



Environmental Assessment Report

Initial Environmental Examination
Project Number: 42094
November 2009

MFF 0026-AFG: Multitranche Financing Facility for the Energy Sector Development Program Proposed Project 2

Kabul Distribution and Transmission Rehabilitation and Expansion

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ABBREVIATIONS

ADB	–	Asian Development Bank
CSC	–	Construction Supervision Consultant
DABS	–	Da Afghanistan Breshna Sherkat
EIA	–	Environmental Impact Assessment
EMF	–	Electric and Magnetic Fields
EMP	–	Environmental Management Plan
EMP	–	Environmental Monitoring Plan
ha	–	Hectare
IEE	–	Initial Environmental Examination
IEIA	–	Initial Environmental Impact Assessment
LV	–	Low voltage
MM	–	Man month
MOI	–	Ministry of Interior
MV	–	Medium voltage
NEPA	–	National Environmental Protection Agency
NGO	–	Nongovernmental Organization
PCB	–	Poly Chlorinated Biphenyl
PIU	–	Project Implementation Unit
PPTA	–	Project Preparatory Technical Assistance
ROW	–	Right-of-Way
SEIA	–	Summary Environmental Impact Assessment
SIEE	–	Summary Initial Environmental Examination
TA	–	Technical Assistance
TOR	–	Terms of Reference
UNEP	–	United Nations Environment Programme
UNMACA	–	United Nations Mine Action Centre for Afghanistan
ZOI	–	Zone of Influence

Units

cm	–	Centimeter
°C	–	Degree Celsius
dB(A)	–	A-weighted decibel
GWh	–	Giga watt hour
kg	–	Kilogram
km	–	Kilometer
kV	–	Kilo volt
kW	–	Kilo watt
m	–	Meter
mg/L	–	Milligram per liter
mm	–	Millimeter
m ³ /s	–	Cubic meters per second
MW	–	Mega watt

1. Introduction

1. Years of conflict have left Afghanistan as one of the poorest post-conflict countries in the Asia and Pacific region. Currently, the country has severely damaged power generation, transmission, and distribution systems, leaving most of the country's 28 million people with no access to reliable, modern forms of energy. Only about 9% of the country has access to electricity. More than 85% of Afghanistan's energy needs are met by traditional fuels and more than 80% of the population who depends on these traditional sources live in rural areas. Use of fuel wood, crop residue and kerosene has led to serious deforestation, adverse impacts on watersheds, air quality and human health.

2. Expansion to the North-East Power System (NEPS) to anticipate the increase in power supplied from Tajikistan and Uzbekistan will benefit the population by sustaining a better and cost-effective power supply grid. A new double-circuit transmission line will be laid out between Chintala and Pul-e-Khumri during this expansion project to distribute electricity to the Kabul region. The focus of this Initial Environmental Examination (IEE) is to study the environmental impact of such expansion activities on the southwest rural region of Kabul.

3. With readily available electricity, industrial and commercial developments can utilize better technologies, which are often more efficient and pollute less. Since electricity is cheaper and healthier than kerosene and fuel wood, the Project will be improving the standard of living in the rural regions through its direct and induced positive impacts for the environment through less habitat destruction through fuel wood collection. Healthcare, education, and government services will also be enhanced with the improved power grid system, which spurs economic development and reduces poverty in the region.

4. This IEE has been prepared on the basis of preliminary field investigations, data analysis, and review of other electricity network development project reports. The environmental impact was considered for physical, environmental, ecological, social, and cultural resources within the project facilities during construction, rehabilitation, and operation phases. This report was prepared with the active cooperation of the DABS and ADB's project team in Manila.

2. Description of the Project

2.1 Need and Beneficiaries for Project

5. Currently, cities in Afghanistan have limited electricity of up to 2-3 hours a day, which has been a limiting factor to the country's development. Most of the country's population covers its energy needs through cheap energy sources such as fuel wood. To better supply electricity to the Afghanistan population, the expansion of the North East Power System (NEPS) is planned under the Afghanistan National Development Strategy (ANDS). Projects include importing power from Tajikistan and Uzbekistan in addition to developing power generation within the country. Kabul has already been receiving power through the NEPS from Uzbekistan at 70 megawatts (MW) for 24 hours a day.

6. Increasing population and economic growth has led to higher demands for better civil infrastructure within the city such as roads, water supply, social infrastructure facilities, and electricity supply. The Kabul Electricity Department (KED) of Da Afghanistan Breshna Sherkat (DABS), the state owned power utility organization in Afghanistan, is still imposing load shedding and power rationing despite the additional power supply from the NEPS system. This is due to the high breakdown rate of the existing poor state of electricity distribution system.

7. The main beneficiaries are the 60,000 households of South West Kabul where grid power is inaccessible. There are 50 schools and clinics, three hospitals, and several government offices, which can improve services with reliable electricity supply. The benefits can be grouped into the following headings – (i) Health, (ii) Education, (iii) Social and family quality of life, and (iv) Business. (i) Risks of disease, sickness and other detrimental health symptoms due to lack of refrigeration for food storage; lack of boiling water to sterilize drinks (especially for infants) and poorly cooked foods, will diminish greatly. Local clinics and hospitals will find it easier to establish themselves in communities. (ii) Education will improve due to better conditions for lighting, heating and educational training aids such as computers and projectors etc. (iii) Family life and the social environment in general will improve due to the availability of power for lighting, better cooking, entertainment (TV), and the general increased penetration of household appliances which lessen the burden of housekeeping and providing for families. (iv) The business sector in general will be better enabled to open, operate, secure them with adequate light, provide power for essential manufacturing services and operate tills, computers and other business appliances.

8. Though electricity production from non-renewable sources such as fossil fuels and natural gas pose long-term environmental impacts, in particular with respect to GHG emission and climate change, there are also potential short-term environmental benefits from provision of reliable electricity from the grid. This includes reduced pressure on natural resources such as forests and woodlands by fuel wood collection.

2.2 Details of the Project

1. Project Objectives and Components

9. The proposed Tranche 2 of the MFF is consistent with the Afghanistan National Development Strategy, launched by the Government in April 2008, which is the country's strategic platform for development during 2008-2020. Tranche 2 will initially provide economical and reliable power supply to 60,000 households, or 420,000 people in the city of Kabul. Tranche 2 will include the following components:

(i) Physical Component

- (a) Construction of approximately 30 km of double circuit 220 kV transmission line from existing Chimtala substation to the new Kabul Southwest substation;
- (b) Construction of new Kabul Southwest substation (220/110/20 kV);
- (c) Development of a distribution network in South West Kabul comprising 65 km of medium voltage (MV - 20 kV) and 500 km of low voltage (LV – 0.4 kV); and
- (d) Supply of 100 distribution transformers for the Kabul distribution network.

(ii) Non-Physical Component

- (a) DABS Management Assistance,
- (b) Assistance for the establishment of revolving fund, and
- (c) Assistance for distribution system planning.

2.3 Project Location

10. Kabul city is the capital in Kabul Province and is located at 34°N, 69°E at an elevation of 1790 meters above sea level. Dashti-e-Barchi is a rural settlement 8 km south west of Kabul city. The transmission line will run from the Chimtala substation to the New substation and will take the route around the densely populated towns in the Dashi-e-Barchi region through the rural areas.

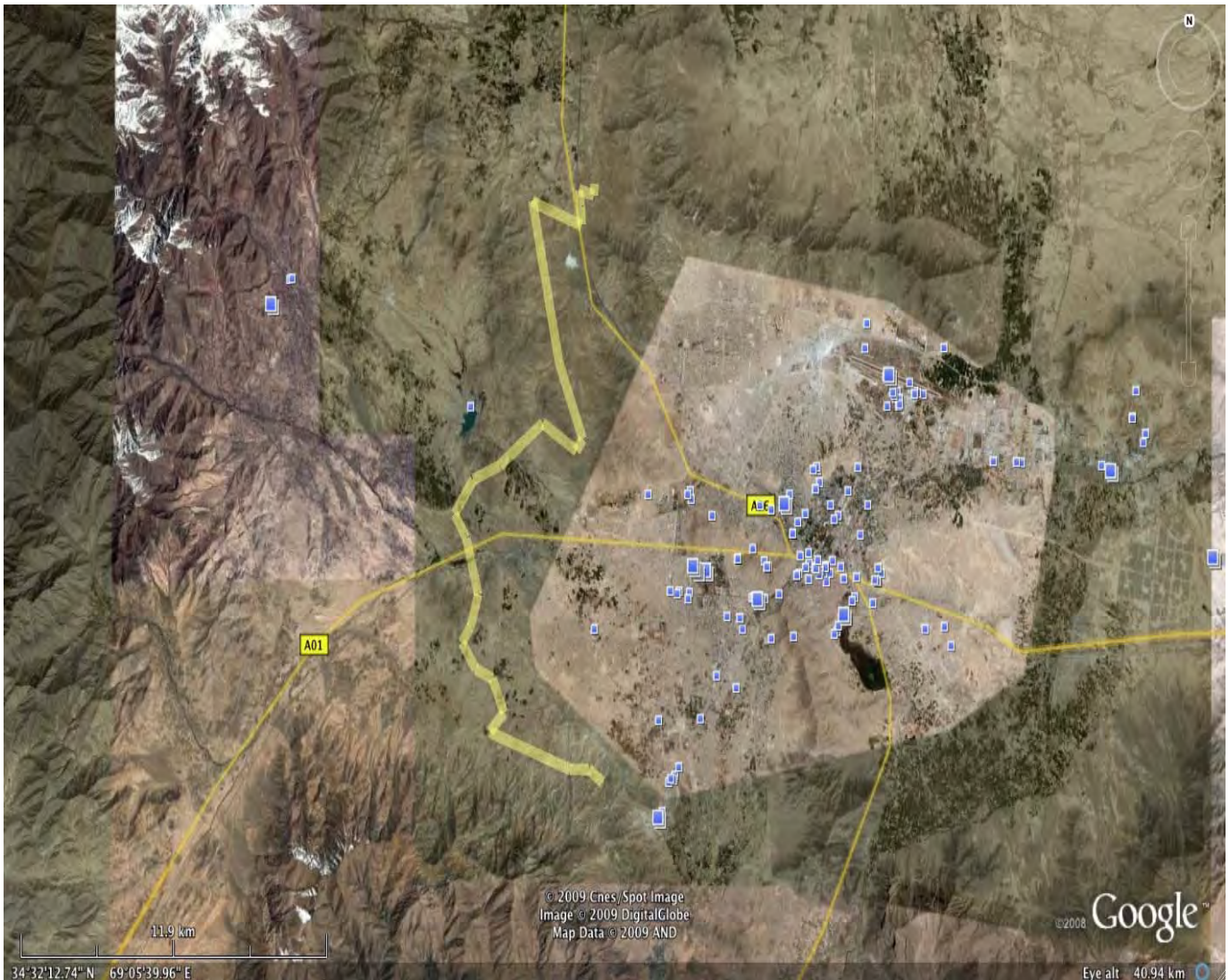


Figure 1: Project Location (yellow band) of the 30 km double circuit 220 kV transmission line from existing Chimtala substation to the new Kabul Southwest substation. The transmission line is located South-West of Kabul City (area to the right), Google Earth Image 2008.

1. Financial Project Cost

11. The following table summarizes the cost (2009 prices) in thousand Dollars:

	Foreign Exchange	Local Currency	Total Cost
A. Base Costs			
1. Equipment/materials	14,238.00	21,357.00	35,595.00
a. Transmission Line	3,974.40	5,961.60	9,936.00
b. Kabul Southwest Substation	4,752.00	7,128.00	11,880.00
c. Kabul Distribution Network	4,326.00	6,489.00	10,815.00
d. Distribution Components	1,185.60	1,778.40	2,964.00
2. Civil Works/Installation	8,701.60	13,052.40	21,754.00
a. Transmission Line	2,649.60	3,974.40	6,624.00
b. Kabul Southwest Substation	3,168.00	4,752.00	7,920.00
c. Kabul Distribution Network	2,884.00	4,326.00	7,210.00
d. Distribution Components	-	-	-
3. Land Acquisition and Compensation	0.00	600.00	600.00
a. Land acquisition & compensation	-	600.00	600.00
Subtotal (A)	22,939.60	35,009.40	57,949.00
B. Non-Physical Component	5,390.00	2,310.00	7,700.00
1. Supervision Consultancy	1,610.00	690.00	2,300.00
2. DABS management assistance	3,150.00	1,350.00	4,500.00
3. Consultancy for revolved funds	140.00	60.00	200.00
4. Distribution planning system	490.00	210.00	700.00
Subtotal (B)	5,390.00	2,310.00	7,700.00
C. Taxes and Duties	0.00	1,952.00	1,952.00
1. Taxes and Duties	-	1,952.00	1,952.00
Subtotal (C)	-	1,952.00	1,952.00
Total (A)+(B)+(C)	28,329.60	39,271.40	67,601.00
D. Contingencies			
1. Physical Contingencies	2,833.00	3,928.00	6,761.00
2. Price Contingencies	8,123.97	2,139.03	10,263.00
Subtotal (D)	10,956.97	6,067.03	17,024.00
E. Interest During Construction	1,875.00	-	1,875.00
Total (A)+(B)+(C)+(D)+(E)	41,161.57	45,338.43	86,500.00

DABS = Afghanistan Electricity Corporation, kV = kilovolt, OH = over head.

Notes: Project costs are by turnkey basis and split between Equipment/Materials and Civil Works/Installation is for information only. Counterparty funds shall cover all taxes and duties.

Source: Asian Development Bank estimates.

2. Implementation Schedule

12. Tranche 2 will be implemented over 4 years total, 3 years from the award of contract, inclusive of procurement and construction activities, starting in Feb 2010 and completed by Feb 2014. Detailed engineering design, surveys, and investigations will start within 12 months of project implementation. The project implementation schedule is appended in Annex E.

2.4 Project Category

13. This Project has been classified as Environmental Category "B" (judged to have minor and limited adverse environmental impacts, of lesser degree and/or significance than those for

category A Projects) and therefore an IEE has been prepared for this Project. The adverse impacts are expected only during the construction stage and the long-term impacts can be managed through proper environmental planning, management, and monitoring in later years.

3. Description of the Environment

3.1 Physical Resources in Project Area

3.1.1 Topography

14. The project site is located in the western region of the Kabul province. The transmission line route is in the western side of the Dashti-e-Barchi and it mostly transverses through rural areas.

15. The project site and the transmission line route are surrounded from the south by the Ningai Ghar Mountains and the west by the Paghman Mountains, which are about 2,200-2,500m above sea level. A Digital Elevation Model (DEM) based on SRTM¹ 90m resolution data was processed digitally with GIS (ARCGIS 9.2) to highlight the topography and slope gradients for the project area.

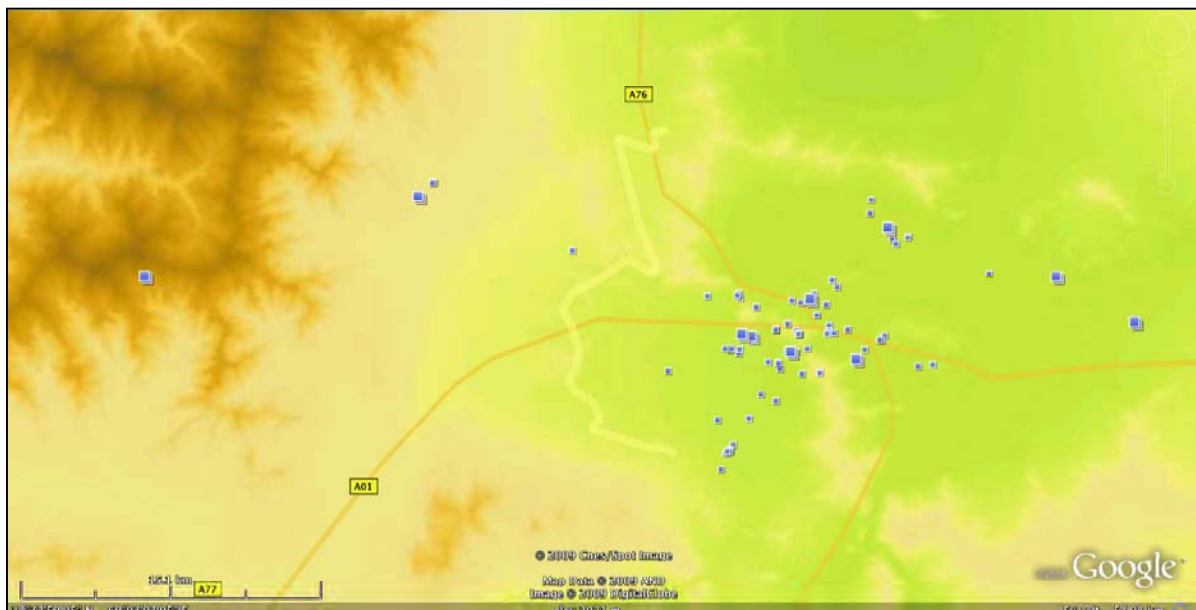


Figure 2: SRTM 90m DEM showing the topography of the project area. Note the dark brown areas representing mountainous areas and the green areas being generally flat terrain. The corridor for the 30 km double circuit 220 kV transmission line from existing Chimtala substation to the new Kabul Southwest substation runs mainly through low-lying terrain or gently sloping hills.

¹ The Shuttle Radar Topography Mission (SRTM) obtained elevation data on a near-global scale to generate the most complete high-resolution digital topographic database of Earth. SRTM consisted of a specially modified radar system that flew onboard the Space Shuttle Endeavour during an 11-day mission in February of 2000. SRTM is an international project spearheaded by the National Geospatial-Intelligence Agency (NGA) and the National Aeronautics and Space Administration (NASA).

3.1.2 Soils

16. Soils at the project site primarily consist of sediments eroded from the mountains and comprise layers of gravels, sands, silts, and loam. Adjacent to the mountains, the sediments are dominated by coarse deposits such as gravels and pebbles, deposited by the runoff water from the mountains. Further away from the mountains, deposits become increasingly dominated by finer sediments such as fine sands/silts. On soil maps for Afghanistan (Source: AIMS), the project area is located within the soil type zone of Mountain Typical Serozems. This soil type is characterized by loam-sand mixes and calcium carbonate deposits. The organic-matter content is almost always less than 0.5%, the base saturation of the cation-exchange complex is high and the pH of the saturated paste is about 8.

17. The river plains are more fertile and there are comparatively few areas affected by water logging and high salinity that decreases productivity.

3.1.3 Geology

18. The mountain ridges are dominantly composed of hard (lithified) rocks of pre-Palaeogene age, dominated by metasediments (sandstones, slates, metaconglomerates, limestone, metabreccias, phyllites, slates, schists etc.), with some igneous rocks such as granites. The rocks are faulted, folded, and deformed. The plains surrounding the mountain range and the valleys between the mountain ridges are filled with Neogene and Quaternary (Pleistocene) sediments, which are the products of erosion of the mountains.

3.1.4 Climate

19. Kabul's climate is considered arid to semi-arid steppe or Xerotic-cold dry season marked, with temperatures ranging from +30°C in summer to -20°C in winter. The climate comprises of four distinct seasons with winter in December to February, spring from March to April, summer from May to September and autumn from October to November. Rainfall varies from a low of 48 mm to 300 mm, maximum rainfall occurs mostly in the winter months and particularly in the February-April period.

3.1.5 Water Resources

20. The 220 kV transmission line is expected to cross several tributaries to the Kabul River that enters the City of Kabul. The Kabul River starts from the Paghman Mountains towards the South Pass at about 70 km west of Kabul.

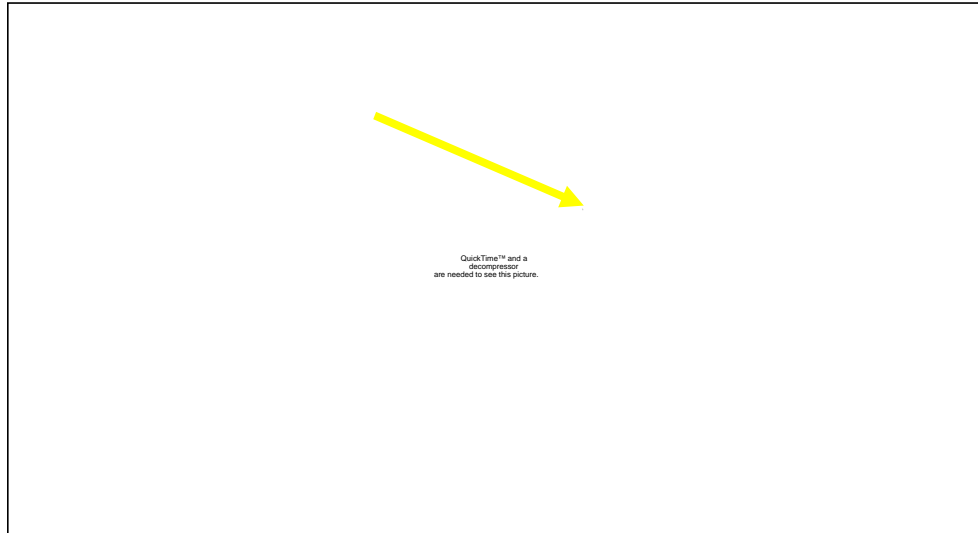


Figure 3: The corridor for the 30 km double circuit 220 kV transmission line from existing Chimtala substation to the new Kabul Southwest substation crosses tributaries to the Kabul River.

21. The river plains are more fertile and with agricultural along the riverbanks. Water from the rivers is used to irrigate crops. To the west of proposed transmission line, the Paghman Water Reservoir (also called Lake Quargha). This water reservoir is man-made and measures approximately 900m by 450m. The water-body and lakesides are used for recreational activities.



Figure 4: View north from proposed transmission line tower 17 to 18. Note the steep riverbank on the opposite site and vegetation growth.

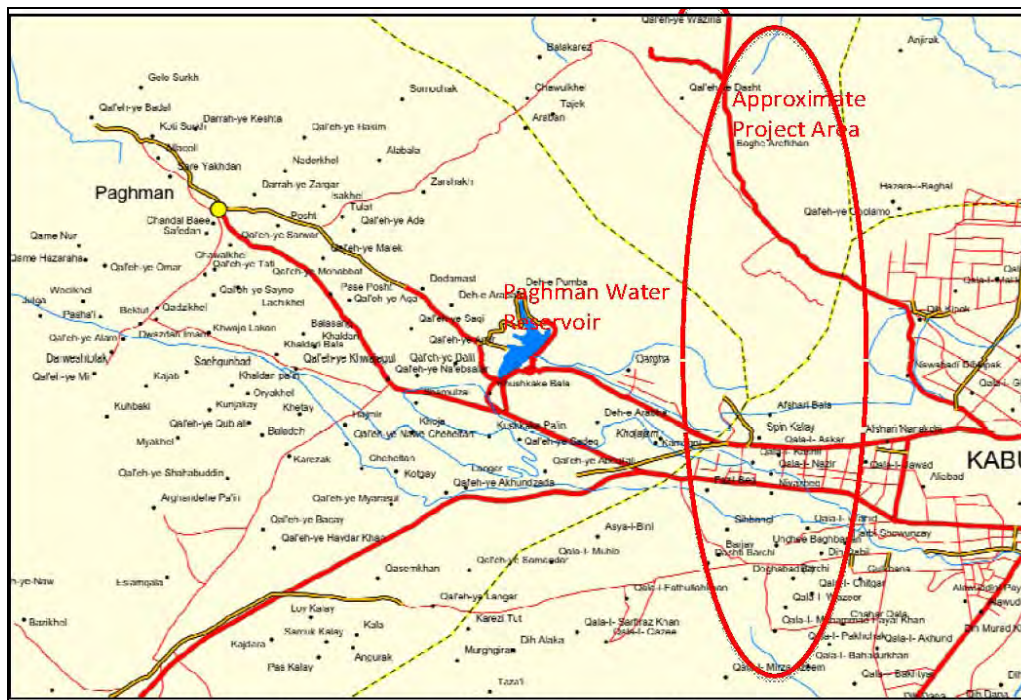


Figure 5: Water-bodies such as the Paghman Water Reservoir and several smaller tributaries are located in or proximity of the project area.

3.1.6 Irrigation Areas

22. Agriculture has been the mainstay of the Afghan economy and irrigation traditionally provides 85% of all crop production. Rivers, canals and springs are the major sources of irrigation in the Project area. Along tributaries to the Kabul River to the west of the project area, some irrigated agricultural land is intensively (1 crop/year) and intermittently cultivated.

3.2 Ecological Resources in Project Area

3.2.1 Land Cover and Vegetation

23. The land cover of the project area consists mainly of a matrix of settlements, intensively (1 crop/year) and intermittently cultivated land (1993 land cover classification). Where fragmented natural vegetation is present it is likely to include natural willow-poplar-oleander (*Salix-Populus-Nerium*) shrubs on irrigated areas. Further away from Kabul, the hardy shrubs and herbs of the Wormwood (*Artemisia*) and Wormwood-tragacanth (*Artemisia-Astragalus*) ephemeral steppe are the dominating vegetation cover.

3.2.2 Protected Area

24. Afghanistan currently has six existing protected areas. Twelve natural sites and additional three cultural heritage sites as potential components of Afghanistan's protected areas system. There is one protected area in Kabul province, the Kole Hashmat Khan. It is located south east of Kabul city and away from project site. The only wetland remaining from the once extensive Kabul marshes, on the south-east outskirts of Kabul city on the Kabul-Gardez highway, at approximately 1,800 m elevation. Kole Hashmat Khan is a small, shallow (about 1.5 m max. depth) L-shaped lake, about 2.5 km long and 300 -1,000 m wide. It lies in a basin

surrounded by the foothills of the Hindu Kush, and the northeast shore opens into the Logar valley, being connected to the Logar River by a small stream; to the east the hills slope down into the subtropical Jalalabad valley, whereas to the west the hills rise steeply into the Paghman Mountains (5,000 m). Past drainage and irrigation have reduced the water in both the lake and the Logar River. Both may become virtually dry in hot summers and the lake is typically frozen for two to three months during winter. In the 1970s the edges of the lake incorporated quite extensive *Phragmites* reedbeds and were grazed by livestock. There was a large area of basic cultivation between the lake and the village (some 300 people). Southern fields were property of the public bath and the northern fields were owned by local residents. Nomads moved through with their animals each spring, and the area was quite popular for picnicking. Nearby are the popular shrine of Jubur Ansar and the old fortress of Qala-i-Hashmat Khan. Current protection of the area is presumed to be non-existent. Human pressures in the 1970s included water-diversion from the source stream for irrigation, excessive hunting, pollution from commercial laundry businesses, indiscriminate shooting, egg-collecting, reed-cutting, and much general disturbance of birds (some deliberate), especially severe and widespread in summer when water levels were low. Cyprinid fish have been introduced, including Carp *Cyprinus carpio* (BirdLife 2009). There are no protected sites or biodiversity hotspots in the proposed project area.



Figure 6: Afghanistan Protected Areas

(Source: Maps and Graphics, UNEP)

3.2.3 Fauna

25. The 200 hectare (ha) Kule Hashmat Khan near Kabul is used as a migration staging post by waterfowl en route from Pakistan/India to Central Asia and Siberia. A figure of over 30,000 waterbirds has been implied (Day 1988), but this misinterprets data of Niethammer (1967) who states that a total of 32,700 individual birds were seen during a two-year study. Figures quoted below are typical, and at least 157 species have been recorded. Small numbers of waterbirds breed. Other breeding species in the 1960s and/or 1970s included *Podiceps nigricollis* (30 pairs), *Netta rufina* (possibly), *Aythya ferina* (2 pairs) and *Porzana pusilla*

(probable). *Acrocephalus scirpaceus* apparently bred in 1967, which would be the sole known Afghan site (nests were found but identification needs confirmation). Moderate numbers of waterfowl occur on passage and in winter, including *Podiceps nigricollis* (233, March), *Anas clypeata* (471, March), *Aythya ferina* (2,210, March), *Fulica atra* (10,000, March), *Tringa glareola* (500, August) and *Chlidonias hybridus* (150, May). The lake is frozen in winter and its value for waterfowl then is limited; species include *Fulica atra* (5,000 in winter). Active hunting is occurring in many regions of the country for fur, which has caused a decline in the indigenous fauna (BirdLife 2009).

26. Kabul is within the region of African-Eurasian Migratory Waterbirds (AEWA) Flyway. An Agreement on the Conservation of African-Eurasian Migratory Waterbirds including 235 species was signed in 1995 and covers birds that are ecologically dependent on wetlands for at least part of their annual cycle. Migratory birds are expected to be found in the project site and will likely use the water bodies in Kabul's vicinity as roosting places during the migration. This includes the Kole Hahsmat Khan Wetlands and the Paghman Water Reservoir amongst other waterways.



Figure 7: The Kole Hahsmat Khan Wetlands are located about 10km east of the proposed 220kV transmission line.



Figure 8: The African-Eurasian Flyway of migratory water birds includes Afghanistan

3.3 Socioeconomic Resources in Project Area

3.3.1 Population

27. The present population of Kabul city is about 3.1 million. The total households served by the Project are approximately 60,000 and the commercial area consists of about 540,000 consumers.

28. The estimated household size is about 8.3 in the Project's Zone of Influence (ZOI), which includes seven key communities. Each household comprises of up to 3 generations and is generally non-nuclear family structure.

3.3.2 Socioeconomic Infrastructure

29. Many of the communities in the Project ZOI practice agriculture by growing rice, wheat and some vegetable crops. The majority of the ethnicity of the population are Tajiks, with

31. 66% of men and 48% of women are literate. Lower literacy for women is largely attributed to the war and lack of formal education under the Taliban regime. Local culture limits the opportunity for women to gain access to education. Hence, public consultation and disclosure and marketing of the Project should include verbal forms of communication in addition to printed publications.

32. The income level in the Project's ZOI tends to be close or even well below the poverty line defined by the ADB and UN. Farm laborers, making up the majority of the communities in the Project's ZOI, earn an average daily income of \$2 whilst Government officers and professionals earn an average daily income of \$2-\$3.

3.3.3 Agriculture and Livestock

33. The Project ZOI included 50 – 90% landless farm laborers with sharecroppers recorded only in some of the communities. The main farm crop includes rice, wheat, and vegetables, which are low-cash crops and any impacts during the laying of the transmission lines will greatly affect the farm laborers' income. Such impacts should be minimized during detailed design and compensation should be included in the losses and entitlements.

4. Screening Environmental Impacts and Mitigation Measures

4.1 Physical Environment

4.1.1 Topography, Soils, and Geology

34. **Construction Period:** The Project involves rehabilitation of the existing distribution networks, a new sub-station and a new transmission line for the Dashti-e-Barchi district. Construction of new lines for distribution networks and sub-station will create some soil erosion impacts from earthworks. Loose soil and clearing of remaining vegetation during earthworks will leave the soil susceptible to increased soil runoffs, which may result in accumulation of silt in the drainage system and roads near the construction site. Possible impacts also include the use of access/maintenance roads to tower sites, damage to local existing roads during transportation of construction material and equipment, erosion of stockpiles during rain, re-suspension of dust during the dry weather and oil leakage or hazardous material spills from vehicles and equipment. The areas that will be subjected to disturbance will be very small and potential impacts are considered significant. However, implementation of appropriate mitigation measures can minimize the impacts.

35. The construction of transmission line requires construction of foundations to increase the stability of the towers. The depth and type of foundation will be determined based on the local soil properties and geology. The greatest impact of construction on the soil and geology is in terms of soil erosion. The extent of impact depends upon the erosion potential of the soil. The detailed soil properties will be known only after soil testing but based on the preliminary studies, regional information on soil type and lack of vegetation cover in most of the project area, it is expected that the potential for soil erosion is high. Erosion potential is anticipated to increase at places where towers are to be placed at slopes greater than 20°. The construction process will remove vegetation and disturb the upper soil layer making it more susceptible to increased erosion and runoff. The proper application of mitigation measures will ensure that impacts are minor and temporary.

36. Measures to achieve these objectives in the Project are:

- (i) Reduce the time surfaces remain bare
- (ii) Keep vegetation clearing to a minimum
- (iii) Minimize disturbance on steep slopes.
- (iv) Keep vehicles on defined tracks.
- (v) Construct necessary temporary and permanent control structures.
- (vi) Strictly enforce disposal of surplus material at designated, environmentally safe disposal sites.
- (vii) Encourage re-vegetation after construction activity finishes by applying bioengineering solutions where appropriate.
- (viii) A detailed Environmental Management Plan (EMP) should be prepared by the contractor, outlining site specific measures to be implemented to minimize impacts on soil and topography.

37. **Operational Period:** Soil contamination can occur from spillage of hazardous materials such as transformer and capacitor oil at the new sub-station. However, such contamination will be localized as plant operators will be appropriately trained in emergency spillage procedures such as cleaning up and disposing the spillage in a safe manner. Furthermore, all hazardous wastes and hazardous materials, such as solvents and fuels, shall be stored within concrete buildings designed for storing such hazards, including the provision of bunded areas to contain accidental spillage.

38. During operation the potential for environmental impacts is low and limited to soil erosion due to maintenance and use of access roads. The soil erosion potential may be high in steep area with soils more prone to erosion.

39. In order to minimize the potential of soil erosion, following mitigation measures are recommended:

- (i) As far possible, use the existing access roads during construction and maintenance of transmission line.
- (ii) In hilly terrains ensure special care to determine the route of access roads to avoid steep gradients.
- (iii) Rehabilitated area susceptible to erosion should be adequately protected by soil conservation measures.
- (iv) Proper maintenance of vehicles and equipments is recommended to avoid any leakage. Kits to cleanup any spillage should be made available at all sites and the contaminated material should be disposed appropriately.

4.1.2 Controlling Sediment and Surface water

40. **Construction Period:** Although the transmission line, distribution networks, and new substation are not located close to a major river, reservoir, or wetland, the large-scale construction activities have the potential to increase the erosion rates, especially when the transmission line and distribution network are crossing tributaries. This will cause increases in the turbidity of surface water run off by washing in sediments from the construction sites. Dust generation can also be a problem during dry periods, especially as much of the project area is arid zone. The issues of erosion and dust are considered significant and will be minimized by proper mitigation measures.

41. Any hazardous material spill can pollute the runoff and subsequently the groundwater and surface water body. The potential contamination due to any oil and other hazardous material spillage is not significant as only small quantities are expected to be used.

42. Wastewater that is generated during the construction phase serving the workers' housing or camping facilities will be treated through septic tanks or similar facilities.

43. **Operational Period:** Sub-stations and transformers have to be routinely checked for leaks from either the lubricant tanks or the sewage pipes. Such leaks should be addressed and fixed immediately to prevent further spreading of contaminants into the ground water.

44. During operation phase the water quality could be also affected by increased soil erosion.

45. In order to minimize the potential of increase of surface water turbidity, pollution, and disturbance to stream flow, the following mitigation measures are recommended:

- (i) Placement of towers on riverbanks and within 1:50 year flood lines should be avoided as far as possible to avoid soil erosion into the stream.
- (ii) Where new access roads are to be constructed, they should not disturb the natural drainage patterns of the area and if the river is crossed, special attention should be given to prevent change in flow patterns.
- (iii) Vegetation stripping should occur in parallel with progress of construction in order to minimize erosion and runoff.
- (iv) Exposed areas should be re-vegetated as soon as possible on completion of construction within each area.
- (v) To prevent sedimentation into river channel during construction, the dredged material should be piled alongside the site and carried to disposal site as soon as possible. If soil has to be stored on site for a period of time, then it should be banded at a location away from the river.
- (vi) Pass storm water run-off from construction areas through a gross pollutant trap (to filter plastics, cans, etc.) and over a vegetated surface (i.e. bio-engineered) to remove petroleum-based organic pollutants before discharge into culverts or drainage systems.
- (vii) Design drains and culverts at new structures (if any) to remove all run-off water without scour. On steep slopes culverts may need to be stepped using rock slabs or gravel in gabion baskets.
- (viii) Store oil and bituminous products (i.e. new substation) at a contained location away from drainage lines in an appropriate manner.
- (ix) Provide sanitary latrines at the construction, work site and camps to avoid any pollution of groundwater and surface water from sewage and maintain hygienic environment. Also, septic tanks shall be constructed for treating the waste water from the camps.
- (x) Using bushes to visually screen the line crossing and maintaining shaded stream areas, where possible.
- (xi) Prohibiting construction and maintenance vehicles from driving in waterways.
- (xii) A detailed EMP should be prepared by the contractor, outlining site-specific measures to be implemented to minimize impacts on surface water.

4.1.3 Solid Waste

46. Two types of wastes will be generated during the construction phase, debris and domestic refuse from construction camps. Unmanaged domestic waste and litter can create unhygienic conditions for workers and communities in the vicinity. Solid waste generated during the operation will be limited to electrical components, cable pieces, etc. resulting from regular maintenance and repair work.

47. To minimize the potential of unhygienic situations in and around construction areas, the following mitigation measures are recommended:

- (i) Any spoil generated by the construction activities should be disposed of at an approved location. The temporary storage of excavated earth should be done to avoid any inconvenience to the daily activities of the community.
- (ii) Choose the location for stockpiles or spoil heaps to avoid blocking surface run-off or drainage lines.
- (iii) If the spoil heap or stockpile containing fine sediments is to remain bare in a high rainfall area, cover it to prevent sediment run-off.
- (iv) Where possible, use spoil to backfill quarry areas or waste disposal pits before they are re-vegetated.
- (v) Littering should be prevented by providing adequate number of containers, which shall be emptied on a regular basis.
- (vi) Domestic waste should be collected and disposed of in an appropriate manner.
- (vii) After completion of construction the site shall be properly cleaned of any construction waste, litter, etc. and properly rehabilitated and vegetated.
- (viii) Small amount of discarded material during maintenance work should be disposed of as per the workplace guidelines.

4.1.4 Air Quality

48. During construction, air quality is likely to be degraded by exhaust emissions from the operation of construction machinery; fugitive emissions from aggregate, and dust generated from earth works, approach roads, exposed soils, and material stock piles. Air quality is not impacted by any activity during operations. The air pollution will be limited to the construction phase and will be short-term and of low impact.

49. In order to mitigate the negative impacts on air quality, the following shall be implemented:

- (i) Construction equipment shall be maintained to a good standard and idling of engines discouraged.
- (ii) Machinery causing excessive pollution (e.g., visible smoke) shall be banned from construction sites.
- (iii) Spray water on access roads if dust is being generated in location close to human settlement
- (iv) Cover the loads of construction material with tarpaulins during transport and also cover stock piles with tarpaulins.

4.1.5 Noise and Vibration

50. The noise and vibration sources for the distribution network, sub-station, and transmission line are limited to the construction phase only as operation of heavy machinery can generate high noise levels. Strong vibrations produced from blasting and by compaction equipments can damage houses, other structures and in this case minor landslides of loose rocks from mountain slopes.

51. As the present transmission line route is passing through part of the city of Kabul and further outlying districts such as Dashti-e-Barchti, the inconvenience caused to nearby residents due to the construction activities can be highly significant. Mitigation measures need to be carefully followed to reduce and avoid the inconvenience to the community. Suggested measures to achieve this objective are:

52. Corona, associated with all energized transmission lines, is the physical manifestation of energy loss, and can transform discharge energy into very small amounts of sound, radio noise, heat, and chemical reactions of the air components. Transmission lines can generate a small amount of sound energy during corona activity but are not an issue for power lines rated at 230 kV and lower. The other types of noise are sizzles, crackles, or hissing noises that occur during periods of high humidity and are usually associated with high-voltage transmission lines (345 kV lines). As the proposed project line is only 220 kV problems related to corona and noise will be negligible. Also, maintaining the right of way (ROW) along the transmission line will minimize any effect on humans.

53. In order to avoid any significant disturbance due to noise and vibration to local community during construction, the following shall be implemented:

- (i) Work hours should be decided in consultation with local community and should avoid Prayer times.
- (ii) Work will be restricted to specific hours within 500m of settlements and 150m from sensitive receptors (schools, hospitals and places of religious importance).
- (iii) Noise levels at residential dwellings shall be maximum 65dBA during the day (7 a.m. to 7 p.m.) and 45 dBA during the night (7 p.m. to 7 a.m.). Contractor shall monitor and report noise levels measured at representative receptor locations.
- (iv) At places with noise violation within the city, mitigation measures such as earth berm, dense layered plantation to block the noise, or other measures like wooden noise barriers or mounds shall be considered as noise screens.
- (v) Use modern and well-maintained equipment (with mufflers where appropriate)
- (vi) Advise local people when there will be blasting or unusual unavoidable noise.
- (vii) In areas where labour-intensive methods of construction are used, for instance for the substation, (rather than machine intensive), the impacts will be considerably lessened, since it is construction machinery that tends to generate most of the noise, dust and vibration. It would even be possible to use labour-intensive construction techniques as a form of mitigation for some of the construction-related impacts. In any case, the use of labour-intensive techniques will result in a very low impact Project.

4.1.6 Mines

54. Afghanistan is one of the heaviest mined countries in the world. In spite of years of

intensive mine clearance hundreds of square kilometres remain to be cleared. Assistance is required on the transmission line with the collaboration of the Afghanistan Information Management Service (AIMS).

55. Special assessment and clearance may be needed for the site from United Nations Mine Action Centre for Afghanistan (UNMACA) before initiation of any project activity.

56. Since distribution networks and sub-station are supposed to be close to the populated areas, mines should have mostly been cleared way before construction. Hence, mines are not foreseen to be a problem for the construction of the distribution networks and sub-station in the city.

4.1.7 Polychlorinated Biphenyls (PCB)

57. Historically most transformers and capacitors used a dielectric fluid based on polychlorinated biphenyls (PCBs). These products, although having fire-resistant and other properties required for use in electrical equipment, are also very toxic. Exposure to PCBs can result in organ failure and they are carcinogenic. They are very stable, non-biodegradable compounds, which persist in the environment for many decades. The environmental and health risks associated with their use resulted in their phasing out and removal from electrical equipments.

58. The proposed project involves construction of new transmission line and a new substation and it is recommended not to reuse any of the old PCB contaminated material. Also, the new products used for the transmission lines should be PCB free.

59. There is the possibility of existing old pole mounted transformers in Dashti-e-Barchi, potentially containing PCBs. Before replacing these transformers, they will be tested for PCB contamination using a PCB testing kit. If any of the transformers are found to be PCB contaminated, they will be taken to a secured location for storage. Such location will be determined in conjunction with the National Environmental Protection Agency and its Environmental Assessment Board of Experts as well as with the contractors and supervision consultants of three other distribution rehabilitation projects currently ongoing. If no locations can be found, the equipment that contains PCBs will be sequestered until an environmentally friendly solution is found.

4.1.8 Electric and Magnetic Fields (EMF)

60. A number of studies have been undertaken since the 1970's to determine if EMF from power lines pose any risk to health. So far, no conclusive evidence has been found and no international standards developed for defining health risks from EMF. Effects of EMF during the operational stage as interference with radio and television signals and generating corona and stray voltage are discussed in other sections. EMF also tend to interfere with the working of cardiac pacemakers, especially the older synchronous models. The inference is only for short duration and not harmful.

61. Magnetic fields can be measured with a Gauss meter. The size of the magnetic field cannot be predicted from the line voltage but is related to the current flow. Magnetic fields quickly dissipate with distance from the transmission line. Also, magnetic fields generated by double-circuit lines are less than those generated by single-circuit lines because the magnetic fields interact and produce a lower total magnetic field. In addition, double circuit poles are often

taller resulting in less of a magnetic field at ground level. The Project has 220kV double-circuit line and hence the EMF effect will be less significance.

62. Following are some measures to reduce the impact of EMF:

- (i) Maximize the distance between transmission lines and human settlement.
- (ii) Bring the lines closer together causing the fields of the conductors to interfere and produce a reduced total magnetic field.
- (iii) Security measures such as installing fences around the transformers and towers and placement of warning signs is recommended.
- (iv) For ensuring the health and safety of the workers adequate training in operation and maintenance of facilities and safety equipments shall be provided.

4.1.9 Aesthetics

63. Aesthetics are, to a great extent, based on individual perceptions. The overall aesthetic effect of a distribution network, sub-station, or transmission line is likely to be negative to most people, especially where proposed lines would cross natural landscapes. The tall steel/concrete or wide structures may seem out of proportion and not compatible with natural landscapes. A distribution network, sub-station, or transmission line can affect aesthetics by removing a resource, such as clearing fencerows that provide visual relief in a flat landscape or degrading the surrounding environment by intruding on the view of a landscape.

64. The distribution network, sub-station, or transmission line in the proposed project passes through urban, rural, and natural or semi-natural landscape. Having protruding transmission poles and towers and cable in the rural areas can be unsightly. Also, Afghanistan has beautiful landscapes and the transmission line can have negative impact on the aesthetics, though this impact can be considered minor as compared to the benefits of having access to reliable and cheap electricity source.

65. Following are some measures to reduce the visual intrusion of a transmission line:

- (i) Lines can be routed to avoid areas considered scenic. Routes can be chosen that pass through commercial/industrial areas or along land use boundaries.
- (ii) The form, color, or texture of a line can be modified to minimize aesthetic impacts. The color and construction material of poles can be chosen to blend with or complement the landscape around them.
- (iii) Stronger conductors can minimize line sag.
- (iv) ROW management can mitigate aesthetic impacts by planting vegetative screens to block views of the line.

4.1.10 Agricultural Land

66. Transmission lines can affect farm operations and increase costs for the farm operator. Potential impacts depend on the transmission line design and the type of farming. Transmission lines can affect field operations, irrigation, aerial spraying, wind-breaks, and future land development. Tower placement in farm fields can:

- (i) Create problems for turning field machinery and maintaining efficient fieldwork patterns
- (ii) Create opportunities for weed encroachment

- (iii) Compact soils and change drainage pattern
- (iv) Result in safety hazards due to pole and guy wire placement
- (v) Interfere with moving irrigation equipment
- (vi) Hinder future consolidation of farm fields or subdividing land for residential development
- (vii) Increase erosion of soils, if the windbreaks along field edges or between fields must be removed.

67. Much of the proposed transmission route passes through agriculture land but the impact of transmission line on farming practices is not expected to be significant. A Short Land Acquisition and Resettlement Plan (LARP) has been prepared by ADB and outlines the entitlement for compensation for any loss or damage to farmland during the project implementation.

68. Following are some measures to reduce the impact on farming practices and farmlands:

- (i) The contractor should work with agricultural landowners to determine optimal tower heights, pole locations, and other significant land use issues.
- (ii) Problems with pole placement can be addressed by using single-pole structures and placing the line along fence lines or adjacent to roads. If the structure is not single-pole, it should be oriented with the plowing pattern.
- (iii) If a field must be crossed, larger structures with longer spans can be used to span them.
- (iv) Guy wires can be kept outside crop or hay land and have highly visible shield guards.
- (v) In areas where aerial spraying and seeding are common, pole height can be minimized and markers on the shield wires above the conductors can be installed.
- (vi) The potential for soil compaction and erosion by transmission construction and maintenance activities can be lessened. Work in agricultural areas can be performed during the winter months and when soils are not saturated. If compaction has occurred, affected soils can be chisel plowed over successive seasons as needed to break up compacted layers.
- (vii) The effects of windbreak removal can be mitigated by trimming the windbreak vegetation selectively, replanting lower-growing trees and brushes beneath the line, or creating a new windbreak elsewhere.

4.1.11 Lightning

69. Power poles, like trees and other tall objects are more likely to intercept lightning strikes. Distribution network, sub-station or transmission lines are therefore usually built with a grounded shield wire at the top of the poles. This protects the distribution network, sub-station or transmission line from lightning. Lightning is not more likely to strike houses or cars near the distribution network, sub-station or transmission line. Shorter objects under or very near a line may actually receive some protection from lightning.

4.1.12 Buildings

70. Electricity should always be treated with respect, especially when working near distribution network, sub-station or transmission lines, such as when building or extending. The distribution network, sub-station or transmission line route passes through residential and

commercial area and villages. Enough space between the buildings and distribution network, sub-station or transmission lines need to be ensured to minimize the risk of electric shock, fire, power cuts or damage to property and distribution network, sub-station or transmission lines, both in present and in the future.

71. The minimum safe clearance or ROW varies from country to country. Following are the building safety guidelines from Government of South Australia. DABS might want to develop such ROW maintenance or Transmission line Safety guidelines to increase public awareness and help safe development in future.

72. It is recommended that special technical approval be sought in cases where existing buildings are falling within the ROW. This case might arise in and around the city of Kabul and the agricultural areas adjacent to the city.

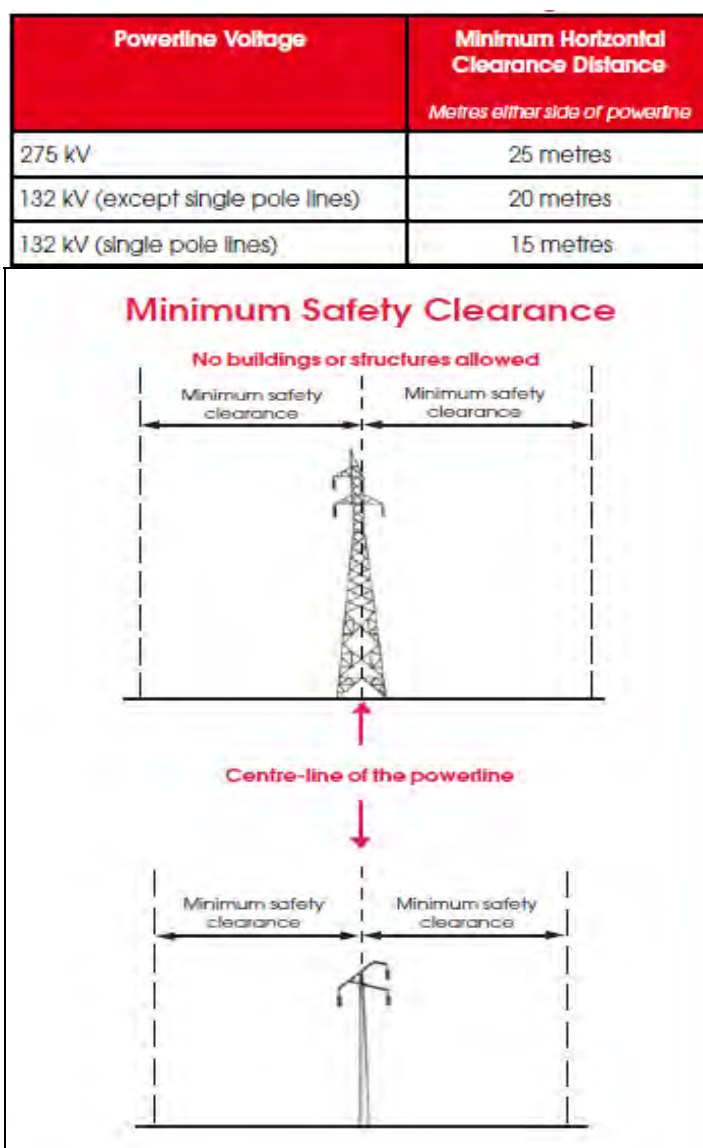


Fig 10: Minimum safe clearance for buildings or structures.

Source: Government of South Australia.

Voltage	Up to and including 1 kV			Above 1 kV		Above 1 kV up to and including 33 kV	66 kV
	Insulated	Bare		Insulated		Bare or Covered	
		neutral	active	with earthed screen	without earthed screen		
Dimension A <i>Vertically above those parts of a building or structure normally accessible to persons</i>	2.7	2.7	3.7	2.7	3.7	5.5	6.7
Dimension B <i>Vertically above those parts of a building or structure not normally accessible to persons but on which a person can stand.</i>	0.1	2.7	2.7	0.1	2.7	4.7	5.5
Dimension C <i>In horizontal direction from those parts of a building or structure normally accessible to persons, or that is not normally accessible to persons but on which a person can stand.</i>	0.1	0.9	1.5	0.1	1.5	3.1	5.5
Dimension D <i>In horizontal direction from those parts of a building or structure not normally accessible to persons.</i>	0.1	0.3	0.6	0.1	0.6	2.5	4.5

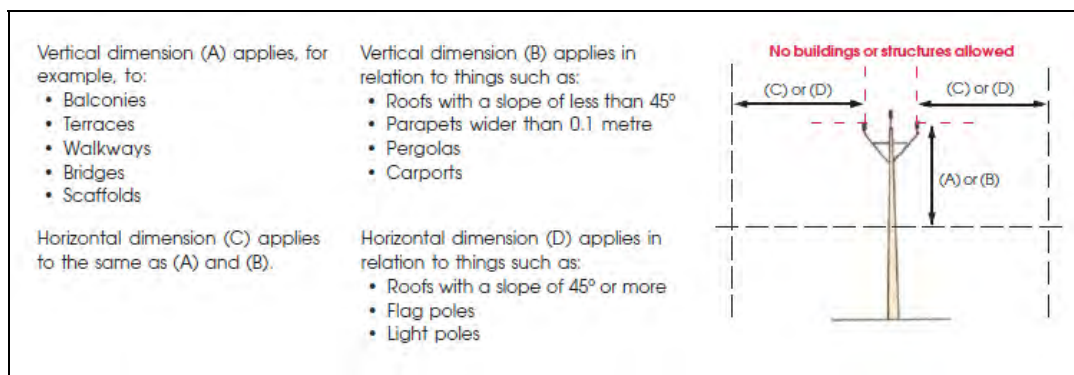


Figure 11. Minimum clearance in meters from the closest conductor in worst conditions

Source: Government of South Australia.

4.1.13 Environmental Benefits

73. The Project will generate substantial positive environmental benefits through avoided air pollution from diesel fuel generator and use of traditional fuels like wood, charcoal, straw, dung cakes etc. Reduced air pollution will have associated local and regional impact and the local community will have access to clean healthy air.

4.2 Ecological Environment

4.2.1 Landcover and Vegetation

74. No forests or protected areas are located near the Project site. The rehabilitation work may require the removal of small areas of vegetation. There is also potential for illegal fuel wood collection by the construction workers. Contractors shall be responsible for putting new vegetation in removal sites. Trees along the ROW may need to be trimmed (or removed only in unavoidable circumstances) to maintain a minimum vertical safe clearance between the conductors and trees. Workers shall be trained in correct techniques of tree trimming without damage to the trunk or roots. Distribution networks shall be aligned along existing road

corridors. Construction around trees shall be performed carefully to avoid the damage of tree “drip-line”. Workers shall be also trained regarding nature protection and the need to avoid felling trees during construction. Contractors shall be responsible supplying appropriate fuel in the work camps to prevent fuel-wood collection.

75. During the operational stage the branches of nearby trees will be trimmed regularly as part of maintenance so as to reduce accidents with humans and birds.

76. The potential impacts of the proposed transmission line anticipated include:

- (i) Total destruction of vegetation at the tower footprint;
- (ii) Loss of rare, endangered and/or protected species (although the detail ecological survey has not been carried out, the potential occurrence of such species cannot be ruled out);
- (iii) Disturbance of natural vegetation along access roads through trampling, compaction by vehicles, and air pollution etc.;
- (iv) Establishment and spread of invasive species from re-vegetation of disturbed area and imported through construction vehicles;
- (v) Trimming of trees in ROW during the operational stage (or removed only in unavoidable circumstances) to maintain a minimum vertical safe clearance between the conductors and trees.

77. Although most of these impacts are likely to occur, they will be localized and of moderate significance. Also, no forests or protected areas are located in or near the Project site. Through implementation of mitigation measures, the impacts can be effectively minimized.

78. The following mitigation measures are proposed:

- (i) Construction activities for towers should be restricted to the minimum area needed;
- (ii) Measures should be implemented to prevent spillage of concrete or other substances that can permanently destroy vegetation;
- (iii) Removal of all excavated material and construction rubble after construction is complete;
- (iv) Distribution networks shall be aligned along existing corridors, Use existing access roads and minimize construction of new access roads;
- (v) Movement of construction vehicles soon after heavy rains should be avoided till the surface has dried;
- (vi) After completion of construction, all access roads which will not be used in future should be rehabilitated and re-vegetated;
- (vii) Construction around trees shall be performed carefully to avoid the damage of tree “drip-line”;
- (viii) Workers shall be trained in correct techniques of tree trimming without damage to the trunk or roots;
- (ix) Spread of invasive species should be avoided and in any case, monitored, reported, and addressed appropriately.

4.2.2 Fauna and Avifauna

79. The potential impacts during the construction stage are destruction of habitat from the trimming or cutting of the trees in the vicinity disturbance of individual animals, localised decline

in the quality of habitat (removal of original plants) and poaching of edible animals by construction workers.

80. During the operational years the most common impact is the increase in bird-strike due to collision with infrastructure and electrocution. Areas surrounding the transmission poles, which are grounded, can often have stray currents, which might affect animals. When electric systems are grounded some current flows through the earth at each point where it is grounded and a small voltage develops. Animals often feel an electric shock when touching an energized water pond and feel the voltage in the ground. Though humans cannot feel this stray voltage, animal behaviour is affected by this.

81. Where possible the location of the poles will be chosen so as to avoid the cutting of large trees and destruction of specific habitat of native wildlife. Also, the contractors' environmental health and safety manager shall be responsible for providing adequate knowledge to the workers regarding the protection of fauna by avoiding any poaching during construction.

82. Electrical infrastructure, due to its size and prominence, constitutes an important interface between wildlife and man. Birds are the most affected from the transmission lines. The transmission line runs for around 15 km over variety of ecosystems including urban areas, agricultural land, river and streams, desert, valley and hills. Afghanistan has some 441 bird species, including some migratory waterfowls. Migratory birds fly through Northern Afghanistan to reach southern provinces and countries. Based on the flyway paths available with international organizations and in absence of any site-specific information, it is deduced that Kabul province does fall within the African-Eurasian Flyway of migratory waterbirds.

83. As the route also passes through fertile agriculture land and rivers, some of the project area will have substantial bird population hence impact on birds will be definite. Following are some of the transmission line impacts on birds:

- (i) Electrocutions: birds attempt to perch on the electrical structures and causes and electrical short circuit by physically bridging the air gap between live wires. Large birds are most commonly electrocuted birds on power-lines but the large transmission line structures (220 – 765 kV) are usually not a threat to large birds as the towers are designed in such a manner that the birds do not perch in close proximity to potentially lethal conductors. At the proposed line of 220 kV the tower designs will help reduce the electrocution possibilities;
- (ii) Nesting: Many species utilize towers as nesting substrates and is anticipated to have a positive impact on the avifauna in the area;
- (iii) Collisions with overhead wires: Large terrestrial birds, especially slow fliers, which have limited maneuverability, are more susceptible to collide with the wires of transmission line. The collision of birds with the proposed transmission line is anticipated to occur on plains, flats, and places where the transmission line runs close to water bodies;
- (iv) Habitat destruction: during the construction phase and maintenance of transmission lines, some habitat destruction and alteration will take place. This happens with construction of access roads and trimming of trees in ROW;
- (v) Disturbances during construction and maintenance.

84. In order to reduce some of the above mentioned impacts, the following measures may be followed:

- (i) Placing markers on the top wire to make the wires more visible to birds in areas where the collision potential is high.
- (ii) All construction and maintenance activities in any natural habitat along the route should be conducted in accordance with best environmental practices to cause minimum disturbance to any habitat
- (iii) Where possible the location of the towers should be chosen so as to avoid the cutting of large trees.

4.2.3 Protected Area and Land Use

85. There are no protected areas in the project site. The land use adjacent to the transmission line will change in the long term due to the ROW management and access road construction. The impact due to change in land use is insignificant and cannot be avoided.

4.3. Socioeconomic Environment

4.3.1 Compensation Plan (LARP)

86. The current route might require land acquisition or permanent resettlement around Kabul city and smaller villages along the route. The minor land acquisition will be for tower footing, ROW and access roads. In addition, there will be some temporary disturbances in terms of accessibility, damage of local access roads and setting up temporary work sites. Minor encroachment of private lands may be required for temporary access roads, particularly for construction of new poles and towers.

87. Land acquisition and resettlement will be minimized through avoiding the proximity to existing settlements and buildings and minimizing the need to acquire agricultural land during the detail design stage. The Project will ensure that impacts are minimized through careful route selection to avoid towers on farmland wherever possible and making use of existing tower footings and access roads.

88. DABS will bear all the costs of the compensation/rehabilitation program for the impacts caused by the Project. This includes land acquisition, crop compensation and temporary occupation compensation costs, and relative administration costs. Survey, training, and monitoring costs will be financed instead under the grant proceeds. DABS will set aside and provide the funds for LARP implementation in an efficient and timely manner during the course of the Project. The PMO ESU will assess unit compensation costs taking into consideration replacement rates. In the implementation of the LARP review and update a new valuation based on current values will be carried out and the unit costs used will be updated as well.

4.3.2 Employment Opportunities

89. Due to the specialized nature of the work to be undertaken during the construction of distribution networks, sub-station or transmission line, it is not anticipated that any major impact on employment opportunities will occur, as the local communities might not possess the skills required for specialized work. For manual labor and non-technical work, the contractor is recommended to hire local people and wherever possible provide appropriate training.

4.3.3 Resource Use

90. Construction sites may place stresses on resources and infrastructure of nearby communities. The project duration may not be very long and hence these stresses will be

temporary and negligible. But the contractor will be responsible and should work to avoid any conflict between residents and workers. It is advised to use local labor during the construction, which will increase benefits to the local community and resolve such conflicts.

4.3.4 Residential Proximity

91. Construction related intrusion impacts like concerns regarding local environment, public safety, noise, dust, etc. on residences are considered to be only temporary and of moderate significance. The long-term effects to residents besides the transmission line route could be visual intrusion and possible perceived health impacts. Transmission lines do not usually interfere with normal television and radio reception. In some cases, especially at a location close to the ROW due to weak broadcast signals or poor receiving equipment. The transmission line induces voltage and people or animals can receive a shock by touching a metal object located near a transmission line. This can be avoided or corrected by grounding metal objects near the transmission line. These impacts due to the proximity to the transmission line will be focused more in populated areas.

4.3.5 Daily Living and Movement Patterns

92. The traffic in the construction site may face temporary problems due to the excavation and construction processes of pole installation which will occur in existing utility corridor, along the road sides. The access to shops and houses near such construction sites will also be hampered temporarily. Temporary bridges to maintain access and covering exposed soil during wind to prevent dust will be provided for some relief to people in the vicinity. In addition the contractor will ensure that any excavated material is placed off the road wherever possible, to limit the width restriction.

93. The rest of the route passes through sparsely populated region and will have minor effect on daily living and movement pattern of local communities.

94. Maintenance of the line will not have any significant impact.

4.3.6 Health, Safety, and Hygiene

95. Construction sites are likely to have public health impacts and to reduce any such impact contractors shall ensure that wastewater and solid waste are disposed of as per the guidelines set by National Environmental Protection Agency (NEPA). There might be a potential for diseases and accidents due to inappropriate health and safety practices on site and hence, the contractor shall be required to recruit a health and safety manager during the construction phase.

96. Following are some of the mitigation measure that shall be implemented by the contractor:

- (i) Provision of adequate healthcare, first-aid facilities at construction sites;
- (ii) Training all construction workers in basic sanitation and healthcare issues (e.g., how to avoid transmission of sexually transmitted diseases such as HIV/AIDS), general health and safety matters, and on the specific hazards of their work;
- (iii) Providing personal protection equipment for workers, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection;
- (iv) Providing clean drinking water to all workers;

- (v) Providing protection to the general public, including safety barriers and marking of hazardous areas;
- (vi) Provide safe access across the construction site to people whose settlements and access are temporarily severed by the construction;
- (vii) Ensuring drainage throughout the construction camps to ensure that disease vectors such as stagnant water bodies and puddles do not form;
- (viii) Provide garbage boxes and septic tank at construction site, which will be periodically cleared by the contractors to prevent outbreak of diseases;
- (ix) Activities like using heavy machinery and/or hammers for digging pole holes, installation of cable etc. can cause accidents if not managed properly. Proper training, instruction and supervision are required to ensure workforce safety during construction activities.

97. The health risks associated with EMF are discussed above. The best way to avoid any such effect is by maintaining a safe ROW throughout the transmission line route. Also, the tower footings and transformers should be fenced and warning boards in local language placed on sites to restrict the access near towers and avoid any accidents.

4.3.7 Socioeconomic Benefits

98. Much of the economic growth in Afghanistan is hampered by inadequate electricity supply. The Project contributes to meeting the commercial and residential electricity requirement of Kabul region. The implementation of this Project ensures improved living conditions in terms of social and economic aspects for both the towns.

99. During the construction phase and later on the operation phase the Project will generate some employment opportunities for the local populations. The property prices of land in proximity of the tower footing or having visual intrusion of cables might decrease. The impact of reduced property value might be greatest for residents within project site and for farmers on whose land the tower might be located.

4.3.8 Public Awareness

100. People in the region might be unaware of health and safety issues related to transformers and high tension wires. As the distribution and transmission lines passes through populated areas around Kabul city and other villages along the route, it is highly recommended to generate awareness through community meetings, leaflets, media, etc. Special sessions should be conducted with farmers which will be working in and around towers and ROW and residents with houses close to ROW.

5. Institutional Requirement and Environmental Monitoring Plan

5.1 Environmental Clearance Requirements

101. In accordance with ADB's *Environmental Policy (2002)*, Environmental Assessment Guidelines² and grant or loan processing, an Initial Environmental Examination and Summary Initial Environmental Examination (SIEE) will be presented to both the Government of Afghanistan and ADB Board.

² 2003. Asian Development Bank. *Environmental Assessment Guidelines*, Manila.

5.1.1 Government Environmental Laws, Regulations, and Guidelines

102. The Government's regulation on environmental impact assessment is based on the Environmental Act of Islamic Republic of Afghanistan (Gazette No. 873), dated 29 Jada, 1384 (19 January, 2006). The NEPA, as an independent institutional entity, is responsible for coordinating and monitoring conservation and rehabilitation of the environment, and for implementing this act. Article 16 and 17 of Chapter 3 of Environmental Act describes the process of preparing a preliminary assessment, an environmental impact statement and a comprehensive mitigation plan to be conducted by the proponent of each Project. Article 21 mentions public consultation is required for all the projects. Article 18 describes the approval procedure of environmental impact assessment. The NEPA will appoint an environmental impact assessment (EIA) Board of Experts to review, assess and consider applications and documents submitted by the proponent. Acting on the advice of the EIA Board of Experts, NEPA shall either grant or refuse to a grant permit in respect of the Project. A permit granted will lapse in the event that the proponent fails to implement the Project within 3 years of the date of which the permit was granted. Article 19 describes the appeal procedure. Any person may within thirty days of the granting or refusal of a permit, appeal the decision to the Director-General of the NEPA. The Director-General shall review the appeal application and thereafter make an appropriate decision. Should the appellant wish to appeal the Director-General's final decision, the matter shall be referred to the relevant court.

103. Chapter 6 of the Environmental Act of the government describes national biodiversity strategy and protected areas management. The NEPA will prepare a national biodiversity strategy and action plan within two years of the entry into force of the Environmental Act. The NEPA will also develop a comprehensive plan for the national protected areas system.

5.1.2 Institutional framework for Environmental Management

104. In March 2008 the Government of Afghanistan approved the formation of Da Afghanistan Breshna Sherkat (DABS) as part of a strategy to commercialize the power sector. DABS will be the executing agency for the Project. DABS will be responsible for ensuring that the Project is implemented in an environmentally acceptable manner in accordance with the Environmental Management and Monitoring Plan (EMP), in Annex B. Since DABS has limited environmental capacity, designated staff members will be trained in environmental management and monitoring of transmission lines. International and local environmental specialists have been included in the Supporting TA project implementation consultant's team to train DABS staff members in environmental management, establish routine environmental monitoring protocols, and undertake periodic environmental monitoring and audit of construction works during construction.

105. DABS will implement and monitor the submission and clearance of IEEs and EIAs under statutory provisions. It will ensure that bidding documents and contracts include the mitigation measures required in the EMPs and that the mitigation measures are implemented by the contractors. The Investment Program requires the establishment of an environmental cell within DABS, and the appointment of environmental and resettlement specialists

106. After project completion, DABS will be in charge of the operation and maintenance of the transmission lines. PMO in cooperation with the district/regional administration will undertake the monitoring and analysis of samples as scheduled in the monitoring plan.

5.2 Environmental Monitoring Program

107. Environmental monitoring is a vital aspect of environmental management during construction and operation stages of the Project to safeguard the protection of environment. Compliance monitoring will be conducted in accordance with the EMP provided with this report. Aspects to be monitored are as follows:

- (i) Pre-construction Phase: updating of EMP during detailed design phase and inclusion of environmental clauses in bid and contract documents.
- (ii) Construction Phase: environmental performance of contractors with regard to control measures pertaining to erosion, material storage, siting of work sites, noise, waste disposal, traffic management, worker's safety, etc.
- (iii) Operation Phase: O & M practices and environmental effects including soil erosion, soil contamination, surface water and EMF.

108. The CSC in cooperation with PMO during project implementation will be required to develop an environmental auditing protocol for the construction period, formulate a detailed monitoring and management plan, supervise the environmental monitoring regularly, and submit quarterly reports based on the monitoring data and laboratory analysis. The PMO shall submit the following environmental reporting documentation to ADB:

109. **Baseline Monitoring Report.** The Baseline Monitoring Report shall be submitted to ADB prior to commencement of civil work 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. A recommended format for environmental performance and effects monitoring for pre-construction, construction and operation phases is presented in Annex D.

- (i) *Environmental Monitoring Reports:* The environmental monitoring reports will include environmental mitigation measures undertaken, environmental monitoring activities undertaken, details of monitoring data collected, analysis of monitoring results, recommended mitigation measures, environmental training conducted, and environmental regulatory violations. The environmental monitoring reports will be submitted to ADB twice annually during the construction period and annually for three years after completion of construction.
- (ii) *Project Completion Environmental Monitoring Report:* Three years after completion of construction, the EA shall submit a Project Completion Environmental Monitoring Report to ADB, which will summarize the overall environmental impacts from the Project.

110. A lump sum budget is allocated in the environmental mitigation to cover monitoring cost and environmental reporting requirements in the Project. PIU will hire a recognized organization for environmental monitoring and ensure that the project sites (substations, transformers, pole line) are monitored regularly for the first two years of its operation.

5.3 Environmental and Social Management Training

111. The DABS has very limited experience and resources for environmental and social management and monitoring. It will be very difficult for PIU to efficiently supervise the

monitoring of environmental and social safeguard parameters. For a better understanding of transmission line related environmental issues, implementation of mitigation measures, and subsequent monitoring, capacity building of PIU and regional administration is advised. Training for the officials is crucial for proper environmental monitoring addressed in the IEE. The contractor shall be provided with hands-on-training in the construction site by the PMO in association with the contractor's environmental, health and safety manager. These training efforts should be extended to aid civil society capacity building, enabling local NGOs to become actively involved and qualified to conduct own environmental audits.

Table 1: Environmental Monitoring and Mitigation Cost

Item	Unit	Quantity	Unit Cost (\$)	Total (\$)
Environmental Costs - Civil Works (included in Contractor's civil works package)				
Air Quality and Dust Monitoring	Site	4	1,000	4,000
Water Quality Monitoring	Site	2	1,000	2,000
Noise and Vibration Monitoring	Site	4	1,000	4,000
Chlorinated solvent monitoring	Site	2	1,500	3,000
Worker and Storage Compound	Site	4	1,000	4,000
Dust Suppression Measures	Day	300	50	15,000
Disposal of old machinery and equipment (e.g. transformers)	Site	2	10,000	20,000
Provision of Health, Safety and Environmental Manager	MM	12	3,000	36,000
Subtotal				88,000
Environmental Costs - PMO Budget				
<i>Environmental Management and Monitoring (during design and construction)</i>				
a. Remuneration and Per diems				
International Environmental Specialist (design)	MM	1	18,000	18,000
International Environmental Specialist (CS)	MM	2	18,000	36,000
Domestic Environmental Specialist (design)	MM	3	3,500	10,500
Domestic Environmental Specialist (CS)	MM	12	3,000	36,000
b. Travel				
International Travel	Trip	3	2,500	7,500
Domestic Travel	No	6	500	3,000
Subtotal				111,000
<i>Environmental Monitoring of Project (during operation for 3 years)</i>				
Chlorinated solvent monitoring	Site	6	1,500	9,000
Sedimentation Monitoring	No	6	500	3,000
Workers Safety	Site	6	500	3,000
Noise and Vibration	Site	6	1,000	6,000
Water Contamination Monitoring	Site	6	500	3,000
Soil Contamination Monitoring	No	6	500	3,000
Environmental Monitoring Reports (construction & ops)	No	6	1,000	6,000
Project Completion Environmental Monitoring Reports	No	1	1,500	1,500
Subtotal				34,500
<i>Environmental and Social Management Training</i>				
a. Remuneration and Per diems				
International Environmental Specialist	MM	1	21,000	21,000

Item	Unit	Quantity	Unit Cost (\$)	Total (\$)
International Social/Resettlement Specialist	MM	1	21,000	21,000
Domestic Environmental/Curriculum Specialist	MM	2	3,500	7,000
Domestic Social/Resettlement Specialist	MM	2	3,500	7,000
b. International Travel	Trip	2	2,500	5,000
c. Trainees Allowance	Person	9	180	1,620
d. Logistics and Others	No	9	500	4,500
			Subtotal	67,120
Grand Total				300,620

6. Stakeholder Consultation and Information Disclosure

112. The stakeholder consultation focused primarily on land acquisition and compensation matters, which are the major concerns. The preparation of LARP has included consultation with the affected communities and where possible, AFs. Field visits and consultations have taken place on three occasions in August 2009, whereas the consultants have discussed the Project with local DABS staff, local governments and potential AFs.

113. The stakeholders were generally supportive of the Project. The review of this LARP during detailed design and the update of impacts and AP surveys will be carried out along with a new round of AP information/consultation to ensure full stakeholder participation in Project preparation. This task will be carried out by the contractor and will involve PMO ESU and both local DABS and local government offices. Methods such as community meetings, consultative groups, focus groups, interviews, and informal interaction with community consultation groups will be adopted to discuss and decide land acquisition and compensation measures.

114. During project implementation, AP consultation will be ensured through regular meetings to be organized by the PMO ESU and the Resettlement Team (or specialist) to be recruited by the contractor. These meetings will be used to identify, together with the AF, implementation problems and to undertake timely remedial actions. An external monitor will monitor LARP implementation and prepare safeguard compliance reports for submission twice a year to the PMO and ADB. Local NGOs may be engaged to assist the implementation and monitoring of the LARP. The final LARP at detailed design stage will detail processes and mechanisms to ensure the APs' active involvement and include an annex with list of the consultation meetings held with date, number of participants and minutes of matters discussed.

115. The Project outline, expected impact, entitlement and grievance redress mechanism was disclosed to the AFs by Project information leaflet distributed during consultation. Upon approval by ADB and DABS, this LARP will be translated and disclosed to the AFs. It will also be disclosed through the posting of the English version on the ADB website and publication of the Dari version in local DABM offices and through the delivery of information leaflets (see Annex 6; to be updated with contact details).³ For the illiterate, the DABS may require community consultation meetings in order to explain activities and rights related to the LARP and its implementation. Public consultations will also include discussion on environmental impacts and mitigation measures. Public consultation will be held at the latest before the start of any civil works. For the final updated LARP at detailed design phase the LAR information booklet with

³ Copies of the Dari translation of this leaflet have been provided to members of the community during the on-going community consultations and surveys.

LAR information including measurement of losses, detailed asset valuations, entitlements and special provisions, grievance procedures, timing of payments and displacement schedule will be made available in the local language (Dari) and distributed to APs. This disclosure will be a condition to proceed to LARP implementation.

7. Findings and Recommendations

116. The present IEE reveals that some moderate to significant negative environmental impacts are likely to occur due to the construction activities and few minor impacts during the normal operations after the proposed construction. Recommendations are made to mitigate expected negative impacts.

117. Construction of transmission line, substation and distribution network will generate a number of limited negative impacts on the environment. The impacts need to be mitigated at the planning and detail design stage, while taking the local community in confidence. The transmission line can also have unavoidable, irreversible and long-term impacts like visual intrusion, safety concerns, change in land use patterns and bird strikes. Following the mitigation measures during planning, construction and maintenance stage can minimise these impacts.

118. Many of the impacts during the construction period cannot be assessed at this moment, because sites for exact construction activities and temporary work activities have not been identified and/or information concerning the period and the duration of these activities are not available. The temporary construction works could create more impacts than the activities related to the permanent works. For this reason, environmental management and monitoring will be required covering construction and operation stages. The budget should include environmental and social management training of Government officials, which will enable them to carry out environmental monitoring, implement environmental management plans and conduct impact assessment.

119. The major positive impact of the Project, which is also the reason behind proposing this Project, is the increased access to electricity for the City of Kabul and surrounding areas, an improved quality of life, reduced health risk, enhancement of the development of small to medium sized enterprises, and increased trade and economic flow in the region.

8. Conclusion

120. The Project will have some minor environmental impacts, which will be both positive and negative, including: (a) soil erosion, (b) temporary effect on noise and air quality due to construction activities, (c) visual intrusion and negative impact on aesthetics, (d) change in land use patterns, (e) increased bird collisions, (f) increased growth in the economy of the region, (h) better life style and improved living conditions, (i) reduced health risk, (j) development of small to medium sized enterprises, (k) reduced poverty; and (l) advanced environmental skills and awareness level among the DABS officials.

121. Implementation of appropriate mitigation measures during the design, construction, and operation phases will minimize the negative impacts of the Project to acceptable levels. To ensure that these mitigation measures are implemented and negative impacts ameliorated, the measures will be included in the contract specification of the Project. Environmental monitoring of the Project will be undertaken regularly through the first three years of its operation to ensure that the measures are being implemented properly.

122. The Project will have an overall beneficial impact and any negative environmental impacts will be carefully monitored and mitigated. Therefore, the completion of this IEE fully meets the ADB and government standards and no further environmental study is required for this Project.

Annex B: Environmental Management and Monitoring Plan (EMP)

1. ENVIRONMENTAL MANAGEMENT PLAN

Sr. No.	Environmental Impact/Issue	Mitigation Measures	Reference in Document	Location	Responsibility	
					Implementation	Supervision
1	Preconstruction Phase					
1.1	Updating of EMP during Detailed Design for Sub-components	i. Updating of EMP during detailed design phase and incorporation of mitigation measures in the project design ii. Allocating and revising budget estimates for EMP	IEE, Section 5	Entire project	PMO	DABS
1.2	Lack of Environmental Specifications for Contractor in Bid Documents, Environmental Clauses for Contracts	i. Prepare relevant environmental sections in the tender documents for bidders ii. Prepare a bid evaluations section for environment, according to ADB bid evaluation format iii. Prepare environmental contract clauses for contractors (refer to EMP)	IEE, Section 5	Entire project	PMO	DABS
1.3	Interference with residences, historical, cultural, religious monuments, hospital, schools etc.	i. Use the existing utility corridor within the city ii. Wherever possible use the existing tower or tower footing iii. Finalize the work hours based on distance from residences, hospitals, schools and especially to avoid prayer times	IEE, Section 4	Locations near human settlements,	PMO	DABS

Sr. No.	Environmental Impact/Issue	Mitigation Measures	Reference in Document	Location	Responsibility	
					Implementation	Supervision
1.4	Farmland Encroachment	<ul style="list-style-type: none"> i. Use existing tower footings/towers wherever possible ii. Plan the route to avoid siting new towers on farmland wherever feasible iii. Use longer spans, place towers adjacent to roads or fences iv. Compensate farmers for any permanent loss of productive land v. compensate farmers/landowners for significant trees that need to be trimmed/removed along ROW. 	IEE, Section 4	Locations in agricultural zone	PMO	DABS
1.5	Interference with river flow and drainage pattern	<ul style="list-style-type: none"> i. Appropriate planning of route to avoid tower siting which may interfere with river flow ii. Placement of towers on the River banks and within 1:50 year flood lines should be avoided as far as possible ii. Use existing access roads and plan new ones to avoid interference with drainage pattern, especially near the river. 	IEE, Section 4	Locations near River and other surface water sources	PMO	DABS
1.6	Aesthetics (Visual intrusion, reduced aesthetics of natural landscape)	<ul style="list-style-type: none"> i. Route the line to avoid areas considered scenic. ii. Routes can be chosen to pass through commercial/industrial areas or along land use boundaries iii. The form, color, or texture of a line can be modified to minimize aesthetic impacts iv. Stronger conductors can minimize line sag v. ROW management can mitigate 	IEE, Section 4	Throughout the route	PMO	DABS

Sr. No.	Environmental Impact/Issue	Mitigation Measures	Reference in Document	Location	Responsibility	
					Implementation	Supervision
		aesthetic impacts by planting vegetative screens to block views of the line				
1.7	Public Consultation	i. Conduct community meetings; distribute information leaflets, educational advertisements in media etc. ii. Special sessions with farmers which will be working in and around towers and ROW and residents with houses close to ROW	Contract Documents and IEE, Section 4	Residents, Farmers & everyone in general	Contractor	CSC
2	Construction Phase					
2.1	Physical Environment					
2.1.1	Topography, Soils and Geology (top soil erosion, erosion of material stockpile, damage of local roads)	i. Restrict the corridor width and unnecessary vegetation clearing ii. Areas disturbed during construction should be appropriately rehabilitated and, if necessary, re-vegetated. iii. Reuse the spoils, removed rocks and earth for tower fences, access roads etc. iii. Removal of contaminated soil from the site and conduct remediation measures, if any. iv. Cover the material stockpiles or store inside a covered area v. Repair the local roads post construction vi. Avoid construction in rainy season vii. Special measures for steep	Contract Documents and IEE, Section 4	Transmission tower locations, ROW, access roads, store house	Contractor	CSC

Sr. No.	Environmental Impact/Issue	Mitigation Measures	Reference in Document	Location	Responsibility	
					Implementation	Supervision
		gradients in hilly area				
2.1.2	Surface water (increase in turbidity, pollution due to improper disposal of waste water, localized change in river flow and drainage patterns)	<ul style="list-style-type: none"> i. Measures to reduce soil erosion ii. Providing sanitary facilities to workers at campsite iii. Proper treatment of wastewater through septic tank iv. Protect wells by covering them up vi. Where new access roads are to be constructed, they should not disturb the natural drainage patterns of the area vii. If the river is crossed, special attention should be given to prevent change in flow patterns viii. Prohibiting construction and maintenance vehicles from driving in waterways 	Contract Documents and IEE, Section 4	Transmission tower locations, ROW, access roads especially near surface water sources like river, streams and ponds	Contractor	CSC
2.1.3	Solid Waste (construction debris, waste from construction camps)	<ul style="list-style-type: none"> i. Reuse the excavated soil or rocks for providing side beams or fencing for poles, towers, access roads etc. ii. Dispose the unused material at specified site iii. Prevent littering by providing adequate number of containers iv. Domestic waste should be collected and disposed of in an appropriate manner at an approved site v. After completion of construction the site shall be properly cleaned of any construction waster, litter etc. and properly rehabilitated or vegetated 	Contract Documents and IEE, Section 4	Transmission tower locations, ROW, access roads, worker camps	Contractor	CSC

Sr. No.	Environmental Impact/Issue	Mitigation Measures	Reference in Document	Location	Responsibility	
					Implementation	Supervision
2.1.4	Air Quality (Increased dust, pollution from exhaust)	<ul style="list-style-type: none"> i. Spray water at the construction site and on access road ii. Maintaining the construction vehicles and machinery iii. Ban the use of machinery causing excess pollution 	Contract Documents and IEE, Section 4	Transmission tower locations, ROW, access roads	Contractor	CSC
2.1.5	Noise and Vibration(Construction activities, machinery and vehicles, Corona activity)	<ul style="list-style-type: none"> i. Restrict work hours in consultation with local community and avoid Prayer times ii. Restrict to specific hours within 500m of settlements and 150m from sensitive receptors (schools, hospitals and places of religious importance). iii. Blasting should take place during mid-day hours and the timing should be made available to the local people within 500m of the blasting site in all directions iv. Noise levels at residential dwellings shall be maximum 65dBA during the day (7 a.m. to 7 p.m.) and 45 dBA during the night (7 p.m. to 7 a.m.). Contractor shall monitor and report noise levels measured at representative receptor locations. v. At places with noise violation within the city, mitigation measures such as earth berm, dense layered plantation and other measures like wooden noise barriers shall be considered. 	Contract Documents and IEE, Section 4	Transmission tower locations, ROW, access roads	Contractor	CSC
2.1.6	Mines	<ul style="list-style-type: none"> i. Determine the proposed transmission line alignment before starting any construction work ii. Special assessment and clearance 	Contract Documents and IEE, Section 4	Transmission tower locations, ROW, access	Contractor	CSC

Sr. No.	Environmental Impact/Issue	Mitigation Measures	Reference in Document	Location	Responsibility	
					Implementation	Supervision
		will be needed for this area from UNMACA before initiation of any project activity.		roads		
2.1.7	EMF (Interference with radio, television signals, generating corona and stray voltage, interfere with cardiac-pacemaker)	<ul style="list-style-type: none"> i. Keep the safety offset, ROW, between buildings and transmission line ii. Provide safety gear to workers working in high voltage area iii. Construct the lines closer so as to reduce the EMF 	Contract Documents and IEE, Section 4	Transmission line towers and along the route	Contractor	CSC
2.1.8	Agricultural land (Negative effect on farming practices like maneuvering of machines, soil compaction/erosion, weed encroachment, safety hazard)	<ul style="list-style-type: none"> i. Use single-pole structures and place the line along fence lines or adjacent to roads. ii. Keep guy wires outside crop or hay land and provide highly visible shield guards. iii. Minimize pole height and install markers on the shield wires above the conductors iv. Conduct work in agricultural areas during the winter months and when soils are not saturated v. Replanting lower-growing trees and bushes beneath the line or create a new windbreakers. 	Contract Documents and IEE, Section 4	Transmission line towers and along the route through agricultural lands	Contractor	CSC

Sr. No.	Environmental Impact/Issue	Mitigation Measures	Reference in Document	Location	Responsibility	
					Implementation	Supervision
2.1.9	Materials contaminated by PCB	<ul style="list-style-type: none"> i. Identify quantity of PCB contaminated materials in the project area ii. Coordinate with other contractors on disposal of PCB contaminated materials iii. identify and secure location for storage from NEPA iv. if NEPA cannot provide suitable location because Afghanistan has no regulation on PCB disposal, sequester PCB-containing equipment in a safe place until a disposal method meeting international standards can be determined. 	Contract Documents and IEE,	Distribution System	Contractor	CSC
2.2	Environment					
2.2.1	Flora (clearing of vegetation for tower footing, disturbance near access roads, trimming the tree branches along ROW)	<ul style="list-style-type: none"> i. Restrict the uprooting of vegetation near tower footings and access road. ii. Train worker in correct techniques of tree trimming without damage to the trunk or roots iii. Minimize the construction activity area and implement measures to prevent spillage of concrete or other substances that can permanently destroy vegetation iv. Restrict the movement of construction vehicles soon after heavy rains v. Rehabilitate and re-vegetated the affected land 	Contract Documents and IEE, Section 4	Transmission tower locations, ROW, access roads	Contractor	CSC

Sr. No.	Environmental Impact/Issue	Mitigation Measures	Reference in Document	Location	Responsibility	
					Implementation	Supervision
2.2.2	Fauna (destruction/interference with habitat, disturbing individuals, bird-strike, increased probability of electric shock, effects from stray voltage, poaching by workers)	<ul style="list-style-type: none"> i. Reduce interference by restricting corridor width, removal of vegetation and trimming of trees ii. Providing fencing around the high voltage areas iii. Educate workers about wildlife conservation and conduct the work while following the best environmental practices iv. Place markers on the top wire to make the wires more visible to birds in areas where the collision potential is high. 	Contract Documents and IEE, Section 4	Transmission tower locations, ROW, access roads	Contractor	CSC
2.3	Socioeconomic Environment					
2.3.1	Compensation Plan (Land acquisition, rehabilitation, temporary acquisition)	<ul style="list-style-type: none"> i. Follow the RAP ii. temporary acquisition should be done only after taking owner's permission. ii. Cause least damage to property and rehabilitate the site after completion of work. 	Contract Documents and IEE, Section 4	Transmission tower locations, ROW, access roads	Contractor	CSC
2.3.2	Employment opportunity and Resource use (increase employment opportunity and stress on resources)	<ul style="list-style-type: none"> i. Train and hire local workers as far as possible. 	Contract Documents and IEE, Section 4	Entire Project	Contractor	CSC

Sr. No.	Environmental Impact/Issue	Mitigation Measures	Reference in Document	Location	Responsibility	
					Implementation	Supervision
2.3.3	Residential proximity, movement and living patterns (access impediment to buildings, increased dust, road congestion, signal interference)	<ul style="list-style-type: none"> i. Provide temporary bridges to maintain access ii. Cover exposed soil iii. Clear the earth removed from foundation pit to limit the width restriction iv. Transfer the material during non-peak hours of traffic v. Restrict working hours v. Maintain ROW 	Contract Documents and IEE, Section 4	Route near human settlement	Contractor	CSC
2.3.4	Health Safety and Hygiene (Health, safety and hygiene of workers and work space, Health and Safety of people living near the transmission line)	<ul style="list-style-type: none"> i. Mitigation for workers safety and health are mentioned in detail in the IEE Report including the provision of safety gears for workers ii. Provide earthing to all the metallic equipments near the transmission line ii. Appropriate distance shall be maintained between the transmission line and buildings. iii. No encroachment shall be allowed in ROW. 	Contract Documents and IEE, Section 4	Entire Project	Contractor	CSC
2.3.5	Public Awareness (Increase through various consultations and educational program)	<ul style="list-style-type: none"> i. Conduct community meetings; distribute information leaflets, educational advertisements in media etc. ii. Special sessions with farmers which will be working in and around towers and ROW and residents with houses close to ROW. 	Contract Documents and IEE, Section 4	Residents, Farmers & everyone in general	Contractor	CSC

Sr. No.	Environmental Impact/Issue	Mitigation Measures	Reference in Document	Location	Responsibility	
					Implementation	Supervision
3	Operational Phase					
3.1	Environment					
3.1.1	Soil (soil erosion due to maintenance and use of access roads)	i. Restrict vehicle speed	IEE, Section 4	Access roads	PMO-consultant	PMO
3.1.2	Surface Water (silt in runoff, change in drainage pattern, scouring of river bed near tower footings)	i. Prohibit maintenance vehicles from driving in waterways ii. Address the scouring if considerable	IEE, Section 4	Route near river and other surface water sources	PMO-consultant	PMO
3.1.4	Noise and Vibration (Corona noise in high voltage area)	i. The proposed project lines are lower than 230 kV, problems related to corona, including sound, will be negligible ii. Provide safety gear to officers working in plant iii. Maintain ROW and restrict access to tower footings.	IEE, Section 4	Towers	PMO-consultant	PMO
3.1.6	EMF	i. Keep the safety offset, ROW, between buildings and transmission line ii. Provide safety gears to officers working in high voltage area iii. Restrict access near towers by fencing and warning signs.	IEE, Section 4	Towers and cables	PMO-consultant	PMO
3.2.1	Flora (Regular trimming of trees in ROW)	i. Train worker in correct techniques of tree trimming without damage to the trunk or roots	IEE, Section 4	Entire route	PMO-consultant	PMO

Sr. No.	Environmental Impact/Issue	Mitigation Measures	Reference in Document	Location	Responsibility	
					Implementation	Supervision
3.2.2	Fauna(Bird-strike, electric shock to wildlife)	i. Providing fencing around the high voltage areas. ii. Place markers on the top wire to make the wires more visible to birds in areas where the collision potential is high.	IEE, Section 4	Entire route, especially near water sources	PMO-consultant	PMO
3.3	Socioeconomic Environment					
3.3.1	Health, Safety and Hygiene (officers working during the operation and maintenance of transmission line and people living in vicinity)	i. Keep the safety offset, ROW, between buildings and transmission line ii. Provide earthing to all the metallic equipments near the transmission line iii. Provide proper health and safety equipments and trainings to officers iv. Educate farmers working near towers and in ROW about the safety hazards v. Restrict access near towers by fencing and warning signs.	IEE, Section 4	Towers and places near human settlement and workplace	PMO-consultant	PMO

2. ENVIRONMENTAL MONITORING PLAN

Sr. No.	Environmental Monitoring Task	Monitoring Details	Timings	Executing Unit	Reporting Responsibility
1	Preconstruction Phase				
1.1	Up-Dating of EMP during Detailed Design for Sub-components	Compliance check for updated EMP during detailed design phase and incorporation of mitigation measures in the project design	In time for inclusion as part of bid documentation and environmental clauses in contracts	PMO/CSC	PMO reports to DABS
1.2	Lack of Environmental Specifications for Contractor in Bid Documents, Environmental Clauses for Contracts	Compliance with provision of key environmental inputs for inclusion in bid preparation documents and contractor contracts.	In time for inclusion as part of bid documentation and environmental clauses in contracts	PMO/CSC	PMO reports to DABS
1.3	Detail environmental planning of the transmission line route	Compliance with provision of key environmental inputs and maintaining safe distance from sensitive receptors and high risk/impact area.	Detail project planning	PMO/CSC	PMO reports to DABS

Sr. No.	Environmental Monitoring Task	Monitoring Details	Timings	Executing Unit	Reporting Responsibility
2	Construction Phase				
2.1	Physical Environment				
2.1.1	Soils and Topography	Compliance inspection and file report on whether erosion control measures are in place and functioning as specified, visual inspection for signs of leakages	Monthly	CSC	PMO
2.1.2	Surface water	Compliance inspection for signs of increased turbidity, change in river flow regime, untreated waste water disposal, leakages, general cleanliness	Monthly	CSC	PMO
2.1.3	Solid Waste	Compliance inspection at sites, visual inspection at camps, general cleanliness	Monthly	CSC	PMO
2.1.4	Air Quality	Compliance inspection at construction sites, visual inspection for signs of dust pollution during dry weather periods	Monthly	CSC	PMO
2.1.5	Noise and Vibration	<ul style="list-style-type: none"> - Compliance inspection at construction sites of noise pollution restrictions outside permissible hours - ambient noise measurements at representative receptor locations during day time and night time hours - ambient noise measurements upon complaints by affected residents 	Monthly	CSC	PMO
2.1.6	EMF	Measuring EMF levels around the towers and where line passes through human settlements and workplace	Monthly	CSC	PMO

Sr. No.	Environmental Monitoring Task	Monitoring Details	Timings	Executing Unit	Reporting Responsibility
2.3	Socioeconomic Environment				
2.3.1	Community Impacts	Visual inspection and talking to people in order to learn their grievances regarding construction process and inconveniences, if any	Monthly	CSC	PMO
2.3.2	Health Safety and Hygiene	Compliance inspection at construction sites and talking to workers and people living in vicinity regarding any issues faced by them, checking total cases of work-related accidents, visual inspection of leakages from transformers/capacitors, chemical storage area	Monthly	CSC	PMO
2.3.3	Employment	Inspection of the total number of local workers, the workers' qualifications, place of origin etc.	Monthly	CSC	PMO
3	Operational Phase				
3.1	Physical Environment				
3.1.1	Soil	Compliance inspection and visual inspection for signs of leakages from transformers/capacitors, chemical storage area	Quarterly for 3 year post construction and later as part of regular maintenance plan of the line	i. Consultants-PMO ii. Plant Officers	PMO
3.1.2	Surface Water	Compliance inspection and visual inspection for signs of change in river flow regime and drainage patterns	Quarterly for 3 year post construction and later as part of regular maintenance plan of the plant and line	i. Consultants-PMO ii. Plant Officers	PMO

Sr. No.	Environmental Monitoring Task	Monitoring Details	Timings	Executing Unit	Reporting Responsibility
3.1.3	Noise , Vibration and EMF	Compliance inspection and general inspection for noises, vibrations and EMFs	Quarterly for 3 year post construction and later as part of regular maintenance plan of the plant and line.	i. Consultants-PMO ii. Plant Officers	PMO
3.2	Environment				
3.2.1	Flora	General visual inspection	As part of regular maintenance plan of the plant and line.	Plant officers	PMO
3.2.2	Fauna	Collect information on number bird strikes and species, from people living nearby and maintain record to understand the pattern and modify mitigation methods if necessary	Quarterly for 3 year post construction and later as part of regular maintenance plan of the plant and line.	i. Consultants-PMO ii. Plant Officers	PMO

Sr. No.	Environmental Monitoring Task	Monitoring Details	Timings	Executing Unit	Reporting Responsibility
3.3	Socioeconomic Environment				
3.3.1	Health, Safety and Hygiene	Compliance inspection and regular general inspection of safety equipments, safe guard installed on sites, visual inspection of runoff signs of leakages from capacitors and reporting accidents, if any	Quarterly for 3 year post construction and later as part of regular maintenance plan of the plant and line.	i. Consultants-PMO ii. Plant Officers	PMO

SUGGESTED FORMAT OF ENVIRONMENTAL PERFORMANCE AND ENVIRONMENTAL EFFECTS MONITORING REPORTS FOR PRE-CONSTRUCTION, CONSTRUCTION AND OPERATION PHASES

Monitoring Report					
1. Introduction and Project Overview					
<i>Reporting period:</i>					
<i>Last report date:</i>					
<i>Key project activities since last report:</i>					
<i>Report prepared by:</i>					
2. Environmental Performance Monitoring					
a. Summary of Compliance with EMP Requirements (Environmental Performance)					
<i>EMP Requirement</i>	<i>Compliance Attained (Yes, No, Partial)</i>	<i>Comment on Reasons for Non-Compliance</i>	<i>Issues for Further Action</i>		
1.					
2.					
3.					
b. Issues for Further Action					
<i>Issue</i>	<i>Cause</i>	<i>Required Action</i>	<i>Responsibility</i>	<i>Timing</i>	<i>Resolution</i>
Old Issues from Previous Reports					
1.					
2.					
New Issues from this Report					
1.					
2.					
3. Environmental Effects Monitoring					
a. Environmental Inspection and Monitoring Results					
<i>Monitoring Parameter</i>	<i>Comparison to Relevant Standard / Criteria</i>	<i>Comment on Incidences of Exceedance</i>	<i>Issues for Further Action</i>		
1.					
2.					

3.					
b. Issues for Further Action					
<i>Issue</i>	<i>Cause</i>	<i>Required Action</i>	<i>Responsibility</i>	<i>Timing</i>	<i>Resolution</i>
Old Issues from Previous Reports					
1.					
2.					
New Issues from this Report					
1.					
2.					
4. Appendices <ul style="list-style-type: none"> a. Correspondence b. Monitoring Results c. Etc. 					

Rapid Environmental Assessment (REA) Checklist

POWER
TRANSMISSION

Instructions:

- ❑ This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- ❑ This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- ❑ This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- ❑ Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

Country/Project Title

Afghanistan: Multi-tranche Financing Facility for the Energy Sector Development Program Proposed Project 2

Sector Division:

Power Transmission

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site	<input type="checkbox"/>	x	
▪ Protected Area	<input type="checkbox"/>	x	
▪ Wetland	<input type="checkbox"/>	x	
▪ Mangrove	<input type="checkbox"/>	x	

SCREENING QUESTIONS	Yes	No	REMARKS
▪ Estuarine	<input type="checkbox"/>	x	
▪ Buffer zone of protected area	<input type="checkbox"/>	x	
▪ Special area for protecting biodiversity	<input type="checkbox"/>	x	
B. Potential Environmental Impacts			
Shall the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?	<input type="checkbox"/>	x	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?	<input type="checkbox"/>	x	
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?	<input type="checkbox"/>	x	
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?	<input type="checkbox"/>	x	
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?	x	<input type="checkbox"/>	Contract will include requirement to use cofferdams in streams, sewage treatment facilities, and safe chemical storage.
▪ increased local air pollution due to rock crushing, cutting and filling?	x	<input type="checkbox"/>	Contract will include requirement to utilize curtains and sprays at crusher plants and water sprinkling during earthworks
▪ chemical pollution resulting from chemical clearing of vegetation for construction site?	<input type="checkbox"/>	x	
▪ noise and vibration due to blasting and other civil works?	x	<input type="checkbox"/>	Blasting noise is unavoidable but advance notice will be given. Noise from other sources will not exceed 65dBA during the day and 45 dBA at night
▪ dislocation or involuntary resettlement of people	<input type="checkbox"/>	x	
▪ social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?	x	<input type="checkbox"/>	Contractor's public relations officer will investigate complaints and devise amicable solutions
▪ hazardous driving conditions where construction interferes with pre-existing roads?	x	<input type="checkbox"/>	Contractor will place signs and guards at critical locations and coordinate with local police

SCREENING QUESTIONS	Yes	No	REMARKS
<ul style="list-style-type: none"> ▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 	x	<input type="checkbox"/>	<ul style="list-style-type: none"> - Contract will require adequate sanitation and solid waste management. - Workers will receive training on prevention of communicable diseases.
<ul style="list-style-type: none"> ▪ creation of temporary breeding habitats for mosquito vectors of disease? 	x	<input type="checkbox"/>	Sites will be graded to avoid the accumulation of stagnant water
<ul style="list-style-type: none"> ▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines? 	x	<input type="checkbox"/>	Resettlement Plan will provide for adequate compensation
<ul style="list-style-type: none"> ▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)? 	x	<input type="checkbox"/>	EA appointed maintenance workers will be trained to properly trim trees and other vegetation
<ul style="list-style-type: none"> ▪ facilitation of access to protected areas in case corridors traverse protected areas? 	<input type="checkbox"/>	x	
<ul style="list-style-type: none"> ▪ accident risks associated with maintenance of lines and related facilities? 	x	<input type="checkbox"/>	Risks will be controlled through appropriate training of maintenance workers
<ul style="list-style-type: none"> ▪ health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization? 	x	<input type="checkbox"/>	
<ul style="list-style-type: none"> ▪ disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height? 	<input type="checkbox"/>	x	

