

# Initial Environmental Examination

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May 2016

## PAK: Proposed Multitranche Financing Facility Second Power Transmission Enhancement Investment Program

Prepared by National Transmission and Despatch Company Limited for the Asian Development Bank.

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# **Power Transmission Enhancement Investment Programme II**

**TA 8818 (PAK)**

## **Initial Environmental Examination**

500 KV D/C T. LINE FOR IN/OUT OF 500 KV MULTAN-GATTI S/C AT  
500 KV FAISALABAD WEST GRID STATION

May 2016

Prepared by National Transmission & Despatch Company Limited (NTDC)  
for the Asian Development Bank (ADB)

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## ***LIST OF ABBREVIATIONS***

ADB	Asian Development Bank
APs	Affected Persons.
BPI	British Power International
CCMR	Community Complaints Management Register
CFC	Chlorofluro carbon
CSC	Construction Supervision Consultant
DFO	Divisional Forest Officer
DoF	Department of Forests
EA	Environmental Assessment
EARF	Environmental Assessment and Review Framework
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
ESIC	Environment & Social Impact Cell
ESS	Environment & Social Safeguards
GoP	Government of Pakistan
GRC	Grievance Redress Committee
GRS	Grievance Redress System
GS	Grid station
LAC	Land Acquisition Collector
Leq	Equivalent sound pressure level
MPL	Maximum permissible level
NEQS	National Environmental Quality Standards
NGO	Non-Governmental Organization
PC	Public Consultation
PCBs	Polychlorinated biphenyls
PEPA	Pakistan Environmental Protection Act1997
PPMS	Project Performance Monitoring System

PTEMFF	Power Transmission and Enhancement Multi-tranche Finance Facility
RE	Resident Engineer
REA	Rapid Environmental Assessment
RoW	Right of Way
Rupee, PKR	Unit of Pakistan currency
SFA	Social Framework Agreement
SIA	Social Impact Assessment
SP	Subproject
SRs	Sensitive Receivers
SFA	Social Framework Agreement
TD	Temporary Drainage.
TOR	Terms of Reference

## EXECUTIVESUMMARY

### 1. INTRODUCTION

Due to inflow of new power, the existing system needs up gradation and installment of new grids and transmission lines. The proposed 500 kV D/C Transmission line from Faisalabad West Grid Station to Multan-Gatti S/C and extension of 500 kV Faisalabad West Grid Station (500 kV line bays) also a step towards improved energy transmission system. This document is the Initial Environmental Examination (IEE) for the construction of 500 DC Transmission Line nearly 30 KM in length and Grid Station extension. The proposed Grid Station and Transmission Line are being funded by Asian Development Bank (ADB).

The proposed project is classified as category B according to ADB's environmental safeguards as stipulated in ADB's Safeguard Policy Statement (SPS) 2009. The environmental impacts of the proposed project are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An Initial Environmental Examination (IEE) is required.

This report presents the Initial Environmental Examination (IEE) for the construction of a new 500 kV DC Transmission Line from Faisalabad West Grid Station to Multan-Gatti S/C and extension of 500 kV Faisalabad Grid Station (500 kV line bays) in Punjab Province.

### 2. LEGISLATIVE AND REGULATORY REQUIREMENTS

The project will comply with ADB's SPS 2009, the national legislation relating with 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:

- Punjab Environment Protection Act 2012, 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), 2010 specify the maximum allowable concentrations of pollutants in municipal and liquid industrial effluents, maximum allowable concentration of pollutants in gaseous emissions from industrial sources, ambient air quality, noise and drinking water quality.
- The other provincial and departmental applicable laws and regulations include Forest Act 1927. 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

Tranche I Transmission Line subproject consists of a new 500 KV D/C Transmission Line from Faisalabad West to Multan-Gatti S/C, about 30 KM in length, along with installation of two Line bays at Grid Station. The transmission line route passes through 10 villages belonging to tehsils Bowana and Sumandri of Districts Chiniot & Faisalabad respectively. There will be installation of 90 towers on lines, i.e. each tower will be erected at a distance of 335 m as reported by Survey & Investigation Section of NTDC.

The existing land use of Grid Station site and Transmission line corridor is mostly agricultural land. Some scattered forest trees and few fruit trees are likely will be affected by the project.

#### 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 study, are; i). No project option, ii) Alternatives of Location, iii) Alternative Construction Logistics and iv) Alternate Labor Options.

#### 5. ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

The physical environment was observed within 0.5 km Area of Influence around the project boundary and 0.15 km from either side of the center line of transmission line along the project route. The physical, biological and social environments of the project area are as under:

##### Physical Environment

**Topography and Geology:** The project area lies in the fertile plains District Chiniot & Faisalabad of Punjab province. The only hills found in the district are situated on the Chenab River between Chiniot and Rabwah. With the exception of these rocks, the whole district is an alluvial plain.

**Seismology:** The project area lies in seismic Zone 2A which is Low hazard zone corresponding to peak ground acceleration (PGA) values of 0.08 to 0.16 m/sec<sup>2</sup>.

**Hydrology and Geohydrology:** River Chenab is the major surface water source of project area. It is perennial and flows throughout the year. It also causes floods in the monsoon season, when it receives excessive rainfall water from upstream. The other surface water resources of project area are canals and irrigation channels. The strata near the transmission line route are water bearing and alluvial deposits, giving groundwater potential throughout the project area and the water table is fairly near the surface at 30 to 45 feet. The water table is not seasonal and dug wells do not generally run dry.

**Climate:** The climate of the district is hot and dry during summer and cold and dry in winter. The mean maximum and mean minimum temperatures during summer are about 40°C and 28°C respectively. The mean maximum and mean minimum temperatures during winters are about 27°C and 6°C respectively. The highest mean temperature (39°C) from 1961 to 1990 was recorded in the month of May. Likewise the minimum mean temperature (8°C) was recorded in the month of January. The annual rainfall of the district is approx. 288.8 mm.

##### Biological Environment

The proposed Transmission Line area is mostly covered with cereal crops and also some scattered forest trees. Naturally grown shrubs are also present on the land. Jungli Kikar (Wild Acacia niloica), Sufaida (Eucalyptus), Aak (Calotropis), Sheesam (Dilbergia Sisso) and Jandh (Prosopis cineraria) were seen on the project land. Orchards of Citrus, Gauva and Grape fruits are found in abundance in the surroundings of the project area. Besides Mangoes, Dates, Pomegranate and Bananas are also grown in minor quantities in the region. The tract inhabits a variety of fauna and mammals, reptiles and birds.

##### Social and Cultural Environment

The major cast in both the Districts i.e. Chiniot & Faisalabad are Rajput, Dhudhani, Gojar, Araeen, Sahmal, Dogar, Syed, Laali, Bhowana, Awanetc and almost all of the people in the district are Punjabi. Joint family as well as separate family system exists in the area. Major occupations are farming, business, service and labor. The total population of Chiniot District was 1.156 million persons according to Punjab Development Statistics 2010, while the Faisalabad population is 2.5 million. There are no officially protected heritage sites or historic, religious or archeologically important sites located within or near the project area. Women work in the fields along with men and also teach at schools.

## 6. STAKEHOLDERS AND PUBLIC CONSULTATIONS

In accordance with ADB 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 site, stakeholders/public consultations were carried out along the project corridor. Most of the public were in favor of the project. The major concerns/issues raised by the stakeholders were regarding loss of trees and crops etc. and their compensation process; to ensure accessibility of the field activities by community people; 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, Area of Influence (AOI) was established consisting of a 2 km wide strip across the project boundary where trees, etc., will be affected, and direct and indirect impacts of the Project are envisaged. The major impacts on physical, biological and social environments and their mitigation measures are described as below:

**Land Resources:** The proposed Transmission Line will not require the Land Acquisition, only the crop and trees compensation will be paid to the owners. The other impacts on the land resources will include physical disfiguration, soil erosion and contamination during the construction activities, drainage and waste disposal. Proper mitigation measures have been considered to minimize the other impacts on the land resources.

**Water Resources:** River Chenab crosses in the middle of the project area hence project activities will cause no impact on it. Transmission line may also have to pass a small canal used for agriculture and domestic purpose. Other than that small drains are present in AOI. It is anticipated that the project activities will not cause any impact on these surface water bodies as these are not near campsite, which lies within the GS boundary, and no construction activity will be done near them. Subsurface water resources may be contaminated at construction campsites.

**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 etc. have been proposed.

**Biological Resources:** It is estimated that the implementation of project activities will cause cutting of about 9,000 trees. Compensatory trees will be planted at a ratio of 3:1.

**Social and Cultural Environment:** The major social impacts will include disturbance to accessibility, communicable diseases, security of public as well as workers. So to resolve the social conflicts, proper mitigation measures have been proposed.

**Environmental and Social Risk Assessment:** An effort has also been made to assess the environmental and social risks during the construction as well as operation stages. Proper mitigations (where required) have also 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, employment opportunities 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 (E&SIC) 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 preliminary estimated cost for compensation of trees and shrub losses, environmental and social management has been worked out as PKR 7.035 million.

## **9. CONCLUSIONS AND RECOMMENDATIONS**

Based on the available preliminary plans, 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 location lies at such a site that it would either cause the least environmental and social effects or the impacts are mitigable. Further adoption of the proposed EMP will help in mitigating or minimizing any adverse impacts due to the implementation of the Project.

# 1. Introduction

## 1.1. General

1. The Power Generation Capacity of Pakistan is 19,855 MW including all resources like hydel, thermal and Independent Power Producers (IPPs). 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.
2. The project is part of the NTDCL's overall power development program and is proposed to strengthen the transmission system to fulfill the need of secure, safe and reliable power supply and to meet not only the existing requirement but also the future demand of the country for sustained economic growth.
3. Due to inflow of new power, the existing system needs up gradation and installment of new grids and transmission lines. The proposed 500 kV DC Transmission line from Faisalabad West Grid Station in/out to Multan-Gatti S/C also a step towards improved energy transmission system. This document is the Initial Environmental Examination (IEE) for the construction of 500 DC Transmission Line nearly 30 KM in length and Grid Station extension. The proposed Grid Station and Transmission Line are being funded by Asian Development Bank (ADB).
4. The proposed sub project aims to meet rapidly growing demand for electrical power. The feasibility study for the subproject was prepared by consultants has demonstrated the need for the proposed improvements based on electricity demand and network studies and that significant benefits can accrue in the form of reduced load on transformers and reduction in transmission line losses. Thus there is a clear and immediate future need for this subproject.
5. The proposed project will help to fulfill the overall objective of the MFF to encourage economic growth and improve transmission efficiency by creating a series of national improvements. The improved transmission efficiency will contribute to expansion of economic opportunities by improving capacity and efficiency and security of supply in Faisalabad Electricity Corporation in Punjab province of Pakistan.
6. The proposed project is classified as category B according to the environmental categorization procedure defined in ADB's Safeguard Policy Statement (SPS) 2009. The environmental impacts associated with this project are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An Initial Environmental Examination (IEE) is required.

## 1.2. Project Details

7. This report presents the Initial Environmental Examination (IEE) for the construction of a new 500 kV DC Transmission Line from Faisalabad West Grid Station to Multan-Gatti S/C. Figure 1.1 presents the location map of the proposed project site.
8. The IEE study takes into account the natural environment (air, water, land, flora & fauna), human health and safety. This study evaluates the project's potential environmental risks and impacts in its areas of influence and outlines planning, designing and implementation by preventing, minimizing, mitigating or compensating for adverse environmental impacts and enhancing positive impacts throughout project implementation.
9. The Social Assessment (SA) has been conducted to evaluate the project's potential positive and adverse effects on the affected people and to examine project alternatives where adverse effects may be significant. The breadth, depth and type of analysis in the social assessment are proportional to the nature of the project and scale of its potential effects, positive or adverse, on the affected people.
10. The Initial Environmental Examination is carried out for proposed project under MFF- II, Tranche 1 of the Asian Development Bank (ADB) project, Power Transmission and Enhancement Multi-tranche Finance Facility (PTEMFF). Thus this IEE presents the results and conclusions of environmental assessment for the proposed construction of 500 kV DC Transmission Line and extension of 500kvFaisalabad West Grid Station (500 kV line bays) and is submitted on behalf of Government of the Pakistan (GoP), Ministry of Water and Power and National Transmission and Dispatch Company (NTDC). The proposed project is to be considered for early improvement under the PTEMFF and requires environmental assessment under ADB operating procedures. An IEE has been carried out to fulfill the requirements of ADB's Safeguard Policy Statement 2009.
11. The Power Transmission Enhancement MFF loan has to be approved by ADB and the sub project under consideration falls under tranche 1 of the MFF- II. The total cost of the 220 kV DC Transmission Line is estimated at Rs. 751.56 million. ADB will fund the design, civil works and procurement of equipment. The PC-1 has been approved and detailed designs are being progressed. Figure 1.2, shows the site of proposed project of 220 KV DC Transmission Line.
12. The environmental assessment requirements of the Government of Pakistan (GoP) for power transmission projects are not identical to those of ADB. The environmental regulations of the GoP categorize development projects into two schedules according to their anticipated potential environmental impacts. The proponents of projects that have more adverse environmental impacts (Schedule II) are required to submit an environmental impact assessment (EIA). The base line data was developed and analyzed to identify potential environmental impacts of the project. An Environmental Assessment Checklist methodology was adopted to identify the high risk activities and suggest their mitigation measures. Where possible, eliminating the risk by altering the scope or method of execution of work was preferred rather than minimizing the risk with control measures.
13. The Tranche I subprojects can be broadly separated into two groups:

- (i) the subprojects involving improvement of facilities and equipment within existing grid station boundaries and should not require any land acquisition,
  - (ii) Construction of new transmission lines and new grid stations of 220kV and 500 kV. Subproject falls in the group of projects that involve construction of new 500 kV transmission line. Environmental impacts from this transmission line are potentially significant, although not insurmountable, and no private land will need to be acquired permanently but the crops and tree removal could possibly be involved for transmission line component.
14. The GoP has requested the Asian Development Bank (ADB) to provide finance for the proposed subproject, to help fulfill the overall objective of the MFF to encourage economic growth and improve transmission efficiency by creating a series of national improvements. The improved transmission efficiency will contribute to expansion of economic opportunities by improving capacity and efficiency in Faisalabad Electric Supply Company (FESCO) region of Punjab Province.

### **1.3. Scope of the IEE Study and Personnel**

15. This subproject will involve construction of New 500 kV D/C Transmission Line 30 km in length and extension of 500 kV Faisalabad West Grid Station (500 kV line bays). This IEE study has included field reconnaissance of the whole transmission line route and Faisalabad Grid Station.
16. The Study Area included the site of transmission line corridor within the RoW (25m either side of transmission line) and the whole area on both sides of the transmission line including all irrigation facilities, water supply, habitable structures, schools, health facilities, hospitals, religious places and sites of heritage or archaeological importance and critical areas (if any) within 200m of the transmission line alignment.
17. The field studies were undertaken by a team with experience of environmental assessment for power projects in Pakistan. Mr. Shabir Ahmad Khan Environmentalist with the help of field enumerators conducted the preliminary scoping, survey and assessment activities and coordinated the field sampling and analysis. The Environment and Social Impact Cell (E&SIC) provided all logistic arrangements and guidance with regards to the essential detailed assessments of design, construction, operational and decommissioning impacts, noise, air quality and waste disposal. The environmental team also benefited from technical support and other important information on the impacts of the proposed power works provided by S&I department of NTDC and from PC-I prepared by Planning Department of NTDC.
18. The study process began with scoping and field reconnaissance during which a Rapid Environmental Assessment was carried out to establish the potential impacts and categorization of project activities. The environmental impacts and concerns requiring further study in the environmental assessment were then identified. The methodology of the IEE study was then elaborated in order to address all interests. Subsequently, both primary and secondary baseline environmental data was collected from the proposed works and the intensity and likely location of impacts were identified with relation to the sensitive receivers; based on the work expected to be carried out. The significance of impacts from the power transmission work was then assessed and, for those impacts requiring mitigation, measures were proposed to reduce impacts to within acceptable limits.

19. Public consultation (PC) was carried out in March and April, 2016 in line with ADB guidelines. Under ADB requirements the environmental assessment process must also include meaningful public consultation during the completion of the draft IEE. In this IEE, the PC process included verbal disclosure of the sub-project works as a vehicle for discussion. Interviews were conducted with local families and communities and line departments along the transmission line alignment. Written records of the responses have been passed to the Project Proponent, NTDC. The responses from respondents have been included in this IEE.

#### **1.4. Project Benefits**

20. The benefits associated with the proposed 500 kV Faisalabad West substation mainly include:

- Improvement in voltage profile at/around the proposed Faisalabad west substation, especially in the 132 kV network of FESCO.
  - Reduction in transmission system losses.
  - Reduction in the loading of 500/220 kV transformers at Gatti and 220/132 kV transformers at 220 kV substations of Jaranwala Road, Nishatabad and Samundri Road.
- a) The other benefits of the proposed 500/220/132 kV Faisalabad West substation are as under:
- Improvement in reliability of NTDC and FESCO system networks.
  - Increase in the available system capacity to meet future load growth at/around proposed project.
  - Serve as 500 kV source of power to feed FESCO load center.
  - Improvement in power supply position of FESCO.

##### **1.1.1 Social Benefits**

21. Envisaged social benefits of the project are:

- Provision of more reliable supply of electricity to the consumers.
- Fulfillment of power demand for rural electrification program etc.
- Improvement in living standard of local population.
- Creation of small business services.
- Creation of new job opportunities for local communities.
- Development of new accommodation facilities and the local people will be exposed to new income generation opportunities.

- Socio economic uplifts of the community such as improved production, incomes and market activities.
- Tube wells electrification which will provide additional water for irrigation, increase cropped areas and also production.
- Developments of new industries in the area will create gainful employment to the increasing work force.
- Additional revenues to Government exchequer from the levy of taxes on finished goods, electricity duty due to additional sale of power & GST etc.

22. In the overall analysis, the improvement in ecological environments coupled with higher production is envisaged to bring out substantial economic gains for the people living in the project area.

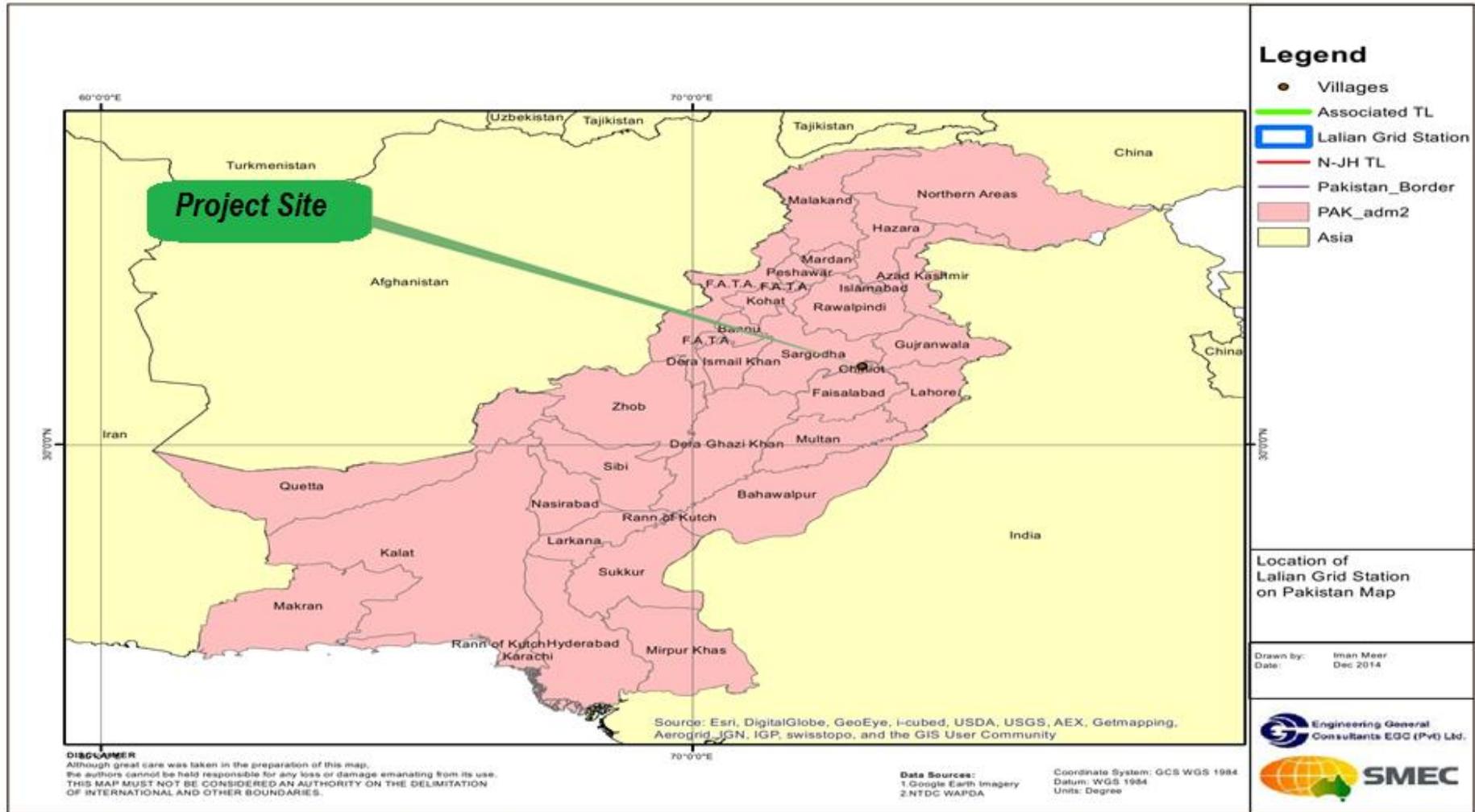


Figure1.1: Location map of proposed project site

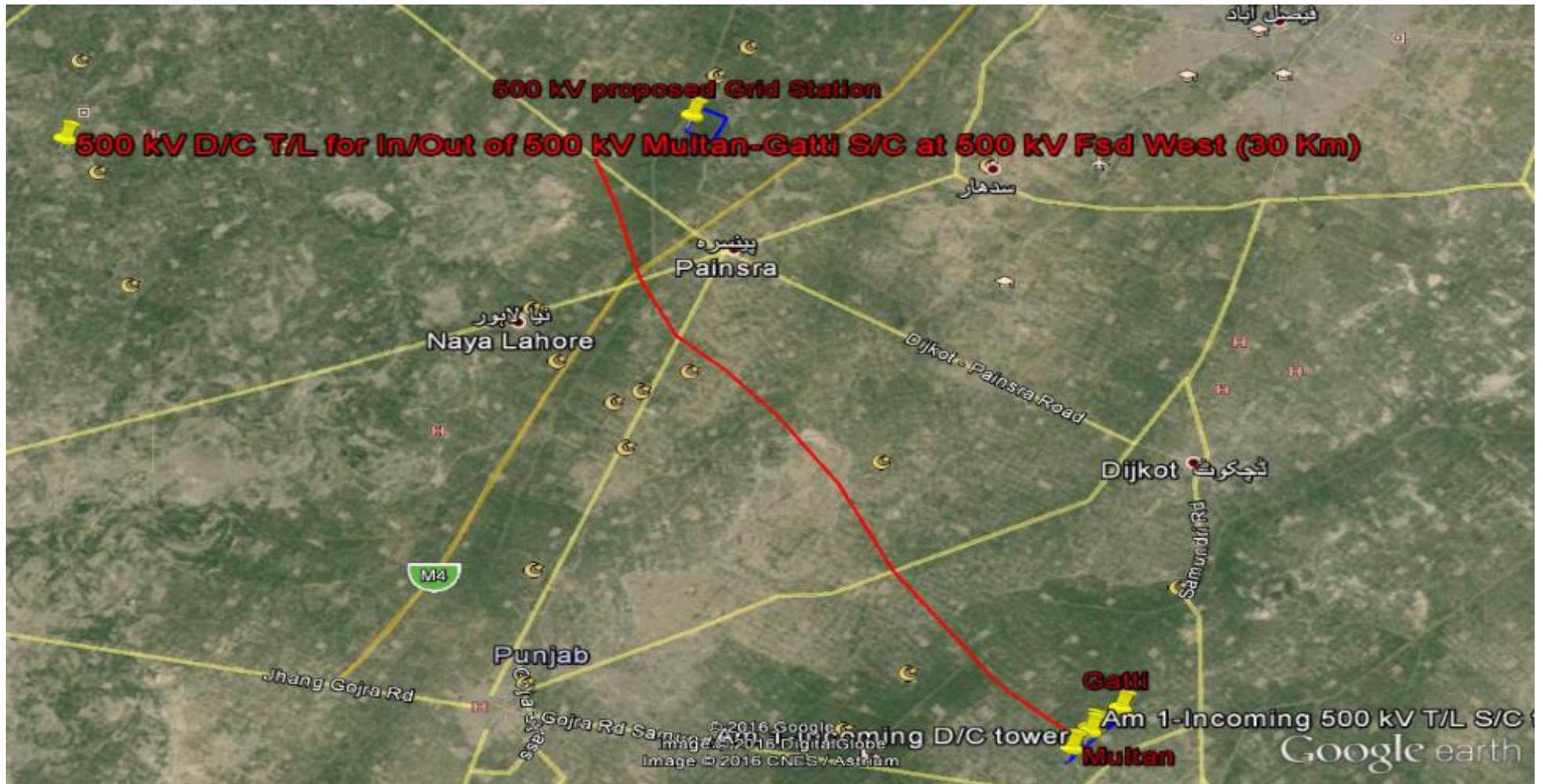


Figure 1.2: Site of proposed 500 KV D/C T. Line for In/Out of 500 kV Multan-Gatti S/C At 500 kV Faisalabad West Grid Station

## **2. Policy Legal and Administrative Framework**

23. Direct legislation on environmental protection is contained in several statutes, namely the Pakistan Environmental Protection Act (1997) the Forest Act (1927) the Punjab Wildlife Act (1974). In addition the Land Acquisition Act (1894) also provides powers in respect of land acquisition for public purposes. There are also several other items of legislation and regulations which have an indirect bearing on the subproject or general environmental measures.

### **2.1. Statutory Framework**

24. The Constitution of Pakistan distributes legislative powers between the federal and the provincial governments through two 'lists' attached to the Constitution as Schedules. The Federal List covers the subjects over which the federal government has exclusive legislative power, while the Concurrent List contains subjects regarding which both the federal and provincial governments can enact laws. "Environmental pollution and ecology" is included in the concurrent list, hence both the federal and the provincial governments can enact laws on this subject. However, after 18th Amendment to the Constitution of Pakistan was adopted, the subject of environment was devolved to the provincial jurisdiction. Each province has now prepared and promulgated its Environmental Protection Act under the overall framework of the Pakistan Environment Protection Act (PEPA) 1997. The key environmental laws affecting this subproject are discussed below.

### **2.2. Pakistan Environmental Protection Act, 1997**

25. The Pakistan Environmental Protection Act, 1997 is the basic legislative tool empowering the government to frame regulations for the protection of the environment. The act is applicable to a wide range of issues and extends to air, water, soil, marine, and noise pollution, as well as to the handling of hazardous wastes. The key features of the law that have a direct bearing on the proposed subproject relate to the requirement for an Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) for development subprojects. Section 12(1) requires that: "No proponent of a subproject shall commence construction or operation unless he has filed with the Federal Agency an Initial Environmental Examination [IEE] or, where the subproject is likely to cause an adverse environmental effect, an Environmental Impact Assessment [EIA], and has obtained from the Federal Agency approval in respect thereof." The Pakistan Environmental Protection Agency has delegated the power of review and approval of environmental assessments to the provincial environmental protection agencies, in this case the Punjab EPA.

### **2.3. Punjab Environmental Protection (Amendment) Act, 2012**

26. After 18th 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 Punjab has formulated its own act. The major content of the act is same as of PEPA, 1997. Minor amendments/changes have been made viz.,

- The Name of Act has been changed into "Punjab Environmental Protection (Amendment) Act, 2012".

- For the words “Federal Government”, wherever occur, the word “Government” shall be substituted;
- For the words “Federal Agency”, wherever occur, the words “Provincial Agency” shall be substituted; and
- For the word “National”, wherever occurs, the word “Punjab” shall be substituted.
- All the other clauses, sub-clauses, sections and sub-sections are almost same.

#### **2.4. Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000**

27. The Pakistan Environmental Protection Act, 1997 (PEPA, 1997) provides for two types of environmental assessments: Initial Environmental Examinations (IEE) and Environment Impact Assessments (EIA). EIAs are carried out for subprojects that have potentially ‘significant’ environmental impacts, whereas IEEs are conducted for relatively smaller subprojects with a relatively less significant impact. The Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000 (the ‘Regulations’), prepared by the Pak-EPA under the powers conferred upon it by the PEPA, categorizes subprojects for IEE and EIA. Schedules I and II, attached to the Regulations, list the subprojects that require IEE and EIA, respectively.

28. The Regulations also provide the necessary details on the preparation, submission, and review of IEEs and EIAs. The following is a brief step-wise description of the approval process:

- (i) A subproject is categorized as requiring an IEE or EIA using the two schedules attached to the Regulations.
- (ii) An EIA or IEE is conducted as per the requirement and following the Pak-EPA guidelines.
- (iii) The EIA or IEE is submitted to the concerned provincial EPA if it is located in the provinces or the Pak-EPA if it is located in Islamabad and federally administrated areas. The Fee (depending on the cost of the subproject and the type of the report) is submitted along with the document.
- (iv) The IEE/EIA is also accompanied by an application in the format prescribed in Schedule IV of the Regulations.
- (v) The EPA conducts a preliminary scrutiny and replies within 10 days of the submittal of a report, a) confirming completeness, or b) asking for additional information, if needed, or c) returning the report requiring additional studies, if necessary.
- (vi) The EPA is required to make every effort to complete the IEE and EIA review process within 45 and 90 days, respectively, of the issue of confirmation of completeness.
- (vii) Then the EPA accords their approval subject to certain conditions:
- (viii) Before commencing construction of the subproject, the proponent is required to submit an undertaking accepting the conditions.
- (ix) Before commencing operation of the subproject, the proponent is required to obtain from the EPA a written confirmation of compliance with the approval conditions and requirements of the IEE.
- (x) An EMP is to be submitted with a request for obtaining confirmation of compliance.

- (xi) The EPAs are required to issue confirmation of compliance within 15 days of the receipt of request and complete documentation.
  - (xii) The IEE/EIA approval is valid for three years from the date of accord.
  - (xiii) A monitoring report is to be submitted to the EPA after completion of construction, followed by annual monitoring reports during operation.
29. Distribution lines and grid substations of 11 kV and above are included under energy subprojects in Schedule II, under which rules EIA is required by GoP. Initial Environmental Examination (IEE) is required for distribution lines and grid stations less than 11 kV and large distribution subprojects (Schedule I). A review of the need for EIA/IEE submission is therefore required by the relevant EPA, in this case the Punjab Environmental Protection Agency (EPA) as the proposed subproject will be located in Punjab.
30. There are no formal provisions for the environmental assessment of expanding existing distribution lines and grid substations but the Punjab EPA has requested disclosure of the scope and extent of each subproject in order that their Director General can determine if additional land is required and the need for statutory environmental assessment. The details of this subproject will be forwarded to the Punjab EPA, in order to commence the local statutory environmental assessment process.

## **2.5. National Environmental Quality Standards (NEQS)**

31. The National Environmental Quality Standards (NEQS) were first promulgated in 1993 and have been amended in 1995 and 2000. The following standards that are specified in the NEQS may be relevant to the Tranche this subproject of Tranche-IV:
32. Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment facilities, and the sea (three separate sets of numbers).
33. Maximum allowable concentration of pollutants (2 parameters) in gaseous emissions from vehicle exhaust and noise emission from vehicles.

## **2.6. Other Relevant Laws**

34. There are a number of other federal and provincial laws that are important in the context of environmental management. The main laws potentially affecting subprojects in this MFF are listed below.
35. The Punjab Wildlife Protection Ordinance, 1972; empowers the government to declare certain areas reserved for the protection of wildlife and control activities within in these areas. It also provides protection to endangered species of wildlife. As no activities are planned in these areas, no provision of this law is applicable to the proposed subproject.
36. The Forestry Act, 1927; empowers the government to declare certain areas reserved forest. As no reserved forest exists in the vicinity of the proposed subproject, this law will not affect to the proposed subproject.

37. The Antiquities Act of 1975; ensures the protection of Pakistan's cultural resources. The Act defines 'antiquities' as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the subproject proponents are obligated to ensure that no activity is undertaken in the proximity of a protected antiquity, report to the Department of Archaeology, Government of Pakistan, any archaeological discovery made during the course of the subproject.
38. Safety Regulations; mainly three laws and regulations viz. (i) PEPA Laws, 2000, (ii) Labor Laws, and (iii) Electricity Rules, 1937 directly or indirectly govern the occupational health and safety issues during the currently studied production activities.

### **2.7. ADB Safeguard Policy Statement (SPS), 2009**

39. The Asian Development Bank's Safeguard Policy Statement (SPS) 2009 requires that environmental considerations be incorporated in to ADB's funded project to ensure that the project will have minimal environmental impact and be environmentally sound. Occupational health & safety of the local population should also be addressed as well as the project workers as stated in SPS. A Grievance Redress Mechanism to receive application and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance is also to be established.

### **2.8. Environment Categorization**

40. All loans and investments are subject to categorization to determine environmental assessment requirements. Categorization is to be undertaken using Rapid Environmental Assessment (REA), consisting of questions relating to:
  - (i) The sensitivity and vulnerability of environmental resources in project area, and
  - (ii) The potential for the project to cause significant adverse environmental impacts. Projects are classified into one of:
    - a) Category A: Project with potential for significant adverse environmental impacts that are irreversible, diverse and unprecedented. These impacts may affect the area larger than the site or facilities subjected to physical work. An Environmental Impact Assessment (EIA) is required to address significant impacts.
    - b) Category B: Projects judged to have some adverse environmental impacts, but of lesser degree and/or significance than those for category A projects. An initial environmental examination (IEE) is required to determine whether or not significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
    - c) Category C: Projects unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are still reviewed.
    - d) Category FI: Projects are classified as category FI if they involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The

financial intermediary must apply an environmental management system, unless all subprojects will result in insignificant impacts.

## **2.9. Structure of Report**

41. This IEE reviews information on existing environmental attributes of the Study Area. Geological, hydrological and ecological features, air quality, noise, water quality, soils, social and economic aspects and cultural resources are included. The report predicts the probable impacts on the environment due to the proposed subproject. This IEE also proposes various environmental management measures. Details of all background environmental quality, environmental impact/pollutant generating activities, pollution sources, predicted environmental quality and related aspects have been provided in this report. References are presented as footnotes throughout the text. Following this introduction the report follows ADB guidelines and includes:

- Executive Summary
- Introduction
- Policy, Legal and Administrative Framework
- Description of the Project
- Description of Environmental and Social Baseline Conditions
- Assessment of Environmental Impacts and Mitigation Measures
- Information Disclosure, Public Consultation and Participation
- Environmental Management and Monitoring Plan
- Conclusion and Recommendations

### **3. Description of the Project**

#### **3.1. General**

42. This Chapter provides an overview of the project including the proposed Transmission Line, project components, design considerations, construction procedures, operation and maintenance activities. The safety parameters to be followed by NTDC (WAPDA) during construction and operation stages.

#### **3.2. 500 KV D/C Transmission Line from Faisalabad west to 500 KV Multan-Gatti S/C**

43. The sub-project is located in Districts Chiniot and Faisalabad of Punjab Province. The main objectives of the sub-project is to enhance the transmission capacity of NTDC system by addition of new 500 kV Transmission Line conducting the Faisalabad west 500 KV substation to Multan-Gatti 500 kV S/C to meet the growing power demand of FESCO.
44. The addition of new 500 kV Transmission in NTDC system is a part of NTDC's overall power development program and is proposed to strengthen the transmission system. In the recent years, there was quantum jump in the power demand as a result of which NTDC systems to stress and congestion at various strategic locations. Thereby, the system was stretched beyond capacity and this caused overloading which resulted in even forced outages. This has necessitated that the transmission system be strengthened and expanded to fulfill the need for secure, safe and reliable power supply and to meet not only the existing requirements but also the future demand of the country for sustained economic growth.

#### **3.3. Scope of Work**

- e) The scope of work includes:
  - i) 500kV double circuit transmission line on quad bundled Drake conductor for looping in/out of existing 500kV Multan-Gatti S/C at 500kV Faisalabad West substation (30 km).
  - ii) Construction of two 500 kV and two 220 kV line bays at 500 kV Substation Faisalabad West.

#### **3.4. Sub-Project Alignment**

45. As the sub-project is on 'Turn-key' basis i.e. construction by a contractor/ developer and turn-over to NTDC in a ready-to-use condition which includes design, supply and installation. In this context, the proposed design provided by NTDC will be finalized by the contractor at the stage of implementation. The Survey & Investigation (S&I) wing of NTDC has marked the route alignment of transmission line on grand trunk sheet (G.T. Sheet). Thus, it is pointed out that although the proposed alignment/ route alignment of transmission line including design and right-of-way was provided by the concerned section of NTDC (i.e. Survey & Investigation), but still this will be finalized by the contractor/ developer.

46. The construction of about 30 km connecting 500 Kv transmission line from 500 KV Faisalabad substation to 500 kV Multan-Gatti S/C, passes through 10 villages belonging to tehsils Bowana of District Chiniot and Tehsil Sumandri of Faisalabad District. There will be installation of 90 towers on lines, i.e. each tower will be erected at a distance of 335 m as reported by Survey & Investigation Section of NTDC.

### **3.5. Width of RoW**

47. In consultation with the Survey & Investigation section of NTDC and the E&SIC (PMU), NTDC, the width of RoW for T/L considered was 50 m, i.e. 25 m on either side from the center of transmission line and it was 225 m<sup>2</sup> (i.e. 15m x15m) in case of tower spotting.

### **3.6. Categorization of the Project**

48. The transmission line route passes almost from the agriculture land of Chaks Jang branch i.e. 138, 51, 50, 529, 530, 272, 270, 278, 277 and Charghabad Tehsil Bohwana and Sumandri. There will be no major environmentally significant impact, except some forest tree removal and temporary disturbance to crops. There is one water body, the Jang Brach Canal will need to be crossed by line. There will be no major disturbance to environmental settings of the area, if routine environmental management procedures and engineering controls are implemented thoroughly.
49. Categorization is based on the most environmentally sensitive component and the Faisalabad West to Multan-Gatti Transmission Line subproject is categorized as a Category "B" sub-project under ADB's environmental safeguard requirements.
50. The aspects of the project with potential for significant environmental impacts need to be assessed in detail and environmental assessment has therefore focused on significant impacts from the construction aspects as well as consultation with the public all along the proposed alignment of the transmission line and grid station. This report has also surveyed the transmission line corridor and immediate hinterland that may be affected by knock on effects from impacts such as waste disposal.

### **3.7. Need for the Project**

51. The conditions of the power distribution system in Pakistan are inadequate to meet rapidly growing demand for electrical power. This situation limits national development and economic growth. Electricity demand is expected to grow by 7.80% per annum during next 10 years over the period 2009-19. The existing power distribution infrastructure has to be improved and upgraded to ensure a reliable power supply to increasing number of industrial, agricultural, commercial, and domestic consumers. The overall contribution of power infrastructure also requires institutional arrangements and capacity that support strategic management of the sector, and planning and management of investments. Overall the proposed MFF facility has been designed to address both investment and institutional aspects in the electrical power sector.
52. As the result of this, enhancement in capacity of NTDC transmission system is required for power evacuation. The proposed project has therefore been prepared to meet the requirement which will also result in overall power efficiency and stability to deliver adequate & quality power to the consumers.

- Main objective of project is to enhance the transmission capacity of NTDC system by addition of new 500 kV T. Line to meet the growing power demand of DISCOs, particularly FESCO.
- This improvement in system will help to bridge the demand supply gap to eliminate the sever load shedding of the country.
- Improvement and enhancement in overall power system efficiency, reliability and power supply position in FESCO area, particularly in the vicinity of Chiniot and Faisalabad Districts.
- Improvement in voltage profile of 132 kV Grid stations in FESCO area.

### 3.8. Design Aspects

#### 3.8.1 Design Standards for Grid Station & Transmission Line

53. The layout plan of a substation which involves various installations of equipment, control room and ancillary facilities are standardized by NTDC. NTDC has developed design parameters for the planning and design of transmission systems in Pakistan (see Table 3.1). The design parameters are based on standard NTDC's existing specifications and practices for the existing as well as proposed Grid Stations and transmission lines.

**Table 3.1: Permissible Conductor Clearance at 65oC (for 500 kV line)**

S. No.	Description	Clearance (m)
1	Across country (including across/along street)	8.23
2	Roads and highways	9.45
3	Rivers and major canals (from high flood line)	9.14
4	Railway track – inside station Railway track – outside station	11.89 9.14
5	Building part – vertical Building part – horizontal	7.62 9.14
6	Earth part of lines	4.57
7	Telegraph lines	4.57
8	400 volt (and below), 11 kV, and 33 kV lines	3.96
9	66 kV and 132 kV lines	4.88

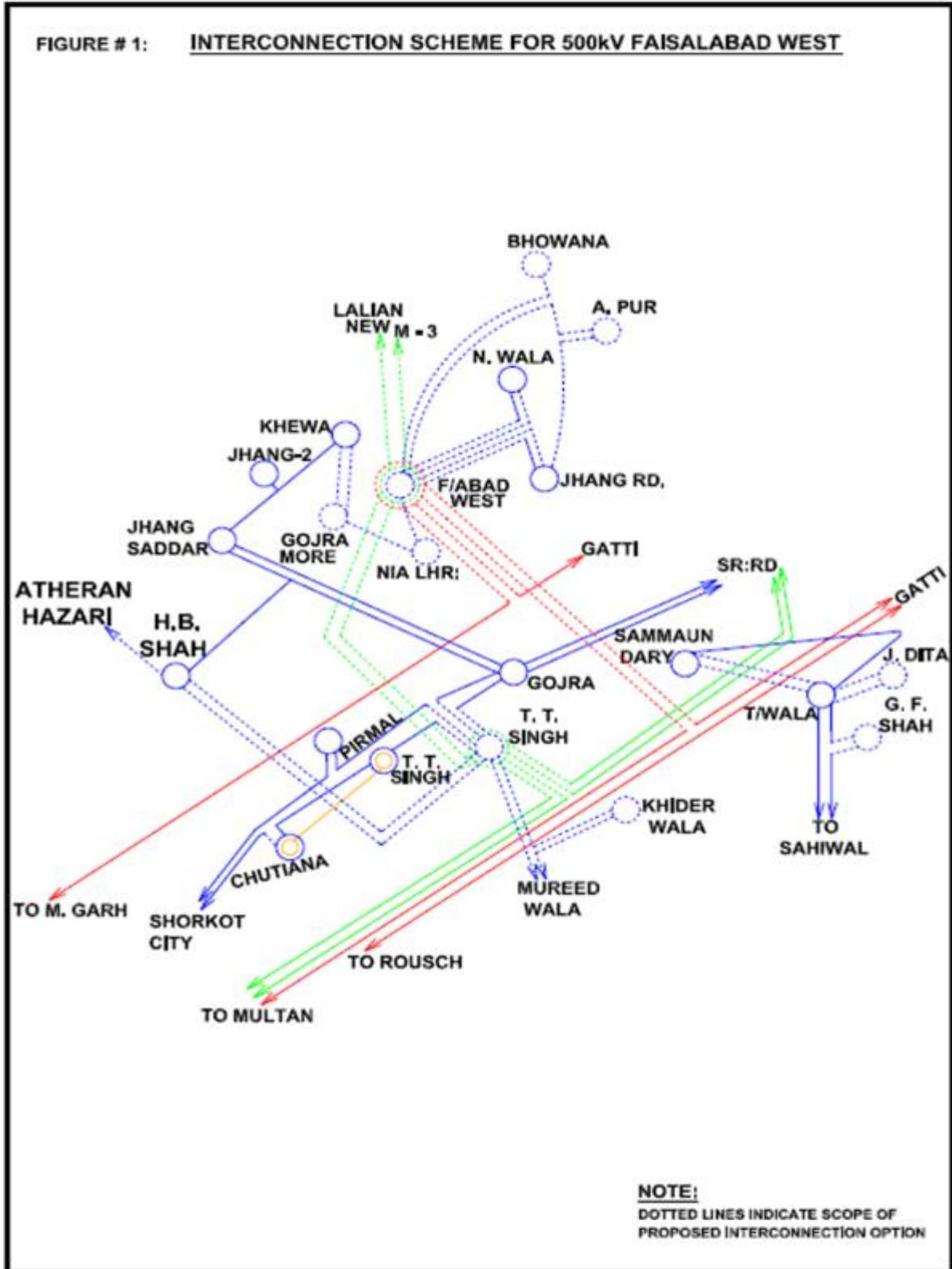
### 3.9. Climatic Consideration

54. Local climatic conditions, i.e. the temperature, wind velocity, thunder storm levels, relative humidity, etc., control the selection of materials to be used. The following climate parameters were considered in the design criteria.

Maximum Temperature	41.5°C
Minimum Temperature	2.1°C
Annual Mean temperature	29.6°C (maximum) to 14.6°C (minimum)
Maximum Rainfall	420 mm/month
Annual Relative Humidity	60.1%

### 3.10. Civil Works and Other Facilities

55. Basic infrastructure facilities including civil work foundations for installation of equipment & other associated works like cable trenches etc will be required, for which necessary provision has been made in the cost estimate. The interconnection scheme for 500 kV and single diagram of 500/220 kV of Faisalabad West Grid Station related alignments in Fig 3.1 & 3.2 respectively.



**Figure3.1: Interconnection Schemes of Faisalabad West Grid Station**

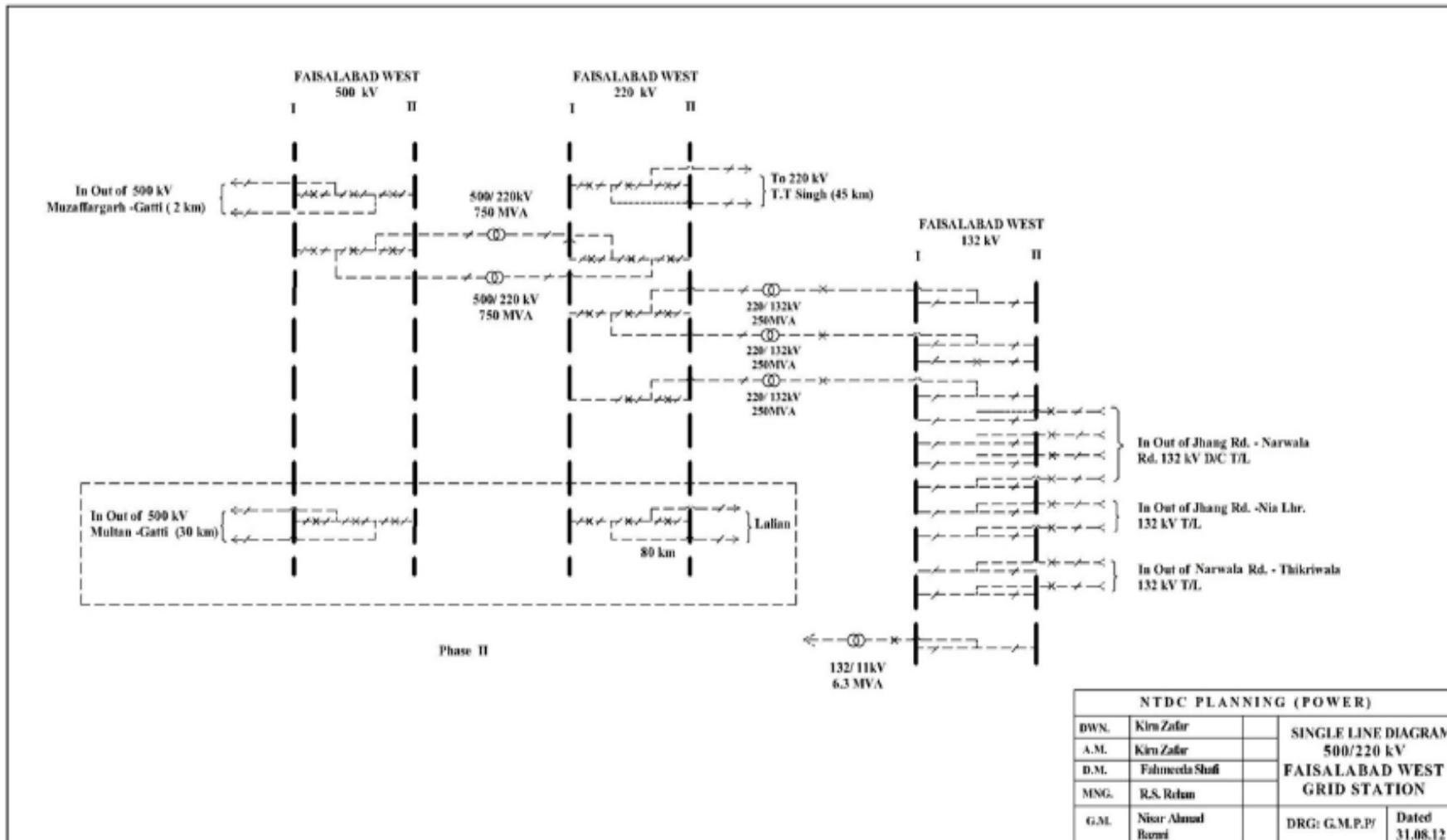


Fig 2.3: Single Line Diagram 500/220 Faisalabad West Grid Station

### 3.11. Equipment & Machinery

56. List of equipment required for extension of 500 kV Substation along with associated transmission line is listed below:

**Table 3.2: Transmission Line Equipment**

Sr. No.	Item	Unit	Qty.
<b>A</b>	<b>500 kV D/C Transmission Line for In/Out of 500 kV Multan – Gatti S/C at Faisalabad West</b>		
i	Towers	No.	6
ii	Conductor (Drake)	km	50
iii	Shield Wire	km	2
iv	OPGW	km	2
v	Insulator	No.	3000
vi	Hardware	Lot	1

**Table 3.3: Grid Station Equipment**

Sr. No.	Item	Unit	Qty.
<b>Equipment for Extension at 500 kV Substation Faisalabad</b>			
<b>A</b>	<b>500 kV Equipment</b>		
i	Circuit Breaker	Set	3
ii	Bus Isolator	Set	6
iii	Line Isolator	Set	2
iv	CT	No.	12
v	CCVT	No.	6
vi	Lightening arrester	No	6

#### 3.11.1 Tower Structures for Transmission Line

57. All the towers shall be self-supporting type, lattice steel structures, fabricated from galvanized structural steel shapes. The steel employed will be in accordance with the latest edition of the standards. All towers will be equipped with danger plates, number plates and anti-climbing devices.

### 3.11.2 Safety Parameters

58. For EHV lines, safety considerations are of two types. One is related with the safety of the system, while others are those that are related to the public. It is for this reason that NTDC (WAPDA) has adopted a 50 m wide (25 m either side from the centerline) corridor as the ROW for the allied 500 KV transmission line and 30 m for 220 KV Transmission line in this Project.
59. The aspects are to be considered in this regard are as under:

#### (a) System Safety

60. Conductor to Tower Clearance: For the safety of the system, it is imperative that any factor that may interrupt the power supply should be considered in the design. The clearance of the conductor from tower legs and trusses is of prime importance. Therefore, in the design, a minimum clearance of 1.55 m has been adopted under extreme wind conditions. This is based on regulations of GOP/WAPDA and minimum requirements of National Electric Safety Code (ANSI C2). With this clearance, there is 99% probability of withstanding switching surge of 3-sigma margin due to maximum over voltage under adverse climatic conditions.
61. Earthing of the System: Every tower is connected to an earthing system. This is to keep tower footings resistance at a level lower than 10 ohms. For this, two earth electrodes of copper-clad steel rods are sunk vertically into the ground to a minimum depth of 3 m and the locations where the required resistance not achieved crow footing will be done.
62. Lightning Performance: The tower geometry, clearance and insulation of the system are designed to perform safely within the permitted lightning intensities. In this respect, consideration has been given to the tower footing resistance and Isokeraunic level of the area. The accepted level is one tripout/ 100 km/ year due to lightning.
63. Security Arrangements: Given the prevailing law and order and security position in the area around the proposed project area, necessary armed security staff is necessary. Reinforced security will be required at work base, labor camp, material depot, equipment yard and the locations where work is in progress.
64. Work Uniform and Health and Safety Equipment: Grid Station and allied transmission line construction is a special job and the labor working on such works requires special protective uniform and personal protection equipment to cope up with safety and health requirements. It will be ensured that the labor engaged in handling rough construction materials, mixing of concrete and handling transmission lines etc. shall have long boots, overall dresses, goggles, gloves and safety hats. They will invariably have their company Identity Cards worn around their necks with the help of a ribbon. As an overall Safety, Health and Environment measure, any one going into the construction area will also wear safety helmet and safety shoes. Special arrangements must be made for Fire Protection by way of providing appropriate type of fire extinguishers with firefighting training to concerned personnel.

## **(b) Public Safety**

65. General Aspects: In view of public safety, NTDC has adopted a policy such that, the existing orchards having fruit trees with a height of not exceeding 2.5 m are allowed to remain under the lines. Similarly, open wells, including Persian wheels, are allowed to remain under the transmission lines. However, tube wells and peter pumps are not permitted under the high voltage conductors. This is for the reason that piping and cranes used to refurbish such wells could come in contact with the lines.
66. No residential or other public buildings like factory, school, hospital, etc. are permitted within the corridor. However, farm buildings, which are not used for residential purposes are allowed to remain under the high voltage lines, provided a 7.0 m minimum clearance is maintained. The height of the towers can be increased to accommodate such buildings.
67. Conductor to Ground Clearance: The conductor to ground clearance is desirable to be worked out based on over voltage due to switching surge. In this consideration, safe clearance is required to be provided for moving objects under the line with a height of 4.5 m, withstanding switching surge of 3-sigma margin with 99.7% probability under adverse atmospheric conditions. This should keep the maximum voltage gradient at ground level and maximum current induced in a person less than the internationally allowable values. As such, the total conductor to ground clearance shall in no way be less than 7.0 meters. This is in accordance with the regulations of Government of Pakistan (GOP) and NTDC practice.

### **3.12. Tower Erection and scale of the project**

68. Tower erection is carried out on the concreted pile pad locations with the help of derrick poles or cranes. The required working area for this activity is about 500 m<sup>2</sup> for each tower. The tower is erected in panels. The panels are assembled on the ground, lifted in parts with the help of derrick poles/crane and then joined together with nuts and bolts, which are tightened at the specified torque.
69. In aligning the high-voltage transmission line the design aims to avoid cultivated fields and pass through the area as thinly populated as possible. As such, the accessibility will not be a problem. There are tracks and katcha ways and the contractor may have to develop a few tracks for transporting the materials. This should result in very little, if any, damage to the vegetation or disruption of the farmland in the vicinity of the route of transmission line. The T.Line route is easily accessible mostly through metalled road or by kacha traks or village roads. Almost all the village tracks are linked to the metalled roads and are thus accessible to vehicles. The contractor is unlikely to need to transport the materials manually. In any event care will be taken that the disruption to the vegetation is kept to a minimum.
70. The environmental impacts are likely to be localized near the supporting tower construction at most places and impacts are reviewed in the environmental impact section of the report. The impacts will need to be reviewed and amended if necessary if the locations change and when the detailed designs are available.

71. The whole project tract is flat and no considerable elevation difference exists except a small depression is present at some locations.

### **3.13. Analysis of Alternatives**

72. The subprojects of Tranche-I of MFF will contribute to the improvement of the overall performance of the power transmission sector, improving transmission efficiency, broadly widening access to power to drive economic opportunities. The beneficiaries of the subproject will be people, companies, and government and non-government agencies in Pakistan that use power transmission services. Power users will benefit in terms of secure power and improved power safety and potentially increased productivity.

#### **3.13.1 Do Nothing Scenario**

73. Based on the available information, the predictions have indicated that without the tranche-I power transmission subprojects, the supply will not be reliable. This subproject is a part of an overall strategic improvement to the system.
74. In the absence of the subproject, the potential for interruptions to power supply will increase and socio-economic development of the province could be affected in the short to medium term. In an un-enhanced state, the wear and tear on existing facilities will rise. In the short term, the power supply would improve and more reliable access to secure power would be available.

#### **3.13.2 Alternative Construction Methods**

75. The feasibility and constructability of the transmission line towers is well established locally and installation of equipment is well practiced in the international context (even if some types of equipment are new to Pakistan). The process basically includes the transportation of equipment to site and the assembly of pre-fabricated units' in-situ. Thus, the impacts from construction activities are very manageable from the environmental viewpoint.

#### **3.13.3 Alternative Geometry**

76. The design and route of transmission line is as short as it can be and avoids the local villages by erecting angle towers. This lines route is total 30 km and the settlements have been avoided by passing the line through cultivated and semi forested land. Some further detailed surveys may be carried out for the detailed design to determine the exact construction methods and locations but no land acquisition is envisaged to be involved in this subproject from private peoples.
77. The present assumption is that the transmission line will be completed as planned on the defined alignment and site. The detailed design and surveys are yet to be carried out.

### **3.14. Proposed Schedule for Implementation**

78. The Project Proponent (NTDC) plans to have the tranche-I completed two to 3 years, after completing the necessary arrangements. Working on these task is in fast track. There will not be any significant land acquisition or compensation process except for the crop compensation of the transmission line towers. Designs, power transmission

arrangements, access, review of environmental management and construction processes will need to be completed in say about three months. When the detailed designs are completed, tendering and award of contract will take place over about three to six months. The construction period will follow and best estimates indicate about eighteen months to two years.

#### 4. Description of Environmental and Social Baseline Conditions

79. The Transmission Line 500 KV D/C for in/out of 500 KV Multan-Gatti S/C at 500 KV Faisalabad West (30 Km length) is located in Tehsils Bhorwana and Samundri of District Chiniot and Faisalabad respectively. The Faisalabad West Grid Station sites coordinates are:

Faisalabad West Grid Station: E 28 75 04, N 34 76 995

80. The transmission line route passes almost from the agriculture land of Chaks Jang branch i.e. 138, 51, 50,529,530,272,270,278,277 and Charghabad of Tehsil Bohwana and Sumandri. It has been endeavored by Surveys and Investigation (S&I) department of NTDC that the route of the transmission line is selected in a way that no structure requires relocation or demolishing. Only tree removal and crop damages will occur during construction phase of project. The transmission line will mostly cross cultivated area. Moreover by using angle towers and by locating the line, as per alignment provided by NTDC, on the agriculture cultivated fields there are no locations where the line is immediately adjacent to any residential or school property (sensitive receptor).
81. Erection of each tower may require working room up to 500 m<sup>2</sup>, however, there is plenty of room in the agriculture fields. Provisions have been made in the LARP to compensate damage to trees and crops. Access to the transmission line will be from the tracks and katcha roads adjacent to the fields. There should be no need to disturb any existing roads and water courses, based on the current alignment subject to reconfirmation after detailed designs are complete.
82. As already depicted in the report, the project corridor lies within the jurisdiction of Punjab Province. For the purpose of baseline conditions and identification of potential social impacts of the project, the following definitions have been taken into consideration:
83. ROW refers to a limit of 50 meters wide strip, i.e. 25 m from either side of the center line of transmission line along the project route and has been considered for identifying the potential social impacts of the proposed project.
84. This Chapter gives an overview of the environmental and social baseline information of Project Area, with special reference to impacts on Project Corridor. The information has been compiled from secondary and primary resources. Major environmental components are:
- Physical Environment
  - Biological Environment
  - Socioeconomic Environment

## 4.1. Physical Environment

85. Baseline studies on the physical parameters including land resources, topography, climate, geology, seismicity, soils, water resources etc. are indicative of the following information.

### 4.1.1 Topography, Geography, Geology, and Soils

86. The project area lies in the fertile alluvial plains of Punjab. The only hills found in the district are situated on the Chenab River between Chiniot and Rabwah. These hills are of the same formation as the Kirana hill of Sargodha District. The Sargodha-Chiniot - Shahkot-Sangla hill belt constitutes the northern outcrops of Indian shield of Pre-Cambrian era. These rock outcrops are not so high and can be used as gravel (crush) for construction when broken and crushed. The sand extracted from the river bed is superior and is commonly used for building purposes. Pre-Cambrian basement rocks of iron ore deposits are found in Chiniot district.
87. With the exception of these rocks, the districts are alluvial plain. The surface soils are grey to brown in color and medium textured i.e. silty clay/ clay loamy or sandy loam at the site, at all the locations and generally continues up to depth of 3-10 feet. This substratum contains fine sand. Topographically the area is almost plain.

### 4.1.2 Seismology

88. Geological survey of Pakistan has divided Pakistan into five seismic zones. The project area, a part of Chiniot and Faisalabad districts, lies in seismic Zone 2A which is Low hazard zone corresponding to peak ground acceleration (PGA) values of 0.08 to 0.16 m/sec<sup>2</sup>. **Figure 4.1** shows seismic map.

### 4.1.3 Climate, Temperature and Rainfall

89. The climate of the district is hot and dry during summer and cold and dry in winter. The mean maximum and mean minimum temperatures during summer are about 40°C and 28°C respectively. The mean maximum and mean minimum temperatures during winters are about 27°C and 6°C respectively. The highest mean temperature (39°C) from 1961 to 1990 was recorded in the month of May. Likewise the minimum mean temperature (8°C) was recorded in the month of January. The annual rainfall of the district is approx. 288.8 mm.

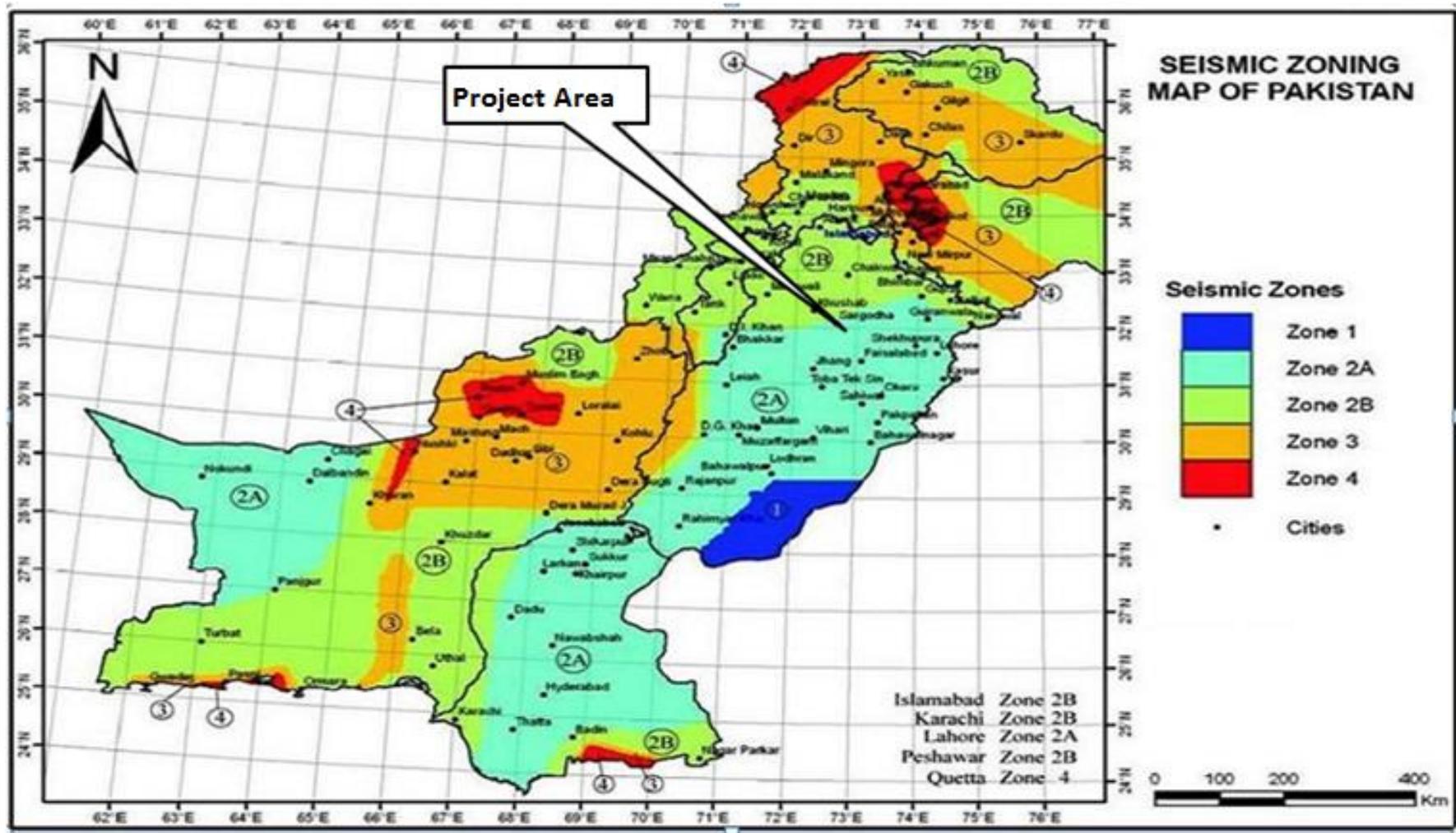


Figure 4.1: Seismic Zoning Map of Pakistan and Project Area

#### **4.1.4 Groundwater Resources**

90. Irrigation is largely dependent on the canals, but tube wells have also been sunk in the areas where water is fit for irrigation. The chemical quality of ground water in the district varies area wise and depth wise. Irrigation supplies are perennial and tube wells have been installed to make up the deficiencies. The strata near the transmission line route are water bearing and alluvial deposits, giving groundwater potential throughout the project area and the water table is fairly near the surface at 30 to 45 feet. The water table is not seasonal and dug wells do not generally run dry, because the ground water aquifer is recharged by Chenab River and canals (flowing about 30 km western side of project site). The local population is generally reliant on installed hand pumps, electric motors and supply from tube wells. Generally the ground water quality parameters i.e. chemical and biological are within the under permissible limits.

#### **4.1.5 Surface Water Resources**

91. River Chenab and related canals are the major surface water source of project area. It is perennial and flows throughout the year. It also causes floods in the monsoon season, when it receives excessive rainfall water from upstream.

#### **4.1.6 Ambient Air Quality**

92. Air quality in the project area is fairly clean. The other major source of air pollution is vehicular emissions on the road, dust arising from construction and other ground or soil disturbance, during dry weather, and from movement of vehicles on poorly surfaced or katcha access roads.
93. Industries and commercial areas are fairly far away from the project site. Domestic sources of air pollution, such as emissions from wood and kerosene burning stoves as well as small diesel standby generators in some households, are a minor source of air pollution.

#### **4.1.7 Noise**

94. Other than noise generated from vehicles moving on the main road, no major source of noise is present in the project vicinity. There are also the occasional calls to prayer from loud speakers in the local mosques but there are no significant disturbances to the quiet rural setting.

### **4.2. Biological Environment**

#### **4.2.1 Flora**

95. The area is located in alluvial plain which is highly fertile. Forest department has planted a number of trees on their land. Naturally grown shrubs are also present on the land. Jungli Kikar (*Wild Acacia niloica*), Sufaida (*Eucalyptus*), Aak (*Calotropis*), Sheesam (*Dilbergia Sisso*) and Jandh (*Prosopis cineraria*) were seen on the project land. Orchards of Citrus, Guava and Mango fruits are found in abundance in the surroundings of the project area. Besides Dates, Pomegranate and Bananas are also grown in minor quantities in the district.

#### 4.2.2 Fauna

96. Fauna within the Project area includes following:

- |  |  |
|--|--|
| <p>(i) <b>Mammals</b><br/>Jackels (<i>Canis aureus</i>)<br/>Foxes (SSP. <i>Vulpes</i>)<br/>Field rats (<i>Rattus norvegicus</i>)</p> | <p>(iv) <b>Birds</b><br/>Shikra (<i>Accipiter badius</i>)<br/>Crow (<i>Corvus splendens</i>)<br/>Common kite (<i>Milvus migrans</i>)<br/>Sparrow (<i>Passer domesticus</i>)<br/>Pigeons (<i>Columba livia</i>)<br/>Dove (<i>Stratopelia</i> SSP.)<br/>Parrot (<i>Psittacula krameri</i>)</p> |
| <p>(ii) <b>Reptiles</b><br/>House Lizard</p>   | <p>(v) <b>Others</b><br/>Spiders</p>   |
| <p>(iii) <b>Amphibians</b><br/>Common Toads</p>  |  |

97. There are no migratory birds reported in or around the project area. Domestic animals of significance include cows/ bulls, buffaloes, goats, donkeys and sheep. There is no endangered species reported in the project area by the Wildlife Department of Punjab.

#### 4.2.3 Protected Areas/ National Sanctuaries

98. There is no protected area in the vicinity of the project area.

#### 4.2.4 Wetlands and Aquatic Biology

99. The nearest Wetland is Chenab River which is at a distance of 10 km, so no impact on it is expected.

#### 4.2.5 Game Reserves & Wildlife Sanctuaries

100. No game reserves and wildlife sanctuaries exist in the vicinity of project area even up to 5 km distance.

### 4.3. Socioeconomic Environment

101. This Section of Report provides the information on socio-economic environment existing in and around the Study Area including methodology, administrative setup, demographic characteristics, educational and institutional facilities, transportation, water supply, income sources, common diseases, religious/archeological and historical sites (if any) existing in the area.

102. A social baseline survey was conducted by the Environmental Team March, 2016. The purpose of this survey was to gather information regarding the social condition of the villages lying in or around the route of proposed Transmission Line and to visit the

relevant District Offices for data collection. The questionnaires used for socioeconomic /village profile survey has been attached in Annex-II.

#### **4.3.1 Political and Administrative Setup**

103. The Project area falls in jurisdiction of Bhowana and Sumandri, district Chiniot and Faisalabad respectively in Punjab Province of Pakistan. As per Provincial Local Government Ordinances, 2001, Union Council is the lowest tier of the local government system. It is constituted of selected council normally representing five to ten villages depending upon population, while four to five union councils form the next higher tier of governance, viz., Tehsil Council. Tehsils are sub-units of a district, which is the highest tier of local government system and deals with the administrative and revenue matters. District is normally constituted of three to five tehsils, and is governed by District Council. In the existing local government system of the project area, the union councils consist of members directly elected through open competition, who also form the Electoral College for the selection of members of the next higher tiers. In this way, it has also been ensured that the councils have a sizeable representation from the vulnerable groups particularly the labor and female members of communities.

104. District Chiniot is spread over an area of 2643 square kilometres and comprises of three tehsils Chiniot, Bhowana and Lalian. The Faisalabad District area is 5856 sq Km and have six tehsils i.e. Chak Jumra, Faisalabad city, Faisalabad Saddar, Jaranawala, Samundri and Tandlawala. The project area falls in Bhowana tehsil of District Chiniot and Samundri Tehsil of Faisalabad District.

#### **4.3.2 Demographic Analysis**

##### **i) Population**

105. According to Punjab Development Statistics 2010, total population of Chiniot district is 1.156 million persons out of which 0.603 million are males and 0.553 million are females. Density of population in the district is 437 persons per square kilometer. The Faisalabad District population is 5429547 and population density is 927 persons per sq Km. the urban population is 43 percent, while rural population is 57 percent.

106. District is Faisalabad having population is 2 500 000 persons., The major towns of this District with population are Jaranwala 80 000 , Sammundri60 000 persons, Khurianwala 30 000 persons, and Tandlianwala 20 000 persons. InChiniot District the Ciniot city population is 160 000 persons and the tehsil population are Chiniot is 5,22000, Bhowana 323000 and Lalian 311000.

107. The population of the district Chiniot and Faisalabad is predominantly Muslims i.e. 95.0 and 97 percent respectively. The next higher percentage is of Ahmadis followed by Christians percent. While other minorities like Hindu (Jati), Schedule Castes etc. are very small in number.

##### **ii) Family System**

108. Joint family as well as separate family structure is common in the region.

##### **iii) Gender Ratio**

109. The number of females for every 100 males was 92 (Punjab Development Statistics 2010).

**iv) Ethnicity/Tribes**

110. Both the Districts Faisalabad and Chiniot are agricultural region with forests during the Indus Valley Civilization. The population is of Multi-tribes nation. Tribes of these districts include Rajput Dhudhi Sahmal Sipra, Janjua, Dogar, Syed, Sial, Mufti, Araaeen, Laali, Marath, Aheer, Awan, Makhdoom, Baloch Bhatti Bhutta, Butt, Bhowana, Chohan Durrani, Gujjar, Hanjra, Andra, Sipra, Walara, Haral, Tamimi, Hashmi, Jappa, Jatt, Kharal, Khokhar, Marral, Naul, Nakokara, traggar\tragar, Nissowana, Puri, Pathan Slaray and Wassi, Dhawan, Wadhawan, Sehgal.

**v) Languages**

111. Punjabi and Urdu are the predominant language being spoken in the districts.

**4.3.3 Literacy Level and Educational Institutions**

112. The literacy level of the area is not known so far, as in 1998 the Chiniot was part of District Jhang having Literacy ration of 37.1% as per 1998 census. The literacy ratio of Faisalabad is 52 percent. Educational institutions (colleges) in Chiniot includes; The KIMS College Chiniot, The Khatam-e-Nabuwat Institute of Modern Sciences, Masoomeen College ICON Group of Colleges, Punjab College , Chenab College, Din College, Govt. Degree College, Govt. Islamia College, Govt. Institute of Commerce, Superior College Chiniot, Pak Poly-technique College, University of Higher Education, Takbeer College. High schools in Chiniot include Masoomeen Foundation high school, Govt. Islamia High School, Govt. High School Chak no. 237 jb Langrana, Govt. High School Ahmad Abad, Govt. Islah High School, Govt. Girls High School, Govt. M.T.B High School, Govt. High School Chak 14 jb Muradwala, GHS Langar Makhdoom and Allied School Chiniot Campus.

113. Faisalabad has several research and educational institutions, both public and private, such as the University of Agriculture, Government College University, National Textile University, Nuclear Institute for Agriculture and Biology, University of Faisalabad, and the University of Engineering & Technology of Lahore. In 2014, the University of Agriculture ranked 1st in agriculture and 4th overall for universities in Pakistan according to the Higher Education Commission of Pakistan

**4.3.4 Employment**

114. The major proportion of total population is self-employed; others are private employees and government employees. The difference in proportions of employed population is significant between the genders and urban and rural residences. The major occupation in project area is agricultural farming, small businesses and service in public and private sectors.

115. The main occupation of women in rural areas is house-keeping which includes attending to the cattle, extracting butter and ghee from milk, weaving and sewing of family clothes. In addition they generally help their men-folk on farms with the lighter duties like transplanting of seedlings, threshing and winnowing of grains and sometimes

they also help in harvesting. In city women are house-wives or work as professionals; such as doctors, nurses, teachers, private jobs etc.

#### **4.3.5 Income Sources and Expenditure**

##### **a) Agriculture and Livestock**

116. The major source of income along the project corridor is agricultural practice. Sugar cane, wheat, Maize are the major crops in the area. Orchards are also a major source of income. Citrus, grape fruits, dates are major fruit trees in the area. Livestock commonly includes cows/ bulls, buffaloes, goats and sheep.

##### **b) Industry**

117. Faisalabad contributes over 20% toward Pakistan's annual GDP; therefore, it is often referred to as the "Manchester of Pakistan. Faisalabad's average annual GDP is \$20.55 billion (USD), of which 21% comes from agriculture. Faisalabad is the center of the textile industry in Pakistan, contributing over 70% to the textile export market of Pakistan which comprises a share of 68% of Pakistan's total exports and represents more than a 45% share in Pakistan's total exports. The Faisalabad clock tower and its eight bazaars (markets) are still a major trading zone in the city today. Each of the eight bazaars has a special name and is known for selling certain goods;

118. In Chiniot District after agriculture, another source of income in the area is industries. There are about 92 large, medium and some small industrial units in the district Chiniot out of which 52 are rice mills, 10 cold storage, two flour mills, three sugar mills, six textiles spinning etc. in the district.

#### **4.3.6 Economic Infrastructure**

##### **i) Roads and Railway Structure**

119. The Transmission Line to be crossed Painsera – Bowannais road, Faisalabad – Jang road, Painsera - Gojra road and Gojra - Dijkot road. Most of roads are metalled with the few exceptions of small roads in the villages.

##### **ii) Electricity**

120. Faisalabad Electricity Supply Company (FESCO) is managing and maintaining the electric supply in the whole project area. Almost all the residents are availing themselves of this facility.

##### **iii) Transport**

121. Area has a reasonably sized road network. Almost all the major towns and cities along the project corridor are provided with the facility of public transport.

##### **iv) Sui Gas**

122. The facility of Sui gas is not available to almost all the residents along the project route.

##### **v) Telecommunication**

123. All the villages along the project corridor are connected with the Pakistan telecommunication network. Mobile coverage exists in the Project area which enables people to use mobile phones for communication.

**vi) Post Offices and Banks**

124. Postal, money order and bank facilities exist throughout the vicinity of the project area.

**4.3.7 Social Infrastructure**

**i) Water Supply**

125. In Samundri and Bhowana tehsils, all the villages the public water supply is available, while the people also uses the Dug wells for water supply. In the rural areas, the people are dependent on local water supply system and dug wells to meet the drinking as well as household use requirements.

**ii) Health**

126. The nearest Basic Health facility to the project site is in Painsra, Boewana and Samundri Cities.

**4.3.8 Religious, Archaeological and Historical Sites**

127. There are no officially protected heritage sites or historic, religious or archaeologically important sites located in the project works areas. There are no major historic or archaeological features of note but there are a few places of worship within about 500 m of the works. It is expected that there will be no impact on such places.

**4.3.9 Gender Impacts**

128. The female population in Pakistan according to the 1998, Census, is around 48 %. In view of these facts, the gender issues assume special focus and need to be properly addressed and evaluated. The results of the survey have shown that women are an integral part of the socio-economic life of the rural economy. Women of the area took active part in household activities (like food cooking, washing of clothes, carrying of fodder for livestock and potable water for human consumption, etc.), child caring and meeting with social obligations. The data indicates that as far as participation in carrying out different activities is concerned, they share the males in every household and field activity. However, they are not considered by the males in making the decisions about various socio-economic matters, particularly relating to activities which require interaction with others such as decisions about children education, farm business, sale & purchase of livestock or property, etc. The male respondents were of the view about this attitude that traditionally they have been undertaking such responsibilities and they do not think that the females have much exposure and courage to decide upon such matters. This is source of social stress for the women.

**4.4. Village Profiles**

129. Various villages located along the project corridor were visited to establish village profile. The details are elaborated as below.

#### **Chak 138 JB**

130. The population of this village is around 3000 people with 350 houses and main castes are Jutt, Gujjar and Rajput. Languages spoken here are Punjabi and Urdu. Approximate area of this village is 3.5 km<sup>2</sup>. Educational facilities include 01 Govt. Girls Primary School and 01 Govt. Boys Elementary School and 03 Mosques as institutional facilities. Public transport is available for local and inter-city travel. Civic facilities in this village include electricity and a few grocery shops. There is 01 graveyards in the village vicinity.

#### **Chak 51 JB (Khush Pur)**

131. The population of this village is approximately 2000 people with 150 houses and main cast is Jutt. This village is inhabited by Christian population. Languages spoken here are Punjabi and Urdu. Approximate area of this village is 2.5 km<sup>2</sup>. Educational facilities include 01 Govt. Girls High School & 01 Govt. Boys High School and 01 Mosque and 01 Church as institutional facility. Public transport is available for local and inter-city travel. Civic facilities in this village include electricity and a few grocery shops. There is 01 graveyard in the village vicinity.

#### **Chak 50 JB**

132. The population of this village is around 2800 people 300 houses and main caste is Jutt and Rajput. Languages spoken here are Punjabi and Urdu. Approximate area of this village is 1.5 km<sup>2</sup>. Educational facilities include 01 Govt. Boys Primary School & 01 Govt. Girls Primary School along with 01 mosque. Public transport is available for local travel. Civic facilities in this village include electricity, a few grocery shops and a public water supply and 01 basic Health Unit. There is 01 graveyard in the village.

#### **Chak 529 JB**

133. The population of this village is around 1800 people 200 houses and main castes are Rajput, Kamboh and Gujjar. Languages spoken here are Punjabi and Urdu. Approximate area of this village is 2.5 km<sup>2</sup>. Educational facilities include 01 Govt. Girls Middle School & 01 Govt. Boys Primary School. Public transport is available for local and inter-city travel. Civic facilities in this village include electricity, a few grocery shops, 01 Medical Store and a public water supply. There is 01 graveyard in the village vicinity.

#### **Chak 530 JB (Nooran Wali)**

134. The population of this village is around 2000 people 250 houses. Main castes are Arain, Kamboh and Gujjar. Languages spoken here are Punjabi and Urdu. Approximate area of this village is 2.0 km<sup>2</sup>. Educational facilities include 01 Govt. Girls High School, 01 Govt. Boys High School and 01 Mosque as institutional facility. Civic facilities in this village include electricity, telephone and a few grocery shops. There is 01 graveyard for the village.

#### **Chak 272 (Simman)**

135. The population of this village is around 3500 people with 400 houses hailing from Arain and Jutt Clan. Languages spoken here are Punjabi and Urdu. Approximate area of this village is 3.5 km<sup>2</sup>. Educational facilities include 01 Government Girls High School and 01 Government Boys Primary School. There are 02 Mosques and public transport is available for local and inter-city travel. A Basic Health Unit has been set-up in the area. All civic amenities are present in this village. There is 01 graveyard in vicinity.

#### **Chak 270 JB**

136. The population of this village comprises of Jutts, Rajputs and Gills with 1500 people and 250 houses. Languages spoken here are Punjabi and Urdu. Approximate area of this village is 2 km<sup>2</sup>. Educational facilities include 01 Govt. Girls High School and 01 Govt. Boys Primary School. There is 01 Mosque for the locals and public transport is available for local travel. Civic facilities in this village include electricity and a few grocery shops and a BHU. There is 01 graveyard in the village.

#### **Chak 278 JB (Usman Kot)**

137. Arain, Ansari (Jillani), Malik make most of the population in this village and number upto 2000 with 250 houses. Languages spoken here are Punjabi and Urdu. Approximate area of this village is 2.5 km<sup>2</sup>. Educational facilities include 01 Govt. Girls High School, 01 Govt. Boys Middle School and 02 Private Schools. There is 01 Mosque for the locals and public transport is available for local travel. Civic facilities in this village include electricity and a few grocery shops and a BHU. There is 01 graveyard in the village.

#### **Chak 277 JB**

138. Population of this village is approximately 3000 and Arain, Jutt and Gujjar have presence here. Languages spoken here are Punjabi and Urdu. Approximate area of this village is 3.5 km<sup>2</sup>. Educational facilities include 01 Govt. Girls Primary School and 01 Govt. Boys Primary School. There are 02 Mosques for the locals and public transport is available for local travel. A medical store and a few grocery shops are in the area. There is 01 graveyard in the village.

#### **Charagh Abad**

139. The population of this village is around 4000 people 500 houses. It is located on main Painsra-Jhang Road. Main castes are Gujjar, Rajput and Jutt. Languages spoken here are Punjabi and Urdu. Approximate area of this village is 2.0 km<sup>2</sup>. Educational facilities include 01 Govt. Girls High School, 01 Govt. Boys High School and 03 Mosques as institutional facility. There is a medical Store for this small town and other civic facilities here include electricity, telephone and a few grocery shops. There is 01 graveyard for the village.

## **5. Assessment of Environmental Impacts and Mitigation Measures**

### **5.1. Subproject Location**

#### **5.1.1 Impact Assessment and Mitigation**

140. This Tranche-I subproject will involve the construction of 500 kV new Transmission Line along with extension of 500 kV Faisalabad West Grid Station (500 kV line bays) to connect with 500 kV Multan/Gatti S/C.

141. The location and scale of the works are very important in predicting the environmental impacts. Therefore, it is essential that a proper analysis is carried out during the subproject planning period. This process of impact prediction is the core of the IEE process and it is critical that the recommendations and mitigation measures are carried out according to, and with reference to the conditions on the ground in the affected areas in the spirit of the environmental assessments process. In this section the potential environmental impacts are reviewed. Where impacts are significant enough to exceed accepted environmental standards, mitigation is proposed in order to reduce residual impact to acceptable levels. In this regard, the impact prediction plays a vital role as these predictions are used for developing mitigation measures and any alternative options, if appropriate. When the detailed designs are completed, the impacts and mitigation measures will need to be further reviewed to take account of how the contracts are set up and in the light of any fine tuning of the subproject proposals.

142. The environmental management plan has been prepared based on the assessment and shall be reviewed in due course at subproject inception and through construction in order to provide a feedback on any significant unpredicted impacts. It is based on the analysis of impacts, primarily to document key environmental issues likely to arise from subproject implementation, to prescribe mitigation measures to be integrated in the subproject design, to design monitoring and evaluation schedules to be implemented during subproject construction and operation, and to estimate costs required for implementing subproject mitigation measures. The EMP must be reviewed in the subproject inception by the subproject management and approved before any construction activity is initiated, to take account of any subsequent changes and fine tuning of the proposals.

#### **5.1.2 General Approach to Mitigation**

143. Based on professional experience on heavy transmission line and grid station projects, contractors have put emphasis on the financial compensation for nuisances. This may be acceptable for some social impacts where evacuation is necessary or where structures have been accidentally damaged, however, it is not best international practice to accept payment for environmental impacts. An approach whereby the subproject contractor pays money for nuisances rather than control impacts at source will not be acceptable. This practice should not be allowed and financial compensation shall not be allowed as mitigation for environmental impacts or environmental nuisance.

144. During the preparation for the subproject construction phase the future contractors must be notified and prepared to co-operate with the executing and implementing agencies, subproject management, construction supervising consultants and local population in the mitigation of impacts. Furthermore, the contractor must be primed

through bidding stages and the contract documentation to implement the EMP in full and be ready to engage or train staff in the management of environmental issues and to audit the effectiveness and review the mitigation measures as the subproject proceeds. The effective implementation of the EMP will be audited as part of the loan conditions and the executing agency (NTDC) must be prepared for this. In this regard, the NTDC must fulfill the requirements of the law and guidance prepared by Pak-EPA on the environmental aspects of power subprojects and the recommendations already made for subproject in this IEE and under Pakistan's PEPA 1997 and Punjab Environmental Protection (Amendment) Act, 2012.

145. Furthermore, prior to the onset of the construction, the Construction Contractor will be obliged to develop a site-specific environmental management plan (SSEMP), which must be submitted to NTDC for approval. The Construction Contractor will be entitled to start the construction works only after the SSEMP is approved by NTDC. The SSEMP must entail the following steps:

- Define boundaries
- Identify sensitive receptors & environmental values
- Specify construction activities
- Conduct risk assessment
- Assign environmental management measures
- Prepare monitoring plan
  - Prepare site plans
  - Prepare environmental work plan

146. The location of the residences, mosques, schools, hospitals and civic, cultural and other heritage sites has been reviewed. A few residences at the start of line near Chak332 JB, 277 JB, 138 , 272, 270 close enough to the subproject on which there could be some potential impacts in the construction stage from disturbance and significant noise and dust. The line route was selected in way that minimum disturbance to human settlements occur and the alignment is along cultivated and barren land and has no human settlements and structures in its ROW of 50 m.

147. The grid station construction activities will be within the boundary wall. Work on the tower sites could cause some generation of air borne dust, but any nuisance from this is likely to be very localized and temporary. Other project activities, e.g. movement of heavy vehicles on unpaved tracks during the works, could generate considerable dust. Water is available in the study area, although surplus water may not always be available to suppress dust at vulnerable locations in the dry season. Therefore, as a general approach it is recommended that where works are within 25m of any residential sensitive receivers, the contractor should install segregation between the works and the edge of the sensitive receivers. The segregation should be easily erectable 2.5 m high tarpaulin sheet and designed to retain dust and provide a temporary visual barrier to the works. Where dust is the major consideration the barrier can take the form of tarpaulins strung between two poles mounted on a concrete base. These can be moved along from tower base to tower base as the work proceeds.

148. Noise from the construction of the towers should not be a major consideration unless very close to schools or hospitals where construction should be avoided at sensitive times. In addition to the physical effect of mitigating dust and noise with barriers

installation of such measures should be discussed with the local population and serve as a vehicle for further public consultation at the implementation stage to assist in public relations.

### **5.1.3 Cultural Heritage, Mosques, Religious Sites, and Social Infrastructure**

149. The location of mosques and other cultural and other heritage SR sites has been reviewed. There is no mosque, graveyard, tomb or any other religious/archaeological site in the ROW of transmission line, therefore, no impact on such site is expected.

150. The clinic / hospitals are all more than 100m from the edge of the Subproject and there will be sufficient buffer distance between the works and the SR such that no significant impact would be expected from the works.

151. The location of schools is more than 100m from the edge of the Subproject. There will be sufficient buffer distance between the works and all the SR such that no significant impacts can be expected. Public consultation should be undertaken at the implementation stage to ensure nuisances are not allowed to escalate.

## **5.2. Impacts During Pre-Construction Stage**

### **5.2.1 Impact due to Land Acquisition**

152. The proposed Project will not involve the acquisition of land on permanent basis for construction of Transmission Line as per NTDC practice. Only the crop & trees compensation will be made.

### **5.2.2 Encroachment, Landscape and Physical Disfiguration**

153. The extent of the proposed power expansion is moderate and will not extend beyond the power corridor created by the subproject. No significant landscape impacts are expected from construction of transmission line and extension of Grid Station. The grid station extension will not pose any encroachment as it will be constructed in a boundary wall.

## **Mitigation Measures**

154. Disposal of surplus materials will be negotiated through local authority approvals prior to the commencement of construction, so that no obnoxious material is produced in the scrap.

### **5.2.3 Loss of Crops**

155. The grid station area is free of any crops or agricultural resources, however transmission line will encounter cultivated lands and orchards. For construction of 30 km of Transmission Line and tower stringing, approximately 2500 acres of crops will be lost.

## **Mitigation Measures**

156. Compensation of crops will be paid to the owners as mentioned in LARP. An approximate amount of PKR 12 million has been estimated for the compensation of crops.

### **5.3. Impacts During Construction Stage**

#### **5.3.1 PHYSICAL IMPACTS**

##### **5.3.1.1 Ambient Air Quality**

157. Air quality will be affected by the fugitive dust and emissions from the construction machinery, and vehicular traffic during the construction phase. Emissions may be carried over long distances, depending on wind speed and direction, the temperature of the surrounding air, and atmospheric stability. These air emissions may contain Particulate matter (PM), Smoke, Dust, CO, SO<sub>x</sub>, NO<sub>2</sub>.

158. The critical sources of air pollution during the construction phase are listed below:

- Quarry areas that generate fugitive dust.
- Earth haulage trucks that generate dust, particularly during transportation, loading and unloading processes.
- Noxious gases emission by Construction equipment and vehicles.

#### **Mitigation Measures**

- Good engineering practices will be used at quarry areas to minimize the impact of dust emissions.
- Concrete batching plants will be equipped with dust control equipment such as fabric filters or wet scrubbers to reduce the level of dust emissions.
- The NEQS applicable to gaseous emissions generated by the construction vehicles, equipment and machinery will be enforced during the construction works. Contractor should make sure that all equipment and vehicles are tested for emissions. Regular maintenance of equipment and vehicles will also control the incomplete combustion.
- Where dust emissions are high, katcha tracks will be overlain with shingle or surface treated. Where necessary, dust emissions will be reduced by a regular sprinkling of water for keeping the dust settled, at least twice a day.
- Haul-trucks carrying sand, aggregate and other materials will be kept covered with tarpaulin to help contain construction materials being transported within the body of each carrier between the sites.
- NTDC will set up a system to monitor the air quality along the project corridor in accordance with the accepted international standards. The system will cover protocols for sampling and analysis, assessment of air quality at sensitive locations, reporting, and information sharing.
- Ensure proper tuning of the construction vehicles.
- Implementation of plantation plan for trees & plants
- The construction material will be stored in the boundary wall and no disturbance to surrounding areas is expected. The contractor will be, however, required to provide a traffic management plan before commencement of work at site.

- The need for large stockpiles should be minimized by careful planning of the supply of materials from controlled sources. Stockpiles (if required) should not be located within 50m of schools, hospitals or other public amenities such as wells and pumps and should be covered with tarpaulins when not in use and at the end of the working day to enclose dust.

#### 5.3.1.2 Noise Level

159. It is anticipated that powered mechanical equipment and some local labour with hand tool methods will be used to construct the subproject works. No blasting is anticipated. Powered mechanical equipment can generate significant noise and vibration. The cumulative effects from several machines can be significant. Noise and vibration from the construction of the towers would not be a major consideration as there are no schools or hospitals present nearby the construction site.

#### Mitigation Measures

- To minimize such impacts, the contractor for subproject should be requested by the construction supervision consultants (engineer) to provide evidence and certification that all equipment to be used for construction is fitted with the necessary air pollution and noise dampening devices to meet EPA requirements.
- Noise will be controlled by monitoring at a distance of 100m from the boundary wall of any residential unit and while following the NEQS of 45dB (A), which is consistent with WB/IFC guidelines.
- Noise from construction of substations is not covered under any regulations however in order to keep in line with best international practice, it is recommended that construction should not be allowed during nighttime (9 PM to 6 AM).
- All noisy equipment should be located within DGS or far away from Sensitive receptors as possible to prevent nuisances to dwellings and other structures from operation. However, if the noise still exceeds NEQS then noise barriers will be installed around the equipment to reduce the effects of the noise. Mitigation measures such as barriers installation should be discussed with the local population.
- Vibration from construction of piles to support pads may be required for some tower construction and may be a significant impact but this should be short duration. Where vibration could become a major consideration (within say 100m of schools, religious premises, hospitals or residences) a building condition survey should take place prior to construction. The physical effect of piling should be assessed prior to construction and measures should be discussed with the local population as well as timing of the works to serve as a vehicle for further public consultation at the implementation stage and to assist in public relations. At nearby schools, the contractor shall discuss with the school principals the agreed time for operating these machines and completely avoid machine use near schools during examination times, if such a need arises.
- Noise barriers should be installed for the workers working more than 8 hr/day during construction activities. Noise level from construction activity can be reduced by regular maintenance of machinery. Noise can be controlled through engineering control e.g. hammering actions can be substituted by hydraulic. Ensure that the workers are wearing

PPE's (ear plugs, ear muffs etc.) where engineering control is not applicable to reduce the impact of noise.

**Table 5.1: National Environmental Quality Standards for Noise**

S No.	Category of Area/Zone	Effective from 1 <sup>st</sup> July, 2010		Effective from 1 <sup>st</sup> July, 2012	
		Limit in dB(A) Leq*			
		Day time	Night time	Day time	Night time
1.	Residential are (A)	65	50	55	45
2.	Commercial area (B)	70	60	65	55
3.	Industrial area (C)	80	75	75	65
4.	Silence zone (D)	55	45	50	45

**Note:**

- *Day time hours: 6 .00 am to 10.00 pm*
- *Night Time hours: 10.00 pm to 6.00 am*
- *Silence zone: Zones which are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts and courts.*
- *Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.*
- *dB(A) Leq: time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.*

**5.3.1.3 Soil Erosion**

160. Soil erosion may occur in the workshop areas as a result of improper runoff drawn from the equipment washing-yards and improper management of construction activities.

**Mitigation Measures**

161. Good engineering practices will help control soil erosion both at the construction sites and in peripheral areas, particularly at substation site, tower foundations and along the haul tracks. Controlled and well managed vehicular movement, excavation, vegetation and regular water sprinkling will reduce the chances of soil erosion.

**5.3.1.4 Drainage**

162. No impact is anticipated on the natural drainage by the implementation of the project. However temporary drainage system for toilets and workshop effluents needs to be developed.

**Mitigation Measures**

163. Design engineer will ensure appropriately sized drainage to avoid negative impacts due to sewage effluent. During construction phase, temporary drains and embankments would be necessarily made to channel the runoff appropriately.

#### **5.3.1.5 Soil Contamination**

164. Lands may get contaminated from the spillage of chemicals like fuels, solvents, oils, paints and other construction chemicals and concrete. This normally happens when these materials are transported in open or loosely capped containers. Unmanaged sewage can also contribute to contamination of soil.
165. The possible contamination of soil by oils and chemicals at camp sites, workshop areas, and equipment washing-yards may limit the future use of land for vegetation purposes.

#### **Mitigation Measures**

166. Control measures will be needed for oily residues such as transformer oil and lubricants in the case of accidental or unexpected release. Transformer oil is supplied in drums from an imported source and tap tanks are topped up as necessary on site. There are facilities in some subproject DGS maintenance yards for recycling (dehydrating) oil from breakers. However the areas upon which these recycling facilities are located have no dedicated drainage which can capture run-off. Oily residues and fuel and any contaminated soil residues should be captured at source and refueling and maintenance should take place in dedicated areas away from surface water resources. Contaminated residues and waste oily residues should be disposed at a site agreed with the local authority.
167. Transformer oil has a long life (typically over 15 years, which depends upon the level of load the transformer serves). Oil spills are very rare and are preempted by routine maintenance. Good housekeeping techniques should be used to control oil spillage. Responsible authority should ensure that the maintenance schedule of each piece of hardware is adhered to.
168. Solid waste generated at the campsites will be properly treated and safely disposed of only in the demarcated waste disposal sites.
169. Proper drainage system as suggested in section 7.5.4 will ensure proper disposal of sewage which will offset any impact on soil.

#### **5.3.1.6 Cut and Fill and Waste Disposal**

170. Disposal of surplus materials must also be negotiated through local authority approvals prior to the commencement of construction. The subproject work does not involve any significant cutting and filling but the excavations (down to 4m) and piling may be required to create the foundations for some towers (if required). It is envisaged (depending on the mode of contract) that the surface under the towers will need to be scabbled to remove unstable materials, or to stockpile topsoil.

#### **Mitigation Measures**

- If surplus materials arise from the removal of the existing surfaces from specific areas, these should be used elsewhere on the subproject before additional soil, rock, gravel or sand is brought in. The use of immediately available material will generally minimize the need for additional rock based materials extraction from outside. Moreover, it will also save the cost of bringing the material from some other locations.
- The subproject detailed designers have so far estimated that no substantial additional materials will be required subject to confirmation at the detailed design stage.
- Contractual clauses should be included to require each contractor to produce a materials management plan (one month before construction commences) to identify all sources of cement and aggregates and to balance cut and fill. The plan should clearly state the methods to be employed prior to and during the extraction of materials and all the mitigation measures to be employed to mitigate nuisances to the local residents. Financial compensation shall not be allowed as mitigation for environmental impacts or environmental nuisance. Mitigation measures shall seek to control the impacts at source in the first place. The engineer shall be responsible to update the subproject cut and fill estimates and create Materials Master Plan to facilitate materials exchange between the different contract areas along the power line and sub-contractors on the power line and to provide an overall balance for materials and minimize impacts on local resources.

#### **5.3.1.7 Impact on Water Resources**

##### **Use of Local Water Supplies/Spring Water**

171. Project lies in an agriculturally rich area, where there is no scarcity of water. Still use of local water supplies for construction purpose can create a big issue. As acknowledged during the public consultation, locals may not want to share their water supplies as they were concerned that sharing will disturb their agricultural activities and water will get contaminated.

##### **Mitigation Measures**

172. The following measures will be carried out to mitigate the impacts of tapping local community water resources, where required:

- Approval from the local administration and representatives of the concerned departments will be obtained before using local water resources.
- Camps will be located within the project boundary to prevent the contamination of community-owned water resources.
- The contractors will be required to maintain close liaison with local communities to ensure that any potential conflicts relating to the common resource utilization for the project purposes are resolved quickly.
- Guidelines will be established to minimize the wastage of water during the construction activities and at campsites.

## Contamination of Surface and Ground Water

173. Only Jang Branch Canal to be crossed by the Transmission Line, being used for agriculture and domestic purpose. Other than that small drains are present in AOI. It is anticipated that the project activities will not cause any impact on these surface water bodies as these are not near campsite, which lies within the GS boundary, and no construction activity will be done near them.
174. Subsurface water resources may be contaminated by fuel and chemical spills, or by unmanaged solid waste and effluents generated by the kitchens and toilets at construction campsites.

## Mitigation Measures

175. Good management practices will be adopted to ensure that fuels and chemicals, raw sewage and wastewater effluent are disposed of in a controlled manner to reduce the risk of contamination. These measures are as described below:
- Best engineered drainage channels will be established in the construction camps in order to facilitate the flow of the treated effluents.
  - Soakage pits and septic tanks will be established for the treatment of sewage effluents.
  - Wastewater effluent from the contractors' workshops and equipment washing-yards will be passed through gravel/sand beds to remove oil/grease contaminants before discharging into the natural streams. According to the local laws, the BOD5 concentration in sewage must be brought down to less than 80 mg/l before being discharged into a natural stream with a capacity to dilute the effluent further by 10 times.

### 5.3.2 BIOLOGICAL ENVIRONMENT

This section describes impacts on flora and fauna and corresponding mitigation measures.

#### 5.3.2.1 Flora, Trees, Ecology and Protected Areas

176. There is no protected area, as per identification of National Conservation Strategy, inside or anywhere near the project. Around 8500 forest trees and 500 fruit trees and some shrubs will have to be removed from the project land and along Transmission line. Wood trees include Jungli Kikar(Wild Acacia niloica), Sufaida (Eucalyptus), Aak (Calotropis), Sheesam (Dilbergia Sisso) and Jandh (Prosopis cineraria). Fruit trees include Citrus, Gauva and Date palms. Dust during the construction phase will also cause an adverse impact on surrounding orchards and crops.

## Mitigation Measures

177. Trees will be enumerated species wise and compensatory plantation will be arranged along roads and paths within the campus or outside the campus through forestry. To replace the removed trees sufficient areas will be identified to allow plantation of trees at a rate of 3:1. Moreover, owners of the affected trees will be paid compensation for their loss. An approximate sum of PKR 5.00 million is estimated for compensation of trees.
178. In addition to this, the contractor will be requested to spray water twice or thrice a day (as per needed) to avoid dispersal of dust on the adjacent flora.

### 5.3.2.2 Wildlife and Fauna

179. Mammals, Amphibians, birds and reptiles will be disturbed with the clearance of flora and leveling of land. Birds can easily fly away to trees outside the campus or to the trees which are retained from original flora. Moreover grazing activity of animals will also be disturbed.

180. During construction stage noise and movement of heavy machinery for road construction, shall disturb the fauna of the area as the reptiles like lizard and snakes may get killed or move to the adjoining areas. Similarly, avifauna shall be disturbed and scared away due to disturbance of habitat. Trees provide resting and nesting places to the birds. Their removal shall have a negative effect on the fauna. Movement of vehicles near corridors of grazing cattle/slow moving animals may cause danger to their lives and require special attention by provision of sign boards and educating the drivers of construction vehicles. As there are no endangered species present near the project area so there is no potential impact on the endangered species by the execution of the project.

### Mitigation Measures

- While constructing boundary wall around the project campus, outlets near the ground surface will be provided at suitable intervals in order to facilitate the mammals and reptiles to migrate out of the disturbed campus. As far as possible, some parts of original habitat should be retained.
- Moreover Vehicle speed will be controlled to avoid incidental mortality of small mammals and reptiles.
- Staff working on the project will be given clear orders, not to shoot or trap any bird.
- Lights used in the camps, during construction of towers will be kept to the minimum requirement. Upward scattering lights will preferably be used.
- There will be adjacent areas available for grazing; hence the grazing activity of animals will not be affected.

### 5.3.3 SOCIOECONOMIC AND CULTURAL ENVIRONMENT

181. This section describes the impact of the proposed Project on local communities, construction workers, indigenous and vulnerable people as well as on structures or sites of cultural and religious significance.

#### 5.3.3.1 Impacts on Local Communities/Workforce

182. The area's surrounding communities will be affected during the construction phase as follows:

- During the construction phase the general mobility of the local residents and their livestock in and around the project area is likely to be hindered.
- Unmonitored construction activities, e.g. excavation, equipment movement etc. may create accident risks.
- Usage of community's common resources like potable water, fuel wood etc. by contractor's workforce may create conflicts between the community and the contractor.

- Induction of outside workers in the contractor labor may cause cultural issues with the local community.
- Theft problems to the community by the contractor workers and vice versa.

### **Mitigation Measures**

183. The presence of migrant construction workers inevitably causes some degree of social unease and even active disputes with the local community as a result of cultural differences. Potential social conflict will be contained by implementing the measures listed below:

- Temporarily and for short duration, the contractor has to select specific timings for stringing so as to cause least botheration to the local population considering their peak movement hours.
- Approval from the local administration will be obtained before using the local resources such as wood and water.
- The contractors will be required to maintain close liaison with the local communities to ensure that any potential conflicts related to common resource utilization for the project purposes are resolved quickly.
- Contractor will take care of the local community and sensitivity towards the local customs and traditions will be encouraged.
- Effective construction controls by the contractor to avoid inconvenience to the locals due to noise, smoke and fugitive dust.
- Haul-trucks carrying concrete, aggregate and sand fill materials will be kept covered with tarpaulin to help contain construction materials being transported between the sites.
- Good relations with the local communities will be promoted by encouraging contractors to provide opportunities for skilled and unskilled employment to the locals, as well as on-the-job training in construction for young people. Contractor will restrict his permanent staff to mix with the locals to avoid any social problems.
- Local vendors will be provided with regular business by purchasing campsite goods and services from them.
- The Contractor will warn the workers not to involve in any theft activities and if anyone found guilty of such activities, he will have to pay heavy penalty and would be handed over to police. Similarly, at the time of employing, Contractor has to take care that the workers should be of good repute. The Contractor camp will be properly fenced and main gate will be locked at night with a security guard to check the theft issues from community side.

#### **5.3.3.2 Indigenous, Vulnerable and Women Headed Households**

184. During the social field survey of the project, no indigenous group of people was identified, which comes under the definition of "Indigenous People". So, no impact on the indigenous people is envisaged due to the implementation of the project. No woman headed household was identified during the social survey of the Project.

### **Mitigation Measures**

As referred earlier, no indigenous people and women headed households have been identified in or along the Project corridor, so no mitigation is required.

#### **5.3.3.3 Public Health and Safety Hazards**

- Construction of Transmission line and Grid Station extension will require large number of workers who will obviously be accommodated in congested temporary camps. This scenario may lead to spreading of diseases like Malaria, Cholera, Typhoid, Hepatitis A, B and C etc.
- Occurrence of accidents/incidents during the construction stage is a common phenomenon as evident from previous experience of NTDC.
- During the operation stage, people believe that they will be prone to danger due to the current flows from towers, breaking of conductors, etc.
- Safety of general public at construction sites.
- During the operational stage electric current (induction) may travel into the substation and will become a hazard to the public/animals.

#### **Mitigation Measures**

- In construction camps, amenities of life including clean food, water and sanitation facilities must be provided. Contractor will arrange first aid boxes in the temporary camps. Routine medical check-ups of all the field staff including unskilled labor needs to be conducted by an MBBS doctor.
- The other source of pollution from the camps will be from garbage and waste. Apparently, there are no solid waste disposals facilities in the villages located in the vicinity of the road and solid waste will have to be disposed of at safe site.
- Complying with the safety precautions for construction workers as per International Labor Organization (ILO) Convention No. 62, as far as applicable to the project contract.
- Workers should be trained in construction safety procedures and environmental awareness.
- Equipping all construction workers with PPEs such as safety boots, helmets, gloves, and protective masks, and monitoring their proper and sustained usage.
- Contractor will ensure the provision of medicines, first aid kits, vehicle, etc. at the camp site.
- Safety lookouts will be built to prevent people and vehicles from passing at the time of excavation and other activities of such sort.
- Cordon off the work areas where necessary.
- It is recommended that NTDC at the planning stage of the project shall plan necessary arrangements in the form of earthing system to avoid accidents.

#### **5.3.3.4 Religious, Cultural and Historical Sites**

185. The location of mosques and other cultural and other heritage SR sites has been reviewed. There is no mosque, graveyard, tomb or any other religious/archaeological site within 100m boundary from the edge of the Subproject; therefore, no impact on the site is expected. There will be sufficient buffer distance between the works and all the SR such that no significant impacts can be expected.

### 5.3.3.5 Sanitation, Solid Waste Disposal, Communicable Diseases

186. The main issues of concern are uncontrolled or unmanaged disposal of solid and liquid wastes into watercourses and natural drains, improper disposal of storm water and black water and open defecation by construction workers.

#### Mitigation Measures

- In order to maintain proper sanitation around construction sites, access to the nearby lavatories will be allowed or provision of temporary toilets will be made. Construction worker camps will be necessary, based on the scale of the works needed. The construction camp will be provided with toilets with soakage pits or portable lavatories or at least pit latrines.
- Disposal of surplus materials must also be negotiated through local authority approvals prior to the commencement of construction. The Subproject work will not involve any significant cutting and filling but minor excavations (down to 4m) and piling may be required to create the foundations for the new transformers and for some towers (if required). It is envisaged (depending on the mode of contract) that the surface under the towers will need to be scabbled to remove unstable materials, or to stockpile topsoil.
- If surplus materials arise from the removal of the existing surfaces from specific areas, it will be used elsewhere on the subproject before additional soil, rock, gravel or sand is brought in. The use of immediately available material will generally minimize the need for additional rock based materials extraction from outside.
- Contractual clauses will require the contractor to produce a materials management plan (one month before construction commences) to identify all sources of cement and aggregates and to balance cut and fill. The plan should clearly state the methods to be employed prior to and during the extraction of materials and all the mitigation measures to be employed to mitigate nuisances to local residents. Financial compensation shall not be allowed as mitigation for environmental impacts or environmental nuisance.
- Contractual clauses will require the contractor to produce a solid waste management plan so that proper disposal of waste can be ensured.

### 5.3.3.6 Disease Vectors

187. Wherever water is allowed to accumulate, in temporary drainage facilities, due to improper storm water management, or improper disposal of wastewater generated from the site, it can offer a breeding site for mosquitoes and other insects. Vectors such as mosquitoes may be encountered if open water is allowed to accumulate at the construction camp site.

#### Mitigation Measures

188. Temporary and permanent drainage facilities should therefore be designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water ponds.

## 5.4. Impacts During Operational Stages

#### 5.4.1 Air Pollution and Noise from the Enhanced Operations

189. The subproject works will extend the power distribution lines. No houses, mosques or schools are close to the new GS in the operational phase. The operation of the facility is not likely to cause any appreciable increase in the noise level already generated by the existing equipment. However, it is recommended that an acoustical check be made on the detailed design to determine if any noise barriers are required. There is no source of atmospheric pollution from the subproject. In the operational phase any nearby industrial facilities with fuel powered mechanical equipment will be the main polluters.

##### **Mitigation Measures**

- All the emissions will be very well dissipated in the open terrain and there will be no cumulative effect from the subproject.
- Noise impacts from the operation of the DGS equipment will be reviewed at the detailed design stage. The NEQS for noise close to residential areas will be complied with 45 dB(A) Leq (exterior, boundary of DGS).

#### 5.4.2 Pollution from Oily Run-Off, Fuel Spills and Dangerous Goods

190. Impacts from spillage of oily residues such as transformer oil and lubricants are expected to arise in this subproject. However control measures will be needed in the case of accidental or unexpected release.

##### **Mitigation Measures**

191. Transformer oil is supplied in drums from an imported source and tap tanks are topped up as necessary on site. There are facilities in some subproject DGS maintenance yards for recycling (dehydrating) oil from breakers. However the areas upon which these recycling facilities are located have no dedicated drainage which can capture run-off. Oily residues and fuel and any contaminated soil residues should be captured at source and refueling and maintenance should take place in dedicated areas away from water resources. Contaminated residues and waste oily residues should be disposed at a site agreed with the local authority.

192. Transformer oil has a long life (typically over 15 years, which depends upon the level of load the transformer serves). Oil spills are very rare and are preempted by routine maintenance. Good housekeeping techniques should be used to control oil spillage. Responsible authority should ensure that the maintenance schedule of each piece of hardware is adhered to.

#### 5.4.3 Impacts on Ecological Resources

193. No more tree cutting is to take place, during the operation stage. On the other hand, tree plantation, on the ratio of 3:1 will improve the ecological habitat and environmental conditions of the project area and thus enable the scared away avifauna to return to this area. New plantations will not only compensate for the loss of trees, but will also add to the aesthetics of the area. There will be healthy and positive impacts on flora and fauna during the operation stage. Substation operation will enhance the risks for reptiles, amphibians and mammals and they will prefer not to return to the area, thus causing a

minor negative impact. Sufficient funds will be allocated to maintain the trees at operation stage and the local communities would be also involved for the maintenance of these plants. This will ultimately have a positive impact.

#### **5.4.4 ENHANCEMENTS**

194. Environmental enhancements are not a major consideration within the subproject site. However it is noted that it is common practice to create some local hard and soft landscaping and successful planting of fruit trees at such sites. This practice should be encouraged as far as practicable. Other opportunities for enhancements can be assessed prior to construction and proposed enhancements will be discussed with the local population to serve as a vehicle for further public consultation at the implementation stage and to assist in public relations.

#### **5.5. Environmental and Social Risk Assessment**

195. The common environmental risks as assessed on the basis of consultations with the stakeholders are as under:

- The local people believe that their movement will be restricted in the project area due to Electro Magnetic Field (EMF), and it may have adverse impacts on their health. EMF due to EHV can cause the risk of leukemia, which is a disease in which white blood cells mutate and become cancerous before maturity. These cells are important in fighting against infection in the body. Leukemia also slows down the production of red blood cells that are needed to carry oxygen in the second leading cause of death for children ages 2-15 years.
- People have to bear an excessive noise due to the current flow in the conductors especially in rainy season.
- The electronic devices/equipment may fail to work when passing under the EHV transmission lines.
- The allied transmission line may become a danger to the movement of birds and fatalities may occur if someone sits on the conductor.

#### **Mitigation**

196. The proposed mitigation measures for the above environmental risks are as under:

##### **5.5.1. Effect of Electro Magnetic Field (EMF)**

197. Different studies are carried out in Britain to find out the effects of EHV on children particularly with reference to leukemia. British study suggested that children who live close to high voltage overhead power lines may be at an increased risk of leukemia. Although the researchers have made efforts to identify the effects of EHV related to leukemia but there is no panic because the researchers cannot prove that the power lines are the cause of leukemia. They have admitted that their findings may be due to some chance.

198. Since the project has been planned in the least populated area, even if some effects due to EMF are envisaged, these will be minimal due to safe distance. Similarly a vertical clearance required as per international standards will also be maintained especially near

the populated areas. During operation stage check will be kept by the NTDC that no construction will be allowed within 100 m of the substation and transmission line.

#### **5.5.2. Excessive Noise Problem**

199. Due to the EMF around the substation, noise is generated during the ionization of the ambient air. Such a situation occurs with more severity in the rainy season when moisture in the air is relatively high. It may generate discomfort due to the noise generated during the ionization process. To overcome this problem, the route has been selected passing through the least populated area. Construction of houses within the project corridor will be prohibited and NTDC will make sure to check such type of construction during the operation stage. NTDC is providing extra vertical and horizontal clearances as compared to the international standards as an additional factor of safety. This will also reduce the noise intensity.

#### **5.5.3. Failure to Work of Electronic Devices/Equipment**

200. The failure of electronic devices/equipment to work under the EHV transmission line is a common apprehension of the stakeholders. To avoid this risk, NTDC has planned to keep excessive clearance as compared to international standards. If proper required clearance is provided, the severity of the risk is minimized, for which observations were made in the field under the existing EHV transmission lines deliberately. Secondly, as the selected route will not pass close to the settlements, the risk is also minimized.

#### **5.5.4. Danger to Bird Movements**

201. Since there is an EMF around the high voltage transmission lines and excessive noise, birds do not sit on the conductors. However, even if the birds sit on the conductors, the danger will arise if two phases of the current meet, but as there is sufficient distance between the two opposite phased conductors; no danger to the birds is envisaged.

### **5.6. Environmental and Social Benefits Of The Project**

202. Although there will be some insignificant and temporary negative effects of the Project during implementation and operation stage, but a large number of positive effects on environment and social settings of the area are also expected. Load Shedding is a hot issue these days due to huge difference in production and demand of electricity. The major positive impacts of the proposed Project on environment and social settings of the Project area include:

- Availability of the electricity will be ensured as per demand of the area.
- Expansion of industries expected due to availability of electricity.
- Better quality of life will be available to the citizens.
- Grid station will open new employment opportunities for locals.

## 6. Information Disclosure, Public Consultation and Participation

203. Public consultation sessions in detail are discussed in this section, which were held with the stakeholders/ groups likely to be affected by the project. The consultation process was carried out in accordance with the Asian Development Bank's Safe Guard Policy Statement (ADB SPS 2009). Following is the process of public consultation:

- Meetings with Government Officials of District Chiniot and Faisalabad.
- Interactive sessions held with communities located near and around T/L Route and Grid Station.

204. This process has been proceeded to involve the stakeholders from the initial stages of the project. All applicable concerns and suggestions of the stakeholders have been included during the planning and design phases of this project. Much of the PC process to date has revolved around concerns for the mitigation of construction impacts and the possible side effects from the proximity of TL.

205. The process of consultation is expected to continue through all stages of the project in order to accommodate stakeholders' desires and to orient the stakeholders positively towards the project implementation and where possible to harness cooperation over access issues in order to facilitate timely completion.

206. This process has been initiated during the feasibility stage in order to disclose the project information to the stakeholders and record feedback regarding the proposed project and preferences.

### 6.1. CONSULTATION PROCESS

207. The process of public consultation is likely to continue throughout the project cycle.

208. The focus of this consultation is the population living near the proposed T/L route i.e., the population that is living around the radius of 200 m to around 1.5 Km of the proposed T/L.

209. The disclosure of information to the stakeholders beforehand has advantages in the environmental assessment and mitigation of impacts. Public consultation can also provide a conduit for the improvement of the project implementation to better serve the stakeholders.

210. The environmental assessment process under the Pakistan Environmental Protection Act only requires the disclosure to the public after the statutory IEE/EIA has been accepted by the relevant EPA to be in strict adherence to the rules. In this IEE the consultation process was performed to satisfy the ADB requirements.

211. Photos presenting awareness and public consultation campaign are given in Annex IV. Surveys were carried out in order to investigate physical, biological and socio-economic resources falling within the immediate area of influence of the project.

212. Different relevant Government departments were consulted in order to gather information regarding the land and people, public-sector infrastructure, possible impact, if any, of project activities on the surrounding environment and any other private or public concerns about the project under review.

Consultation was held with the following officers:

Sr. No.	Date	Venue of Meeting	Name of Participants	Designation
1	01-03-2016	District Office Education Fsd	Mr. Muhammad Fayyaz,	Assistant Director
2	01-03-2016	District Office Community Development Fsd	Ms. Sofia Tasleem Akhtar	Deputy District Officer (Social Welfare)
3	01-03-2016	District Office (Agriculture) Fsd	Ms. Sobia,	Agriculture Officer
4	01-03-2016	District Office Health Fsd	Mr. Shafique Ahmad Asif	Health/Education Officer
5	1-03-2016	District Office Agriculture Chiniot	Ch. Shahid Hussain	D.O Agriculture
6	1-03-2016	District Office Forest Chiniot	Muhammad Ilyas Bashir	D.O Forest
7	2-03-2016	District Office Social Welfare Chiniot	Ms. Farrukh Rizwan	D.O Social Welfare
8	2-03-2016	District Office Environment	Muhammad Arif	D.O Environment
9	2-03-2016	AC Office, Tehsil Bhowana	Muhammad AkhtarBhutta	AC Bhawana

## 6.2. IDENTIFICATION OF STAKEHOLDERS

213. Field work and public consultation phase was used to identify the stakeholders. On the basis of the findings of the field team, the primary stakeholders are:

- Landowners within the corridor of the transmission line.
- Landowners whose properties may be hired or acquired for access purposes.
- People that might be indirectly affected by the project.
- People who shall benefit from project activities in the form of employment or business opportunities.
- Government departments directly or indirectly involved with the project.
- Knowledgeable residents of the area keen to contribute to the consultation process.
- Pressure groups demanding table power supply on urgent basis.

214. A number of stakeholders were identified during the field surveys. These included villagers, local residents, government officials, shop owners, public representatives and general public. All those stakeholders had different types of stakes according to their professions.

215. During the Environmental and Social Assessment of the project area, two types of stakeholders were identified; the primary stakeholders, who would be directly affected by the project; and the secondary

stakeholders, who would be indirectly affected by the project (or who could indirectly affect the project).

216. Subsequent to the stakeholder identification, guidelines and questionnaires (Annex II) were prepared for conducting the focus group discussions/meetings, which were arranged through contacting the key persons from the community, such as, village heads, and patwaris.

217. After completing the preparatory steps described above, the consultations were carried out in the communities. The consultations with the secondary stakeholders were carried out in parallel to the community meetings. The details of these consultation meetings have been attached as Annex-III

### **6.3. CONSULTATION FINDINGS**

#### **6.3.1 Stakeholders' Concerns**

218. Residents did not raise many issues. Exceptions were the importance of providing information early and well before the start of work, targeting minimum wastage of crops, compensation according to the appropriate shares in crops, employment as laborer during installation of T/L, avoiding extensive tree cutting, advance payment should be made before harvesting the crops, T/L should be diverted to avoid our houses, interested to become guard /chowkidar (watchman) during implementation of the TL, prompt compensation and less wastage, payment should be made to the affected person, not to the landowner only, compensation should be through crossed check, early & fairly compensation required, need of wide publicity of compensation schedule and employment as laborer during installation of T/L. Women folk did not point out many problems but their confidence to respond was limited. These remained restricted to mainly following issues. The issues raised by women's groups included:

- i. Minimum wastage of crops & trees,
- ii. Company workers should take care of our culture during installation of T/L,
- iii. Fair & timely compensation of crops,
- iv. Early information before start of work,
- v. Employment should be given to local men,
- vi. Company works should not disturb us during field work,
- vii. Project should offer jobs to the affected persons and compensation should be according to shares in crops.

219. Small number of contribution of women folk towards issues/problems of this subproject were perhaps, due to the fact that construction of 500 kV Fsd-West to Multan-Ghatti TL did not have any direct impact on the community and transmission line is passing through agriculture land.

220. On the basis of the consultations so far, the consultants reckon that the social and environmental impacts of this project are not insurmountable, and NTDC will make sure that compensation and

assistance amounts are paid properly including skilled and unskilled employment to the affected people (AP) as far as is reasonably practicable.

221. All of the above concerns and expectations have been adequately incorporated in the project design in the form of the mitigation measures included in the Environmental Management Plan and the communities were so informed during the consultation meetings.

#### **6.4. GENDER COMPONENT**

222. The consultations identified some potential environmental and social impacts and perceptions of the affected communities. The public consultation was held in March-April 2016. Overall, the community supported the construction of the transmission line and extension in grid.

223. All the above points would be reflected in Social Framework Agreement (SFA) between the local community and the NTDC and when the project is commissioned for construction.

#### **6.5. SOCIAL FRAMEWORK AGREEMENT**

224. The project proponent has committed that they will work hand-in-hand with the community for the successful completion of the project.

225. SFA shall be considered as a "follow up" of the public consultation and public hearing (has to be held) and indicates that NTDC and the communities are mutually facilitating the construction process of 500kV T/L DS from Fsd-West to Gatti-Multan S/C subproject.

##### **6.5.1 Parties to Agreement**

226. The local villagers/representatives and the project proponent will sign the SFA through mutual consent. At least two leaders/elders will be chosen from each of the villages situated adjacent to the area where construction activity will be based. These leaders/elders will constitute a villagers committee, which will choose a Chairman among themselves.

227. SFA shall be signed by NTDC Resident Engineer (RE) representing the project proponent and by the Chairman of villagers' committee representing the local community before two month start of the construction work.

##### **6.5.2 Agreement Contents**

228. SFA shall be prepared in the form of a legal agreement in Urdu language on a stamp paper to be provided by RE at the project cost. Three copies of the agreement shall be signed by both parties. All the mitigation measures described in EMP which are relevant to SFA shall be included in the agreement. The obligations of the NTDC and those of the community shall be listed clearly. Signed copies of SFA shall be kept by both parties and the Executive Engineer in charge of this TL project.

## 7. Environmental Management and Monitoring Plan

### 7.1. General

229. This Chapter provides an overall approach for managing and monitoring the environment related issues and describes the institutional framework and resource allocations proposed by NTDC to implement the EMMP for 5000 kV Transmission Line from Faisalabad West Station to Gatti-Multan S/C and Grid Station extension i.e. Two Line bays. The main objectives of EMP are to:

- Provide the details of the project impacts along with the proposed mitigation measures, and a corresponding implementation schedule.
- Define the responsibilities of the project proponent, contractor, supervisory consultants and other role players, and effectively communicate environmental issues among them.
- Define a monitoring mechanism, reporting frequency, auditing and identifying monitoring parameters to ensure that all the mitigation measures are completely and effectively implemented.
- Identify the resources required to implement the EMP and outline the corresponding financing arrangements.

### 7.2. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

230. The environmental protection and enhancement are achieved in various ways. These approaches should begin right at the embryonic stage, i.e. i) project location, ii) design, specifications and tender/contract documents, iii) construction activities and iv) post completion activities i.e. operation and maintenance stage. Appropriate environmental management measures are required to be exercised in a cascade order by NTDC at each stage of the project.

231. In this way, it is envisaged that the Project will achieve maximum ongoing cost-effectiveness, environmental sustainability and social soundness, far beyond the end of implementation of the Project. All the stages of the Project have to be managed by adopting the proposed environmental mitigation measures, where, besides engineering aspects, due importance is to be accorded to mitigation measures which make a perfect blending with the surrounding ecosystem.

232. The key environmental and social issues, which have already been discussed in Chapter 7 are as under:

- Impacts on Crops and Trees
- Contamination of air, water and soil during the construction activities
- Borrowing of aggregate materials
- Soil erosion and soil contamination
- Impact of noise generated by vehicles, machinery and equipment during the construction activities
- Impact on community and work force safety as a result of accident hazards during the construction and operation of the project
- Vegetation clearing for tower foundations and establishment of camp facilities

233. An Environmental Management Plan is provided in Table 7.1, which establishes the linkages between the environmental and social impacts, mitigation strategy and the agencies responsible for execution.

Table 7.1: Environmental Management Plan

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
<b>DESIGN STAGE</b>						
1. <b>Social Impacts</b>	To ensure that the adverse impacts on crops and trees are mitigated according to the LARP provisions.	<ol style="list-style-type: none"> <li>1. NTDC to select the route in a way that minimum impact on trees and crops occur.</li> <li>2. Assessment of losses of tree and crops damages (if any) due to construction of transmission line towers.</li> <li>3. Preparation of LARP for the proposed project before commencement of construction activities.</li> <li>4. All the payments / entitlements are paid according to the Entitlement Matrix, prepared according to the LARP.</li> <li>5. All the impacts identified by the IEE are incorporated in to the project as well as the LARP and relevant entitlements included into the Entitlement Matrix.</li> </ol>	Before the construction of the transmission line and all other structures, the APs should be given sufficient time and compensation to satisfy them.	Affected Persons will be compensated by NTDC through its land acquisition officers.	NTDC / LAOs	MC and External Monitors
2. <b>Hydrological Impacts</b>	To minimize hydrological and drainage impacts during constructions.	<ol style="list-style-type: none"> <li>1. Hydrological flow in areas where it is sensitive, such as water courses or bridges and culverts.</li> <li>2. Adequate culverts should be</li> </ol>	Before the commencement of construction activities/during	Considered locations are as in the design report.	NTDC with the Design Consultant	NTDC

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
		provided where any water channel is needed to be crossed for transmission line construction activities.	designing stage.			
<b>3. Noise Barriers</b>	Ensure cumulative noise impacts are acceptable in operational phase.	<ol style="list-style-type: none"> <li>1. Conduct detailed acoustic assessment for all residential buildings, schools, (other sensitive structures) within 50m of RoW.</li> <li>2. If noise at sensitive receiver exceeds the permissible limit, the construction activities should be monitored and controlled.</li> </ol>	During detailed design stage, and in include in the contract.	Noise sensitive locations to be identified after detailed design.	NTDC with the design consultant	NTDS and Construction Supervision Consultant (CSC if any)
<b>4. Waste Disposal</b>	Ensure adequate disposal options for all waste including unsuitable soils, scrap metal.	<ol style="list-style-type: none"> <li>1. Identify sufficient locations for disposal of transformer oils, unsuitable soils, scrap metal “cradle to grave”.</li> <li>2. Include in contracts for unit rates for re-measurement for disposal.</li> <li>3. Designate disposal sites in the contract and cost unit disposal rates accordingly.</li> <li>4. Prepare a PCB spill handling procedure and equip such teams with special clothing, steel containers and solvents.</li> </ol>	<ol style="list-style-type: none"> <li>1. During designing stage no later than pre-qualification or tender negotiations</li> <li>2. Include in the contract.</li> </ol>	Locations approved by ADB and NTDC and waste disposal local authorities.	ADB and NTDC with the design consultant	NTDC and CSC
<b>5. Temporary Drainage and Erosion Control</b>	Include mitigation in Preliminary and detailed designs for erosion control and	<ol style="list-style-type: none"> <li>1. Identify locations where drainage or irrigation crossing RoW may be affected by works.</li> <li>2. Include in protection works</li> </ol>	During designing stage no later than pre-qualification	Locations based on drainage or irrigation	NTDC and Design Consultant	NTDC and CSC

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
	temporary drainage.	contract as a payment milestone(s).	or tender negotiations.	crossing RoW.		
<b>6. Avoidance of Sensitive and High Value Areas</b>	The siting of transmission facilities must seek to avoid to the maximum extent possible areas of high ecological, cultural, economic, and aesthetic value and sensitivity.	When siting in such areas cannot be avoided altogether, the area of disruption should be minimized and the impacts mitigated.	During designing stage no later than pre-qualification or tender negotiations	Locations based on crossing RoW	NTDC and Design Consultant	NTDC and CSC
<b>7. EMF Reduction</b>	Although the health effects of chronic exposure to EMFs from AC transmission lines remain scientifically uncertain, many utilities and regulatory authorities employ EMF reduction practices as a precautionary measure, usually within the limit of a few percent of overall project cost. Utilities seek to keep annual average magnetic field intensities at the	<ul style="list-style-type: none"> <li>• Raising conductor height above the ground, typically by increasing tower height.</li> <li>• Reducing conductor spacing.</li> <li>• Arranging phases so that fields tend to cancel.</li> <li>• Increasing transmission voltage (since magnetic field intensities are a function of current, and increased voltage, all things being equal, will result in reduced current).</li> <li>• Reducing loads (and therefore, currents).</li> <li>• Increasing right-of-way widths or buffer zone widths, to move people further from transmission lines.</li> </ul>	Design Stage	<b>Project Area</b>	NTDC	NTDC

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
	edge of the right-of-way below about 10 mG (milli-Gauss).					
<b>8. Site-specific environmental management plan</b>	Prior to the onset of the construction, the Contractor will be obliged to develop a site-specific environmental management plan (SSEMP), which must be submitted to NTDC for approval.	<ul style="list-style-type: none"> <li>• Define boundaries</li> <li>• Identify sensitive receptors &amp; environmental values</li> <li>• Specify construction activities</li> <li>• Conduct risk assessment</li> <li>• Assign environmental management measures</li> <li>• Prepare monitoring plan</li> <li>• Prepare site plans</li> <li>• Prepare environmental work plan</li> </ul>	Prior to construction		Construction contractor	CSC and NTDC
<b>CONSTRUCTION STAGE</b>						
<b>1. Hydrology and Drainage Aspects</b>	To ensure the proper implementation of any requirements mentioned in EPA conditions of approval letter in relation to Hydrology of the project.	<ol style="list-style-type: none"> <li>1. Consideration of weather conditions when particular construction activities are undertaken.</li> <li>2. Limitations on excavation depths in use of recharge areas for material exploitation or spoil disposal.</li> <li>3. Use of landscaping as an integrated component of construction activity as an erosion control measure.</li> <li>4. Minimizing the removal of vegetative cover as much as possible and providing for its</li> </ol>	<ol style="list-style-type: none"> <li>1. Prepare a thorough plan to be approved by SC one month prior to a commencement of construction.</li> <li>2. Proper</li> </ol>	<ol style="list-style-type: none"> <li>1. Locations of each construction activity to be listed by the engineer.</li> <li>2. Special locations are identified along the</li> </ol>	CSC or NTDC to actively supervise and enforce	NTDC

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Respon MM
		restoration where construction sites have been cleared of such areas.	timetable prepared in consideration with the climatic conditions of each area, the different construction activities mentioned here to be guided.	RoW by the contractor to minimize disturbance. 3. A list of locations of irrigation channels/ drains to be compiled by the contractor.		
<b>2. Orientation for Contractors, and Workers</b>	To ensure that the CSC, contractor and workers understand and have the capacity to ensure the environmental requirements and implementation of mitigation measures.	<ol style="list-style-type: none"> <li>1. NTDC to engage environmental specialist in the PMC to monitor and progress all environmental statutory and recommended obligations.</li> <li>2. Conduct special briefing for managers and / or on-site training for the contractors and workers on the environmental requirement of the project. Record attendance and achievement test.</li> <li>3. Agreement on critical areas to be considered and necessary mitigation measures, among all parties who are involved in project activities.</li> </ol>	<p>Induction of all relevant staff required for implementation of EMP.</p> <p>At early stages of construction for all construction employees as far as reasonably practicable.</p>	<p>All staff members in all categories.</p> <p>Monthly induction and six month refresher course as necessary until contractor complies.</p>	Contractor and the CSC and record details	NTDC & CSC to observe and record success

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
		4. Continuous progress review and refresher sessions to be followed.				
<b>3. Water Quality</b>	To prevent adverse water quality impacts due to negligence and ensure unavoidable impacts are managed effectively. Ensure adverse impacts on water quality caused by construction activities are minimized.	<ol style="list-style-type: none"> <li>1. Compile temporary drainage management plan one month before commencement of works.</li> <li>2. Proper installation of Temporary Drainage (TD) and Erosion Control (EC) before works within 50 m of water bodies.</li> <li>3. Proper construction of TD and EC measures, maintenance and management including training of operators and other workers to avoid pollution of water bodies by the considerate operation of construction machinery and equipment.</li> <li>4. Storage of lubricants, fuels and other hydrocarbons in self-contained dedicated enclosures &gt;50m away from water bodies.</li> <li>5. Proper disposal of solid waste from construction activities and labor camps.</li> <li>6. Cover the construction material and spoil stockpiles with a suitable material to reduce material loss and sedimentation and avoid stockpiling near to water bodies.</li> </ol>	Prior to construction, 50 m from water bodies. Timing will depend on the construction timetable.	Relevant locations to be determined in the detailed project design	<ol style="list-style-type: none"> <li>1. Contractor CSC to enforce</li> <li>2. Contractor has to check water quality and report to NTDC.</li> <li>3. CSC supervises monitoring activities.</li> </ol>	NTDC review results

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
		<ol style="list-style-type: none"> <li>7. Topsoil stripped material shall not be stored where natural drainage will be disrupted.</li> <li>8. Borrow sites (if required) should not be close to sources of drinking water.</li> </ol>				
<p><b>4. Air Quality</b></p>	<p>To minimize effectively and avoid complaints due to the airborne particulate matter released to the atmosphere.</p>	<ol style="list-style-type: none"> <li>1. Control all dusty materials at source.</li> <li>2. All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations. (Relevant regulations are in the Motor vehicles fitness rules and Highway Act).</li> <li>3. Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions.</li> <li>4. Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions.</li> <li>5. Vehicles transporting soil, sand and other construction materials shall be covered.</li> <li>6. Limitations to speeds of such vehicles necessary. Transport through densely populated area should be avoided.</li> <li>7. To plan to minimize the dust within the vicinity of orchards and fruit</li> </ol>	<p>All construction sites within 100 m of sensitive receivers.</p>	<p>A list of locations to be included in contract and other sensitive areas identified by the CSC along the ROW during works.</p>	<p>Contractor should maintain acceptable standard CSC to supervise activities.</p>	<p>NTDC/CSC</p>

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
		farms. 8. Spraying of bare areas with water. 9. Concrete plants to be controlled in line with statutory requirements should not be close to sensitive receptors.				
<b>5. Noise / Ground Vibration</b>	To minimize noise level increases and ground vibrations during construction operations.	<ol style="list-style-type: none"> <li>1. All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations and with effective silencing apparatus to minimize noise.</li> <li>2. As a rule, the operation of heavy equipment shall be conducted in daylight hours.</li> <li>3. Hammer- type percussive pile driving operations shall be not be allowed at night time.</li> <li>4. Construction equipment, which generates excessive noise, shall be enclosed or fitted with effective silencing apparatus to minimize noise.</li> <li>5. Well-maintained haulage trucks will be used with speed controls.</li> <li>6. Contractor shall take adequate measures to minimize noise nuisance in the vicinity of construction sites by way of adopting available acoustic</li> </ol>	Maximum allowable noise levels should be below 80 dB (A) $L_{EQ}$ at the boundary of the construction site.	During construction stage, the most sensitive locations need special attention.	Contractor should maintain the acceptable standards  CSC to supervise relevant activities.	NTDC / CSC

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
		methods such that at the edge of the works nearest residential areas will be less than 45 dB(A) Leq during night time (10 p.m. to 7 a.m.) and 55 dB(A) Leq at other times during the day.				
<b>6. Soil Erosion/ Surface Run-off</b>	<p>Prevent adverse water quality impacts due to negligence and ensure unavoidable impacts are managed effectively.</p> <p>To minimize soil erosion due to the construction activities of towers, stringing of conductors and creation of access tracks for project vehicles.</p>	<ol style="list-style-type: none"> <li>1. Schedule works in sensitive areas (e.g. rivers) for dry season</li> <li>2. Temporary erosion control plan one month before commencement of works.</li> <li>3. Proper installation of TD and EC before works within 50m of water bodies.</li> <li>4. Meaningful water quality monitoring up and downstream at any tower site within a river or stream during construction. Rapid reporting and feedback to CSC.</li> <li>5. Back-fill should be compacted properly in accordance with design standards and graded to original contours where possible.</li> <li>6. Cut areas should be treated against flow acceleration while filled areas should be carefully designed to avoid improper drainage.</li> <li>7. Stockpiles should not be formed within such distances behind</li> </ol>	<p>Because the area can be subject to unseasonal heavy rain plan before and during construction (cut and fill, land reclamation etc.) while considering the climatic conditions.</p>	<ol style="list-style-type: none"> <li>1. Locations based on history of flooding problems.</li> <li>2. A list of sensitive areas during construction to be prepared by the detail design consultant in consideration with the cut and fill, land reclamation, borrow</li> </ol>	Contractor and CSC	NTDC/ CSC

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
		<p>excavated or natural slopes that would reduce the stability of the slopes.</p> <p>8. In the short-term, either temporary or permanent drainage works shall protect all areas susceptible to erosion.</p> <p>9. Measures shall be taken to prevent pounding of surface water and scouring of slopes. Newly eroded channels shall be backfilled and restored to natural contours.</p> <p>10. Contractor should arrange to adopt suitable measures to minimize soil erosion during the construction period. Contractor should consult concerned authorities in the area before deciding mitigation measures.</p> <p>11. Clearing of green surface cover to be minimized during site preparation.</p> <p>12. Replanting trees to be done before the site is vacated and handed back to NTDC with appropriate trees (other vegetation cover as appropriate) to ensure interception of rainwater and the deceleration of surface run-off.</p>		<p>areas etc.</p> <p>3. Locations of all culverts, irrigation channels, road and highway.</p>		

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
<b>7. Exploitation Handling, Transportation and Storage of Construction Materials</b>	<p>To minimize contamination of the surroundings</p> <p>(Due to Implementation of works, concrete and crushing plants).</p>	<ol style="list-style-type: none"> <li>1. In order to minimize and or avoid adverse environmental impacts arising out of construction material exploitation, handling, transportation and storage measures to be taken in line with any EPA conditions/recommendations in approval.</li> <li>2. Conditions that apply for selecting sites for material exploitation.</li> <li>3. Conditions that apply to timing and use of roads for material transport.</li> <li>4. Conditions that apply for maintenance of vehicles used in material transport or construction.</li> <li>5. Conditions that apply for selection of sites for material storage.</li> <li>6. Conditions that apply for aggregate production.</li> <li>7. Conditions that apply for handling hazardous or dangerous materials such as oil, lubricants and toxic chemicals.</li> </ol>	<p>Update monthly</p>	<ol style="list-style-type: none"> <li>1. List of borrow areas to be prepared one month prior to construction.</li> <li>2. List of routes of transport of construction material is to be prepared for the contract and agreed one month prior to construction.</li> <li>3. Report of vehicle conditions is available.</li> <li>4. Map of locations of storage is prepared by the contractor.</li> <li>5. Environmental accident checklist and a list of banned substances are</li> </ol>	<p>Contractor and CSC to agree format of reporting</p>	<p>NTDC/CSC</p>

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
				included in the contractor's manual.		
<b>8. Construction Waste Disposal</b>	Minimize the impacts from the disposal of construction waste.	<ol style="list-style-type: none"> <li>1. Waste management plan to be submitted to the CSC and approved by MC one month prior to starting works.</li> <li>2. Estimating the amounts and types of construction waste to be generated by the project.</li> <li>3. Investigating whether the waste can be reused in the project or by other interested parties.</li> <li>4. Identifying potential safe disposal sites close to the project or those designated sites in the contract.</li> <li>5. Investigating the environmental conditions of the disposal sites and recommendation of most suitable and safest sites.</li> <li>6. Piling up of loose material should be done in segregated areas to arrest washing out of soil. Debris shall not be left where it may be carried by water to downstream flood plains, dams, lagoons etc.</li> <li>7. Used oil and lubricants shall be recovered and reused or removed from the site in full compliance with</li> </ol>	Update monthly	A list of temporary stockpiling areas and more permanent dumping areas to be prepared at the contract stage for agreement	Contractor and CSC should supervise and take action to complete contractor's relevant activities according to EIA/IEE/EMP requirement & environmental standards.	NTDC/ CSC

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
		<p>the national and local regulations.</p> <p>8. Oily wastes must not be burned. Disposal location to be agreed with local authorities/EPA.</p> <p>9. Machinery should be properly maintained to minimize oil spill during the construction.</p> <p>10. Solid waste should be disposed at an approved solid waste facility, open burning is illegal and contrary to good environmental practice</p>				
<p><b>9. Work Operation Location</b></p> <p><b>Camp and</b></p>	<p>To ensure that the operation of work camps does not adversely affect the surrounding environment and residents in the area.</p>	<p>1. Identify location of work camps in consultation with local authorities. The location shall be subject to approval by the NTDC. If possible, camps shall not be located near settlements or near drinking water supply intakes.</p> <p>2. Cutting of trees shall be avoided and removal of vegetation shall be minimized.</p> <p>3. Water and sanitary facilities (at least pit latrines) shall be provided for employees. Worker camp and latrine sites to be backfilled and marked upon vacation of the sites.</p> <p>4. Solid waste and sewage shall be managed according to the national and local regulations. As a rule,</p>	<p>Update once a month</p>	<p>Location Map is prepared by the Contractor.</p>	<p>Contractor</p>	<p>NTDC/ MC</p>

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
		<p>solid waste must not be dumped, buried or burned at or near the project site, but shall be disposed off to the nearest sanitary landfill or site having complied with the necessary permission of local authority permission</p> <p>5. The Contractor shall organize and maintain a waste separation, collection and transport system.</p> <p>6. The Contractor shall document that all liquid and solid hazardous and non-hazardous waste are separated, collected and disposed of according to the given requirements and regulations.</p> <p>7. At the conclusion of the project, all debris and waste shall be removed. All temporary structures, including office buildings, shelters and toilets shall be removed.</p> <p>8. Exposed areas shall be planted with suitable vegetation.</p> <p>9. NTDC and Supervising Engineer shall inspect and report that the camp has been vacated and restored to pre-project conditions.</p>				
10. Loss of Trees and	To avoid several negative impacts due	1. Land holders will be paid compensation for their standing	Rerouting and site	A list of Locations with	Design consultant,	NTDC/CSC

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Respon MM
<b>Vegetation Cover of the Areas for Towers and Temporary Work-space</b>	to removing of landmark, sentinel and specimen trees as well as green vegetation and surface cover.	<p>trees in accordance with prevailing market rates (LARP). The land holders will be allowed to salvage the wood of the affected trees. They will also be encouraged to plant suitable new trees outside the 30 meter corridor of the transmission line in lieu of tree removed.</p> <ol style="list-style-type: none"> <li>2. The contractor's staff and labor will be strictly directed not to damage any vegetation such as trees or bushes.</li> <li>3. In order to save the affected orchards (if any), Transmission Line route will need to be changed. However, if unavoidable, use of towers with maximum height will be resorted to.</li> <li>4. Clearing of green surface cover for construction, for borrow of for development, cutting trees and other important vegetation during construction should be minimized.</li> <li>5. Landscaping and road verges to be re-installed on completion.</li> <li>6. Compensatory planting of trees/shrubs/ornamental plants (at a rate of 3:1) to contribute to the</li> </ol>	identification during design stage and other matters during construction of relevant activities	a Map to be compiled by the design consultant during detailed design and CSC to update as necessary.	Contractor and CSC	

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
		<p>aesthetic value of the area and compensate for the lost capability of the area to absorb carbon dioxide in line with best international practice.</p> <p>7. At completion all debris and waste shall be removed.</p> <p>8. All temporary structures, including office buildings, shelters and toilets shall be removed.</p>				
<b>11. Safety Precautions for the Workers</b>	To ensure safety of workers	<ol style="list-style-type: none"> <li>1. Providing adequate warning signs.</li> <li>2. Providing workers with skull guard or hard hat.</li> <li>3. Contractor shall instruct his workers in health and safety matters, and require the workers to use the provided safety equipment.</li> <li>4. Establish all relevant safety measures as required by law and good engineering practices.</li> </ol>	Prior to commencement and during construction	Location to be identified by the CSC with contractor.	Contractor and CSC	NTDC/CSC
<b>12. Traffic Condition</b>	Minimize disturbance of vehicular traffic and pedestrians during haulage of construction materials, spoil and equipment and machinery, blocking access roads during works	<ol style="list-style-type: none"> <li>1. Submit temporary haul and access routes plan one month prior to start of works.</li> <li>2. Formulate and implementation of a plan of alternate routes for heavy vehicles.</li> <li>3. Vicinity of schools and hospitals to be considered.</li> <li>4. Installation of traffic warning signs,</li> </ol>	Prior to and throughout the construction.	The most important locations to be identified and listed. Relevant plans of the Contractor on traffic arrangements	Contractor and Engineer	NTDC/CSC

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
	<p>damage/maintenance problems for roads and bridges used by the haulage trucks, dust nuisance to school and hospitals.</p>	<p>and enforcing traffic regulations during transportation of materials and equipment and machinery. Conditions of roads and bridges to be considered.</p> <p>5. Provision of culverts on water channels and drains.</p> <p>6. Widening/upgrading of access paths/roads</p>		<p>are available.</p>		
<p><b>13. Social Impacts</b></p>	<p>To ensure minimum impacts from construction labor force.</p> <p>To ensure minimum impacts on public health.</p> <p>To ensure minimum effects of indirect impacts of constructions to the people who are living close to the boundaries of ROW; Dust, Noise, Vibration and Rock blasting effects etc.</p> <p>To minimize access problems for local population during</p>	<p>1. Potential for spread of vector borne and communicable diseases from labor camps shall be avoided (worker awareness orientation and appropriate sanitation should be maintained).</p> <p>2. Claims/complaints of the people on construction nuisance/damages close to ROW to be considered and responded to promptly by the Contractor.</p> <p>3. Contractor should organize temporary means of access and make alternative arrangements to avoid local community impacts and to avoid such short-term negative impacts.</p>	<p>Complaints of APs to be solved as soon as possible.</p> <p>Necessary evacuations to be done as when necessary if construction impacts are of significant duration and close to APs.</p>	<p>The whole alignment route of transmission line.</p>	<p>Contractor and the CSC</p>	<p>NTDC/ CSC</p>

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
	construction.					
<b>14. Institutional Strengthening and Capacity Building</b>	To ensure that NTDC officials are trained to understand and to appreciate EMP.	Capacity building activities were taken by Environmental Officer in Tranche 1 and 2. Environmental and Social Impact Cell (ESIC) was setup within NTDC under GM (Projects) in Tranche 1.  Trainings and provisions of proper monitoring facilities to ECIS are recommended.	Initiate preconstruction and continue beyond project completion	Awareness training for all management and senior staff in NTDC at senior engineer and above in PMU and related units.	NTDC	NTDC & ADB
<b>OPERATIONAL STAGE</b>						
<b>1. Air Quality</b>		No Impacts			NTDC	NTDC
<b>2. Noise</b>		No significant Impacts by subprojects.		All Project sites	NTDC	NTDC
<b>3. Compensatory Tree Planting</b>	Maintain survival of trees planted	Employ landscaping contractor to monitor, water, feed and replace dead specimens as necessary.		All Project sites	NTDC	NTDC
<b>4. Landslides and soil erosion</b>	Avoid landslips and loss of productive land	No significant Impacts.		All Project sites	NTDC	NTDC
<b>5. Water Quality</b>	Avoid disruption to water bodies.	No significant Impacts from this subproject.		All Project sites	NTDC	NTDC
<b>6. Crops and Vegetation</b>	Monitor impacts from maintaining tree clearance under transmission lines	Track growth of large trees under the conductors.		All Project sites	NTDC	NTDC

Environmental Concern	Objectives	Mitigation Measures (MM) Recommended	Timing to Implement MM	Location to Implement MM	Resp imp MM	Resp mon MM
7. Social Impacts	safety Ensure no encroachments/ construction under the transmission line. No violation of clearances spaces.	Necessary signboards with limits of height clearances to be placed properly. Identify and prevent any illegal encroachments under the transmission line.		All Project site	NTDC	NTDC

### FLAGGING

**Some other social impacts during construction phase, particularly from local socio-cultural perspective, if require, will review at the implementation stage according to the existing Land Acquisition criteria.**

1. During the construction phase the general mobility of the local residents and their livestock in and around the project area is likely to be hindered.
2. Usage of Community's common resources like potable water, fuel wood etc. by Contractor workforce may create conflicts between the community and the Contractor.
3. Community will have to face the noise and dust problems during the construction activities.
4. Induction of outside workers in the Contractor labor may cause cultural issues with the local community.
5. Theft problems to the community by the Contractor workers and vice versa.
6. During the construction activities of tower foundations, erection, and conductor stringing people will lose their annual income due to the loss of crops, trees, etc.
7. The land under the towers during the operation stage may restrict its current use for agriculture purpose.
8. The restriction of plantation of trees above 2.5 m height during the operation stage may also cause the reduction of income of the farmers.

9. Due to the erection of towers and passing of the transmission line, the value of land may depreciate in the long term.
10. As the project route is passing through the rural areas and rural community, women activities in the field may become affected due to the construction activities.
11. The rural women normally use the open field latrines and their privacy may suffer due to the project activities.
12. The induction of outside labor may create social and gender issues due to the unawareness by them of local customs and norms. It will also cause hindrance to the mobility of local women.
13. Disturbance to the privacy of the local women when workers will work on the erection of towers

### **7.3. ENVIRONMENTAL AND SOCIAL MONITORING PLAN**

234. This section provides a monitoring plan that identifies the roles and responsibilities of the project staff involved in environmental and social monitoring under the proposed Project, and list the parameters that will be used in the monitoring process.

#### **7.3.1 Objectives**

235. The main objectives of the pre-construction and construction phase monitoring plans will be:

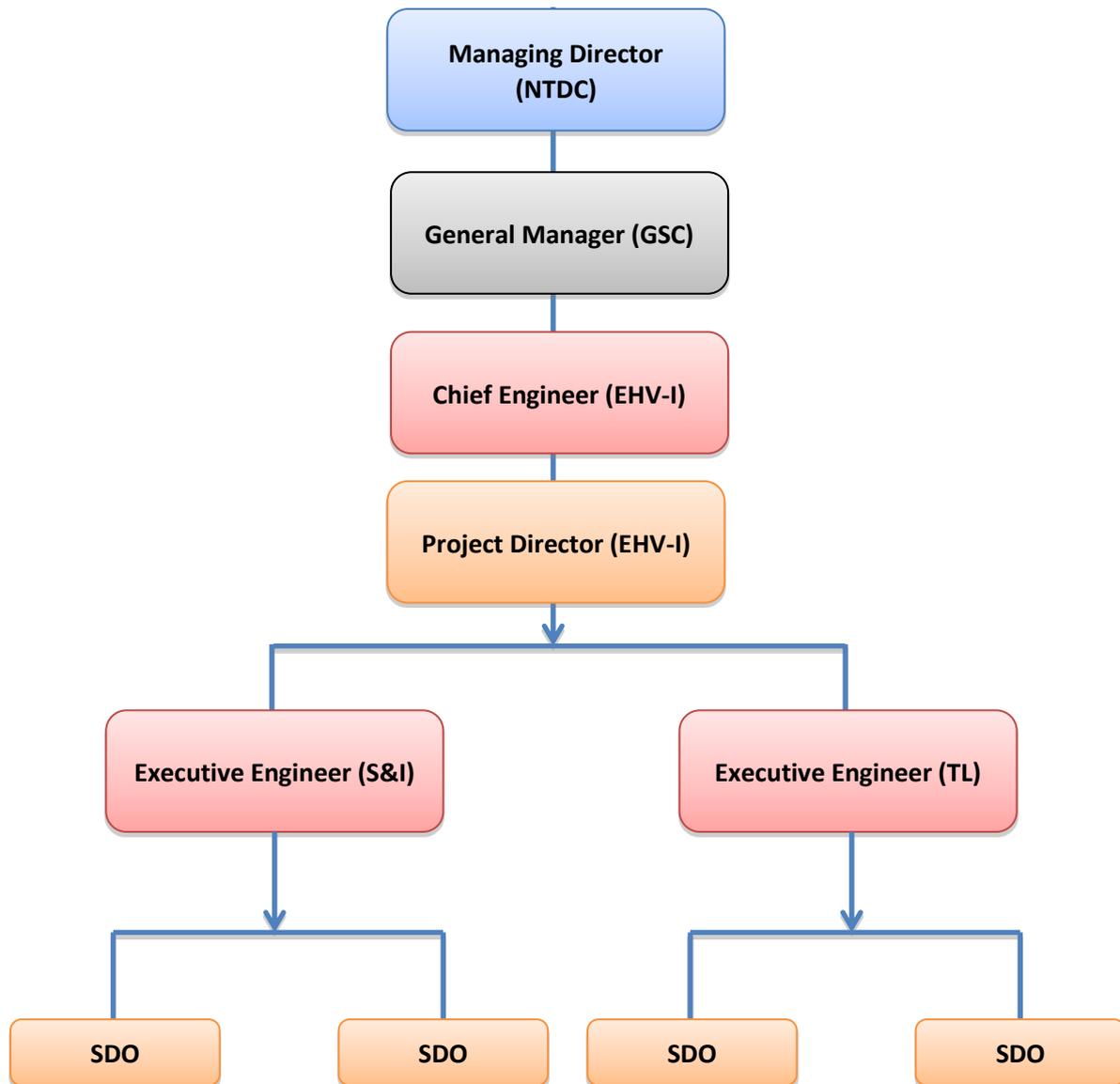
- The compensation for loss of assets will be monitored during the pre-construction activities as per latest rates announced by the government as every year rates have to be revised by the government. This aspect will be strictly monitored.
- Monitor the actual impact of the construction activities on the project corridor's physical, biological and socio-economic receptors. This will indicate the adequacy of the IEE.
- Recommend mitigation measures for any unexpected impact or where the impact level exceeds that anticipated in the IEE.
- Ensure compliance with legal and community obligations including safety at construction sites.
- Monitor the impacts on land, water resources, air quality, noise level and cutting of trees in the project area as described in the EMP.

236. The main objectives of environmental monitoring during the operation phase will be to:

- Appraise the adequacy of the IEE with respect to the project's predicted long-term impact on the corridor's physical, biological and socio-economic environment.
- Evaluate the effectiveness of the mitigation measures proposed in the EMP, and recommend improvements, if necessary.
- Compile periodic accident data to support analysis that will help to minimize the future risks.

#### **7.3.2 Institutional Structure for Implementation and Operation of the Project**

237. The proposed Project will be administrated by NTDC during the implementation stage as described in detail below, and the existing institutional setup of NTDC for implementation of the project is illustrated in Fig. 7.1. The existing organizational setup of NTDC for all the stages of the project (design, construction and operation) is fully integrated with handling of environment and social issues.



**Figure 7.1: NTDC's Institutional Setup for Project Implementation**

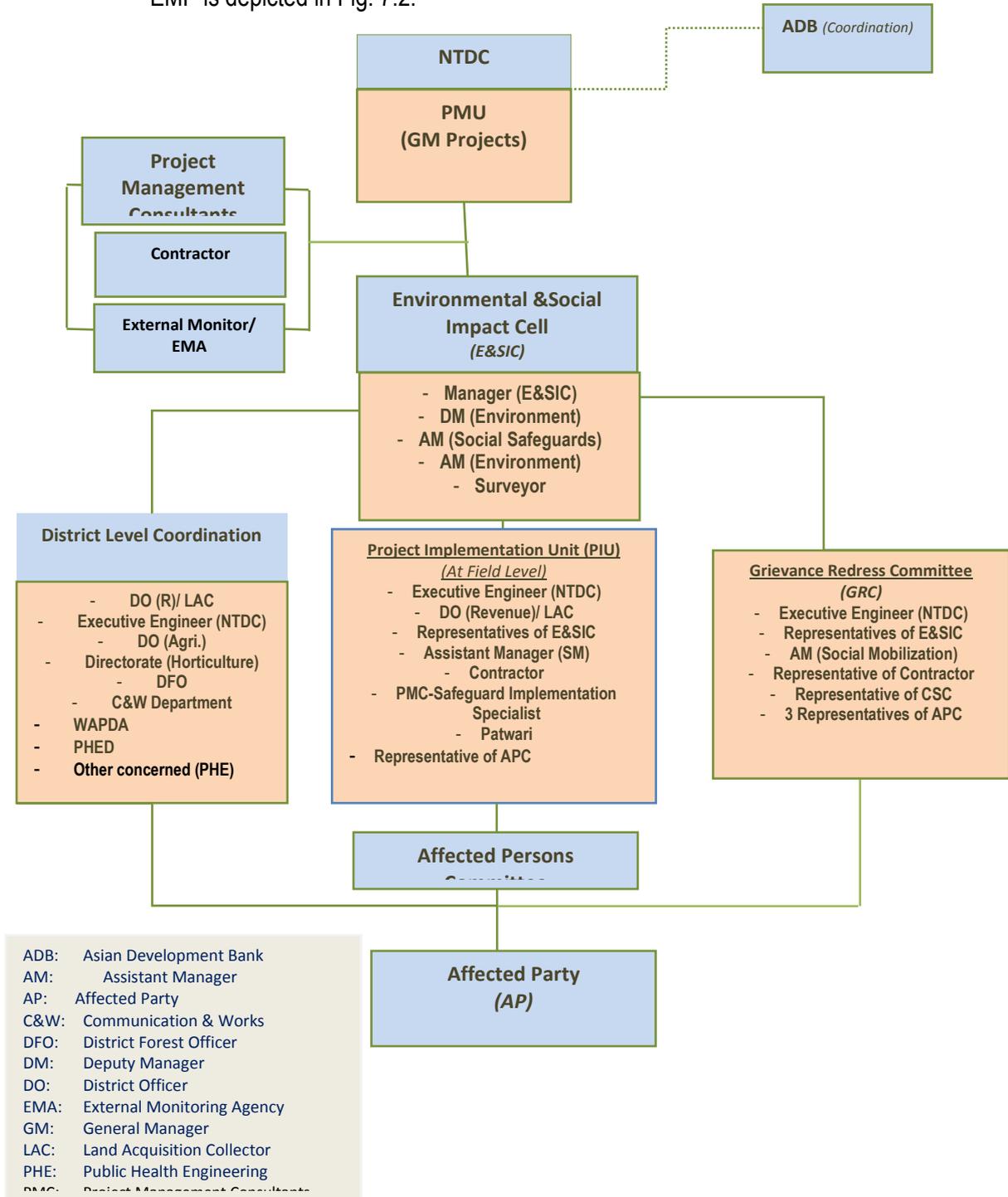
238. The NTDC federal headquarter is based in Lahore, and is responsible for managing the project at the policy level. At the highest level, the Chief Engineer (EHV-I) will be responsible for day-to-day project management at project implementation stage. He will report directly to the General Manager (GSC), who will have ultimate responsibility for planning and managing implementation of the projects.

239. The Chief Engineer (EHV-I) will be assisted by Project Director, who will have overall responsibility for ensuring the project compliance with the EMP. The Project Director (PD) will be supported by two Executive Engineers i.e. Survey and Soil Investigations (SI) and Transmission Line Construction (TLC) who, will further be assisted by the concerned Sub-Divisional Officers and their teams.

240. After completion of the Project, the Project will be handed over to the GSO Division of NTDC, which is working under the Chief Engineer (GSO). He reports to the General Manager (GSO) for operation and maintenance of grid stations and transmission lines.

The Chief Engineer GSO will be supported by the Superintending Engineer for the proposed Project, who will also be assisted by Executive Engineer, Sub-Divisional Officer and his field team.

241. To ensure the community participation and to provide the environmentally and socially viable conditions, the Environment and Social Impact Cell of NTDC will extend its services and support the field teams. The Organogram of ESIC for the implementation of EMP is depicted in Fig. 7.2.



**Figure 7.2: Organogram of NTDC Environment and Social Impact Cell**

242. The EMP was prepared taking into account the capacity of the NTDC to conduct environmental assessments of the subprojects. But it is envisaged that the NTDC's Environmental and Social Impact Cell (ESIC) will conduct monitoring of subproject to check the compliance of EMP provisions and will obtain environmental approval from EPA Punjab. The ESIC is composed of one Manager, one Deputy Manager, and two Assistant Managers (refer to Fig 7.2). Most of the environmental work is delegated to consultants. Specific areas for immediate attention are in EMP auditing, environmentally responsible procurement, air, water and noise pollution management, Social and ecological impact mitigation. It is recommended that an environmental specialist should be made part of team of supervisory consultants for effective monitoring of EMP provisions.

243. The duties of the ESIC include but not limited to followings:

- Provide review and technical support to PMU, including review of papers, feasibility studies, appraisal reports and other relevant documents from the perspective of environment and land acquisition and resettlement management, on assignment basis.
- Supervise and scrutinize the consultants hiring process for environmental and social documents preparation.
- Oversight of construction contractors for monitoring and implementing mitigation measures.
- Preparing and implementing environment policy guidelines and environmental good practices.
- Liaising with the PIUs and seeking their help to solve the environment related issues of project implementation.
- Providing awareness training workshop on environmental and social issues related to power transmission to PIU staff.
- Preparation of bi-annual progress reports on environmental and social safeguards for submission to ADB.
- Conduct seminars / local training workshops on environment safeguards matters with the help of NGOs / PIU / IFIs, etc. and
- Prepare EIAs/IEEs of new projects.
- Seek environmental approvals (NOCs) from respective EPA

#### **7.4. Environmental and Social Monitoring by ESIC**

244. The general monitoring responsibilities of the NTDC Environment and Social Impact Cell will consist of:

- Assist in valuation of the trees, crops etc., and negotiation with the owners.
- Assist in checking genuine ownerships of the claimants, in consultation with the Revenue staff for prompt payment to the affectees.
- Assist the Contractor for the timely payments of negotiated price.
- Check that the Contractor backfills, compacts, and leaves the ground in the original condition after excavation of pits for subsurface investigations, and for the tower footings.
- Keep checks and controls so that the pollution of land and water resources due to the spills of lubricants, fuel, chemicals, and other wastes does not take place.

- Monitor, that pollution of wetlands is not excessive during the excavation for the tower footings.
- To see that the Contractor keeps the damages to the minimum during the substation construction especially while making tracks for accessibility and that the damage is rectified properly.
- All the existing tracks, roads, water courses are left in the original shape after completion of the construction activities.
- Monitor that the Contractor uses such working methodology so as not to cause disturbance to the communities by fugitive dust, noise, fumes, etc.
- Monitor that the Contractor adjusts his working hours during the stringing activities in such a manner that it causes least inconvenience to the local population.
- To ensure that the Contractor keeps first aid kits, medicines, safety gadgets at site for taking care of possible mishaps to the workers or other persons.
- To keep the working site/camps tidy so as to avoid unhealthy impacts on the work force.

245. The Environmental Monitoring Plan is provided in Table 7.2.

**Table 7.2: Environmental Monitoring Plan**

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Responsible PI supervision	Cost of Supervision
<b>DESIGN PHASE</b>								
Review of EMP	EMP is reviewed	During detailed design (later monthly by Contractor to cover any unidentified impacts)	By completion of detailed design	NTDC proposed Grid Stations.	Contractor	Initially NTDC Cell / later Contractor cost	NTDC, ESIC cell / Environmental Specialist	ESIC cell staff cost
Project disclosure	Design changes notified	During detailed design by Contractor.	Complete on of detailed design.	NTDC proposed Grid Stations.	Contractor	Contractor cost	NTDC, ESIC cell / Environmental Specialist	ESIC cell staff cost
Environmentally Responsible procurement (ERP)	Contract follows ADB Guidelines on ERP Performance bond. Deposited Contractual clauses include implementation of environmental mitigation measures tied to a performance bond.	Once, before Contract is signed	Once, before Contract is signed	Method Statements	NTDC Project Cell	Contractor cost	NTDC, ESIC cell / Environmental Specialist	ESIC cell staff cost
Waste disposal	Disposal options for all waste , residually contaminated soils, scrap metal agreed with NTDC and local authority. Transformers containing PCB based oil will not be used.	1. Monthly or as required in waste management plan to identify sufficient locations for, storage and reuse of transformers and recycling of breaker oils and disposal of transformer oil, residually contaminated soils and scrap metal 2. Include in contracts for unit rates for re-measurement for disposal. 3. After agreement with local authority, designate disposal sites in the contract and cost unit disposal rates accordingly.	1. Prior to detailed design stage no later than prequalification on or tender negotiate ones 2. Include in contract	Locations approved by local waste disposal authorities	NTDC cell with the design/supervision consultant.	ESIC cell	ESIC cell	NTDC
Noise and air quality mitigation in design.	Design changes included in IEE (supplementary) & EMP approved by provincial EPAs	During detailed design by Contractor	Complete on of detailed design	As defined in IEE (supplementary) & EMP	NTDC Cell / Contractor	Contractor cost	NTDC / /Environment specialist	NTDC Cell staff cost
Hydrological Impacts	Temporary Drainage	During detailed design by	One month before	Considered	Contractor	Contractor cost	NTDC / and NTDC Project	NTDC Cell

	Management plan.	Contractor and monthly to cover any unidentified impacts	commencement of construction on	locations to be as identified in the Detailed Drainage Report			Cell	staff cost
Planning construction camps	Use of land agreed with surrounding residents & villages.	During detailed design updated by Contractor monthly to cover any unidentified impacts.	One month before construction commences.	Locations agreed NTDC cell in consultation with community and the Contractor	Contractor NTDC Cell facilitates.	Contractor cost	NTDC / and NTDC Project Cell.	NTDC Cell staff cost
Traffic Condition	Temporary Pedestrian and Traffic Management Plan agreed.	During detailed design updated by Contractor monthly to cover any unidentified impacts.	One month before construction commences.	Locations agreed with NTDC cell in consultation with community and the Contractor.	Contractor	Contractor cost	NTDC / and NTDC Project Cell.	NTDC Cell staff cost
Institutional strengthening and capacity building	Strengthening plan agreed for NTDC cell.	Once	As soon as practicable e	Throughout the project	NTDC Project Cell.	NTDC Cell staff cost	NTDC / and / Environmental Specialist.	NTDC Cell staff cost
CONSTRUCTION PHASE								
Orientation for Contractor, and Workers	1. Contractor agreed to provide training to professional staff and workers. 2. Special briefing and training for Contractor completed. 3. Periodic progress review sessions.	1. Once 2. Ongoing 3. Ongoing	1. Before contract is signed 2. Before construction areas are opened up 3. Every six months	All staff members in all categories. monthly induction and six month refresher course	Contractor with ESIC-NTDC assistance and record details.	Contractor cost	NTDC and NTDC to observe and record success	NTDC Cell staff cost
Plans to control environmental impacts	1. Drainage Management plan 2. Temp. Pedestrian & Traffic Management plan, 3. Erosion Control & Temp. Drainage plan 4. Materials Management plan, 5. Waste Management plan; 6. Noise and Dust Control plan, 7. Safety Plan 8. Agreed schedule of costs for environmental mitigation. {N.B. Forest Clearance and Compensatory Planting plan is prepared by NTDC cell}	Deliverable in final form to NTDC cell one month before construction commences for any given stretch.	One month before construction commencement	All of NTDC Grid Stations	Contractor	Contractor cost	NTDC Project Cell	NTDC Cell staff cost
Spoil disposal and	1. Use of land agreed with	Monthly (line item when	Prior to	NTDC proposed	Contractor	Contractor cost	NTDC and NTDC Cell	NTDC Cell

construction waste disposal	surrounding residents & VILLAGES. 2. Waste Management Plan implemented. 3 No open burning	opening up construction).	construction. Update monthly.	project site.				staff cost
Noise	Noise mitigation measures implemented in line with guidelines for noise reduction from ISO/TR116881:1995(E)	Monthly (line item when opening up construction).	Follow WB/IFC standards 45dB(A)-night time and 55dB(A) day time	At and around NTDC proposed Grid Stations.	Contractor should maintain the accepted standards	Contractor cost	NTDC / NTDC Project Cell will monitor sample activities	NTDC Cell staff cost
Air quality	Noise and dust control plan implemented.	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	At and around NTDC proposed Grid Stations.	Contractor	Contractor cost	NTDC and NTDC Cell	NTDC Cell staff cost
Soil Contamination	Contractors workforce instructed and trained in handling of chemicals	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	At and around NTDC proposed Grid Stations.	Contractor	Contractor cost	NTDC and NTDC Cell	NTDC Cell staff cost
Work Camp Location and Operation	1. Use of land agreed with surrounding residents & VILLAGES. 2. Waste Management Plan implemented. 3 No open burning	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	At and around NTDC proposed Grid Stations.	Contractor	Contractor cost	NTDC and NTDC Cell	NTDC Cell staff cost
Safety Precautions for Workers	Safety Plan submitted	Once (update monthly as necessary)	One month before construction and update quarterly.	At and around NTDC proposed Grid Stations.	Contractor	Contractor cost	NTDC and NTDC Cell	NTDC Cell staff cost
<b>OPERATION PHASE</b>								
Air Quality	1. Roadworthiness of vehicles on NTDC. 2. Monitor NO2 and PM10 as indicators	1. Road worthiness s of vehicles on NTDC Daily during operations 2. Yearly intervals for 3 years after opening for reassurance	During operation	At and around NTDC proposed Grid Stations.	Contractor	Contractor cost	NTDC and NTDC Cell	NTDC Cell staff cost

## 7.5. Estimated Environmental and Social Management Costs

246. Table 7.3 provides the estimated costs for the compensation of trees damages and implementation of EMP. The compensation costs include the costs for cutting of trees due to construction of subproject. It should be noted that as referred earlier that the project is at a preliminary stage and detailed surveys including tower spotting is to be carried out for the project showing the actual position of the towers, so at this stage only tentative and lump sum amount has been allocated for the expected losses and is based on the environmental and social field surveys.
247. The cost for implementation of mitigation measures prescribed in Environmental Management Plan (EMP) has also been given. The mitigation measures include; water sprinkling, provision of PPEs to workers, arrangement of first aid kits at site, waste management etc.
248. The total estimated cost for the environmental and social management comes to about Pak Rs.5,415,000. This includes the cost of environmental implementation of mitigation measure. Cost estimates of mitigation and other environmental management measures are summarized in Table 7.3.

**Table 7.3: Estimated Environmental and Social Management Costs**

Particulars	Details	Total Cost (PKR)
Staffing, audit and monitoring	1 person for 1.5 years <sup>1</sup>	10,80,000
Monitoring activities	As detailed under EMP <sup>2</sup>	1,000,000
Mitigation measures	As prescribed under EMP and IEE <sup>3</sup>	3,000,000
Contingency	5% contingency	335,000
<b>Total</b>		<b>5,415,000</b>

### Note:

<sup>1</sup> @ rate of PKR 60,000/month

<sup>2</sup> Laboratory charges for: testing of construction materials; water quality tests; ambient air tests; emissions measurements; and noise measurements.

<sup>3</sup> Includes; Compensatory tree plantation under supervision of forest department and training on counterpart staff

## 7.6. Grievance Redressal Mechanism

249. This section describes mechanism to receive and facilitates the resolution of affected party including women's concerns and grievances. A grievance mechanism will be available to allow an AP appealing any disagreeable decision, practice or activity arising from land or other assets compensation. APs will be fully informed of their rights and of the procedures for addressing complaints whether verbally or in writing during consultation, survey, and time of compensation.

252. The Executing Agency will establish a mechanism to receive and facilitate the resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance. The Executing Agency at site will be the Project Implementation Unit (PIU). The PIU will overall be responsible for executing the work at site. The Executive Engineer/Resident engineer will be in charge of the project. The Executive Engineer will be supported with Sub Divisional Officers and other supporting staff. The GRM will be established at each project location as described below:

253. Prior to the contractor's mobilization to the project site NTDC's Environment and Social Impact Cell (E&SIC) will assist the affected communities to establish a Grievance Redress Committee (GRC) and identify local representatives to act as Grievance Focal Points (GFP) for that community. The Grievance Redress Committee (GRC) will comprise of:

- Executive Engineer (NTDC) for the project;
- Representative of E&SIC (Assistant Manager (Environment));
- Environment Specialist CSC;
- Representative of Contractor; and
- GFP of relevant community.

254. The function of the GRC is to address the project related grievances of the affected parties that are unable to be resolved satisfactorily through the initial stages of the GRM procedure.

255. The Grievance Focal Points (GFPs) are designated personnel from within the community who will be responsible for: i) acting as community representatives in formal meetings between the project team (contractor, CSC, Assistant Manager (Environment), E&SIC and the local community he/she represents and ii) communicating community members' grievances and concerns to the contractor during project implementation. The number of GFPs to be identified for each project will depend on the number and distribution of affected communities.

256. A pre-mobilization public consultation meeting will be convened by E&SIC and attended by GFPs, contractor, CSC, E&SIC representatives and other interested parties (e.g. District level representatives, NGOs). The objectives of the meeting will be as follows:

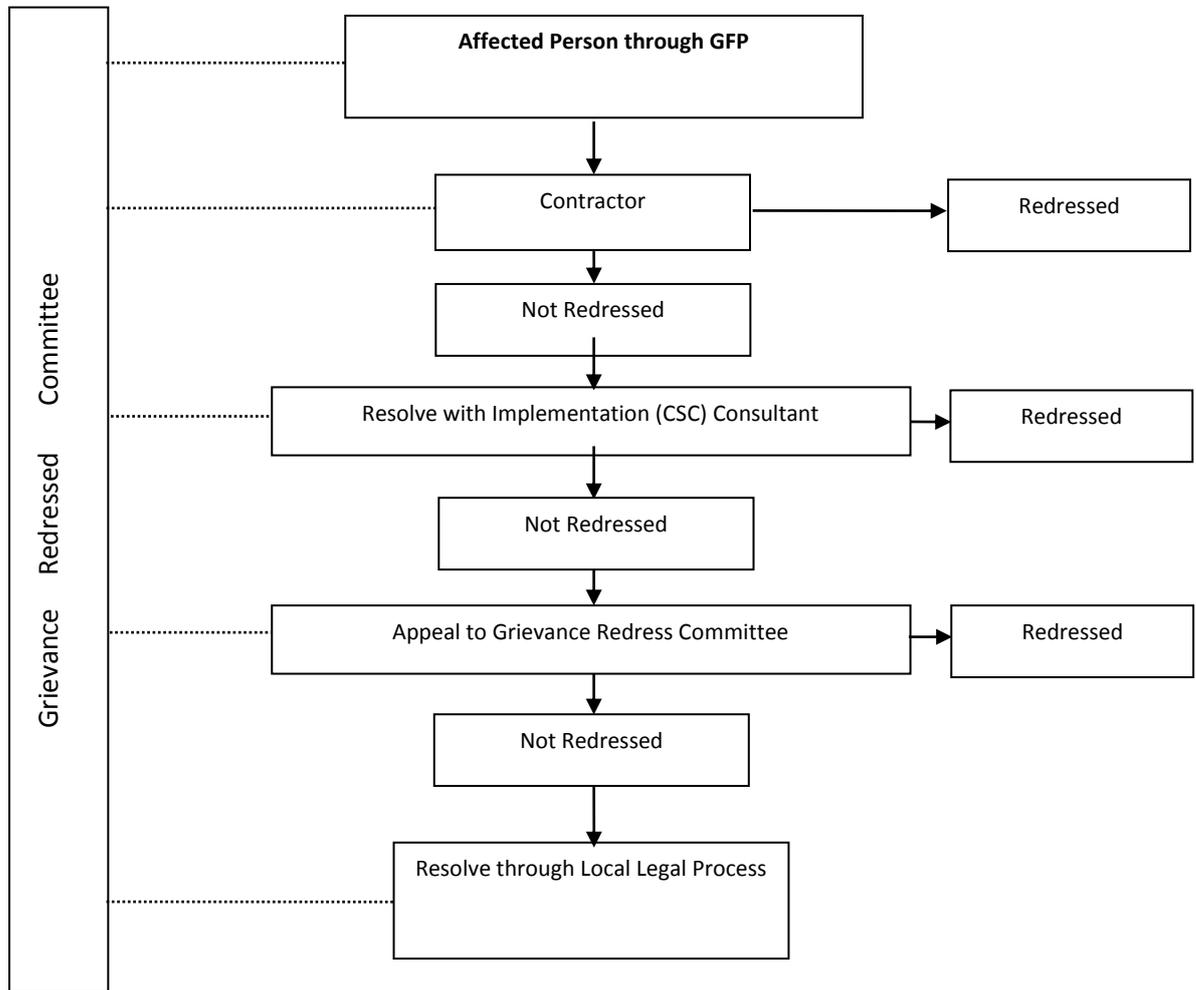
- Introduction of key personnel of each stakeholder including roles and responsibilities,
- Presentation of project information of immediate concern to the communities by the contractor (timing and location of specific construction activities, design issues, access constraints etc.) This will include a brief summary of the EMP - its purpose and implementation arrangements;
- Establishment and clarification of the GRM to be implemented during project implementation including routine (proactive) public relations activities proposed by the project team (contractor, CSC, E&SIC) to ensure communities are continually advised of project progress and associated constraints throughout project implementation;
- Identification of members of the Grievance Redress Committee (GRC); and
- Elicit and address the immediate concerns of the community based on information provided above.

257. Following the pre-mobilization public consultation meeting, environmental complaints associated with the construction activity will be routinely handled through the GRM as explained below and shown schematically in Figure 1:

- Individuals will lodge their environmental complaint/grievance with their respective community's nominated GFP.
- The GFP will bring the individual's complaint to the attention of the Contractor.
- The Contractor will record the complaint in the onsite Environmental Complaints Register (ECR) in the presence of the GFP.
- The GFP will discuss the complaint with the Contractor and have it resolved;
- If the Contractor does not resolve the complaint within one week, then the GFP will bring the complaint to the attention of the CSC's Environmental Specialist. The SC's Environment Specialist will then be responsible for coordinating with the Contractor in solving the issue.
- If the Complaint is not resolved within 2 weeks the GFP will present the complaint to the Grievance Redress Committee (GRC).
- The GRC will have to resolve the complaint within a period of 2 weeks and the resolved complaint will have to be communicated back to the community. The Contractor will then record the complaint as resolved and closed in the Environmental Complaints Register.
- Should the complaint not be resolved through the GRC, the issue will be adjudicated through local legal processes.

258. In parallel to the ECR placed with the Contractor, each GFP will maintain a record of the complaints received and will follow up on their rapid resolution. E&SIC will also keep track of the status of all complaints through the Monthly Environmental Monitoring Report submitted by the Contractor to the SC and will ensure that they are resolved in a timely manner.

**Figure 7.1: Grievance Redress Mechanism**



## 8. Conclusions and Recommendations

### 8.1. Conclusions

250. Based on the preliminary plans, environmental and social field surveys, and impacts assessment of the proposed 500 kV 30 km Transmission Line and installation of line bays at Faisalabad 500 Grid station, it may be concluded that there are insignificant, short term and reversible impacts of the Project. The major impacts of the Project are summarized as under:

- No acquisition of permanent land will be involved for erection of towers for transmission line as per Telegraphy Act, 1910. However, the payments for the loss of trees and crops will be made as per market rates.
- All the other impacts like soil erosion, soil contamination, water contamination, air pollution, high noise level, etc. are of temporary nature and can be controlled and mitigated.
- It is estimated that the implementation of project activities will cause cutting of about 9,000 trees.
- No protected forest area or wildlife sanctuary or any other environmentally sensitive site exists along the Project corridor, which may be affected by the Project.
- No indigenous people and women headed households have been identified in the Project.
- The other social issues like safety of general public and workers, security problems, risk of communicable diseases, vector borne diseases etc. are of temporary nature.
- Most of the above impacts are of temporary nature and manageable through good engineering practices and none of these are irreversible.
- A comprehensive EMP has been developed identifying the impacts, mitigation measures, agencies responsible for implementation and monitoring of the proposed measures. EMP also describes the environmental and social monitoring responsibilities of ESIC.
- The total estimated cost for the environmental and social management comes to about Rs. 7.035 million.

251. In the light of the above discussions, it may be concluded that the proposed preliminary Project route is environment friendly and will cause the least effects on the area's existing social and environmental settings.

### 8.2. Recommendations

252. Although comprehensive mitigation measures have been proposed in the report to minimize the negative impacts and to enhance the positive impacts of the Project, however, major recommended mitigation measures are summarized as under:

- Temporary labour camps should be developed inside the grid station boundary and should be facilitated with proper drainage facilities.
- Soil erosion and contamination, water contamination, air pollution and high noise levels should be controlled with the use of good engineering practices.

- Contractor should develop plan such as traffic management, Solid waste management and material management etc. before starting the construction activities.
- Fair and negotiated compensation in accordance with the prevailing market prices should be made for loss of crops and trees during the construction activities of the Project.
- Erection of towers in the water bodies should be avoided as far as possible. However, at places where realignment of the transmission line is unavoidable, towers with the maximum span should be used to minimize the number of towers in the water body.
- Contractor should warn the workers not to hunt the water birds, fish resources, etc.
- The Contractor will have to adopt some suitable timing for the construction activities so as to cause the least disturbance to the local community particularly women considering their peak movement hours.
- Contractor should take due care of the local community and its sensitivity towards local customs and traditions.
- EMP proposed in Chapter 7 should be implemented in the true letter and spirit.

## ANNEXURES

## **Annexure I - REA CHECKLIST**

**Instructions:**

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to Environment and Safeguards Division (RSES) for endorsement by Director, RSES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

**Country/Project Title:** 500 kV D/C T/Line for In/Out of 500 kV Multan-Ghatti S/C at 500 kV Faisalabad West (30 km)

**Sector Division:** Power Transmission

SCREENING QUESTIONS	Yes	No	REMARKS
<b>A. Project Siting</b>			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No cultural heritage site near the project corridor.
▪ Protected Area	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No protected site near the project corridor.
▪ Wetland	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ Mangrove	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ Estuarine	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ Buffer zone of protected area	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ Special area for protecting biodiversity	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>B. Potential Environmental Impacts</b>			
Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	No impact on historical site, but landscape will be disrupted and waste will be generated. That will be managed by implementation of EMMP
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

SCREENING QUESTIONS	Yes	No	REMARKS
▪ 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 checked="" type="checkbox"/>	<input type="checkbox"/>	The impact will be minimum and limited to the tower foundation sites. The appropriate mitigation measures will be built into the EMP to address this impact.
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Such activities are not involved in proposed project.
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	As per EMP provisions, respective mitigation measure will be followed.
▪ increased local air pollution due to rock crushing, cutting and filling?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Appropriate mitigation measure will be adopted to minimize the impact.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The impacts will be short term and will be observed only in construction phase. Respective mitigation measures will be adopted to minimize the impact.
▪ chemical pollution resulting from chemical clearing of vegetation for construction site?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NTDC does not use any chemical for vegetation removal.
▪ noise and vibration due to blasting and other civil works?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Blasting will not be involved, but the noise and vibration will be generated during construction phase by heavy machinery. These impacts will be occur, even though it will be mitigated by implementing the Environment Management Plan.
▪ dislocation or involuntary resettlement of people?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Contractors will be strictly advised not to interfere the local community resources.
▪ hazardous driving conditions where construction interferes with pre-existing roads?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The drivers will be advised to keep the speed below 30km/hr. and traffic planning to avoid hazardous circumstances.
▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	This impact can be minimized by proper waste management and other remedial measures.
▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Properly control the vegetative growth during operation phase with due consideration of environmental protocols.
▪ facilitation of access to protected areas in case corridors traverse protected areas?	<input type="checkbox"/>	<input type="checkbox"/>	There is no protected area in the vicinity of the project corridor.
▪ disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NTDC does not use any herbicide for vegetation control or removal.
▪ large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	It may not likely be happened, as the line passes mostly away from population, more over the contractor will advised for proper care to avoid social conflict.
▪ social conflicts if workers from other regions or countries are hired?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	It will not likely be happened, as mostly the local labor is hired.

SCREENING QUESTIONS	Yes	No	REMARKS
<ul style="list-style-type: none"> <li>poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?</li> </ul>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	These impacts will be mitigated by proper implementation of EMP provisions regarding health, safety, waste management and sanitation protocols.
<ul style="list-style-type: none"> <li>risks to community safety associated with maintenance of lines and related facilities?</li> </ul>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Community associated safety safeguards are considered during operation phase.
<ul style="list-style-type: none"> <li>community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Al ready considered in the feasibility/design stage.
<ul style="list-style-type: none"> <li>risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?</li> </ul>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Explosive material will not be used, but other materials like fuel, oil etc. will be kept in the construction camps only. Transport and disposal of such materials will be according to protective measures given in EMP. Therefore, risk to community health and safety is manageable by maintaining H&S protocols.
<ul style="list-style-type: none"> <li>community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?</li> </ul>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	These impacts will be mitigated by implementing EMP provisions during all the stages of project implementation.

#### A Checklist for Preliminary Climate Risk Screening

**Country/Project Title:** 500 kV D/C T/Line for In/Out of 500 kV Multan-Ghatti S/C at 500 kV Faisalabad West (30 km)

**Sector:** Power Transmission

**Division/Department:** NTDC Pakistan

Screening Questions		Score	Remarks <sup>1</sup>
<b>Location and Design of project</b>	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	
<b>Materials and Maintenance</b>	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
<b>Performance of</b>	Would weather/climate conditions, and related extreme events likely	0	

<sup>1</sup> If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

<b>project outputs</b>	affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?		
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Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

**Result of Initial Screening (Low, Medium, High):** Low

**Other Comments:**    the project is in category B, according to ADB Environment safeguards    the impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE) is required.

**Prepared by:** Shabir Ahmad Khan

## **Annexure II - SURVEY QUESTIONNAIRE**

Serial No. \_\_\_\_\_

Interviewer's Name \_\_\_\_\_

Date \_\_\_\_\_

Name of the Respondent \_\_\_\_\_

Father's Name \_\_\_\_\_

Age (years) \_\_\_\_\_

Education \_\_\_\_\_

Q.1 Name of Tehsil: آپ کے رہنے کی تحصیل کا نام لکھیے؟  
\_\_\_\_\_

Q.2 Name of Union Council: آپ کی رہنے کی یونین کونسل کا نام لکھیے؟  
\_\_\_\_\_

Q.3 Name of Valley: آپ کی رہنے کی وادی کا نام لکھیے؟  
\_\_\_\_\_

Q.4 Name of the Village: آپ کے رہنے کے گاؤں کا نام لکھیے؟  
\_\_\_\_\_

Q.5 Names of Tribes in the Village: آپ کے گاؤں کے قبیلوں کے نام لکھیے؟

1.	2.	3.	4.
5.	6.	7.	8.
9.	10.	11.	12.

Q.6 Languages Spoken in the Village: آپ کے گاؤں میں بولی جانے والی زبانیں کونسی ہیں؟

1		4	
2		5	
3		6	

Q.7 Accessibility from main road to Village:

Track	Un metalled Road	Metalled Road	Other (Specify)
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Q.8 Distance from tarred road to Village: \_\_\_\_\_ Km گاؤں سے سڑک تک فاصلہ؟

Q.9 Approximate area of the Village: \_\_\_\_\_ (km<sup>2</sup>) آپ کے گاؤں کا کل تقریباً کتنی مربع کلومیٹر ہے؟

Q.10 Approximate population of the Village \_\_\_\_\_ آپ کے گاؤں کی کل آبادی تقریباً کتنی ہے؟

Q.11 Total Houses in the Village \_\_\_\_\_ آپ کے گاؤں میں تقریباً کتنے گھر ہیں؟

Q.12 Educational Facilities Available in the Village. آپ کے گاؤں میں کون سے تعلیمی ادارے ہیں؟

Sr. No	Facilities	Yes	No	Govt.	Private	Boys (M)	Girls (F)	Co-Education
(a)	Primary School							
(b)	Middle School							
(c)	High School							
(d)	College							
(e)	Vocational Training Centers							
(f)	Deeni Madrassa							
(g)	Others (Specify)							

Q.13 Institutional Facilities Available in the Village. آپ کے گاؤں میں کون سے ادارتی سہولیات موجود ہیں؟

Sr. No	Facilities	Yes	No	Govt.	Private	Name
a.	Hospital					
b.	Dispensary					
c.	Basic Health Unit					
d.	Post Office					
e.	Mosque					
f.	Banks					

g. Others					
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**Q.14 Means of Transport Available in the Village.** آپ کے گاؤں میں کون سے وسائل دستیاب ہیں؟

LOCAL	INTERCITY
1. Public Transport	1. Public Transport
2. Private Transport	2. Private Transport
3. Pedestrian	3. Pedestrian
4. Others	4. Others

**Q.15 Civic Facilities Available in the Village** آپ کے گاؤں میں کون سے شہری سہولتیں دستیاب ہیں؟

Sr. No	Facilities	Yes	No	Remarks if Any
A	Lined Drainage System	1	2	
B	Street Lights	1	2	
C	Grocery Shops	1	2	
D	Recreational / Games Facilities	1	2	
E	Medical Stores	1	2	
F	Graveyards	1	2	
G	Electricity	1	2	
H	Telephone	1	2	
I	Public Water Supply	1	2	
J	Others	1	2	

**Q. 16 Source of Water in the Village** آپ کے گاؤں میں پانی کون سے ذرائع سے آتا ہے؟

Storage Pit	Channel	Spring	Nullah	Other _____
A	B	C	D	E

**Q.17 If Channel,** 1 Katcha 2 Partly Lined 3 Completely Lined

**Q.18 Nature of water supply** آپ کے گاؤں میں پانی کی کون سی قسم دستیاب ہے؟

1. Public	Mode of supply of water:	(a) Self Carried (b) Tapped
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2. Private		(c) By Channel (d) By Tanker
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**Q. 19 Common Diseases in the Village**

آپ کے گاؤں میں کون کونسی بیماریاں پائی جاتی ہیں؟

a. Common cold	b. Diarrhea	c. Typhoid
d. Stomach Worms	e. TB	f. Malaria
g. Goiter	h. Dysentery	i. Hepatitis
j. Other (specify)		

**Q.20 Does a Child Birth Attendant Available in the Village?**

1. Yes

2. No

کیا آپ کے گاؤں میں بچے کی پیداگئی کے لیے طبی مددگار ہے؟

**Q.21 If Yes:** اگر ہاں تو کیا وہ تربیت یافتہ ہے یا غیر تربیت یافتہ؟

1 Trained

2 Untrained

**Q. 22 Does any NGO exist in the Village?**

کیا آپ کے گاؤں میں کوئی غیر سرکاری تنظیمیں کام کر رہی ہیں؟

1. Yes

2. No

**Q.23 If Yes:**

Sr.No	Name	Status
A		1. Local 2. National 3. International
B		1. Local 2. National 3. International
C		1. Local 2. National 3. International

**Q.24 Major Development projects run by different organizations in the village?**

کیا آپ کے گاؤں میں کوئی بڑے پیمانے پر چلائی ہوئی کام چلا رہے ہیں؟ اور اگر ہاں تو ان کے نام بتائیے؟

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**Q.25 Who has the ownership rights of the mountains, pastures, jungles and natural resources of the area?** آپ کے علاقے میں پہاڑوں، چراگاہوں، جنگلات اور قدرتی وسائل کے ملکیتی حقوق کن کو حاصل ہیں؟

- a. Owner Tribes       b. Non Owner Tribes       c. Individual   
 d. Others (Specify) \_\_\_\_\_

**Q.26 Who has the right to allow the people to get benefits from natural resources? (Forest trees, Mountains, Pastures, Herbs etc)?** ان قدرتی وسائل سے فائدہ حاصل کرنے کے لیے باہر سے جانے والے لوگوں کو اجازت دینے کا حق کس کو حاصل ہے؟

- a. Owner Tribes       b. Non Owner Tribes       c. Owner   
 d. None       e. Others (Specify) \_\_\_\_\_

**Q.27 Who has the rights of selling and purchasing the agriculture land, residential and commercial property?** آپ کے گاؤں میں زرعی زمین، رہائشی اور کمرشل ملکیت کو بیچنا اور خریدنا کس کا حق ہے؟

- a. Owner Tribes       Non Owner Tribes       c. Individual   
 d. Anyone       e. Others (Specify) \_\_\_\_\_

**Q.28 What are the preferences to sell the personal immoveable property like houses, agriculture land, shops etc. to:** ذاتی جائیداد مثلاً گھر، زرعی زمین اور دکانیں وغیرہ بیچنے کے لئے اولیٰ ذیلی میں سے کن کو ترجیح دی جاتی ہے؟

- a. Owner Tribes       b. Non Owner Tribes   
 c. Immediate Neighbor       d. Anyone   
 e. Others (Specify) \_\_\_\_\_

**Q.29 What are the prevalent units of measurement of agricultural land in your village?** آپ کے گاؤں میں زرعی زمین کی پیمائش کے لئے استعمال کی جانے والی اولیٰ ذیلی میں سے کون سے پیمانے استعمال کیے جاتے ہیں؟

- a. Marlas       b. Kanals       c. Acres   
 d. Jarib       e. Sq Feet       f. Sq. Haath   
 g. Others (Specify) \_\_\_\_\_

**Q.30 What are the prevalent units of measurement of agricultural produce in your village?** آپ کے گاؤں میں زرعی پیداوار کی پیمائش کے لئے استعمال کی جانے والی اولیٰ ذیلی میں سے کون سے پیمانے استعمال کیے جاتے ہیں؟

- a. Kilogram       b. Maunds       c. Haa   
 d. Sinn       e. Others (Specify) \_\_\_\_\_

**Q.31 Who are the influential in your village?**

آپ کے گاؤں میں درجن ذیل میں سے کون سے لوگ سزاوار ہونا چاہتے ہیں؟

- a. Head of the Tribe  b. Councilors   
 c. Religious Scholars  d. Heads of Families   
 e. Government Servants  f. Numberdar   
 g. Others (Specify) \_\_\_\_\_

**Q.32 How the matters related to property, dispute about the control and Consumption of the natural resources of the area are settled?**

آپ کے گاؤں میں جائیداد اور قدرتی وسائل کے استعمال سے متعلق مسائل کا حل درجن ذیل میں سے کون سے طریقوں سے حل کئے جاتے ہیں؟

1. Jirgah جرگہ	2. Head of the Tribes قبیلے کا سردار
3. Council of Ulamaہ علماء کونسل	4. Heads of Families سربراہ خانہ
5. Government Officials سرکاری افسر	6. Others (Specify)

**Q.33 What types of migration exists in your village?**

آپ کے گاؤں میں لوگ درجن ذیل میں سے کس نوعیت کی نقل مکانی کرتے ہیں؟

Patterns of local migration		
Nature of Migration	Duration	Radius of Migration
(a) Permanent	(a) Seasonal	(a) Within the same valley
(b) Temporary	(b) Yearly	(b) Within the local neighboring valleys
(c) Voluntary	(c) Monthly	(c) Within the neighboring districts
(d) Involuntary	(d) Others (Specify)	(d) In Province
(e) Individual		(e) Other parts of the country
(f) With family / sub-tribe		
(g) Other		

**Q.34 What are the reasons of local migration in your village?**

مقامی نقل مکانی کی کوئی بڑی وجہ ہوتی ہے؟

- a. \_\_\_\_\_  
 b. \_\_\_\_\_  
 c. \_\_\_\_\_

**Q.35 What are the major problems of your area?**

آپ کے گاؤں میں اہم ترین دو نوعیت کے کون سے دو مسائل ہیں؟

Sr.No	Types of Problems	Proposed Solutions
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A		
B		
C		
D		
E		
F		

**Q.36 Do rock carvings / historical places exist in the village?**

1. Yes  2. No

کیا آپ کے گاؤں میں اجرتقدیر سے متعلق یادگاریں استقامت اور شہداء موجود ہیں؟

**Q.37 If yes:** اگر ہاں تو مندرجہ ذیل کی تفصیل دیجئے؟

Sr.No	Name	Number	Location
A	Rock Carvings		
B	Historical Ruins		
C	Old Graveyard		
D	Others (Specify)		

**Q.38 Are there markets for grains and livestock in the village?**

کیا آپ کے گاؤں میں اجناس اور جانوروں کی خرید و فروخت کے لئے منڈیاں ہیں؟

**Q.39 If No, where do people sell their agricultural produce and livestock?**

اگر نہیں تو کون سی جگہیں اور جانور کہاں فروخت کرتے ہیں؟

Grains	
Livestock	

**Q.40 What types of trees are in your area?**

آپ کے گاؤں میں وریج ذیل میں سے عام طور پر کون سے درخت پائے جاتے ہیں؟

Fruit Trees	
Forest/wood Trees	

**Q.41 What kinds of wild animals are found in your village area?**

آپ کے گاؤں کے گرد و نواح میں کون کون سے جنگلی جانور پائے جاتے ہیں ان کے نام بتائیے؟

**Q.42 What type of cottage industry exists in your village?**

آپ کے گاؤں میں کون کون سی گریج صنعتیں ہیں ان کے نام بتائیے؟

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**Comments of the Interviewer**

انٹرویو کرنے والے کی رائے


-- END --

## **Annexure III - PUBLIC CONSULTATION**

<b>Sr. No</b>	<b>Participant Name</b>	<b>Village</b>	<b>Remarks/Concerns</b>
1	<ul style="list-style-type: none"> <li>• Qurban Ali S/O Ihsan ud Din</li> <li>• Muhammad Anisul S/O Riasat Ali</li> </ul>	Chak138	
2	<ul style="list-style-type: none"> <li>• Augustine S/O Jamal Shah</li> <li>• Pervez S/O Yousaf</li> </ul>	Chak51 JB (Khush Pur)	
3	<ul style="list-style-type: none"> <li>• Abdul Aziz</li> <li>• Muhammad Riaz S/O Ashraf</li> <li>• Azad S/O Saddique</li> <li>• Anwar S/O Manzoor Ahmad</li> <li>• Liaquat S/O Jalal Din</li> <li>• Ashiq Hussain S/O Muhammad Ashraf</li> <li>• Munir Ahmad S/O Bashir Ahmad</li> </ul>	Chak 50 JB	
4	<ul style="list-style-type: none"> <li>• Bashir S/O Kalu</li> <li>• Liaquat S/O Latif</li> <li>• Tajammul Hussain S/O Muhammad Iqbal</li> <li>• Karamat S/O Muhammad Ali</li> <li>• Liaquat Ali S/O Muhammad Tufail</li> </ul>	Chak 529 JB	
5	<ul style="list-style-type: none"> <li>• Ismail S/O Barkat Ali</li> <li>• Abdul Majid S/O Ismail</li> <li>• Muzaffar Iqbal S/O Ghulam Muhammad</li> <li>• Arshad Ali S/O Muhammad Shafi</li> <li>• Rafi Din S/O Charagh Din</li> <li>• Jamal Din S/O Hussain Bakhsh</li> </ul>	Chak 530 JB (Nooran Wali)	
6	<ul style="list-style-type: none"> <li>• Abdul Rehman</li> <li>• Nasir Ishaq S/O Muhammad Ishaq</li> <li>• Muhammad Sadiq S/O Muhammad Din</li> <li>• Muhammad Asif S/O Abdur Rehman</li> </ul>	Chak 272 (Simman)	

7	<ul style="list-style-type: none"> <li>• Ghulam Mohiyuddin</li> <li>• Shaukat S/O Barkat Ali</li> <li>• Mian Nasim Mehr S/O Ch. Murtaza Sindhu</li> <li>• Ahmad S/O Shaukat</li> </ul>	Chak 270 JB	
8	<ul style="list-style-type: none"> <li>• Usman Farooq S/O Farooq</li> <li>• Haseeb S/O Mohsin</li> <li>• Munir S/O Bashir Ahmad</li> <li>• Muhammad Shahbaz S/O Muhammad Ashraf</li> </ul>	Chak 278 (Usman Kot)	
9	<ul style="list-style-type: none"> <li>• Zeeshan S/O Muhammad Ijaz</li> <li>• Imran S/O Talib Hussain</li> <li>• Muhammad Imran S/O Abdul Majid</li> <li>• Muhammad Shoaib S/O Muhammad Yaqoob</li> </ul>	Chak 277 JB	
10	<ul style="list-style-type: none"> <li>• Muhammad Ramzan</li> <li>• Muhammad Shakur S/O Jeevan</li> <li>• Muhammad Asif S/O Sagheer</li> <li>• Muhammad Dildar S/O Iqbal</li> </ul>	Charagh Abad	

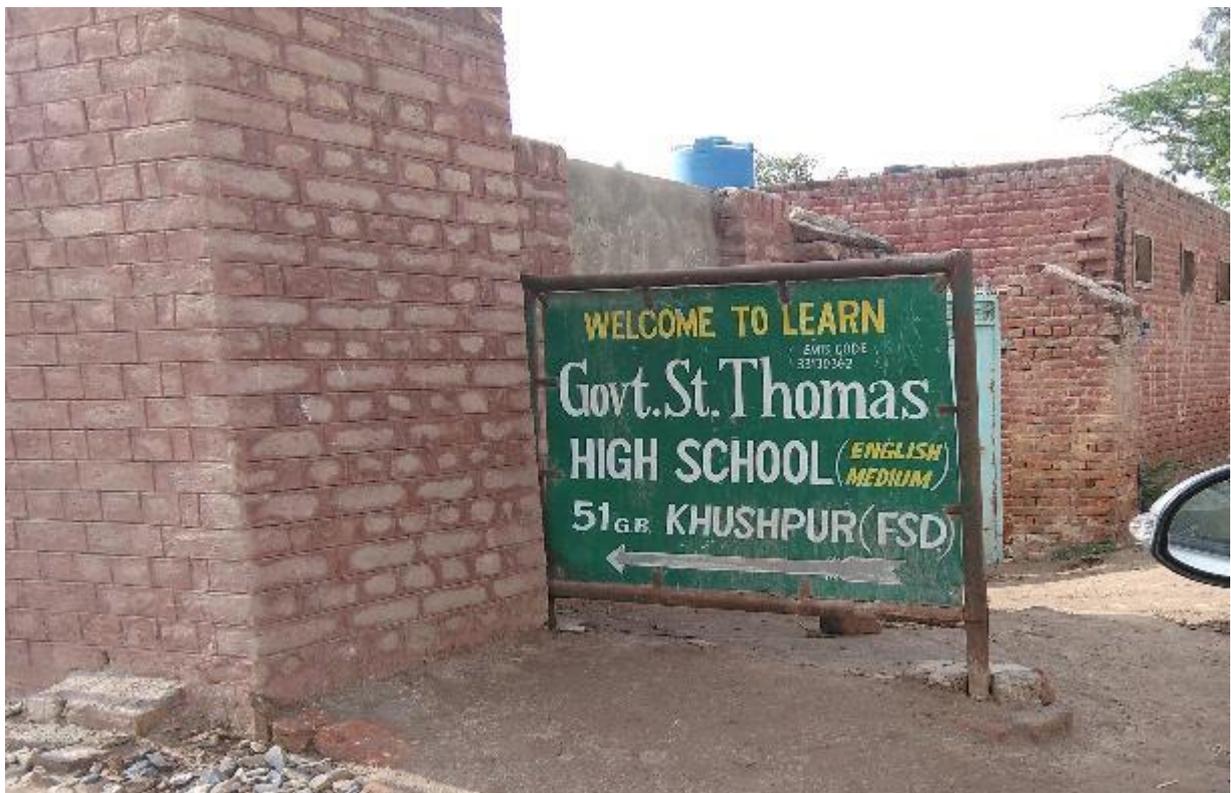
## **Annexure IV - PHOTOLOG**



Village View at Chak 138



Public Consultation at Chak 138





**Village View at Chak 51**



Public Consultation at Chak 529

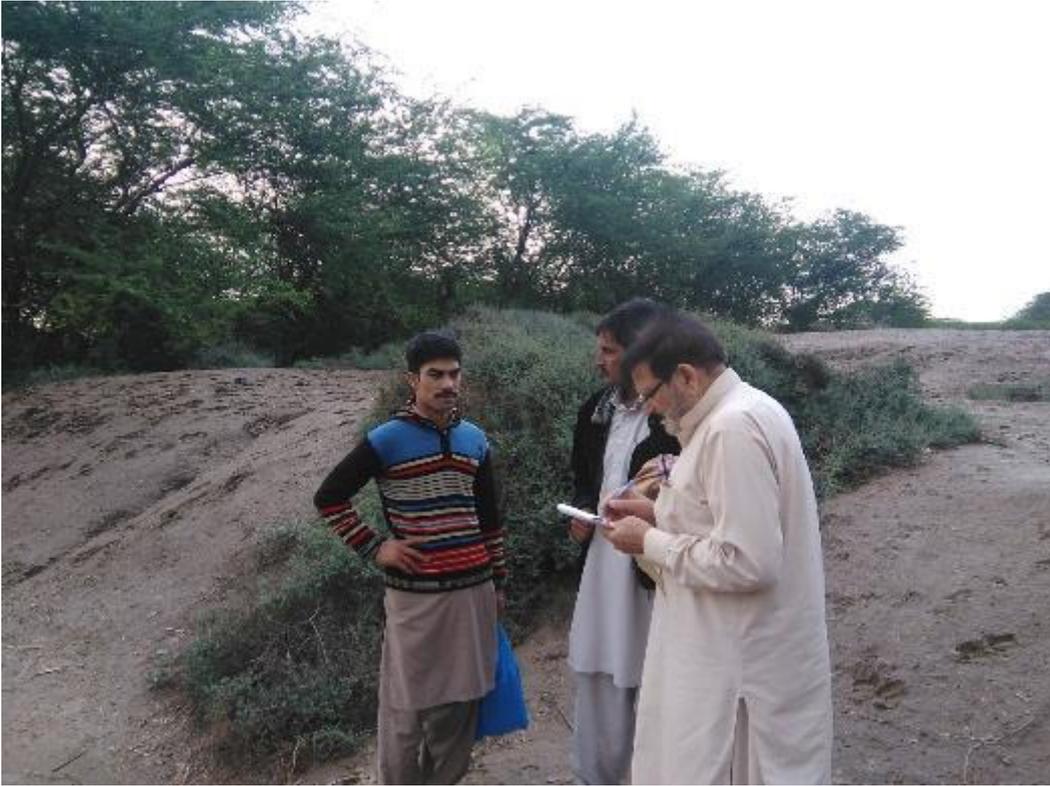




Public Consultation at Chak 530



Village View Chak 530



**Public Consultation at Chak 270**





Public Consultation at Charagh Abad





At Chak 277





School at Chak 278



## **Annexure V- Brochure**



