Initial Environmental Examination

September 2014

Pakistan: Power Transmission Enhancement Investment Program
Tranche 4

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

NATIONAL TRANSMISSION & DESPATCH COMPANY LIMITED (NTDC) PAKISTAN

Power Transmission Enhancement Program

(Multi - Tranche Financing Facility)

Tranche – IV

Initial Environmental Examination (IEE) Report

for

The Construction of New 220 KV Nowshera Grid Station and Allied 2 Km Transmission Line

September, 2014

Submitted to:

ADB Asian Development Bank

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LIST OF ACRONYMS

ADB	Asian Development Bank
DXL	Distribution Transmission Line
DGS	Distribution Grid Substation
EARF	Environment Assessment Review Framework
EIA	Environment Impact Assessment
GDP	Gross Domestic Product
GOP	Government of Pakistan
GIS	Gas Insulated Switchgear
G/S	Grid Station
IA	Implementing Agency
ILO	International Labour Organization
IRR	Internal Rate of Return
KP	Khyber Pakhtunkhwa
LARP	Land Acquisition and Resettlement Plan
Nowshera SP	Nowshera 220KV Grid Substation and Associated T/Line Subproject
Leq	Equivalent Sound Pressure Level
NEQS	National Environmental Quality Standards
NGO	Non-Governmental Organization
PC	Public Consultation
PEPA	Punjab Environmental Protection Agency
PEPA	Pakistan Environment Protection Act 1997 (as regulated and amended)
PESCO	Peshawar Electric Supply Company
RoW	Right of Way
SP	Subproject
SR	Sensitive Receiver
TOR	Terms of Reference

EXECUTIVE SUMMARY

This document presents the Initial Environmental Examination (IEE) report of 220 kV Nowshera Grid Station and its allied Transmission Line to be constructed with financial assistance of Asian Development Bank (ADB) under its Multi Tranche Facility (MTF) by National Transmission and Despatch Company Limited (NTDCL) as part of its Tranche-IV programme. This IEE has been conducted in response to ADB Environmental Safeguard Policy Statement 2009 and according to ADB Environmental Assessment Guidelines 2003. The Pakistan Environmental Protection Act 1997, as adopted by KP Province in 2010, and other allied laws were also kept in view.

The proposed project is located 10 km on west side of G.T Road on Cherat Cement Factory Road, between the town of Nowshera and Pubbi in KP Province of Pakistan. The project will augment the efforts of Pakistan Water & Power Development Authority (WAPDA) to overcome the shortage of electricity by ensuring an efficient and loss free transmission of electricity available from Ghazi Barotha Hydel Power Project (GBHP). The site of the proposed Grid Station consists of 40 acre (450m x 350m) of community grazing land of village Spin Khak. The GPS coordinates of the site are 33° 56" 31.28" N and 71° 51" 55.71E.

This project will be completed by the end fall of 2016 at a preliminary total estimated cost of Pak. Rs. 1875 million. The design and construction of the project have been assigned to NTDC and its operation and maintenance shall be done by NTDC under an overall control of WAPDA. The cost of environmental mitigation measures and monitoring is estimated to be Rs. 2,343,250 Pak .

As part of this IEE study primary as well as secondary data were collected through field surveys, public consultation particularly local communities, and literature research. Consultation were also held with other stakeholders like WAPDA, NTDC, PESCO, ADB and related departments of Government of Pakistan as well as KP screening and scoping of the study was carried out before preparing the IEE. The proposed Grid Station as well as its associated Transmission Line is located in Peshawar valley which is partly flat and partly piedmont with rolling topography. Whereas the Grid Station is situated on semi-barren community range land, the transmission line shall pass through semi-arid grazing area as well as barani (rain fed) agricultural lands. Rainfall is scanty (300-500 mm/annum) and is mainly received during the late monsoon season or early spring. The Kabul River flows parallel to G.T Road on its east. The river can get in spate if there are heavy rains in its upper watershed. Extremely cold winds blow during winter. Ambient air is generally clean. Main flora in and around the project area consists of Kikar (*Acacia militia*), Walla (*Zizyphus numularia*), *Capparis Aphylla* and Mesquete *(Propis Glandulosa)* along with typical semi-arid zone bushes, herbs and grasses. If water is available from rain or tubewell, the valley is very suitable for fruit garden or plums and apricot. Main Fauna includes mammals like Jackals, foxes, porcupines, jungle cats, hares and field rats; birds like common crows, sparrows, shikra, nuyena, pigeon, doves, parrots, common kites and partridges. Common reptiles are snakes and lizards. Major amphibian is common toad. Scorpion and spiders are other poisonous creatures of the area. There are no reported endangered species nor there is any protected area. Along G.T Road, there is a Botanical Garden which is maintained by KP Forest Department.

Barani agriculture is restricted to comparatively flat area, and its practice is rather limited. Domestic arrivals include camels, horse, mules, donkeys, buffaloes, sheep and goats. Economy is mostly pastoral and therefore the people of the area are mainly meat eaters.

Although union councils and civil courts of various levels are fully functional, Jirga system is still considered to be the most dependable system for delivering justice by the local communities. The area is predominately inhabited

by Khattak tribe and is popularly known as Khattak Nama. Almost 100% population is Muslim. Women are from a less favoured section of society. Child labour is not considered as an objectionable practice.

Analysis of alternative has shown that project site as proposed and design as being prepared is the best option. It has a cost benefit ratio (CBR) of 2.25 at 12% and 1.97 at 14% with an economic rate of return (EIRR) as 27.34 %. Logistically the best option is to locate all facilities of the contractor within the walled and gated campus of proposed Grid Station. Best option of labour is an admixture of 100% unskilled with at least 50% semi-skilled and at least 20% skilled labour from the local population. Although the local labour will be given the priority, in case of unavailability, semi-skilled and skilled labour shall have to be bought from outside by the contractor.

This IEE has shown that the project construction with either cause no adverse impacts or will cause such impacts which will be linked with contractors work practice matter that inherent potential and shall be easily mitigable and manageable. Because of being of a localized nature, the project is unlikely to trigger any adverse impacts except during fixing of towers for transmission lines which are manageable in the light of experience of WAPDA gained from similar projects.

To ensure the implementation of mitigation measures of all potential adverse impacts, an environmental monitoring plan (EMP) has been prescribed. EMP shall be made integral parts of tender bid and contract agreement documents. The cost of implementation of mitigation as well as monitoring plan shall be reflected in project Bill of Quantities (B.O.Q). A system of contractor's non-compliance has been prescribed and its linkage with contractor's bill clearance has been provided.

This IEE study shows that the project does not have any negative environmental impacts inherently from design. Any non-compliance, during work practice, can be committed by contactor but those can be forestalled or mitigated through effective monitoring. The proposed project therefore is environmental friendly, socially acceptable, financially viable, economically sustainable, neutral to gender and pro-poverty alleviation.

CHAPTER - 1: INTRODUCTION

1. This document presents Initial Environmental Examination (IEE) of Nowshera 220 KV Grid Station, under Tranche-IV of a multi-tranche programme of Water and Power Development Authority (WAPDA) to be financed by Asian Development Bank (ADB) and to be implemented by National Transmission Despatch Company (NTDC).

1.1 Project Overview

2. Pakistan is suffering from serious shortage of energy. This shortage can be overcome by production of energy through optimizing the existing sources and discovering new sources. Of this effort hydropower can constitute a major part. A major limitation on an effective use of the hydropower available out of existing resources and to be available from potential resources is availability of an efficient transmission system. Absence of a good transmission system results in unequal distribution of available hydropower and heavy line losses along the way. For proper distribution of the hydropower produce from Ghazi Barotha Hydropower Project, a new transmission line is required of which Nowshera Grid station is essentially required. The scope of work includes addition of 6.3 MVA, 132/11 KM Power Transformers and allied equipment. The transmission line will require installation of towers which will be installed on the route of In/Out 2 Km Ghazi Brotha-Shahi Bagh transmission line. The Grid Station shall be located about 10 Km from Nowshera Town on a 450m x 350m (about 315 Kanals) of acquired barren land located along Cherat Cement Factory road about 10 Km off G.T. Road. When developed, the proposed Grid Station shall augment the transmission capacity of Peshawar Electric Supply Company (PESCO) and shall enable it to meet the increased domestic and industrial demand of electricity in and around Nowshera District. It will reinforce the transmission capacity of PESCO already existing in the area. For exact location of the proposed project see Figs. 1.1, 1.2, 1.3 and 1.4.

1.2 Project Category

3. As studied locally, and as learnt from the experience of similar projects financed by ADB for WAPDA, the project does not cause high environmental sensitivity as per ADB classification of development projects. Either the project shall have negligible or conveniently mitigable environmental impacts. Hence it qualifies to fall in Category B project as per ADB guidelines. Accordingly its Environmental Assessment has been done at a manageable environmental sensitivity level and an Initial Environmental Examination (IEE) has been produced to provide an Environmental Assessment cover to the Project. In the chapters to follow, therefore, the study shall meet the requirements of an IEE as per latest guidelines provided by ADB.

1.3 Study Methodology

4. As a part of IEE study, primary and secondary data were collected through field survey, public consultations, literature research, ADB internet research and public libraries at Nowshera and Peshawar. Also consulted were WAPDA officials at Lahore, Peshawar and Islamabad and of great help was the information provided by PESCO staff, in particular the Executive Engineer, the sub-Divisional Officer and PESCO Land acquisition Officer. Of great significance was the information available from Soil Survey of Pakistan office, Meteorological Department Office, Departments of Forests, Wildlife and Fisheries, Land Revenue Department, and Agriculture Department all located at Peshawar. The Geology, Botany and Zoology Departments of University of Peshawar, the Agronomy Department of University of Agriculture, Peshawar and Watershed Management and Range Watershed Management and Range Research Departments of Pakistan Forest Institute provided data wherever required. ADB Questionnaire (see Appendix-I) was used for assessment of

general features of environment of the Project. Performa given in Appendix-II was used for a structured social survey. Major data available out of these sources were land use, soil and physiography, climatic data, flora, fauna, surface and ground water quality and biodiversity in general. In addition, the social data collected through surveys was verified from Pakistan Statistical Year Book, Economic Survey of Pakistan and District Record in DCO office Nowshera.

5. As stated above, for social data of nearby communities, a structured survey was conducted. Because of socio-cultural conditions prevailing around the Project area, at places Rapid Rural Appraisal (RRA) has to be carried out. For women consultation, due to cultural inhibitions, elderly men have to be used to visit the women and get their opinion regarding the proposed project.

6. For issues pertaining to Land Acquisition and Resettlement Plan (LARP), a separate stand-alone study has been conducted. Its findings are contained in a separate report (LARP). Key findings of the LARP have, however, been incorporated under social impact assessment under baseline study of the area.

7. For various maps, the courtesy of Survey of Pakistan at Peshawar was used. The information available was also supplemented through a Google earth study on internet. Whereas necessary GPS coordinates and photographs of the Project area and its surroundings were taken for record and reference. GPS coordinates were used to derive site plans out of large maps. Photographic data is shown in Chapter 3.

1.4 Environmental Assessment Process

8. The Environmental Assessment was carried out according to the process given in Table 1.1.

Table 1.1 Environmental and Social Environmental Process

Phase 1	Activities 2	Status 3	Responsibility 4
Screening and Scoping	Reconnaissance and initial site visit and Consultations ➢ Identification of issues and applicable safeguards ➢ Policy, Categorization and working out an action plan	Carried out during the preparation of this IEE study	Project consultants appointed for this IEE preparation
Mitigation Plan Preparation	Women Consultation	Carried out during the preparation of this IEE	Project consultants appointed for this IEE preparation
	1st draft IEE		
	Final draft of IEE		
Discussion and agreements and drawing understanding with communities and Disclosure	Discussion of Draft IEE and Mitigation Plan	A progressive activity	
	Reaching and understanding with communities	A continuing activity	NTDC assisted by the consultants
Final Mitigation Plan	Final version of Mitigation Plan produced	Included in present IEE	Project consultants
Implementation and Monitoring	Monitoring and Reporting of any possible environmental and social mitigation	Will be carried out at construction and operational phase	PESCO and NTDC

1.5 Field Surveys

9. A well trained local team of three experts, one male and two females carried out field surveys. They undertook two phased consultation programme, as detailed below.

10. Phase 1 composed of meetings and discussions with local and regional officials. Meeting with officials facilitated achieving multiple and diverse objectives such as:

- Provision of forum for initial definition of critical environmental issues
- Establishment of their implementation as official stakeholders, the key sector development issues and linkage to the social, the key sector development issues and lineage to the environmental and social development
- Confirmation of the suitability of initial list of communities selected for consultation

11. Phase 2 involved the understanding of a programme or a semi-structured discussion in communities in project area of influence. The programme induced both community discussion in general and discussion with women through their family elders.

1.6 Women Consultations

12. The area around the selected project area generally known as Khattak Nama is highly conservative where direct access to women for social surveys was not possible. Even when contacted through family elders in selected localities, the women would not like to allow the recording of their names. However, through all available means, women consultation was carried out according to the Gender Issue Study, commissioned by EPA and ADB and is considered to be an essential part of IEE preparation. The ADB studies overlap those required out of this study, which also include the "Gender Impact Assessment". Accordingly three meetings were held with women, through their family elders, in different small villages located part of Khattak Nama in Nowshera District.

1.7 The Study Objectives

13. The ultimate objective of this study is to assess realistically whether or not the project is environmentally manageable. This would make the project environmentally responsible and socially acceptable. Specific objectives of this study can be identified as follows:

- To collect the baseline data on physical, biological and social conditions of the project area and its surrounding area of influence.
- To carry out environmental (including physical, biological and social) assessment of supporting administrative and legal framework of the proposed Grid Station.
- To identify mitigation measures for any potential environmental impacts
- To propose institutional responsibilities and methods of monitoring the mitigation measures and monitoring procedures
- To prepare Mitigation Plan for those environmental impacts which may be considered as adverse.

1.8 The Report Structure

14. The IEE document is structured, as per ADB outline, as follows:

Chapter 1: Introduction containing general information about the project, the IEE and the process of carrying out the study.

Chapter 2: Legal and Policy Framework describes the policy, laws, regulations any protocols governing the IEE.

Chapter 3: The Project Description describes overall details of the works to be undertaken. This in fact provides the physical framework in which various environmental impacts are likely to be generated.

Chapter 4: The Baseline Study gives data and explanatory information on Physical, Biological and Social conditions collected through surveys of the Project and project area of influence.

Chapter 5: Analysis of Alternatives describes and analyses various alternatives to establish the feasibility of the Grid Station on proposed site.

Chapter 6: Public Consultations and Disclosures explain the process of public consultation and disclosure of the IEE report at important public offices/ places/ libraries. This step makes an IEE a public legal document.

Chapter 7: Environmental Impact Assessment identifies various environmental impacts and classifies them according to their degree of effect on the environment. This classification makes the basis of the Mitigation Plan in IEE.

Chapter 8: Environmental Monitoring Plan contains comprehensive prescription regarding mitigation measures for various adverse impacts of the project. This also includes institutional arrangement and short environmental monitoring plan for implementation of the Mitigation Plan. Despite its being only a part of an IEE, the Mitigation Plan is included in the Tender as well as the contract Agreement Document.

Chapter 9: Conclusion is based on the entire IEE report saying that the Environmental Impacts are either both negligible and insignificant or can be easily and effectively mitigated.

Appendices

1. Photographic data
2. ADB Project Assessment Questionnaire duly filled in
3. Social Survey Questionnaire used during Project surveys (sample)
4. Maps etc.

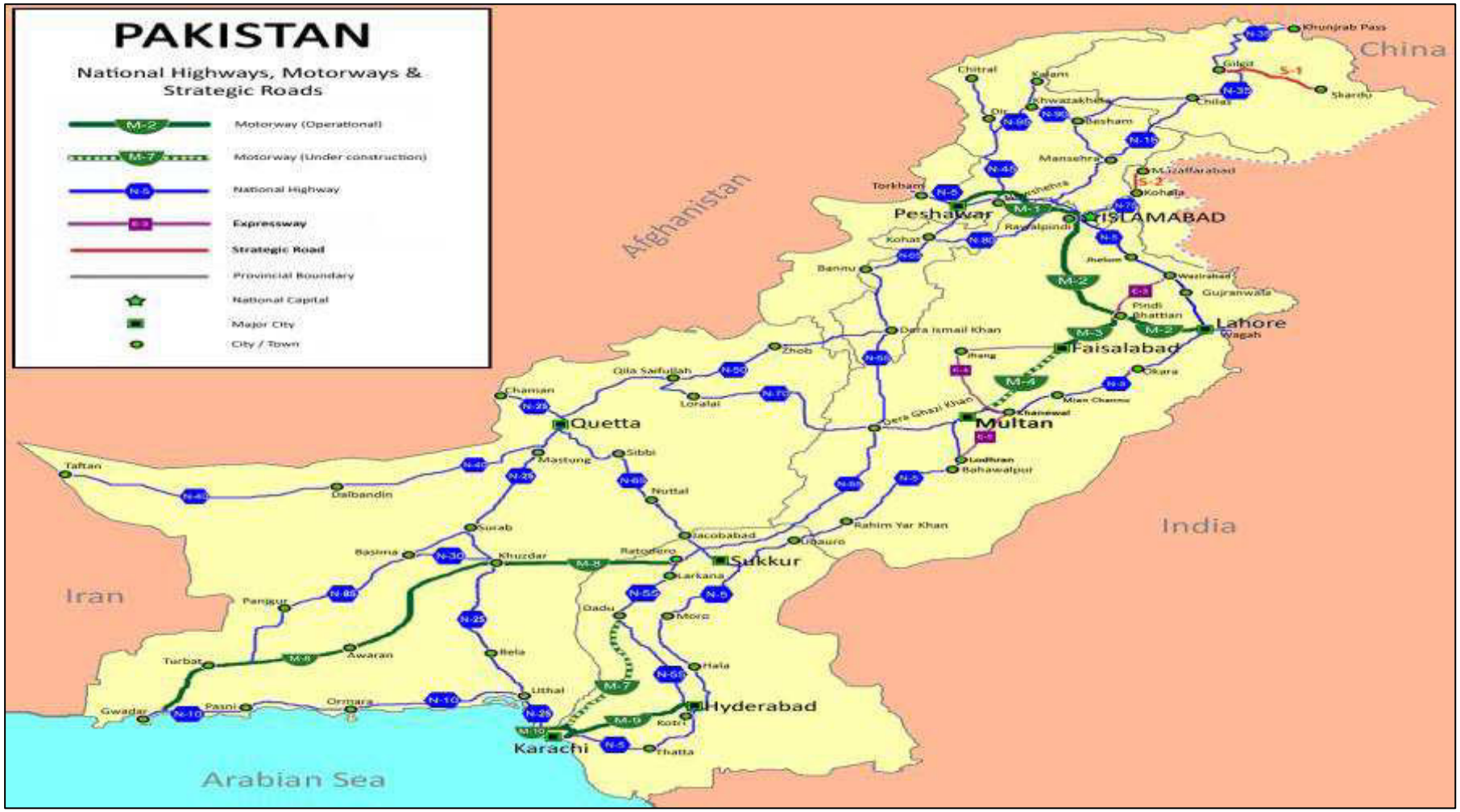


Figure 1.1: Location Map of Nowshera Grid Station Project in Pakistan

Figure 1.2: Map showing the location of Proposed Nowshera Grid Station

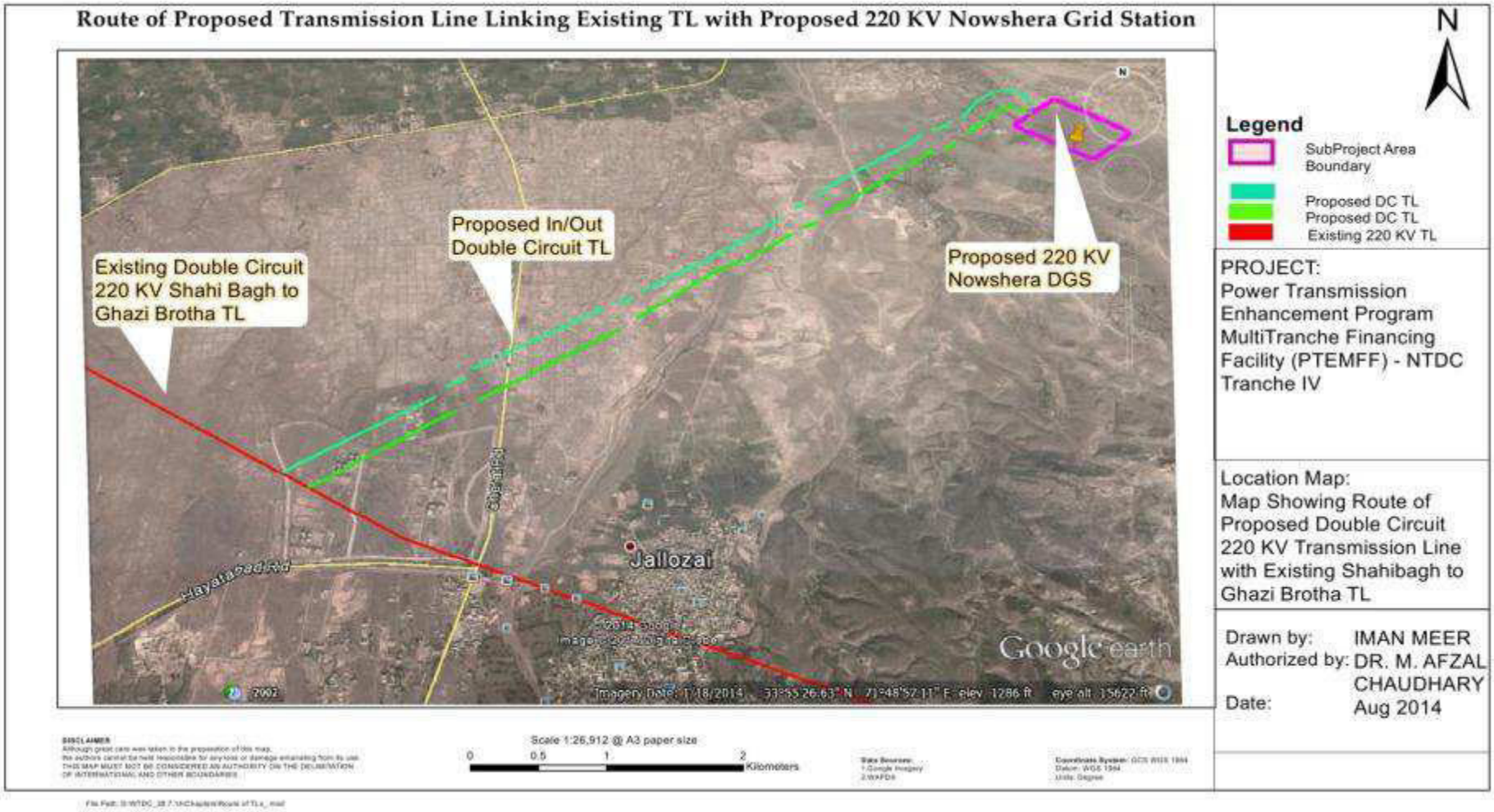


Figure 1.3: Map showing Existing and Proposed TL for Nowshera 220 KV Grid Station

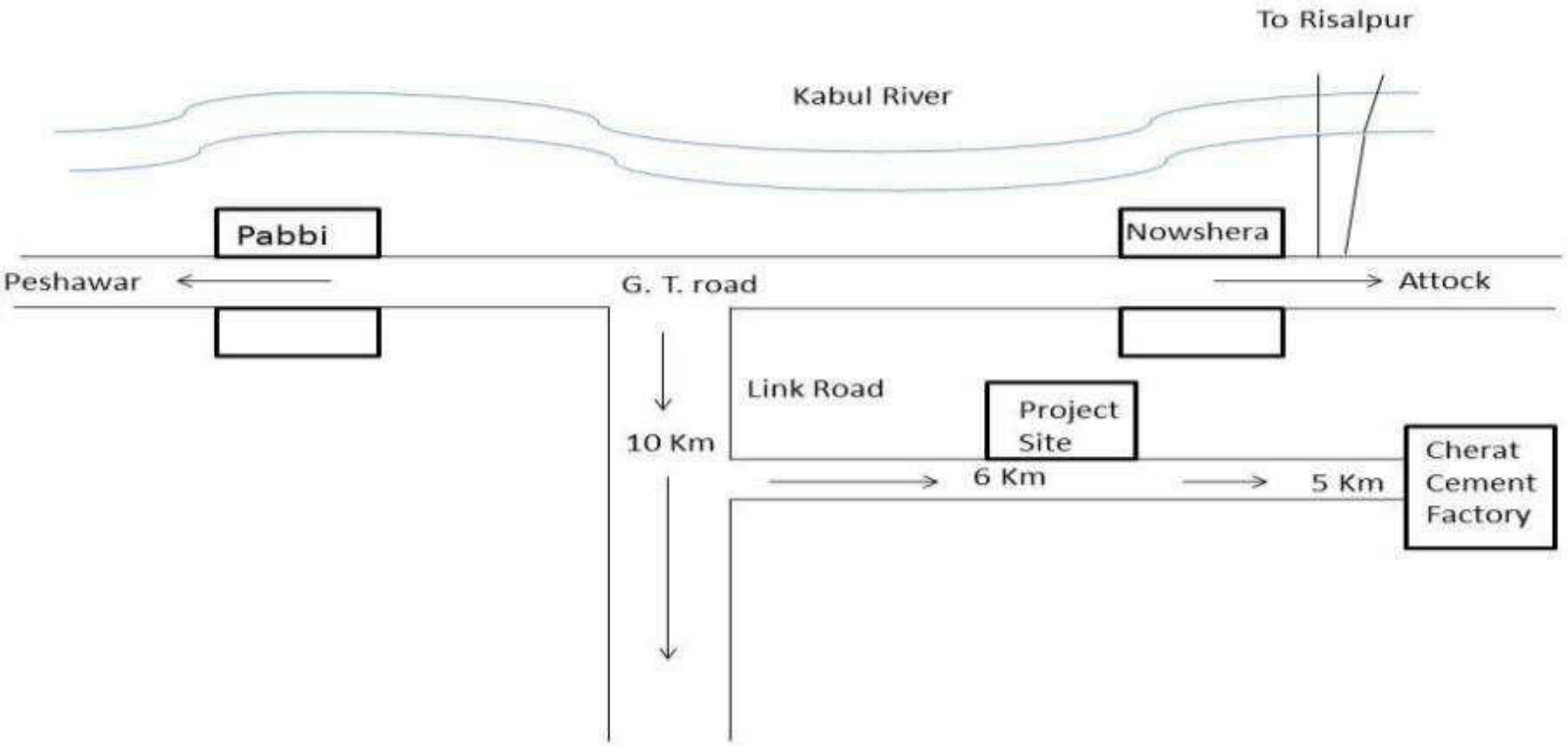


Figure 1.4: Sketch of the Project Area

CHAPTER - 2: POLICY, LAW AND PROTOCOLS

15. A detailed preview of all the legislations encompassing the subproject is cited below. Direct legislation on environmental protection is contained in several statutes, namely the Pakistan Environmental Protection Act (1997), the Forest Act (1927). 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 a bearing on the subproject or general environmental measures.

2.1 The ADB Environmental Assessment Guidelines

16. ADB's guidelines for Environmental Impact Assessment (EIA) for the developing countries in Asia 1997 is a useful tool for the environmental assessment for project loans. It is a useful guide for identifying impacts, and designing mitigation measures and monitoring requirements for the specific projects in the industrial, energy, social infrastructure, agriculture and natural resources, and transport sectors.

17. ADB's Environmental Assessment Guidelines, 2003, describe ADB's policies and procedures for preparation of IEE or EIA report for any project under consideration. It also provides strategic tools such as country environmental analysis (CEA) and strategic environmental assessment (SEA). The guide is developed to harmonize the procedures of multilateral banks development. These guidelines also specify the content and format to be followed for preparation of IEE.

2.2 Statutory Framework

18. 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, to date, only the federal government has enacted laws on environment, and the provincial environmental institutions derive their power from the federal law. The key environmental laws affecting this subproject are discussed below.

2.2.1 Pakistan Environmental Protection Act, 1997

19. 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 Khyber Pakhtunkhwa EPA.

2.2.2 National Conservation Strategy (NCS) – Pakistan

20. The National Conservation Strategy (NCS) – Pakistan, as approved by the Federal Cabinet in March 1992 is the guiding document on the environmental issues in the country (Ref. EUAD / IUCN, 1992). The NCS outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources.

21. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment. The core areas that are relevant in the context of the envisaged project are pollution prevention and abatement, restoration of supporting forestry and plantations, and preservation of cultural heritage.

2.2.3 Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000

22. The Pakistan Environmental Protection Act, 1997 (PEP Act) provides for two types of environmental assessments: initial environmental examinations (IEE) and environment impact assessments (EIA). EIAs are carried out for subprojects that have a potentially 'significant' environmental impact, 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, 2001 (the 'Regulations'), prepared by the Pak-EPA under the powers conferred upon it by the PEP Act, categorizes subprojects for IEE and EIA. Schedules I and II, attached to the Regulations, list the subprojects that require IEE and EIA, respectively.

23. 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.

24. 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 environment examination (IEE) is required for distribution lines 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 Khyber Pakhtunkhwan Environment Protection Agency (EPA) as the proposed subproject will be located in KP.

2.2.4 NTDC Safety Considerations

25. NTDC Design Directorate has issued safety considerations which must be borne in mind during selection of route for a Transmission Line. The main points of the guidelines are:

- Operation in environmentally sensitive areas with special respect for fragile ecosystems and their inherent biodiversity are to be avoided to the extent possible;
- Similarly, ROW for a Transmission Line through natural features like mountains, hilly terrain susceptible to landslides, large lakes, reservoirs, marshes, human habitations and reserved forests or national parks are to be avoided to the extent possible;
- ROW is selected after due consideration for location of telecommunication lines and railway circuits to avoid electrical interference due to mutual induction;
- Residential structures are kept a minimum of 12m out from the plumb line of the outer conductor in the ROW. However, in the absence of an alternative alignment, an exception can be made for farm buildings and single floor factory buildings, provided neither is used for purposes of residence;
- Innovative technologies and latest equipment must be adopted or used to abate pollution in construction activities and operations;
- Routes of Transmission Lines are avoided to the maximum extent through areas of cultural or historical importance and religious places;
- Tubewells and open wells using a surface pump are not permitted under high voltage conductors as piping and cranes used to recondition such wells could make contact with high voltage conductors;
- Existing orchards can remain within the ROW although Towers are kept out of orchards wherever possible. Orchards are to be over-sailed by a clearance of 6m above the height of a mature orchard whereas all other trees are to be removed;
- Brick kilns should be kept at 30m outside the centerline of ROW;
- Alternative route alignments should be used if any school, rural dispensary, mosque or local shrine (ziarat) falls within 200m of the centerline of a planned route;

- Existing open wells and hand pumps can remain under high voltage conductors, provided open wells are capped;
- Selection of sites for Tower foundation and Tower erection is made consciously on stable surfaces and by rejecting sites susceptible to erosion, slips and landslides;
- Alignment of the Transmission Line is made by NTDC after discussions with key persons of the area and by avoiding properties and infrastructure to the extent feasible;
- Spacing between Towers/poles may not be uniform and ranges could vary for physical and other considerations, such as crossing of main roads, residential areas, streams and canals and trees and for avoiding graveyards and big ditches in between Towers/poles;
- The route alignment of the Transmission Line, location of the Towers/poles and the corridors are identified by NTDC;
- The main consideration relating to public safety is a safe horizontal and vertical distance of conductor from ground level to prevent electrocution of people or animals under the Transmission Line. A corridor having a minimum width of 30m, clear of all obstructions, is provided for extra high voltage (500KV and 220KV) Transmission Lines (half on either side from the centerline). However, general farming within this corridor is allowed and tree plantations that do not exceed a height of 1.5m are also allowed to remain under the lines. Similarly, open wells, including Persian wheels, can remain under Transmission Lines. Tubewells and pumps are not permitted under high voltage conductors, because piping and cranes used to refurbish such wells may come into contact with the lines; and
- No residential or other public buildings such as factory, school, hospital and mosque, except for graves/graveyards, are permitted within the corridor. However, farm buildings which are used for residential purposes may remain under extra high voltage lines, provided vertical clearance of at least 8m is maintained. The height of Towers can be increased to accommodate such buildings.

2.2.5 National Environmental Quality Standards - 2010

26. The National Environmental Quality Standards (NEQS) were first promulgated in 1993 and have been amended in 1995 and 2000. They have been revised and the latest NEQS were issued in 2010. The following standards that are specified in the NEQS are relevant to the proposed Subproject (See detailed Tables in Appendix III).

27. NEQS for Ambient Air – November, 2010 state the Maximum allowable concentration of pollutants (9 parameters) in gaseous emissions from vehicle exhaust.

28. NEQS for Drinking Water Quality 2010 describe the drinking water properties by outlining the defined physical and chemical parameters.

29. NEQS for Noise – November 2010 states the maximum allowable limit of noise arising from vehicles in decibels (dB) separately for day and night times.

30. NEQS for Waste Effluents 2000 states the Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment facilities, and the sea.

2.2.6 The Constitution of Pakistan 1973

31. It contains concurrent legislative power to federation and provinces to legislate in respect of environment and ecology (Article 142(b), Clause 24). Any gaps in the environmental law can be referred to National as well as the provincial assembly for passage of an appropriate law.

2.2.7 Pakistan Penal Code 1860

32. It treats pollution and destruction of ecology as a mischief and makes it a public offence. The Pakistan Penal Code further prohibits corrupting and fouling water, any public spring, reservoir or river or rendering it less fit for the purpose for which it is ordinarily used.

2.2.8 The Drainage Act 1973

33. The Act binds the public water users to restore the environment of the water bodies, should there be any damage by the community in any way.

2.2.9 Local Government Ordinance 1979

34. The ordinance empowers Zila Councils to control environmental pollution by preparing and implementing appropriate schemes to protect air, water and land in their respective jurisdictions.

2.2.10 The Telegraphy Act 1910

35. This act was promulgated for installation of telegraph polls and stringing. This act makes a provision of installing poles/towers without acquiring any land. However provision is there for temporary acquisition of land during the construction period. As such compensation is made for the loss of crop for a specific period.

2.2.11 The Khyber Pakhtunkhwa (KP) Wildlife (Protection, Preservation, Conservation and Management) Act 1974

36. The Act provides full protection to the listed birds and animals and their habitat including the migratory ones.

2.2.12 Guidelines for Sensitive and Critical Areas

37. Specifying the sensitive and critical areas in Pakistan, these guidelines apply to both the natural environment and cultural aspects of Pakistan.

2.2.13 The Forest Act 1927

38. The Act provides full protection to the reserved forests as well as to wildlife habitats. The Act also prohibits certain acts in protected forests.

2.2.14 The Antiquities Act 1976

39. The Act provides full protection and safety to archives, monuments, physical cultural heritage or chance finds and binds communities to cooperate, collabourate and report to the archeological department.

2.2.15 Factories Act 1934

40. Permission to establish an industry along the road can only be permitted by Government of Khyber Pakhtunkhwa.

2.2.16 The Public Health (Emergency Provision Act 1954 read with West Pakistan Epidemic Control Act 1958) Act

41. These two laws cover the preservation of human health by prohibition of any disease, safeguarding the public health and providing and maintaining adequate medical services and other services essential to the health of communities in the project area. Protection against HIV/AIDS and infectious diseases like Cholera and Hepatitis B in labour camps would come under the same preview.

2.2.17 Explosive Act 1884

42. Under the Explosive Act 1884, the Project Contractors are bound by regulation on properly and securely handling, transporting and using explosives during quarrying, blasting and any other purpose. A prior notice has to be given to local public and road users in collabouration with Resident Engineer.

2.2.18 Conventions, Protocols, Agreements and Understandings at International Level

43. On international level Pakistan is a signatory to a number of conventions, agreements, protocols and understandings. Not all of these may be directly applicable to this project but most important of these are listed below for any possible reference.

- Convention on Biological Diversity popularly called the Earth Charter (1992)
- Convention on wetlands of international importance especially wetland habitats (Ramsar 1971)
- Convention on conservation of Mitigatory migratory species of Wild Animals (Bonn 1979) a follow up of Ramsar 1971
- ILO convention No. 62 regarding ergonomic limitation of labour

2.2.19 Employment of Child Act, 1991

44. Article 11(3) of the Constitution prohibits employment of children below the age of fourteen years in factories, mines or any other hazardous employment. The Employment of Child Act, 1991, was accordingly enacted to comply with the Constitutional provision as also abide by international conventions and treaties in order to prohibit child labour.

2.2.20 Labour Laws

45. Construction and operational activities during project implementation can affect occupational health of workers. Employers are required to abide by labour laws in respect of their own employees and also to ensure that contractors also follow the relevant labour laws and rules relating to safety of the workforce and creating a healthy working environment. The proponents shall ensure that workers engaged at project site are not exposed to any danger by monitoring the contractor's work frequently.

2.2.21 Electricity Act IX of 1910 with Electric Rules 1937

46. Electricity Act 1910 and rules of 1937 are related to the supply and use of electrical energy in Pakistan. This Act will apply together with supplementary rules issued from time to time. It states the laws of electricity distribution system and the terms and conditions relevant to electric supply. It also states rules for abiding to the license provision. In a nutshell it outlines safe and practical distribution of electric Transmission lines, imposing penalties for those not abiding by the Act.

CHAPTER - 3: DESCRIPTION OF THE PROJECT

3.1 Location and Land

47. WAPDA Tranch IV Nowshera subproject consists of a new 220 KV Grid Station along with its allied transmission line. The proposed site is located adjacent to Cherat Road some 10 Km on West side of G. T. Road between towns of Nowshera and Pubbi. The link road connecting to the proposed site with G. T. road is a single lane metalled road. The GPS coordinates of the proposed site are 33° 56' 31.28' N and 50° 55' 71" E (See Figure 1.2 and 1.3).

48. The proposed site is a 450m x 350m piece of community grazing land situated lengthwise about 5 km short of Cherat Cement Factory. The area is semi-barren and supports grass and semi-arid zone shrubs and small trees only. The NTDC has already initiated the land acquisition process in collabouration with KP Revenue Department.

3.2 Scope of Work

49. This IEE has been conducted based on the assumption that information made available by WAPDA by August 2014, is valid. It is truer about the preliminary project design which is still under preparation by NTDC for the new DGS and TXL.

3.3 Design Criteria

3.3.1 Design Criteria for Grid Station

50. The layout plan of a substation which involves various installation of equipment, control room and ancillary facilities are standardized by NTDC.

3.3.2 Design Criteria for Transmission Lines

51. The design of Transmission Lines is based on following parameters.

Table 3.1: Permissible Conductor Clearance at 65°C

S. No.	Description	Clearance (m)
1	Cultivated land traversed by vehicles	6.7
2	Roads and Streets	7.9
3	Communication and Power lines: • Power lines upto 66 KV • Power lines upto 33 KV	 2.7 2.7
4	Highways	7.9
5	Railroads	7.9
6	Electrified railroad trolley wire	3.85
7	River at high flood	9.1
8	Places accessible to pedestrians only	7.9
9	Building roofs not accessible to people	5.2
10	Top of trees (Orchards)	5
11	Canals	9.1

3.3.3 Machinery to be Used

52. As estimate of machinery of different types like grades, cranes, batching plants etc. are given below in Table 3.6.

Table 3.6 Machinery Requirement

S. No.	Machinery	Quantity /No.
1	Excavators	2
2	Mixer Machines	3
3	Tractors	5
4	Cranes	3
5	Tensioner Pulleys	1

3.3.4 Equipment and Installation

53. The equipment and installations required for propose Grid Station and associated Transmission Line are given below in Table 3.7.

Table 3.7 Equipment and Installation

S. No.	Equipment/ Installations	Quantity
1	Circuit Breaker 3-Pole 245 kV with Steel Structures Etc.	11
2	Bus Isolator 3-Pole 245 kV with Steel Support Structures Etc.	25
3	Line Isolator 3-Pole 245 kV with Steel Support Structures Etc.	4
4	C.T, 245 kV, Single Pole, 50 kA, 6 Core With Steel Structures Etc.	33
5	P.T (CVT) 245 kV, single pole, 50 kA, 2 core With Steel Support Structures Etc.	17
6	Auto T/F, 250MVA With Local Control Cubicals & Accessories Etc.	3
7	Lightning arrestor (198kV S.A) with Steel Support Structures Etc.	21
8	Bus Bar Material including Tubular Conductor/Overhead Flexible Conductor & Hardware Accessories Etc.	Lot
9	Overhead Shield Wire & Hardware Accessories Etc.	Lot
10	Insulator Assemblies	Lot
11	Steel Structure	Lot
12	Protection System	Lot
13	Telecommunication System	Lot
14	Metering Equipment	Lot
15	Fire Extinguisher	As per appropriate for site
16	Electricity generator	1
17	Water Pumping Equipment	1 set
18	Telephone Exchange	1
19	Lights, Vehicles etc.	3
20	Equipment/ Installations	As per appropriate for site

3.3.5 Construction Schedule

54. If all the processing goes on as per the schedule, the construction of Nowshera Grid Station and associated Transmission lines will be commenced by March, 2015 and completed by December, 2016. In case any unavoidable delays at the outset or during construction phase do take place, the envisaged completion date of the project will slide forward accordingly.

3.4 Construction Logistics

3.4.1 Work Base

55. Since Construction of the Grid Station is a localized work and the associated Transmission line will by and large start from the Switch yard from within the Grid Station Campus, an ideal arrangement would be to set up the work base within the fenced land acquired for construction of Grid Station. This will also help in keeping the labour within an enclosed campus and forestall any social problem which can be caused due to interaction between any outside labour and local population especially women. The local labour can also come to the work base at the start of the shift and return to their homes after the work is finished. This will ease accommodation on labour camp on the campus.

3.4.2 Labour Supply

56. The contractor shall be contractually bound to employ maximum local people except on the job for which local expertise is not available. Keeping in view the experience of WAPDA on construction of similar Grid Stations and allied transmission lines, the local labour sharing can be illustrated as given in Table 3.8 given below.

Table 3.8 Illustration Distribution of Labour

Type of Labour	Local	Non-Local	Total
Skilled	20%	80%	100%
Semi-skilled	60%	40%	100%
Unskilled	100%	0	100%

By and large the daily wage rate fixed by the local communities will be used.

3.4.3 Labour Camp

57. Best Labour Camp shall be inside the fenced Grid Station campus. Although majority of labour will come from local sources, some semi-skilled and skilled labour shall have to be bought from outside by the contractor. All those who are bought from outside shall live in the camp on the campus. Pick and drop facility may have to be provided to the labour which is employed locally. Being facilitated to live in the camp or getting pick and drop, all the labour shall have an easy access to work base, which will also be placed within the Grid Station Walled Campus.

3.4.4 Machinery Maintenance and Equipment Yard

58. Near the work base a machinery and equipment yard will be provided. The yard will have enough storage and haulage space with ample moving and working space. The yard will be within the walled campus of proposed Grid Station yet its security shall have to be reinforced by appointing special guards.

3.4.5 Material Depot

59. Near the work base within the walled campus, a material depot shall be required for safe storage of construction material. It will have temporary sheds for storage of expandable material like cement and open space for storing stones, shingles and bricks. Sensitive electrical materials shall have to be kept in suitable stores under lock and key. Material depots shall have to be provided with extra security. A trained store keeper shall be appointed for keeping an account of incoming and outgoing materials.

3.4.6 Machinery Repair Workshop

60. With a large number of vehicles and other similar machinery a repair workshop is essential. The contractor may establish his own workshop.

3.4.7 Approach to Work Base

61. Since the work base will be established within the walled Grid Station campus, so the workers shall have an easy access to that. Within the campus internal small roads and paths shall have to be provided within the campus to facilitate movement of vehicles and workers.

3.4.8 Petrol Pump and CNG Pump

62. Petrol and CNG gas pumps are available at nearby towns such as Nowshera and Pubbi. For his own convenience, however, the contractor may like to have his own small facility of petrol and CNG pump on the campus.

3.4.9 Camp Offices

63. Adjacent to work base and material depot, the contractor will be allowed to set up a camp office to run his day to day field affairs.

3.4.10 Security Arrangements

64. 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, labour camp, material depot, equipment yard and the locations where work is in progress.

3.4.11 Healthcare

65. With a good number of labour and employees working in the project, small accidents are expected to take place on various construction sites. A first aid box shall be maintained on every work site. A well-equipped dispensary will be set up by the contractor near his camp office. The dispensary will have services of a full time qualified doctor and a dispenser. An ambulance service shall support the dispensary. For major cases, the patients will be shifted to District Headquarter Hospital Nowshera under a pre-coordinated arrangement for full contract period.

3.4.12 Labour Reporting Officer

66. At a central point within the campus of proposed Grid Station, preferably close the work base, a special area will be marked where the labour can gather at the time of pick and drop or gather at the time of emergency or briefing. Such a place, also called Assembly Point will be indicated with a sign board. The place shall be kept open, clean and equipped with a public address system.

3.4.13 Labour Transport

67. Almost entire lot of unskilled labour will be employed from local sources. Contractor will provide transport (preferably a bus) to pick and drop local labour every day. That will help keep the labour camp less pressurized and more manageable.

3.4.14 Work Uniform and Health and Safety Equipment

68. Grid Station and allied transmission line construction is a special job and the labour 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 labour 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.

3.4.15 Signology

69. On all construction sites and other important points like material store, machinery yard, equipment store, labour camp, main gate etc. suitable signboards and traffic signs will be displayed. Important instructions e.g. “no smoking”, “speed limit” and “stop for identity” can also be made known on well-presented sign boards. A good signology helps in forestalling any possible accidents.

3.4.16 Lighting and illumination

70. Suitable lighting arrangements will be made by the contractor on overall work site basis particularly at contractors office dispensary, labour camp, machinery yard, material depot, main gate and all other points where security at night has to be ensured. Good lighting at work places can help the contractor for extended working hours as well as security. If WAPDA electric supply is not available or is available with load shedding breaks, electricity generators will have to be arranged on all necessary points where lighting is required.

3.4.17 Estimated Cost of the Project

71. Final design and drawings of the Project have yet to be finalized. The total estimated preliminary cost of the Project as per the PC-1 document will be Pak Rs. 1875.6 million with 90% cost contributed through ADB financial assistance and 10% cost through the Government of Pakistan contribution. According to economic analysis of the Project, the Benefit: Cost Ratio will be 2.25 at 12% and 1.97 at 14% with an IRR of 27.34 %.

Figure 3.1: Layout of the Proposed 220 KV Nowshera G/S Subproject

CHAPTER - 4: DESCRIPTION OF THE ENVIRONMENTAL BASELINE

4.1 The Project Area of Impact

72. The 220kV substation and its allied transmission line will be constructed on Cherat Cement Factory road, 10 km west of GT road, between towns of Nowshera and Pabbi. The proposed Grid Station (GS) extents over about 40 acres of land in precincts of village Spin Khak situated about 32 km from Peshawar and 21 km from Nowshera City, in Nowshera District, Khyber Pakhtunkhwa, Pakistan.

73. Nowshera District lies between 33° – 41' to 34° – 10' North latitudes and 71° - 39' to 72° - 16' East longitudes. It is bounded on the east by Attock District of Punjab province and in the west by the districts of Peshawar and Charsadda, in the north by districts of Mardan and Swabi and in the south by Kohat district. (See map as Fig 4.1)

Figure 4.1: Location Map of Nowshera District

4.2 Physical Environment

4.2.1 Topography, Geography, Geology, and Soils

74. The Nowshera project area lies in border with Peshawar valley at an elevation of 295 m amsl. Nowshera District is largely barren with distant range of mountains in the background. Spin Khak is a Barani area where soil is prevalently sandy with gravel with clay on top. This makes it very suitable for ground water retention. Stratigraphically the rocks of the area are part of the Nowshera Formation of Stauffer. The Nowshera Formation consists of sandy dolomite, calcareous and dolomitic quartzite, calcareous argillite and fossiliferous limestone. The area has a rolling topography.

4.2.2 Seismology

75. Geological survey of Pakistan has divided Pakistan into five seismic zones. The project area, a part of Nowshera district, lies in seismic Zone 2B which is Moderate hazard zone corresponding to peak ground acceleration (PGA) values of 0.16 to 0.24 m/sec^2. Normally, the earthquake range between 3-5 on Richter scale. Figure 4.2 shows seismic map of Pakistan.

4.2.3 Climate and Hydrology

76. There is no meteorological station present in Nowshera District therefore reliance has been placed on the data available from the nearest meteorological station i.e. Peshawar, which is in the same climatic zone. The temperatures in Nowshera range from 3.9 ^oC as mean minimum in winter to 39.25 (Celcius) as mean maximum temperature in summer. The maximum temperature in summer reaches 41.5^oC. In winter the minimum is 2.1^oC. The annual mean maximum and minimum temperatures are 29.6^oC and 14.6^oC respectively.

77. Rainfall in Nowshera varies from 30.0 to 420.0 (mm/month). The average annual rainfall at Risalpur and Cherat during 1988-2007 was recorded to be 684 and 585 mm respectively. The area receives maximum rainfall (about 60%) in the months of February, March, July and August, i.e. during summer monsoons and early spring. Winter rains contribute relatively more to groundwater recharge than monsoon rains (WAPDA, 2008).

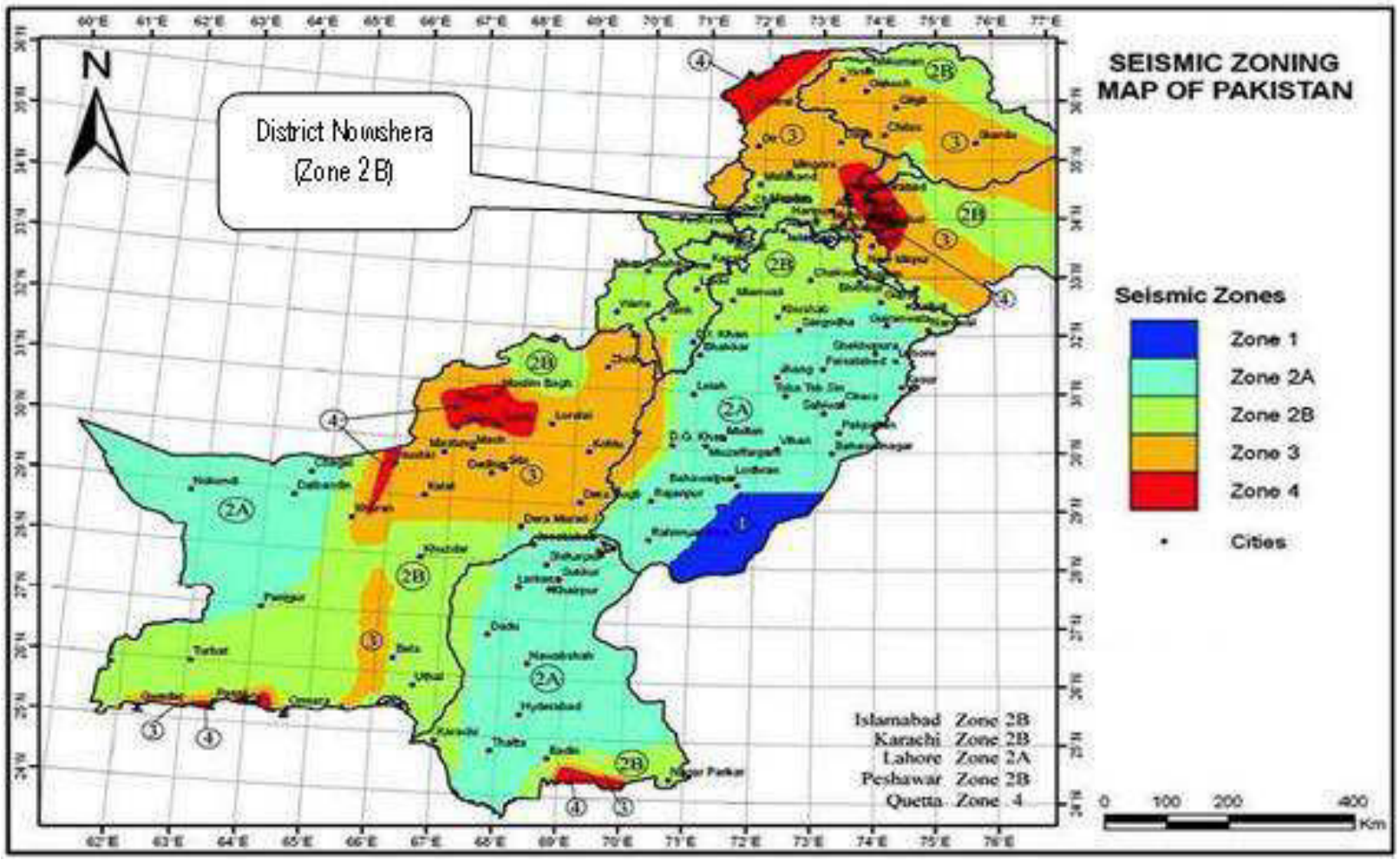


Figure 4.2: Seismic Zoning Map of Pakistan

4.2.4 Groundwater

78. Project area is a barani area. Depth to water table generally varies from 13 to 50 meters below ground level in barani areas whereas it is within 10 m in canal irrigated areas.

79. The occurrence of groundwater particularly in barani areas is controlled by hydro-geologic and climatic conditions. Rainfall is the main source of groundwater recharge. Deep percolation from fields and stream losses at various stages of flow coupled with varying properties of the upper soil strata and the underground aquifer are responsible for varied availability of groundwater across the district.

4.2.5 Surface water

80. There is no surface water body near the project site. Kabul River is almost 10 km far away from the project site.

4.2.6 Air Quality

81. Air quality in the project area is fairly clean and there is no likely source of air pollution. A cement factory is located about 5 km from project site. There may be some industrial pollution present in the vicinity of the cement factory but that has no effect on the clean air in the project area. Other than that emission from vehicles roving the factory road is also a source of pollution. Residential area is also far away from the project site hence no pollution from domestic wood or kerosene burning is anticipated.

4.2.7 Noise

82. Other than noise generated from vehicles moving on the factory road, no major source of noise is present in the project vicinity and therefore noise level will never cross the NEQS limit of 80 decibels.

4.3 Biological Environment

4.3.1 Flora

83. The area is located in semi-arid “Barani” tract. The flora is xerophytic and represented by following piedmont dry scrub species of tree shrubs, herbs and grasses.

Kikar	*(Acacia niloica)*
Ber	*(Zizyphus jujube)*
Bush ber or Malla	*(Zizyphus mumularie)*
Dailay	*(Capparis decidua)*
Naturalized Mesquete	*(Prosopis glandulosa)*
Pohli	*(Argemone maxicana)*
Harmel	*(Paganum harmala)*

4.3.2 Fauna

84. Fauna typical to dry scrub areas can be seen in the area such as:

(i) Mammals
Jackels *(Canisaureus)*
Foxes (SSP. *Vulpes*)
Field rats (*Rattus norvegitus)*

(iv) Birds
Shikra *(Accipiter badius)*
Crow *(Corvus splendens)*
Common kite *(Milbus migrans)*

Hare *(Lepus nigricollis)*
Porcupine *(Hystrix indica)*
Hedge Hog (*Erinaceinae)*
Wild cat *(Felis chaos)*

(ii) Reptiles
Cobra snake *(Naja naja)*
Rat eating snake
House gecho

(iii) Amphibians
Common Toads

Sparrow *(Passer domesticus)*
Pigeons *(Columba livia)*
Dove *(Strato pielia* SSP.*)*
Parrot *(Psittacula kramerl)*
Partridges

(v) Others
Scorpios
Spiders

4.3.3 Domestic Animals

85. Domestic animals of significance include cows/ bulls, buffaloes, goats, sheep and camels.

4.3.4 Endangered Species

86. Reportedly there are no endangered plants or animal species in the area.

4.3.5 Protected Areas

87. There is no protected area in the vicinity of the project area. There is a botanical garden near GT road but being 10 km away, the GS cannot cause any impact on that.

4.3.6 Wildlife Sanctuary

88. There is no wildlife sanctuary in the vicinity of the project area.

4.4 Economic Development

4.4.1 Land Use and Agriculture

89. This area is a lies in semi-arid region. It is a Barani (rain fed) area with scrub vegetation. Agriculture is practiced only on the flat areas that depend on rainfall. Cultivation of wheat depends upon winter rainfall. The rolling country makes good grazing land for sheep and goats.

4.4.2 Industry

90. There are about 125-130 factories in Nowshera District of which 24 are major factories. Paper international, Colony Sarhad Textile Mills, Pakistan Tobacco Company, Cherat Cement factory and Swat Ceramics are some of the major factories present in the district. Cherat Cement factory is located just about 5 km from the project site.

4.4.3 Transportation and Tourism

91. Nowshera District is linked with the rest of the country by rail, air and roads. National Highway (N-5) enters at Khairabad and goes all along in the district. PAF Air Base at Risalpur and Pakistan Railways are worth mentioning. More than half of the motorways in KP pass through Nowshera. There is a network of farm to market roads, within the districts.

92. Project site is located adjacent to Cherat Cement Factory Road. This is a wide road used by heavy traffic for transporting the goods between the factory and the GT road.

4.4.4 Energy Sources

93. Within Nowshera district distribution lines for electrical power run to a 132 kV grid sub-station Nowshera. The existing main 220kV Grid Station is present in Mardan which supply energy to Nowshera.

4.4.5 Population Communities and Employment

94. According to the census report of 1998 the total population of Nowshera District was 874,373 persons with an annual growth rate of 2.9% at that time. The district is predominantly (99%) Muslim. The next higher percentage is of Christians with 0.5%, followed by 0.3% Ahmadis and 0.1% Hindu (jati). Other minorities and scheduled castes are small in number. Areas adjacent to the project site are all from Khattak tribe and are almost 100% Muslims.

95. Pushto is the predominant language being spoken in the district, representing 91% of the population, followed by Punjabi spoken by 3.6%, Urdu 1.3% and Siraiki 0.3%. Others speak Sindhi, Balochi, Baravi and Dari.

96. Of the total economically active population 95.6% were registered as employed in 1998. Nearly two-forth (38.9%) were self-employed, 28.4% were private employees and 24.2% government employees. Unpaid family helpers were recorded as 4.4%. The difference in proportions of employed population was significant between the genders in both urban and rural residences. Only 1% of the females are economically active out of which 3.9% of the women are unemployed.

4.4.6 Education and Literacy

39. The literacy ratio in Nowshera district increased from 23.8% in 1981 to 42.5% in 1998. The literacy ratio for males is 60.6% and for females is 22.7%. Literacy is much higher in urban areas (55.6%) compared with rural areas (37.6%) for male and female.

4.4.7 Health Facilities

97. Health facilities in Nowshera City are adequate. District Headquarter Hospital, CMH are main hospitals in the city. Other than that there are a number of private doctors and hakeems present in the city.

Basic Health Unit is only 3 km away from project site. It has no maternity facility. Maternity facilities are provided by mid wives to local people.

4.4.8 Customs and Community Structures

98. A majority of the people of the district is purely Pashtoon. The major tribe in or near the project vicinity is Khattak.

99. Joint family structure is common in the region. Families live in a big compound with separate rooms for each sub family. The oldest family male is the head of the family and usually takes all the major decisions for his family.

4.5 Cultural Heritage

100. There are no officially protected places of physical cultural heritage nor there are any historic, religious or archeologically important sites located within or near the project area.

Photo N-1: General view of the proposed project site from road leading to Cherat Cement Factory

Photo N-2: The project has a rolling topography with sandy soil mixed with gravel. The flora is a scrub vegetation of dry temperate climate.

Photo N-3: Mostly the ground flora consists of soil forming gravels which makes the area a good grazing land after every rain shower.

Photo N-4: At a number of places the water erosion during winter rains has built erosion pavement. The stones covering the soil are mostly sandstones broken off from sandstones and quartziterocks underneath.

Photo N-5: Area survey team at work. The area in general is considered as a barren land with very open density tree cover.

Photo N-6: At places the top soil has totally been eroded away and no vegetation is visible on surface. At a distance towards the west of the area, a 220kV transmission line connecting Ghazi Barotha hydroelectricity with existing GS at Nowshera.

Photo N-7: Prevalent current used of the land in project area is grazing. Sheeps are preferred animals for the range land.

Photo N-8: Survey team with some local staff and some members of public who joined public consultation session.

Photo N-9: Open density flora of the area mostly consists of Acacia Nilotica, Zizyphyus Numeularia, Capparis Aphylla and Prosopis Glandulosa.

Photo N-10: A Prosopis Glandulosa tree has turned bushy because of over disturbance of the leading bud. The tree branches of Nesquette are cut for use as a high calorie fuelwood by local communities.

Photo N-11: Prosopis Glandulosa prefers to grow near depressions where moisture regime is better.

Photo N-12: Northern boundary of the project area is along a barani agriculture field. The houses of the farmer are out of the project area. Acacia Nilotica tree is flourishing in the agricultural field of the farmer.

CHAPTER - 5: ANALYSIS OF ALTERNATIVES

5.1 Available Options

101. From IEE point of view, the following available alternatives for the project were considered for their analysis based on strengths, weaknesses, threats and opportunities (SWOT).

A Grid Station Site Alternatives

- No project option/ Worst scenario option
- Grid Station at exactly the present proposed location and design
- Grid Station at the site available at Shahi Bagh
- Grid Station at altogether a different site along G.T. Road

B Logistic Alternatives

- Siting of Contractor's facilities e.g. Labour Camp site, machinery yard and material store within the acquired campus.
- Siting of contractor's facilities on adjacent private land

C Labour Options

- All labour local
- All labour from outside to brought by contractor as his own team
- An admixture of local and outside labour as per skills required for various jobs.

102. An analysis of all above alternatives is as follows.

A Grid Station Site Alternatives

A.1 No Project Alternatives/ Worst Scenario Option

- **Strengths and Opportunities**

a. Land, funds inconvenience and staff time will be saved and can be diverted elsewhere on other projects

b. No land acquisition and rehabilitation shall be needed and no LARP will be required

c. No recurring cost shall be required for maintenance or repairs of Grid Station and also the operational cost will be saved.

d. No disturbance shall be caused to any physical, biological or social part of the environment.

- **Weaknesses and Threats**

a. Transmission of electricity to an acutely energy deficient area shall remain unchanged and allied developmental process shall be withheld.

b. Industrial development process shall be highly restricted and economy of the area, dependent upon, electricity shall not grow.

c. Greater job opportunities likely to become available at construction and operational steps of the project shall not be available.

d. One of the objectives of Ghazi Barotha hydroelectric Project shall be frustrated in that full utilization of Ghazi Barotha-Shahi Bagh transmission line shall not take place.

e. Standard of living of the local communities shall remain low as it is now and poverty would not be alleviated.

Conclusion

103. As per SWOT analysis for no project option, the weaknesses and threats outweigh the strengths and opportunities. "No Project Option" possessing the potentials of the worst scenarios is not recommended.

A.2 Grid Station site exactly as presently designed and as per proposed Location

- **Strengths and Opportunities**

a. All costs on carrying out on any fresh survey or making new design shall be saved and expenses and efforts already incurred shall fully fructify

b. No fresh area shall be impacted at construction or operational stage and no fresh site shall have to be acquired and no problems connected with new site shall be triggered.

c. Existing proposal is in complete response of the engineering requirements of the transmission system and is located appropriately at a place where distribution of electricity received from Ghazi Barotha is aptly suitable for the area.

d. All along, during construction and operational phases, the project shall provide employment to local population.

e. The proposed site is a barren land with very open density scrub flora. There shall be no loss of any production agricultural land.

f. Availability of good supply of electricity shall help in giving better opportunities in education, health and social welfare.

g. The financial analysis of the project shows that the project is financially viable. Along with that it is socially acceptable, environmentally manageable, gender wise neutral and pro-poverty alleviation.

- **Weaknesses and Strengths**

a. Land shall have to be acquired but that would be inevitable on any site when no state land is available near Nowshera for this purpose.

b. The site is located in Khattak Nama area where tribal prides and prejudices are common and the Grid Station shall have to be secured properly by appointing armed security guards and building check posts and watch towers along the outer wall of the campus.

Conclusion

104. The strengths and opportunities of this option far outweigh the weaknesses and threats of this option. Further, the weaknesses and threats are conveniently mitigable. Therefore the option of existing design and proposed location is strongly recommended.

A.3 Grid Station Site at Shahi Bagh

- **Strengths and Opportunities**

a. The site is closer to Nowshera Town and is more easily approachable.

b. The site is located relatively closer to Ghazi Barotha-Shahi Bagh

c. The site is adjacent to an existing 132 KV Grid Station and some of the facilities at existing Grid Station can be of assistance to the new setup.

d. Due to reduced length of transmission line, there may be some reduction in cost.

- **Weaknesses and Strengths**

a. The entire available area has been occupied by internally displaced persons (IDPs) and some Afghan Refugees (AR) who have built their mud houses there. No part of the area is available physically for new Grid Station Installation.

b. Eviction of IDPs and ARs shall trigger heavy and complicated resettlement issues the solution of which may not be within the capacity of Government of KP or Pakistan. Experience from other AR campus shows that it is almost next to impossible to displace and resettle the ARs and move so IDPs. This is by far the greatest hurdle in the way of choosing this site for the Grid Station.

c. The ADB team surveyed the area and they opined that they would not be able to hear the high cost of resettlement. Moving to a nearly new site and paying the cost of land acquisition would be a lot more affordable than paying resettlement expenses for a large number of IDPs and ARs in KP area which is already destabilized because of war against terrorism.

Conclusion

105. The site is too risky, complicated with a very high cost involved. The weaknesses and threats of this option are overly weightier than any strengths and weaknesses. This option is therefore strongly not recommended.

A.4 Grid Station site at altogether on a different location along G.T. road

Strengths and Opportunities

1. Any spot along G.T. road between Nowshera and Pubbi would have easy access from all sides.

2. Security along G.T. road would be easier.

Weaknesses and Threats

1. Land along the G.T. road is heavily populated, urbanized and in part industrialized or is under intensive agriculture. Getting some 300 Kanals of land in this tract shall be prohibitively costly and can upset Benefit: Cost ratio in economic analysis.

2. There is a Botanical Park and roadside plantation and fruit orchards in the area which can get destroyed. Establishing a new grid station along G.T. road shall be anti-biodiversity.

Conclusion

106. The weaknesses and threats of this Option weigh greater than the strengths and opportunities. This option is therefore not recommended.

B Logistic Alternatives

B.1 Siting of Contractor's facilities e.g. Labour Camp site, machinery yard and material store within the acquired campus

Strengths and Opportunities

1. The contractor will get land free of cost. This cost will not be reflected in BOQ and this will reduce the overall cost of contract and therefore the project.
2. There will be very little possibility of interaction with local communities and the contractor shall have a free hand to manage his labour and works as per his schedule.
3. The contractor will not be encouraged to hire private agricultural land and therefore productive agricultural land will be saved.
4. The activities and logistics of contractor will be under full control of the project management and any possibility of adverse environmental or social spill over to outside territory will be eliminated.
5. Given the law and order and security conditions in KP due to War against terrorism, a walled and gated campus shall be far more secure than any open and exposed area.

Weaknesses and Threats

1. With the campus the space for facilities of contractor may be rather squeezed. Any permission to contractor to go out of walled and gated campus, the management may be compromising with a secure site selection and therefore with overall efficiency in the execution of the contract.
2. Getting a spacious land on lease in tribal society of Khattak Nama may not be possible physically and socially.
3. For creating enough space for contractor's facilities a situation may arise for the Project where a Resettlement gets involved. In that case heavy cost and overly complicated situation may arise.

Conclusion

107. In presence of adequate, walled and gated and encumbrance free project campus for the facilities of the contractor and for convenience of supervision and control by project management, this is an acceptable option and is therefore recommended.

B.2 Siting of contractor's facilities on adjacent private land

Strengths and Opportunities

1. The contractor shall enjoy freedom of choosing the best sites for his facilities, machinery and labour.
2. By way of payment of lease money to private land owner, participation of community in project execution shall be achieved.

Weaknesses and Threats

1. The contractor may convert a productive agricultural land into a nonproductive and compacted field.
2. Out the direct control of the project proponents, the contractor may indulge in unplanned social activities which may not be acceptable to local communities. This can cause direct clash between the communities and the project. Such hostilities can stall the project.

Conclusion

108. The weaknesses and threats of this option are weightier than strengths and opportunities. This option is therefore not recommended.

C Labour Options

C.1 All labour local

Strengths and Opportunities

1. All labour will be local and their employment will fulfill a major social requirement of the policy of Environment Protection Agency of KP.
2. Local economy will benefit and poverty alleviation will take place.
3. The project will become socially acceptable. It will bring economic relief to many poor families.
4. Most of the local labour will come from and go back to their homes daily and there be very little pressure on labour camp.
5. The unskilled local labour shall get an on the job training. Through transfer of technology, the unskilled labour will become semi-skilled and their chances of employment on another similar project, within or outside their area, shall enhance many times.

Weaknesses and Threats

1. For an efficient execution of the project three types of labour shall be required, skilled, semiskilled and unskilled. All types of labour may not be available locally. So binding the contractor to hire all labour locally can put technical and technological limitations on the contractor.
2. All labour from one area can give birth to trade unionism and the labour can threaten to stop the work and bring the construction work to a standstill.
3. In competition with other projects, industry and occupation, reliance only on local labour may create seasonal or overall labour shortages and thus failure in achieving targets on time.

Conclusion

109. From practical point of view, it is not possible to rely entirely on local labour for all trades. So this option is not recommended. However it should be ensured that all skilled labour openings must be given to locals.

C.2 All labour from outside

Strengths and Opportunities

1. Labour from outside (anywhere) will be preselected and ergonomically tailored to the requirement of the project.
2. A preselected outside labour is generally more dependable, well trained and more disciplined.
3. Outside labour from various sources will not be able to build undue pressures on the contractor or the project.
4. Outside trained labour will set model for untrained local labour which may improve in due course of time and become candidate for better jobs.
5. Spending by outside labour/workers will bring additional benefits to local economy.

Weaknesses and Threats

1. Bringing outside labour will take away economic benefits of employment from the local communities and they will not develop a sense of ownership for the project.
2. The project objective of poverty alleviation, social uplift and capacity building will be defeated.
3. A friction may develop between outside labour and local communities. This may trigger a problematic social hostility with chain reactions ultimately launching the project in serious trouble.

Conclusion

110. In case entire labour is brought from outside, the social losses will be much higher than the economic gains of the contractor. However the ergonomic limitations may necessitate bringing in a small percentage of outside manpower especially at skilled level. But this must be done with extra care. As far as possible, the local human resource will have to be preferred.

C.3 An Admixture of Local and Outside Labour as per Skills Required

Strengths and Opportunities

1. Unskilled labour can be 100% local.
2. Semi-skilled can be local if they possess training for required trade, and are available as per requirement. If skill and availability allows, even up to 50% labour can be recruited locally. Such an option can build up a strong and coordinated team of workers which always goes in the larger interest of the project.
3. Inevitably, most of the senior technicians and skilled workers shall have to be hired from outside the area of influence of the Project. This flexibility will be available only under admixture of labour. Presence of outside component will provide transfer of technology.

Weaknesses and Threats

1. Because of presence of outsiders often earning higher wages and commanding superior positions there is likely to be social losses.
2. Direct income of local community from the project in terms of wages will reduce.

Conclusion

111. From project implementation point of view, this option presents the best combination of local manpower and outside skills. This option also presents an opportunity of transfer of technology and technical know-how from outside technicians to local workers. This option is therefore recommended in the better interest of the project.

5.2 Summary of Alternatives

1. No project option/ worst scenario option is not recommended
2. The option of following existing design and location is recommended
3. The option of siting contractor's facilities within walled and gated campus of project site is recommended
4. Option of getting 100% local unskilled, at least 50% semiskilled local labour and remaining manpower from outside is recommended.

CHAPTER - 6: PUBLIC CONSULTATION

6.1 Approach to Public Consultation

120. Public consultation (PC) about the proposed project was held at the project site on August 6, 2014, with the assistance of notables from adjacent villages namely Jabba Khan, Bhakti, Shah Kot, Kotli Kalan, Kotli Khurd an Saleh Khana. In all 27 notables participated whose names are given in the following list.

Table 6.1: Names of Local people consulted

Sr.No.	Name of the Person	Name of the Village
1	Shan Gul	Jabba Khan
2	Fareed Gul	Jabba Khan
3	Naek Muhammad Khattak	Jabba Khan
4	Mumtaz Ali	Jabba Khan
5	Dr. Tahir	Jabba Khan
6	Habib Khan	Bakhti
7	Hameed Khan	Bakhti
8	Umar Ali	Bakhti
9	Malik H.	Bakhti
10	Imandar	Shah Kot
11	Malik Shahzad Gul	Shah Kot
12	Dr. Dildar	Shah Kot
13	Zubair	Shah Kot
14	Jaan Malik	Shah Kot
15	Subhan Khan	Shah Kot
16	Ashar Iqbal	Kotli Kalan
17	Tariq Mehmood	Kotli Kalan
18	Ghani Shah	Kotli Kalan
19	Abdur Rahim	Kotli Kalan
20	Zahid Farooq	Kotli Khurd
21	Shehzad	Kotli Khurd
22	Tariq	Kotli Khurd
23	Inam	Kotli Khurd
24	Noor e Islam	Saleh Khana
25	Ilam Khan	Saleh Khana
26	Dr. Khan	Saleh Khana
27	Iqbal Shah	Saleh Khana

112. The women of the villages were consulted through elderly persons from each village because the Khattak tribe living in the area around the proposed project is tribalistic and highly conservative. The women declined to get their names in the list. However their opinion was included in the overall public suggestions.

113. Local staff also joined the public consultation session and assisted in answering the public questions. Important questions asked by the public and answers answered by the consultation team are as follows:

Table 6.2: Details of Public Consultation session

Sr. No.	Question	Answer
1	If you take away my land what shall I get in return?	You will get due compensation for your land. The rate shall be equal to average of last three years sale price for similar land.
2	Can we get land for land?	There is a procedure for that but due to paveity of land in the area; the preferred method is payment of land.
3	The land is a grazing are which shall be lost. Where shall we graze our animals?	This is a very small area of about 40 acres. Grazing lands (barren lands) are in abundance in the area. For this land you will get compensation.
4	We obtain fuel wood from trees and bushes growing in the area. All these trees and bushes shall be lost. What shall we do?	Compensatory fuel wood plantation shall be carried out through social forestry for which project shall supply nursery and advice.
5	Shall there be reduction in load shedding when this grid station is built? (Question from women).	Obviously there shall be a positive effect on electricity supply. The construction of this grid station is a proof that electricity production at the source shall improve.
6	Shall more land be acquired after the GS is completed?	No. the land to be acquired now shall be adequate for the project.
7	The ground water is sweet. Will enough electricity be available for installation of tube wells and expand agriculture?	Hopefully so. When the ground water is pumped out it will not only help agriculture to expand but will also help livestock and dairy farming.
8	"Hakoomat" is notorious for not paying compensation in time. How about this project?	This time Insha Allah you will have a better experience.
9	We understand that a colony shall also be built in the project. Can we use school and dispensary built there in.	Yes your children can come to colony school and dispensary.
10	How will the effluent sewage water from colony be disposed?	A sump shall be constructed. In addition, the excess water shall be treated in a tank and supplied to agricultural fields.
11	A number of people living near the project steal electricity by putting hooks. Can you stop them?	We all shall try our best that the electricity is not stolen and all villages get full load.
12	Where the electricity shall be taken from GS?	There shall be two incoming and four outgoing lines totaling to 220kV. The electricity shall be generated in Ghazi Barotha Hydroelectric dam.
13	Will project support local schools?	The project may not be able help schools outside

Sr. No.	Question	Answer
		the project area. However educational facilities within the project shall be open to all.
14	Will project support local health system?	The project will rely on the medical facilities in general area. Any dispensary service available in project shall be open to public.
15	Will electricity be available to local people free or at concessional rates?	Electricity shall not be available free or at concessional rates.

6.2 Outcome of Public Consultation

114. Generally people were found to be aware of the benefits of the establishment of the grid station. They had some personal quarries but on overall scale almost all were in full support of the project. Local communities however expressed that they would like to be part of continuous consultation process. Various concerns expressed by the local community have already been listed in Table 6.2.

6.3 Grievance Redressal Mechanism

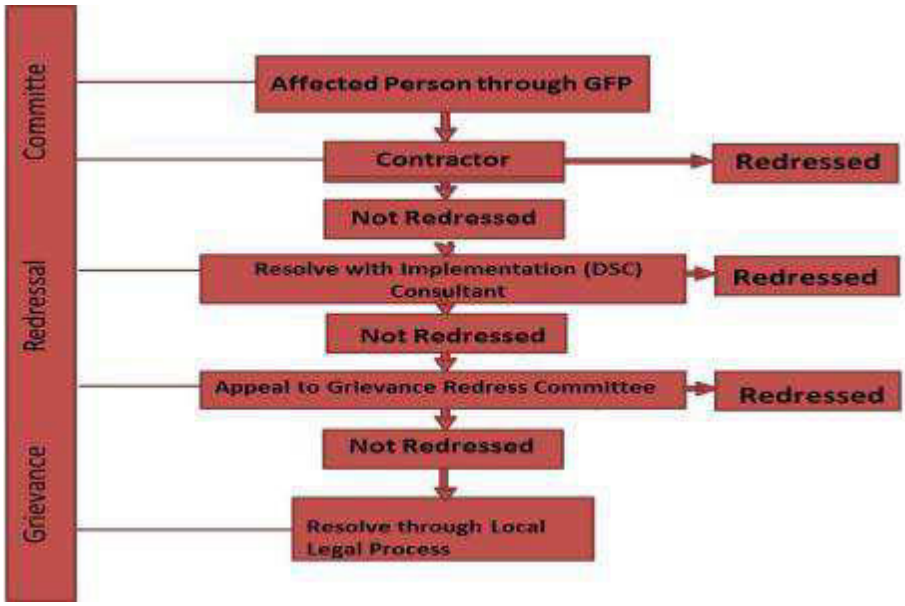
115. There shall be a public grievances redressal committee which will receive and redress the grievance of the public relating to environment. The committee shall consist of:

- Project Director
- Resident Engineer
- A representative of the local community

128. The committee shall ensure the following steps are taken as the construction of the project proceeds.

- A pre-mobilization public meeting shall be held to inform them regarding the participation in maintenance of environment in construction and operational phases of the process.
- If required, a training session may be held for all stakeholders giving them awareness about environment of the project.

Figure 6.1: Grievance Redress Mechanism



CHAPTER - 7: ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

116. This section identifies the potential impacts of proposed Nowshera Grid Station and its allied Transmission Line.

7.1 Potential Impact Sources

117. Environmental and Social impacts attributable to the proposed Project can be classified into those which are likely to take place during construction and those occurring during Operational Phase. For such an environment friendly project, most of these impacts can be anticipated and avoided through appropriate adjustments in the Project design. Some can be mitigated by adopting good practices while implementation of the Project.

118. Construction related impacts will depend upon the following factors:-

- The Contractor's Work practices, especially those related to storage of construction material and cleanliness of the work sites.
- Cooperation between local communities and local authorities and the contractor for any use of public space and utilities
- Project management's enforcement of correct construction practices and standards
- Incorporation of mitigation measures identified in the IEE into the tender, bid and Contract agreement documents and provision of linkage between IEEs monitoring regime and contractor's payments
- Quality of Monitoring and Reporting

119. Operational Impacts of the proposed project are associated with the management of the Grid Station and its allied transmission line.

120. Combining the construction as well as the operational phases, the expected impacts can be grouped as follows:

Physical Environment

- Land Resources
- Water Resources
- Air Quality
- Noise Level

Biological Environment

- Flora
- Fauna
- Fish
- Endangered Species

Social Environment

- Physical Cultural/ Historical Sites

- Any adverse social interaction

121. Table 7.1 provides a checklist of the status of potential impacts likely to be associated with the construction and operation of 220 KV Grid Station and its allied Transmission Line. Each impact has been classified as Negligible, Slight, Moderate and Significant. These classes will mean as follows:-

- **Negligible:** Not expected
- **Slight:** Easily mitigable through good design
- **Moderate:** Mitigable through good practice by contractor
- **Significant:** Irreversible, requiring compensatory steps

Table 7.1: Evaluation of Environmental Impacts

CONSTRUCTION PHASE

Aspects	Impacts Assessed		Assessment			
			Negligible	Slight	Moderate	Significant
1.Land Resource	1.1.1	Site for disposal of construction waste			✓	
	1.1.2	Landslide, Unstable soil or similar unforeseen conditions	✓			
	1.1.3	Location of Labour camps, material depots, equipment yards and approach roads			✓	
	1.1.4	Any Natural disasters such as heavy rains, floods and earthquakes	✓			
	1.1.5	Soil Contamination from diesel and oil spills from construction machinery			✓	
	1.1.6	Damage/blockage of Drains, paths, roads and cross drainage by moving machinery	✓			
	1.1.7	Scouring of Earthen embankment or concrete work edge	✓			
	1.1.8	Release of construction water	✓			

Aspects	Impacts Assessed		Assessment			
			Negligible	Slight	Moderate	Significant
		on unstable slope or any public/private property				
	1.1.9	Release of construction water to any river structure such as bridge/culvert	✓			
	1.1.10	Any discharge, spill or dumping on any building or house on riverbank	✓			
	1.1.11	Impact of taking borrow material from earth borrow site		✓		
	1.1.12	Impact on paths or road used for transport of construction material	✓			
	1.1.13	Impact of stone quarrying	✓			
	1.1.14	Any blasting during Construction	✓			
	1.1.15	Soil Compaction due to labour camp and other uses			✓	
2.Water Resources	1.2.1	Sourcing of construction water			✓	
	1.2.2	Impact of surface water	✓			
	1.2.3	Impact of ground water			✓	
	1.2.4	Impact of drinking water		✓		
	1.2.5	Diesel and other fluids spilling over to river water from machinery	✓			
	1.2.6	Damages from floods of rivers or streams	✓			
	1.2.7	Obstruction of flow of water in the river		✓		

Aspects	Impacts Assessed		Assessment			
			Negligible	Slight	Moderate	Significant
		or any stream				
	1.2.8	Effect on surface flow conditions in rains		✓		
3.Air Quality and Noise Pollution	1.3.1	Dust, smoke and other pollutants from construction machinery including the machinery deployed on Transmission Line		✓		
	1.3.2	Dust from batching plants		✓		
	1.3.3	Dust from vehicles moving around and inside the construction area		✓		
	1.3.4	Dust or other air pollutants from stored material and soil keeps	✓			
	1.3.5	Smoke from burning of waste material or burning of firewood		✓		
	1.3.6	Noise from use of old or outdated machinery	✓			
	1.3.7	Dust or smell from spoil dumps or keeps		✓		
	1.4.1	Damage to Flora				✓
	1.4.2	Damage to Fauna		✓		
	1.4.3	Damage to Fisheries	✓			
	1.4.4	Impact on adjacent open land	✓			
	1.4.5	Impact on any Protected Area	✓			
	1.4.6	Impact on any Wildlife Sanctuary or Reserve	✓			
	1.4.7	Impact on migratory birds	✓			

Aspects	Impacts Assessed		Assessment			
			Negligible	Slight	Moderate	Significant
	1.4.8	Impact on endangered Species	✓			
	1.4.9	Impact on any wetland (close or far away)	✓			
	1.4.10	Impact on agriculture in adjacent barani lands	✓			
	1.4.11	Impact on domestic livestock in the adjacent areas	✓			
4.Socio-Economic Cultural and Archeological Issues	1.5.1	Impact on existing services e.g. education, health, electricity, water supply, communication	✓			
	1.5.2	Impact on local ethnicity, Tribal Tensions, or communal rivalries	✓			
	1.5.3	Impact on farmers raising agricultural crops in the adjacent areas	✓			
	1.5.4	Impact on land ownership and Land Tenure System		✓		
	1.5.5	Impact on access to Construction Material	✓			
	1.5.6	Adverse effect on physical, cultural and archeological heritage	✓			
	1.5.7	Impact on graveyards or burials	✓			
	1.5.8	Impact on Public safety at construction site		✓		
	1.5.9	Impact on Health and safety of labour			✓	

Aspects	Impacts Assessed		Assessment			
			Negligible	Slight	Moderate	Significant
		and employees on construction site				
	1.5.10	Resettlement of Affectees		✓		
	1.5.11	Loss of cultural ties and family lands due to involuntary shifting of population	✓			
	1.5.12	Loss of livelihood due to land loss and ancestral villages	✓			
	1.5.13	Loss of local techniques and knowledge due to shifting of population	✓			
	1.5.14	HIV/AIDS and infectious diseases such as cholera and Hepatitis in the labour, employees or nearby public			✓	
	1.5.15	Impact on Employment		✓		
	1.5.16	Impact on Women status Exposure to employment and education opportunities	✓			
	1.5.17	Hurdle in cultural Reunion	✓			
	1.5.18	Hurdle in accessing market opportunities for agricultural produce	✓			
	1.5.19	Reduction in recreation opportunities	✓			

OPERATIONAL PHASE

At Operational stage these are not impacts, but practices

Aspects		Impacts Assessed	Assessment			
			Negligible	Slight	Moderate	Significant
Monitoring and Evaluation as per operational manual and monitoring plan	2.1	Identification of Monitoring Indicators				✓
	2.2	Decision regarding Monitoring Frequency				✓
	2.3	Preparation of Checklist based on Monitoring Indicators				✓
	2.4	Preparation of Comprehensive Monitoring Plan				✓
	2.5	Compliance to Monitoring Plan				✓
	2.6	Continuous Evaluation of Design Efficiency				✓
	2.7	Understanding and training of Operational Manual				✓
	2.8	Environmental annual audit				✓
	2.9	Regular Maintenance				✓
	2.10	Staff Welfare				✓
	2.11	Continuous Public Consultation				✓
	2.12	Continued gender issues and women consultation				✓
	2.13	Refresher courses and training of Operational Staff				✓

Key to Colors

Negligible	
Slight	
Moderate	
Significant	

122. Explanation of the Impact Assessment in Table 7.1

123. Table 7.1 provides a schematic presentation of the degree of significance of various environmental factors at construction and operational phases. A summary of environmental impacts at construction stage is given below in Table 7.2.

Table 7.2: Summary of Impacts at Construction Stage

Impact Source	Negligible	Slight	Moderate	Significant
Physical (31)	16 (51%)	9 (29%)	6 (20%)	0 (0%)
Biological (11)	9 (82%)	1 (9%)	0 (0%)	1 (9%)
Social (19)	13 (68%)	4 (21%)	2 (11%)	0 (0%)
Total (61)	38 (62%)	14 (23%)	8 (13%)	1 (2%)

124. Table 7.2 shows that only 2% of the total impacts are significant in nature. 13% of the total impacts are of moderate nature. Most of the impacts (62%) are negligible. This table may conclude that the project is environmental friendly and will not impose any major adverse impact on the environment.

7.2 Potential Environmental Impacts in Construction Phase

7.2.1 Physical Impacts

7.2.1.1 Air Quality and Noise Level

125. Due to the construction of the proposed project, air pollution and associated health risks may increase. Air pollutants would be generated during following processes:

- Excavation of soil, Civil works, Movement of machinery, Placement and storage of construction material

126. This machinery used for the above listed operations will generate air emissions that may contain the following components in ambient air

- Particulate matter (PM), Smoke, Dust, CO, NO_2

127. In addition to these fugitive dust emissions will be generated in the construction phase. These emissions are directly proportional to silt content of dirt tracks, vehicle speed and mean annual number of days with 0.01 inches or more rainfall.

Mitigation

- Regular tuning, checkup of construction vehicles and machinery to comply with NEQS
- Limit the speed of the vehicle in the working area.
- Construction activities causing dust will not be carried out on excessively windy days
- Trucks carrying, earth, sand, aggregate and other materials will be kept covered with sheet.
- Dust emissions can be controlled by regular sprinkling of water to settle it down.
- Dust emissions (mainly common ambient air dust) may be generated in the construction phase for these workers will be provided and instructed to wear the goggles and dust masks, whenever and wherever required.
- Plantation plan for trees & plants around the Industry.

- Do not leave equipment idling unnecessary this will reduce both air emissions (NO_X, SO_x and CO) and unnecessary noise.

7.2.1.2 Encroachment, Landscape and Physical Disfiguration

128. The extent of the proposed power expansion is moderate and should not extend beyond the power corridor (RoW) created by the subproject. No significant landscape impacts are expected from New 220 kV Nowshera Grid Station.

Mitigation

129. It would be ensured that scrap does not contain any material which will produce obnoxious material that would contaminate soil or water resources.

7.2.1.3 Cut and fill and waste disposal

130. Disposal of surplus materials must also be negotiated through local authority approvals prior to the commencement of construction. The Subproject work should 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 scrabbled to remove unstable materials, or to stockpile topsoil.

Mitigation

131. Mitigation measures must focus on the minimization of impacts. In order to allow the proper functioning of the settlement sites (access to villages) during construction it is recommended that consideration be given to erect temporary hoardings immediately adjacent to the nearest houses and shops if they are within 15m of the power distribution line tower construction.

132. 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.

133. The subproject detailed designers have so far estimated that no substantial additional materials will be required subject to confirmation at the detailed design stage.

134. 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 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.

7.2.1.4 Hydrology, Sedimentation, Soil Erosion

135. The drainage streams en-route of the subproject should not be impeded by the works. The scale of the works does not warrant hydrological monitoring.

Mitigation

136. Design engineer will ensure appropriately sized drainage to avoid negative impacts on the local drain system. During construction phase, temporary drains and embankments would be necessarily made to channel the runoff appropriately.

7.2.1.5 Air Pollution from earthworks and transport

137. The material (cement, sand and aggregate) requirement of a typical 220 kV substation (about 150 cu m) and a 132 kV transmission tower (4.8 cu m, or 40 bags of cement per tower) are not large. In transmission line construction sand and aggregate are delivered directly to the tower location from the quarry / source, there is no intermediate or bulk storage of these materials. Similarly construction materials for the substation are stored within the substation site are scheduled as per the work progress (which is staggered as the buildings which require bulk of the construction materials are built in phases over 6 to 12 months period), which means that at any given point in time the amount of construction material stored is not significant. The quantities of construction material required for a typical substation or transmission tower are not so large that they potentially represent a traffic hazard , these requirements are time dispersed in case of sub stations and time and space dispersed in case of transmission lines. The contractor will be, however, required to provide a traffic management plan before commencement of work at site. Field observations indicate that ambient air quality is generally acceptable and that emissions from traffic and other powered mechanical equipment in the area are rapidly dispersed. There will be a few items of powered mechanical equipment to be used in the construction of the distribution line works that may give rise gaseous emissions. However these should be well dissipated. The major sources of complaint will likely be any necessary earthworks and local soil compaction.

Mitigation

138. Earthworks will contribute to increasing dust, and the foundation earthworks for the transformers and the line poles will generate dust and the following mitigation measures are suggested:

- Dust suppression facilities (water sprayers / hosepipe) shall be available where earth and cement works are required.
- Areas of construction (especially where the works are within 50m of the SRs) shall be maintained damp by watering the construction area.
- Construction materials (sand, gravel, and rocks) and spoil materials will be transported trucks covered with tarpaulins.
- Storage piles will be at least 30m downwind of the nearest human settlements.
- All vehicles (e.g., trucks, equipment, and other vehicles that support construction works) shall be well maintained and not emit dark, smoky or other emissions in excess of the limits described in the NEQS.

139. The need for large stockpiles should be minimized by careful planning of the supply of materials from controlled sources. Stockpiles 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.

7.2.1.6 Noise, Vibration and Blasting

140. 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. 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.

141. Noise from the construction of the towers would not be a major consideration as there are no schools or hospitals present nearby the construction site. 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.

Table 7.3: National Environmental Quality Standards for Noise

S No.	Category of Area/Zone	Effective from 1st July, 2010		Effective from 1st 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.*

Mitigation

142. Noise will be monitored at a distance of 100m from the boundary wall of any residential unit and should follow the NEQS of 45dB (A).

143. Noise from construction of the power distribution lines and improvements to substations is not covered under any regulations however in order to keep in line with best international practice It is recommended that no construction should be allowed during nighttime (9 PM to 6 AM) Any noisy equipment should be located within DGS or as far from Sensitive Receivers (SRs) 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.

144. 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.

145. 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 maintained 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.

7.2.1.7 Impact of Stone Quarrying

146. Inappropriate quarrying practices can lead to unstable slopes, risk of landslides, loss of top soil, and damage to the natural vegetation.

Mitigation

147. The government approved quarry will be selected after obtaining approval from the RE. It will be ensured that the quarrying does not significantly affect the slope stability, top soil, and natural vegetation of the area.

7.2.1.8 Soil Compaction due to Labour Camps and Machinery Yards

148. The human and mechanical activity normally compresses the soil and turns the area as impervious and nonproductive for plant production after the project completion.

Mitigation

149. The contractor will restore the area under its temporary facilities. Photographs taken at the time of establishment of these facilities will be used for this purpose.

7.2.2 Biological Impacts

7.2.2.1 Damage to Flora

150. There shall be a major clearance of the indigenous flora from the project site and the land shall be more or less, leveled. This will be a significant impact on the site.

Mitigation

151. If possible, the indigenous trees and other flora may be saved on the spot which are not required directly from construction.

152. Trees should be enumerated species wise and compensatory plantation should be arranged along roads and paths within the campus or outside the campus through social forestry. At least 5 compensatory saplings should be planted in place of one tree cut. Keeping in view 15% inflation rate each year and the estimated price rate for each sapling is 30 Rs. per plant, total cost for plantation accounts to be 50,000/- Rs if the plantation plan is implemented after 3 years from today.

7.2.2.2 Damage to Fauna

153. Mammals and reptiles shall be especially disturbed with 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.

Mitigation

154. While constructing boundary wall around the project campus, outlets near the ground surface should be provided at suitable intervals in order to facilitate the mammals and reptiles to migrate out of the disturbed campus.

155. As far as possible, some parts of original habitat should be retained.

156. In spots there is absolutely no tree, birds' nests (boxes with a hole) can be fixed with poles or other installations.

7.2.2.3 Damage to Fisheries

157. There is no water body, stream or river within or around the campus where fish can be found. So any fish damage is not involved in this case.

Mitigation

158. Possibility being negligible, no mitigation measure for fish is required.

7.2.2.4 Impact on Protected Area

159. There is no protected area, as per identification of National Conservation Strategy, inside or anywhere near the project.

Mitigation

160. The possibility is negligible so no mitigation measure can be considered.

7.2.2.5 Impact on Adjacent Open Land

161. The adjacent open land is either barani (rainfed) agricultural land or semi barren rangeland with very open density scrub flora. With effective control on dust and other emissions, there is no possibility of any impact on the open land around the project campus.

Mitigation

162. Possibility being negligible, no impact is expected on the open land lying adjacent to the project. Hence the situation does not warrant any mitigation measures.

7.2.2.6 Impact on any Wildlife Sanctuary or Reserve

163. There is no wildlife sanctuary inside or anywhere near the project area.

Mitigation

164. Possibility being negligible, no mitigation is warranted in this case.

7.2.2.7 Impact on Migratory Birds

165. The Project area is nowhere near any Ramsar site. Nor there is any water body inside or near the project campus. Therefore the project cannot have any effect on migratory birds.

Mitigation

166. Possibility being negligible, no mitigation is warranted in this case.

7.2.2.8 Impact on endangered Species

167. No endangered species is attributable to project area which is listed in IUCN Red Book of endangered species.

Mitigation

168. There is no endangered species in the Project area. The situation does not require any mitigation.

7.2.2.9 Impact on any Wetland

169. No wetland is situated inside or anywhere near the Project area.

Mitigation

170. Possibility being negligible, no mitigation measure is warranted.

7.2.2.10 Impact on Adjacent Barren (Rainfed) Agricultural Land

171. Dependence of barani (rainfed) agriculture is on rain. The project area cannot have any impact on rain. Therefore it is not possible for Project area to have any influence on adjacent barani (rainfed) agricultural land.

Mitigation

172. Possibility being negligible, no mitigation measure is warranted.

7.2.2.11 Impact on domestic livestock in the adjacent area

173. Diversion of 40 acres of semi-barren rangeland shall be conveniently compensated by alternate grazing land or stall feed with fodder from agricultural lands. Hence it is not possible for the project area to cause any impact on domestic livestock in the adjacent areas.

Mitigation

174. Possibility being negligible, no mitigation measure is required.

7.2.3 Social Impacts

7.2.3.1 Land Acquisition

175. Land required for establishing contractor's facilities including camp, workshop, plants, borrowing earth material and dumping excess spoil would be acquired directly from the private land owners by the contractor.

Mitigation

176. The supervisory consultants would monitor the process of restoration through the terms of construction contracts, the land owners would be compensated according to the terms of lease agreements.

7.2.3.2 Cultural Heritage, Mosques, Religious Sites, and Social Infrastructure

177. The location of mosques and other cultural and other heritage SR sites has been reviewed There is no mosque within the DGS and there are no other mosques or other religious sites close to the DGS site. The associated Transmission line will also not affect or disturb any such site.

Mitigation

178. Public consultation should be undertaken at the implementation stage to ensure nuisances are not allowed to escalate for the Sensitive Receivers close to the DGS sites.

7.2.3.3 Sanitation, Solid Waste Disposal, Communicable Diseases

179. 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.

180. In order to maintain proper sanitation around construction sites provision of temporary toilets should be made. Construction worker camps will not be necessary, based on the scale of the works needed. If for some unforeseen reason a larger workforce is needed any construction camp should not be located in settlement areas or near sensitive water resources and portable lavatories or at least pit latrines should be provided.

181. 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 subproject site.

Mitigation

182. 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.

7.3 Potential Environmental Impacts in Operation Phase

7.3.1 Physical Impacts

7.3.1.1 Air pollution and noise from the enhanced operations

183. The subproject works will extend the power distribution lines but no houses, mosques or schools will be 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 of any noise barriers are required. There should be 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

184. All the emissions will be very well dissipated in the open terrain and there will be no cumulative effect from the subproject.

185. Noise impacts from the operation of the DGS equipment should 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).

7.3.1.2 Pollution from oily run-off, fuel spills and dangerous goods

186. No significant impacts from oily residues such as transformer oil and lubricants are expected to arise in this subproject. However 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.

Mitigation

187. Contaminated residues and waste oily residues should be disposed at a site agreed with the local authority. 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.

7.3.1.3 Enhancement

188. Environmental enhancements are not a major consideration within the Nowshera subproject site. However it is noted that it is common practice at many such sites to create some local hard and soft landscaping and successful planting of fruit trees and shrubs has been accomplished in many sites. This practice should be encouraged as far as practicable. Other opportunities for enhancements can be assessed prior to construction and proposed enhancements should 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. Trees removed for construction purposes should be replaced as compensation in line with best practice at ratio of three replaced for one removed however additional trees should be planted as enhancements where there is space in the DGS and along the DXL.

7.3.2 Biological Impacts

189. In operational phase, the grid construction will have positive impacts on the flora and fauna. Replantation and thus the rehabilitation of biodiversity will give a positive impact on overall.

7.3.3 Social Impacts

7.3.3.1 Positive Impacts on Power Distribution

190. The Grid Station construction will improve the voltage and power availability overall. It would assist in overcoming the energy shortage and low voltage issues. It will improve and upgrade the existing power distribution infrastructure to ensure a reliable power supply to increasing number of industrial, agricultural, commercial, and domestic consumers. This will be a beneficial effect of the proposed sub project. It will meet the requirement and result in overall power efficiency and stability to deliver adequate & quality power to the consumers.

7.3.3.2 Employment Generation

191. Labour will be employed for the sub project implementation. Moreover it will improve the power availability and hence a positive impact on the entire industrial and manufacturing sector. The major occupation in project area is agricultural farming, small businesses and service in public and private sectors. Implementation of the subproject will improve the country's overall economy.

7.3.4 General Approach to Mitigation

192. The proposed Mitigation measures must be reviewed by the project management and approved by the EPAs before any construction activity is initiated. This is also an ADB requirement in order to take account of any sub-sequent changes and fine tuning of the proposals. It is recommended that before the works contract is worked out in detail and before pre-qualification a full extent of the environmental requirements of the project

(IEE/EIA) are included in the bidding documents including the EMP. Past environmental performance of contractors and awareness of environmentally responsible procurement should also be used as indicators for prequalification of contractors.

193. In order to facilitate the implementation of the EMP, during the preparation for the construction phase, the future contractors must be prepared to co-operate with the local population in the mitigation of impacts. Furthermore, the contractor must be primed through the contract documentation and ready to implement all the mitigation measures and engage trained environmental management staff to audit the effectiveness and review mitigation measures as the project proceeds. The effective implementation of the Environmental Monitoring Plan will be audited as part of the mid-term review of loan conditions and the executing agency must be prepared for this.

194. In the Mitigation Plan Matrix, the impacts have been classified into those relevant to the design/preparation stage, construction stage and operation and maintenance stage. The matrix provides details of the mitigation measures recommended for each of the identified impacts, approximate location of the mitigation sites, time span of the implementation of mitigation measures, an analysis of the associated costs and the responsibility of the institution. The institutional responsibility has been specified for the purpose of the implementation and the supervision. The matrix is supplemented with a monitoring plan in chapter 7 for the performance indicators. An estimation of the associated costs for the monitoring is given with the plan including physical mitigation costs. The EMP has been prepared following the best practices and the ADB's Safeguards Policy Statement, 2009.

195. Prior to implementation of the subproject, the NTDC needs to comply with several environmental requirements, such as obtaining EPA clearance ("No Objection Certificate", compiling acceptable EMP and Clearance Certificate) under PEPA, 1997 (IEE/EIA guidelines and regulations 2000), securing tree removal and replanting permits from the Department of Forests and any permissions required from the Irrigation Department, Provincial Highway Department and Department of Wildlife Services. NTDC will also need to confirm that contractors and their suppliers have complied with all statutory requirements and have appropriate and valid licenses and permits for all powered mechanical equipment, permissions for use of local water supplies in line with the all environmental requirements (e.g. and local authority conditions).

196. Project impacts on sensitive receivers (SR), including some houses, schools, colleges, factories, being more than 500 m away from the DGS boundary would be minimum, and there are no sensitive receivers close to the DGS which could be possibly affected by certain activities of the construction works. The Grid Station would require the removal of some trees, but there are no other sensitive receivers on its route, which could be affected by the works.

197. Thus overall the Environment and Social impacts attributable to the Project during construction and operation phases are at minor level. Some of them can be anticipated and avoided through careful implementation of the Project, while rest can be adjusted by appropriately following operational manual and effective implementation of mitigatory measures.

198. The EMP has been reviewed 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 Mitigation measures and Environmental Monitoring Plan 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.

CHAPTER - 8: ENVIRONMENTAL MONITORING PLAN AND INSTITUTIONAL REQUIREMENTS

199. In this section, the mitigation measures that are required for the Nowshera Grid Station Tranche-IV subproject, to reduce residual impact to acceptable levels and achieve the expected outcomes of the project, are discussed. The Environmental Monitoring Plan is based on the type, extent and duration of the identified environmental impacts for the proposed Tranche-IV subproject of new Nowshera 220 KV Grid Station along with about 2 km (1+1) In/Out 220 kV transmission line. The IEE has been prepared following best practice and by reference to the ADB Policy Statement 2009.

200. It is important that the recommendations and mitigation measures are carried out according to the spirit of the environmental assessment process and in line with the guidelines. The impact prediction has played a vital role in reconfirming typical mitigation measures and in identifying any different approaches based on the feasibility and detailed design assumptions and any alternatives available at this stage.

201. Prior to implementation and construction of the subprojects the Environmental Monitoring Plan shall be amended and reviewed by the NTDC in due course after detailed designs are complete. Such a review shall be based on reconfirmation and additional information on the assumptions made at this feasibility stage on positioning, alignment, location scale and expected operating conditions of the subprojects. For example, in this case if there are any additional transmission lines or extension of the substation boundaries to be included, the designs may be amended and then the performance and evaluation schedules to be implemented during project construction and operation can be updated and costs estimates can be revised. The IEE and Environmental Monitoring Plan should than be revised on a subproject by subproject basis.

202. The IEE and Environmental Monitoring Plan must be reviewed by the project management and approved by the PEPA before any construction activity is initiated. This is also an ADB requirement in order to take account of any sub-sequent changes and fine tuning of the proposals. It is recommended that, before the works contract is worked out in detail and before pre-qualification of contractors, a full extent of the environmental requirements of the project (IEE/EIA and EMP) are included in the bidding documents. Professional experience indicates that past environmental performance of contractors and their awareness of environmentally responsible procurement should also be used as indicator criteria for the prequalification of contractors.

203. The effective implementation of the Environmental Monitoring Plan will be audited as part of the ADB midterm review of loan conditions and the executing agency must prepare for this at the inception stage.

204. The future contractors must be prepared to co-operate with the local population during the construction phase to facilitate in mitigation of impacts and the implementation of the EMP. Furthermore, the contractor must be primed through the contract documentation and ready to implement all the mitigation measures and engage trained environmental management staff to audit the effectiveness and review mitigation measures as the project proceeds. The effective implementation of the EMP will be audited as part of the mid-term review of loan conditions and the executing agency must be prepared for this.

205. The impacts have been classified into those relevant to the design/preparation stage, construction stage and operation and maintenance stage. The matrix provides details of the mitigation measures recommended for each of the identified impacts, time span of the implementation of mitigation measures, an analysis of the associated costs and the responsibility of the institution. The institutional responsibility has been

specified for the purpose of the implementation and the supervision. The matrix is supplemented with a monitoring plan for the performance indicators. An estimation of the associated costs for the monitoring is given with the plan. The EMP has been prepared following best practice and the ADB Safeguard Policy Statement 2009.

206. Prior to implementation of the subproject, the NTDC needs to comply with several environmental requirements, such as obtaining EPA clearance ("No Objection Certificate", compiling acceptable EMP and Clearance Certificate) under PEPA, 1997 (IEE/EIA guidelines and regulations 2000), securing tree removal and replanting permits from the Department of Forests and any permissions required from the Irrigation Department, Provincial Highway Department and Department of Wildlife Services. NTDC will also need to confirm that contractors and their suppliers have complied with all statutory requirements and have appropriate and valid licenses and permits for all powered mechanical equipment, permissions for use of local water supplies in line with the all environmental requirements (e.g. and local authority conditions).

Table: 8.1: 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	Resp PI supervision	Cost of Supervision
DESIGN and PRE-CONSTRUCTION STAGE								
1. Review of Mitigation Measures	Mitigations Matrix reviewed	During detailed design (later monthly by Contractor to cover any unidentified impacts)	By completion of detailed design.	All project alignment	Contractor	Initially NTDC/ later Contractor cost	NTDC, ESIC cell / ADB*	ESIC cell staff cost
2. Social Impacts	Inventory of losses, Property acquisition, and compensation completed to RP requirements.	*Completed prior to commencement of construction*	Before removal of houses and structures.	APs according to RP & LAFC.	NTDC's Cell	NTDC, ESIC cell	NTDC, ESIC cell /ADB*	ESIC cell staff cost
3. Project disclosure	Design changes notified	During detailed design by Contractor to cover any access roads and alignment changes, additional Villages.	Completion of detailed design.	All project alignment.	Contractor	Contractor cost	NTDC, ESIC cell / ADB*	ESIC cell staff cost
4. 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.	Before Contract is signed.	Method Statements include resources for mitigation measures.	NTDC, ESIC cell	Contractor cost	NTDC, ESIC cell / ADB*	NTDC, ESIC cell
5. Waste disposal	Disposal options for all waste transformer oil,	Monthly to identify sufficient locations	1.Prior to detailed design stage no	Locations approved by	NTDC, ESIC cell consultant.	ESIC cell	NTDC, ESIC cell / ADB*	NTDC, ESIC cell

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Resp PI supervision	Cost of Supervision
	residually contaminated soils, scrap metal agreed with NTDC'S and local authority..	for, storage and reuse of transformers and recycling of breaker oils and disposal of transformer oil, residually contaminated soils and scrap metal "cradle to grave". 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.	later than pre-qualification or tender negotiations 2. Include in contract.	local waste disposal authorities.				
6. Noise and air quality mitigation in design.	Changes in the design of construction processes as approved by the Contractors and appointed engineers	During detailed design by Contractor.	Completion of detailed design.	As defined in Mitigation Plans.	NTDC, ESIC cell	Contractor cost	NTDC, ESIC cell / ADB*	NTDC, ESIC cell
7. Hydrological Impacts	Temporary Drainage in Mitigation Measures	During detailed design by Contractor	One month before commencement of	Considered locations to be	Contractor	Contractor cost	NTDC, ESIC cell / ADB*	NTDC, ESIC cell

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Resp PI supervision	Cost of Supervision
		and monthly to cover any unidentified impacts	construction	as identified in the Detailed Drainage Report.				
8. Temporary drainage and erosion control	Erosion Control and Temporary Drainage completed.	During detailed design updated by Contractor monthly to cover any unidentified impacts.	One month before construction commences.	All stream and river crossings and where slopes indicate erosion will be a problem.	Contractor.	Contractor cost	NTDC, ESIC cell / ADB*.	NTDC Cell staff cost
9. 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's cell in consultation with community and the Contractor.	Contractor/ NTDC Cell facilitate.	Contractor cost	NTDC, ESIC cell / ADB*.	NTDC's Cell staff cost
10.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'S cell in consultation with community and the Contractor.	Contractor	Contractor cost	NTDC, ESIC cell / ADB*.	NTDC'S Cell staff cost
11. Institutional strengthening and capacity building	1. Strengthening plan agreed for NTDC's cell. 2. International environment specialist (IES) 3. Increase staffing of	1. Once, 2. Once 3. Ongoing 4. Ongoing	1. As soon as practicable 2, 3, 4. No later than one month before Contract award.	Throughout the project	NTDC'S Project Cell.	NTDC'S Cell staff cost	NTDC, ESIC cell / ADB*	ADB cost of IES & support for 1 month

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Resp PI supervision	Cost of Supervision
	NTDC's Cell. 4. Train NTDC's Cell officials.							
CONSTRUCTION STAGE								
1.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 BOT staff members in all categories. monthly induction and six month refresher course	Contractor with IES assistance and record details.	Contractor cost	NTDC to observe and record success	NTDC'S Cell staff cost
2. 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	Deliverable in final form to NTDC's cell one month before construction commences for any given stretch.	One month before construction commences.	All of NTDC'S alignment.	Contractor	Contractor cost	NTDC, ESIC cell / ADB*.	NTDC'S Cell staff cost

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Resp PI supervision	Cost of Supervision
	mitigation.*{N.B. Forest Clearance and Compensatory Planting plan is prepared by* NTDC's *cell}*							
3. Water quality	Meaningful water quality monitoring up and downstream during construction within 100m of rivers. Rapid reporting and feedback by NTDC's	Once (line item when opening up construction near water bodies).	During detailed design by Contractor and update to cover any unidentified impacts.	Locations to be provided with the detailed designs including all bridges during construction within 100m of rivers	Independent experienced laboratory.	Contractor cost	NTDC, ESIC cell	NTDC'S Cell staff cost
4. Water Resources	1. Availability of water acceptable to community. No complaints. 2. Guidelines established to minimize the water wastage during construction operations and at worker camps.	1. Monthly 2. Monthly	Prior to submission of progress reports.	All local water supply resources and rivers.	Contractor	Contractor cost	NTDC, ESIC cell	NTDC'S Cell staff cost
5. Spoil disposal and construction waste disposal	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.	All NTDC'S alignment.	Contractor	Contractor cost	NTDC, ESIC cell	NTDC'S Cell staff cost
6. Noise	Noise mitigation	Monthly (line item	Maximum	All NTDC's	Contractor	Contractor cost	NTDC, ESIC	NTDC'S Cell staff

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Resp PI supervision	Cost of Supervision
	measures implemented in line with guidelines for noise reduction from ISO/TR11688-1:1995(E)	when opening up construction).	allowable noise levels are 45dB(A)L_{EQ}.	alignment.	should maintain the accepted standards		cell.	cost
7. Air quality	Noise and dust control plan implemented.	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All NTDC's alignment.	Contractor	Contractor cost	NTDC, ESIC cell	NTDC'S Cell staff cost
8. Soil Contamination	Contractors workforce to instructed and train handling of chemicals	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All NTDC's alignment.	Contractor	Contractor cost	NTDC, ESIC cell	NTDC'S Cell staff cost
9. 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.	All NTDC's alignment.	Contractor	Contractor cost	NTDC, ESIC cell	NTDC'S Cell staff cost
10. Safety Precautions for Workers	Safety Plan submitted	Once (update monthly as necessary)	One month before construction and update quarterly.	All NTDC's alignment.	Contractor.	Contractor cost	*NTDC* (ESIC cell to actively supervise and enforce.	NTDC'S Cell staff cost
11. Social Impacts	1. Local labour is used and workforce 2. Local educated people for office work. 3. Complaints on construction nuisance damages close to ROW	Monthly (line item when opening up construction).	During construction. Update monthly.	All NTDC's alignment.	Contractor	Contractor cost	NTDC, ESIC cell	NTDC'S Cell staff cost

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Resp PI supervision	Cost of Supervision
	are responded to promptly by the Contractor. 4. Quarterly meetings with local VILLAGE for liaison purposes to monitor complaints.							
12. Enhancements	Contractor has included for some enhancements in detailed designs Including planting of trees in addition to bioengineering such as in median	Once (update monthly as necessary)	One month before construction and update quarterly.	All NTDC's alignment.	Contractor.	Contractor cost	*NTDC* Cell to actively supervise and enforce.	NTDC'S Cell staff cost
OPERATIONAL STAGE								
1. Air Quality	*1. Roadworthiness of vehicles on* NTDC's *2. Monitor NO_2 and PM_{10} as indicators.*	*1. Roadworthiness of vehicles on* NTDC's *Daily during operations* *2. Yearly intervals for 3 years after opening for reassurance.*	*During operation.*	5 locations on NTDC'S alignment nearest settlements.	Contractor	Contractor cost	NTDC / and ESIC Cell	NTDC'S Cell staff cost
2. Vegetation	1. Follow up on Tree Clearance and Compensatory Planting Plan. 2. Records on survival of planted trees.	1) Quarterly 2) Quarterly 3) Quarterly 4) Quarterly	1) Throughout project 2) Each of three years after initial planting. 3) Continuous for	All NTDC'S alignment.	Contractor	ESIC Cell	NTDC	NTDC'S Cell staff cost

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Resp PI supervision	Cost of Supervision
	3. The compensatory planting maintained 4. Audited report by ESIC cell for on-site and off-site compensatory planting.		three years after project completion 4) For four years after initial clearance of the forest.					

Note: *LAFC = Land Acquisition Compensation Fixation Committee. DDS=Detailed design stage. Based on EIA/IEE reports to be revised at DDS, RAP, SIA and other engineering considerations may change, EIA=environmental impact Assessment. EPA= Environmental Protection Agency, TD = Temporary drainage. EC = Erosion control. NGO = Non-Government Organization. ADB * = ADB checks that processes have been completed and signed off by* NTDC's *before moving to construction stage. MoFSC = Ministry of Forest and Soil Conservation.*
ESIC = Environmental and Social Impact Cell (NTDC)

8.1 Institutional Requirements

207. 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 Khyber Pakhtunkhwa. The ESIC is composed of one Director, one Deputy Director, and two Assistant Directors (refer to Fig 8.1). 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 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.

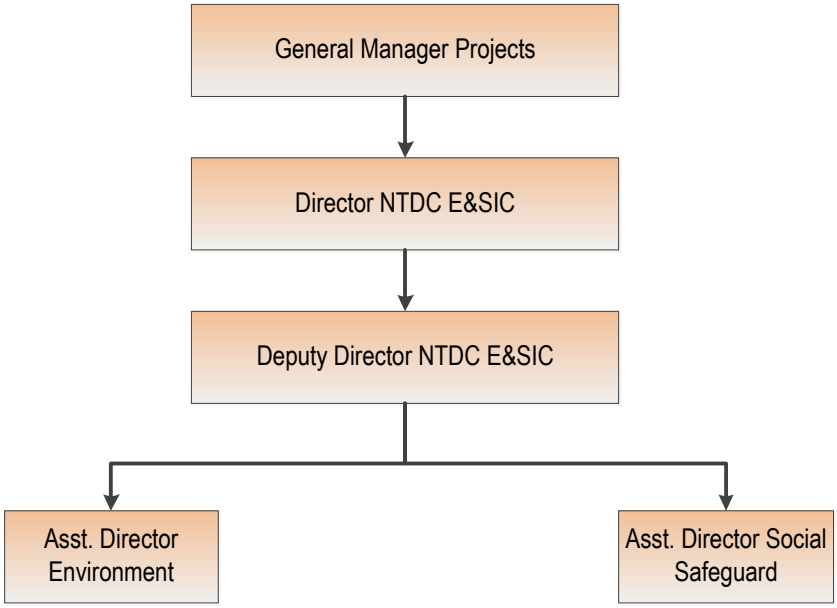


Figure 8.1: Organogram of NTDC Environment and Social Impact Cell

208. An Environment Specialist should also be the part of Project Management Consultants' team to assist the ESIC and PMU for monitoring and reporting to ADB for all the sub projects of Tranche-IV. This Specialist will;

- work in close coordination to ESIC and PMU, NTDC to ensure all statutory environmental submissions under PEPA, 1997 and other environmentally related legislation are thoroughly implemented;
- to ensure all environmental requirements and mitigation measures from the environmental assessment of subprojects are included in the contract prequalification and bidding documents;
- work with NTDC to execute any additional IEE and IEE requirements needed due to fine tuning of the subprojects and that environmental performance targets are included in the contracts prior to project commencement;
- work in the PMU with NTDC to ensure all environmental requirements and mitigation measures from the IEEs and environmental performance criteria are incorporated in the subproject contracts or variations and that the EMP is effectively implemented;

- work with management consultants, supervising consultants and contractors to manage and monitor the implementation of the project EMP;
- Prepare bi-annual environmental monitoring report for all the subprojects of Tranche-IV for submission to ADB;
- Participate in all safeguards review missions of ADB.

209. Overall implementation of the EMP will become NTDC's responsibility. Other parties to be involved in implementing the EMP are as follows:

210. Contractors: Responsible for implementing all measures required to mitigate environmental impacts during construction; carry out the contractual obligations;

211. Government Agencies: Such as provincial environmental agencies, and bureaus, at the local level, will be responsible for monitoring the compliance with implementation of environmental conditions related to statutory approvals of subprojects in their areas. They will comprise of regional PEPA and state pollution authorities, Department of Forests, Department of Wildlife Services, who will be responsible for monitoring the implementation of environmental conditions and compliance with statutory requirements in their respective areas and local land use groups at the local level.

212. Considering that other government agencies involvement in implementing the EMP and Mitigation Measures, training or harmonization workshops should be conducted for all ESCs in all NTDC every six months or twice each year, for the first 2 years (and annually thereafter) to share the monitoring report on the implementation of the EMP in each NTDC and to share lessons learned in the implementation and to achieve a consistent approach decide on remedial actions, if unexpected environmental impacts occur.

213. NTDC Board of Directors: Responsible to ensure that sufficient timely resources are allocated to process the environmental assessments and to monitor implementation of all construction and operational phase mitigation measures required to mitigate environmental impacts.

214. The environmental monitoring plan was designed based on the project cycle. During the preconstruction period, the monitoring activities will focus on (i) conducting baseline monitoring; (ii) checking the contractor's bidding documents, particularly to ensure that all necessary environmental requirements have been included; and (iii) checking that the contract documents' references to environmental mitigation measures requirements have been incorporated as part of contractor's assignment and making sure that any advance works (protection of specimens and transplantation, design of power transmission etc.) are carried out in good time. Where detailed design is required (e.g. for power transmission lines and avoidance of other resources) the inclusion and checking of designs must be carried out. During the construction period, the monitoring activities will focus on ensuring that environmental mitigation measures are implemented, and some performance indicators will be monitored to record the Project's environmental performance and to guide any remedial action to address unexpected impacts. Monitoring activities during project operation will focus on recording environmental performance and proposing remedial actions to address unexpected impacts. The potential to use local community groups' contacts for monitoring should be explored as part of the activities of the Environmental and Social Impact Cell which should have regular meetings with the NGOs as a matter of good practice and to discuss matters of mutual concern.

215. At this stage, due to the modest scale of the new power transmission lines and by generally keeping to non-sensitive and non-critical areas the construction and operational impacts will be manageable and no

insurmountable impacts are predicted providing that the EMP is implemented to its full extent and required in the contract documents. However, experience suggests that some contractors may not be familiar with this approach or may be reluctant to carry out some measures. In order that the contractors are fully aware of the implications of the EMP and to ensure compliance, it is recommended that the cost of environmental measures be treated separately in the tender documentation and that payment milestones are linked to environmental performance, viz-a-viz the carrying out of the EMP.

216. The effective implementation of the EMP will be audited as a part of the loan conditions and the executing agency must be prepared for this. In this regard, the NTDC (the EA) must be prepared to guide the design engineers and contractors on the environmental aspects.

217. The NTDC procedures for handling PCB need to be strengthened. The maintenance of transformers needs to be based on the manufacturer's instructions. There need to be performance evaluation procedure prescribed and followed for each power transformer. In working areas where PCBs are handled, it is necessary to monitor the levels of chlorinated solvents. In case of emergencies, the first step is to attempt to control the spread of the liquid, this is especially relevant during transportation. In case of spills, emergency measures need to be taken by personnel specially trained and wearing protective clothes. Oil absorptive materials are a useful tool and needs to be spread over the spill. All equipment and surfaces exposed to the spill need to be washed with solvent .The best international procedures and guidelines need be followed, one such guideline is the UNEP 'PCB Transformers and Capacitors –From Management to Reclassification and Disposal, May 2002'.

218. NTDC already prohibits use of PCB's in new power transformers, there is however, need to prepare an inventory of any PCB carrying equipment in the system and all such equipment be replaced. The maintenance instructions prepared by the Technical Services Group needs to be reviewed and revised to add PCB based equipment maintenance and a procedure for handling any PCB spills. These need to be reviewed and upgraded in light of best International practice. This would include provision of special clothing, availability of oil absorptive solvents and availability of steel containers. Training to staff on oil spills and special care during transportation of equipment using PCB's.

8.2 Grievance Redressal System

219. A Grievance Redress System (GRS) will be established by the PMU to handle the community complains received from the complaints. Under this mechanism, a Grievance Redress Cell (GRC) will be established. The project will establish a Project Information Centre at site and a Community Complaints Management Register (CCMR) will be placed there for logging complaints and grievances. All written and oral grievances will be recorded in the Register. The information recorded in the register will include the date of the complaint and particulars of the complainant; a description of the grievance; the follow-up action required; the person responsible for implementing the action; and a target date for its completion.

220. Affected communities and their representatives will be identified during the project preparation stage. The PMU will work towards resolving the grievances recorded in the CCMR in conjunction with the Supervision Consultant within seven calendar days. After this deadline, any unresolved issues will be forwarded to NTDC.

8.3 Environmental and Social Complain Register

221. The consultant's environmental team will maintain an environment & social complaint register at camp site office to document all complaints received from the local communities. The register will also record the measures taken to mitigate these concerns. The final report will be communicated to Environmental section of

PMU. The Project Monitoring team shall carry out the monitoring of the implementation of social and environmental mitigation measures as per ADB Safeguard Policy Statement.

Table 8.2: Grievance Resolution Process

Land Compensation Issues	Project / Other Items Compensation Issues
Complaint resolution will be attempted at office of SDO. If still unsettled, a grievance will be lodged to the Head PMU/NTDC. He will redress in 10 days.	Complaint resolution will be attempted at village level through GRC* in one week. If still unsettled, a grievance can be referred to court of law.

8.4 Environmental Management and Monitoring Cost

222. The total cost of the environmental management of the proposed project is about 2,343,250 Pak. Rupees. This includes the cost of environmental implementation of mitigation measure. Cost estimates of mitigation and other environmental management measures are summarized in Table – 8.3.

Table 8.3: Cost Estimates for Environmental Management

Particulars	Details	Total Cost (PKR)
One dedicated Environmental Officer	1 person for 2 years (60,000/month)	1,440,000
Implementation of Mitigation Measures	Provision of PPEs (Safety Goggles, shoes, safety masks, eye shields, ear muffs, etc.) and first aid kits.	300,000
	Procurement of one noise level meter	35,000
	Arrangements for daily water sprinkling	250,000
	Plantation of trees/plants in the grid station	100,000
	Arrangements for careful collection and disposal of wastes, oils, lubricants etc.	150,000
Contingency	3% contingency	
Total		**2,343,250**

CHAPTER - 9: CONCLUSIONS

223. In overall analysis this study brings us to a conclusion that there are no inherent adverse impacts possible to be caused through design or at construction phase. The only possible source of adverse impacts can be some non-compliance and faulty practices by contractor during construction phase which shall be easily mitigable. Therefore it is safe to conclude that either the proposed project shall not trigger any adverse impact on the environment or any non-compliance by contractor shall be mitigable and shall be of minor significance. As such, this project is considered as environment friendly for which environment study beyond an IEE is not required

Appendices

Appendix – I: ADB REA Checklist

Rapid Environmental Assessment (REA) Checklist

POWER TRANSMISSION

Instructions:

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

Country/Project Title:

Sector Division:

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
• Cultural heritage site	☐	☐	
• Protected Area	☐	☐	
• Wetland	☐	☐	
• Mangrove	☐	☐	
• Estuarine	☐	☐	
• Buffer zone of protected area	☐	☐	
• Special area for protecting biodiversity	☐	☐	
B. Potential Environmental Impacts Will the Project cause…			
• encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?	☐	☐	
• encroachment on precious ecosystem (e.g. sensitive or protected areas)?	☐	☐	

Power Transmission, page 2

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?	☐	☐	
• damage to sensitive coastal/marine habitats by construction of submarine cables?	☐	☐	
• deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?	☐	☐	
• increased local air pollution due to rock crushing, cutting and filling?	☐	☐	
• chemical pollution resulting from chemical clearing of vegetation for construction site?	☐	☐	
• noise and vibration due to blasting and other civil works?	☐	☐	
• dislocation or involuntary resettlement of people	☐	☐	
• social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?	☐	☐	
• hazardous driving conditions where construction interferes with pre-existing roads?	☐	☐	
• poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?	☐	☐	
• creation of temporary breeding habitats for mosquito vectors of disease?	☐	☐	
• dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?	☐	☐	
• environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?	☐	☐	
• facilitation of access to protected areas in case corridors traverse protected areas?	☐	☐	
• accident risks associated with maintenance of lines and related facilities?	☐	☐	
• health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization?	☐	☐	
• disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height?	☐	☐	

Appendix – II: Field Survey Questionnaire

A. Personal Data

Interviewer's Name: _____

Date & Time: _____

Name of the Respondent: _____

Father's Name: _____

Tribe: _____

Gender: _____

Age (years): _____

Education: _____

Languages Spoken: i. Urdu _____ ii. Pushto _____ iii. Hindko _____ iv. Other _____

B. Social Data

Q.1 Village: _____

Q.2 Union Council: _____

Q.3 District: _____

Q.4 Marital Status:

i. Married

ii. Un-Married

iii. Divorced/ Separated/Widowed

Q.5 Total No. of Dependents: _____

Q.6 Age Group and Education Level of Dependents:

Age Group	Male	Education	Female	Education
0-4				
5-9				
10-19				
20-39				
40-59				
60+				

Q.7 Occupancy Status & Sources of Income:

i. Govt. Servant _____

ii. Private Service _____

iii. Business _____

iv. Agriculture _____

v. Livestock _____

vi. Labour _____

vii. Retired _____

viii. Any other (Specify) _____

Q.8 Housing Condition:

i. Pucca _____

ii. Katcha _____

iii. Hut _____

iv Any other (Specify) _____

Q.9 Toilet Facilities:

i. Flush _____

ii. Open _____

iii. Field _____

Q.10 Electric Facilities: _____

Q.11 Source of Drinking Water:

i. Public _____

ii. Private _____

iii. Any other (Specify) _____

Q.12 Monthly Income from all Sources:

i. Less than 2000 _____

ii. 2001-5000 _____

iii. 5001-8000 _____

iv. 8001-11000 _____

v. 11001-14000 _____

vii. 14001 and above _____

Q.13 Monthly Expenditure:

i. Less than 2000 _____

ii. 2001-5000 _____

iii. 5001-8000 _____

iv. 8001-11000 _____

v. 11001-14000 _____

vi. 14001 and above _____

Q.14 Do you have any livestock?

Yes _____ No _____

Q.15 If yes, how much? _____

Q.16 If yes, what type of livestock do you have?

i. Sheep No. _____

ii. Goat No. _____

iii. Cow No. _____

iv. Poultry No. _____

v. Donkey No. _____

vi. Horse No. _____

vii. Bull No. _____

viii. Buffalo No. _____

ix. Any other (Specify) No. _____

Q.17 Do you have any Land?

i. Yes_____ ii. No_____

Q.18 Type of Land:

i. Barani _____

ii. Irrigated _____

Q.19 Is your land included in the land to be acquired for the proposed project? _____

Q.20 If so, how much? _____

Q.21 Major Crops in the area:

i. Wheat _____

ii. Maize _____

iii. Cotton _____

iv. Sugarcane _____

v. Any Other _____

Q.22 During the last one year, did you borrow money?

i. Yes ii. No

i. If yes, how much money was borrowed? (Rs.) _____

ii. For what purpose this money was borrowed?

_____

iii. How much of it has been paid back?

i. One fourth ii. One half iii. Three fourth iv. All

iv. Source of borrowing?

i. Bank ii. Relative iii. Money Lender

v. Interest rate of that loan _____%

Q.23 Do you know about the subject Project?

i. Yes ii. No

Q.24 In your opinion, should this Project be implemented at the proposed location?

i. Yes ii. No

If yes, then reasons If no, then reasons

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Q.25 In your opinion, what will be the possible impacts of this Project on the locals?

Q.27 Availability of education institution:

1. For Boys

i. Primary School _____

ii. Middle School _____

iii. High School _____

iv. College _____

2. For Girls

i. Primary School _____

ii. Middle School _____

iii. High School _____

iv. College _____

Q 28. Medical facilities:

i. District, HQ Hospital _____

ii. Basic Health Unit _____

Appendix – III: National Environmental Quality Standards 2010

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PART II

Statutory Notifications (S. R. O.)

GOVERNMENT OF PAKISTAN

MINISTRY OF ENVIRONMENT

NOTIFICATIONS

Islamabad, the 18th October, 2010

S. R. O. 1062(I)/2010.—In exercise of the powers conferred under clause (c) of sub-section (I) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to establish the following National Environmental Quality Standards for Ambient Air.

National Environmental Quality Standards for Ambient Air

Pollutants	Time-weighted average	Concentration in Ambient Air		Method of measurement
		Effective from 1st July, 2010	Effective from 1st January 2013	
Sulphur Dioxide (SO_2)	Annual Average*	80 µg/m³	80 µg/m³	-Ultraviolet Fluorescence method
	24 hours**	120 µg/m³	120 µg/m³	
Oxides of Nitrogen as (NO)	Annual Average*	40 µg/m³	40 µg/m³	- Gas Phase Chemiluminescence
	24 hours**	40 µg/m³	40 µg/m³	

(3205)

[2944(2010)/Ex. Gaz.] *Price: Rs. 5.00*

Pollutants	Time-weighted average	Concentration in Ambient Air: Effective from 1st July, 2010	Concentration in Ambient Air: Effective from 1st January 2013	Method of measurement
Oxides of Nitrogen as (NO_2)	Annual Average*	40 µg/m³	40 µg/m³	- Gas Phase Chemiluminescence
	24 hours**	80 µg/m³	80 µg/m³	
O_3	1 hour	180 µg/m³	130 µg/m³	-Non dispersive UV absorption method
Suspended Particulate Matter (SPM)	Annual Average*	400 µg/m³	360 µg/m³	- High Volume Sampling, (Average flow rate not less than 1.1 m3/minute).
	24 hours**	550 µg/m³	500 µg/m³	
Respirable Particulate Matter, PM_{10}	Annual Average*	200 µg/m³	120 µg/m³	-β Ray absorption method
	24 hours**	250 µg/m³	150 µg/m³	
Respirable Particulate Matter, $PM_{2.5}$	Annual Average*	25 µg/m³	15 µg/m³	-β Ray absorption method
	24 hours**	40 µg/m³	35 µg/m³	
	1 hour	25 µg/m³	15 µg/m³	
Lead Pb	Annual Average*	1.5 µg/m³	1 µg/m³	- ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	2 µg/m³	1.5 µg/m³	
Carbon Monoxide (CO)	8 hours**	5 mg/m³	5 mg/m³	- Non Dispersive Infra Red (NDIR) method
	1 hour	10 mg/m³	10 mg/m³	

*Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.

** 24 hourly /8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but not on two consecutive days.

S. R. O. 1063(I)/2010.— In exercise of the powers conferred under clause (c) of sub-section (1) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to establish the following National Standards for Drinking Water Quality.

National Standards for Drinking Water Quality

Properties/Parameters	Standard Values for Pakistan	Who Standards	Remarks
Bacterial			
All water intended for drinking (e.Coli or Thermotolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water entering the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water in the distribution system (E. coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12 month period.	Most Asian countries also follow WHO standards
Physical			
Colour	≤ 15 TCU	≤ 15 TCU	
Taste	Non objectionable/Acceptable	Non objectionable/Acceptable	
Odour	Non objectionable/Acceptable	Non objectionable/Acceptable	
Turbidity	⟨ 5 NTU	⟨ 5 NTU	
Total hardness as $CaCO_3$	< 500 mg/l	----	
TDS	⟨ 1000	⟨ 1000	
pH	6.5 – 8.5	6.5 – 8.5	
Chemical			
Essential Inorganic	***mg/Litre***	***mg/Litre***	
Aluminium (Al) mg/l	≤ 0.2	0.2	