is noticed that some families might settle on the government land during the course of implementation to receive compensations. The approximate number of towers considered for this transmission line is 247 (96 tension, 151 suspension towers). It is important to note that the location of 220-kV towers can safely be adjusted by 10 - 15 meters to minimize environmental impact as the average distance between two transmission towers ranges from 200-225 meters.

26. The Project Executing Agency (EA) or Employer is Da Afghanistan Breshna Sherkat (DABS). This project is assessed to be a Category B Project according to the Asian Development Bank (ADB) Safeguard Policy Statement (SPS) (2009), for which an Initial Environmental Examination (IEE) is required. The IEE and Environmental Management Plan (EMP) are prepared following the recommendation of the ADB SPS (2009) and the National Environmental Protection Agency (NEPA) guidelines.

27. The main objective of this study is the assessment of the environmental and social impacts of the proposed project. The study was carried out in compliance with the environmental requirements of ADB, 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 considered when applicable. The purpose of this IEE is to:

    - identify and assess the significance of potential environmental and social impacts that may occur as a result of the construction, commissioning, operation, and decommissioning phases of the Project;
    - to assess cumulative impacts resulting from other projects being developed in parallel and in the vicinity; and
    - to propose measures that can be implemented to enhance positive impacts and mitigate negative impacts.

2.2 The scope of the Study

28. Within the scope of this IEE, the assessment of the potential environmental impacts of the construction and operation of the planned 220 kV transmission line from Ghazani substation and Sharana City capital of Paktika province and the construction of the new substation at Sharana. On the basis of the existing environmental baseline of the project area, the consultant determined the potential environmental impacts and mitigation measures of the proposed 220 kV transmission line during Design, Construction, Operation and Decommissioning phases. Alternate routings and options, as well as appropriate mitigation

and monitoring measures, were considered to reduce possible adverse impacts.

29. This 220 kV transmission line navigates through semi-desert area, mountainous terrain, hillsides, cultivated land, some houses, and settlements. In the initial phase of the project inspection, the main focus has given to find a route that is feasible from technical points of view and achieve the following expectation:

    - Follow environmental friendly route
    - Technically feasible route and avoid crossing other high voltage lines in the area to the possible extent
    - To high extent possible avoid the need of resettlement actions
    - Avoid ecologically sensitive zones as well as cultural and historical areas.
    - Consideration of security and accessibility on the line route
    - The necessary mitigation measures are suggested and their implementation should be closely monitored.

2.3 Methodology[1]

30. The IEE has been developed following the ADB SPS (2009) introduced by ADB to promote the sustainability of the project outcomes by protecting the environment and people from projects' potential adverse impacts.

31. The below activities have been carried out for the purpose of this IEE:

    - Desk review of project affected area related data such as Terms of Reference (TOR), maps, reports, etc.
    - Development of a checklist for project related data collection.
    - Afghanistan government environmental laws and legal frameworks review.
    - Site visits for data collection and interviews.
    - Stakeholder's engagement: DABS officials, government, and local communities.

32. For the development of this IEE, Dynamic Vision has assigned the following team:

    - Environmental Expert and
    - Socio-Economic Expert.

33. A corridor of 500 m on both sides of the planned transmission line has been investigated for the environment impacts examination, during the site survey. The project likely environmental impacts and mitigation measures have considered for the project key phases such as design, construction, operation and decommissioning. The extent of impacts has marked as high, medium, low and no impact.

34. **Noise Level Measurement:** The continuous 24-hour noise surveys are normally recommended as part of a study of this nature but due to security constraints, long-term monitoring is not possible. Short-term monitoring is also considered to be sufficient in obtaining data on existing noise sources in the area. Therefore, three non-consecutive 15-minute spot measurement at the proposed monitoring locations have been recorded within a 1-hour period during the daytime period using Cirrus CR: 1710 Class 1 sound level meter.

[1] The referencing style of this report is according to the American Psychological Association (APA) 6th edition.

35. For the physical environment and archeology, the whole route has been surveyed along with the analysis of the secondary data available.

3. Legal Policies and Institutional Framework[2]

36. The National Environment Protection Agency (NEPA) of Afghanistan is the leading independent government authority responsible for the environment related issues. Other national bodies such as the Ministry of Agriculture, the Ministry of Energy and Water, the Ministry of Mines, etc. also play an essential role. NEPA is responsible for all-encompassing environmental concerns of national significance, including the development of national policy, development of environmental standards, coordination between government institutions, regulatory aspects, collection of environmental information and data, monitoring of environmental indicators, licensing, and public awareness (UNEP, 2007).

37. The final version of the Environment Law came into force in January 2007 (Gazette No. 912). This Environmental Law has formed a regulatory framework for the management and sustainable use of Afghanistan's natural resources, and provided the base for the conservation and rehabilitation of the environment towards realizing specified economic, social, and ecological objectives. This law is based on international standards which recognize the current state of Afghanistan's environment while setting a framework for the progressive development of governance, leading ultimately to effective environmental management. Furthermore, there are national environmental impact assessment policy, national environmental strategy, procedures for air pollution prevention and work with wild animals in place which is developed by NEPA.

38. The environmental law defines the process of the development of a preliminary assessment, an environmental impact statement and mitigation plan to be conducted for certain projects and must be submitted to NEPA for approval. Based on Afghanistan's National Environmental Impact Assessment Policy (NEIAP, 2007), the Environmental Impact Assessment (EIA) for transmission lines projects (11 KV and above) is required as it comes under the category 1 of NEIAP projects categories for which NEPA's approval is required. Therefore, prior to commencing Civil and Construction Works, DABS must submit the IEE for regulatory approval of the NEPA, and obtain approval, e.g., environmental clearance, Non-Objection Certificate, forest clearance, and water board clearance as per the Government's regulatory requirements, and submit them promptly to the Asian Development Bank. Furthermore, it is important to ensure that the required mitigation measures during the implementation of the Environmental Management Plan (EMP) are included in the bidding document of the subproject and that all bidders have access to the IEE and EMP.

39. The NEPA is expected to play a major role in environmental protection, as well as to be the central point in dealing with the management of Afghanistan's environment so that it benefits all the citizens of Afghanistan. Furthermore, NEPA is an autonomous body, responsible for implementation of the Environmental Act, monitoring, conservation and rehabilitation of biodiversity, etc. Below table provides further details of NEPA's National guidelines and policies.

[2] A portion of this section has been adopted from ADB ESDIP-Tranche 2/3 IEE; and Naghlu Solar Power Project IEE.

Table 1: NEPA's National regulations, guidelines, and policies

Regulation/ Guideline/ Policy	Date	Key areas
Environmental Impact Assessment Regulations	(Official Gazette No. 939, dated 10 March 2008)	These regulations are issued in accordance with Article 22 of the Environmental Law to govern the process of environmental impact assessment. These regulations describe screening (Regulation 5) and environmental assessment (Regulation 7).
Administrative Guidelines for the Preparation of Environmental Impact Assessments	June 2008	These guidelines have been prepared as a companion to the Environmental Impact Assessment Regulations (Official Gazette No. 939, dated 10 March 2008). The guidelines are provided to assist those undertaking development projects that may have a potential impact on the environment and will guide proponents on the various aspects of dealing with the National Environmental Protection Agency as the competent environmental authority in Afghanistan.
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.

40. Additionally, a summary of concerned Ministries and Agencies related to this transmission project is provided below:

3.1 Ministry of Energy and Water (MEW)

41. MEW regulates electricity, identifies water resources and enterprises for generating power. The Ministry also sets energy policy and taxes on energy use; manages the planning and development of water systems for irrigating land. Furthermore, it develops water policy and administers water rights. In supporting the socio-economic growth of Afghanistan, the MEW is responsible for preparing and managing national policies of the energy sector except for 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.

3.2 Da Afghanistan Breshna Sherkat (DABS)/ the National Power Utility

42. DABS is an independent and autonomous company established under the Corporation and Limited Liabilities Law of Afghanistan. Incorporated on 04 May 2008, DABS replaced Da Afghanistan Breshna Moassassa (DABM) and is serving since then as the nation's main power utility. Its equity shares are owned entirely by the government entities. DABS have witnessed a tremendous growth in its number of customers nationwide, with the household sector

forming most the customers. The expansion of customers has pushed DABS to increase its imports to be able to meet the demands for electricity in the nation. DABS has its own design standard for transmission line which needs to be considered for this project. DABS operates and manages electric power generation, import, transmission, and distribution throughout Afghanistan on a commercial basis. DABS is the Executing Agency (EA) of the Project.

3.3 Afghanistan National Standards Authority (ANSA)

43. ANSA was established in 2004 by Presidential Decree 952 under the Ministry of Commerce and Industries which was the cornerstone for the establishment of a standards body. Through 2007, the operations of this body were limited due to a lack of human resources, budget, work plan, and strategy. The government then placed greater attention in this area. The Council of Ministers approved ANSA as an Independent entity in August 2007 - the first step towards a fully functioning standards body in the country. Recognizing the needs of modern business and cross-border trade - vital for the Afghan private sector - the Parliament of Afghanistan also ratified this decision in February 2008. ANSA now works toward the following objectives:

    - Serve Afghan stakeholders (government, industry and consumers etc.) in the fields of standardization, conformity assessment, accreditation and metrology
    - Improve commercial interactions, build the technical infrastructure and capacity, develop human resources, and establish closer ties amongst relevant institutions
    - Encourage the private sector to participate in standardization, conformity assessment, accreditation, and metrology activities to contribute to commercial interactions within Afghanistan
    - Enhance implementation of international standards as well as regional and national standards and their application in business and industry
    - Improve awareness of the role and to promote the benefits of standardization and conformity assessment, accreditation and metrology amongst government, the private sector and the general public.

44. ANSA is responsible for the development of national standards. ANSA operates in 13 fields including the environment. But up to now, the agency has developed limited numbers of standards, particularly in the environmental field. Therefore, it is recommended to adopt International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability with coordination of ANSA.

3.4 Civil Society Organizations

45. 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 the 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).

3.5 National Health and Safety Regulation

46. Chapter ten of the Afghanistan labor law is dedicated to the Provision of Health and Occupational Safety Conditions. Article 107 of the law states that “The Administration shall be obliged to ensure the preservation of health and labor safety, application of safety techniques to prevent work and production related accidents and to provide healthy conditions to prevent occupational diseases of Employees” (Afghanistan Labor Law, 2007). The labor law is approved based on the Official Gazette, 2007-02-04, No. 914. In 13 article (from 107 to 119) the Labor Law covers relevant occupational health and safety concerns. Furthermore, Regulation on Protection of Health Workers at Risk (2015) was adopted by the Ministry of Justice as another legislative document for occupational safety and health.

47. IFC Environmental, Health, and Safety (EHS) or general EHS guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance to users on EHS issues in specific industry sectors should also be applied.

3.6 Government Environmental Policies, Laws, and Regulations

48. The power transmission components shall go through the environmental requirements of the Government of Afghanistan. The regulations on environmental impact assessment are based on the Environmental Act of Islamic Republic of Afghanistan (GazetteNo.873), dated 29 Jadi, 1384 (19 January 2006). 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.

49. Other Government environmental legislative documents relevant to this project are as follows:

- The Environment Law 2007
- Water Law 1981
- The Law of Land Ownership 2000
- Nature Protection Law 1986/2000
- Agricultural Quarantine Services Law 2000
- Hunting and Wildlife Protection Law 2000
- Range Management Law 1970/2000
- Agriculture Cooperative Development Law 2000
- Charter for Development of Fertilizer and Agro-Chemicals 2000
- Clean Air Regulation of Afghanistan in 2010
- National Ambient Air Quality Standard of Afghanistan (2011) is as per WHO guidelines.

50. Furthermore, it is necessary to mention that, UNEP is contributing to the development and institutionalization of environmental laws and regulations through training and technical support in the development of an integrated environmental legal, regulatory and policy framework. An essential step throughout the development of this framework is an extensive public consultation process with national and international stakeholders.

51. Previously, UNEP provided extensive technical and drafting support for the Environment Law of the Islamic Republic of Afghanistan and supported stakeholder consultations and the promulgation of the law through the Ministry of Justice and President's Office. The final version of the environmental law, approved by the National Assembly, came into force in January 2007.

52. UNEP's work in this area has also included:

    - The draft Forestry Law and Protected Area Regulations have been submitted to the Ministry of Justice for review and processing;
    - A Forestry and Rangeland management policy has been developed;
    - The water law has been approved by the Cabinet and is with the Parliament for ratification; and
    - A Rangeland law is under development.
    - Support for regulations covering environmental impact assessments and ozone-depleting substances which have been approved by the Cabinet;

53. Likewise, a small but growing EIA sector is now developing in Afghanistan. Achievements to date include:

    - EIA regulations have been approved;
    - EIA administrative guidelines have been approved;
    - A pollution control policy paper has been approved;
    - Work has been started on the development of a waste management policy and of environmental quality standards for air, water, and pollution control;
    - A survey to identify the types of chemicals currently used by the industries in Afghanistan and the main chemical pollutants likely to have a significant impact on human health has been conducted.

54. Below table provides details of relevant National acts/laws of Afghanistan

Table 2: National acts/laws of Afghanistan[3]

Act/ Law	Date	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.

[3] Adopted from: AFG: Energy Supply Improvement Investment Program – Tranche 2

Act/ Law	Date	Key areas
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 the 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).
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. The customary law generally governs the allocation of water through the Karez system, which is constructed and maintained on a community basis (McMurray and Tarlock, 2005).
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 the sustainable use and management of the rangeland resources, to maximize the 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.

3.7 International Treaties

55. Afghanistan is a member of many international environmental agreements and treaties. The treaties relevant to the approved development are given below:

- The United Nations Framework Convention on Climate Change (UNFCCC or FCCC): This is an international environmental treaty produced at the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro in 1992. The treaty aimed at reducing emissions of greenhouse gas in order to combat global warming.
- The United Nations Convention to Combat Desertification: This agreement came into force, on 26 December 1996. The Convention was as much about rural development, agricultural growth, and poverty alleviation, as it was about combating desertification.

- The Convention on Biological Diversity: is an international treaty that was adopted at the Earth Summit in Rio de Janeiro in 1992. The Convention has three main goals:
    - Conservation of biological diversity (biodiversity);
    - Sustainable use of its components; and
    - Fair and equitable sharing of benefits arising from genetic resources.
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora: is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Afghanistan became a member of this treaty in 1986.
- The Paris Agreement (French: Accord de Paris), or Paris climate accord and Paris climate agreement: is an agreement within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with greenhouse gas emissions mitigation, adaptation, and finance starting in the year 2020.

3.8 Environmental Safeguards of ADB

56. The ADB requirements for projects environmental assessment are described in the SPS 2009. This states that ADB requires an environmental assessment of all project loans, program loans, sector loans, sector development program loans, financial intermediation loans and private sector investment operations.

57. Furthermore, ADB's safeguard policies are central to achieving sustained development impact and poverty reduction. The objective of these policies is to avoid, minimize or mitigate adverse environmental impacts, social costs to third parties or the marginalization of vulnerable groups that may result from development projects. Safeguard policies prescribe "do no harm" requirements that must be met for all ADB projects.

58. ADB has the following safeguard policies relevant to the Project:

    - Safeguard Policy Statement, June 2009
    - Public Communication Policy 2011
    - Accountability Mechanism Policy 2012

59. According to ADB SPS (2009), the Project is classified as category “B” and therefore an IEE is required. ADB uses a classification system to reflect the significance of a project’s potential environmental impacts. A project’s category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project’s area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. A project is classified as one of the four environmental categories (A, B, C, or Fl) based on the most environmentally sensitive component. As such, projects are screened for their expected environmental impacts and are assigned to one of the following categories:

    - Category A: This category project is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
    - Category B: A proposed project is classified as category B if its potential adverse

environmental impacts are less adverse than those of Category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases, mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.

- Category C: Projects unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are still reviewed.
- Category FI: A proposed project is classified as category FI if it involves an investment of ADB funds to or through an FI.

3.9 Other international Guidelines

60. Other relevant international guidelines:

    - IFC Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution, April 2007
    - ICNIRP Guidelines for Limiting Exposure to time-varying Electric, Magnetic, and Electromagnetic Fields (UP TO 300 GHz) (International Commission on Non-Ionizing Radiation Protection)

61. CIGRE 1998: High Voltage Overhead Lines – Environmental Concerns, Procedures, Impacts & Mitigation.

4. Project Description

62. On behalf of the Government of Afghanistan Da Afghanistan Breshna Sherkat (DABS) the national electricity utility has requested ADB to finance the extension of the power network central region of the country. Currently, around half of the provinces in Afghanistan are not connected to the power grid supply. This has badly impacted the economic growth; created inequalities in the country's economic development; fuels insecurity, and discontent. The proposed tranche will extend the national grid into Paktika province with a population of about 809,772. Through this project, a 68.5 kilometer 220-kilovolt (kV) transmission line between Ghazni and Paktika Sharana city will be constructed along with a substation at Sharana.

63. Sharana municipality has allocated 20,000 m^2 land for the new substation construction near the Sharana City Kotwal village at (Lat: 33.113237°; Lon: 68.721979°). The area is government owned and is a free land with very little primary natural plants.

Figure 1 Transmission line route overview

4.1 Technical Description

64. The 200 MW electrical energy will be transmitted from Ghazni Substation to Paktika Sharana via a 220 kV overhead transmission line. The proposed line will be approximately 68.5 km long.

65. The following are the high-level design components of Transmission Line:

- The proposed 220 kV transmission line shall be designed with a complete duplex conductor for single circuit.
- The transmission line conductors shall be of Aluminum Conductor Steel Reinforced (ACSR) “Panther”, with a nominal aluminum cross-section of 200 mm^2, or equivalent. The basis for selection of conductor is described in the above section.
- The Optical Ground Wire (OPGW) shall be concentric-lay-stranded aluminum alloy/steel with an aluminum clad stainless steel tube housing for 48 fibers.
- The transmission line shall be constructed on lattice towers.
- The members of the lattice structure shall be hot-rolled steel angle sections.
- All tower material shall be factory made and entirely galvanized by the hot dip process.
- The design of the towers shall cater for leg extensions up to 8 m in steps of 1 m.
- Specified clearances shall be considered as a minimum. The supplied values are elevation dependent and have been provided for information only.
- The design of all supports, conductors, insulators, and fittings will be such as to minimize the risk of damage or deterioration in service to any part of the transmission line due to vibration or climatic conditions.
- Required power transmission capacity is about 200 MW.
- The Approximate Line length is: 68.5 km
- Approximate number of towers: 247 (96 tension, 151 suspension towers)
- Number of circuits: One
- Foundations: Concrete, cast in-situ, concrete shaft or pad and chimney; or concrete cap with rock anchors for firm rock sub-base
- The right of Way: 40 m (20 m each side of the line)
- Design Code: EN 50341-1:2012; relevant IEC standards.

66. The starting point of the overhead transmission line (OHL) is the Ghazni Substation. Consultants’ visited the substation and reviewed the existing configuration of the outgoing 220 kV feeder bays and discussed with the DABS team on the availability of the feeder bay for connecting the new 220 kV OHL. It is assumed, that spare bays are available at this substation to connect the OHL. DABS needs to shift the Kandahar line bay in order to avoid the OHL crossover.

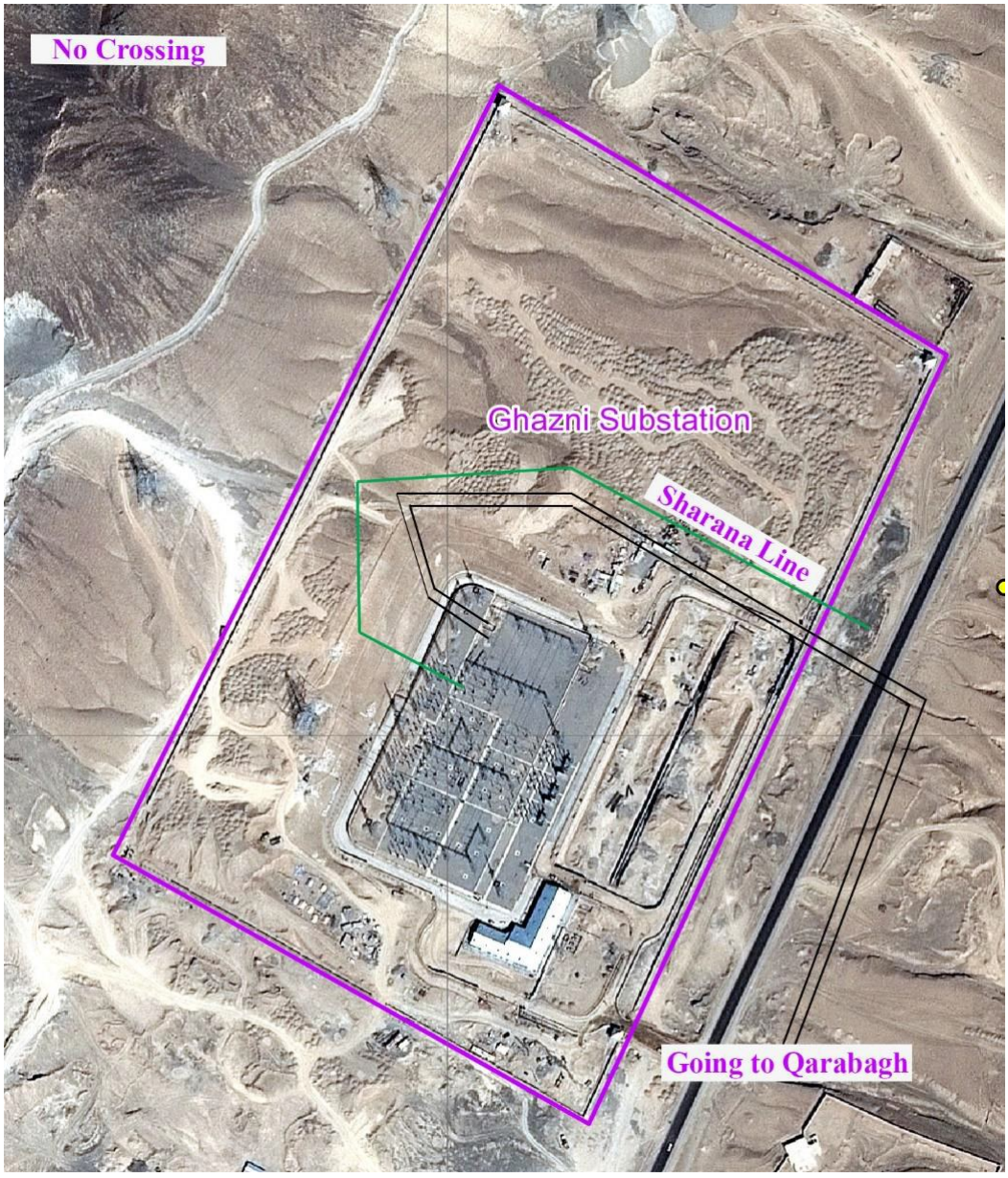

Figure 2 Ghazni Substation view

67. The following are the high-level design components of Substation:

- The substation switchyard will be an air insulated Substation
- Two separate voltage levels (220 kV, and 20 kV) are proposed by constructing separate 220kV & 20 kV Switch Yards
- The transformation capacity proposed is 220/20 kV 16 MVA transformer.
- Air insulated substation
- Power transformer capacity 32 MVA (2x16 MVA) 220 kV/20 kV
- Facility for future extension (two line bays and busbars) at both voltage levels
- Smart monitoring and control system will be supplied to increase the efficiency and smart management of the substation. This will decrease loss and reduce environmental damages.

- Interference with outside surroundings will be minimized by using approved engineering design approaches

68. The following figure shows the proposed new substation area at Kotwal Village of Sharana city at (Lat: 33.113237°, Lon: 68.721979°).

Figure 3 the proposed substation area general view

69. The proposed standards are listed in the below table:

Table 3 the proposed standard for the design

Description	IEC Standard
Power Transformers	IEC 60076
Insulating bushings for alternating voltages above 1000V	IEC 60137
Fluids for electro-technical applications - Unused mineral insulating oils for transformers and switchgear	IEC 60296
Degrees of protection provided by enclosures	IEC 60529
Loading guide for oil-immersed transformers	IEC 60354
Tap-changers	IEC 60214
Application guide for on-load tap-changers	IEC 60542

4.2 The right of Way and Clearance

70. The Right of Way (ROW) for the 220 kV transmissions line is considered to be 20 m (on both

sides of the center line) on the basis of the span-width, the line swinging and the electrical safety distance.

Table 4 Clearance for 220 kV transmission lines (Northern Ireland Electricity NIE, 2017)

Clearance	**220 kV Line**
Above normal ground	7.0
To Roads	9.8
To other OHLs	4.5

4.3 General Profile of the Project Affected Area

71. **<u>Ghazni Substation to Gardez Road near Khashek village (0-10 KM):</u>** The line in this section passes through the hilly and desert areas. No sensitive receptors have been noticed in the area. Three floodways are located in this section of the line. The largest floodway is located at (Lat: 33.600110°; Lon: 68.490768°). The line also passes through Kabul-Ghazni highway at the start point. Very few diverse primary natural plants are visible at the area.

Figure 4 Ghazni Substation to Gardez Road near Khashek village (0-10 KM) section of the transmission line.

Figure 5 A view of the flood-prone area at (Lat: 33.600110°; Lon: 68.490768°) Ghazni, along with the TL route

72. **Khashek Village to Sardeh Band and Sardeh Airport (11-38 KM):** The line goes parallel with the Gardez Road for five KM and then crosses the road at (Lat: 33.512194°, Lon: 68.566648°) southward. This area is highly insecure and various insurgent groups are active. The line passes Pajak, Tasan, Sardar Kala, Janabad, Gumbat villages and reaches Sardeh Band water dam area. In this section the line passes mainly through agricultural land and flat terrain for 15 km until it reaches Balay village and then it follows the semi-desert area of mountain skirt until Sardeh Band (dam) airport. The Sardeh Airport is located in 2 km distance to the east side of the line. The line does not pass nearby any sensitive receptor.

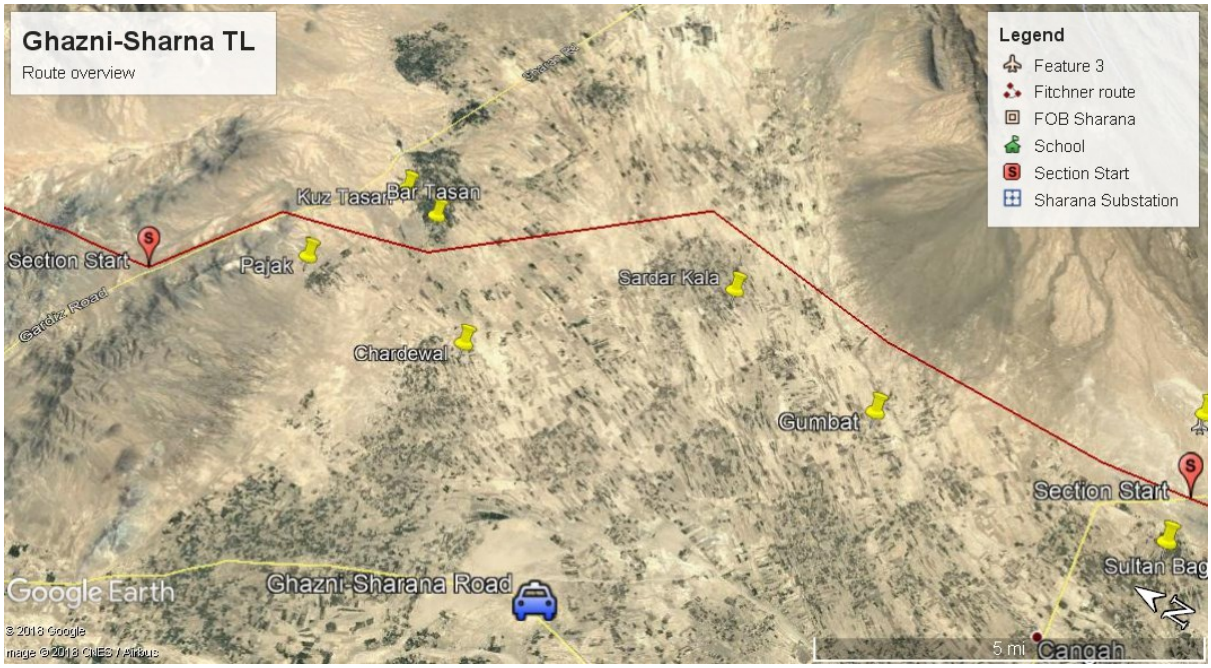

Figure 6 Khashek Village to Sardeh Band and Sardeh Airport (11-38 KM) section

73. **<u>Sardeh Band to Sharana Substation (38-68 KM):</u>** From this section onward the transmission line follows the Ghazni-Sharana main road. The Sardeh Band dam is located in 600-meter distance from the line. The Soviet Union constructed the dam in 1967. It contains an earth dam, intake, spillway, one main canal, and administration buildings. An Afghan government army checkpoint is also located near the dam. The system provides irrigation water for around 15,280 hectares of agricultural land. Mahmood Khail high school is located in 400-meter distance from the line.

Figure 7 Sardeh Band to Sharana Substation (38-68 KM) section of the line

Figure 8 Sardeh Band dam view with respect to the line

Figure 9 Sardeh Band dam overview

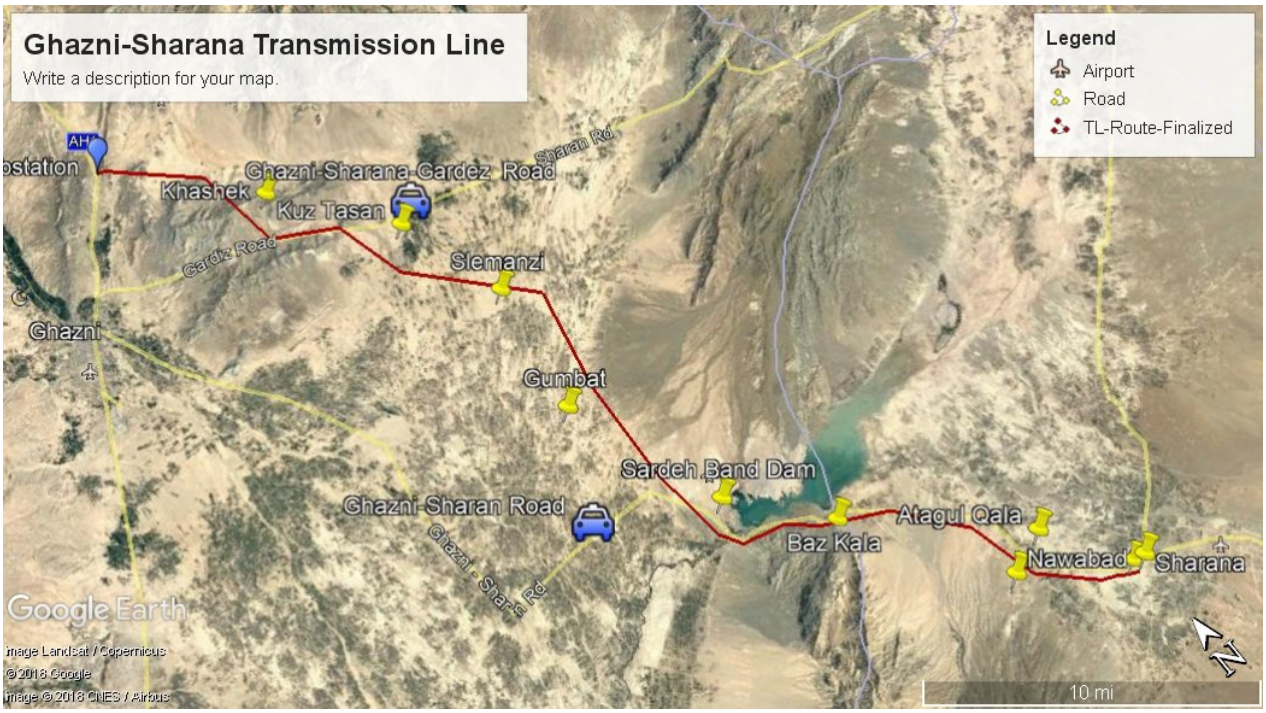

Figure 10 Overall Transmission Line Route Overview

5. Description of the Environment (Baseline)

74. The environmental baseline aspects were grouped into four categories: Physical Resources, Ecological Resources, Economic Development, and Social and Culture Resources.

5.1 Physical Resources

5.1.1 Atmosphere and Climate

75. Overall Ghazni province has a cold and temperate climate. The province receives most of its precipitation during the season of winter. On the other hand, the summer is the driest season of the province.

76. Ghazni climate is considered to be Dsa (humid continental climate) according to the Köppen-Geiger climate classification. The average annual temperature of Ghazni province is 9.9 °C. And about 254 mm of precipitation falls annually. Moreover, the average temperature of the Sharana is 10.8 °C, whereas the annual precipitation averages 265 mm.

77. While Sharana City with an influence from the local steppe climate features a cold semi-arid climate (BSk) under the Köppen climate classification. August is the driest month of the year with 0 mm of rain. Most of the precipitation here falls in March, averaging 58 mm. In another standpoint, in the Sharana the September is the driest month with 1 mm of rainfall, while March, the wettest month, has an average precipitation of 54 mm.

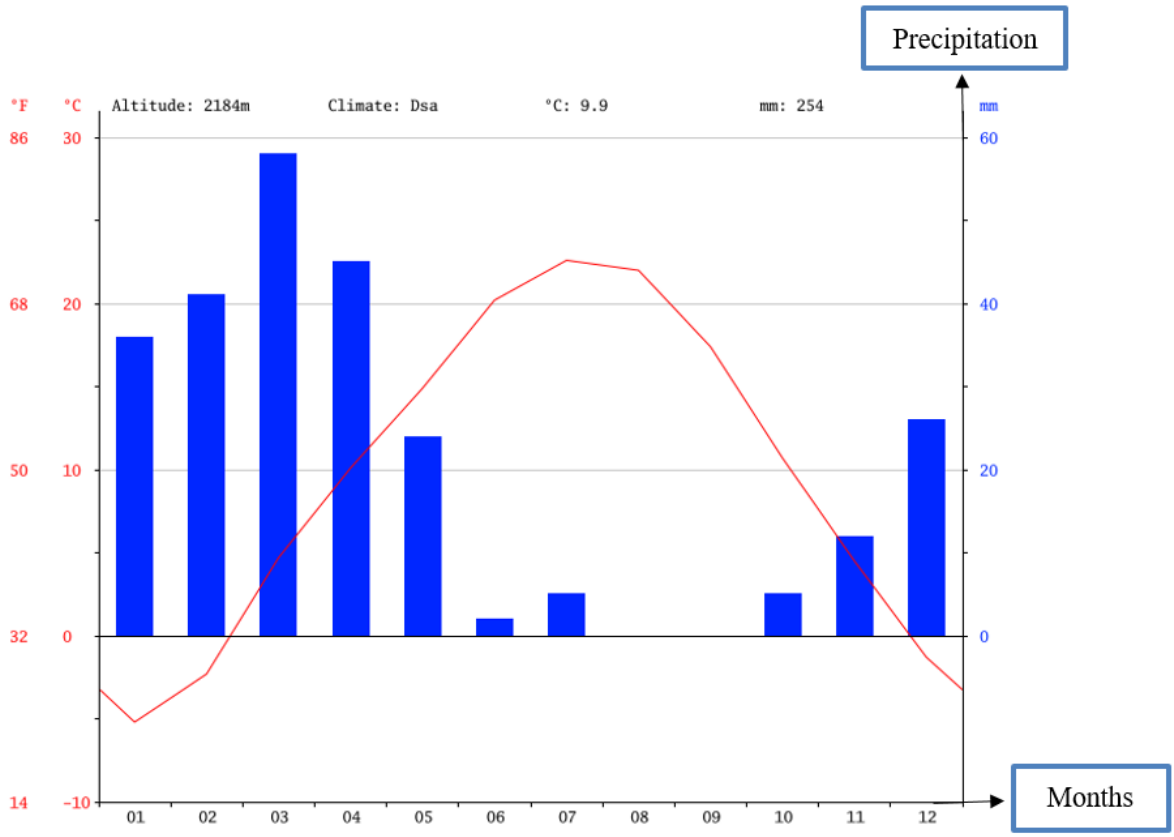

Figure 11 Ghazni weather by month (Climate-data, 2018)

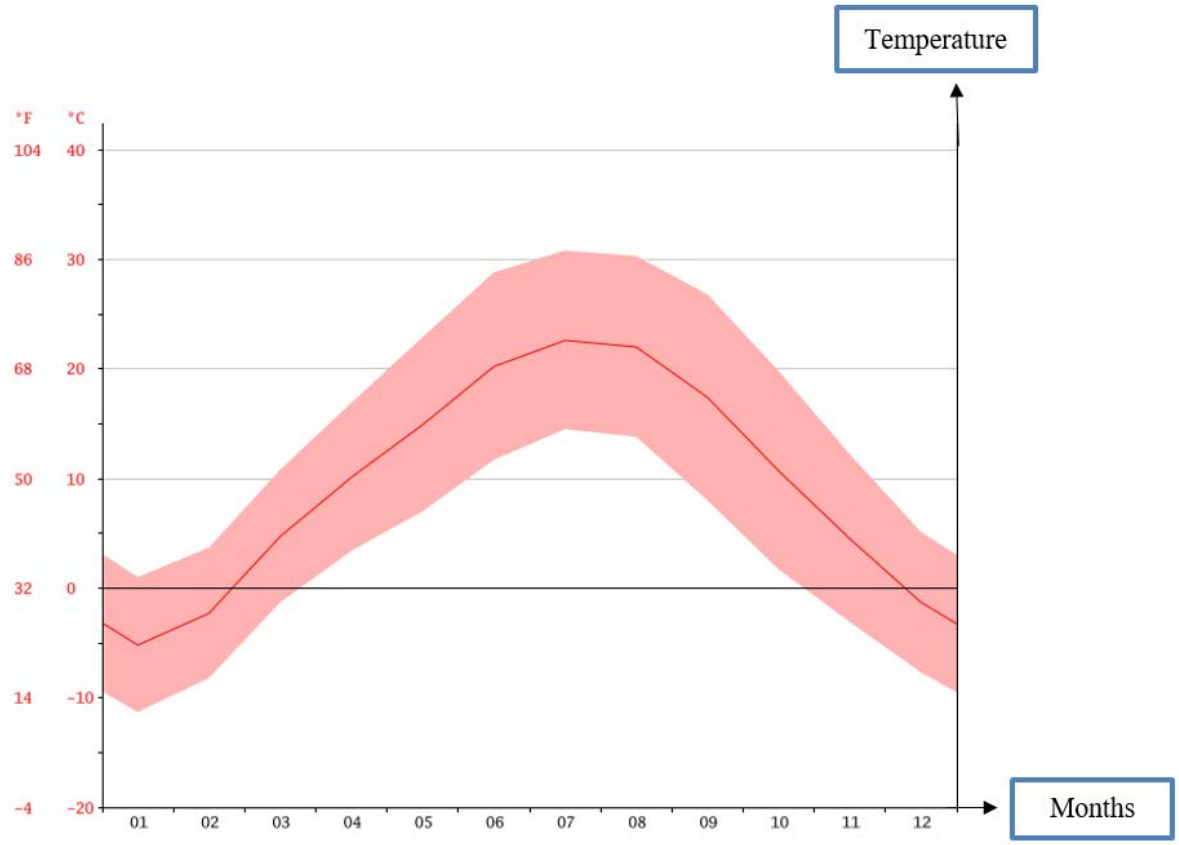

Figure 12 Average temperature of Ghazni province (Climate-data, 2018)

78. The warmest month of the year in Sharana is July. With an averages temperature of 22.6 °C. And the coldest month is January, with temperatures averaging of -5.2 °C. Furthermore, in Sharana, the July is the warmest month of the year with an average temperature of 23.6 °C. The coldest month January has an average temperature of -4.5 °C. There is a difference of 58 mm of precipitation between the wettest and driest months.

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	-5.2	-2.3	4.7	10.1	14.9	20.2	22.6	22	17.4	10.7	4.5	-1.3
Min. Temperature (°C)	-11.3	-8.2	-1.3	3.4	7	11.7	14.5	13.8	8	1.7	-3.1	-7.7
Max. Temperature (°C)	1	3.7	10.8	16.9	22.9	28.8	30.8	30.3	26.8	19.8	12.2	5.1
Avg. Temperature (°F)	22.6	27.9	40.5	50.2	58.8	68.4	72.7	71.6	63.3	51.3	40.1	29.7
Min. Temperature (°F)	11.7	17.2	29.7	38.1	44.6	53.1	58.1	56.8	46.4	35.1	26.4	18.1
Max. Temperature (°F)	33.8	38.7	51.4	62.4	73.2	83.8	87.4	86.5	80.2	67.6	54.0	41.2
Precipitation / Rainfall (mm)	36	41	58	45	24	2	5	0	0	5	12	26

Figure 13 Ghazni weather annual data sheet (Climate-data, 2017)

5.1.2 Geology and Soil

79. The transmission line starts with mountainous terrain and after 14 km it enters the agricultural

land and flat terrain for 15 km until it reaches Balay village and then it follows the semi-desert area of mountain skirt until Sardeh Band (dam) airport. After crossing Sardeh Band dam the line goes through a flat area of Sharana City.

80. The soil of the area is xeric nature. The soil in the project area primarily consists of sediments eroded from the mountains and layers of gravels, sands, and clays. Adjacent to the mountains, the sediments are dominated by coarse deposits such as gravels and pebbles. Generally, the soil can be classified as mountain light Serozems (non-saline and made of medium loam).

5.1.3 Topography

81. Afghanistan's is a mountainous country and more than 65% of the land is covered by the mountains. Ghazni province project area topography is a mixture of mountains, hills and bare and agriculture land. Whereas, the Sharana (Paktika) have every complex topography, with high mountains like the Hindu Kush occupies the Central–Eastern and eastern area, reaching their highest point in the peak of Naochak (7485 m). 40% of the line goes through mountainous areas and the remaining 60% is rangeland and agricultural land.

5.1.4 Seismicity

82. The Ghazni and Sharana (Paktika) provinces are located in degree 4 zone based on the earthquake intensity modified Mercalli[4] scale and is potentially prone to earthquakes of over 7.3 on the Richter scale.

83. Afghanistan is located in the region with low and high seismic hazard. In some parts of the country, the earthquakes of 7.0 magnitude have already happened. Paktika province is not prone to landslides due to the low rolling hills topography. While Ghazni province some part are prone to landslide.

84. Below figure shows the seismic hazard map for Afghanistan. Medium to high-risk seismicity level (Richter scale 6-7.5) is proposed to be taken into design consideration in the designs. This translates into peak ground acceleration of 2.4 to 3.2 m/s. However, the hazard values for project area is relatively uncertain because of lack of information and records characterizing the sources of seismic hazard, particularly the many faults that might be active.

85. In addition to earthquakes, the project area is also prone to flooding, landslides, and rocks fall down.

[4] The Mercalli intensity scale is a seismic intensity scale used for measuring the intensity of an earthquake. It measures the effects of an earthquake.

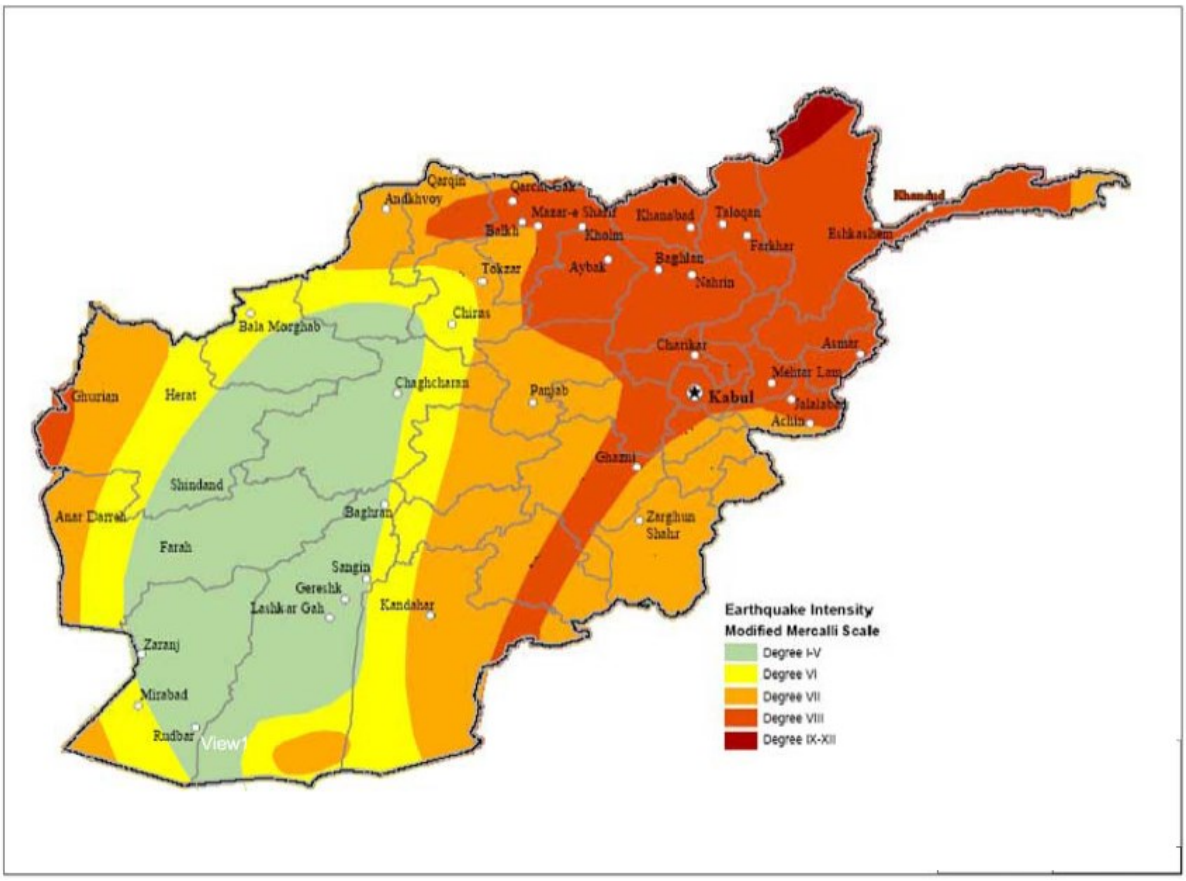

Figure 14 Afghanistan's earthquake intensity modified Mercalli scale map

5.1.5 Surface Water

86. Most hydrologic and climatic data-collection activities in Afghanistan were interrupted in the early 1980s because of war and civil war and therefore, most investigations have made considerable use of remotely sensed data and, where available, historical records to investigate the water resources of the country (Mack, 2010). As shown in below figure the project area is located in the Kabul River Basin.

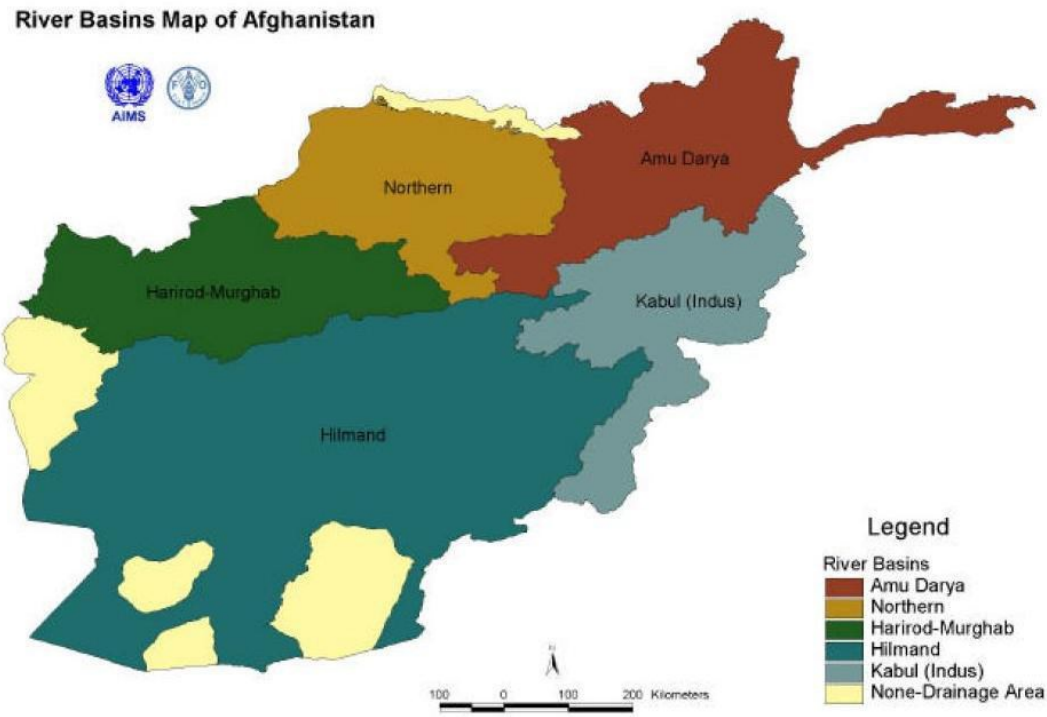

Figure 15 Afghanistan rivers basins map (UN-FAO, 2012)

87. The source of water in the area is Jilga River. The Sardeh Band dam is constructed on this river. The Soviet Union constructed the dam in 1967. It contains an earth dam, intake, spillway, one main canal and administration buildings. The system provides irrigation water for around 15,280 hectares of agricultural land.

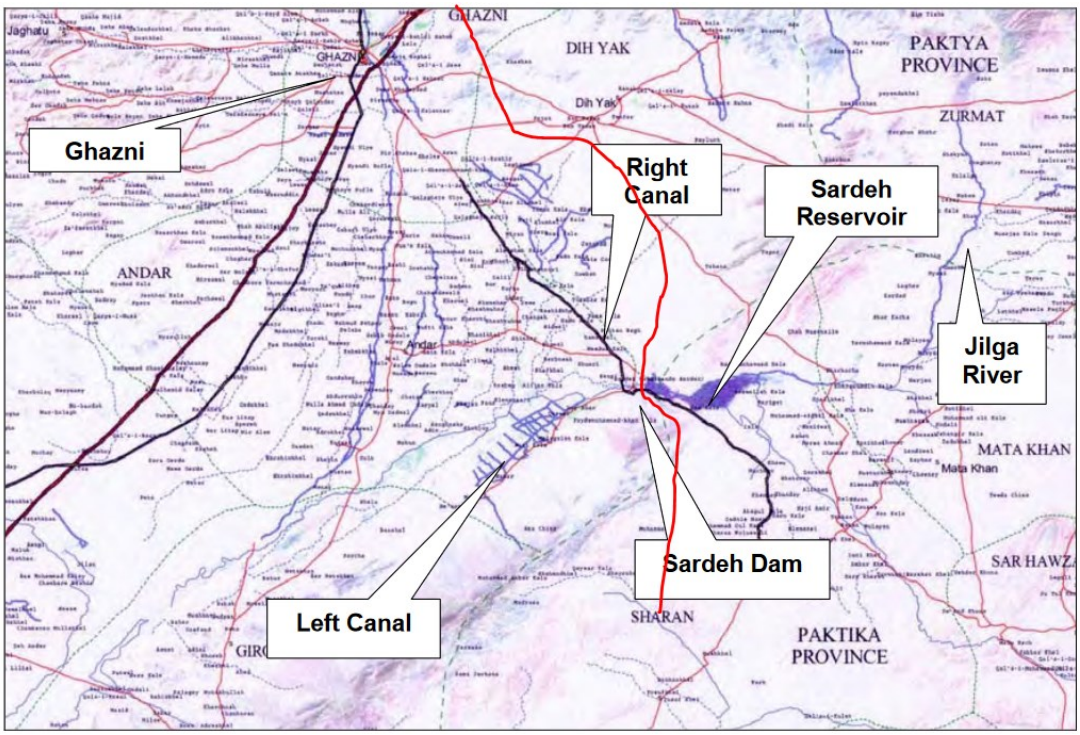

Figure 16 Shows Ghazni province surface water resources

88. Most of the inhabitants of the area does not have access to potable water, according to 2015 recent water analysis by Danish Committee for Aid Afghan Refugees (DACAAR). In combination with a lack of sanitation and hygiene, has serious consequences for the health and well-being of the population.

Figure 17 Sardeh Band dam water reservoir view

Figure 18 Sardeh Band Dam water view during field observation

5.1.6 Groundwater

89. Ghazni and Paktika (Sharana) natural groundwater system consists of middle to recent Quaternary aquifers and, Neogene multi alternating aquifers with various thicknesses, hydraulic properties, and water qualities. The basin is related to the Alpine Folded Area. This area from groundwater point of view has relatively good possibility for groundwater development. The groundwater sources have extended to the Neogine and Quaternary sediments. There the groundwater is controlled by Quaternary and Neogene aquifers and discharging on the surface as Karez and springs which currently dried out or decreased in yield, due to prolonged drought and pumping of water supply for irrigation (Saffi, 2007).

90. In Ghazni, Arsenic contamination is an issue of current drinking water supply systems where users have been using groundwater sources. Arsenic contamination is the major environmental health management concerns especially in Ghazni and surrounding areas in

water, sanitation and hygiene (WASH) sector. Increasing human activities and haphazard urbanization have modified the cycle of heavy metal, non-metal and metalloids. The arsenic contaminated groundwater used for drinking can cause an adverse effect on human health. The water quality study results show that the arsenic concentration values in the project area varied between 0.00 - 0.99 mg/L and 38% of drinking water points (DWPs) samples exceeded the value of the WHO guideline of 0.01 mg/L of Arsenic however, 62% of the analyzed water samples exceeded the National drinking water quality standard (NDWQS) of 0.05 mg/L of Arsenic (Saffi et al, 2016).

91. Below indicates groundwater quality study details performed by DACAAR.

Table 5: Two of the project area groundwater wells analysis details

ID	District	Province	Village	LON	LAT	WP Type	Well Depth (m)	Well Diameter (m)	Org
1	Ghazni	Ghazni	Arbaba	68.43911	33.54383	TW	60	0.10	DACAAR
2	Jaghatu	Ghazni	Qala-I-Naw	68.39050	33.71292	TW	23.3	0.10	DACAAR
3	Qara Bagh	Ghazni	Walikay	68.09195	33.16155	TW	56	0.10	DACAAR

Table 6: Groundwater level and Electro Conductivity (EC)

Water Level (m)					Electrical Conductivity (µS/cm)			
ID	Average	Minimum	Maximum	Difference	Average	minimum	Maximum	Difference
1	41.4	40.0	42.4	2.4	741	680	775	95
2	12.7	11.9	13.7	1.82	525	480	590	110
3	4.8	4.5	5.1	0.67	544	528	558	30

Table 7: Physical, Chemical, and Bacteriological Analysis – Anions of the project area groundwater (Saffi, 2007)

ID	Physical Parameters					Chemical Parameters												Analysis Date
						Anions (mg/l)												
	EC (µS/cm)	TDS (mg/l)	Turbidity (NTU)	pH	T (°C)	HCO^{3-}	CO_3^{2-}	Cl^-	SO_4^{2-}	SO_3^{2-}	S^{2-}	F^-	NO_3^-	NO_2^-	PO_4^{3-}	B	Br-	Total Anions	
1	782	538	0.2	7.8		375	20	3.2	37	1	0.01	0.6	1.5	0	0.18	0.6	0.03	439.14	25/11/05
2	525	361	18.3	7.9	14.5	350	30	1.9	30	14	0.01	0.6	5	0	0.31	0.3	0.21	432.32	29/11/05
3	540	372	25.5	7.3	14.3	240	10	40	21	0	0.02	0.4	9.2	0	0	0.6	0	321.12	30/11/05

5.1.7 Acoustic Environment

92. The noise baseline in the project area varies and is from low to moderate. Field investigations did not disclose the presence of “sensitive receptors” in Ghazni province while there are

receptors in Sharana (Paktika) city. However, some of the villages within the Project Area may be subjected to minor noise disturbances.

93. In Sharana city the noise level is moderate with short time high level (80 -90 dBA). The short-term high level of noise was resulting from rehabilitation activities and heavy vehicle road traffics.

Figure 19 Noise Measurement at project area.

94. The following table provides details of the measured noise level:

Detail	Measured Level	Location
LA_{eq}	60.4 dB	Sharana
LA_{max}	89.9 dB	
LA_{eq}	55.4 dB	Ghazni
LA_{max}	78 dB	

5.2 Ecological Baseline

5.2.1 Protected Areas

95. There are two protected areas near the project. This transmission line is located in 60 km and 104 km distance from Dashti Nawar and Ab-i Istada protected areas respectively and birds might pass by the TL route between these IBAs particularly because of the Sardeh Band dam located in between these IBAs.

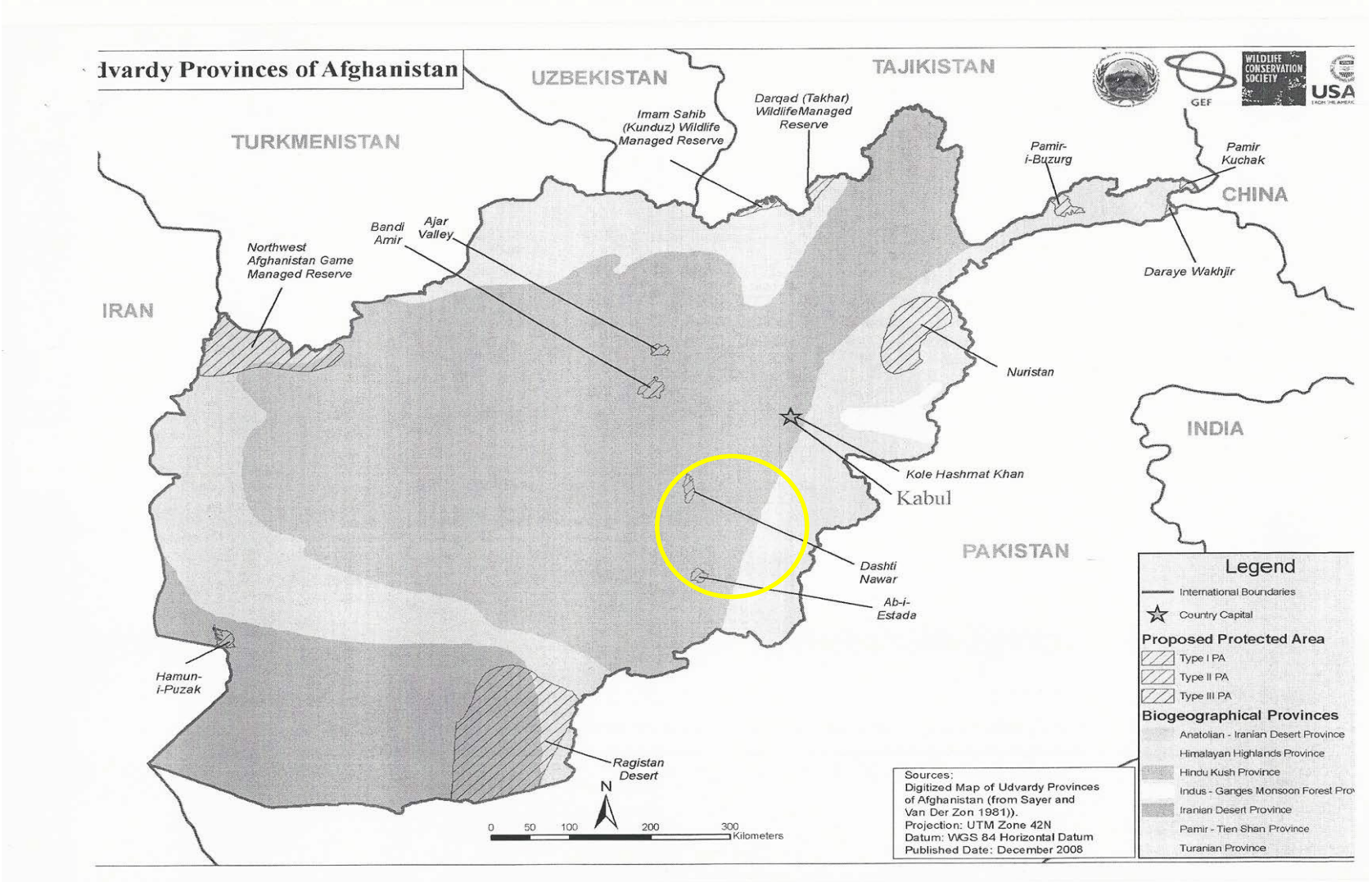

Figure 20 Afghanistan Protected Area Map (Yellow circle shows the project affected area)

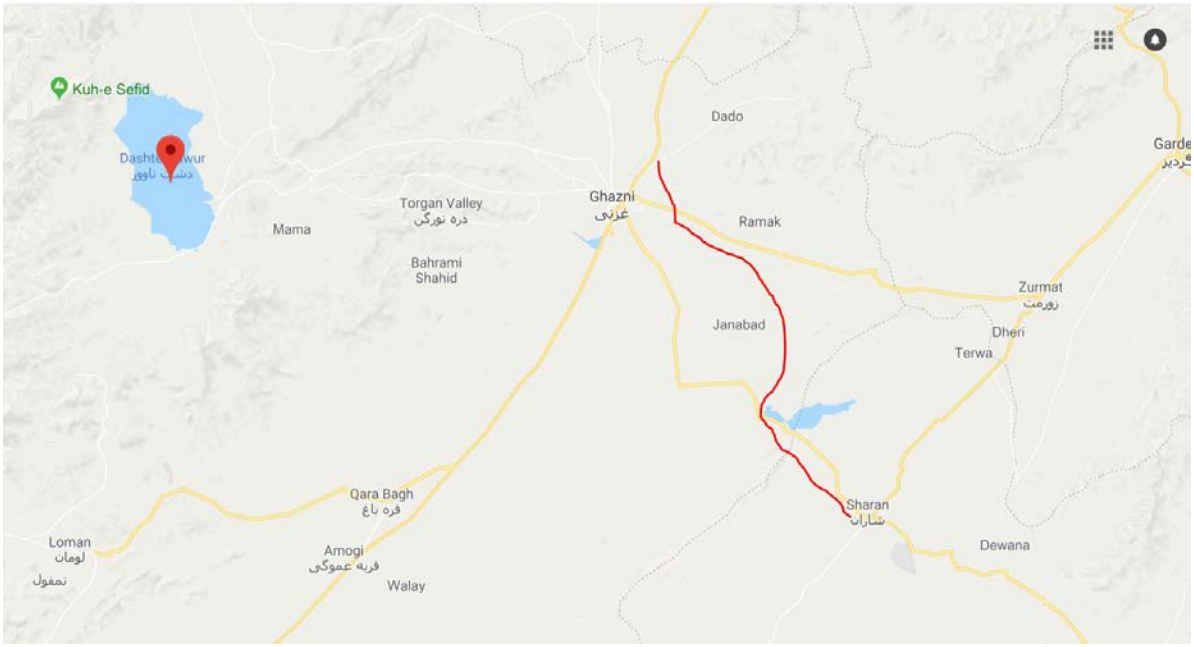

Figure 21 Ghazani Dashti Nawar IBAs with respect to the TL (Birdlife.org, 2017-b)

Figure 22 Dashti Nawar view

5.2.2 Flora and Fauna

97. Afghanistan has the unique distinction of being the original home of a very large number of plant and animal species, a majority of which are endemic. Afghanistan retains a wide variety of fauna. Though, most of the country is subject to some degree of land degradation, notably that resulting from some 30 years of war, deforestation and desertification.

98. Agricultural fields and primary natural plants are the main flora of the Project area in Ghazni and Paktika provinces. The land surface of the Ghazni province is mostly covered by rangeland which is used for grazing of livestock such as sheep, goats and cattle. Areas adjacent to the irrigation canals are, nevertheless, occupied by agricultural land growing a variety of crops, the most prominent of which are wheat, potatoes, corns, and beans.

99. The main floras of the Paktika province are, natural vegetation mainly consists of grasses and trees that dry out in the summer and some sparse of shrubs. The area is best place for grazing of the animals during the summer and spring as well. During the field visit, no protected species have been identified in the Ghazni province.

Figure 23 Agricultural fields in the project area

100. The most prominent animal species in this area were fox, jackal, and rabbit; ducks were also observed near the Sardeh Band dam. From physical observation, the project area is an unlikely venue for threatened and endangered plants, special status terrestrial wildlife species.

5.2.2.1 Avifauna

101. The following two protected areas are located in Ghazni province:

102. **Dashte Nawar:** This site is a high desert plateau in south-east Afghanistan, located 55 km north-west of Ghazni. It is surrounded by the Kohe Baba range which rises above 4,800 m. In the center of this desert at 3,200 m is Ab-i-Nawar, a shallow, brackish, alkaline lake of 3,500 ha, being 14 × 3 km; the lake contains 40 small islands of 3500 m^2. The water comes primarily from snow-melt of the surrounding mountains. The climate is hot and dry in summer and very cold in winter, with only three months of the year having mean minimum temperatures above freezing. The lake bottom supports a dense cover of algae Characeae, but the surrounding mudflats are barren except where they approach the meadows and grasses of the 'Dasht', an upland steppe plateau of meadow grasses and herbs, interspersed with shallow, mostly dry stream beds. The land is state-owned, but semi-nomadic people have grazing rights. (BirdLife International, 2018).

103. Key biodiversity: The site holds the highest known breeding colony of Phoenicopterus ruber (12,000 birds in 1970; 10,000 birds plus 400 young in 1975); with increasing disturbance and consistently low water levels during the 1970s at the flamingo colony at Ab-i-Istada, that population seemed to be breeding increasingly at this site. Little other ornithological information is available. Other breeding species include Charadrius leschenaultii, Pterocles orientalis and Rhodopechys mongolica. Together with Ab-i-Istada, these wetlands are of extreme importance to migratory waterfowl, the nearest comparable habitat being 600 km away in Seistan. The site was listed as a wetland of international importance by Carp (1980).

104. **Ab-i-Istada:** This area is a large, very shallow, alkaline lake situated on a gently rolling plateau at the foot of the Kohe Baba and Kohe Paghman ranges in south-east Afghanistan,

130 km south of Ghazni, at 2,100 m. The following description is based on observations in the 1970s. The lake's size varied considerably from year to year, being recharged mainly by snow-melt water flow once per year in spring when it was most extensive (usually 16 km at the widest point, and up to 13,000 ha). Summers are very hot and winters very cold: the lake shrank through evaporation during the summer, in some years becoming completely dry by October, but in other years water lasted through the winter, although often freezing apart from a few tiny pools. Extensive mudflats surrounded the lake, extending for 7 km on the east side but only 0.5 km on the west; normally three islands were visible. The lake was fed by a river entering in the north-east and formed by a confluence of the Gardez, Ghazni and Nahara rivers. Extensive semi-desert steppe surrounded the lake and mudflats; characteristic shrubs were Amygdalus, Cousinia, Artemisia and Tamarix. Carex predominated in a small marsh at the river mouth in the north-east corner, but otherwise, there was little plant life in the lake proper or on the mudflats, apart from Ruppia. There were no fish in the lake. There were 2,500 people in 15 villages within 10 km of the lake area, concentrated 8 km to the north-east, as well a 200-300 semi-nomadic people living in the area, with traditional grazing rights for their livestock on the plains. Following a survey in November 1993, the following changes are apparent. Average water levels are higher than in past years, and the water is fresher, due apparently too much water being released from the Band-i-Sardeh dam upstream by local Mujahideen commanders. Fish now occur in the lake. Most villagers left as refugees during the war, but the semi-nomadic people remained. The site is important archaeologically, having several early dwelling mounds and accompanying artifacts. Roads to the area are usually not passable in winter.

105. Key biodiversity: A very important wetland for migrating waterfowl and Grus leucogeranus in particular, as well as for breeding Phoenicopterus ruber. The whole of the tiny, remaining 'central' of the three known breeding populations of G. leucogeranus depends on the site as a key 're-fuelling' area whilst on spring migration en route between the Ganges plain in India and Siberia; the species almost certainly uses the site on autumn passage in some years as well, since there is a record of 3 birds in December 1970, although a one-month survey in November 1993 did not locate the species. Since at least the late 1960s, numbers have been declining steadily (e.g. max. 76 at Ab-i-Istada in March 1970, compared to only 5 in India in winter 1992/3), with uncontrolled crane-hunting in Pakistan and Afghanistan being the prime suspect for the decline. P. ruber breeds on the islands: 2,900-9,000 birds were present in the three springs of 1969, 1970 and 1974 (an average of c.5,700 birds) but the colony fluctuates markedly in size and in many years no breeding takes place; when conditions are unsuitable the birds shift to Dashte Nawar (see site 013), where breeding was more frequent than at Ab-i-Istada during 1966-1975. Other breeding species include Tadorna tadorna (100 pairs), Recurvirostra avosetta, Charadrius alexandrinus, C. leschenaultii and Larus genei (100+ birds, June). Large numbers of waterfowl occur on spring passage (when water levels are highest), and several thousand ducks can be present in winter in years of high spring-melt water flow and if the lake does not freeze over; other winter counts include Recurvirostra avosetta (285). Over 60 bird species have been recorded. The site was listed as a wetland of international importance by Carp (1980) (BirdLife International, 2018).

Figure 24 Dashti Nawar and Ab-i Istada protected areas view

5.3 Economic Development

5.3.1 Industries

106. Approximately 22% percent of Afghanistan's economy is based on industry, and approximately 22% percent is based in agriculture and livestock, primarily wheat, fruit, wool, and mutton, as of 2016. The rest of the economy 56% is service-based. No economic data is known to be available for the project area. However, field observations indicate that agricultural practices are the primary economic activity in the area.

5.3.2 Agriculture

107. The Ghazni province has 19 districts that include 22,461 square kilometers, Counting 361,891 hectares of agricultural land. Ghazni famous fruits area grapes, apricots and Bukhara plums. The total 2008 crop production surveyed in Ghazni was approximately 1,034,942 metric tons (MT), mostly involving of fruits (43.21 percent), followed by vegetables (36.24 percent), grain (16.77 percent) industrial and fodder crops (3.48 percent). The famous agriculture production which grown in Paktika province includes wheat, corn and alfalfa.

5.3.2.1 Fisheries

108. The fresh-water fish of Afghanistan have been little studied, but many are believed to be endemic. Based on communication with the local community, the Sardeh Band dam reservoir contains two species of fish, thought to be Brown Trout and a type of carp. The reservoir is used by locals for fishing in the past, but such activities were not observed during field investigations.

109. Based on the protected wildlife species list of NEPA the Fringebarbel Sturgeon (Acipenser nudiventris) and Amu Darya Shovelnose Sturgeon (Pseudoscaphirhynchus kaufmanni) are the only two protected fishes in Afghanistan.

Figure 25 Protected fishes of Afghanistan

5.3.3 Transportation

110. The main transportation road of the province is Kabul–Kandahar Highway which runs through the province. Furthermore, Ghazni Airport began operations in April 2012 but does not have any commercial flights as of August 2018. Paktika Airport began its regularly scheduled passenger flights to Kabul from Sharana Airstrip in May 2014. About 154-kilometers roads had been constructed with 70 km having been constructed in 2013 alone. There are two roads connecting Ghazni with Paktika Sharana city.

5.3.4 Land use

111. Most of the TL route is bare land covered by a very small number of primary natural plants. The middle portion of the route (15 km) is mainly passed through the agricultural land. Along the route, there is grazing land exist too especially during the spring and summer months. Herds of goats were observed during field investigations.

Figure 26 Agricultural and bare land along the route

5.3.5 Power Source and Transmission

112. The Sharana City does not have an electricity grid yet. Only a few diesel generators operate for a short duration during the night.

5.4 Social and Cultural Resources

5.4.1 Demography

113. As of 2013, the total population of the Ghazni was about 1, 368, 800, which is multi-ethnic. Pashtun, Hazara, and Tajiks are the major ethnics groups which make about 90% of the Ghazni population. The remaining ten percent of the population are Hindu, Gugar and other groups. Furthermore, due to war in recent years, most of the population of the province have immigrated to other parts of the country.

114. The total population of Paktika is approximately 809,772. There are an estimated 115,075 households in the province. Around 51% of the population is male and 49% is female. More than 96% of the population is speaking Pashto. A large majority of the province' population (about 99%) lives in the rural areas.

5.4.2 Health and Education Facilities

115. In the recent decades of war, several educational years have been lost and many children were unable to attend schools because of the closures of schools. The literacy rate of Ghazni is approximately 22.7%. In Ghazni, there are 635 schools and has 245,986 students including 45 percent female students. In 2008, Ghazni University was established and so far, it has four departments including education, Sharia law, economy and agriculture where 1,500 students including 200 female are enrolled.

116. Paktika is one of those provinces which has a very low literacy rate of only 2%. While one in every twenty-five men are literate (4%) the average literacy rate for women is zero (0%). In the population aged between 15 and 24, the situation for men is a little worse with only 3% literacy, whereas for women the figure remains the same (0%). The Kuchi population in the province has a slightly lower level of literacy than the general with just 2.1% of men and

no women are able to read and write.

117. The Health situation of the Ghazni province is described as below according to a recent report of the Ministry of Public Health of Afghanistan.

Table 8 shows the situation of health in Ghazni province.

The share of the population with access to the nearest health facility within one hour by any means of transport	72%
12-23 months fully immunized	32%
Skilled Birth Attendance Coverage	10%
Access to Safe Drinking Water	17%
Overall Clients Satisfactions and perceived quality of care	77%
Health Worker Satisfaction Index	61.2%
% of Health Facilities With At Least One female Health Worker	70%

118. The Health situation of the Paktika province is described as below according to recent report of Ministry of Public Health of Afghanistan.

Table 9 shows the situation of health in Paktika province.

The share of the population with access to the nearest health facility within one hour by any means of transport	60%
12-23 months fully immunized	18%
Skilled Birth Attendance Coverage	2%
Access to Safe Drinking Water	35%
Overall Clients Satisfactions and perceived quality of care	74.4%
% of Health Facilities With At Least One female Health Worker	44%
Health Worker Satisfaction Index	64.7%

5.4.3 Socio-economic Conditions and Employment

119. No economic data is known to be available for Ghazni and Paktika provinces in which the Project is located. However, field observations indicate that agricultural practices are the

primary economic activity in the Project Area.

5.4.4 Tourism

120. Ghazni from past is famous in literature, knowledge, history and culture hundreds writer and poets such as Sanaiee Ghaznawee, Sayeed Hosain Ghaznawee, Masood Sad Salman, Farokhi Sestani, Ferdows Tose, Ansary Balkhi, Mansor Samarqandy, Kasaie Marzori, Aziri Razi, Abu Raihan Beroni and so many others have been livening in epoch of Sultan Mahmood Ghaznawein.

121. Ghazni has 1500 years ago history far of Islam that has more ancient monuments and the historical place of Ghazni is old city of Ghazni by the name of Balahesar which at the past was base of Sultan Mahmood Ghaznawe's imperatory. At total Ghazni province has about 300 monuments and shrine or tombs that only 30 of these have reconstructed recently (Tourism.gov 2018).

122. Ghazni province had selected as Center for Islamic Culture of 2013 to encourage tourism. The province had a huge number of tourism in the past due to the city structures, works of art, the sites of outstanding universal value form historical, aesthetic, scientific-technological and anthropological point of views but owing to long-term war between Government and Taliban the number of tourism decreased significantly.

5.4.5 Archeological and Historical Heritage

123. Ghazni has had a fascinating, turbulent and complex history that has been at the center point of many of the main military, political and artistic exchanges in the region for centuries. But the most important time for the Ghazni province was Ghaznavid Empire which was between the 10th and 11th centuries. Then Ghurids period in the mid-12th century, until once more sacked by Genghis Khan in the early 13th century. Furthermore, late 14th- mid 16th centuries saw the rise of the Timurid Empire in the region with the Timurid prince Babur. And another period of the Ghazni province was Afghan- British war in (1839).

124. Ghazni province architecture goes to two periods, the Pre-Islamic periods and Islamic period. However, most of the architecture in Ghazni province remind from the Empire and dynasty (from the period 977 - 1186). Many of the monasteries and temples from this initial period of Ghazi’s history have been lost (or remain to be discovered yet). Overall the Ghazni province has totally about 300 monuments and shrine or tombs that only 30 of these monuments rebuild during the past 10 years. Some of the architecture in Ghazni province is.

- Tepe Sardar indeed be one of those Temples that build 1400 years ago. The status has a religious shape which was worshiped by the people of that time. It is one of largest discovery in the history of Afghanistan. Which was discovered in 1950 by an Italian archeologist team.

Figure 27 Tepe Sarda status in Ghazni province

- Ghaznavid Architecture belongs to the Ghaznavid dynasty (366-582 I 977-1186) that included Afghanistan, Baluchistan, Khurasan, and north-western India. The architecture of this period is often built on a massive scale, some examples of the architecture of that time are, the tomb of Sultan Mahmud Ghaznavi who ruled the Ghaznavid Empire from 998 -1030, Victory Towers, Bahram Shah Minarets, and Bagh-e Firuzi and was one of Sultan Mahmud's preferred spots for escaping the city.

Figure 28: Some of the Sultan Hammed Ghazni time architecture

- Ghazni Citadel (Bala Hissar) is constructed when Sultan Mahmood Ghaznavi returned to the country from India in 1024, he started the construction of the Citadel in the Ghazni province.

Figure 29: The Citadel (Bala Hissar) of Ghazni province

125. Paktika located in the southernmost part of a chronological region known as Greater Paktia that was once a unified province including Khost, Paktia, and parts of Logar and Ghazni. Which is one of the most remoteness province in the country. The province which saw much damages in previous years. Furthermore, no archeological significantly site still identified by the government at the project area.

126. All the historically important sites are located far from the project area. The nearest archeological site to the project is the Bahram Shah Minarets located at (Lat: 33.566667°; Lon: 68.449990°) east side of the transmission line at 7 km distance.

Figure 30 Shows the Bahram Shah Minarets site with respect to the TL

Figure 31 A view of the Ghazni historical Bahram Shah Minarets

6. Analysis of Alternatives

6.1 No Project Alternative

127. There is no better alternative for this project. Afghanistan plan is to connect all the provinces to the national grid and provide electricity to people and currently, Paktika (Sharana) is isolated from the grid and almost 90% of people are without electricity connection. This TL project is the fasted way to electrify the province and bring stability to the people and industries. Consequently, no project alternative is available for the time being.

6.2 Transmission Line Route Alternative

128. Three different routes have been assessed for this transmission line. Marked in below photo as option #1 (Parallel to Gardez road) option #2 and option #3 (Parallel to Ghazni Sharana Road) as shown in below figure. After technically and environmentally analyzing the three options the option #2 has been selected based on the following reasons:

- Though option #1 follows the existing road hence has eased in the accessibility but it makes the route 23 km longer compared to option #2 hence economically not favorable. Furthermore, option #1, requires a high level of resettlement efforts as more people are living alongside the road.
- Option #3 goes parallel to the Ghazni Sharana road for most parts but it also has a high level of resettlement issues and also crosses more agricultural land than option #2.
- Based on the information gathered from the community elders, from security perspectives, all three options have equal concerns.
- Option #2 is 4 km shorter compared to option #3.

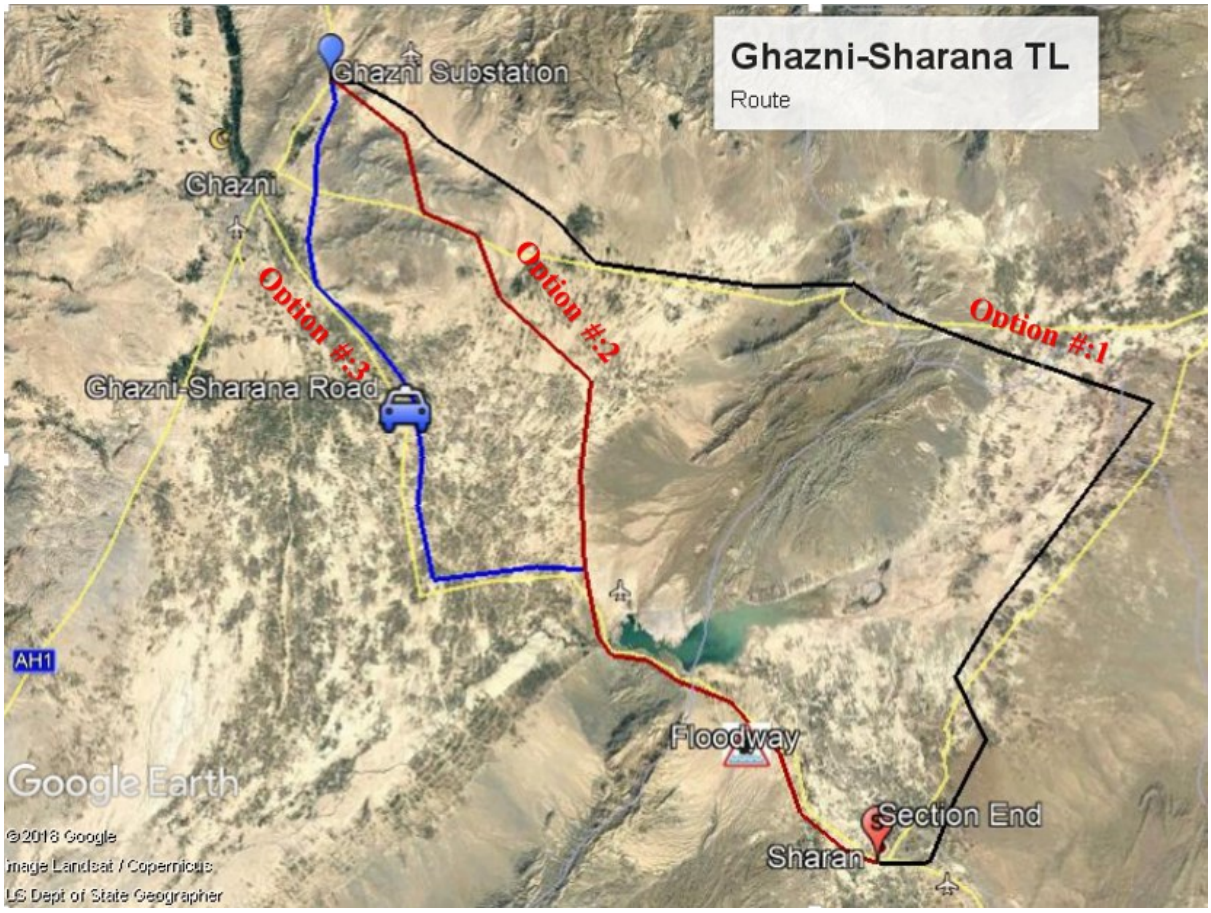

Figure 32 Line routing alternative options

6.3 Tower Design

129. Two types of high voltage transmission lines towers have been analyzed, Tubular Steel and Lattice Tower.

A. Tubular steel

130. Poles made of tubular steel are generally assembled at the factory and placed on the ROW afterward. Because of its easy manufacturing, installation, and durability, many utilities in recent years prefer the use of tubular towers over lattice steel for new power lines and tower replacements.

131. However, as this transmission line goes through mountainous terrain the transportation of these towers were challenging. Furthermore, as these towers don't manufacture here in Afghanistan and import from abroad was costly. Therefore, this type of tower has not considered for this project.

B. Lattice Tower

132. This type of tower is made of steel or aluminum sections in the form of framework construction. Lattice towers are the most common type for high-voltage transmission lines and can be used for all types of voltages. These types of the tower are usually made of galvanized steel. Aluminum is also used for reduced weight, such as in mountainous areas where the access is not easy. Aluminum is also used in steel corrosive prone environments. The additional material cost of aluminum towers will be offset by lower installation cost. Design of aluminum lattice towers is similar to that for steel, but must take into account aluminum's lower

Young's modulus, also recognized as the elastic modulus, which is a measure of the stiffness of a solid material.

133. The lattice tower is commonly assembled at the erection location. This makes very tall towers possible, up to 100 m. Assembly of lattice steel towers can be done using a crane. Lattice steel towers are generally made of angle-profiled steel beams (L- or T-beams).

134. As this type of transmission line towers can be transported easily than the other types and can be assembled at the site, therefore, this type of towers has been considered for this project.

135. In this transmission line four main types of lattice steel tower (or pylon) will be used which are:

- Suspension towers which support the conductors on straight stretches of the line;
- Deviation towers or tension towers at points where the route changes direction; and
- Terminal towers where lines terminate at substations or are connected to underground cables.

7. Screening of Potential Environmental Impacts and Mitigation Measures[5]

136. Anticipated impacts and mitigation measures have been discussed considering the following four key phases of the project:

- Design phase
- Construction phase
- Operation phase
- Decommissioning phase

137. Each phase environmental screening is done in consideration of its impacts on the physical environment, ecological environment, and socio-economic development.

7.1 Impacts and Mitigation Measures during the Design Phase

138. The transmission line site evaluation and design impacts such as line path survey site characterization, and monitoring are usually temporary and of relatively smaller magnitude. The impacts at this stage include vehicular and pedestrian traffic and drilling to characterize subsurface conditions.

139. The initial feasibility analysis is performed to make sure that an acceptable route exists for the ROW that:

- Presents minimal engineering challenges (e.g., avoids rock outcrops, steep slopes, water bodies and other similar features to the extent possible) and
- Results in the least impact to the existing public infrastructures and environment.

140. An ideal site selection for a project avoids or reduces major environmental impacts. Therefore, activities that could occur during the detailed design phase are field surveys for recording significant resources present in a potential project area (e.g., cultural resources, archaeological sites or wetlands). These surveys are typically of short duration and result in the limited disturbance.

141. All the essential permits must be obtained and regulatory requirements must be achieved before detail design. The route is surveyed to establish the centerline and edges of the ROW. Generally, only small survey crews and survey equipment would be required. The below potential impacts might result from the project site evaluation activities.

7.1.1 Physical Environment

7.1.1.1 Impacts on Soils and Geologic Resources (including Seismicity and Natural Hazards) and Mitigation Measures

142. Surface disturbance and use of geologic materials are minimal during the site assessment phase, and soils and geologic resources are unlikely to be affected. Site geotechnical survey activities would also be unlikely to activate geological hazards or increase

[5] Some of the mitigation measures are adopted from Kabul-Jalalabad Transmission line IEE as both projects have same scope.

soil erosion.

i. Seismicity

143. As mentioned in section (5) the project area is located near the fault zones. Research shows that future large earthquakes, driven by ongoing active geologic processes in the region, will occur, with a consequent risk for casualties and damage. The seismic hazard must be considered in the design of this project facilities. As the transmission line goes through mountainous terrains therefor, the designer must keep in mind that large earthquakes can cause landslides and rock falling in the mountainous terrain.

144. Medium to high-risk seismicity level (Richter scale 6-7.5) is proposed to be taken into design consideration in the Detailed Design Report. This translates into peak ground acceleration of 2.4 to 3.2 m/s.

ii. Rock Fall and Flooding

145. As mentioned in the baseline section the route has flood-prone areas. Therefore, tower construction in those areas should be avoided and rock fall protection measures need to be considered in the detail design in case the route cannot be diverted. Furthermore, flooding can devastate the substation infrastructure and can cause short circuits in the underground feeders. Therefore, flooding assessment should also be considered in the detail design around the substation area and towers erection in the potential flooding sites on the line route.

146. Overall Mitigation Measures: Siting and design considerations that mitigate impacts include:

- Identify soil properties, engineering constraints, corrosive potential, and facility design criteria.
- Avoid the floodways and rock fall areas for tower installation in the detail design phase.
- Identify and avoid areas with unstable slopes and local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, slope angles, and geologic structure).
- Develop a site grading and management plan to identify areas of disturbance, areas of cut and fill, slope during and after grading, existing vegetation, and measures to protect slope, drainages, and existing vegetation in the project area.
- Develop an erosion control and re-vegetation plan to delineate measures to minimize soil loss and reduce sedimentation to protect water quality.
- Locate facility structures to comply with the setback requirements of the site grading and drainage plan to avoid disturbing natural watercourses.
- Design runoff control features to minimize soil erosion (TEEIC, 2017).

7.1.2 Health and Safety

147. Occupational and community health and safety risks normally associated with construction and outdoor activities exist, however, are very limited during the site assessment phase because of the limited range of activities. Siting and design considerations that mitigate impacts include:

- Conducting a safety assessment to describe potential safety issues (site access, construction, work practices, hazardous materials, security, transportation of heavy equipment, traffic management, emergency procedures, wildlife encounters, and fire control and management) and measures to mitigate them.

- Develop and implement a health and safety program for workers and the public, addressing all the safety issues identified in the assessment and all applicable safety standards.
- Address specific issues (e.g., school bus routes and stops) in a traffic management plan or in the health and safety program.
- Fence the site and towers to prevent the public access (TEEIC, 2017).

7.1.3 Line Routing

148. Any overhead line will be a visual intrusion into the landscape through which it passes, and it is the dominant scale of towers which makes them difficult to absorb into the landscape. In selecting a route, it is recommended to reduce the visual effect of the line in terms of the number of people affected and the degree to which they are affected. The nature and topography of the landscape are considered and any statutory protection afforded to an area is also considered (Nationalgrid, 2008).

149. The current design of the transmission line routing is preliminary. The line has been routed considering technical and economic aspects along with social and environmental ones. However, not all impacts can be avoided, specifically:

- The line will pose visual effects to some extent on the topography of the area.
- Some land acquisition and resettlement activities are required in Ghazni (Ander District and Sharana city) areas.

150. Adjustments to the route shall be considered during detailed design to minimize or avoid the above impacts. As the detailed design is the responsibility of the turnkey contractor, a careful monitoring will be necessary.

151. Careful preparatory investigations of birds must be done as bird migration often follows local or regional flyways determined by topology, shorelines, etc. Prior to detail design of the transmission line, such investigations are needed and must comprise bird migration at day and night time and other seasonal phenomena and birds repellent installation must be proposed accordingly, particularly at 10 km vicinity of the Sardeh Band dam.

7.2 Impacts and Mitigation Measures during the Construction Phase

152. The transmission line construction process includes the following steps:

- ❖ The ROW is cleared of vegetation, rocks (possibly requiring blasting), and other items that may prohibit construction. In addition to these activities, the establishment of access roads would also necessitate grading and, possibly, excavation.
- ❖ Support structures are installed. A work area for placement and construction of the structural components of support structures would be established at each support structure location. Blasting may be required if bedrock occurs at structure locations or for breaking or moving large rocks that restrict construction equipment access. The support structure would be erected by a crane. Some support structures may require backfilling of the hole with concrete, concrete bases, or guy wires.
- ❖ Insulators are installed to the support structure cross-arms.

❖ Conductors and shield wires are strung. These are pulled through stringing blocks by tensioning equipment to keep them from coming in contact with the ground or other objects that could cause damage (TEEIC, 2017).

153. The activities during project's construction phase, potentially causing environmental impacts, include ground clearing and removal of vegetative cover, grading, excavation, blasting, drilling, vehicular and pedestrian traffic, noise, dust and project component construction and installation.

154. Environmental concerns of power transmission can include the following:

- Terrestrial habitat alteration (as this project does not cross any forest so this impact is negligible)
- Aquatic habitat alteration
- Electric and magnetic fields
- Hazardous materials (IFC, 2007)

155. The following impacts, presented by resource, may result from this transmission line construction activities.

7.2.1 Physical Environment

7.2.1.1 Impacts on Topography and Mitigation Measures

156. Land use during construction would be affected by intrusive impacts such as ground clearing, increased traffic, noise, dust, and human activity, as well as by changes in the visual landscape. In particular, these impacts could affect sensitive receptors, such as schools or hospitals or recreationists seeking solitude or recreational opportunities in natural landscapes.

157. Vegetation removal and ground disturbance could result in visual impacts that produce contrasts of color, form, texture, and line. Excavation for foundations and ancillary structures; trenching for poles foundation; grading and surfacing roads; clearing and leveling staging areas; and stockpiling soil and spoils (if not removed) would (1) damage or remove vegetation, (2) expose bare soil, and (3) suspend dust.

158. Specific mitigation measure recommended during the construction phase of the project are:

- Bring construction material from authorized sites.
- Avoid creating excessive slopes during excavation and blasting operations.
- Dispose of excess excavation materials in approved areas to control erosion and minimize leaching of hazardous materials.
- Save topsoil removed during construction and use to reclaim disturbed areas.
- Stabilize soils during final landscaping of project site.

7.2.1.2 Impacts on Acoustics (Noise) Environment and Mitigation Measures

159. The sources of noise during construction would primarily occur from equipment (chainsaws, bulldozers, and diesel engines). The additional noise sources include vehicular traffic and blasting. In most cases, this transmission line passes through terrain which is away from residential areas. In places that the line passes near residential area such as Chaharbagh of Jalalabad, noise levels from equipment operation could exceed the permissible noise levels

indicated in the World Bank General EHS guidelines but would be intermittent and extend for only a limited time. Based on the Guidelines the noise impacts should not exceed the levels presented in the below table or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table 10 community noise levels guidelines values for noise levels measured out of doors (IFC, 2007)

Receptor	**One Hour L_{Aeq} (dBA)**	
	Daytime (07:00-22:00)	Nighttime (22:00-07:00)
Residential; institutional; educational	55	45
Industrial; commercial	70	70

i. Noise Impacts on Workers and Mitigation Measures

160. The noise of construction and transportation will have a negative impact on workers. Noise could cause hearing loss, impair the ability to communicate and hear high-frequency sounds and even permanent hearing loss. During construction of the substation and pole foundation, there would be noise from construction equipment. The levels would range from about 70 decibels (dB) for a paving breaker to about 85 dB from large trucks. The noise must not exceed the OSHA all worker permissible exposure limit of 80 dBA for eight hours day. There are two main ways to reduce and control worker exposure to noise in the workplace where the noise is excessive:

- Engineering Control: this involves replacing or modifying equipment, or bringing relevant changes at the source of noise or along the noise transmission path. The contractor must make sure that the low noise level machinery and tools are utilized. Maintain and lubricate equipment and machinery (oil bearings) in accordance to its respective manufacturer recommended periods. Place a noise barrier such as curtains and sound walls between the employees and the noise source. And isolate or enclose the noise source.
- Administrative Control: this includes changes in the schedule or workplace that eliminate or minimize the labors exposure to noise. The contractor must schedule the noisy machinery operation when fewer workers are exposed in case possible, limit the time a worker spends near a noisy source, and provide a quiet area where employees can gain relief from noise sources. Furthermore, the control of the noise exposure through distance is often a simple, inexpensive and yet effective administrative noise control way. To be precise, for every double of the distance between the workers and the noise source the noise could be reduced by 6 dBA (OSHA, 2017).

ii. Noise Impacts on Communities and Mitigation Measures

161. Work outside the usual working hours/day will have negative impacts in terms of noise and disturbances in communities. Therefore, it is recommended that no construction should be allowed during nighttime (22:00-07:00), particularly the construction material transportation or night construction work could be limited to relatively quiet activities, such as interior work.

162. As this project does not require a huge amount of construction work at a specific location except the Sharana Substation the impacts of noise will be minimal. However, if the noise still exceeds the allowable limits the above-mentioned mitigation measures should be taken. The contractor must have a sound level meter at the site to continuously monitor and

record the noise level.

163. Additional key mitigation practices for noise impacts that could apply to all phases of this transmission line and substation project include:

- Limit noisy activities to the least noise-sensitive times of the day (weekdays only between (07:00- 22:00).
- Whenever feasible, schedule different noisy activities (e.g., blasting and earthmoving) to occur at the same time, since additional sources of noise generally do not add a significant amount of noise. That is, less-frequent noisy activities would be less annoying than frequent less-noisy activities.
- Heavy-duty equipment should have sound-control devices no less effective than those provided on the original equipment. Muffle and maintain all construction equipment used.
- Notify nearby residents in advance when noisy activities are required.
- To the extent feasible, route heavy truck traffic supporting construction activities away from residences and other sensitive receptors.
- Post warning signs in high-noise areas and implement a hearing protection program for work areas where noise exceeds 80 dBA.

iii. Noise Impacts on Sensitive Facilities and Mitigation Measures

164. As mentioned earlier in section 5 there are two schools located near the transmission line path and construction noise will disturb the education process. These schools are mostly morning time (8 AM to 12 PM) therefore it is recommended to schedule the construction of the poles located in the 500-meter distance to these schools during off time in the afternoon.

iv. Blasting Operation

165. The blasting operations should be avoided to the extent possible. Blasting process is associated with the generation of ground vibrations, noise, dust, fumes, and fly-rocks. The environmental impacts of ground vibrations, noise and fly-rock pose a great challenge to the safety of the nearby structures and the people. A proper blast design ensures effective utilization of the energy of the explosives and will mitigate the environmental impacts. Furthermore, blasting will be carried out using a pre-established schedule. Where possible blasting mats will be used to reduce noise levels when blasting is carried out. Nearby communities will be informed about the schedule of controlled blasting during the construction phase. Following mitigation measures are necessary to consider for the blasting process:

- Develop a blasting management plan.
- Monitor ground heave, block movement.
- Closer holes spacing, use smaller diameter holes.
- Good perimeter control blasting to minimize over-break.
- Use blasting mats to contain the blast, prevent flying rocks and suppress dust.
- Observe geology, look for open seams.
- Videotape blast rounds and watch for little problems, to prevent bigger problems.
- Inform the near communities and security officials in advance.
- Provide a safe area for the workers.

7.2.1.3 Impacts on Air Quality and Mitigation Measures

166. Emissions generated during the construction phase include diesel emissions from generators and large construction equipment; volatile organic compounds (VOCs), vehicle emissions; emissions from storage and transfer of fuels for construction equipment; small amounts of carbon monoxide, nitrogen oxides, and particulates from blasting activities; and fugitive dust from various sources such as disturbing and moving soils (grading, clearing, excavating, backfilling, dumping, and truck and equipment traffic), mixing concrete, storage of un-vegetated soil piles, and drilling and pile driving. Air quality impacts could also occur if cleared vegetation is burned. Therefore, measures need to be taken to mitigate these emissions.

167. The construction work of the project generates particulate matter, which can be a significant pollutant particularly in any nearby areas such as residential areas. During the construction of the project, fugitive dust comes from blowing exposed soil or other particles. Fugitive dust becomes an issue as the land is cleared and graded, and as delivery trucks and other vehicles and equipment travel on dirt or gravel roadways in the construction area. The dust becomes a nuisance in nearby neighborhoods, a face and lung irritant, or a visual obstacle in nearby streets. The dust must be suppressed, and this is usually done by spraying unpaved roads with water and stabilizing exposed soil areas.

168. Vehicle and diesel generator emission will have a negative impact on the environment. Therefore, vehicles and generators should be kept in good working condition and properly maintained, in order to minimize the exhaust emissions. The dust emissions should be minimized by methods, such as spraying water on soil, where required and removal of dirt and mud from vehicles wheels before leaving the project site and the loading plants. In addition, the vehicle should move at a slow speed in the site and on unpaved roads to avoid excessive dust emissions. Attention should be given to conserve water during the construction. The construction and operation worker should be provided with liquefied petroleum gas (LPG) for cooking and heating if required, and the usage of fuelwood should not be allowed. Generators and vehicles used in this project should have exhaust mufflers to minimize the exhaust and noise.

169. The below mitigation measures are recommended in all phases of the project to control the air quality particularly during the construction phase:

- Use dust abatement techniques on unpaved surfaces to minimize dust and during earthmoving activities, prior to clearing, before excavating, backfilling, compacting, or grading, and during blasting.
- Introduce speed limits to reduce airborne fugitive dust from vehicular traffic.
- Limit access to the construction site and staging areas to authorized vehicles only through the designated treated roads.
- When possible, schedule construction activities during periods of low winds to reduce fugitive dust.
- Cover construction materials and stockpiled soils if they are a source of fugitive dust.
- Train workers to handle construction materials and debris during construction and dismantlement to reduce fugitive emissions.
- Keep soil moist while loading into dump trucks.
- Keep soil loads below the freeboard of the truck.

- Minimize drop heights when loaders dump soil into trucks.
- Tighten gate seals on dump trucks.
- Around the work area, the NO_2 (annual average concentration) must not exceed 0.053 ppm and Sulphur Dioxide (SO_2) - 0.14 ppm.
- Cover dump trucks before traveling on public roads (TEEIC, 2017).

7.2.1.4 Impacts on Soils and Geologic Resources and Mitigation Measures

170. Surface disturbance, heavy equipment traffic, and changes to surface runoff patterns can cause soil erosion. Impacts of soil erosion include soil nutrient loss and reduced water quality in nearby surface water bodies. Sands, quarry stone, and gravel would be excavated for use in the construction of access roads; concrete for foundations and ancillary structures; for improving ground surface for lay-down areas and crane staging areas.

171. Possible geological hazards (earthquakes, landslides) can be activated by excavation and blasting of raw materials, increasing slopes during site grading and construction of access roads, altering natural drainage patterns, and toe-cutting bases of slopes. Altering drainage patterns accelerates erosion and creates slope instability.

172. During the route survey, a spot of soil erosion has been noticed near Sardeh Band dam. Pole erection in such areas should be diverted at possible extent. Furthermore, the transmission line tower sides' soil needs to be protected from erosion by applying certain structures of metal mesh or stone masonry. Additionally, the soil around the towers needs to be fully compacted to avoid potential erosion in the future. The below figure shows the soil erosion spots on the TL route.

173. General mitigation principles and practices that could mitigate this transmission line soil impacts include:

- Clean and maintain catch basins, drainage ditches, and culverts regularly.
- Obtain material from authorized and permitted sites.
- Inspect and maintain project facilities regularly, including access roads, to ensure erosion levels remain the same or less than current conditions.
- Reclaim or apply protective covering on disturbed soils as quickly as possible.
- Apply erosion controls, such as jute netting, silt fences, and check dams.
- In areas of potential wind erosion, apply gravel to access road surfaces.
- Use special construction techniques in areas of steep slopes, erodible soils, and stream crossings.
- Maintain vegetative cover within the right-of-way (ROW) to prevent erosion and monitor periodically to assess erosion (TEEIC, 2017).

7.2.1.5 Impacts on Cultural and Historic Resources and Mitigation Measures

174. As mentioned in Section 5 the line route can trespass on underground historical and archeological resources particularly in the Ghazni city area from where the TL will initiate. Archeological sites belonging to both pre-Islamic and Islamic exist in Ghazni.

175. Direct physical disturbance through construction activities such as vegetation removal and earthmoving, or building renovation; indirect construction disturbance by blasting or vibration; increased human access; and operational impacts that include altering the amenity of a site or area by factors such as noise, vibration and reduction in scenic quality (ADB, 2012;

Environment Safeguard a Good Practice Sourcebook).

176. Potential impacts to cultural resources include:

- Complete destruction of the resource if present in areas undergoing surface disturbance or excavation;
- Vandalism, theft and illegal export of movable Physical Cultural Resources (PCR), and of pieces of monumental PCR.
- Degradation or destruction of near-surface cultural resources on- and off-site resulting from changing the topography, changing the hydrological patterns, and soil movement (removal, erosion, sedimentation).
- Unauthorized removal of artifacts because of human access to previously inaccessible areas.
- Soil compaction, damaging buried PCR (archaeological and paleontological) on site.
- Vibration, air, soil and water pollution, leading to damage to natural and human-made PCR in the vicinity (ADB, 2012; Environment Safeguard a Good Practice Sourcebook).

177. To avoid adverse impacts to PCRs it is recommended to undertake the following mitigation measures:

- Searches need to be conducted to determine the presence of known archaeological sites and historic structures within the area of potential effect. Identify the need for an archaeological and/or architectural survey.
- Periodic monitoring of significant cultural resources near the development may be required to reduce the potential for looting and vandalism.
- An unexpected discovery of cultural resources during any phase of the project shall result in a work stoppage near the find until the resources can be evaluated by a professional archaeologist.
- Educate workers and the public on the consequences of unauthorized collection of artifacts.
- During all phases of the project, keep equipment and vehicles within the limits of the initially disturbed areas.
- Prepare and follow a cultural resources management plan, if cultural resources are present at the site or if areas with a high potential to contain cultural material have been identified.
- Use existing roads to the maximum extent feasible to avoid additional surface disturbance.

i. PCR Chance Find Procedure

178. An unexpected discovery of cultural resources during any phase of the project shall result in a work stoppage near the find until the resources can be evaluated by a professional archaeologist. Chance finds must not be disturbed until avoidance, minimization or mitigating measures are developed by competent experts from Afghanistan Ministry of Information and Culture (MoIC). Workers should be educated on the consequences of unauthorized collection of artifacts.

179. The contractor must develop a cultural resources management plan. The plan should include:

- Definition of the PCR to which the procedure applies
- Ownership of the found artifacts: Ministry of Information and Culture
- Recognition procedure for identifying chance finds during project implementation
- Procedure upon discovery, a rapid response procedure to protect chance finds while minimizing disruption to project activities (i.e., stipulates the procedures for consultation with the authorities legally responsible for PCR, demarcation of the

discovery site, chance finds report, arrival, and actions of cultural authority, and suspension/non-suspension/further suspension of work) (ADB, 2012; Environment Safeguard a Good Practice Sourcebook).

ii. Removal

180. Most PCRs are best protected by conservation in situ, as removal is likely to result in permanent damage or destruction. The contractor and DABS must ensure that the project team does not remove any PCRs unless the following conditions are met:

- No alternatives to removal are available.
- The overall project benefits substantially outweigh the anticipated cultural heritage loss from removal.
- Removal is conducted in accordance with the relevant provisions of national laws, regulations, and protected area management plans and national obligations under international laws, and employs the best available techniques.

181. Prior to removal of the PCR, the contractor and DABS should consult the owners MoIC and take their views into consideration. Additionally, the removal technique proposed by the expert may be peer-reviewed by other qualified experts (ADB, 2012; Environment Safeguard a Good Practice Sourcebook).

7.2.1.6 Impacts on Water Quality and Mitigation Measures

182. The line goes at 0.6 km vicinity of the Sardeh Band dam and irrigation canals. Use of or spills of chemicals (for example dielectric fluids, herbicides) could result in contamination of surface or groundwater. There is always the risk of the spill which could result in these chemicals leeching into the soil and contaminating water.

183. In addition, water would be required for making concrete, dust control and consumptive use by the construction workers. Depending on availability, it may be trucked in from off-site or obtained from local groundwater wells or nearby surface water bodies such as Sardeh Band dam. Water quality can be affected by:

- Activities that cause soil erosion;
- Weathering of newly exposed soils causing leaching and oxidation that can release chemicals into the water;
- Discharges of waste or sanitary water;
- Herbicide applications; and
- Contaminant spills, especially oil.

184. As the groundwater table in the transmission line corridor, Ghazni and Sharana can be observed at various depth from 30 to 90 meters, the risk of groundwater pollution is low. Nevertheless, surface and groundwater flow systems could be affected by withdrawals made for water use, wastewater and storm-water discharges, and the diversion of surface water flow for access road construction or storm-water control systems.

185. Following mitigation measures are recommended to reduce the adverse impacts on water quality:

- Save topsoil removed during construction and use it to reclaim disturbed areas upon completion of construction activities.
- For in-stream construction, use isolation techniques such as diversion to limit the exposure of disturbed substrates to moving water.

- Closely monitor construction near aquifer recharge areas to reduce potential contamination of the aquifer.
- Obtain borrow material from authorized and permitted sites.
- Dispose of excess excavation materials in approved areas to control erosion and minimize leaching of hazardous materials.
- Pollution of rivers by vehicles and waste shall be forbidden and controlled, (e.g. no car washing in the rivers, no oil spills, etc.).
- Where access roads would cross a dry wash, restrict the road gradient to 0% to avoid diverting surface waters from the channel specifically near Sardeh Band dam.

7.2.1.7 Waste and Hazardous Material Management

186. Solid and industrial waste can be generated during construction activities. The solid wastes are expected to be nonhazardous and consist of mostly containers and packaging materials, miscellaneous wastes from equipment assembly and presence of construction crews (food wrappers and scraps). Industrial wastes would include minor amounts of paints, coatings, and spent solvents. Most of these materials would likely be transported off-site for disposal. Other hazardous materials would include dielectric fluids in electrical equipment used in substations and pump and compressor stations; lubricants and coolants added to prime mover equipment in pump and compressor stations; and compressed gases (for welding), solvents and cleaning agents, and corrosion control paints. Impacts could result if hazardous wastes were not properly handled and were released to the environment.

187. The secondary containment should be considered wherever liquid wastes are stored in volumes greater than 220 liters. The available volume of secondary containment should be at least 110 percent of the largest storage container, or 25 percent of the total storage capacity (whichever is greater), in that specific location. Provide adequate ventilation where volatile wastes are stored.

188. General mitigation practices and principles that could apply to all phases of this transmission line project include:

- Implement plans for hazardous materials management, waste management spill prevention and response, and storm-water management.
- Train employees to promptly contain, report, and/or clean up any oil or hazardous material spill.
- Provide secondary containment for all on-site hazardous materials and waste storage, including fuel.
- Containerize and periodically remove wastes for recycling or for disposal at appropriate off-site permitted disposal facilities.
- Provide portable spill containment and cleanup equipment in all vehicles.
- Keep vehicles and equipment in good working order to prevent oil and fuel leaks.
- Document accidental releases as to cause, corrective actions taken, and resulting environmental or health and safety impacts.
- All measures for waste management, waste storage, transportation, etc. mentioned in the IFC general EHS (2007) guidelines must be followed.

7.2.2 Ecological Environment (Flora and Fauna)

189. Impacts on flora at the middle from 14 to 34 km portion is relatively higher than the remaining portion of the line as in this portion the line passes through agricultural lands. The

rest of the line goes through open land of mountainous and hilly areas with almost no forest cover hence, environmental impacts are much lower. Chopping of trees in the ROW is limited to some locations and soil sealing leading to a loss of vegetation and habitats is very limited. 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. The substation site proposed Sharana is in an open area with no agriculture and plants.

190. Dust settling on vegetation may alter or limit plants' abilities to photosynthesize and/or reproduce. Although the potential for an increase in the spread of invasive and noxious weeds would occur during the construction phase due to increasing traffic and human activity, the potential impacts could be partially reduced by interim reclamation and implementation of mitigation measures.

191. There are two major types of impacts on vegetation:

- Direct impacts: vegetation removal or damage during construction activities.
- Indirect impacts on vegetation from air pollution or surface water impacts caused by the power plant.

192. The ecological survey of the site confirmed lack of endangered and ecologically significant fauna and flora. Therefore, there are no serious biological concerns with the implementation of this project.

193. The following mitigation measures during construction are recommended to reduce the adverse impacts on the environment:

- Use existing facilities and disturbed areas (e.g., access roads, graded areas) to the extent feasible to minimize the amount of disturbance.
- Given that trees are supposed to be cut on the line route it is recommended to compensate it by planting the similar type trees on at least 1:1 ratio at nearby free space.
- Conduct blasting for raw materials only within specified times and at specified distances from sensitive wildlife or surface waters as specified by IFC/NEPA.
- Design permanent facility structures to discourage their use by birds for perching or nesting.
- Refuel in a designated fueling area that includes a temporary berm to limit the spread of any spill. Use drip pans during refueling to contain accidental releases and under fuel pump and valve mechanisms of any bulk fueling vehicles parked at the construction site.
- Retain all ground-level vegetation and stumps left after cutting, unless their removal is necessary to install support structures or other ancillary facilities.
- Schedule construction activities to avoid important periods of wildlife courtship, breeding, nesting, lambing, or calving.
- Re-vegetation of disturbed areas with native plant species and unnecessary removal of plants should be avoided.
- Use dust abatement techniques on unpaved, un-vegetated surfaces to minimize airborne dust.
- If an endangered species is found during construction, work in the area will be stopped and NEPA and other relevant institutions should be immediately notified (TEEIC, 2017).

7.2.3 Socioeconomic Environment and Land Use

194. The construction and operation of the transmission line will lead to limited land use changes in the transmission line rights-of-way and on the grounds of associated facilities. Transportation can be affected by the placement of transmission lines and towers near roads, and waterways (Williams, 2003).

195. Impacts to land use could occur during construction if there were conflicts with existing land use plans and community goals; conflicts with existing recreational, educational or other use areas; or conversion or cessation of the existing commercial land use of the area (e.g., mineral extraction). During construction, most land use impacts would be temporary, such as removal of livestock from grazing areas during periods of blasting or heavy equipment operations; curtailing hunting near work crews; or temporary effects to the character of a recreation area because of construction noise, dust, and visual intrusions. Long-term land use impacts would occur if existing land uses are not compatible with the energy transmission project, such as remote recreational experiences. Within forested areas, ROW clearing could result in the long-term loss of timber production.

196. Siting and design considerations that mitigate impacts include:

- Consult with the Department of Defense to identify and address any issues regarding the transmission project construction and military operations.
- Establish a reclamation plan to ensure that all temporary impact areas are restored.
- Consolidate infrastructure requirements (transmission, roads) for efficient use of land.
- Distribute a proposed schedule of construction activities to all potentially affected landowners and nearby residents so they know when they might experience construction-related disruptions.
- Minimize the amount of land disturbance, and develop and implement stringent erosion and dust control practices.
- Repair underground drainage tile damage on agricultural lands.
- Repair compacted or rutted agricultural lands.
- Dewater open trenches in a manner that does not damage the adjacent agricultural land. If this cannot be done, compensate the landowner appropriately.
- Compensate farmers or ranchers for crop or forage losses and restore compacted soils.

197. Direct positive socioeconomic impacts would include the creation of new jobs for construction workers and the associated income and taxes generated by the project. Indirect impacts would occur as a result of the new economic development and would include new jobs at businesses that support the expanded workforce or provide project materials, and associated income and taxes. This project development activity could also potentially affect property values, either positively from increased employment effects or negatively from proximity to the substation and towers and any associated or perceived environmental effects (noise, visual, etc.). Local people hiring will have positive socio-economic impacts on the community. It is, therefore, recommended to hire local labor for the construction phase of this project.

7.2.4 Health and Safety

198. The workers and equipment safety risks are high during construction specifically during the tower climbing. To mitigate these impacts, the staff must have essential protective equipment (i.e. PPE) and must be provided with safety training.

199. All safety precautions should be taken into consideration during the construction phase of the project to minimize the safety hazards and risk of accidental electrocution. Standard clearance distance of 7 meters from the live wires and buildings should be considered for the buildings trees, etc. in respect to the operational voltage range of 220 kV. Furthermore, all the equipment, particularly transformers considered for this project should meet the national noise standards.

200. Potential impacts to the worker and public health and safety from transmission project construction would be similar to those expected for any construction project with earthmoving, large equipment, transportation of oversized materials, and construction and installation of industrial facilities. In addition, health and safety issues include working in potential weather extremes, and possible contact with natural hazards, such as uneven terrain and dangerous plants, animals, or insects.

201. Mitigation measures specific to the construction phase of this transmission project include:

- Hold contractor crew safety meetings at the start of each workday to go over potential safety issues and concerns.
- Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures.
- Establishment of criteria for use of 100 percent fall protection (typically when working over 2 meters above the working surface, but sometimes extended to 7 meters, depending on the activity).
- Installation of fixtures on tower components to facilitate the use of fall protection systems.
- Install grounding devices on all fences that cross or run parallel to a transmission line.
- Ensure that employees are trained, as necessary, in tower climbing, first aid, rescue techniques, and safety equipment inspection and use.
- Secure construction sites at the end of the workday to protect the equipment and the general public.
- Safety belts should be of not less than 16 millimeters (mm) two-in-one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibers become evident.
- When operating power tools at height, workers should use a second (backup) safety strap (IFC, 2007).
- Health and safety supervisor must always available at the construction work site.

7.3 Impacts and Mitigation Measures during Operation Phase

202. In addition to energy transmission, other activities occur during the operational phase of the project. Most of these activities, listed below, are done to maintain the safety and integrity of the project. Typical activities during the operation and maintenance phase include the operation of compressor stations or pump stations, ROW inspections, ROW vegetation clearing, and maintenance and replacement of facility components.

203. Transmission Lines Line inspections are conducted periodically to determine if there are areas where trees may be approaching minimum clearances before the next scheduled vegetation maintenance period.

204. Vegetation management within the ROW is needed to prevent tall-growing vegetation from contacting the conductors. Danger trees adjacent to the ROW that could come in contact

with conductors are removed or trimmed. Maintenance clearing is generally performed on a 3- to 6-year cycle using hand and mechanical vegetation cutting. Cleaning or other maintenance of the transmission line components is done on an as-needed basis.

205. Environmental impacts that could occur during the operation and maintenance phase would mostly occur from long-term habitat change within the ROW, maintenance activities (e.g., ROW vegetation clearing and facility component maintenance or replacement), noise (e.g., compressor station, corona discharge), the presence of workers, and potential spills (e.g., oil spills).

206. The following potential impacts may result from the operation and maintenance of this transmission project.

7.3.1 Physical Environment

7.3.1.1 Impacts on Acoustics Environment and Mitigation Measures

207. Sources of noise during the operation and maintenance phase can include compressor or pump stations, transformer, and switchgear at substations, corona discharge from transmission lines, vehicles, and machinery. The primary impacts from noise can be localized disturbance to wildlife and recreationists.

208. High voltage overhead lines and substations will generate noise, the level of which depends mainly on the voltage of the overhead line or substation, which is 220 kV for this project. Noise from energized overhead lines is produced by “corona discharge” (a limited electrical breakdown of the air). While conductors are designed and constructed to minimize corona discharge, surface irregularities caused by damage, insects, raindrops or pollution may locally enhance the electric field strength sufficiently for corona discharges to occur. This can be audible in certain conditions as a “crackling” sound, occasionally accompanied by a low-frequency hum. The noise level generated by a high voltage overhead line is weather-related, with highest noise levels occurring during damp conditions. Overhead lines are normally quiet during dry weather, except during long, dry spells when airborne debris adheres to the conductors.

209. Any noise disappears when sufficient rain falls to wash the debris away. The transformers installed at the substation will generate low-frequency hum. It is recommended to install low noise level transformers (IFC, 2007; Nationalgrid, 2008). Measures to mitigate this impact should be addressed during project planning stages to locate rights-of-way away from human receptors, to the extent possible. Use of noise barriers or noise canceling acoustic devices should be considered as necessary (IFC, 2007).

7.3.1.2 Impacts on Air Quality and Mitigation Measures

210. Currently the majority of the Nangarhar and the east region as whole use diesel generator as their energy source for households and industries which is not environment-friendly. Therefore, this project will provide relatively cheap and clean energy hence, the project will have positive results on air quality.

211. Vehicular traffic and machinery would continue to produce small amounts of fugitive dust and exhaust emissions during the operation and maintenance phase. These emissions would not likely cause an exceedance of air quality standards nor have any impact on climate

change. Trace amounts of ozone would be produced by corona effects from transmission lines (e.g., less than 1.0 part per billion which is considerably less than air quality standards). Therefore, the project impacts during operation on air quality are low.

212. Enacting fugitive dust and vehicle emission controls policies and speed limits in the site will reduce the air quality impacts.

Sulfur Hexafluoride (SF6):

213. 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. However, the use of SF_6, a greenhouse gas with a significantly higher global warming potential (GWP) than CO_2, should be minimized (IFC, 2007). On the other hand, SF_6 is a very highly effective and persistent greenhouse gas and has to be handled properly following guidelines such as:

- IEC (DIN EN)1 60376 “Specification and acceptance of new sulfur hexafluoride”
- IEC (DIN EN) 60480 “Guide to the checking of sulfur hexafluoride (SF6) taken from electrical equipment”
- IEC 61634 “High-voltage switchgear and control gear – Use and handling of sulfur hexafluoride (SF6) in high-voltage switchgear and Control gear”.

214. Following these guidelines and considering the recommendations of the IFC General EHS Guidelines ad CIGRE Guide for SF6 Gas Mixtures-EPA will ensure that the amount of released SF6 into the atmosphere is reduced to an absolute minimum.

7.3.1.3 Impacts on Soils and Geologic Resources and Mitigation Measures

215. Following construction, disturbed portions of the site would be re-vegetated and the soil and geologic conditions would stabilize. Impacts during the operation phase would be limited largely to soil erosion impacts caused by vehicular traffic and machinery operation during maintenance activities. Except in the case of a large oil spill, soil contamination would be localized and limited in extent and magnitude. Procedures for prevention and control of hazards associated with spill prevention, emergency response, clean-up, and contaminated soil remediation should be addressed in the spill prevention plan.

7.3.1.4 Impacts on Water Resources and Mitigation Measures

216. Impacts to water resources during the operation and maintenance phase would be limited to possible minor degradation of water quality resulting from vehicular traffic and machinery operation during maintenance (e.g., erosion and sedimentation) or herbicide contamination during vegetation management (e.g., from accidental spills) and wastewater disposal. The following mitigation measures will help reduce the impact on water resources:

- Ensure that vegetative cover is maintained within the right-of-way and regularly monitor for indications of erosion.
- Maintain equipment and vehicles to minimize the risk of accidental fuel spillage.
- The substation must have appropriate sewage handling system. Septic tanks or Decentralized Wastewater Treatment System (DEWATS) systems need to be constructed to accommodate the wastewater generated by the station operation staff. The treated water can also be reused as a water source for the site.

- Apply erosion controls relative to possible soil erosion from vehicular traffic and during construction activities (e.g., jute netting, silt fences, and check dams). Regularly monitor access roads and other project areas for indications of erosion.
- Reclaim protective covering (e.g., vegetative cover) on disturbed soils as quickly as possible.
- Clean and maintain catch basins, drainage ditches, and culverts regularly.
- Refuel in a designated fueling area that includes a temporary berm to limit the spread of any spill.
- Use drip pans during refueling to contain accidental releases and under fuel pump and valve mechanisms of any bulk fueling vehicles parked at the project site.
- The herbicide/pesticide must not be allowed to use for this project.
- Keep all equipment and vehicles within the limits of the previously disturbed areas.

7.3.1.5 Visual Impacts

217. The aboveground portions of energy transmission projects would be highly visible in rural or natural landscapes, many of which have few other comparable structures. Visual evidence of these projects cannot be completely avoided, reduced, or concealed. Additional visual impacts would occur during maintenance from vehicular traffic, and workers. Maintenance, replacement, or upgrades of project components would repeat the initial visual impacts of the construction phase, although at a more localized scale (TEEIC, 2017).

218. Landscaping, both through the modification of ground form and by planting, can help to mitigate the visual impact of a substation. Where new development is proposed in the vicinity of existing substations, the layout and design of the development can be planned to keep the adverse visual impact of the substation to a minimum (Nationalgrid, 2008).

219. General mitigation practices that could apply to all phases of this transmission project include:

- Siting power lines, and designing substations, with due consideration to landscape views and important environmental and community features.
- Location of high-voltage transmission and distribution lines in less populated areas, where possible. This has done during the concept design stage but the detail design must look for further improvement in this aspect.
- Consider site-specific landscaping in selected areas to provide screening for year-round residents whose property abuts the project.
- Maintain the right-of-way with low-growing natural vegetation that requires minimal maintenance and is consistent with local vegetation.
- Keep areas around support towers, and other facilities clean and free of debris.
- Do not apply paint or permanent discoloring agents to rocks or vegetation to indicate survey or construction activity limits. Use survey markers, flagging, or other suitable materials to delineate limits (IFC, 2007).

7.3.1.6 Hazardous Materials and Waste Management

220. Industrial wastes are generated during routine operations (e.g., lubricating oils, hydraulic fluids, coolants, solvents, and cleaning agents). These wastes must be stored in proper containers, characterized and labeled, possibly stored briefly, and transported by a licensed hauler to an appropriate permitted off-site disposal facility as a standard practice. Impacts could result if wastes were not properly handled and were released to the environment. Environmental contamination could occur from accidental spills of herbicides or, more significantly, equipment's oils (TEEIC, 2017).

221. The waste oils and chemicals should be disposed of in accordance with their respective Material Safety Data Sheet (MSDS). The MSDS sheets must be available at the site for all chemicals and oils used in the site. DABS as the operation responsible of the facilities must develop a final set of mitigation measures for the project in consultation with the appropriate government resource management agencies and stakeholders such as Jalalabad municipality and specify a safe procedure for industrial waste management and removal (Ahmadzai, 2017).

222. The recyclable and unrecyclable waste from the site should be separated and transferred to the recycling plants. No open burning should be allowed at the site. In addition, the hazardous and toxic waste such as batteries acid contaminated rags, soil contaminated by the oil/chemical, oil contaminated rags and etc. should be stored separately, and handled according to MSDS.

223. Oil and chemical leakage pose negative impacts on the environment. Therefore, the plant must have channels and drainage points to collect any leaked oil from the transformers and other apparatus. Any soil contaminated by the oil/chemical spillage will be removed and disposed of appropriately in accordance with the MSDS of the spilled oil/chemical.

224. Many electrical apparatus contain mineral oil and other fluids for the purpose of insulation and heat extraction. Electrical transformers are a major source of used mineral oil. The main types of transformers and oil-filled equipment are:

- Power transformers
- Voltage transformers (VTs) and Current transformers (CTs)
- Capacitor voltage transformers (CVTs)
- Circuit breakers (CBs)
- Switchgear
- Capacitors
- High voltage bushings

225. During the operation of the transformer the oil go through the electrical stress and eventually wears out. The life expectancy of it can be as long as 30+ years in some cases and mostly reusable. Transformer oil disposal, therefore, need not occur in locations where the used oil is destroyed, because in most cases it can be recovered. Except for oil highly concentrated with PCB (which should not be used in this project), used transformer oil can avoid disposal in favor of reuse.

226. PCBs are persistent organic pollutants (POPs), i.e. chemical substances that are persistent, bio-accumulate and adversely affect human health and the environment (UNEP1, 2002). Therefore, PCB containing equipment are not allowed to use in the project based on the ADB's Prohibited Investment Activities List.

227. Environment unfriendly industrial waste accumulation risk exists in the operation period. The preventive maintenance of the plant might require the replacement of some equipment parts and lubricants which results in the creation of used spare parts such as batteries and used lube oil. This kind of solid and liquid waste must be treated in accordance with the government rules. This practice must not create any environmental impact on the local people and areas.

228. Following general mitigation measures will help minimize the waste impacts of the project.

- Implement plans for hazardous materials management, waste management spill prevention and response, storm-water management. Train employees to promptly contain, report, and/or clean up any oil or hazardous material spill.
- Provide secondary containment for all on-site hazardous materials and waste storage, including fuel.
- Containerize and periodically remove wastes for recycling or for disposal at appropriate off-site permitted disposal facilities.
- Provide portable spill containment and cleanup equipment in all vehicles.
- Keep vehicles and equipment in good working order to prevent oil and fuel leaks.

7.3.1.7 Natural Disasters Mitigation Measures

A. Floods

229. As the transmission line route is passing mountainous terrain which contains several flooding runoffs, therefore, it is important for the turnkey contractor to prepare a detail survey report with consideration of storms water analysis. The towers must not be placed on any flood runoffs.

230. The contractor should make its own hydrological study to verify and assume the results for project design. A stormwater management plan (SWMP) report will be prepared, the SWMP will include the following points:

- A site vicinity map
- Drainage lines, pooling areas and stormwater drainage flow of the entire site
- Recommendation plan about water drainage system
- Drainage pooling areas
- Illustration of erosion/sedimentation controls
- Stormwater outfall structures

B. Mudflows

231. The soil erosion and mudflow risks are high due to flooding. It is recommended to construct drainage channels and retaining walls along the flood runoffs and the loose topsoil areas to minimize the risks of mudflow and erosion (Saadatullah, 2017). A geotechnical investigation needs to be conducted to determine soil characteristics and strength for substation, towers, drainages, and building. This will reduce the impacts associated with mudflow and soil erosion.

232. Following mitigation measures could help reduce the mudflows impacts:

- Plant ground covers on slopes or build retaining walls.
- Reinforce the foundation and walls of the facilities.
- Install flexible rather than stiff pipe fittings to avoid gas or water leaks in the event of a mudflow or landslide.
- Construct channels or reinforced walls to direct the mudflows around the project facility and buildings. Clear obstructions from waterways.

C. Seismic

233. Sands, gravels, and quarry stone would be excavated for constructing access roads; making concrete for foundations and ancillary structures, and improving ground surface for lay-down areas and crane staging areas. Possible geological hazards (earthquakes, landslides) could be activated by excavation and blasting for raw materials, increasing slopes during site grading and construction of access roads, altering natural drainage patterns, and toe-cutting bases of slopes. Altering drainage patterns could also accelerate erosion and

create slope instability.

234. The buildings constructed in seismically active areas such as this project, during settlement term of operation should observe the requirements of seismic stability (grade VIII (8) points) and provide a safe stay of the people, the safety of designs with earthquakes of calculated intensity.

7.3.2 Ecological Environment

7.3.2.1 Impacts on Fauna, Flora, and Mitigation Measures

235. During operations and maintenance, adverse impacts to ecological resources could occur from:

- Disturbance of wildlife from the noise and human activity;
- ROW maintenance (e.g., vegetation removal);
- Exposure of biota to contaminants; and
- Mortality of biota from colliding with transmission lines or other components.

236. As there are few trees growing in the transmission line corridor, it is fairly easy to keep the minimum safety clearance between vegetation and the conductor lines (7 m for 220 kV line). Most of the land within the ROW is grassland, sand desert or agricultural land that can be cultivated as before, except for the tower sites. Herbicides shall not be used for corridor clearance. Therefore, the impacts on flora are low.

237. Ecological resources may continue to be affected by the reduction in habitat quality associated with habitat fragmentation due to the presence of the ROW, support facilities, and access roads. In addition, the presence of an energy transmission line and its associated access roads may increase human use of surrounding areas, which in turn could impact ecological resources in the surrounding areas through:

- Introduction and spread of invasive non-native vegetation,
- Fragmentation of habitat,
- Disturbance of biota,
- Collision and/or electrocution of birds, and
- Increased potential for fire.

i. **Avifauna:**

238. It must be pointed out, that power poles and wires pose a higher risk for large birds. This transmission line is located in 60 km and 104 km distance from Dashti Nawar and Ab-i Istada IBAs respectively and birds might pass by the TL route between these IBAs particularly because of the Sardeh Band dam located in between these IBAs.

239. Above-ground power lines pose three main risks to birds:

- Risk of electrocution: Birds sitting on transmission line poles and lines will be killed if they cause short circuits (short circuit between phases, or short-to-ground). In particular, wrongly engineered power pole constructions has resulted in an enormous risk for numerous medium-sized and large birds, which use power poles as perching, roosting, and even nesting sites.
- Risk of collision: In flight, birds can collide into the cables of power lines, because the cables are difficult to perceive as obstacles. In most cases, the impact of collision

leads to immediate death or to fatal injuries and mutilations, which cannot be survived.

- Risks and loss of habitat quality in staging and wintering areas: mainly when aboveground power lines cut across open landscapes and habitats (wetlands, steppe, etc.) (Haas et al. 2005; Flynn and Nairn, 2012).

240. Therefore, to minimize fatal birds collision with power lines, the following measures must be applied to the power line to a possible extent:

- DABS environmental team should survey the transmission line corridor ROW once in the first year of its operation to look for any bird's mortality because of the line. In case mortality was noticed the excessive bird flapper and diverter installation must be considered.
- Constructions shall obstruct only a minimum of airspace in the vertical direction: Single-level arrangement of conductor cables; no neutral cable above the conductor cables in case possible.
- Infrastructures shall be bundled, where possible, e.g. power lines to be routed along roads, in order to maintain open un-fragmented landscapes.
- Installing visibility enhancement objects such as firefly bird flapper, marker balls, and bird diverters at 5 km distance of the line in both sides of Sardeh Band dam. In total approximately 100 firefly bird flapper/diverter must be installed in 50 to 100 m spacing.
- Birds are most vulnerable to collisions with wires during sunset and sunrise hours, especially during bad weather. Therefore, these bird diverters must have visible light up during dark light.
- Attachment of well-visible black-and-white markers on cables posing a high collision risk, in particular, the neutral cable of high-voltage power lines.
- Careful preparatory investigations of different routing alternatives: bird migration often follows local or regional flyways determined by topology, shorelines, etc. Prior to detail design of the transmission line, such investigations are needed and must comprise bird migration at day and night time and other seasonal phenomena.
- Edison Electric Institute guideline for Reducing Avian Collisions with Power Lines is recommended to be followed (aplic.org, 2012).

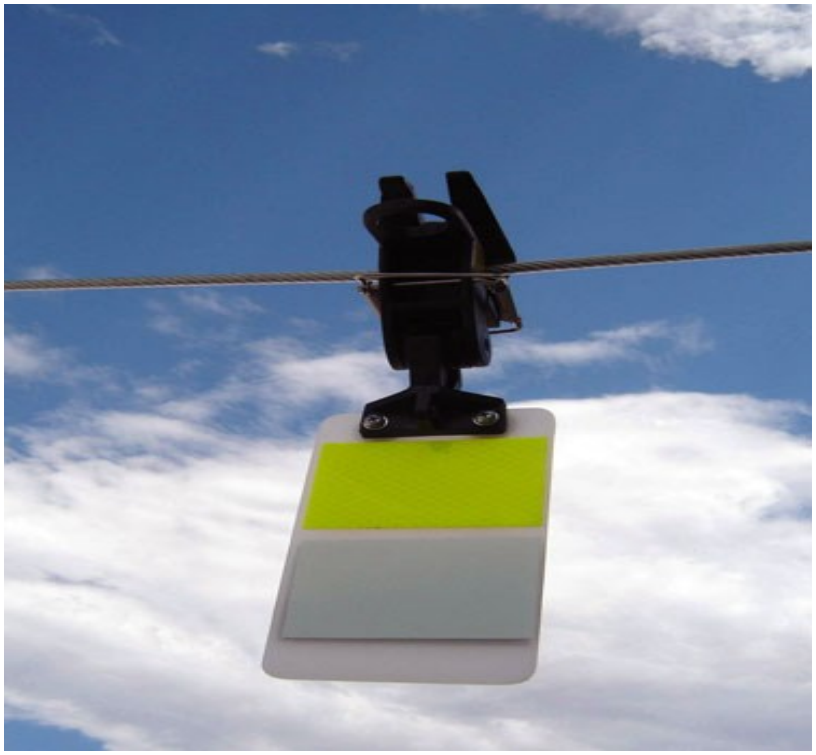

Figure 33 firefly bird flapper/diverter recommended (or equivalent) for this transmission line (Birdbusters, 2017)

ii. Right-of-Way Maintenance

241. Regular maintenance of vegetation within the rights-of-way is necessary to avoid disruption to overhead power lines and towers. Unchecked growth of tall trees and accumulation of vegetation within rights-of-way may result in a number of impacts, including power outages through contact of branches and trees with transmission lines and towers.

242. Excessive vegetation maintenance may remove unnecessary amounts of vegetation resulting in the continual replacement of successional species and an increased likelihood of the establishment of invasive species.

243. Recommended measures to prevent and control impacts from ROW vegetation maintenance include:

- Implementation of an integrated vegetation management approach (IVM). The selective removal of tall-growing tree species and the encouragement of low-growing grasses and shrubs is the common approach to vegetation management in transmission line ROW.
- Removal of invasive plant species, whenever possible, cultivating native plant species.
- Scheduling activities to avoid breeding and nesting seasons.
- Observing manufacturer machinery and equipment guidelines, procedures with regard to noise, and oil spill prevention and emergency response (IFC, 2007)

7.3.3 Socioeconomics Environment

244. Direct impacts would include the creation of new jobs for operation and maintenance workers and the associated income and taxes paid. Indirect impacts are those impacts that would occur as a result of the new economic development and would include things such as new jobs at businesses that support the expanded workforce or that provide project materials, and associated income and taxes. Furthermore, this project will provide reliable and relatively cheaper energy to businesses and factories there in Sharana which will subsequently have positive social and economic impacts on communities. The number of project personnel required during the operation and maintenance phase would be about an order of magnitude less than during construction. Therefore, socioeconomic impacts related directly to jobs would be minimal. Potential impacts on the value of residential properties located adjacent to an energy transmission project would continue during this phase.

7.3.4 Health and Safety

245. Possible impacts to health and safety during operations include exposures to electromagnetic fields (EMF), accidental injury or death to workers during operation and maintenance activities, and accidental injury or death to the public (e.g., from off-highway vehicle (OHV) collisions with project components or from airplane collisions with transmission lines). In addition, health and safety issues include working at heights, working around energized equipment, working in potential weather extremes, and possible contact with natural hazards, such as uneven terrain and dangerous animals, or insects. There is an increased potential for fires from electrical discharges from energized equipment.

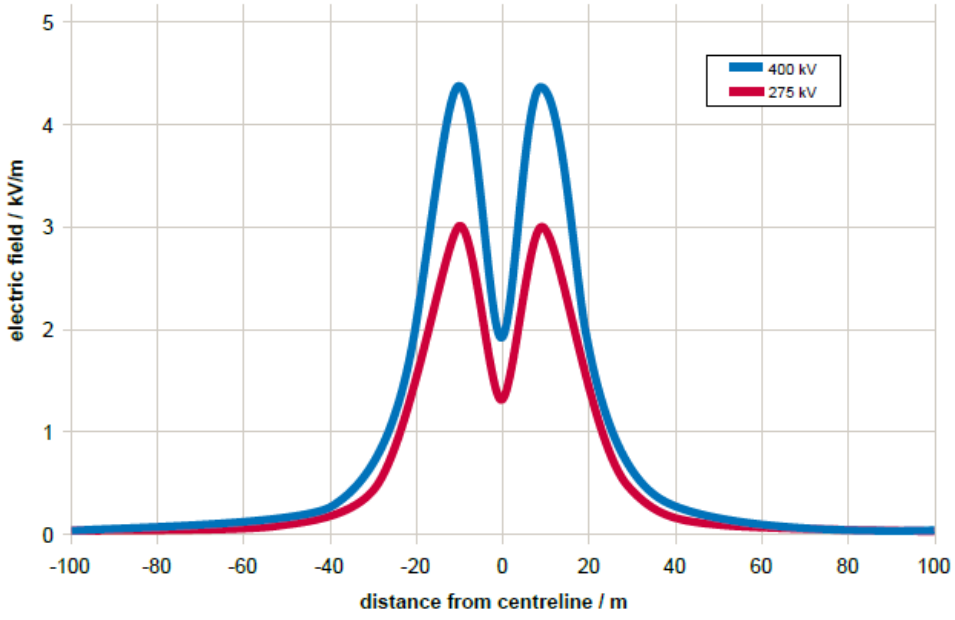

Figure 34 Overhead line typical electric fields (Nationalgrid, 2008)

246. To mitigate these impacts, the operation and maintenance (O&M) staffs must have the essential protective equipment and must be provided with safety training. There must be fire extinguishers in place in a variety of places that are at risk of material fires and flammable liquid fires. The foam extinguishers contain is nonconductive of electricity (must be

nonconductive), so it reduces the risk of electric shock if the fire contains electrical equipment. The site must be equipped with first aid kits. The fire exits and alarms must be clearly identified in the site. In addition, the site must have clearly identified fire assembly areas.

247. Personal electrocution risk is high in case if the safety procedures are not followed. To mitigate the risks the metal frames of all the equipment should be grounded for the personal safety measures. Public awareness practices should be implemented to let them know the risks of electrocution, clearance distance, and illegal connections. In addition, the following safety procedures should be followed before doing the maintenance of the energized equipment:

- Only allow trained and certified workers to install, maintain, or repair electrical equipment.
- De-energize the equipment which needs repairing or maintenance.
- Perform the circuit switching and isolation of the equipment.
- At the point of isolation, the rack must be locked off and breakers must be tagged. The tag and safety lock should be placed at points of isolation.
- Discharge equipment to be worked on and place safety grounds to protect personnel.
- On completion of the work and prior to the return of the system to normal, remove safety grounds and make sure: that equipment is in a safe condition to energize, and, personnel has been informed that equipment is going to be energized.
- Deactivating and properly grounding live power distribution lines before work is performed on, or in close proximity, to the lines.

248. The site must have a comprehensive range of substation and plant safety equipment including insulating matting, lifesaving kits & rescue rods, voltage detectors, insulated gloves, arc flash clothing (suite), protective gear, etc.

249. The Emergency Response Plan (ERP) should be made available at the substation. The team must be provided with safety training and there must always be an occupational safety supervisor available at the site to make sure the safety precautions are always adhered to by the workers. The safety and security precaution signs must be installed in all danger places of the solar plant. The health and safety measures discussed in the construction phase for working at height on poles and structures should be followed in the operation stage as well.

7.4 Impacts and Mitigation Measures during Decommissioning Phase

250. Decommissioning tasks that may cause environmental impacts include removal of project components, land re-vegetation, and re-contouring. Following decommissioning, the ROW may be restored to resemble its original condition or reclaimed to some standard that results in stable environmental conditions. Potential impacts from these activities are presented below, by the type of affected resource.

251. The following potential impacts may result from decommissioning and site reclamation of this power transmission project.

7.4.1 Physical Environment

7.4.1.1 Impacts and Mitigation Measures on Soil and Topography

252. Soil erosion impacts include soil nutrient loss and reduced water quality in nearby surface water bodies. Upon completion of decommissioning, disturbed areas would be contoured and re-vegetated, which would minimize the potential for soil erosion. Impacts to geologic resources are expected to happen. No permanent land use impacts would occur during this phase. For the mitigation purposes, the measures used to minimize impacts to soils and geologic resources during construction must be applied at this stage as well.

7.4.1.2 Impacts on Acoustics Environment and Mitigation Measures

253. Sources of noise during decommissioning would be similar to those during construction and would be caused primarily by construction equipment and vehicular traffic. Near residential areas, noise levels could exceed OSHA guidelines but would be intermittent and extend for only a limited time. Repeat the mitigation measures mentioned during the construction phase to minimize noise impacts in the decommissioning process.

7.4.1.3 Hazardous Materials and Waste Management

254. Similar to operation phase waste management procedures must be applied to mitigate the adverse impacts of the industrial waste of the decommissioning phase.

7.4.2 Ecological Environment

7.4.2.1 Impacts on Fauna, Flora, and Mitigation Measures

255. Impacts to ecological resources from decommissioning and reclamation activities would be similar in nature to the impacts that occur during construction, but of a reduced magnitude. Following mitigation measure will help reduce the adverse impacts on flora and fauna at this stage:

- Salvage topsoil from all decommissioning activities and reapply during final reclamation.
- Repeat mitigation measures used to minimize impacts to ecological resources during construction for the decommissioning phase.
- Monitor all disturbed areas for restoration and re-vegetation success.

7.4.3 Human Health and Safety

256. Potential impacts to the worker and public health and safety during decommissioning and site reclamation would be similar to those during construction. The health and safety measure mentioned in the construction and operation phases must be strictly followed to minimize the adverse impacts.

8. Public Consultation and Information Disclosure

257. Consultation meetings were held with the potentially affected people along the transmission line route. The objectives of the meetings were to share the project relevant information with communities and understand their concerns. The information shared included

project activities and their expected impacts on the physical, biological and socio-economic conditions. In coordination with LARP experts, the concerns of the affected population associated with the project were documented and understood.

258. The following tables represent the community consultation details along with its photos:

Table 11 Sharana Provincial Governor office community consultation details

Ghazni-Sharana Transmission Line - Community Consultation and Information Disclosure Participants Meeting Attendance Sheet				
Meeting Location	**Sharana, Paktika Provincial Governor office**		**Date**	06.Sep.2018
Agenda	Awareness about electricity transmission line project			

No	**Name**	**Duty**	**Contact No**	**Key Concerns Shared**
1	Shir Badsha Orgunai	Deputy Governor Paktika	0777642076	1. People urgently need the energy and this project needs to be implemented very soon. 2. Paktika Sharana has been remained disconnected from electricity since last 17 years. 3. Will the villages located along the route get access to electricity? 4. When is the project going to start? 5. How and who will compensate the affected land, property and crops?
2	Mohammdad Asof Hotak	Irrigation Director	0773004252	
3	Esmatullah	Paktika Youth Committee Head	0779612362	
4	Sayed Mohammad Akbar	Paktika Youth Committee Member	0779612362	
5	Mohammad Omber	CDC Member Sharana	0775784496	
6	Najib Masoud	Project Member	077599610	
7	Abdul Rashid	Head of the Finance Department	0799538181	

Figure 35 Sharana Community Consultation Meeting

Table 12 Sharana Municipality community consultation meeting details

Ghazani-Sharana Transmission Line - Community Consultation and Information Disclosure Participants Meeting Attendance Sheet				
Meeting Location		Sharana Muncipality	**Date**	10/Sep/2018
Agenda		Awareness about electricity transmission line project Ghazani-Sharana		
No	**Name**	**Position**	**Contact No**	**Remarks**
1	Eng Mohammad Karim	Sharana Mayor	0773834504	1. The line passes through insecure area how will the government provide security to the project? 2. Will the local community workforce be utilized for this project? 3. We have allocated 20,000 m^2 land for substation and got the necessary approval of the land. 4. How and who will compensate the affected land, property and crops?
2	Eng Nasrullah	Munucipality Planing Engineer	0744480689	
3	Mohammad Amberkhial	Community Member	NA	
4	Najib Masoud	Project Member	0775999610	

Figure 36 Sharana Municipality Community Consultation Meeting

Table 13 Paktika Community Development Council (CDC) Member Meeting

Ghazni-Sharana Transmission Line - Community Consultation and Information Disclosure Participants Meeting Attendance Sheet				
Meeting Location		Paktika Sharana	**Date**	07/Sep/2018
Agenda		Awareness about electricity transmission line project		
No	**Name**	**Position**	**Contact No**	**Remarks**
1	Mr. Fazel Rahmand Katawazai	Member of Provincial Council	0786182425	1. Aneder district is located along this transmission line route and we will not allow the line to pass without giving our district the electricity connection. 2. You need to hire people from our community.
2	Ayoubi Ander	Ander Community Member	0748466224	
3	Agha Shahi	Sharana Community Member	0774814810	

4	Mri Akbar Musafir	Ander Community Member	NA	3. Why the government doesn't invest in domestic energy generation instead of import power.
5	Abdul Baqi	Sharana Community Member	NA	
6	Mula Sharif	Ander Community Elder	0767258413	
7	Qari Bilal	Ander Community Member	NA	

Figure 37 Community Consultation Meeting at Surkh-Rod district CDC Head Office

259. All the participants expressed their willingness to cooperate in the implementation of this project. When asked who should organize the valuation of losses, fix the compensation, and conciliate in case of grievances, most people favored either the government established institutions. Furthermore, the Community Development Councils (CDC) were also mentioned. Almost all the participants expressed their concerns about the security condition of the area and mentioned that without proper coordination with community, government and in some cases with insurgent the project implementation is a huge challenge.

260. The main questions and concerns raised by the communities were as below:

- How the security issues will be addressed?

- Will the villages located along the route get access to electricity?
- Who is funding the project?
- How and who will compensate the affected land, property and crops?
- Ander district will not cooperate if they don't get the electrical connections.

9. Institutional Requirements and Environmental Monitoring Plan

9.1 Institutional Requirements

261. Institutions responsible for executing and monitoring the environmental aspects of this project are:

- DABS is responsible for planning, constructing, operating and maintaining regional, national and provincial electricity-related projects in Afghanistan. The Project Management Office (PMO) will be in charge of project management to ensure that the contract provisions are properly maintained. The supervision consultants under the PMO are responsible for environmental monitoring and management of project implementation.
- DABS official and its provincial authorities will undertake routine and random monitoring of specific environmental management plans (EMP) addressed in this IEE.
- The PMO may hire a supervision consultant (SC) to help ensure the implementation of environmental management practices at each stage of the construction.
- National Environmental Protection Agency (NEPA) of Afghanistan will be consulted if complicated issues arise during construction and operation stages.

262. Implementation of mitigation measures presented in the EMP (Appendix A) during the construction stage will be the responsibility of the Contractor. The representative of DABS and environmental specialists of SC will supervise the monitoring of implementing mitigation measures during the construction stage. The domestic environmental specialist will coordinate with the international environmental specialist for resolving complicated issues that arise in the field and to provide continuously updated information in order to submit reports to PMO and ADB.

Table 14: Responsibilities of involved parties

No.	Agency	Responsibility
1	DABS–PMO {Executing Agency (EA)}	• Project management throughout all cycles; to ensure that the contract provisions are properly maintained. • Make timely decisions on project policies, change orders, requests for information, and etc. • Ensure that the mitigation measures presented in the IEE are considered in all phases of the project. • Ensure that the IEE is part of the contract bid documents. • Responsible for the EMP implementation during the operation phase.

		• Ensure that the project is going in compliance with ADB and NEPA regulations and environmental standards. • Development of an environmental and social management department to implement and monitor the EMP implementation. • Provide required resources to ensure the proper implementation of the EMP. • Review and evaluate EMP implementation and in case of any breach stop work that may lead to serious impacts on communities, environment, and project reputation. • Disclosure and share the IEE with NEPA. • Process the contractor payments in accordance to project contract terms.
2	Contractor {Implementing Agency (IA)}	• Implementation of mitigation measures presented in the IEE and EMP (Appendix A) during the design and construction stages. • Ensure that qualified environmental team is in place to supervise and implement the EMP. • Develop environmental activities checklist and submit the environmental compliance monthly reports to EA. • Ensure that sufficient budget is considered for implementation of all mitigation measures addressed in the IEE. • Obtain necessary environmental license and permits from NEPA for implementation of the project prior to the commencement of work. • Ensure full compliance with environmental legal requirements and contractual terms and obligations. • Implement all mitigation measures in the EMP. • Train all workers, supervisors, and management team in regard to the implementation of the IEE. • Document the environmental baseline data before the start of physical work and continue collection of environmental quality data as given in the EMP during construction. • Respond on time to grievances raised by the local community and other stakeholders. • Cooperate with the PMO to implement environmental corrective actions and corrective action plans, as necessary. • Review the EMP on quarterly bases and update it with coordination of EA and ADB if required.

3	Project Supervision Consultant (PSC)	• Daily on-site supervision of the IEE and environmental safeguards implementation by the contractor. • Development of monitoring checklists during pre-construction, and construction stages. • Coordinate and communicate with the contractor to facilitate the implementation of all the mitigation measures identified in EMP. • Preparation and submission of monitoring reports to DABS PMO. • Provide technical support and advice for addressing grievances and cooperate in resolving issues as a member of the grievance redress committee. • Preparation of monthly and weekly monitoring reports based on the monitoring checklists and submission to DABS PMO and further submission to ADB. • Review and approve updated/revised EMP as necessary in coordination with DABS and ADB.
4	ADB	• Review and approve the IEE report and disclose it on the ADB's website as required. • Issue project approval based on the IEE report. • Monitor the implementation of the EMP throughout the project stages. • Provide assistance to the EA and IA of the project in carrying out its responsibilities and capacity building for safeguard compliance. • If necessary provide further guidance to the EA on the format, and content of the IEE report and annual or quarter monitoring reports for submission to ADB

263. After project completion, DABS will be in charge of the operation and maintenance of the project facilities. DABS in cooperation with the district/provincial offices will undertake routine and random monitoring and analyze samples scheduled in the monitoring plan (Appendix B).

264. The following measures should be taken to provide an environmental compliance monitoring program during project implementation:

- The tender and contract documents should clearly set out the contractor's obligations to undertake environmental mitigation measures set out in the EMP (appended to Contract Specifications).
- The recommended environmental mitigation cost should be included as an item in the Bills of Quantities. This will ensure that there is specific environmental mitigation budget and will be implemented as required. During the procurement, contractors will be encouraged to include these costs in their rates and present the mitigation cost as a line item in the Bills of Quantities. There will be an identified

extra payment in the contract to ensure measures are calculated and carried out.

- Each contractor will recruit an environmental, health and safety manager, who will be responsible for implementing the contractors' environmental responsibilities and liaising with PMO. The manager will also be responsible for the health and safety aspects of work sites (ADB, 2012).

9.2 Environmental Monitoring Program

265. Environmental monitoring is a very important component of environmental management during construction and operation stages of the project to safeguard the protection of the environment. During construction, environmental monitoring will ensure the protection of landslide, side slopes, and embankment from potential soil erosion, borrow pits restoration, quarry activities, sitting of work sites and material storages, sitting of the batch, preservation of religiously sensitive locations, community relations, and safety provisions. During operation, air, noise, and surface water quality monitoring and greening and landscaping of project will be an important parameter of the monitoring program.

266. In response to environmental impacts identified during the study, an environmental monitoring plan has been developed and is presented in Appendix B. The contract documents will contain a listing of all required mitigation measures (Appendix A) and a time frame for the compliance monitoring of these activities. The monitoring will comprise surveillance to check whether the contractor is meeting the provisions of the contract during construction and the executing agency during the operation of the project.

267. The SC in cooperation with DABS–PMO and NEPA during the project implementation will be required to:

- Develop an environmental auditing protocol for the construction period, and formulate a detailed monitoring and management plan; and
- Supervise the environmental monitoring regularly, and submit the environmental monitoring reports to the Govt. of Afghanistan and ADB twice annually based on the monitoring data and laboratory analysis: the main parameters to be monitored by the contractor are outlined in the national standards (air pollution, noise, water quality and etc.) and Appendix B.
- The contractor will be responsible for subcontracting data collection of environmental monitoring to a recognized organization. The cost for this monitoring is included in the environmental mitigation budget Table.

268. The DABS–PMO shall submit the following environmental reporting documentation to the Government of Afghanistan and ADB:

- Baseline Monitoring Report: The Baseline Monitoring Report shall be submitted to the Government of Afghanistan and ADB prior to the commencement of civil works and will include a detailed environmental management and monitoring plan (including data collection locations, parameters, and frequency), baseline environmental data, relevant standards and data collection responsibilities.
- Environmental Monitoring Reports: The environmental monitoring reports will include environmental mitigation measures undertaken, environmental monitoring activities are undertaken, details of monitoring data collected, and analyses of monitoring results, recommended mitigation measures, environmental training conducted, and

environmental regulatory violations. The environmental monitoring reports will be submitted to the Government of Afghanistan twice annually during the construction period and annually for three years after completion of construction.

- Project Completion Environmental Monitoring Report: Three years after completion of construction, the DABS–PMO shall submit a Project Completion Environmental Monitoring Report to Government of Afghanistan and ADB which will summarize the overall environmental impacts from the Project (ADB, 2012).

9.3 Environmental and Social Management Capacity Building

269. DABS doesn't have operational environmental safeguard department yet. The creation of a Social Environmental Department in DABS and training of qualified staff are therefore highly recommended. Staff needs to be trained regarding projects environmental concerns and how to mitigate these concerns. Furthermore, DABS needs to assign a specific team for the project Environmental Management Plan follow-up. Environment and social department should also deal with social issues and shall be responsible for monitoring during the operation phase.

270. In general, the Environment, Health, and Safety (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. Training on how to use an EMF meter and how to interpret the results shall also be given to DABS staff. Training should focus on the application of ADB Safeguard Policy and monitoring procedures.

9.4 Estimated EMP Costs Summary

271. A preliminary cost estimate of the implementation of the EMP is given in Table below. The costs for LARP implementation are separately calculated in the respective document. The turnkey contractor must do its own cost calculation as this cost breakdown considered operation phase costs as well which is not part of the contractor responsibility.

Table 15 Estimated costs for EMP implementation

PROJECT STAGE	DETAILS	ESTIMATED COST (USD)
DESIGN	As stated in the project IEE section 7.1, 14.1.1	7,000
SITE OFFICE ESTABLISHMENT AND OPERATION	As stated in the project IEE section 7.2, 7.2.1.7, 14.1.1 9 (DEWATS system)	6,000
BIRDS FLAPPER/DIVERTER (200 EACH)	As stated in the project IEE section 7.1.3, 7.3.2.1, 14.1.1	14,000
CONSTRUCTION PHASE	As stated in the project IEE section 7.2, 7.2.1.7, 14.1.1	6,000
OPERATION AND MAINTENANCE PHASE	As stated in the project IEE section 7.3, 14.1.1	14,000
MISCELLANEOUS	Costs of transportation, tests and etc.	6,000

DECOMMISSIONING PHASE	As stated in the project IEE section 7.4	4,000
CAPACITY BUILDING TRAINING	Capacity building training for contractor workers and management team.	2,000
EMP MONITORING [6]	Detailed in EMP section 14.2.1	10,000
CONTINGENCY	Contingency	4,000
TOTAL	**256,000**	

10. Grievance Redress Mechanism (GRM)

272. A mechanism to receive and facilitate resolution of concerns, complaints, and grievances about the project's environmental performance will be established. It will address Aggrieved Person (AP) concerns and complaints promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people at no costs and without retribution. Systems and institutions for grievance redress available to affected persons are shown in below figure.

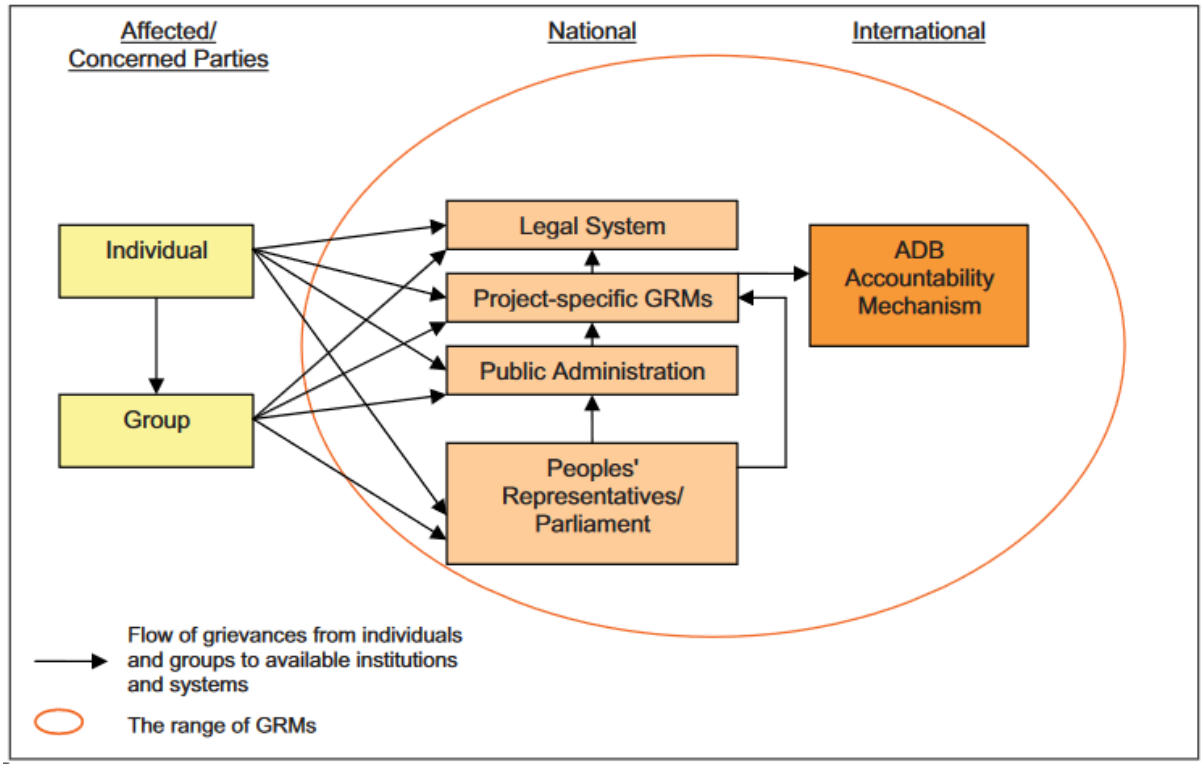

Figure 38 Systems and Institutions for Grievance Redress Available to Affected Persons (ADB, 2010)

273. In 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

[6] An environmental monitoring specialist has been considered for all the duration of the plant lifecycle (30 Years) with approximate 1000 USD/Month cost. The turnkey contractor is not responsible for this portion and should not consider it in the EMP cost.

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.

274. 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 will undertake.

275. 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. 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.

276. 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. 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 to 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.

277. Members of the grievance committee will be the contractor, DABS-PMO, local administration, the environmental authority in charge, a lawyer and NGO representatives in case applicable. The contractor 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 the 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.

278. There must be a complaint register at the site to record and register all complaints and its remedial actions. The complaint register will include a narrative on the actual process undertaken to mitigate these grievances. The contractor, together with the Implementing Agency (IA), will be responsible to include a social and gender specialist to:

- coordinate the grievance redress procedure
- arbitrate grievances with the contractor, AP, and local administration /Community leader
- liaison with DABS
- liaison with court
- Documentation of all grievances and resolution procedures.

279. 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 AP is encouraged to proceed in the following way:

- contact the contractor's designated grievance staff /committee representative during periodical site visits in person or via the designated telephone number or via the community leader or NGO staff
- lodge the complaint and provide information on the case
- agree with the construction contractor on specific mitigation measures
- agree with the contractor on a time limit for the grievance settlement
- grievances have to be settled within two weeks, or as otherwise specified in the scheduled agreement
- sign if the mitigation measure has been implemented as agreed
- seek redress from DABS if not satisfied with the above-mentioned procedure
- involve appropriate local authorities to liaison with DABS and contractor
- involve NGOs or the construction supervision consultant to liaison with DABS and the contractor
- seek redress from ADB if not satisfied with a response by DABS
- Seek redress from the court if all other ways have failed.

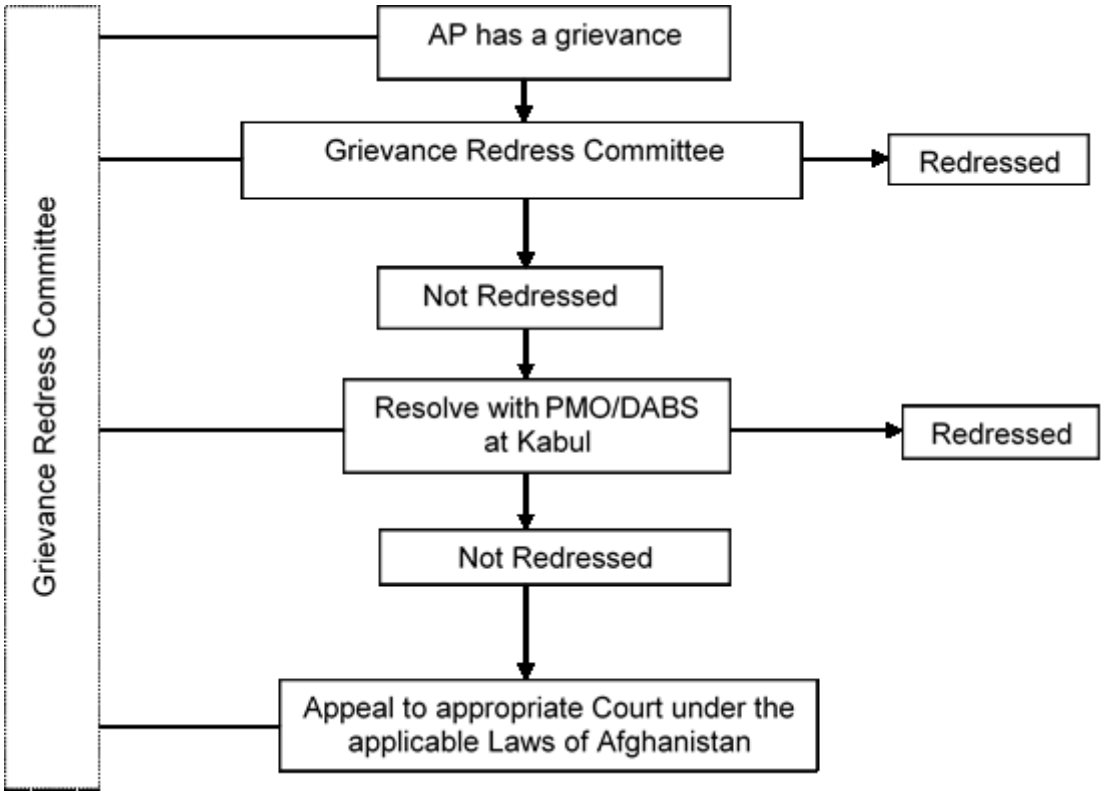

Figure 39 Grievances Redress Chart

280. 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 the 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.

281. The grievance mechanism shall be implemented by the PMO in cooperation with the contractor. The PMO shall ensure the availability of GRM staff and make information about GRM (telephone number, contact persons etc. publicly available and free of charge.

11. Findings and Recommendations

282. This IEE reveals that there will be both positive and negative impacts due to the construction activities and normal operations after the proposed construction. Mitigation measures have been discussed to mitigate the expected negative impacts. The major positive impacts of the project will be economic and access to energy. The industry will grow and will create short and long-term job opportunities for the people.

283. The study results suggest that the project will overall have lesser environmental impacts if the proposed mitigation measures and EMP are implemented properly. The transmission line site evaluation and design impacts such as site characterization, line route survey, and monitoring are generally temporary and of relatively lesser magnitude. The possible impacts include ground clearing (removal of vegetative cover), vehicular and pedestrian traffic, borings for geotechnical surveys, and drilling to characterize subsurface conditions (e.g., soils, depth to groundwater). In some places the excavation or access road construction is necessary at this stage, impacts to resources would be similar in character, but lesser in magnitude, to those for the construction phase. The mitigation measures mentioned in the report will help reduce and avoid these negative impacts.

284. Impacts to ecological resources (wildlife, vegetation, special status species, and their habitats) will be minimal and localized in all phases of the project because the line doesn't pass through ecologically sensitive areas. The introduction or spread of some non-native invasive vegetation could occur as a result of vehicular traffic, but this would be relatively limited in extent. It is worth mentioning that above-ground power lines pose three main risks to birds: risk of electrocution; risk of collision and risks and loss of habitat quality in staging and wintering areas. Based on the IBAT database the transmission line route is located in 60 km and 104 km distance from Dashti Nawar and Ab-i Istada IBAs respectively and birds might pass by the TL route between these IBAs particularly because of the Sardeh Band dam located in between these IBAs. Furthermore, the Sardeh Band airport is located in 2 km distance from the line. Therefore, for the safety of air traffic and for the minimization of fatal bird collision on power lines, the mentioned mitigation measures must be applied to the power lines to a possible extent. However, as this transmission line does not pass directly through a protected area or on the bird's migration path this impacts on bird safety is considered as low.

285. Careful line routing during the detailed 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. Adjustments to the route shall be considered during the detailed design to minimize or avoid the impacts listed above.

286. As the line route passes through areas which might contain archeological artifacts such as the area near Ghazni city. The accumulation of sediment mentioned above could serve to protect some buried resources by increasing the amount of protective cover. It is therefore recommended to follow the mitigation measures discussed in the IEE.

287. Within DABS an Environmental and Social Department currently does not 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 its associated substations.

11.1 Recommendations

- The security condition through the route is alarming. It was very hard for our team to perform the surveys and we have faced several security challenges. In order for the project to be implemented successfully, the government must address the security issues of the area.
- Ander district is located along the transmission line route and is highly insecure place. The Ander community members said that they will not allow the line to pass without providing them the electricity.
- To make sure that the proposed mitigation measures are implemented and negative impacts are avoided, the IEE must be part of the bidding documents.
- An unexpected discovery of cultural resources during any phase of the project shall result in a work stoppage in the vicinity of the find until the resources can be evaluated by a professional archaeologist. And educate workers and the public on the consequences of unauthorized collection of artifacts
- For increasing the project socioeconomic positive impacts, it is recommended that the first priority shall be given to the recruitment of local people to work in the project.

12. Conclusion

288. The project will have overall positive environmental impacts. However, it will also have minor negative impacts too. The implementation of appropriate mitigation measures during design, construction, and operation phases will minimize the negative impacts of the project to acceptable levels.

289. After analysis of all environmental and social aspects of the project, it can be concluded that the project will not have adverse environmental impacts in case all the mitigation measures mentioned in this IEE have taken into the consideration.

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14. Appendices

14.1 Appendix A

14.1.1 Environmental Management Plan (EMP)

290. This section provides information about the management and mitigation measures to be considered during the project implementation to avoid, mitigate, reduce, or compensate for adverse environmental impacts.

Table 16: EMP Design Phase

Issue	Section Explained	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
Line routing	6.1	➢ Physical and Economical Resettlement ➢ Crossing of rivers	Low	• Adjustments to the route shall be considered during detailed design to minimize or avoid the impacts. • Place access roads to follow natural topography, and avoid or minimize side hill cuts. New roads should avoid going straight upgrades in excess of 10%. • Minimize the amount of land disturbed as much as possible by using existing roads and disturbed areas. Minimize unnecessary vegetation removal.	Turnkey Contractor	Project Supervision Consultant (PSC) and EA	During design prior to construction

				• The IEE/EMP should be updated based on the detailed design.			
Seismicity, and rock fall Consideration	6.1	➢ Damage to tower and infrastructure	Medium	• Medium to high-risk seismicity level (Richter scale 6-7.5) is proposed to be taken into design consideration in the design stage. • Avoid rock fall spots for tower installation.	Turnkey Contractor	PSC and EA	During final design

Table 17: EMP for the Construction Phase[7]

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
Acoustics (Noise)	6.2.1.2	➢ Disturbance to communities ➢ Noise could cause hearing loss, impair the ability to	Medium	• The application of Engineering and Administrative methods for noise control	Turnkey Contractor	PSC and EA	During construction

[7] The contractor must be required under the IEE to prepare Site-specific Environmental Management Plans as required. The SSEMP must be approved by the IA and shared with ADB before start of civil works.

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
		communicate and hear high-frequency sounds and even permanent hearing loss		• Noisy construction activities should not be allowed during nighttime, particularly near the identified sensitive receptors. • Develop a blasting management plan • Use blasting mats to contain the blast, prevent flying rocks and suppress dust • Inform the near communities and security officials in advance • Limit noisy activities (including blasting) to the least noise-sensitive times of day (weekdays only between 8 a.m. and 6 p.m.).			
Air Quality	6.2.1.3	➢ Emissions ➢ Fugitive dust	Low	• Use dust abatement techniques on unpaved, un-vegetated surfaces to minimize airborne dust and during earthmoving activities, prior to clearing, before excavating, backfilling, compacting, or grading, and during blasting.	Turnkey Contractor	PSC and EA	During construction

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
				• Post and enforce speed limits to reduce airborne fugitive dust from vehicular traffic. • Cover construction materials and stockpiled soils if they are a source of fugitive dust. • Cover dump trucks before traveling on public roads.			
Impacts on Soils and Geologic Resources	6.2.1.4	➢ Soil erosion ➢ Soil nutrient loss ➢ Altering drainage patterns accelerates erosion and creates slope instability	Medium	• Obtain material from authorized and permitted sites. • Inspect and maintain project facilities regularly, including access roads, to ensure erosion levels remain the same or less than current conditions. • Reclaim or apply protective covering on disturbed soils as quickly as possible. • Apply erosion controls, such as jute netting, silt fences, and check dams. • Maintain vegetative cover within the right-of-way (ROW) to prevent erosion	Turnkey Contractor	PSC and EA	During construction

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
				and monitor periodically to assess erosion			
Impacts on Water Quality	6.2.1.6	➢ Spills of chemicals (for example, dust suppressants, dielectric fluids) could result in contamination of surface or groundwater ➢ Discharges of waste or sanitary water; ➢ Herbicide applications; and ➢ Contaminant spills, especially oil.	Low	• Save topsoil removed during construction and use it to reclaim disturbed areas upon completion of construction activities. • For in-stream construction, use isolation techniques such as diversion to limit the exposure of disturbed substrates to moving water. • Closely monitor construction near aquifer recharge areas to reduce potential contamination of the aquifer. • Pollution of rivers by vehicles and waste shall be forbidden and controlled, (e.g. no car washing in the rivers, no oil spills, etc.).	Turnkey Contractor	PSC and EA	During construction
Cultural and Historic Resources;	6.2.1.5	➢ Complete destruction of the resource if present in areas undergoing	Low	• Conduct a records search to determine the presence of known archaeological sites and historic structures within	Turnkey Contractor	PSC and EA	During construction

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
PCR Chance Find		surface disturbance or excavation ➢ Degradation or destruction of near-surface cultural resources on- and off-site resulting from changing the topography, changing the hydrological patterns, and soil movement (removal, erosion, sedimentation) ➢ Unauthorized removal of artifacts or vandalism as a result of human access to previously inaccessible areas		the area of potential effect. • Periodic monitoring of significant cultural resources in the vicinity of the development may be required to reduce the potential for looting and vandalism. • An unexpected discovery of cultural resources during any phase of the project shall result in a work stoppage in the vicinity of the find until the resources can be evaluated by a professional archaeologist. • Educate workers and the public on the consequences of unauthorized collection of artifacts. • During all phases of the project, keep equipment and vehicles within the limits of the initially disturbed areas. • Develop a PCR chance find procedure.			

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
Ecological Environment (Flora and Fauna)	6.2.2	➢ Damages to vegetation and habitats ➢ Dust settling on vegetation	Low	• Use existing facilities and disturbed areas (e.g., access roads, graded areas) to the extent feasible to minimize the amount of disturbance. • Design permanent facility structures to discourage their use by birds for perching or nesting. • Retain all ground-level vegetation and stumps left after cutting, unless their removal is necessary to install support structures or other ancillary facilities. • Initiate habitat restoration activities as soon as possible after construction activities are completed within a given area. • Use dust abatement techniques on unpaved, un-vegetated surfaces to minimize airborne dust. • 1:1 ratio trees replanting	Turnkey Contractor	PSC and EA	During construction

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
Human Health and Safety	6.2.4	➢ The workers and equipment safety risks ➢ Loss of workers ➢ Working in potential weather extremes, and possible contact with natural hazards	Low	• Preparation of Health and Safety Plan • Everyone in the working area should be equipped with the PPE • Hold contractor crew safety meetings at the start of each workday to go over potential safety issues and concerns. • Install grounding devices on all fences that cross or run parallel to a transmission line. • Ensure that employees are trained, as necessary, in tower climbing, cardiopulmonary resuscitation, first aid, rescue techniques, and safety equipment inspection and use. • Secure construction sites at the end of the workday to protect the equipment and the general public.	Turnkey Contractor	PSC and EA	During construction

Table 18: EMP for the Operation Phase

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
Impacts on Acoustics Environment	6.3.1.1	➢ Noise from compressor or pump stations, transformer, and switchgear at substations, corona discharge from transmission lines, vehicles, and machinery ➢ Inspect the noise level regularly	Low	• Install low noise level transformers exhaust silencers, quieter cooling fans and etc.	DABS	NEPA	During Operation
Air Quality	6.3.1.2	➢ Fugitive dust and exhaust emissions	Low	• Enacting fugitive dust and vehicle emission controls policies and speed limits in the site will reduce the air quality impacts.	DABS	NEPA	During Operation
Water Resources	6.3.1.4	➢ Pollution of soil and water through oil leakage in the substation ➢ Degradation of water quality resulting from vehicular traffic and machinery operation during maintenance (e.g., erosion and sedimentation) or	Low	• Ensure that vegetative cover is maintained within the right-of-way • Maintain equipment and vehicles to minimize the risk of accidental fuel spillage. • The substation must have appropriate sewage handling system.	DABS	NEPA	During Operation

		herbicide contamination during vegetation management (e.g., from accidental spills) and wastewater disposal		• Apply erosion controls relative to possible soil erosion from vehicular traffic and during construction activities • Reclaim or apply protective covering (e.g., vegetative cover) on disturbed soils as quickly as possible. • The herbicide/pesticide must not be used.			
Visual Impacts	6.3.1.5	➢ Visual impacts of substation and towers	Low	• Planting trees/ bushes around the new substation • Consider site-specific landscaping in selected areas to provide screening for year-round residents whose property abuts the project. • Maintain the right-of-way with low-growing natural vegetation that requires minimal maintenance and is consistent with local vegetation.	Turnkey Contractor and DABS	NEPA	During Operation

				• Keep areas around support towers, and other facilities clean and free of debris. • Do not apply paint or permanent discoloring agents to rocks or vegetation to indicate survey or construction activity limits.			
Hazardous Materials and Waste Management	6.3.1.6	➢ Industrial wastes are generated during routine operations (e.g., lubricating oils, hydraulic fluids, coolants, solvents, and cleaning agents) ➢ Environmental contamination	Medium	• The waste oils and chemicals should be disposed of in accordance with their respective Material Safety Data Sheet (MSDS). • PCB containing equipment are not allowed to use in the project • Implement plans for hazardous materials management, waste management spill prevention and response, and storm-water management. Train employees to promptly contain, report, and/or clean up any oil or		NEPA	

				hazardous material spill. • Provide secondary containment for all on-site hazardous materials and waste storage, including fuel. • Containerize and periodically remove wastes for recycling or for disposal at appropriate off-site permitted disposal facilities. • Provide portable spill containment and cleanup equipment in all vehicles. • Prevent oil and fuel leaks.			
Flora	6.3.2.1	➢ ROW maintenance (e.g., vegetation removal) ➢ Clearance during maintenance works	Low	• Herbicides shall not be used for corridor clearance • Monitor the right-of-way (ROW), access roads, and ancillary facilities regularly for invasive non-native plant species establishment, and initiate weed control measures immediately upon	DABS	NEPA	During maintenance

				evidence of invasive species introduction or spread.			
Fauna and Avifauna	6.3.2	➢ Disturbance of wildlife from the noise and human activity; ➢ Exposure of biota to contaminants; and ➢ Mortality of biota from colliding with transmission lines or other components. ➢ Collision and/or electrocution of birds	Low	• Careful preparatory investigations of different routing alternatives: bird migration often follows local or regional flyways determined by topology, shorelines, etc. Prior to the final planning of the power lines, such investigations are needed and must comprise bird migration at day and night time and other seasonal phenomena. • Installation of bird diverters in case needed. • Edison Electric Institute guideline for Reducing Avian Collisions with Power Lines is recommended to be followed.	DABS and contractor	NEPA	Design and during and before the operation

Human Health and Safety	6.3.4	➢ Workers electrocution and fires ➢ Avoidable damage and injuries of workers ➢ Exposures to electromagnetic fields, accidental injury or death to workers during operation and maintenance activities, and accidental injury or death to the public	Low	• Preparation of Health and Safety Plan • Staffs must have the essential protective equipment and must be provided with safety training. • There must be fire extinguishers in place in a variety of places that are at risk of material fires and flammable liquid fires. • Public awareness of the risks of illegal connections • Fire protection measures that follow international requirements • De-energize the equipment which needs repairing or maintenance and completely isolated them • At the point of isolation, the rack must be locked off and breakers must be tagged. The tag and safety lock should be placed at points of isolation.	DABS	NEPA	During Operation and Maintenance

				• Discharge equipment to be worked on and place safety grounds to protect personnel. • On completion of the work and prior to the return of the system to normal, remove safety grounds and make sure: that equipment is in a safe condition to energize, and, personnel has been informed that equipment is going to be energized.			

14.2 Appendix B

14.2.1 Environmental Monitoring Plan

Table 19: Monitoring Plan for Design and Construction Phase

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Monitoring and Reporting Responsibility	Project Phase
Noise	➢ Noise level in dBA	• Vehicles exhaust mufflers and silencers availabilit. • Vehicle speed near the communities. • Nighttime (22:00-07:00) work. • Noise barriers installation around the noisy equipment • Regular measurement of noise level at SS	Near residents and inside the construction site	Average of 15 minutes measurement of the noise level in dBA	Once before construction and Daily during construction	Contractor and PSC	Construction
Line Routing	➢ Compliance with ADB SPS, ➢ Minimization of resettlement needs, ➢ Avoidance of cultural sites,	• Avoidance of environmental and social impacts during line routing, • Avoidance of resettlement requirements	Entire line corridor	Visual control (Field visit) of final line routing	One time, before the start of physical works	Contractor and PSC	During the design phase, before the start of physical work

	➢ Compensation payments (see LARP), ➢ Access road design, ➢ Design of river crossings ➢ Special tower consideration for the line crossover	• Towers shall not be located near river banks and flooding areas • Towers shall be located with minimum local environmental impact • Construction activities shall be restricted to as small an area as possible (incl. access roads).					
Soil and Erosion	➢ Construction standards of access roads, ➢ Temporary bridges, ➢ Re-planting activities	• Control of low impact construction standards • Visual control of river crossings • Visual control of re-planting activities	Entire line corridor	Visual control of record keeping of length built and length rehabilitated	Weekly during construction	Contractor and PSC	During construction
Land Acquisition and Resettlement	➢ Compensation payments, ➢ Resettlement actions (see LARP)	• Visual control and photo-documentation of resettlement activities and reinstallation including GPS data (See LARP).	Entire line corridor and substation site	Visual control, records, survey	Once after final design	DABS PSC LARP coordinator/facilitator (see LARP document)	Before construction
Air Pollution	➢ CO, NOx, Sox, PM10 and 2.5	• Monitoring of good construction standards;	Work areas	Laboratory measurements of air samples	Monthly during construction	Contractor and PSC	During construction

	➢ Construction standards	• Monitoring of correct implementation of construction manual, especially related to vehicle use and maintenance		Visual control			
Pollution of Surface Water	➢ Good construction principles at river crossings ➢ Location of towers no closer than 50 m to flooding areas ➢ No pollution sources near rivers	• Visual control of downstream water quality (turbidity), • Regular measurements of up/downstream basic parameters, • Plan for detailed analysis (e.g. for hydrocarbons) if pollution/ spills are suspected. • Visual control that any temporary bridges are properly constructed, do not cause deterioration of river bed and are dismantled after completion • Control of Implementation of EMP measures	Line sections with river crossings, substation sites	Visual Control, Measurements and Analysis of basic surface water parameters (EC, pH, DO, TSS, BOD, Oil, and grease, Lead, E. Coli), sampling within 100 meters upstream and downstream of river crossings and substation sites	Monthly during construction	EHS Auditor, PSC	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 the substation and good construction practices during stringing, tower construction, and substation construction • Analysis and measurements of basic groundwater parameters.	Substations, tower sites, work camps	Visual control, water analysis in wells and analyses of water parameters such as (EC, pH, DO, TSS, BOD, Oil, and grease, Lead, E. Coli).	Monthly during construction	EHS Auditor, PSC, and Contractor	During construction
Flora and Fauna	➢ Respect for minimal ground clearance (7 m for 220 kV lines) in design ➢ The extent of lay down areas and routing of new access roads ➢ Implementation of Avifauna protection measures	• Monitoring of final design, including specifications of tower locations and height of towers, location, and length of access roads, • Monitoring of tree cutting, enforcement of prohibition, • Monitoring of implementation of bird flappers/ markers. • Monitor birds mortality rate	Entire line ROW	Regular visual inspection during construction Complete line survey after construction	Six Monthly during construction General survey after construction	EHS Auditor, PMO, and Contractor	During construction

		under the corridor					
Waste	➢ Implementation of Sewerage and Waste 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 campsites; Substations; Lay-down Areas	Design compliance, Visual control	Daily monitoring during construction process; EHS Audit	EHS Auditor, Contractor, and PSC	During construction
Health and Safety	➢ Compliance with EHS Plan (Work Safety / Sanitation, Noise)	• Health and safety plan checklist. • 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,	All work areas, Workers camps, Substation sites	Visual Control of EHS Management Plan implementation	Daily during construction	EHS Auditor, Contractor, and PSC	During construction

		prevention of work accidents etc. during construction					
Physical Cultural Resources	➢ Implementation of the chance procedure	• Photo-documentation of key sites close to alignment before the 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	Monthly during construction	EHS Auditor, Contractor, and PSC	Before, during and after construction
Grievance Mechanism	➢ Implementation of an accessible grievance mechanism for APs to address complaints at the local level	• A social survey by an independent expert to find out if grievances have been settled.	Community level in both provinces	Communication of GRM to stakeholders/APs'.	Daily during the construction process	EHS Auditor, Contractor, PSC and PMO	During Construction

Table 20: Monitoring Plan for the Operation and Decommissioning Phases

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Monitoring and Reporting Responsibility	Project Phase
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 secure drainage system. ➢ Provision of separate storage tanks for further treatment of oily wastewater at the substation.	• 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	DABS and NEPA	After construction

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Monitoring and Reporting Responsibility	Project Phase
Landscape and Visual Impacts	➢ A complete dismantling of the old TL and substation after its useful life ➢ Planting trees/ bushes around the new substation	• Visual Inspection Control of planning and implementation of re-plantation at sites	All work areas	Visual inspection	Once after construction	DABS Environment Department (ED)	After construction
Flora	➢ No use of herbicides for ROW clearing	• Supervision of maintenance procedures	Entire ROW	Periodical Inspection	Yearly during operation	DABS Environment Department / NEPA	During operation
Fauna	➢ Disturbance of animals during maintenance work ➢ Prohibition of hunting	• Supervision of maintenance procedures	Entire ROW	Periodical Inspection	Yearly during operation	DABS ED / NEPA	During operation

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Monitoring and Reporting Responsibility	Project Phase
Waste Management	➢ Development of a 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	DABS	During operation
Health and Safety	➢ EHS Management System/ Plan development and implementation during Substation operation ➢ Electric and Magnetic fields	• Monitoring of Implementation of EHS Management Plan • Regular EMF measurements (after purchasing of EMF meters and related training for handlers) • PEE availability	Substation Sites, Maintenance locations	Periodical Inspection, Regular EHS Audits	Monthly during operation	DABS, EHS Auditor	During operation

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Monitoring and Reporting Responsibility	Project Phase
Land Use ROW clearing and maintenance	➢ Further agricultural land use in the ROW, Use rights and use practices ➢ Compensation payment for damaged crops during maintenance. ➢ No use of herbicides for ROW clearing	• Monitoring of land use possibilities, compensation payments, grievance mechanism	Entire line ROW	Periodical Survey	Yearly during operation	DABS	During operation

Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Monitoring and Reporting Responsibility	Project Phase
Decommissioning	➢ A repeat of mitigation measures used in construction stage to minimize impacts to on environment during construction ➢ Use topsoil removed during the beginning of the project or during decommissioning activities to reclaim disturbed areas. ➢ Reestablish the original grade and drainage pattern to the extent practicable. ➢ Stabilize all areas of disturbed land using weed-free native shrubs, grasses, and forbs.	• 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 practices	entire line ROW, all substation sites	visual control, review of records	One time after the lifespan of the project (50 years)	DABS	After a lifespan of the project