Initial Environmental Examination

Project Number: 47282-008
October 2018

Afghanistan: Energy Supply Improvement Investment Program (Tranche 5)

Section No. 1: Jalalabad-Kunar 220 kV Double Circuit Transmission Line Project

Note: The document has two sections, the section one covers Jalalabad-Kunar IEE and section two covers Ghazni-Sharana project IEE.

Prepared by the project preparatory consultant, on behalf of Da Afghanistan Breshna Sherkat of the Government of Afghanistan for the Asian Development Bank.

Section No: One

Jalalabad-Kunar 220 kV Double Circuit Transmission Line Project

Initial Environmental Examination (IEE)

October 2018

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

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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 east region. Currently, more than half of the provinces in Afghanistan are not connected to the power grid supply. This has badly impacted the economic growth in the east; created inequalities in the country's economic development; and fuels insecurity, and discontent. The proposed tranche 4 will extend the national grid into eastern provinces with a population of nearly 2 million and will allow evacuation of indigenous generation in future. The tranche 4 will construct a 95 kilometer 220-kilovolt (kV) transmission line between Nangarhar provincial capital Jalalabad and Kunar Asad Abad.

2. 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.

3. 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.

4. However, not all impacts in the line routing can be avoided such as:

- The line passes Kabul River near Daronta dam.
- The line will cross in some portions of Hadda agricultural farms.
- The line will pose visual effects to some extent on the topography of the area.
- Some land acquisition and resettlement activities are required in Jalalabad city.

5. This 220 kV transmission line traverses through agricultural land and residential area at the start at Shaikh Mesri and Chaharbagh areas followed by the Gambiri desert, mountainous terrain, and hillsides along the Jalalabad Kunar road. The new substation will be constructed in Jalalabad, Shaikh Mesri area from where the line will start. 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.

6. Soils in the project area primarily consist of sediments eroded from the mountains and comprise alternating layers of gravels, silts, sands, and clays. Nearby to the mountains, the sediments are subjugated by coarse deposits such as gravels and pebbles, deposited by the runoff water from the mountains. Further away from the mountains, the deposits are expected to

become increasingly dominated by finer sediments such as fine sands/silts. The dominant rocks along the route are sedimentary and volcanic rocks. Alluvial sub-soils with loess top soils are common in the valley areas. These are calcareous soils with relatively high calcium carbonate (CaCO3) contents. Upland grazing areas are likely to be very gravelly but have the same high CaCO3 characteristic as the alluvium soils in the valleys (ADAPT, 2005).

7. During the route survey, two spots of soil erosion have been noticed. A soil erosion spot exists at (Lat: 34.448676°, Lon: 70.361510°) caused by Surkh Rod river and another one at Chahar Bagh at (Lat: 34.418138°, Lon: 70.394020°). Pole erection in such areas should be diverted to the possible extent and the mitigation measures mentioned in the IEE must be followed.

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. One main source of seismicity (Kunar faults) is present in the project area which might contribute to an appreciable seismic hazard. Furthermore, the line route has rock falling potential areas and floodways. 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. DABS has proposed an empty area near Asad Abad the provincial capital of Kunar for the new substation contractions where this line will be terminated.
12. The Land Acquisition and Resettlement Plan (LARP) document which is part of the tender package can provide further socioeconomic 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 sensitive receptors located near the transmission line such as schools and clinic 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. Based on Integrated Biodiversity Assessment Tool (IBAT) database the two Important Bird and Biodiversity Areas (IBA) located outside the project area are Nuristan (Pech and Waygal valleys) IBA and Safed Koh IBA through which birds might migrate. 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 Shaikh Mesri to Kunar Asad Abad. 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 access to energy for those villages located near the line, the insufficient energy capacity allocated for Kunar and Jalalabad, job opportunities for the local people and the resettlement compensation.

17. 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.

18. 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.

19. 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.

20. 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.

21. 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.

2. Introduction

2.1 Project Background

22. The Project is financed by ADB Tranche 4: Energy Supply Improvement Investment Program multitranche financing facility (MFF) (Energy MFF) in Afghanistan. The tranche will finance construction and commissioning of a 220 kV transmission line (95 KM) between Jalalabad Shaikh Mesri substation and Asad Abad, Kunar provincial capital. A new substation near Asad Abad will be constructed.

23. The precise location of transmission towers will be ascertained 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 383. 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.

24. 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.

25. 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.

2.2 The Scope of the Study

26. 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 Jalalabad Shaikh Mesri Substation, to Kunar Asad Abad and the construction of the new substation at Kunar Asad Abad. 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.

27. This 220 kV transmission line navigates through mountainous terrain, hillsides, semi-desert area, cultivated land, some houses, and settlements. The Jalalabad Shaikh Mesri Substation construction is in the tendering process now and a new substation will be constructed in Kunar Nawabad area near Asad Abad. The transmission line ecological 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.

28. In the initial phase of the project inspection, the main focus has given to find a line routing 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]

29. 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.

30. 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.

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

- Environmental Expert and
- Socio-Economic Expert.

32. 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.

33. **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.

34. **Water Physical Quality Test:** For water physical parameters test the Danish Committee for Aid Afghan Refugees (DACAAR) water lab facility has been utilized; for more details about DACAAR Lab please refer to this link (https://www.dacaar.org/functions/waterlab/).

35. DACAAR uses Palintest water analysis technologies which are NEPA approved. Palintest water analysis technologies are backed by 70 years research, very accurate and widely used around the world in more than 100 countries. The water samples have been collected from the field in the laboratory recommended bottles, labeled the sample, noted the location with date and

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

time. The sample then transported to the laboratory in accordance to the lab recommended preserved manner (i.e. portable lab sample carrier) within 24 hours.

36. 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]

37. 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).

38. 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.

39. 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.

40. 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.

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

3.1 Ministry of Energy and Water (MEW)

42. 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

43. 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)

44. 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.

45. 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

46. 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

47. 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.

48. 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

49. 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.

50. 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.

51. 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.

52. 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.

53. 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;

54. 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.

55. 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.
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.

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

Act/ Law	Date	Key areas
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

56. 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

57. 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.

58. 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.

59. ADB has the following safeguard policies relevant to the project:

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

60. 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 FI) 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

61. 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)

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

4. Project Description

63. The Government of Afghanistan has requested ADB to finance the extension of the power network toward the east region. Currently, more than half of the provinces in Afghanistan are not connected to the power grid supply. This has badly impacted the economic growth in the east; created inequalities in the country's economic development; fuels insecurity, and discontent. The proposed tranche 4 will extend the national grid into eastern provinces with a population of nearly 2 million and will allow evacuation of indigenous hydro-power generation in future. The tranche 4 will construct a 95 kilometer 220-kilovolt (kV) transmission line between Nangarhar provincial capital Jalalabad and Kunar Asad Abad.

4.1 Project Location

64. The transmission line starts from the Jalalabad Shaikh Mesri Substation towards north-west direction and ends at the Kunar newly proposed Substation at Dandoona area of Kunar. The line bypasses the Hamesha Bahar substation and then crosses the Hada farms in Ghowchak area. The proposed line enters the residential area and crosses the agricultural lands while keeping its parallel distance with the 110 kV existing transmission line. The line crosses over the Kabul River and continues in Gambiri Desert towards Shamol area (Kuz Kunar). At this point, it follows the Jalalabad – Kunar road until it reaches Kunar substation. The following points outline the main features of the line:

- The transmission line traverses about 12 km in the urban areas of the Jalalabad until it crosses Kabul River.
- It starts from the new Sheikh Mesri 220 kV substation and travels northward until it bypasses the existing Hamesha Bahar substation.
- It continues its route from the available and optimal spaces inside the agricultural farms in Ghowchak area towards north-west until it crosses the Jalalabad bypass road.
- The line traverses the agricultural lands and gets closer to the existing 110 kV transmission line and keeps its parallel path with it in Charbagh followed by Mirzayan area.
- The line continues towards north-west until it reaches Surkhab River and takes a sharp turn to align itself with the river direction towards north-east.
- The line follows the Surkhab River and crosses over Kabul River and then ascends to Gamberi desert. The Gamberi desert is a vast dry land with no limitation on the line route except for some flood risk which shall be taken into account during the construction phase.
- The line route passes at the west side of the Dr. Nakamora Park in Shamol area and bypasses it and leans more towards the east in Kuz Kunar. The Transmission line follows a parallel path to the existing Marwarid canal eastward until it reaches close to the intake point near the Jalalabad – Kunar road.
- The line continues its journey along the Jalalabad – Kunar road and crosses Noorgul district. Some of the tough terrains exist which can make the construction work challenging.
- The line reaches Tsawkay district after crosses the rough terrain while avoiding crossing over the private lands and premises where possible.
- The line reaches Kuz Narang followed by Narang district along its way.
- The line crosses many floodways and makes its way finally after traversing 95 km distance to the Kunar substation area near Nawabad area.
- The line route is selected such that it shall keep maximum distance with the road and with the residential areas.
- The line enters the substation switchyard in the south-west side.

65. Vegetation along the project area generally comprises agricultural crops (wheat, corn, beans), economic trees, and grasses. No reserved forest exists in the investigation area.

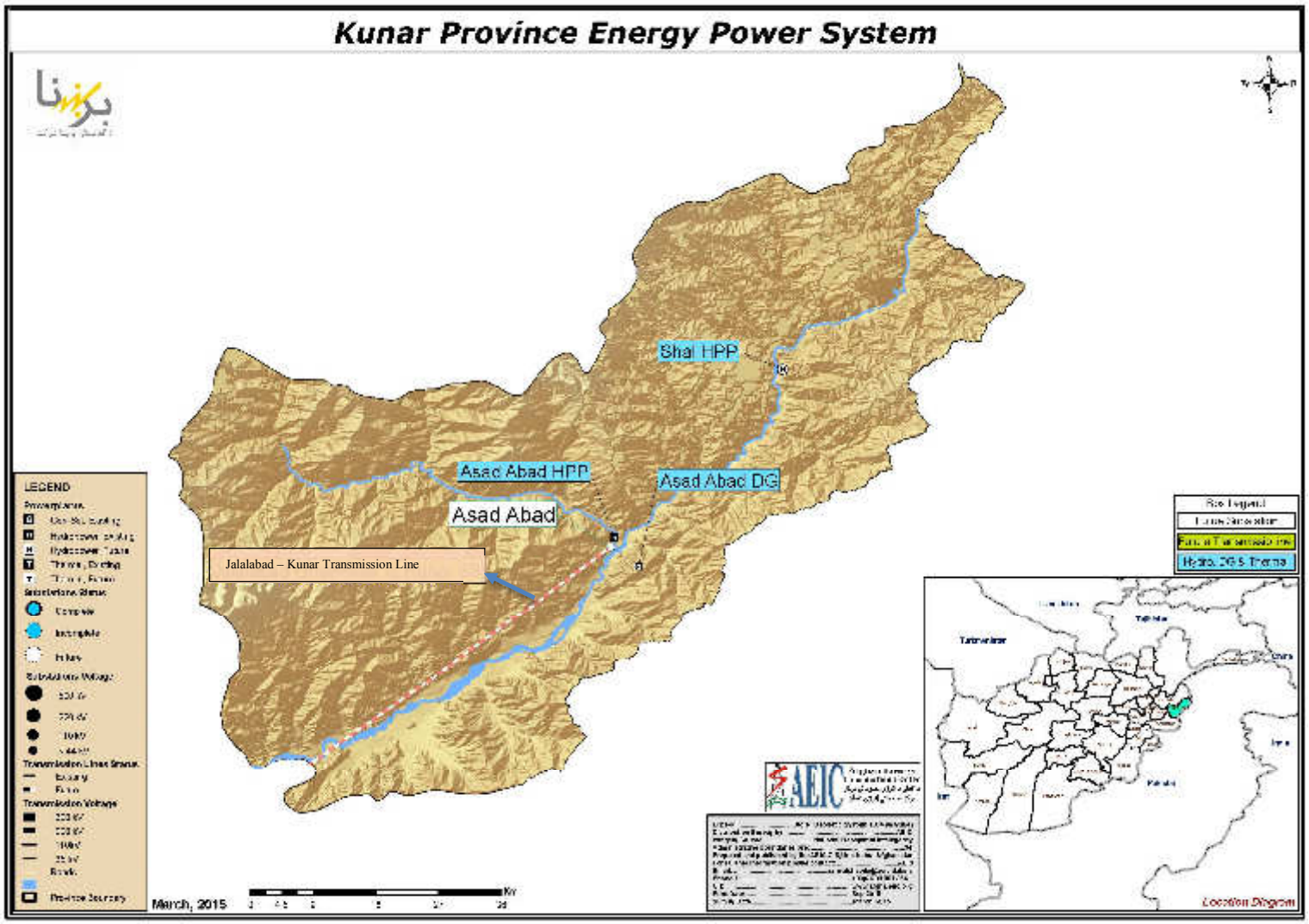


Figure 1 Transmission line propose area (AEIC, 2017)

66. There are two 220 kV outgoing circuits proposed from the Jalalabad Shaikh Mesri Substation. Which will be utilized to evacuate power toward Kunar province. The below figure shows the single line diagram of the substation.

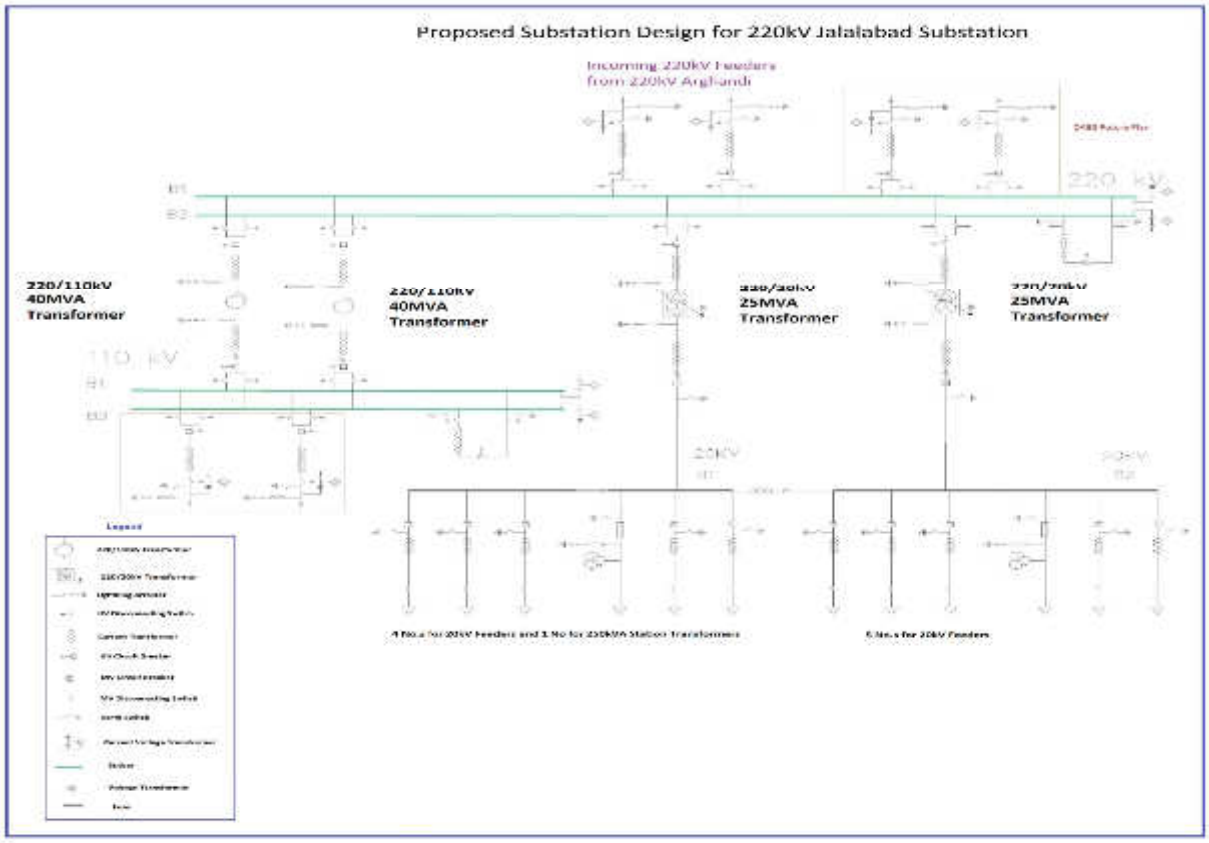


Figure 2 Jalalabad Shaikh Mesri Substation layout

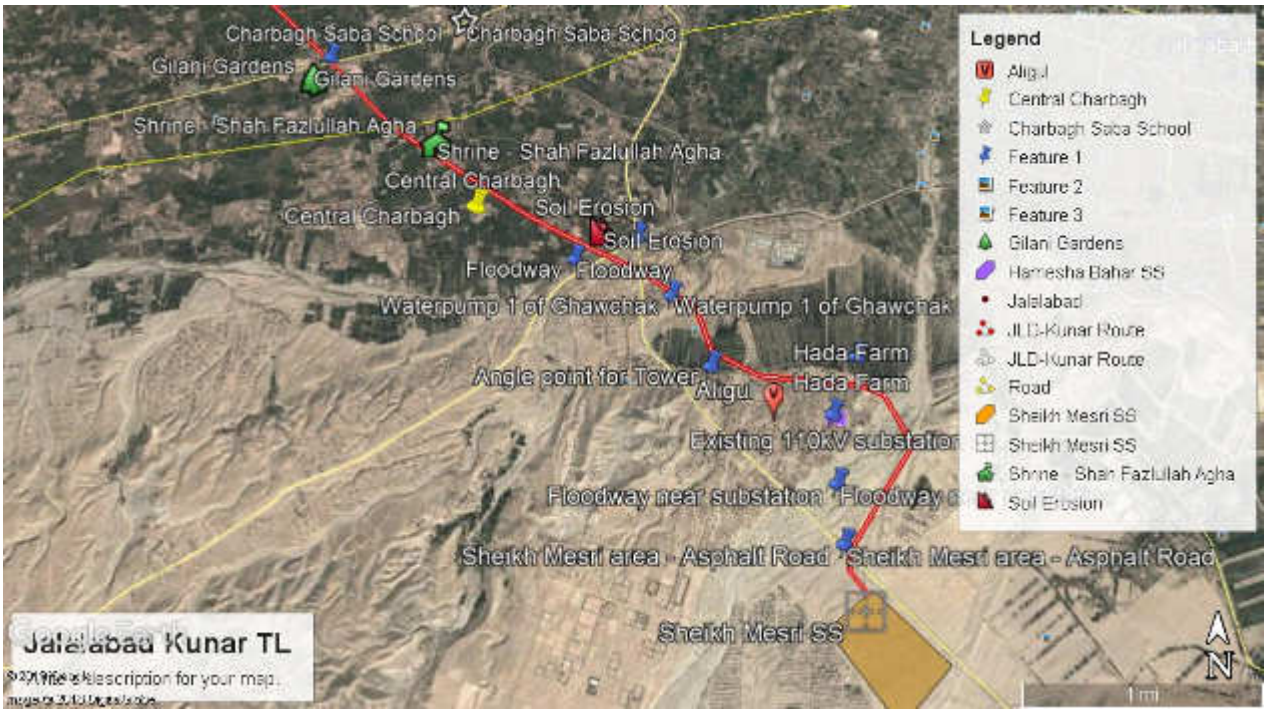


Figure 3 the Transmission line route overview with mapping of sensitive receptors (for detailed route map please see the power design technical report)

4.2 Technical Description

67. The 300 MW electrical energy will be transmitted from Jalalabad Shaikh Mesri Substation to Kunar Asad Abad via a 220 kV overhead double circuit line. The proposed line will be approximately 95 km long.

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

- The Transmission Line is proposed on steel lattice towers
- Required power transmission capacity is about 300 MW.
- Double conductor (400sqmm) will be used for power transmission.
- Optical Ground Wire (OPGW) / Steel optical fiber ground wire (48-fiber)
- The Approximate Line length is: 95 km
- Approximate number of towers: 383
- The Voltage level: 220 kV
- Number of circuits: Two
- Insulator: Composite, alternatively cap and pin toughened glass or porcelain;
- 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: 25 m
- Design Code: EN 50341-1:2012; relevant IEC standards.

69. The starting point of the overhead transmission line (OHL) is the new Jalalabad Shaikh Mesri Substation. Consultants' visited source substation (Shaikh Mesri) for the OHL 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 a fully equipped bay is considered at this substation to connect the OHL.

70. 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 110/20 kV 16 MVA transformer. In future, they are reproducing the same transformers at each level.
- Air insulated substation
- Power transformer capacity 32 MVA (2x16 MVA) 220 kV/20 kV
- Double busbar configuration for 220 kV system with bus coupler
- 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

71. The following figure shows the proposed new substation area at Shaikh Mesri and the existing substation. As shown in the figure the coordinates of the substation proposed area is as follows:

- Corner 1: N: 34°23'44.26", E: 70°24'54.75"
- Corner 2: N: 34°23'29.95", E: 70°25'13.51"
- Corner 3: N: 34°23'16.58", E: 70°24'57.14"
- Corner 4: N: 34°23'35.68", E: 70°24'40.93"

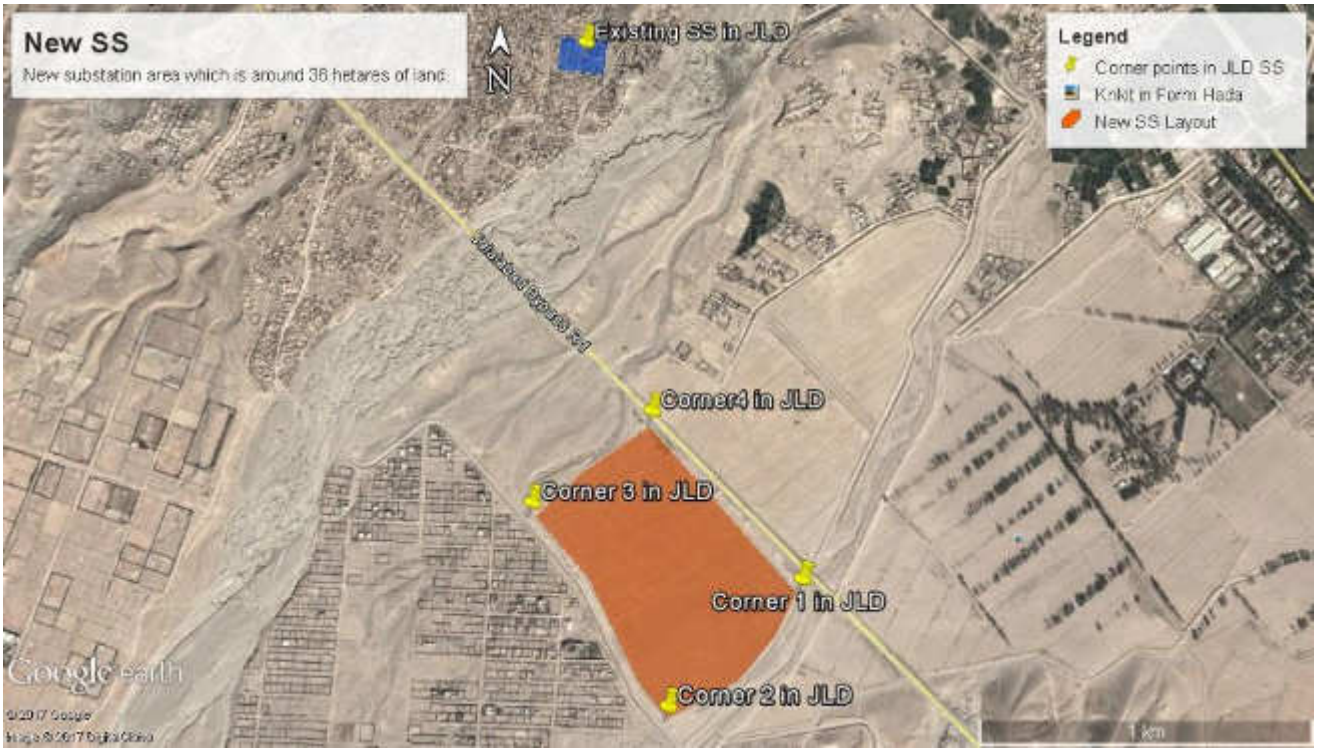


Figure 4 the proposed substation area at Shaikh Mesri Jalalabad

72. The proposed area of the new substation at Kunar province is shown below:

Figure 5 The proposed area of the new substation at Kunar

73. 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

4.3 The Right-of-Way and Clearance

74. The right-of-way (RoW) for the 220 kV transmissions line is considered to be 25 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

4.4 General Profile of the Project Affected Area

75. **Shaikh Mesri to Surkh Rod (0-12 KM):** This section passes through the agricultural land mainly. At 1.5 KM of the route, a floodway passes through at (Lat: 34.406175°, Lon: 70.417603°). The Hada farm is located in the 50 meter north side of the line. At 4 KM of the route, a floodway and Chahar Bagh Seasonal river are located with soil erosion at (Lat: 34.418138°, Lon: 70.394020°). Then the line passes through the Central Chaharbagh village and agricultural land. Shah Fazlullah Agha shrine is located at the 20 meters of the line in the Chahar Bagh village at (Lat: 34.425670°, Lon: 70.380350°). After passing in the 150 meter of Gailani Gardens the line crosses the Kabul-Jalalabad new highway at (Lat: 34.432713°, Lon: 70.370397°). After reaching the Surkh Rod river the line turns 80° towards the north and follows the riverside until reaches Kabul River Surkh Rod Area where it passes the Kabul river at (Lat: 34.457770°, Lon: 70.382524°). A big soil erosion spot exists at (Lat: 34.448676°, Lon: 70.361510°) caused by Surkh Rod river.

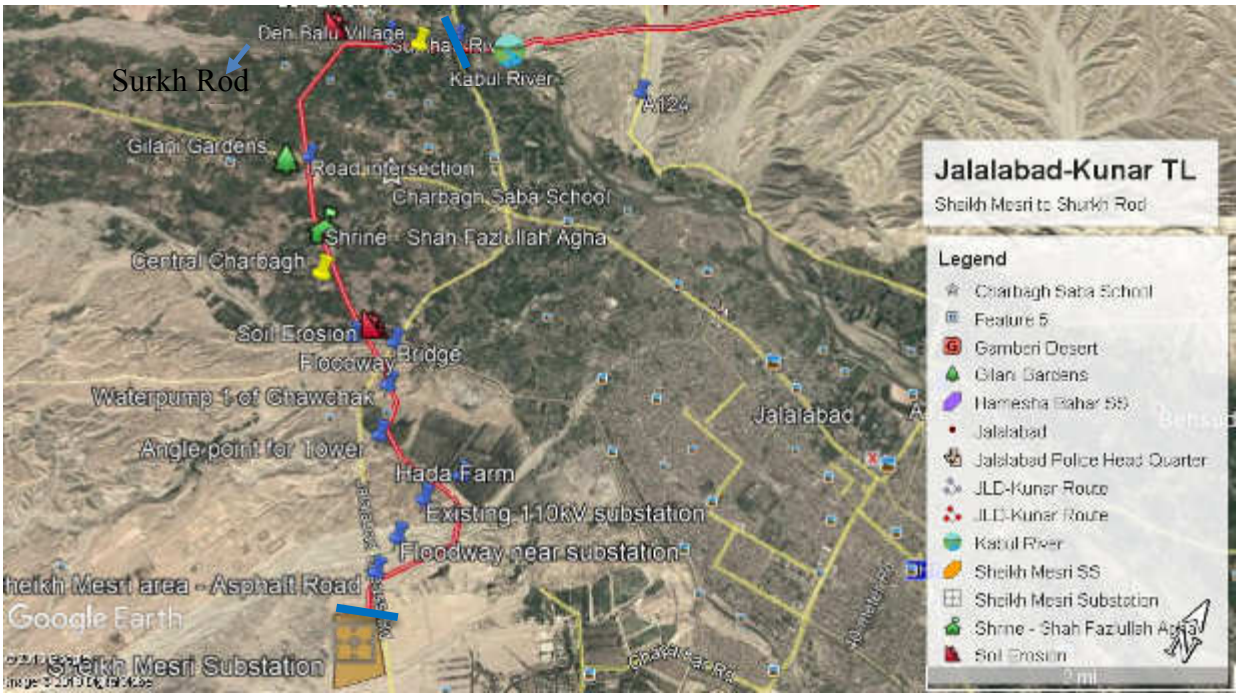


Figure 6 Shaikh Mesri to Surkh Rod (0–12 KM) transmission line route key features (vertical blue line on TL indicates this portion start and end point of the line)

Figure 7 Shah Fazlullah Shrine located at the 20 meters of the line in the Chahar Bagh village at (Lat: 34.425670°, Lon: 70.380350°)

76. **Surkh Rod to Shagey Village Kuz-Kunar (12-35 KM):** This section passes through a

mainly desert area of Gamberi until it reaches Shagey village. The line passes through three floodways inside Gamberi desert. In Shagey village an agriculture farm exists called Japani Bagh (Japan Garden) located at 1 KM distance from the line. A recreational park exists at the Japani Bagh called Dr. Nakamura Memorial Park (Lat: 34.552388°, Lon: 70.528525°). Furthermore, Shagey high school is located 3.5 KM away from the transmission line.

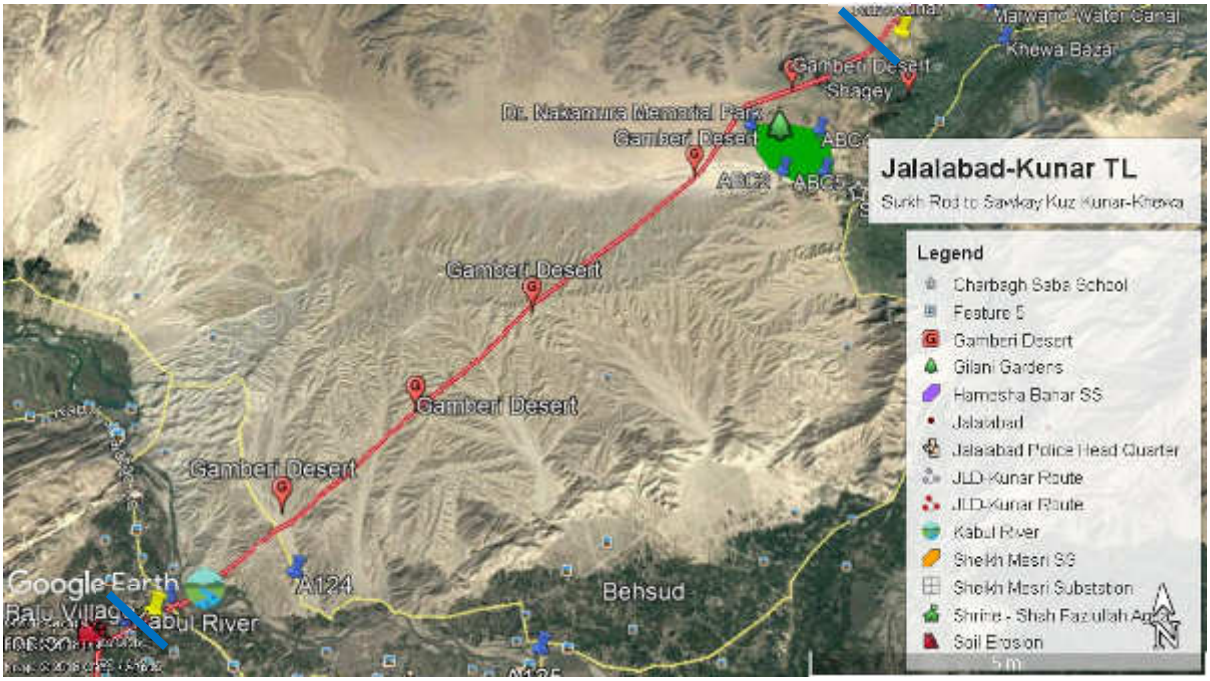


Figure 8 Surkh Rod to Shagey Village Kuz-Kunar Khewa (12–35 KM) transmission line route key features (vertical blue line on TL indicates this portion start and end point of the line)

Figure 9 Dr. Nakamura Memorial Park located at 1 KM distance from the line

77. **Shagey Village (Kuz-Kunar) to Sawkay Bazar (35-70 KM):** From this section onward the transmission line follows the Jalalabad-Kunar main road. Kunar River also passes through the east side of the line. The nearest distance of the river to the line is 0.17 KM. A floodway crosses the transmission line path at (Lat: 34.592296°, long: 70.608459°). Marwarid Canal (water supply canal of Japani Bagh) also passes parallel to the line with the closest distance of 0.25 KM. After passing Khewa the line enters Noorgal district. A small recreational park exists at (Lat: 34.593502°, Long: 70.696765°) with 0.5 KM distance from the line. In Noorgal district the line passes 0.7 KM through agricultural lands dominated by wheat fields.

78. In Noorgal village the Fatima Basic Health Care Clinic is located 0.35 KM away from the line. Furthermore, Samiullah Khalil School is also located at 0.4 KM distance. Another floodway exists along the route in this portion at (Lat: 34.631822°, Lon: 70.804523°). Then starting from (Lat: 34.633437°, Lon: 70.818619°) the line passes through a rough mountainous steep terrain for about 0.5 KM. Ustad Fazlullah School is located at 0.25 KM distance from the line at (Lat: 34.685928°, Lon: 70.904480°) and enters Sawkay Bazar.

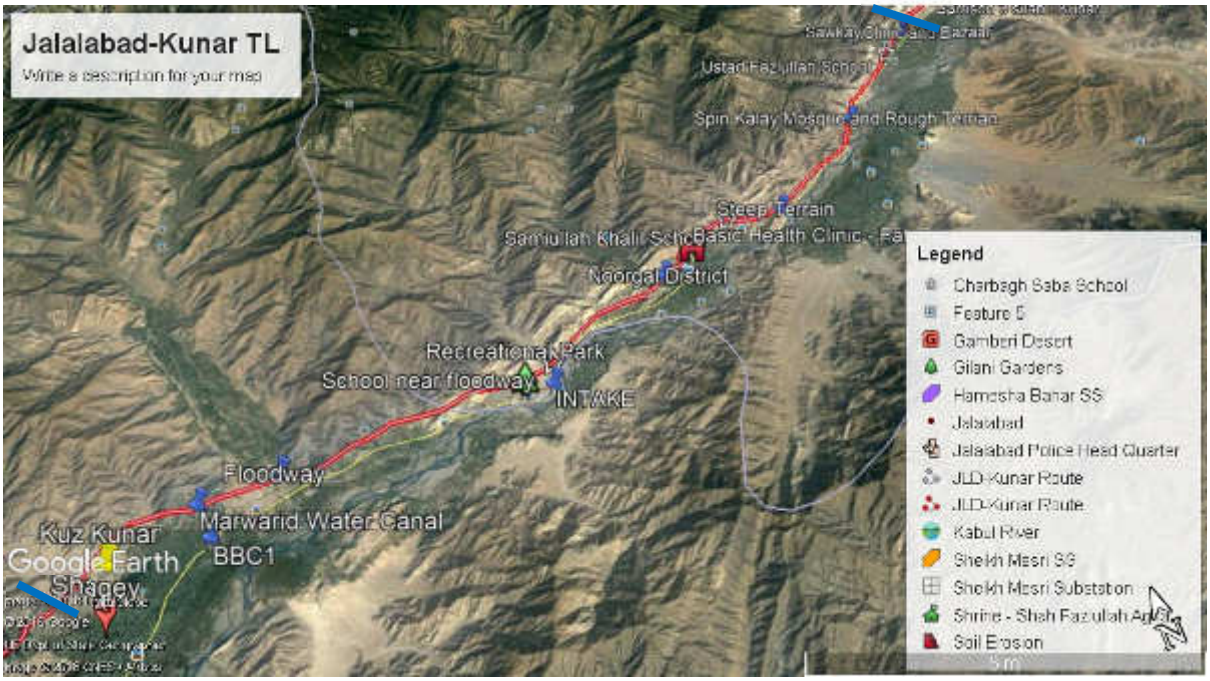


Figure 10 71.Shagey Village (Kuz-Kunar) to Sawkay Bazar (35-70 KM) transmission line route key features (vertical blue line on TL indicates this portion start and end point of the line)

Figure 11 Marwarid Canal near the transmission line

79. **<u>Sawkay Bazar to Kunar Substation end of Transmission Line (TL) (70 to 94 KM):</u>** This section of the line also passes parallel to the Jalalabad-Kunar main road along the mountainous terrain. The TL passes through five floodways. Chinar Religious School is located at 0.3 KM distance from the TL. Furthermore, the Kotkay School is also located at 0.12 KM distance from the TL. Narang Clinic is located at the 0.6 KM distance from the line. And finally, the TL ends at the new Kunar Substation located at Nawabad Village (Lat: 34.810762°, Lon: 71.110228°).

Figure 12 Sawkay Bazar to Kunar Substation end of transmission line route key features (vertical blue line on TL indicates this portion start and end point of the line)

Figure 13 Proposed Substation Location

Figure 14 Overall Transmission Line Route Overview

5. Description of the Environment (Baseline)

80. 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

81. The climate throughout the project area is classified as Hot desert (Jalalabad) and Hot-summer Mediterranean (Kunar-Asadabad) climates.

82. The climate of Nangarhar is categorized as BWh (*BWh* = Hot desert climate), by Köppen and Geiger {The Köppen climate classification is the widely used climate classification systems first published by Wladimir Köppen in 1884 later, on Rudolf Geiger introduced some changes to this classification system. This climate classification divides climates into five main groups, and each group being divided based on seasonal precipitation and temperature patterns. The five main groups are A (tropical), B (dry), C (temperate), D (continental), and E (polar).}

83. The average temperature in Nangarhar is 21.5 °C. About 206 mm of precipitation falls annually (Climate-data, 2018).

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	9.2	12.1	16.6	21	26.3	32.6	33.3	32.2	28.4	22.3	14.6	9.9
Min. Temperature (°C)	2.5	5.9	10.5	14.7	19	24.8	27	26.5	21.7	14.5	6.5	2.8
Max. Temperature (°C)	15.9	18.4	22.7	27.3	33.7	40.5	39.6	38	35.2	30.1	22.8	17.1
Avg. Temperature (°F)	48.6	53.8	61.9	69.8	79.3	90.7	91.9	90.0	83.1	72.1	58.3	49.8
Min. Temperature (°F)	36.5	42.6	50.9	58.5	66.2	76.6	80.6	79.7	71.1	58.1	43.7	37.0
Max. Temperature (°F)	60.6	65.1	72.9	81.1	92.7	104.9	103.3	100.4	95.4	86.2	73.0	62.8
Precipitation / Rainfall (mm)	19	27	43	46	20	2	7	3	3	8	9	19

Figure 15: Nangarhar weather annual data sheet (Climate-data, 2017)

84. Kunar-Asadabad's climate is categorized as warm and temperate. The rain here mostly falls in the winter, with relatively little rain in the summer. Asadabad is classified as Csa by Köppen and Geiger. The average annual temperature is 19.4°C and average precipitation here is 532 mm (Climate-data, 2018).

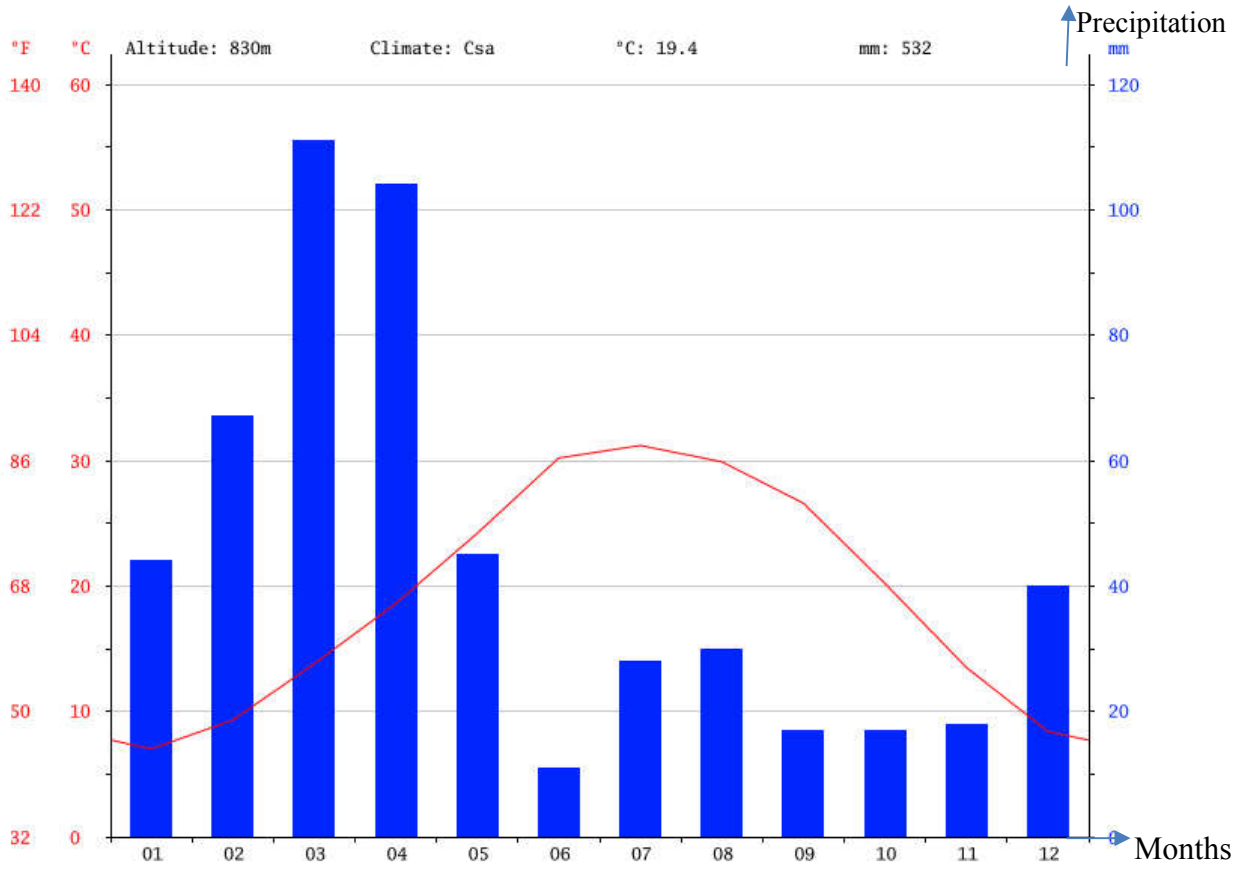


Figure 16 Kunar Climograph (Climate-data, 2018)

85. The minimum amount of rainfall in Kunar happens in June averaging 11 mm. In March, the precipitation touches its peak, averaging 111 mm. In July, the temperature peaks at around 31.2°C and the January is the coldest with an average of 7.0°C.

86. Urban air quality in the major city of Jalalabad is poor. The reasons for the high pollution level are both natural and anthropogenic. Among anthropogenic reasons is the rapid growth of the urban vehicle fleet with a high share of old and/or poorly maintained vehicles, rickshaws, substandard fuel, roads with poor surfaces generating fugitive dust, burning fuels, coal, and tires, and widespread use of diesel generators. Kunar relatively has cleaner air with little population density and industries as well as the existence of forests.

5.1.2 Geology and Soil

87. The transmission line route geology is mainly mountainous. Only at the start the 0–12 km route it passes through the relatively flat agricultural land.

88. 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.

5.1.3 Topography

89. In Kunar, the line goes through Rock Outcrop / Bare Soil, Sand Covered Areas, Sand Dunes and rocks. Almost 65% of the line passes through mountainous terrain, 20% passing through rolling to mountainous terrain and 15% through flat terrain.

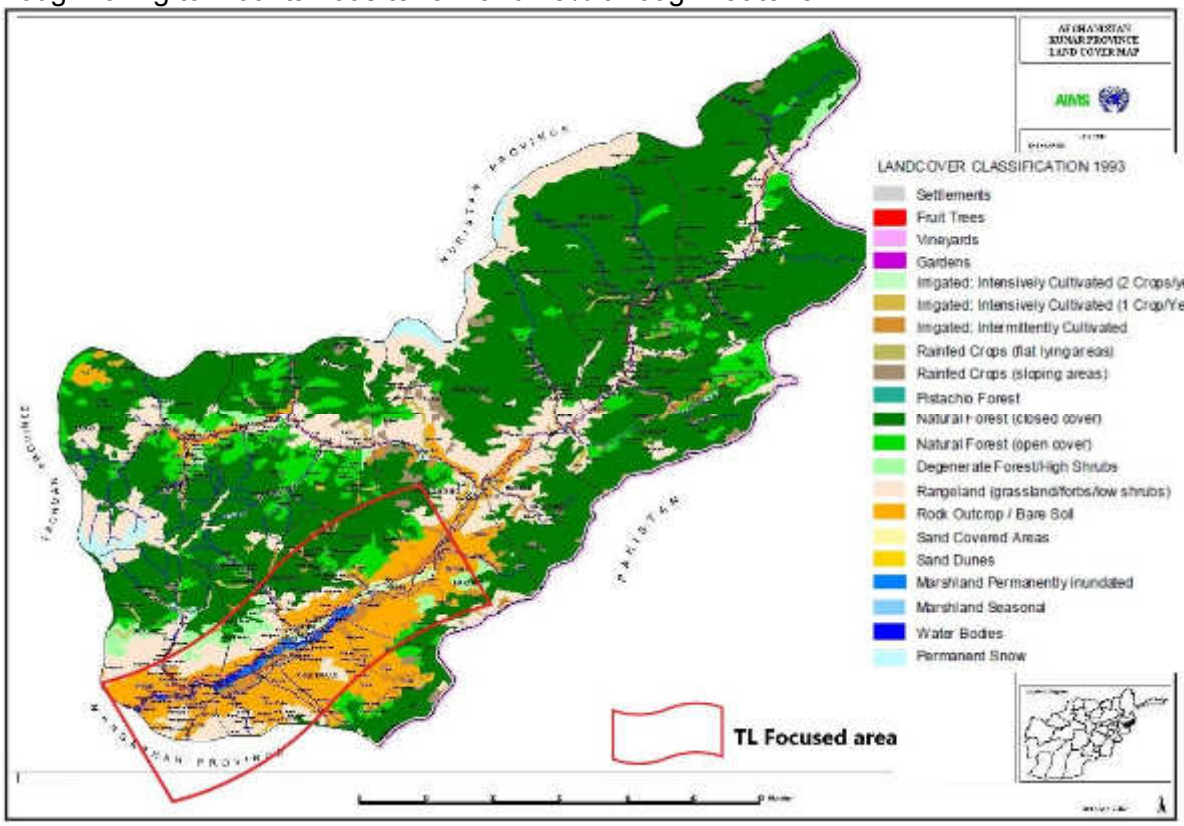


Figure 17 Kunar province land cover map (ucdavis.edu, 2012)

5.1.4 Seismicity

90. Two main sources of seismicity (Chaman and Konar (Kunar) faults) are present in the project area (Jalalabad and Kunar) which might contribute to appreciable seismic hazards.

91. 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.

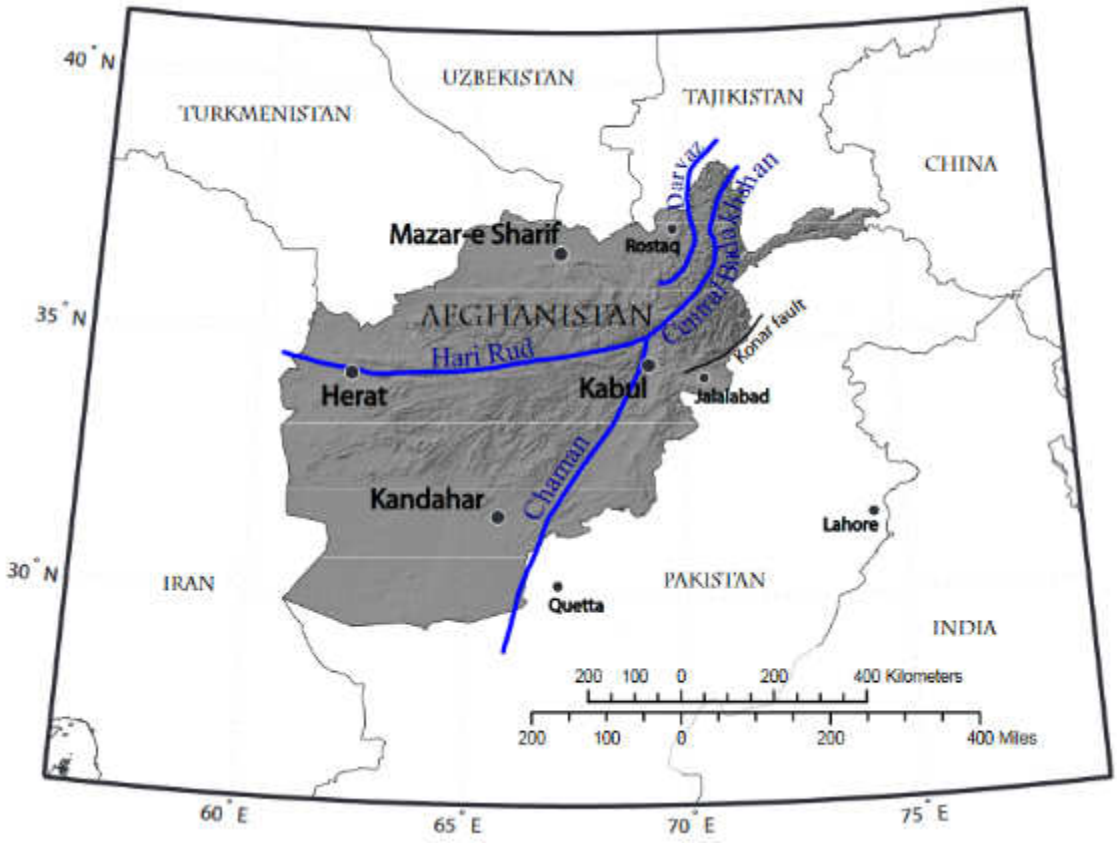


Figure 18: Map of Afghanistan showing the locations of modeled fault sources (heavy blue lines), (Boyd et al, 2007)

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

5.1.5 Surface Water

93. 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).

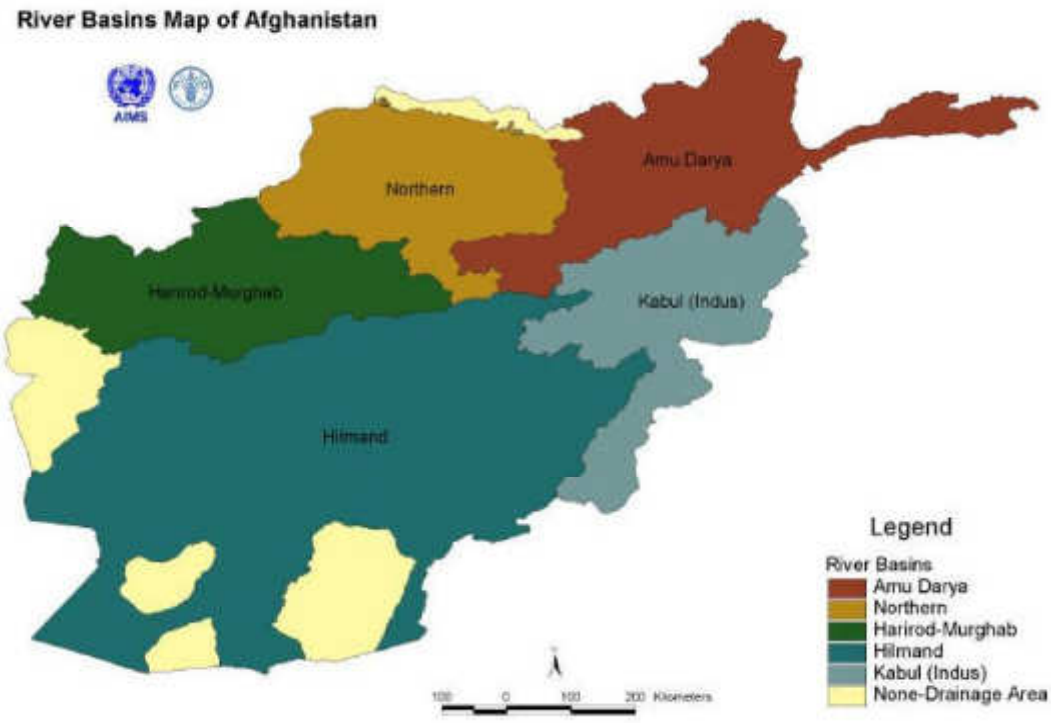


Figure 19: Afghanistan rivers basins map (UN-FAO, 2012)

94. The project is entirely located in the Kabul (Indus) river basin which comprises Kabul River and its tributaries such as Logar River, Pajsheer River, Surkhrod River and Kunar River. The transmission line route crosses Kabul River at (Lat: 34.457770°, Lon: 70.382524°) and goes parallel with Kunar River for the most part i.e. 55 km.

95. The Kunar river system is fed by melting glaciers and snow of the Hindu Kush Mountains. It is also part of the Indus watershed basin. In general, the peak flow of melted water occurs in spring.

Figure 20 Kunar River view at Asad Abad

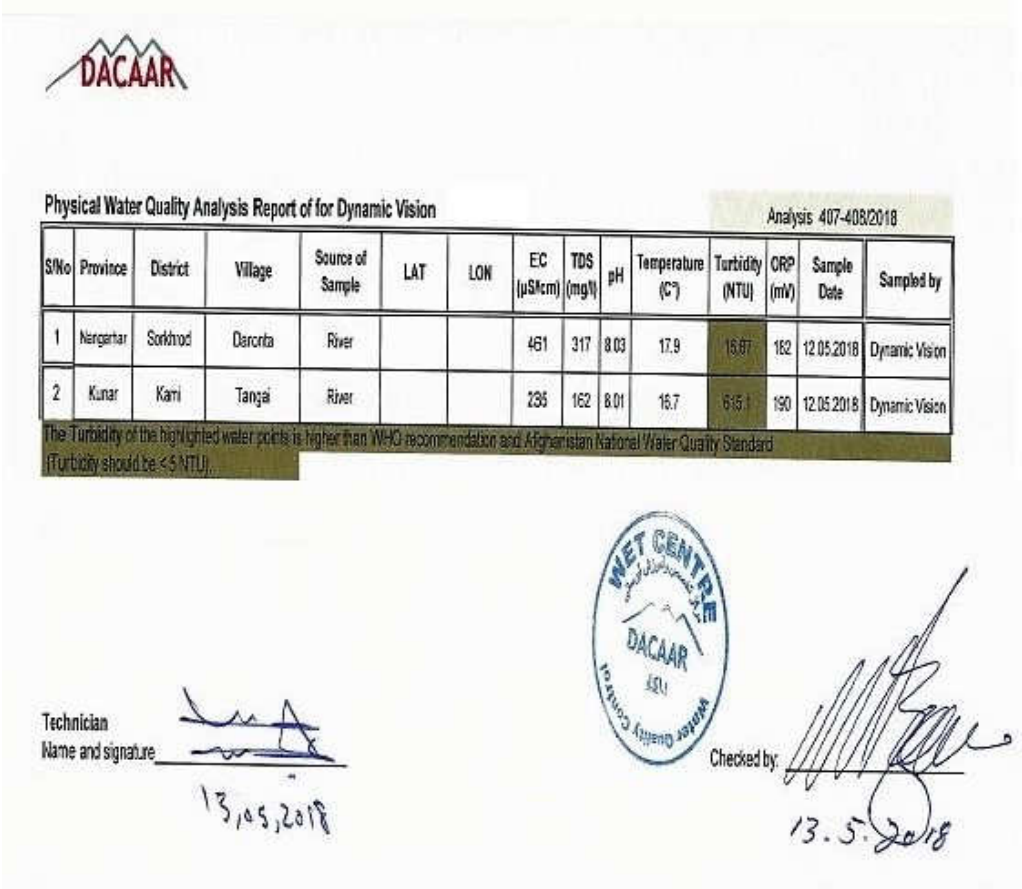
5.1.5.1 Surface Water Quality

96. Majority of the population does not have access to safe drinking water. This, in combination with a lack of sanitation and hygiene, has serious consequences for the health and well-being of the population.

97. We have analyzed both the Kunar and Kabul rivers water sample using Palintest water analysis technologies utilized by Danish Committee for Aid Afghan Refugees (DACAAR) water testing laboratory, and below table represents the physical laboratory test results:

Table 5: Kabul and Kunar Rivers Water Physical Test Analysis

No	Province	District	Source	EC (µS/cm)	TDS (mg/l)	pH	Turbidity	ORP (mV)	Sample Date
1	Nangarhar-Jalalabad	Surkh Rod	Kabul River	461	317	8.03	15.87	182	12/05/18
2	Kunar	Kama	Kunar River	235	162	8.01	615.1	190	12/05/18



DACAAR

Physical Water Quality Analysis Report of for Dynamic Vision

Analysis 407-408/2018

S/No	Province	District	Village	Source of Sample	LAT	LON	EC (µS/cm)	TDS (mg/l)	pH	Temperature (C°)	Turbidity (NTU)	ORP (mV)	Sample Date	Sampled by
1	Nangarhar	Sorkhrod	Daronta	River			461	317	8.03	17.9	16.67	162	12.05.2018	Dynamic Vision
2	Kunar	Kami	Tangai	River			236	162	8.01	16.7	6.65.1	190	12.05.2018	Dynamic Vision

The Turbidity of the highlighted water points is higher than WHO recommendation and Afghanistan National Water Quality Standard (Turbidity should be < 5 NTU).

WET CENTRE DACAAR Water Quality Control

Technician
Name and signature

13,05,2018

Checked by:

13.5.2018

Figure 21 Water physical test laboratory results

98. Based on FAO standards the pH values of 9.5 and above indicate high alkalinity while values of 3 and below indicate acidity. Low pH values help in effective chlorination but cause problems with corrosion. Values below 4 generally do not support living organisms in the marine environment. Drinking water should have a pH between 6.5 and 8.5 considering this both rivers pH values in the good range while the turbidity values are high above the World Health Organization (WHO) recommended rage of 5 NTU or below. As the results show both river water turbidity is above the WHO normal range for drinking water. Kunar River higher turbidity is because of the flooding season.

5.1.6 Groundwater

99. The project affected area groundwater flow is controlled from the groundwater recharge areas (foothills of mountains) ranges towards discharge areas in the mid to lower reaches of rivers valleys. The Quaternary aquifers of the area are likely to be recharged in foothills by rivers and streams coming from the high mountains and infiltrating into coarse-grained and fine-grained alluvial sediments. The recharge is likely to be highest during snowmelt season. Thus groundwater recharge is highly dependent on quantities of winter snowfall and rainfall. Further away from the mountains the recharge to the Neogene and Quaternary aquifer is likely to take place by infiltration of water through to the bed of perennial and seasonal Rivers and streams. In the irrigated areas substantial recharge is likely to occur via leakage from irrigation channels ditches and canals (Saffi, 2007). Below indicates groundwater quality study details performed by DACAAR.

Table 6: 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	Kama	Nangarhar	Qaleh yeAkhund	70.57511	34.41641	Tube Well	16.9	0.10	DACAAR
2	Kuz Konar	Nangarhar	Qalagay (Malakzai)	70.57033	34.55982	TW	15.5	0.10	DACAAR

Table 7: Groundwater level and Electro Conductivity (EC)

Water Level (m)					Electrical Conductivity (µS/cm)				Record Date	
ID	Average	Minimum	Maximum	Difference	Average	Minimum	Maximum	Difference	First Date	Last Date
1	8.7	6.3	10.4	4.07	584	548	660	112	03/05/05	16/12/06
2	3.1	2.5	3.5	1.02	657	561	789	228	03/05/05	14/12/06

Table 8: Physical, Chemical, and Bacteriological Analysis – Anions of the project area groundwaters (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	657	452	0.46	7.7	20.8	350	60	32	67	4	0.01	0.7	1.2	0	0.16	0.3	0.11	515.42	24/11/05
2	669	460	0.57	7.8	21.9	320	70	21	72	2	0.01	0.5	1	0	0.07	0.3	0.07	486.91	24/11/05

5.1.7 Acoustic Environment

100. 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 location have been recorded within a 1-hour period during the daytime period using Cirrus CR: 1710 Class 1 sound level meter.

101. The noise baseline in the project area varies and is from low to moderate. Outside the Jalalabad City the noise level low. The noise level in most of the transmission line route is 50-70 dBA. The main source of noise at Shaikh Mesri substation area is road traffic.

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

Detail	Measured Level
LAeq	53.2 dB
LAmax	71.9 dB

Figure 22 Shaikh Mesri Substation Area Noise Measurement

5.2 Ecological Baseline

5.2.1 Protected Areas

103. The only protected near the project area is the Nuristan Forest National Reserve (Nuristan) located around 30 KM away from the transmission line. Based on the IBAT database the two Important Bird and Biodiversity Area (IBA) located outside the project area is Nuristan (Pech and Waygal valleys) IBA and Safed Koh IBA through which birds might migrate.

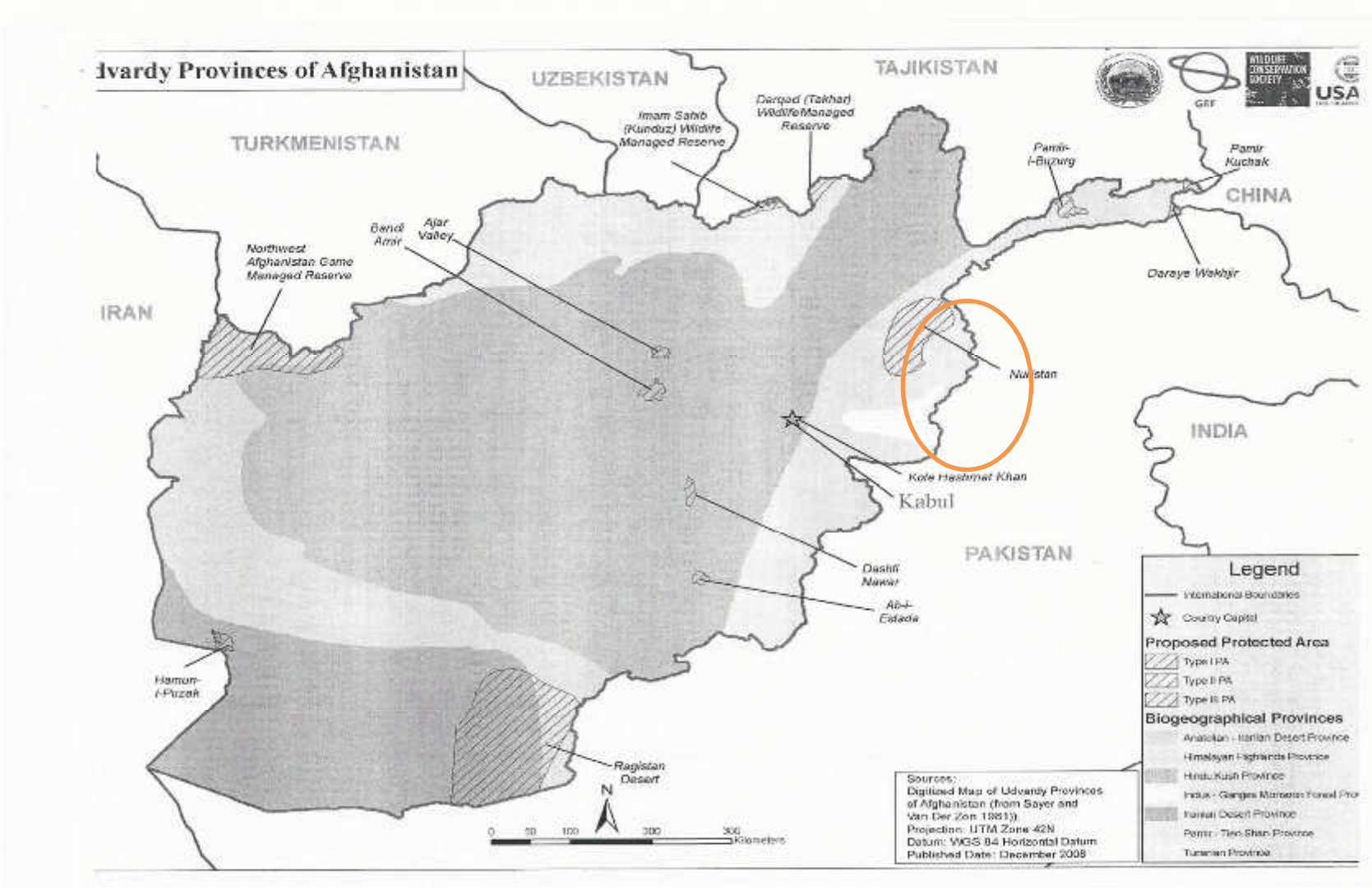


Figure 23 Afghanistan Protected Area Map

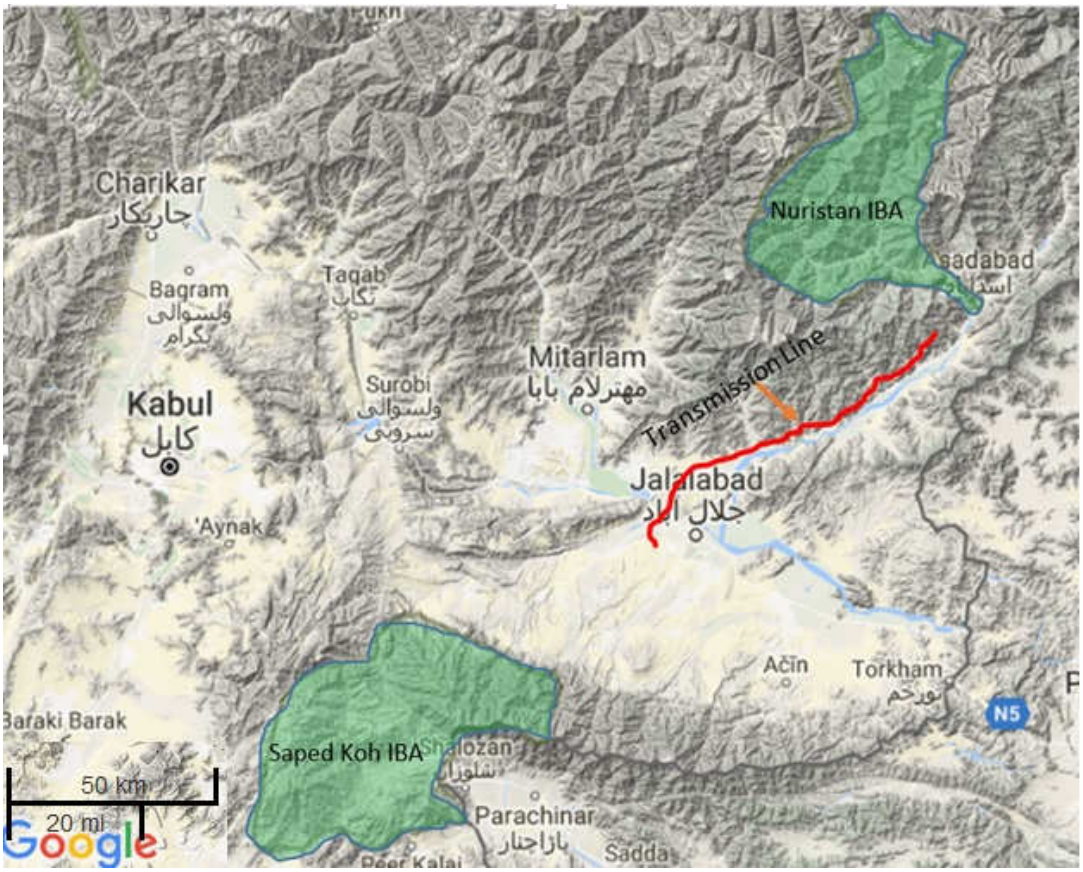


Figure 24. Nuristan and Safed Koh IBAs with respect to the TL (Birdlife.org, 2017-b)

5.2.2 Flora and Fauna

104. The project area climate provides support to a wide range of flora and fauna species. In the mountainous area, the common trees are oaks, deodar and wild olive in Kunar and Nuristan. In the arid regions, the common plants are locoweed, camel thorn, mimosa, spiny restharrow and wormwood, and a variety of sagebrush. There are a number of medicinal plants like rue, wormwood, and asafetida.

105. There are 15 to 20 types of important plants exist which are used in the production of medicine found in the mountains and plains areas of Kunar.

106. Non-bird biodiversity in the region contains Selenarctos thibetanus, Ursus arctos (rare), Uncia uncia, Panthera pardus (rare), Canis lupus, Capra falconeri and Macacca mulatta. Moschus sifanicus is thought to be extinct. Other notable species include Capra ibex sibericus, Prionailurus bengalensis, Petaurista petaurista and Hylopetes fimbriatus. In the project particular area, these species are very rare as the route is located around 25 KM away from the forest area. Only fox and jackals are reported in the project area. It is less likely that any endangered wildlife species live along the line corridor (Wildlife Conservation Society - WCS, 2009).

5.2.2.1 Avifauna

107. **Nuristan IBA:** Nuristan is a mountainous area, with granitic peaks of up to 6,300 m. The lower slopes of the valleys contain Quercus forest up to c.2,000 m, being replaced by coniferous forest up to c.3,000 m, above which is a narrow Juniperus zone. The highest, alpine zone receives little rain and is relatively barren.

108. Key biodiversity includes typical and representative west Himalayan breeding avifauna, with at least 53 breeding species. Other notable breeding species (some with very restricted world ranges) include Phylloscopus subviridis, Lophophorus impejanus, Pucrasia macrolopha, Aegithalos leucogenys, P. tytleri and Sitta cashmirensis. Phylloscopus trochiloides nitidus is a passage migrant (BirdLife International, 2018).

109. **Safed Koh:** This IBA occupies an area of 200,000 hectares. The upper zone of a range of mountains south-east of Kabul and bordering the Khyber Pakhtunkhwa Province province of Pakistan, from 2,000 m to over 3,000 m. Among known species in this area are: *Buteo rufinus, Tetraogallus himalayensis, Lophophorus impejanus, Psittacula himalayana, Picus squamatus, Anthus similis, A. roseatus* (breeds over Pakistan border), *Prunella strophiata, Turdus rubrocanus, Phylloscopus chloronotus* (breeds over Pakistan border), *P. occipitalis, P. subviridis, Muscicapa sibirica, M. ruficauda, Ficedula superciliaris, Aegithalos leucogenys, Parus melanolophus, P. rufonuchalis, Sitta leucopsis, S. cashmirensis, Certhia himalayana, Garrulus lanceolatus, Nucifraga caryocatactes, Corvus macrorhynchos, Dicrurus leucophaeus, Mycerobas carnipes* and *M. icterioides*. The closest distance of this IBS from the transmission line is 9.5 KM. This IBA meets A2 and A3 criteria (1994) of Global IBA Criteria (Birdlife.org, 2017-b).

5.3 Economic Development

5.3.1 Industries

110. 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. In the project area, around160

big and small factories are operating in Jalalabad.

111. Industries in Jalalabad has severely suffered due to lack of electricity. The main source of its electricity is the Soviet-era Daronta Dam and the hydroelectric plant built in 1964. Many industries have been closed because of electricity shortages in the region. Recently a 110 kV line has extended from Naghlu hydropower plant (HPP) to Kunar Asad Abad city with very limited capacity compared to the region demand.

112. Furthermore, In Jalalabad, there are around 2,500 poultry farms which have met a domestic need and generated thousands of jobs for people (Zarifi, 2017). While Kunar is known to have vast mineral resources.

5.3.2 Agriculture

113. Nangarhar can be called the food basket of Afghanistan. The province good environment is favorable for various crops during different seasons. There is a trend to increased production of vegetables due to favorable market demand and its price. Most farmers have livestock, with dominant sheep and goats. Nangarhar key export products are grape, orange, watermelon, walnut, potato, and pomegranate.

Table 9 Main agricultural corps of Nangarhar Province

FRUIT AND NUTS	GRAPE
	Orange, Olives, Watermelon
	Walnut/Mulberry
GRAINS	Wheat, Maize
VEGETABLES	Onion, Potato
INDUSTRIAL	Cotton, Sugarcane

114. According to the Ministry of Agriculture, Irrigation, and Livestock (MAIL) the Kunar Province agricultural land includes: 22,536 Hectares (Ha) is in forestry, 18,000 Ha is irrigated, 6,000 Ha is rainfed and 7,000 is fallow land. The livelihood of the people living in Kunar depends on animal farming and forests, as most of the area comprised of mountains, and agriculture is practiced on a very limited area which extends alongside Kunar River. The key crops of the Kunar area include wheat, barley, rice, maize/corn and various vegetables. Common crops grown in garden plots include fruit and nut trees, vegetables, grapes, and forages. Dried sugar and honey are the two small commercial agricultural enterprises in the province (ADAPT, 2010).

115. In Nangarhar province, some 59 % of rural households own or manage agricultural land or garden. Some 55% of rural households rely on agriculture as their main source of revenue. Some 28% of households in rural areas receive some income from trade and services and 40% of households in rural areas earn some income through nonfarm related labor. Livestock also accounts for income for 14% of rural households in Nangarhar (UCDAVIS, 2013). Most crops are cultivated by men in Nangarhar, except for vegetables, which are cultivated by both men and women. Harvesting is done by both men and women for all crop categories.

116. The main agriculture products in the project area include wheat, corn, potatoes, tomatoes, onions, garlic, and a few other vegetables in small or negligible quantities.

5.3.2.1 Fisheries

117. The transmission line passes through Kabul River and goes parallel with the Kunar River. Kabul River basin is dominated by a variety of cyprinid snow trout (Schizothoracini) and cobitids. Based on FAO report in the past production from the fish farms in Darunta (in 4 KM distance from the TL) and the adjacent Darunta Reservoir, reached 30 tons in 1973. In 1992 the Darunta Dam was extremely damaged in the war and recent statistics are not available.

118. 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

119. An asphalt highway exists connecting Jalalabad to Kunar. The transmission line mainly goes parallel to this road for around 60 KM.

5.3.4 Land use

120. Shaikh Mesri to Surkh Rod (12 KM) of the transmission line route mainly passes through the agricultural land. The remaining portion of the line passes largely through rangeland and mountainous terrain. The line route is select as such to avoid towns and villages and minimize the resettlement issues.

121. DABS has proposed an area for the substation to be constructed near Asad Abad. The area is located in a non-resident place with sufficient free land which can be utilized for the substation. The total available land is more than 20000 m^2.

5.3.5 Power Source and Transmission

122. There are currently three hydropower plants built on Kabul River, Mahipar (66 MW), Naghlu (100 MW) and Surobi (22 MW) these three plants are located in the Kabul province. Surobi and Mahipar are mainly providing electricity to Kabul while Naghlu provides electricity to both Kabul and Jalalabad cities. Furthermore, approximately 7 km west of Jalalabad on the Kabul River Daronta hydropower plant currently produce 11.5 MW energy to Jalalabad city. A 110 kV transmission line is connecting Naghlu Hydropower Plant (NPP) with Jalalabad city, built in 2011. In Kunar, there is a small micro hydropower operational with the capacity of 2x 0.35 MW.

5.4 Social and Cultural Resources

5.4.1 Demography

123. Based on Afghanistan Central Statistics Organization (2017) the total population of Nangarhar province is 1,573,973. The Kunar Province population is about 414,700 and approximately half 0f the population is male. 98% of the populations are Pashtun whereas 2% of the population is Nooristani and

Gujar. More than 50 percent of the population lives in dwellings in the foothills, whereas the rest of the inhabitants subsist on plains land near the Kunar River with 96% lives in rural areas.

124. Some 86% of Nangarhar population lives in rural areas, while the remaining inhabit the urban areas, mainly Jalalabad city. In terms of ethnicity, the main groups comprise Pashtuns (1st), Pashayee (2nd). Minority groups of Tajiks and Gujjars also live in this province. The province's major language is Pashto. Furthermore, during winter Nangarhar province witnesses more than 200,000 Kuchi migrants, and during summer this figure ranges from 50,000 to 100,000.

125. The Land Acquisition and Resettlement Plan (LARP) document which part of the tender package provides further socio-economic information about the project affected people and properties.

5.4.2 Health and Education Facilities

126. Nangarhar and Kunar provinces have 73 and 18 Basic Health Centers (BHC), 19 and 10 Comprehensive Health Centers (CHC), 3 and 1 District Hospitals (H3) and 3 and 1 Mobile Clinics (MOB) respectively. These details are shown in the below figures.

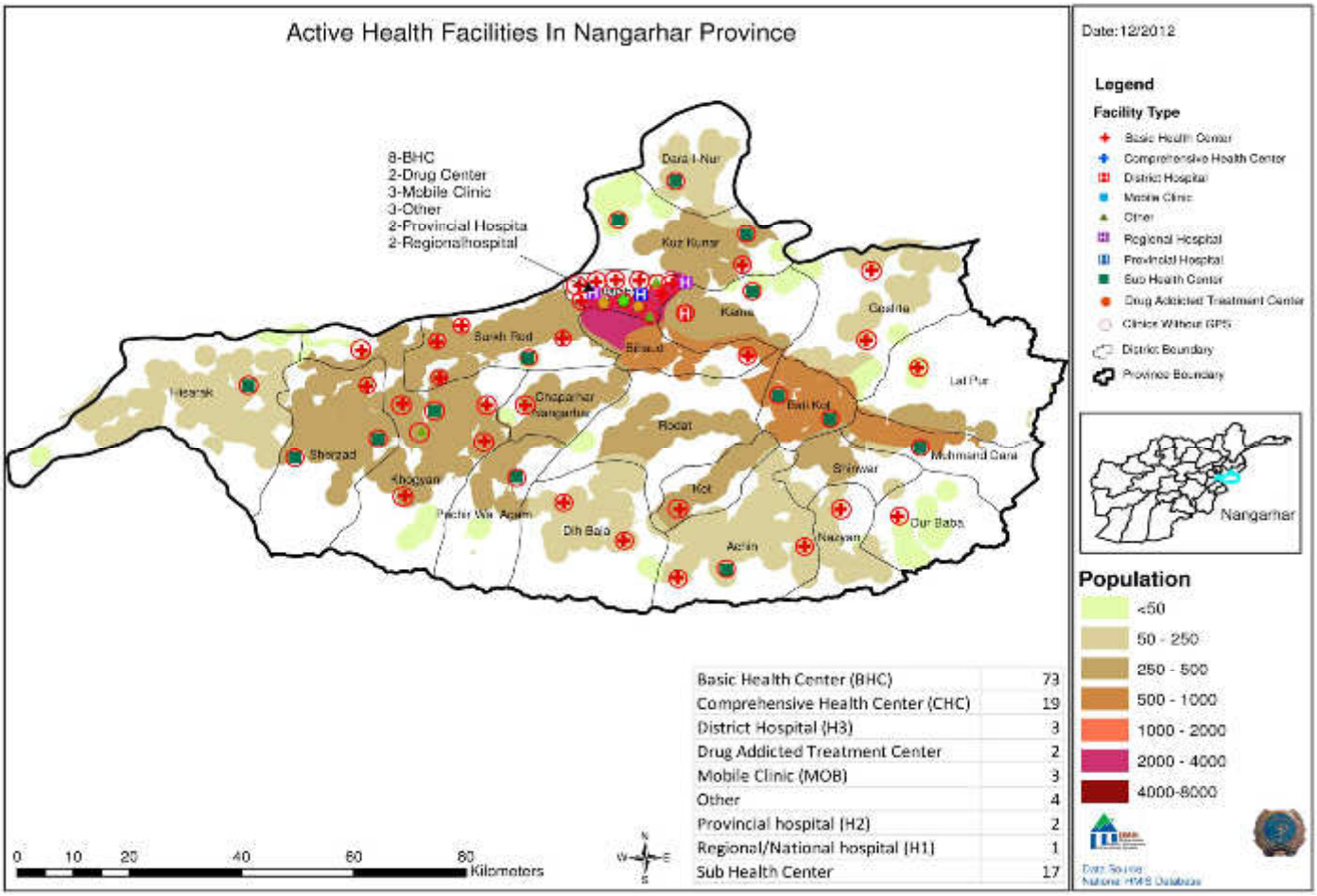


Figure 26 Nangarhar province active health facilities (MoPH, 2013)

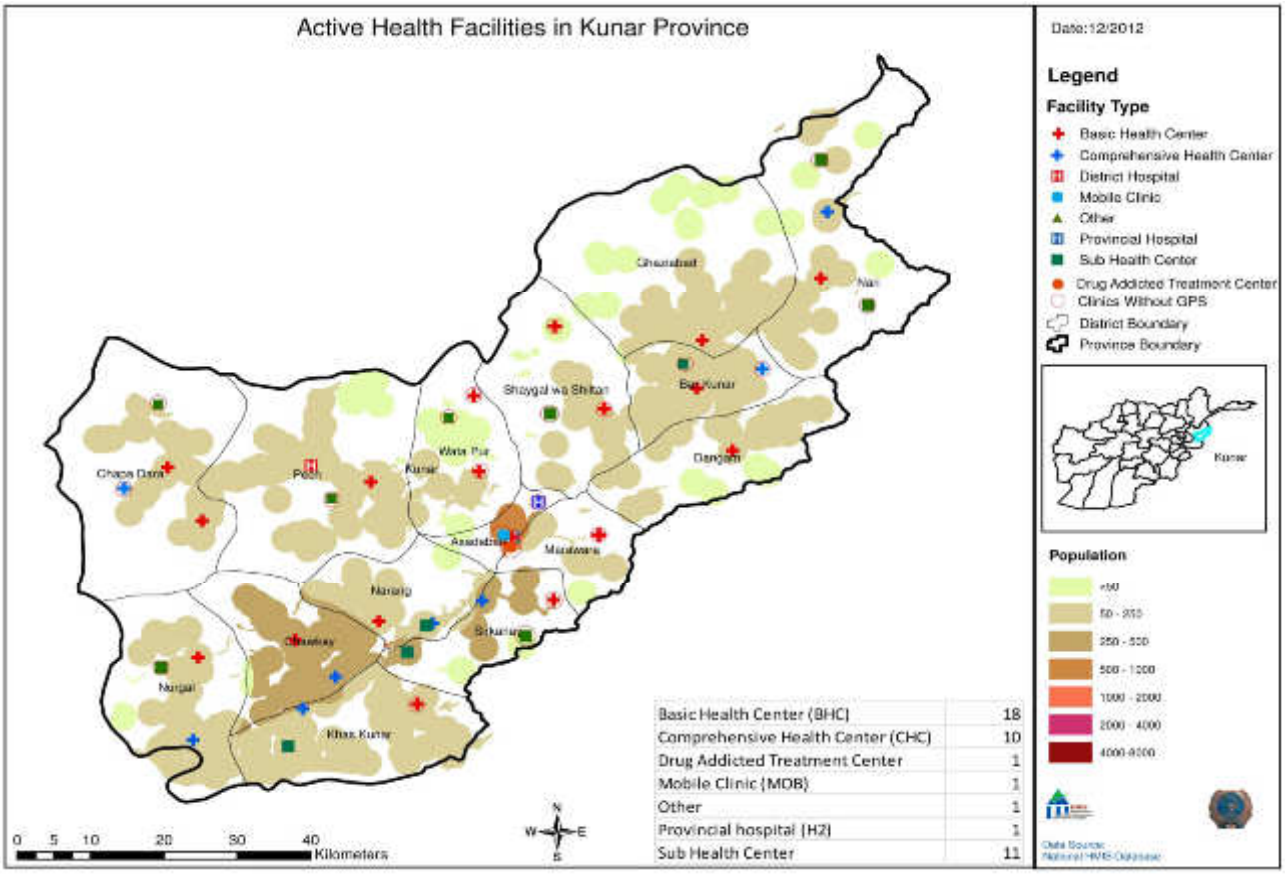


Figure 27: Kunar province health centers profile (MoPH, 2013)

127. The transmission line passes near (in 0.2 to 10 KM) distance of the following educational and health facilities: Chaharbagh-e-Saba High School, Shagey High School, Kashkowt School, Fatema Basic Health Clinic, Samiullah Khalil School, Ustad Fazlullah High School, Sawkay Clinic, Chinar Religious School, Kotkay School, Narang Clinic and Danduno High School.

5.4.3 Socio-economic Conditions and Employment

128. The project main beneficiary is Kunar province. More than 50 percent of the population lives in dwellings in the foothills, whereas the rest of the inhabitants subsist on plains land near the Kunar River. The population of Kunar is 96% rural. The literacy rate in the province has been estimated at 30 percent, which includes a meager 7 percent of females. The province is made up of about 90% mountainous and hilly terrain. Kunar is very scenic as it is the only province across Afghanistan whose hills contain forests.

129. The livelihood of the people living in Kunar depends on animal farming, agriculture, and forests. The major crops of the area include wheat, rice, barley, maize/corn and various vegetables. Agriculture is a major source of revenue for 74% of households with 79% of rural households owning or managing agricultural land or garden plots. Rural areas derive 33% of income from trade and services and 28% earn income through non-farm related labor. Livestock production provides income for 50% of rural families (ADAPT, 2010).

130. Nangarhar province which is located in the eastern part of Afghanistan. More than half of province is mountainous (55%) while the rest is made up of flat or semi-mountainous land.

Nangarhar is also one of the Kuchi (nomadic herdsmen) destinations during the different season (UCDAVIS, 2013).

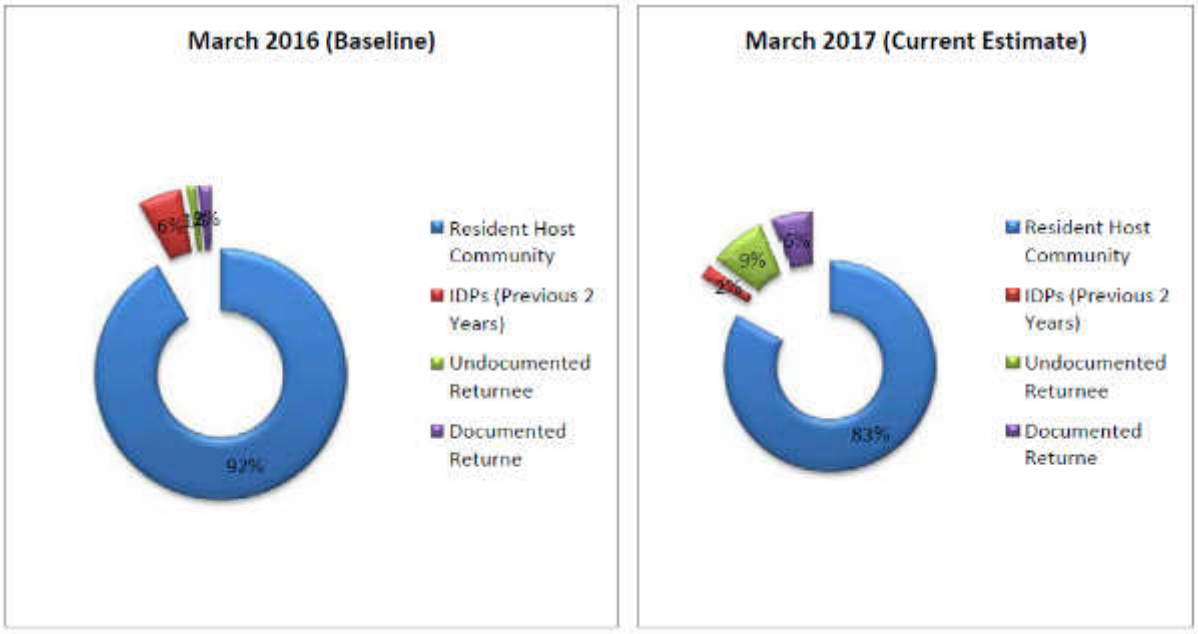


Figure 28 Nangarhar province demographics by status: baseline, current, and projection (EMMA, 2017)

5.4.4 Tourism

131. The project route has a significant tourism potential due to its rich cultural, historical heritage and attractive views. The major tourist attraction spot in the project area is Japani Garden (Japani Bagh). Furthermore, the coniferous forests on the mountains and the Kunar River make the area attractive to tourist but the volatile security condition in the area has affected tourism badly.

5.4.5 Archeological and Historical Heritage

132. Based on (Neelis, 2011) reliquaries and other artifacts from stupas and monasteries clustered around Haḍda also called Ada-Akhundzada (at 6.8 KM of the new substation planned to be constructed at Shaikh Mesri from where the line will initiate) show that this area was an important center of artistic and textual production with immediate ties to Gandhāra. Buddhist stupas and monasteries at Chahar Bagh, and Haḍda were already recognized as major sources of coins deposited in reliquaries as well as Buddhist sculptures before preliminary surveys by French Archaeological Mission (DAFA) excavations undertaken at sites around Haḍda. But currently, there is no sign of such artifacts in the Hadda area. All the sculptures of the site have been looted during the war. It is reported, however, that the area might have undiscovered underground heritage which is not known to the public. Shah Fazlullah shrine is also located near the transmission line:

Figure 29 Shah Fazlullah Shrine located at the 20 meters of the line in the Chahar Bagh village at (Lat: 34.425670°, Lon: 70.380350°).

6. Analysis of Alternatives

6.1 No Project Alternative

133. For the time being there is no alternative to this project as almost 90% of the Kunar province population lives without electricity connection. This TL project is the fasted way to electrify the province and bring stability to the people and industries. Furthermore, in future, this TL could be utilized to evacuate power from the under planned hydropower plants on Kunar river to Jalalabad and Kabul but these hydropower plants construction is time-consuming considering the trans-boundary water sharing issues, which will take approximately 15 to 20 years to be realized. Therefore, currently, this project is the only quick way to provide electricity to much-needed people and industries of Kunar province. Consequently, no project alternative is not feasible.

6.2 Transmission Line Route

134. At the start in Shaikh Mesri, there is only one possible route to cross the densely populated city of Jalalabad towards Daronta-Gamberi desert. From Gamberi onwards two routes have been studied Option #:1 (North-West of the Kunar River) Option #2: (South-East side of the Kunar River) as shown in below figure. After technically analyzing both options the Option #:1 has been selected based on the following reasons:

- Both options are going in the same valley between the mountains parallel to the Kunar River and to the mountainsides free space but Option #:2 is passing through relatively steeper and rougher mountainous terrines compared to Option #:1.

- Option #:2 is crossing the river twice while Option #1 does not cross the river.

- Based on the information gathered from the community elders, from security perspectives Option #:1 is much secured and safer compared to the Option #:2.

- Option #:1 is 5 KM shorter compared to Option #:2.

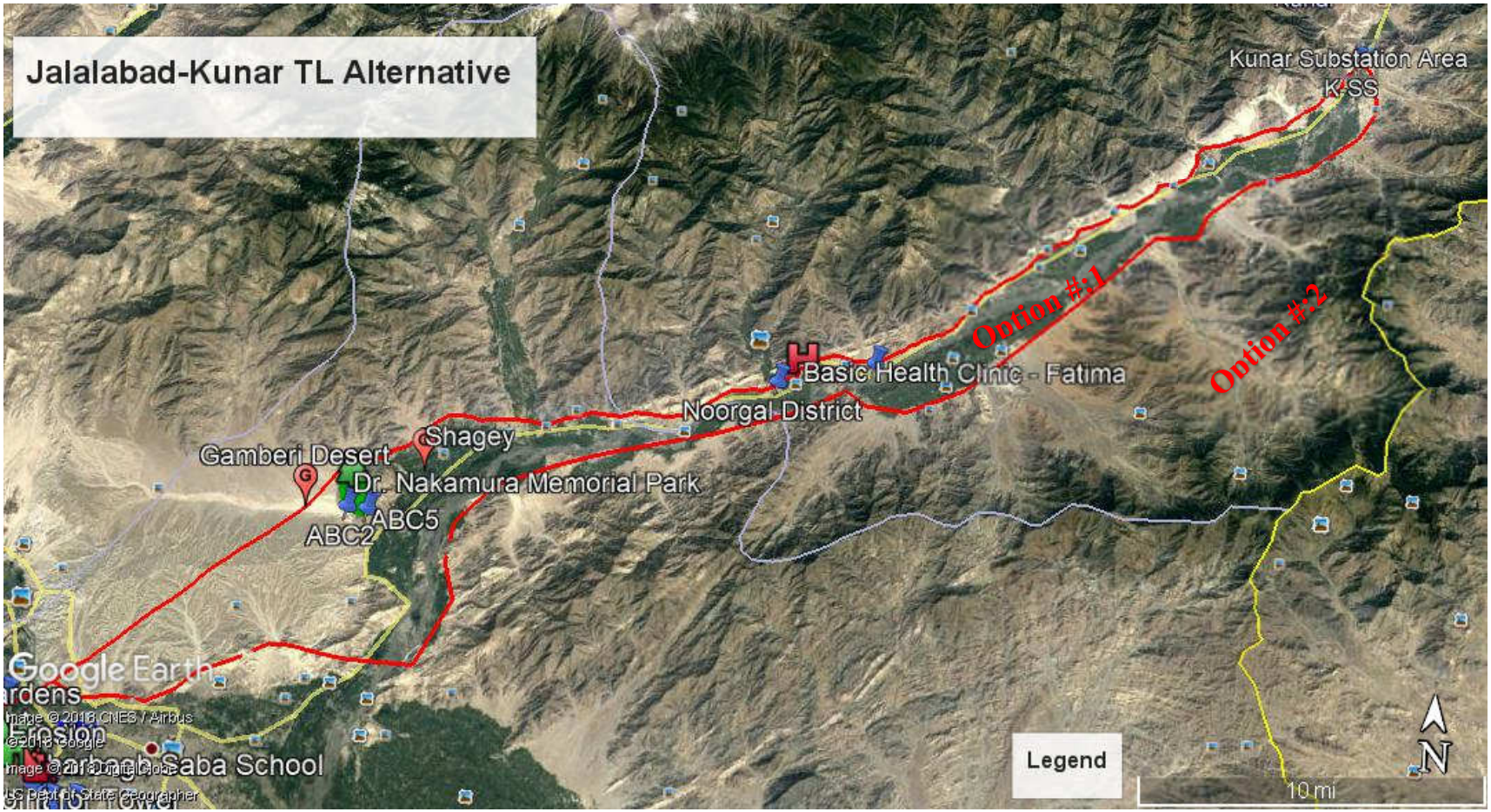


Figure 30 Line routing alternative options

6.3 Tower Design

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

A. Tubular steel

136. 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.

137. 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

138. 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.

139. 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).

140. 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.

141. 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.
- Special Towers for Kabul river crossing near Daronta Area.

7. Screening of Potential Environmental Impacts and Mitigation Measures[4]

142. 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

143. 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

144. 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.

145. 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.

146. 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.

147. 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

148. 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 soil erosion.

i. Seismicity

149. As mentioned in section (5) the project area is the Kunar fault zones. Research shows that

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

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.

150. 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

151. As mentioned earlier the route has rock-fall ad 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.

152. 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

153. 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 to prevent the public access (TEEIC, 2017).

7.1.3 Line Routing

154. 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).

155. 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 crosses Kabul River and Surkh Rod River.
- The line will pose visual effects to some extent on the topography of the area.
- Some land acquisition and resettlement activities are required in Kunar and Jalalabad areas.

156. 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.

157. 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 from Shagey village till Kunar Substation area.

7.2 Impacts and Mitigation Measures during the Construction Phase

158. 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).

159. 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.

160. 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)

161. 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

162. 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.

163. 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.

164. 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

165. 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

166. 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

167. 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.

168. As this project does not require a huge amount of construction work at a specific location except the Kunar 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.

169. 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

170. As mentioned earlier in section 5 there are schools and clinic 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

171. 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

172. 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.

173. 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.

174. 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.

175. 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 NO2 (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

176. 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.

177. 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.

178. During the route survey, two spots of soil erosion have been noticed. A soil erosion spot exists at (Lat: 34.448676°, Lon: 70.361510°) caused by Surkh Rod river and another one at Chahar Bagh at (Lat: 34.418138°, Lon: 70.394020°). 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.

Figure 31 soil erosion spot at Chaharbagh area

Figure 32 Soil erosion spot at Surkh Rod

179. 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

180. As mentioned in Section 5 the line route can trespass on underground historical and archeological resources particularly in the Hada area from where the TL will initiate. Furthermore, approximately 130 years old already damaged shrine of Shah Fazlullah Agha is located near the TL route which might be impacted during the transmission line construction phase.

Figure 33 Shah Fazlullah Shrine near the TL route at Chaharbagh village

181. 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).

182. 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).

183. 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

184. 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.

185. 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

186. 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.

187. 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

188. Almost 70 % of the route goes parallel with the Kunar River. 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.

189. 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 Kunar River.
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.

190. As the groundwater table in the transmission line corridor, Shaikh Mesri to Kunar Asad Abad can be observed at various depth from 20 to 50 meters, the risk of groundwater pollution is low even under sandy soils. 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.

191. 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 Kunar river (TEEIC, 2017).

7.2.1.7 Waste and Hazardous Material Management

192. 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.

193. 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.

194. 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)

195. Impacts on flora at the start 12 KM portion is relatively higher than the remaining portion of the line as in this portion the line passes through agricultural lands. Due to the location of the transmission line in open land of mountainous and hilly areas with almost no forest cover, 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.

196. The substation site proposed near Asad Abad is in a bare land with no agriculture and plants covered by gravel and sand.

197. 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.

198. 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.

199. 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.

200. 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

201. 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).

202. 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.

203. 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.

204. 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

205. 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.

206. 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.

207. 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.

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

- Provision of HSE Plan. The plan must be prepared by the contractor as part of SSEMP before construction commences;
- 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

209. 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.

210. 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.

211. 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.

212. 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).

213. 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

214. 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.

215. 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.

216. 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

217. 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.

218. 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.

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

Sulfur Hexafluoride (SF6):

220. 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”.

221. 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

222. 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

223. 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

224. 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).

225. 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).

226. 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

227. 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).

228. 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).

229. 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.

230. 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.

231. 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
-

232. 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.

233. 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.

234. 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.

235. 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

236. 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.

237. 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 and shall contain a summary of hydrogeological, and regulatory data related to this site. The report will also contain a description of proposed activities and an operations timeline. Additionally, 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

238. 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.

239. Drainage and stormwater management system for the entire substation land will be necessary since stormwater erosion and watercourses are observed at the site. There are stormwater canals already exist under the Jalalabad Ring Road located at the south side of the substation.

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

- Plant ground cover 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

241. 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.

242. 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

243. 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.

244. 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.

245. 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:**

246. It must be pointed out, that some power poles and wires pose a higher risk for a number of large birds than all road traffic. This transmission line is located between Safed Koh and Nuristan IBAs and birds might pass by the TL route between these IBAs. 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).

247. 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 from Shagey village to Kunar Substation, highway and rivers crossing, and other potential birds passing areas. In total approximately 160 firefly bird flapper/diverter must be installed in 100 to 150 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 34 firefly bird flapper/diverter recommended (or equivalent) for this transmission line (Birdbusters, 2017)

ii. Right-of-Way Maintenance

248. 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.

249. 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.

250. 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

251. 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 Kunar which will subsequently have positive social and economic impacts on communities. In addition, this line can be used to transfer the energy from potential hydropower plants planned in future to Jalalabad and Kabul. 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

252. 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.

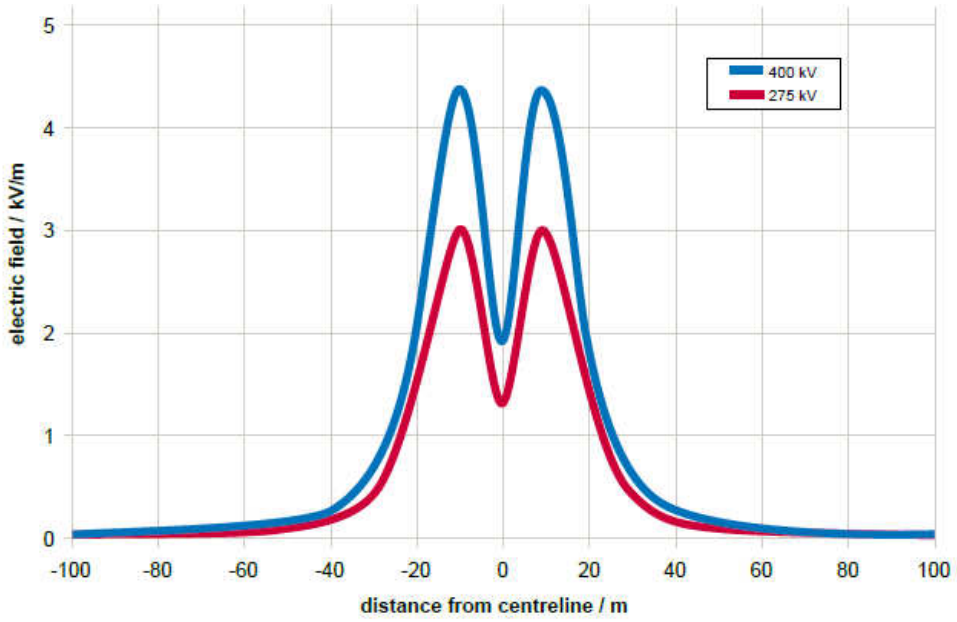


Figure 35 Overhead line typical electric fields (Nationalgrid, 2008)

253. 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.

254. 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:

- Provision of HSE Plan. The plan must be prepared before operation commences;
- 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.

255. 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.

256. 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

257. 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.

258. 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

259. 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

260. 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

261. 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

262. 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

263. 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

264. Consultation meetings were held with the potentially affected people along the transmission line route from Shaikh Mesri to Kunar Asad Abad. 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.

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

1. Kuz-Dandona and Bar-Dandona Kunar community consultation details

Jalalabad – Kunar Transmission Line - Community Consultation and Information Disclosure Participants Meeting Attendance Sheet			
Meeting Location	Kuz-Dandona and Bar-Dandona Kunar	**Date**	18.Mar.2018
Agenda	Awareness about electricity transmission line project Jalalabad-Kunar		

No	Name/F.Name	Duty	Contact No	Key Concerns Shared
1	Mohammad Yousuf/ Nooruddin	Community Elder	0779384930	1. Will the villages located along the route get access to electricity? 2. When is the project going to start? 3. Why the hydropower of the Kunar river not utilized? 4. The amount of energy supplied from Kabul through this line is not sufficient to Jalalabad so how could Kunar get the energy from this line?
2	Samiullah/Mohammad Sediq	CDC Head	0775589215	
3	Shairzada/Malik Ahmad	School Teacher	0708351563	
4	Mohammad Hanif/Shiar Hassan	Community Elder Council Head	0771501509	
5	Hassan Khan/Noor Mohammad	Kuz-Dandona Community Elder, and Cashier	0771501508	

6	Haji Mohammad Ghafar/Abdul Mukhtar	Head of Village Council	0700852671	5. How and who will compensate the affected land, property and crops?
7	Haji Habiburrahman/Mohammad Yousuf	Community Elder	0700596886	
8	Rahmatullah/Fazil Rahman	Community Elder		
9	Abdul Ghani/Talib	Community Elder	0796508165	
10	Eng. Attaullah/Lalgul	Community Member	0729002532	
11	Haji Hazratullah/Atta Mohammad	Community Member	0729933295	

Table 11: Kuz-Dandona and Bar-Dandona Kunar community consultation details

Figure 36: Kuz-Dandona and Bar-Dandona Kunar Community Consultation Meeting

2. Bar Kandona Village community consultation meeting details

Jalalabad – Kunar Transmission Line - Community Consultation and Information Disclosure Participants Meeting Attendance Sheet				
Meeting Location		Bar Kandona Village	**Date**	17/Mar/2018
Agenda		Awareness about electricity transmission line project Jalalabad-Kunar		
No	**Name**	**Position**	**Contact No**	**Remarks**
1	Attaullah	Operational Manager	0729002532	

2	Haji Hazrat Mohammad	Procurement Manager	0729933259	1. Will the local community workforce be utilized for this project? 2. The amount of energy supplied from Kabul through this line is not sufficient to Jalalabad so how could Kunar get the energy from this line? 3. How and who will compensate the affected land, property and crops?
3	Gul Sediq	Teacher	0700641934	
4	Samiullah	Community Elder Head	0775589215	
5	Shahzada	An official at Arazi Authority	0797032856	
6	Mohammad Ameen	An official at Statistics Org.	0770761126	
7	Mohammad Salim	Responsible for the depreciation of electricity transmission	0799447511	

Table 12: Bar Kandona Village community consultation meeting details

Figure 37: Bar Kunarona Village Community Consultation Meeting

3. Surkh-Rod District Community Development Council (CDC) Head office Meeting

Jalalabad – Kunar Transmission Line - Community Consultation and Information Disclosure Participants Meeting Attendance Sheet				
Meeting Location	Surkh-Rod district CDC Head Office	**Date**	10/April/2018	
Agenda	Awareness about electricity transmission line project Jalalabad-Kunar			
No	**Name**	**Position**	**Contact No**	**Remarks**
1	Fazel Mohammad	Community Elder	0799447961	1. The power dispatched from Kabul to Shaikh Mesri substation is not sufficient for Jalalabad existing demand so how you will transmit it to Kunar. 2. Why the government doesn't invest in domestic energy generation instead of import power.
2	Haji Malik Ghufran	Community Elder	0731382384	
3	Malik Mohammad	Community Elder	0772279793	
4	Malik Sharifullah	Community Elder	0784718467	
5	Haji Mohammad Arif	Community Elder	0700696718	
6	Haji Abdul Ghafar	Community Elder	0778436149	
7	Mailk Mohammad Afzal	Community Elder	070898028	
8	Said Rahman	Haji Sahiban Village Elder	0784547675	
9	Malik Salam	Community Elder	0791919600	
10	Haji M. Anwar Ikram	Surkh-Rod Community Council Head	0782005767	

11	Eng. Sharafzai	DABS employee	0728437413	

Table 13: Surkh-Rod District Community Development Council (CDC) Head office Meeting

Figure 38 Community Consultation Meeting at Surkh-Rod district CDC Head Office

4. Jalalabad DABS Directorate meeting details:

Jalalabad – Kunar Transmission Line - Community Consultation and Information Disclosure Participants Meeting Attendance Sheet				
Meeting Location		Jalalabad DABS Directorate	**Date**	07.Apr.2018
Agenda		Awareness about electricity transmission line project Jalalabad-Kunar		
No	**Name**	**Position**	**Contact No**	**Key Concerns**
1	Eng. Sufi Shah	Power System Expert	+93799526779	1. The power allocated for the east zone through Arghandeh-Jalalabad line is very less compared to the existing demand.
2	Saadatullah Ahmadzai	IEE specialist		
3	Eng. Nazim	Plan & Energy Manager	+93 72900 2068	
4	Omid Sabah	Director of Nangarhar DABS		

5	Eng. Salim Yahya	LARP Specialist	0799447961	2. When the document will be completed and advertised for bidding. 3. The route of the Kabul-Jalalabad line is insecure and need to be discussed with security officials to make the project possible and dispatch the power to Jalalabad and Kunar. 4. The transformer capacity considered for Shaikh Mesri is not sufficient and we might face problems providing power to Kunar. 5. The route survey must avoid resettlement issues at possible extent.

Table 14 Jalalabad DABS Directorate meeting details

266. 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 traditional (tribal) Jarga or the government established institutions. Furthermore, the Community Development Councils (CDC) were also mentioned. Some community elders expressed their concerns regarding the compensation payments and mentioned that the compensation money would not cover losses adequately. The project LARP expert assured them about the fair and transparent procedures. Further details can be found in the LARP document.

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

- Will the villages located along the route get access to electricity?
- When is the project going to start?
- The power dispatched from Kabul to Shaikh Mesri substation is not sufficient for Jalalabad existing demand so how you will transmit it to Kunar.
- Why the government doesn't invest in domestic energy generation instead of import power.
- How and who will compensate the affected land, property and crops?

9. Institutional Requirements and Environmental Monitoring Plan

9.1 Institutional Requirements

268. 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.

269. 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 15: 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

270. 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).

271. 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

272. 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.

273. 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.

274. 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.

275. 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

276. 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.

277. 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

278. 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 16 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	3,000
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 [5]	Detailed in EMP section 14.2.1	10,000
CONTINGENCY	Contingency	4,000
TOTAL	**253,000**	

[5] An environmental monitoring specialist has been considered for all the duration of the plant lifecycle (30 Years) with approximate 1,000 USD/month cost. The turnkey contractor is not responsible for this portion and should not consider it in the EMP cost.

10. Grievance Redress Mechanism (GRM)

279. 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.

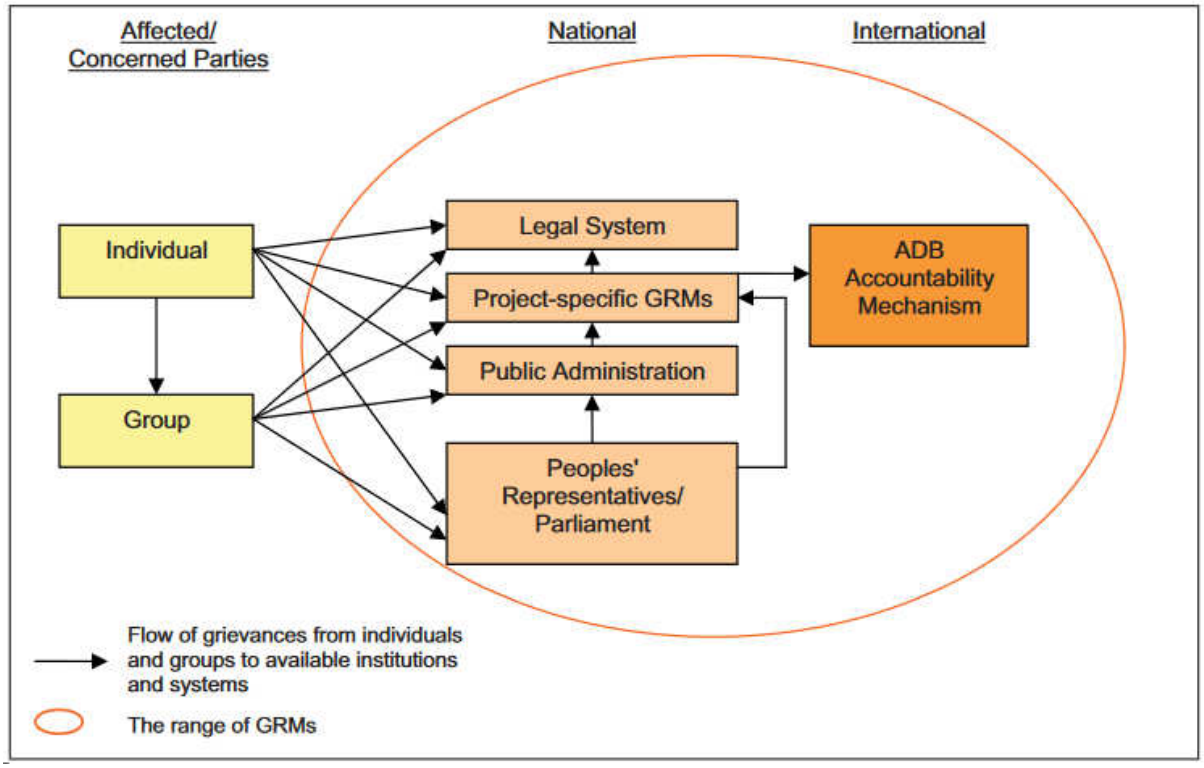


Figure 39 Systems and Institutions for Grievance Redress Available to Affected Persons (ADB, 2010)

280. 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 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.

281. 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.

282. 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.

283. 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.

284. 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.

285. 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.

286. 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.

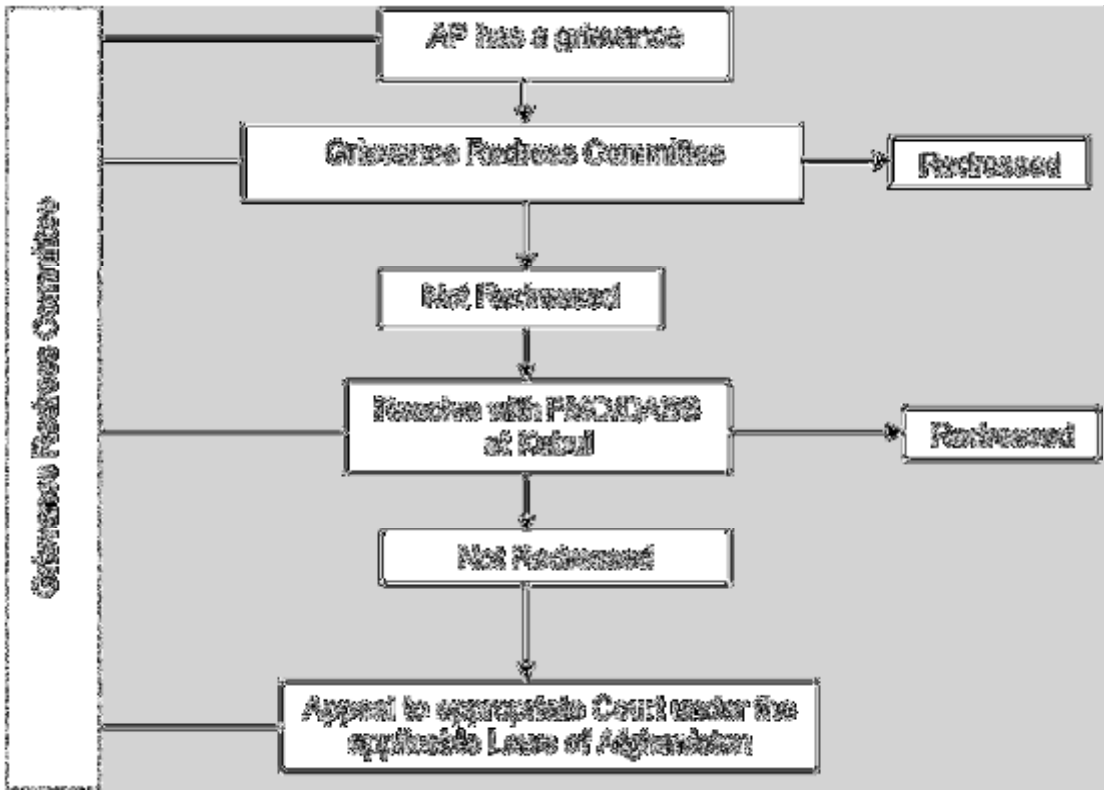


Figure 40 Grievances Redress Chart

287. 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.

288. 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

289. 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 and access to energy. The industry will grow and will create short and long-term job opportunities for people.

290. 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.

291. 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 between two IBAs of Nuristan and Safed Koh IBA which are located at around 30 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.

292. 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.
293. As the line route passes through areas which might contain archeological artifacts such as the in Surkhrod district. 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.

294. 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

- Based on Jalalabad DABS directorate the energy allocated for Jalalabad Shaikh Mesri of 2x16 is not sufficient and must be reconsidered by DABS HQ as the demand there in Jalalabad is 140 MW with the served demand of 54 MW and increasing. Therefore, it is recommended to increase the substation capacity to serve the much-needed demand.
- To make sure that the proposed mitigation measures are implemented and negative impacts are avoided, the measures should be included in the contract specification of the project.
- 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

295. The project will have both positive and negative environmental impacts. Implementation of appropriate mitigation measures during design, construction, and operation phases will minimize the negative impacts of the project to acceptable levels.

296. 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)

297. 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 17: 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. • The IEE/EMP should be updated based on the detailed design.	Turnkey Contractor	Project Supervision Consultant (PSC) and EA	During design prior to construction

Issue	Section Explained	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
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 18: EMP for the Construction Phase[6]

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 communicate and hear high-frequency sounds and even	Medium	• The application of Engineering and Administrative methods for noise control • Noisy construction activities should not be allowed during nighttime, particularly near the identified sensitive receptors.	Turnkey Contractor	PSC and EA	During construction

[6] 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
		permanent hearing loss		• 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. • 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.	Turnkey Contractor	PSC and EA	During construction
Impacts on Soils and Geologic Resources	6.2.1.4	➢ Soil erosion ➢ Soil nutrient loss ➢ Altering drainage patterns accelerates	Medium	• Obtain material from authorized and permitted sites. • Inspect and maintain project facilities regularly, including access roads, to ensure	Turnkey Contractor	PSC and EA	During construction

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
		erosion and creates slope instability		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 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 the area of potential effect.	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		• 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.			
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	Turnkey Contractor	PSC and EA	During construction

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
				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			
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	Turnkey Contractor	PSC and EA	During construction

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
				protect the equipment and the general public.			

Table 19: 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 herbicide contamination during vegetation management (e.g., from accidental spills) and wastewater disposal	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. • 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.	DABS	NEPA	During Operation

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
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. • 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.	Turnkey Contractor and DABS	NEPA	During Operation
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		NEPA	

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
				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. • 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 evidence of invasive species introduction or spread.	DABS	NEPA	During maintenance
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	DABS and contractor	NEPA	Design and during and before the operation

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
				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.			
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. • Discharge equipment to be worked on and place safety	DABS	NEPA	During Operation and Maintenance

Issue	Reference Heading No.	Potential Impacts	Severity	Mitigation Measures	Implementing Agency	Supervision By	Time for Implementation
				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 20: 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, ➢ Compensation payments (see LARP), ➢ Access road design, ➢ Design of river crossings	• Avoidance of environmental and social impacts during line routing, • Avoidance of resettlement requirements • Towers shall not be located near river banks and flooding areas • Towers shall be located with	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

	➢ Special tower consideration for the line crossover	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 ➢ Construction standards	• Monitoring of good construction standards; • Monitoring of correct implementation of construction manual, especially related to vehicle use and maintenance	Work areas and nearby sensitive receptors	Laboratory measurements of air samples Visual control	Before start of construction and then quarterly during construction	Contractor and PSC	During construction
Pollution of Surface Water	➢ Good construction principles at river crossings ➢ Location of towers no closer than 50 m to flooding areas	• Visual control of downstream water quality (turbidity), • Regular measurements of	Line sections with river crossings, substation sites	Visual Control, Measurements and Analysis of basic surface water parameters (EC, pH, DO, TSS,	Before start of construction and then quarterly	EHS Auditor, PSC	During Construction

	➢ No pollution sources near rivers	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		BOD, Oil, and grease, Lead, E. Coli), sampling within 100 meters upstream and downstream of river crossings and substation sites	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).	Before start of construction and then quarterly 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	• Monitoring of final design, including specifications of tower locations and height of towers, location, and length of access roads,	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

	routing of new access roads ➢ Implementation of Avifauna protection measures	• Monitoring of tree cutting, enforcement of prohibition, • Monitoring of implementation of bird flappers/ markers. • Monitor birds mortality rate 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, prevention of work	All work areas, Workers camps, Substation sites	Visual Control of EHS Management Plan implementation	Daily during construction	EHS Auditor, Contractor, and PSC	During construction

		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 21: 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

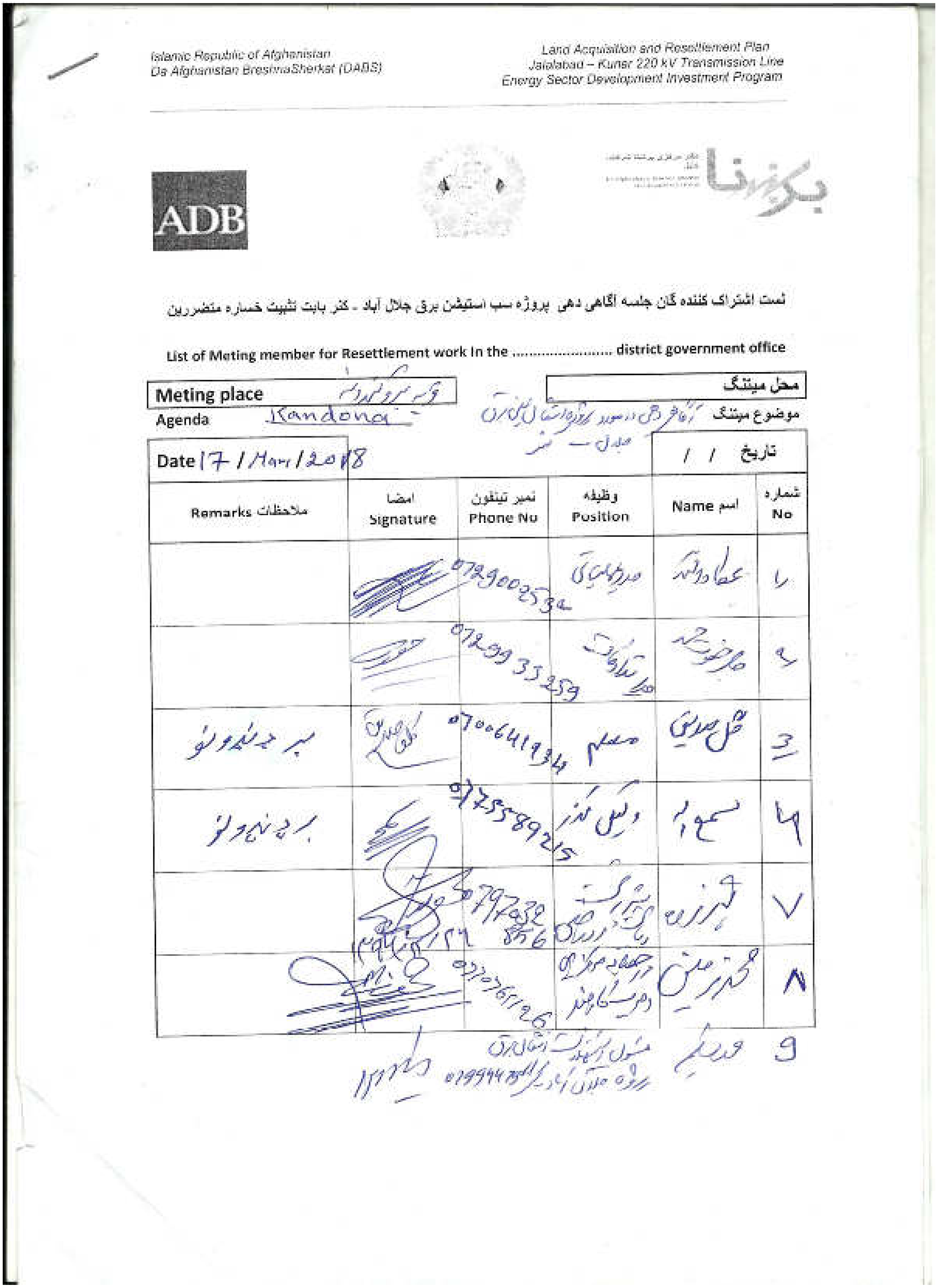
Issue / Potential Impact	Parameters to be monitored	Monitoring Action	Location	Measurements	Frequency	Monitoring and Reporting Responsibility	Project Phase
Decommissioning	➢ A repeat of mitigation measures used in construction stage to minimize impacts to on environment during construction ➢ Use topsoil 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

14.3 Appendix C

14.3.1 Project Site Visit Photos

Figure 41 Environmental team during Noise level survey

Figure 42 Kunar Substation site inspection along with Kunar DABS head (center), Jalalabad DABS planning head (right) and DV power system expert (left)



Islamic Republic of Afghanistan
Da Afghanistan BreshnaSherkat (DABS)

Land Acquisition and Resettlement Plan
Jalalabad – Kunar 220 kV Transmission Line
Energy Sector Development Investment Program

ADB

لست اشتراک کننده گان جلسه آگاهی دهی پروژه سب استیشن برق جلال آباد - کنر بابت تثبیت خساره متضررین

List of Meting member for Resettlement work In the .... district government office

Meting place — محل میتنگ

Agenda Kandona — موضوع میتنگ

Date 17 / Mar / 2018 — تاریخ / /

Remarks ملاحظات	امضا Signature	نمبر تیلفون Phone No	وظیفه Position	اسم Name	شماره No
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	[illegible]	0799933259	[illegible]	[illegible]	٢
[illegible]	[illegible]	0700641934	معلم	[illegible]	٣
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Figure 43 Community consultation attendance sheet sample in Bar Kunarona