



**National Transmission & Despatch  
Company Limited (NTDC) Pakistan**

## **ENVIRONMENTAL IMPACT ASSESSMENT (EIA)**

**OF**

### **220 KV TRANSMISSION SYSTEM NETWORK REINFORCEMENT IN ISLAMABAD, TARBELA AND BURHAN AREA**

***A) Replacement of existing 220 kV Tarbela-Burhan D/C transmission line with a  
new line on twin bundled Rail conductor (35.1 km)***

***B) In/Out of one circuit of 220kV Mansehra-ISPR D/C Transmission line at  
Islamabad (23.99 km)***



**JUNE, 2017**

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## **EXECUTIVE SUMMARY**

### **1. INTRODUCTION**

The Power Generation Capacity of Pakistan is 21,353 MW including all resources like hydal, thermal and Independent Power Producers (IPPs). The contribution of power generation through hydel, thermal and IPPs is 7075 MW, 4829 MW and 8678 MW respectively. The power generated from Thermal and IPPs sources is costly and the government as well as public cannot afford the high prices of electricity. Therefore, to generate cheap electricity, WAPDA is endeavoring to explore the hydropower resources. In this regard, WAPDA is working on various hydropower projects including Diamer Bhasha Dam, Kurram Tangi Dam, Munda Dam, Kohala Dam, Golen-Gol Hydropower, Dasu Hydropower, Bunji Hydropower, Neelum Jhelum Hydropower, Palas Hydropower, Spatgah Hydropower projects and extension in Tarbela hydropower project. For dispersal of power from these hydropower projects, which are mostly located in northern part of the country, large and extensive power transmission network consisting of 500 kV, 220 kV transmission lines and grid stations will be required. All the power plants in WAPDA's power system are operated in an integrated manner to supply power to the National Grid consisting of a large network of High Voltage and Extra High Voltage (HV & EHV) transmission lines and grid stations.

National Transmission and Despatch Company (NTDC) is responsible for construction, maintenance and operation of transmission lines and grid stations of 220 kV, 500 kV and above.

Due to inflow of new power, the existing system needs up-gradation and installment of new grids and transmission lines. The proposed reinforcement of 220 kV transmission network is also a step towards improved energy transmission system. This document is the Environmental Impact Assessment for the (a.) Replacement of existing 220 kV Tarbela-Burhan double circuit transmission line with a new line on twin bundled Rail conductor (35.1 km) and (b.) In/Out of one circuit of Mansehra-ISPR 220 kV double circuit transmission line at 220 kV Zero Point Grid Station (23.99 km). Component (a.) is financed by Government of Pakistan while component (b.) will be funded by Japan International Cooperation Agency (JICA).

### **2. LEGISLATIVE AND REGULATORY REQUIREMENTS**

The project will comply with all the national legislation relating to the environment in Pakistan, and other international protocols and obligations. The national legislation relating to the environment in Pakistan in order to obtain the required regulatory clearances is as under:

- *The Pakistan National Conservation Strategy (NCS), which outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources.*
- *Pakistan Environmental Protection Act 1997, which empowers the Pak-EPA to delegate powers to the Provincial EPAs, identifies categories of projects to which the IEE/EIA provisions will apply, develop guidelines for conducting IEE and EIAs and procedures for their submission, review and approval, develop environmental emission standards for parameters such as air, water and noise, etc.*

- *The National Environmental Quality Standards (NEQS), 2000 specify the maximum allowable concentrations of pollutants in municipal and liquid industrial effluents, maximum allowable concentration of pollutants in gaseous emissions from industrial sources, etc.*
- *KPK Environmental Protection Act, after 18<sup>th</sup> Constitutional Amendment in the Constitution of Pakistan, the Federal Ministry of Environment has been dissolved and subject of environment has been handed over to provinces. EPA KPK has formulated its own act. This project will comply with relevant provisions of this act.*
- *The other provincial and departmental applicable laws and regulations include Reserved Trees Act 1966. The Telegraphy Act, 1910 which makes a provision of installing poles/towers without acquiring any land, Provincial Wildlife (Protection, Preservation, Conservation and Management) Acts, Ordinances and Rules (Act, 1972), Antiquities Act, 1975, Provincial Local Government Ordinances, 2001, etc.*

### 3. DESCRIPTION OF THE PROJECT

As per provision of approved PC-I, the project scope is as under:

Sr. No.	Name of Proposed Project
a.	Replacement of existing 220 kV Tarbela-Burhan D/C transmission line with a new line on twin bundled Rail conductor (35.1 km), under NTDC own resources.
b.	In/Out of one circuit of 220kV Mansehra-ISPR D/C Transmission line at 220 kV Zero Point Grid Station (23.99 km), to be financed by JICA.
c.	Replacement of existing 220 kV Tarbela-Burhan-ISPR D/C transmission line with a new line on twin bundled Rail conductor (62.5 km), to be financed by JICA.

However, this EIA will cover only two components mentioned at Sr. No. a. and b. above and component c. is to be financed by JICA and has been covered under another EIA report.

#### **Component-A**

Presently, two 220 kV D/C transmission lines emanate from Tarbela towards Burhan/ISPR, i.e. one direct 220 kV D/C transmission line from Tarbela to Burhan (Circuit # 1 and 2) and the other 220 kV D/C transmission line from Tarbela to 220 kV ISPR (Circuit # 3&4). In summer season when hydel generation is maximum; these 220 kV transmission lines are highly stressed due to increased heavy power flows. The power flows on the above mentioned 220 kV lines are expected to increase in future. Moreover, Tarbela 4<sup>th</sup> Extension project (1,410 MW) has been planned in 2016-17. Although, additional generation at Tarbela would be connected to 500kV switchyard but it would also result in increase in power flow towards 220 kV bus through 500/220 kV transformers which would consequently increase stress on the Tarbela-Burhan-ISPR 220 kV lines. Therefore the reinforcement of the 220kV Tarbela-Burhan-ISPR network is required in order to remove the system constraints. The reinforcement includes the replacement of both existing lines with new lines on twin bundled rail conductors.

**Component-B**

NTDC has planned up gradation of existing 132 kV Zero Point Grid Station to 220 kV Grid Station to improve the reliability of NTDC network and to provide relief to existing 132kV Grid Stations in IESCO area. Further, this would also provide a second source of supply to existing 220 kV Islamabad University Grid Station. The Zero Point grid station will be supplied by constructing new 220 kV Transmission Line for in/out of one circuit of 220 kV Mansehra-ISPR Double Circuit Transmission Line (23.99 km).

The total project cost as per PC-1 provision has been worked out at PKR 1496 Million. Out of which PKR 882 million has been estimated for A. Replacement of existing 220 kV T/L from Tarbela to Burhan with a new line on twin bundled L/L-ACSR conductor (35.1 km) and PKR 614 Million for B. In/Out of one circuit of 220kV Mansehra-ISPR D/C Transmission line at 220 kV Zero Point Grid Station Islamabad (23.99 km).

**4. ANALYSIS OF ALTERNATIVES**

An analytical overview of the alternatives has been considered for the project. The analysis has been carried out critically so as to justify the need of the Project. The various alternatives, which have been considered during the conduct of the study are; i). No project option, ii). Replacing to Increased Capacity Conductor, iii). Change from Single Conductor To Double Conductors, iv). Replacing to Low Loss Conductors, v). Alternative Route Alignment Selection, and vi). Design Alternatives.

**5. ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS**

The physical environment was observed within a strip of 30 m ROW while in case of biological and social environment, the parameters were recorded up to 100 m away and even more from the Project corridor. The physical, biological and social environments of the project area are as under:

***Physical Environment***

*Topography and Geology:* Haripur is located at the north-eastern boundary of the project area. Haripur district is approximately 53 km long, 32 km wide and covers 644 km<sup>2</sup>. Basin Topography ranges from 375 meters to 975 meters above the sea level. The topography of the district is fairly plain with an average gradient of 20 m per km. District Attock is a combination of hills and Plains. In the north-western part, Attock Chirat Range and Kharimar hills are located, while the southern part of the project area is surrounded by tredian hills and salt range. In the Northern boundary of District Attock, Kala Chitta hills are located, which also form the part of the migration route of bird's flocks. The greatest elevation in the Pothohar area is located in the Southern Hazara Range, which commonly exceed 1,200 m above sea level.

Islamabad is located on the Northern edge of the track known as Potohar Plateau. The Potohar Plateau has an uneven table and land is gradually rising in elevation from 500 to 600 meters above the sea level and the highest point is 1,600 meters above mean sea level. The land gradually slopes towards South. The land is composed either of alluvium (clay or silt) or of gravel caps. The plains are formed of alluvial deposits laid by the past and the present river systems in varying thickness. A large part of the area is undulating and at various places dissected by gullies and ravines.

**Seismology:** The Project area of both the components i.e. Haripur (KPK), Attock (Punjab) and Islamabad lies in seismic zone 2-B, which is a minor to moderate damage zone corresponding to peak ground acceleration (PGA) with value ranges from 0.16 to 0.24g. All the tower foundations structures will be designed according to seismic zoning of project area which is 2-B for both transmission lines.

**Climate and Meteorology:** The Climate of the area (Tarbela-Burhan) is extreme which is hot and dry in summer and cold and dry in winter. The Köppen Climate Classification subtype for this climate is "Cfa" (Humid Subtropical Climate). In winter, average high temperature recorded in that area is 19.7°C and average low temperature recorded is 3.4°C, with average precipitation of 37.3 mm, and mean monthly sunshine hours recorded are 195.6. In summer, average high temperature recorded is 38.7°C and average low temperature recorded is 23.7°C, with average precipitation of 62.2°C, and mean monthly sunshine hours are 300.1.

Islamabad has distinct seasons marked by wide variation in temperature. The climate remains very salubrious from April to October but the winters get very cold due to snowfall. The coldest months are December, January and February. The hottest months are June and July. Rainfall in April and May is occasional but the heaviest rain is in July and August. The temperature of capital territory Islamabad ranges between -1 °C to 46 °C. The coldest month is January when the mean maximum temperature is 18.3 °C and mean minimum is 3.8 °C. From February to May the temperature rises at the rate of 5.0 °C per month. The highest temperature reached in May when the mean maximum temperature remains 39.1 °C.

**Water Resources:** The potential water sources along the T/L (component a.) are Tarbela Dam in Haripur District, constructed in the year 1976, Ghazi Barotha Canal (located at around 45-50 km from project area) constructed on run the of River Indus, starting from Ghazi in Haripur district and terminating at Brotha in Attock District, Qibla Bandi Dam in Attock district (5-10 km from T/L site). Underground water is being used for drinking purpose, while arable land is dependent on rain.

For component (B), Rawal Lake is the major man-made water reservoir, located across Korang River at a distance of about 5 km toward north east from project end at Zero Point. Second surface water body is reservoir of mini hydal project near Dhoke Sulman located at about 3.5 km towards western side of transmission line route. Third water resource is Nala Lai, which is crossed by this TL at sectors G-10 and H-10 before entering into the Zero Point Grid Station.

### **Biological Environment**

For component-A, major flora species include; **Trees:** *Acacia modesta* (Phulahi), *Acacia nilotica* (Desi Kekir), *Albizia lebbeck* (Sers), *Dalbergia sissoo* (Sheshum), *Ficus benghalensis* (Bur), *Ficus virgate* (Phagwara), *Ficus religiosa* (Pipil), *Morus alba* (Toot), *Cedrela serrate* (Drawi), *Olea cuspidate* (Kao), *Ailanthus altissima* (Drewa). **Shrubs/Herbs:** *Prosopis glandulosa* (Pahari Kekir), *Ziziphus mauritiana* (Ber), *Achyranthes aspera* (Puthkanda), *Adhatoda vasica* (Bahkar), *Cannabis sativa* (Bhang), *Dodonia viscosa* (sanatha), *Lantana sp.* (Lantana), *Oxalis acetosella* (Khatti Booti), *Calendula arvensis* (Zergul), *Cichorium intybus* (Neeli Buti). *Helianthus annus* (Suraj Booti), *Oxalis corniculata* (Khatti Booti), and **Grasses:** *Cynodon dactylon* (Khabal), *Dicanthium annulatum* (Pelwan), *Heteropogan contortus* (Surala).

For Component-B, **Trees:** *Dalbergia sissoo* (Sheeshum) *Broussonetia papyrifera* (Paper Mulberry), *Accacia nilotica* (Kiker), *Acacia modesta* (Phulahi), *Albizia lebbeck* (Sers), *Ficus virgate* (Phagwara), *Morus alba* (Toot), *Ailanthus altissima* (Drewa), **Shrubs:** *Cannabis sativa* (Bhang), *Achyranthes aspera* (Poth Kanta), *Amranthus viridis* (Chanlai , Dhindo), *Carthamus oxycantha* (Pholi), *Lathyrus aphaca* (Jangli matar), *Melilotus indicus*, (Sainji), *Ricinus communis* (Arand), *Rosa brunonii* (Jungli gulab), *Sonchus arvensis* (Dodol), and

**Grasses:** *Cynodon dactylon* (Khabal), *Avena sativa* (Wild Oat), *Dichanthium annulatum* (Marvel grass), *Aristida depressa*, (Needlegrass), *Imperata cylindrical* (Seer).

Fauna of Component-A includes; **Mammals:** *Canis aureus* (Asiatic jackal), *Vulpes vulpes* (Common red fox), *Hystrix indica* (Grey mongoose), *Felis chaus* (jungle cat), *Sus scrofa* (Wild boar), *Hemiechinus auritus* (long-eared hedgehog), *Scotophilus* sp. (house bat), *Rattus rattus* (house rat), *Mus musculus* (house mouse), *Funambulus palmarum* (Northern palm squirrel), *Rattus rattus* (house rat), *Paradoxurus hermaphroditus* (Civet), *Lepus* sp. (Wild hare), *Bandicota bengalensis* (Indian mole rat), *Tatera indica* (Indian gerbil), *Bandicota indica* (Bandicoot rat) , *Apodemus sylvaticus* (Field mouse) *Hystrix indica* (Porcupine), **Reptiles:** *Hemidactylus brooki* (Spotted Indian House Gecko), *Laudakia agrorensis* (Agror Valley Agama), *Varanus indicus* (Common lizard). *Uromastic* sp. (Spiny-tailed lizard Lizard), *Bungarus caeruleus* (Common krait), *Naja naja* (Cobra), *Vipera russelli* (Viper), *Urosaurus ornatus* (common tree lizard), **Amphibians:** *Rana tigrina* (Common frog) *Bufo stomaticus* (Indus Valley toad), *Bufo bufo* (Common toad), **Birds:** *Phoenicurus ochruros* (Black Redstart), *Turdus merula* (Eurasian Blackbird), *Myophonus caeruleus* (Blue-whistling Thrush), *Montocola solitaries* (Blue Rock Thrush), *Oenanthe deserti* (Desert Wheatear), *Riparia diluta* (Plain Martin), *Carpodacus erythrinus* (Common Rose Finch), *Sturnus vulgaris* (Common Starling), *Acridotheres tristis* (Common Myna), *Acridotheres ginginianus* Bank Myna, *Motacilla alba* (White Wagtail), *Motacilla maderaspatensis* (White Browed Wagtail), *Oriolus oriolus* (Golden Oriole), *Turdoides caudatus* (Common Babbler), *Turdoides striatus* (Jungle Babbler), *Phylloscopus collybita* (Common Chiffchaff), *Phylloscopus trochiloides* (Greenish Warbler), *Galerida cristata* (Crested Lark), *Passer domestica* (House Sparrow), *Halcyon smyrnensis* (White-throated Kingfisher), *Lanius schach* (Long Tail Shrike), *Pycnonotus leucogenys* ( White-cheeked bulbul), *Pycnonotus cafer* (Red-vented Bulbul), *Milvus migrans* (Black Kite).

Fauna of Component-B include; **Mammals:** *Canis aureus* (Asiatic Golden jackal), *Prionailurus bengalensis* (Leopard cat), *Vulpes vulpes* (Red fox), *Manis crassicaudata* (Pangolin), *Hystrix indica* (Porcupine), *Martes flavigula* (Yellow throated marten), *Suncus murinus* (House Shrew), *Lepus capensis* (Cape Hare), *Millardia meltada* (Field Rat), *Rattus rattus* (House Rat), *Rattus pyctoris* (Turkestani Rat), **Reptiles:** *Daboia russelli* (Russell's viper), *Naja naja* (Indian cobra), *Gloydius himalayanus* (Himalayan pit viper), *Echis leucogaster* (Saw scaled viper), *Hemidactylus brooki* (Spotted Indian House Gecko), *Hemidactylus flaviviridis* (Yellow-bellied House Gecko), *Calotes versicolor* (Garden Lizard), *Laudakia agrorensis* (Agror Valley Agama), *Uromastix hardwickii* (Common Spiny-tailed Lizard), *Mabuya dissimilis* (Striped Grass Skink), *Lygosoma punctate* (Common Dotted Garden Skink), *Varanus bengalensis* (Indian or Bengal Monitor), *Typhlops braminus* (Brahminy blind Snake), *Lycodon aulicus* (Common Wolf Snake), *Lycodon striatus* (Northern Wolf Snake), *Boiga trigonata* (Indian Gamma Snake), *Psammophis schokari* (Afro-Asian Sand Snake), *Psammophis condanarus* (Indian Sand Snake), *Coluber ventromaculatus* (Plain's Racer), *Xenochrophis piscator* (Checkered Keelback), *Ptyas mucosus* (Indian Rat

Snake), *Bungarus caeruleus* (Krait), *Vipera russelli* (Russell's Viper), **Amphibians:** *Bufo stomaticus* (Indus toad), *Bufo melanostictus* (Hazara toad), *Rana tigrina* (Common Frog), *Rana cyanophlyctis* (Skipping Frog), *Rana syhyadrensis* (Purple Frog), *Microhyla ornate* (Narrow Mouthed frog or Ant frog).

No endangered, threatened, or vulnerable terrestrial faunal species as per IUCN List of Threatened Species has been observed/reported from the study area.

### **Socio-Economic Environment**

The component A of project is located in the KPK province and Punjab province. Out of total 106 towers; 58 towers are located in Haripur District (KPK) and 47 towers are in Attock District (Punjab). The Tehsils are Ghazi (Haripur District), Hazro (Attock District), and Hassan Abdal (Attock District). Main villages around the project are Mehran Colony, Umar Khana, Hamlet Colony, Qibla Bandi, and Dhoke Manata.

The whole transmission line route (total 72 towers) of component B falls in Islamabad Capital Territory (ICT), starting from rural area of ICT (i.e. Sarai Kharbuza) and ending at Urban Area (i.e. Sector H8, Zero Point). Main villages/sectors through which transmission line will pass include; Sarai Kharbuza, G-13, Maira Sumbal, H-12, H-11, H-10, H-9 and Zero Point (H-8).

### **6. STAKEHOLDERS AND PUBLIC CONSULTATIONS**

In accordance with EPA and JICA guidelines, the consultation process was carried out to share the information with the stakeholders/public on the proposed works and the expected impacts on the physical, biological and especially socio-economic conditions of the project corridor.

At various locations along the project route, stakeholders/public consultations included interviews with the people of the area were carried out along the project corridor. The major concerns/issues raised by the stakeholders were regarding loss of crops, trees, etc. and their compensation process; to ensure accessibility of the field activities by community especially women; conflicts due to the uses of common resources by the contractor during the construction activities and during compensation for losses. All the concerns/issues have been taken care of and addressed accordingly in the respective chapters of the report.

### **7. ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT AND MITIGATION MEASURES**

For the sake of impacts assessment, first corridor of impact (COI) was established consisting of three types of COI i.e. corridor of direct impact (COI-1), a 30 m wide strip where crops, trees, etc., will be affected, ROW is a 30 m wide strip where trees over 2.5 m height will be disrupted and finally a 100 m strip (COI-2) within which some indirect impacts of the Project are envisaged. The major impacts on physical, biological and social environments and their mitigation measures are described as under:

*Land Resources:* No permanent acquisition of land will be involved for the project. However, the temporary acquisition of land for the construction activities including the establishment of the contractor facilities will be involved. The other impacts on the land resources will include about 101.4 acres of crops will be affected due to implementation of Component-A, soil erosion and contamination during the construction activities. Compensation of crops, tree,

etc. will be made to APs by NTDC. Proper mitigation measures have been considered to minimize the other impacts on the land resources.

*Infrastructure:* To cross the existing infrastructure like highways (M-1), Kashmir Highway, local roads, railway, existing transmission lines, etc., proper clearance will be achieved by using towers of maximum height as per site requirements.

*Water Resources:* The major impacts envisaged on the water resources include use of local water supplies, contamination of surface and groundwater and siltation of streams/nullahs. Proper mitigation measures have been proposed to control the contamination and siltation of water resources.

*Ambient air quality and noise Levels:* To control the effects on the ambient air quality and noise level, proper tuning of vehicles, sprinkling of water on katcha tracks under use by the contractor, controlled blasting and other mitigation measures have been proposed.

*Biological Resources:* It is estimated that the implementation of the proposed project activities will cause cutting of about 2291 trees, out of which 232 are fruit trees and 2059 are non-fruit trees. Proper mitigations have been proposed to overcome these impacts.

*Socio-Economic Environment:* The major social impacts will include accessibility to farm fields, restriction on women's field activities, disturbance to the privacy of local community particularly women, security of public as well as workers. So to resolve the social conflicts, proper mitigation measures have been proposed.

*Environmental and Social Benefits of the Project:* Along with negative impacts of the Project, some major expected positive impacts have also been identified including availability of electricity as per demand, installation of industry and other linked benefits.

## **8. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN**

A comprehensive environmental management and monitoring plan (EMMP) has been prepared to effectively manage and monitor the environmental and social impacts of the project. The salient features of EMMP are as under:

*Environmental Management Plan:* To manage the environmental and social impacts of the Project, significant negative impacts and their mitigations have been covered in this section. For the ease to understand and identify the impacts and to implement their mitigations, a mitigation matrix has been developed as a ready reference for the proponent and contractor to minimize the negative impacts or to manage activities in such a manner to avoid any adverse negative impact.

*Environmental and Social Monitoring Plan:* Keeping in view the impacts and existing institutional setup of NTDC, and environmental and social management plan has been developed. Environment and Social Impact Cell (ESIC) of NTDC will be responsible for the overall environmental and social issues of the project. Responsibilities have been assigned to each key player of the project including Client, Consultant and Contractor.

The total estimated cost for compensation of trees and crop losses, environmental and social management has been worked out as PKR 47.92 million.

## **9. CONCLUSIONS AND RECOMMENDATIONS**

Based on the available project plans/designs, field surveys and assessment of the impacts, it may be concluded that the Project has insignificant negative environmental and social

impacts on the existing situation as the project alignment was selected in such a way that it would cause the least environmental and social effects. Further adoption of the proposed EMP will help in mitigating or minimizing any adverse impacts due to the implementation of the Project.

It is recommended that the anticipated impacts on crops and trees should be compensated and the affected persons should be satisfied.