

Initial Environmental Examination

May 2016

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

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



ASIAN DEVELOPMENT BANK

TA-8818 PAK: Power Transmission Enhancement Investment Program II

**Rehabilitation of NTDC System in South Area for Improvement in System Reliability to
Avoid Frequent Tripping**



**NATIONAL TRANSMISSION & DESPATCH
COMPANY (NTDC) LIMITED PAKISTAN**

DRAFT IEE REPORT

May 2016

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AOI	Area of Influence
CLL	Concurrent Legislative List
CO	Carbon Monoxide
COI	Corridor of Impacts
EA	Executing Agency
EC	Electrical Conductivity
EHS	Environment & Health Guidelines
EIA	Environmental Impacts Assessment
EMMP	Environmental Management & Monitoring Plan
EMU	Environmental Management Unit
EPA	Environmental Protection Agency
ESIC	Environment and Social Impacts Cell
ft	feet
GHGs	Green House Gases
GOP	Government of Pakistan
GSO	Grid Station Operation
IEE	Initial Environmental Examination
km	Kilo Meter
MFF	Multitranches Finance Facility
NCS	National Conservation Strategy
NEP	National Environmental Policy
NEPRA	National Electric Power Regulatory Authority
NGOs	Non-Government Organizations
NOC	No Objection Certificate
OPs	Operational Policies
PEPA	Pakistan Environmental Protection Act
PMU	Project Management Unit
PPEs	Personal Protective Equipment
RBOD	Right Bank Outfall Drainage
RE	Resident Engineer
REA	Rapid Environmental Assessment
TOR	Terms of Reference

EXECUTIVE SUMMARY

A Introduction

The Project

1. Government of Pakistan (GoP) had requested the Asian Development Bank (ADB) for a Multi-tranche Financing Facility (MFF) to provide financial assistance for power transmission enhancement program in the state of Pakistan. The power enhancement program will cover investments in transmission, energy efficiency, and related non-physical investments. The program will finance expansion and upgrade of transmission systems under tranche IV (project loans) to be executed under the MFF. National Transmission and Dispatch Company (NTDC) is the Executing Agency (EA) and Implementing Agency (IA) for Tranche IV of the MFF. The Project aims at achieving sustainable power transmission enhancement in Pakistan.
2. The investments to be supported by ADB will (i) Facilitate increased power transmission to accommodate increased demand and economic growth; peak demand and total energy demand (ii) Improve supply side energy efficiency by system and reducing technical losses; (iii) Reduce the intensity of Green House Gas (GHG) and other emissions via improved system efficiency; and (iv) Facilitate poverty reduction via improved transmission services and economic growth. The proposed program will sustain the reform agenda established with earlier ADB support, and is expected to help to attract other long-term financiers to the power transmission sector in Pakistan.

Scope and Objectives of the IEE:

3. This report is the Initial Environmental Examination (IEE) of the sub projects/Grid Stations falling under the administrative jurisdiction of NTDC south zone and complies with the environmental assessment guidelines and requirements of the Asian Development Bank Safeguard Policy Statement (SPS) 2009, and the Government of Pakistan's environmental legislation and guidelines. This IEE has been prepared to ensure that the potential adverse environmental impacts are appropriately mitigated and also to present the environmental assessment process of the project.

B Critical Facts

Policy Legal and Administrative Framework

4. The Government of Pakistan has formulated and proclaimed a comprehensive policy and legal framework for environmental assessment and protection.
5. The main provisions for environmental protection and pollution control on the level of provinces are proclaimed in their respective provincial environmental protection acts while on federal level the Pakistan Environmental Protection Act, 1997 is the applicable regulatory framework for the project.
6. The Provincial EPAs provide the framework for protection and conservation of species, wildlife habitats and biodiversity, conservation of renewable resources, establishment of standards for the quality of ambient air, water and land, establishment of Environmental Tribunals, appointment of Environmental Magistrates, and Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) approval. These Acts have a direct bearing on the proposed sub projects in Sindh, Balochistan and Punjab provinces as the project requires an IEE.

Project Categorization for Environmental Assessment

7. As per the classification of ADB, the sub-projects have been classified under Category C. However, to avoid any unforeseen adverse environment impacts, an umbrella IEE along with EMP has been prepared for all Grid Stations considered for equipment's replacement under the MFF.

The Rehabilitation of NTDC System

8. Most of 500 & 220 kV grid stations located in southern areas of the country, particularly in Sindh & Baluchistan Provinces, are in operation since long. Some of the equipment installed at these grid stations particularly Circuit Breakers, Isolators, Current Transformers (CT) and Power Transformers (PT) etc. have been out dated and un-repairable as they have completed their useful life and need to be replaced. Moreover, improvement in protection system of these grid stations is also required to avoid frequent tripping.
9. Keeping in view the above, rehabilitation of various 500 kV and 220 kV grid stations in south area of NTDC system have been planned by replacement of the outdated equipment, installation of Shunt Reactors and installation of additional protection equipment including protection relays, fault recorders, fault locators and event recorders etc. for improvement in system reliability to overcome the constraints.
10. As a result of implementation of the proposed project frequent tripping occurring due to underrated and outdated equipment will be avoided and the system will be able provide stable power supply to the respective DISCOs.

E Recommendations

11. **Environmental Management Plan:** The Environmental Management Plan (EMP) for the subprojects has been prepared keeping in view the anticipated environmental impacts during pre-construction, construction and operational stages of the project on the existing environmental conditions including air, soil, water, land, biodiversity and socio economic condition of the project area, and recommends appropriate measures to mitigate the potential adverse impacts and enhance the positive impacts. The compliance and effects monitoring of mitigation measure implementation would be ensured through the implementation of the Environmental Monitoring Plan included in the EMP.
12. The EMP will be included in the contract as specific conditions making it obligatory for the contractor to carry out the works assigned in the EMP.
13. **Grievance Redress Mechanism (GRM):** A GRM has been proposed to receive, evaluate and facilitate the resolution of affected people's concerns, complaints, and grievances. The GRM will provide a time bound and transparent mechanism to address and resolve social and environmental concerns related to the project.

F Conclusion

14. Assuming the effective implementation of the mitigation measures and monitoring plan as outlined in the Environmental Management Plan, the sub-project is not expected to have significant adverse environmental impacts.

1. INTRODUCTION

1.1 Background of MFF Project

15. The NTDC has launched the Multitranche Financing (MFF) Project with the financial sponsorship of Asian Development Bank (ADB). The objective of the proposed MFF Project is to improve Pakistan's power transmission infrastructure and management. To achieve this objective, the investment program consists of staged physical investments in the high-voltage transmission system, including the rehabilitation, augmentation and expansion of transmission lines, substations and supporting infrastructure. The physical investments will increase transmission capacity to meet growing demand, improve transmission efficiency and energy security, and evacuate additional sources of power. Nonphysical investments will focus on increasing the financial management, regulatory relations and procurement capacity of the transmission system owner and operator, the National Transmission and Despatch Company (NTDC). The nonphysical investments will increase institutional efficiency, cost recovery, competition, transparency and good governance within the sector.

1.2 The Objectives of NTDC System Rehabilitation

16. Most of 500 and 220 kV grid stations located in southern areas of the country, particularly in Sindh & Baluchistan Provinces are in operation since long. Some of the equipment installed at these Grid Stations particularly Circuit Breakers, Isolators, C.Ts & P.Ts etc. have been out dated and un-repairable as they have completed their useful life and needs to be replaced. Moreover, improvement in protection system of these Grid Stations is also required to avoid frequent tripping.
17. Keeping in view the above, rehabilitation of various 500 kV and 220 kV Grid Stations in south area and one Grid Station which is located in north area of NTDC system have been planned by replacement of the outdated equipment, installation of Shunt Reactors and installation of additional protection equipment including protection relays, fault recorders, fault locators and event recorders etc. for improvement in system reliability to overcome the constraints.
18. As a result of implementation of the proposed project, the frequent tripping occurring due to underrated and out-dated equipment will be avoided and system will be able provide stable power supply to the respective DISCOs.

1.3 Project Proponent

19. The National Transmission and Despatch Company (NTDC) is the executing agency of the project.

1.4 Project Interventions

20. Most of 500 and 220 kV Grid Stations located in southern areas of the country, particularly in Sindh and Balochistan Provinces are in operation since a long period. Some of the equipment installed at these Grid Stations is outdated and is unrepairable as it has completed its useful life; therefore its replacement is required.
21. Moreover, due to increase in power demand of the area, some of the equipment of these Grid Stations has been underrated and causes the system constraints and interruptions for supply of power to the load centres. Therefore, replacement of this equipment is essentially required to remove the bottlenecks of the system in the area. Detail of equipment required to be replaced along with justification for replacement is given in **Table 3.1**.
22. In addition to the above, protection system of these grid stations is also required to be improved by installation of new protection relays along with the allied equipment

including fault locators, fault recorder & event recorders etc. to avoid the frequent tripping.

23. Keeping in view of the above, rehabilitation of the following grid stations have been planned by replacement of the out-dated equipment and installation of additional equipment to overcome the system constraints in southern and only one Grid Station is in northern area of NTDC network:

- i) 500 kV Jamshoro-Sindh
- ii) 500 kV Guddu-Sindh
- iii) 500 kV NKI-Sindh
- iv) 220 kV Hala Road-Sindh
- v) 220 kV Shikarpur-Sindh
- vi) 220 kV Sibbi-Balochistan
- vii) 220 kV Quetta Industrial-Balochistan
- viii) 220 kV TM Khan Road (Hyderabad) -Sindh
- ix) 220 kV Khuzdar-Balochistan
- x) 220kV Loralai-Balochistan
- xi) 500kv Nokhar-Punjab
- xii) 500kV Dadu

1.5 Location of the Sub-Projects

24. Out of 12 proposed sub-projects, 4 Grid Stations are located in Balochistan Province, 7 Grid Stations are located in Sind Province and 1 Grid Station is located in Punjab Province. The location of each sub-project is shown in **Figure: 1.1** below;

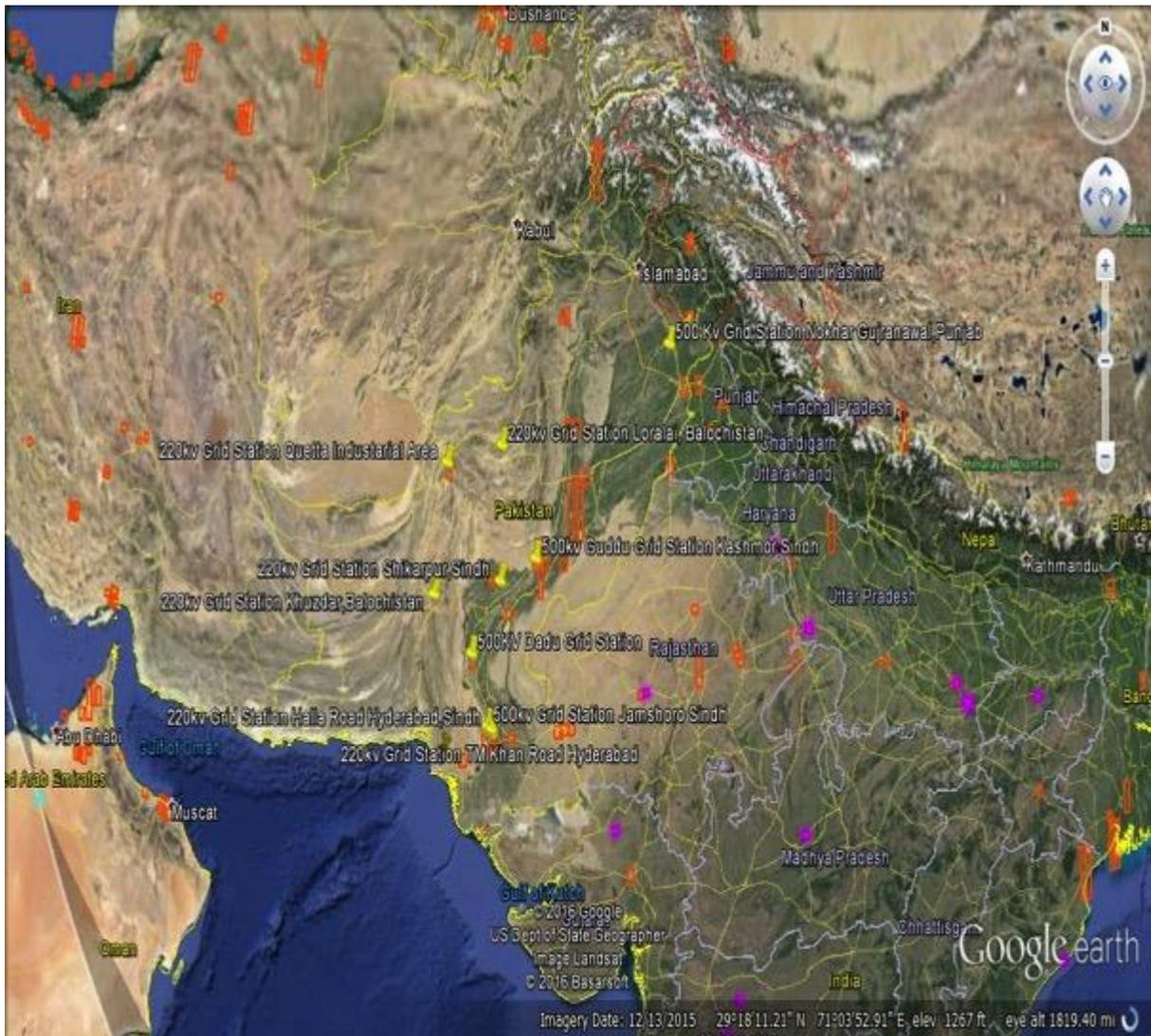


Figure 1.1: Project Location Map of 12 Grid Stations

1.6 Requirements for Environmental Assessment

25. The environmental assessment requirements of the GoP for grid stations and power distribution subprojects are different to those of ADB. Under GoP regulations, the Pakistan Environmental Protection Agency's (Pak-EPA) 'Review of Initial Environmental Examination and Environmental Impact Assessment (IEE/EIA) Regulations (2000)' development projects are divided into two schedules according to their potential environmental impact. The proponent of project that has reasonably less foreseeable impacts are required to submit an Initial Environmental Examination (IEE) for their respective subprojects (listed in Schedule-I to the IEE/EIA Regulations). Projects that have more adverse environmental impacts (listed in Schedule – II to the IEE/EIA Regulations) are required to submit an Environmental Impact Assessment (EIA) to the concerned provincial EPAs. Figure 1.2 shows the

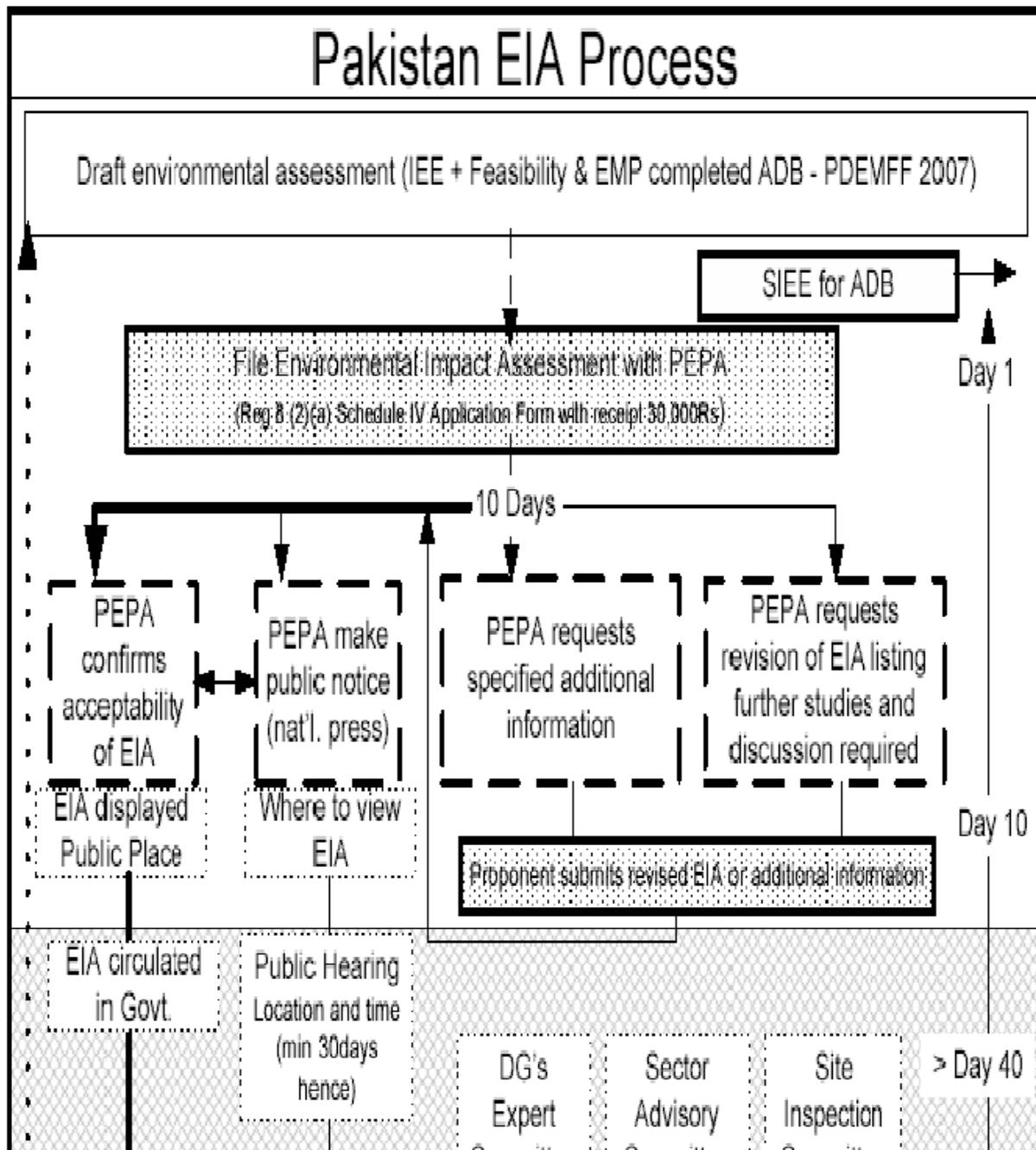


Figure 1.2: EIA Process in Pakistan

26. For this subproject, Rapid Environmental Assessment (REA) Checklists (attached as Annex-I), and an IEE were prepared for review of ADB. According to the aforementioned screening documents, environmental impacts associated with the subproject component have limited impacts.
27. Under the Multitranche Financing Facility (MFF) loan procedures of ADB, implementation of safeguards is to be achieved under ADB Guidelines. The project that have no adverse environmental impacts. Pak-EPA emphasizes that proponent must follow the Section 12 of the Pakistan Environmental Protection Act (PEPA) 1997 for all subprojects. Pak-EPA has also assumed that all proponents will consult with the relevant provincial EPAs and follow their advice. With 18th Amendment in Constitution, more power regarding environment are delegated to the provinces. Therefore, this IEE finalized will be submitted by NTDC to the relevant provincial EPAs for review and approval.

1.7 Purpose of the IEE Report

28. The main aims and objectives of this IEE are to:
- Provide information for decision-making on the environmental and social consequences of the proposed project interventions;
 - Establish an environmental baseline;
 - Determine potential environmental impacts and assess these in terms of severity, magnitude and time scale;
 - Devise mitigation measures to reduce the identified environmental and social impacts;
 - Promote environmentally and socially sound and sustainable development through the identification of appropriate enhancement and mitigation measures and monitoring programmes that will be required to ensure the implementation of the project without significant adverse impacts;
 - Meet the provincial, national, international and ADB standards;
 - Ensure compliance with ADB's SPS (2009); and national and provincial Environmental legislation; and
 - Ensure environmental management through development of an environmental management and monitoring plan (EMMP).

1.8 Scope of the Study

29. The scope of the study as per TOR and requirement of the ADB SPS, includes:
- Collection of required baseline primary and secondary information on physical, biological and socio-economic conditions prevailing within the premises of each Grid Station where the primary impacts are anticipated;
 - Environmental impact assessment of project interventions;
 - Development of mitigation measures for impacts identified;
 - Preparation of environmental management plan including a monitoring program and

institutional strengthening program;

1.9 Review of Previous Studies

30. The PC-I prepared by NTDC for the rehabilitation of NTDC system was reviewed and the information collected was supplemented by additional information. In addition, secondary data from available relevant reports was also reviewed in compiling this IEE report.

1.10 IEE Methodology

1.10.1 Baseline Survey of the Sub-Projects

31. In accordance to the ADB SPS, the REA checklist specific to the project was prepared and the REA surveys (Annex-I) were carried out during the month of February, March and April, 2016.
32. During the visit, environmental data were collected for project categorization in accordance with the REA Checklist and requirements of the Provincial Environmental Protection Acts of Sindh, Baluchistan Punjab, Pakistan Environmental Protection Act -1997 and the Pakistan Environmental Assessment Regulations, 2000. The approach and methodology during data gathering was a combination of qualitative and quantitative techniques.

1.10.2 Environmental Assessment

33. Baseline information on prevailing environmental conditions was collected from both primary and secondary sources. Primary data on flora, fauna and water quality and noise levels were collected through site visits and surveys.

1.10.3 Assessment and Reporting

34. This study has been conducted using a risk-based approach and the assessment process consisting of a number of elements based on previous studies and incorporation of additional information gathered during site visits. The IEE complies with the environmental guidelines of the ADB as stipulated in SPS 2009, and the contents of the report conform to the requirements of the Provincial EPAs.

2 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 Introduction

35. This section provides an overview of the policy, legal and administrative framework that apply to the proposed sub-projects. The Project is expected to comply with all national and provincial legislations relating to environmental protection in Pakistan. This section also describes the applicable regulations of ADB and its guidelines as well as other relevant international policies.
36. Subsequent to the 18th Amendment to the Constitution of Pakistan in 2010, 'Environmental pollution and ecology' was transferred from the Concurrent Legislative List (CLL) to the legislative domain of the Provincial Assemblies. The legislation of Pakistan (now also applicable to, and adapted by, each province) contains many laws in the form of acts and ordinances, which are driven by policies and have direct or indirect relevance and implications in the design, construction and operation of the sub-projects. The sub-projects have been assessed for compliance with the existing legal framework in Pakistan including that of the Provinces, as well as relevant international policies and guidelines.

2.2 National Conservation Strategy

37. The Pakistan National Conservation Strategy (NCS) was approved by federal cabinet in March 1992 and is the principal policy document on environmental issues in the country. The NCS outlines the country's primary approaches towards encouraging sustainable development, conserving natural resources and managing resources. 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 proposed Project are pollution prevention and abatement, conserving biodiversity and preservation of cultural heritage.

2.3 National Environment Policy

38. The National Environmental Policy provides an overarching framework for addressing the environmental issues facing Pakistan, particularly pollution of fresh water bodies and coastal waters, air pollution, lack of proper waste management, deforestation, loss of biodiversity, desertification, natural disasters and climate change. It also gives directions for addressing the cross-sectoral issues elaborating the underlying causes of environmental degradation and international obligations. The policy provides broad guidelines to the Federal Government, Provincial Government, Federally Administrated Territories and Local Government for addressing environmental concerns and ensuring effective management of their environmental resources.

2.4 Guidelines for Environmental Assessment

39. The Pak-EPA has published set of environmental guideline for conducting

environmental assessment and the environmental management of different types of development projects. The guidelines relevant to the proposed Project are listed below.

2.10.1 Guidelines for the Preparation and Review of Environmental Reports, Pakistan Environmental Protection Agency, 1997

40. The guidelines, targeted at project proponents, specify:
- The nature of the information to be included in environmental reports. The minimum qualification of the EIA conductors appointed. The need to incorporate suitable mitigation measures during project implementation. The need to specify monitoring procedures.
 - The report must contain baseline data relating to the project area, an interpretation of the data and mitigation measures.

2.10.2 Guidelines of Public Consultation, Pakistan Environmental Protection Agency, May, 1997

These guidelines deal with possible approaches to public consultation and techniques for designing an effective program of consultation that reaches out to all major stakeholders and ensure that their concerns are incorporated in any impact assessment study.

2.5 Pakistan Environmental Protection Act, 1997

41. 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 (Pak-EPA) 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 Approval/NOC in this respect from the Environmental Agency.* Thereof, the Pak-EPA has delegated the power of review and approval of environmental assessments to the provincial environmental protection agencies, in this case the Provincial EPAs of Sindh, Balochistan and Punjab are the agencies to whom the IEE shall be submitted.

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

42. The *Pakistan Environmental Protection Act, 1997* provides for two types of

environmental assessments: Environment Impact Assessments (EIA) and Initial Environmental Examinations (IEE). 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. Under Section 12 (and subsequent amendment) of the *PEPA, 1997* a project falling under any category specified in Schedule-II requires the proponent to file an IEE or EIA with the federal agency. These schedules provide guidance for Project screening. Within ten working days of the IEE or EIA having been submitted, the federal agency will confirm that the document submitted is complete for the purpose of review. During this time, should the federal agency requires the proponent to submit any additional information; the IEE or EIA will be returned to the proponent for revision, clearly listing those aspects that need further discussion. Subsequently, the federal agency shall make every effort to complete an IEE review within 45 days and an EIA review within 90 days of filing of the complete information of report.

43. Distribution lines and grid substations of 11Kv 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 11Kv and large distribution subprojects (Schedule I). A review of the need for EIA/ IEE submission is therefore required.
44. Relevant EPA, in this case is the Provincial Environment Protection Agencies (EPAs) as the project is located in Sindh, Balochistan and Punjab provinces.
45. There are no formal provisions for the environmental assessment of expanding existing distribution lines and grid substations. The details of the subproject will be forwarded to the concerned EPA, in order to commence the local statutory environmental assessment process.

2.7 National Environmental Quality Standards

46. The National Environmental Quality Standards (NEQS) (Annex-II) were first promulgated in 1993 and have been amended in 1995 and 2000. Furthermore, NEQS for ambient air, drinking water quality and noise were promulgated in 2010. The NEQS, 2000 specify the following standards:
 - Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment facilities, and the sea (three separate sets of numbers).
 - Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources.
 - Maximum allowable concentration of pollutants (two parameters) in gaseous emissions from vehicle exhaust.
 - Maximum allowable noise levels from vehicles.

2.8 Other Relevant Laws

47. There are a number of other federal and provincial laws that are important in the

context of environmental management. The main laws potentially affecting subprojects in this MFF are listed below:

- **The Forest Act, 1927 (and Provincial Acts and Rules)**

48. The Act, inter alia, deals with the matters related with protection and conservation of natural vegetation/habitats. It empowers the concerned agency to declare protected and reserved forest areas and their maintaining. In spite of the fact that it recognizes the right of people for access to the natural resources for their household use, it prohibits unlawful cutting of trees and other vegetation from forest reserve area. The permission is required prior to undertake any tree cutting from the Provincial Forest Departments. The contractor will inform formally to the Provincial Forest Departments at-least 1 month before cutting any tree on site.

- **Provincial Wildlife (Protection, Preservation, Conservation and Management) Act, Ordinances and Rules**

49. In addition to empowering provincial wildlife department to establish game reserves, parks, and wildlife sanctuaries, these acts regulate the hunting and disturbance of wildlife. This law will help in eliminating any trespassing into protected areas.

- **Antiquities Act, 1975**

50. The Antiquities Act relates to the protection, preservation and conservation of archaeological/historical sites and monuments. There are no archeological site(s) or cultural heritage site inside or in the AOI of the project. Nevertheless if there is chance find during the construction phase this law would provide due guidance.

- **Provincial Local Government Ordinances, 2001**

51. These ordinances, issued following the devolution process, establish regulations for land use, conservation of natural vegetation, air, water, and land pollution, the disposal of solid waste and wastewater effluents, as well as matters related to public health and safety. This law will help as and when participatory management of irrigation system becomes the order of the day.

- **Factories Act, 1934**

52. The clauses relevant to the project are those that are related with the health, safety and welfare of workers, disposal of solid waste and effluent, and damage to private and public property. The Factories Act also provides regulations for handling and disposing of toxic and hazardous materials. There are no factories / industries inside the project area.

- **Land Acquisition Act 1894**

53. Land Acquisition Act (LAA), 1894 is the primary law governing land acquisition in Pakistan. For the acquisition of land, the above-mentioned Act, rules and regulations are followed whether the acquisition is for Government of Punjab or any other

agency.

2.9 ADB's Safeguard Policy Statement (SPS), 2009

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

55. All loans and investments are subject to categorization to determine environmental assessment requirements. Categorization is to be undertaken using Rapid Environmental Assessment (REA) checklists, consisting of questions relating to (i) the sensitivity and vulnerability of environmental resources in project area, and (ii) the potential for the project to cause significant adverse environmental impacts. Projects are classified into one of the following environmental categories:

Category A: A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA) is required.

Category B: A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE) is required.

Category C: A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.

Category FI: A proposed project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary (FI).

2.10 Relevant International Treaties and Conventions

56. Pakistan is a signatory to a number of international environment related treaties, conventions, declarations and protocols. The following are the relevant international treaties and conventions to which Pakistan is a party:

- Convention on Conservation of Migratory Species of Wild Animals 1979;
- International Plant Protection Convention, 1951
- Convention on Wetlands of International importance especially as Waterfowl Habitat, Ramsar, 1971 and its amending protocol, Paris, 1982
- Convention concerning the Protection of World Culture and Natural

Heritage (World Heritage Convention), 1972

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington, 1973;
- Vienna Convention for the Protection of the Ozone Layer, Montreal, 1987.
- Convention on Biological Diversity, Rio de Janeiro, 1992.
- United Nations Framework Convention on Climate Change, Rio de Janeiro, 1992
- Convention on the Control of Trans boundary Movements of Hazardous Wastes and their Disposal, 1992
- Plant protection Agreement for the Asia and Pacific Region, 1956
- Male Declaration on Control and Prevention of Air Pollution and its Likely Trans boundary Effects for South Asia, 1998.
- Kyoto Protocol, 2005
- Ramsar Convention

2.11 Environmental Institutions and their Responsibilities

2.11.1 Provincial EPA

57. NTDC will be responsible for submitting the complete environmental documentation to the provincial EPA, obtain approval of the relevant provincial EPA before commencing civil works, and remaining committed to the approved project design. No deviation is permitted during project implementation without the prior and explicit permission of the respective EPA.

2.11.2 Provincial Departments of Forestry and Wildlife

58. Wildlife department nominates any sensitive wildlife area as game reserve or highly sensitive area as wildlife sanctuary. A competent person should manage the work activities in wildlife sensitive areas to minimize any adverse impacts on wildlife habitat. However no environmentally sensitive area has been identified within the direct influence of the project activities.
59. Local Government and Municipalities NTDC and its contractors must ensure that the project meets the criteria of district governments as related to the establishment of construction camps and plants, and the safe disposal of wastewater, solid waste and toxic materials. The NTDC will coordinate and monitor environment-related issues.

2.11.3 Environmental and Social Impacts Cell (E&SIC)

60. NTDC has established the Environmental and Social Impacts Cell (E&SIC), which includes one Manager (Env. & Social Safeguards), one Deputy Manager (Env.) and one Assistant Manager (Env.) in addition to social safeguard staff. E&SIC is responsible for addressing the environmental and social issues in a timely and

effective manner during operation, maintenance, construction of transmission lines and grid stations.

3 DESCRIPTION OF THE PROJECT

3.1 Background

61. This chapter describes the Project, based on the PC-I report prepared by NTDC. It also establishes the need for the project, size and magnitude of the operation.

3.2 Type of the Project

62. The subprojects in this IEE are the 12 Grid Stations in south of NTDC system and 1 Grid Station located in north NTDC system are proposed for replacement of equipment's which are out-dated to improve the efficiency of the systems. The site-specific pictures of the existing equipment's are given in the Photogallery (Annex-II) of this report.

3.3 NTDC Existing System

63. National Transmission & Despatch Company (NTDC) Limited was incorporated on 6th November, 1998 and commenced commercial operation on 24th December, 1998. It was organized to take over all the properties, rights and assets obligations and liabilities of 220 KV and 500KV Grid Stations and Transmission Lines/Network owned by Pakistan Water and Power Development Authority (WAPDA). NTDC operates and maintains twelve 500 KV and twenty nine 220 KV Grid Stations, 5077 km of 500 KV transmission line and 7359 km of 220 KV transmission line in Pakistan.
64. NTDC was granted Transmission Licence No.TL/01//2002 on 31st December 2002 by National Electric Power Regularity Authority (NEPRA) to engage in the exclusive transmission business for a term of thirty (30) years, pursuant to Section 17 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997. The Grid Stations operated by NTDC are shown in the following **Figure:3.1**.

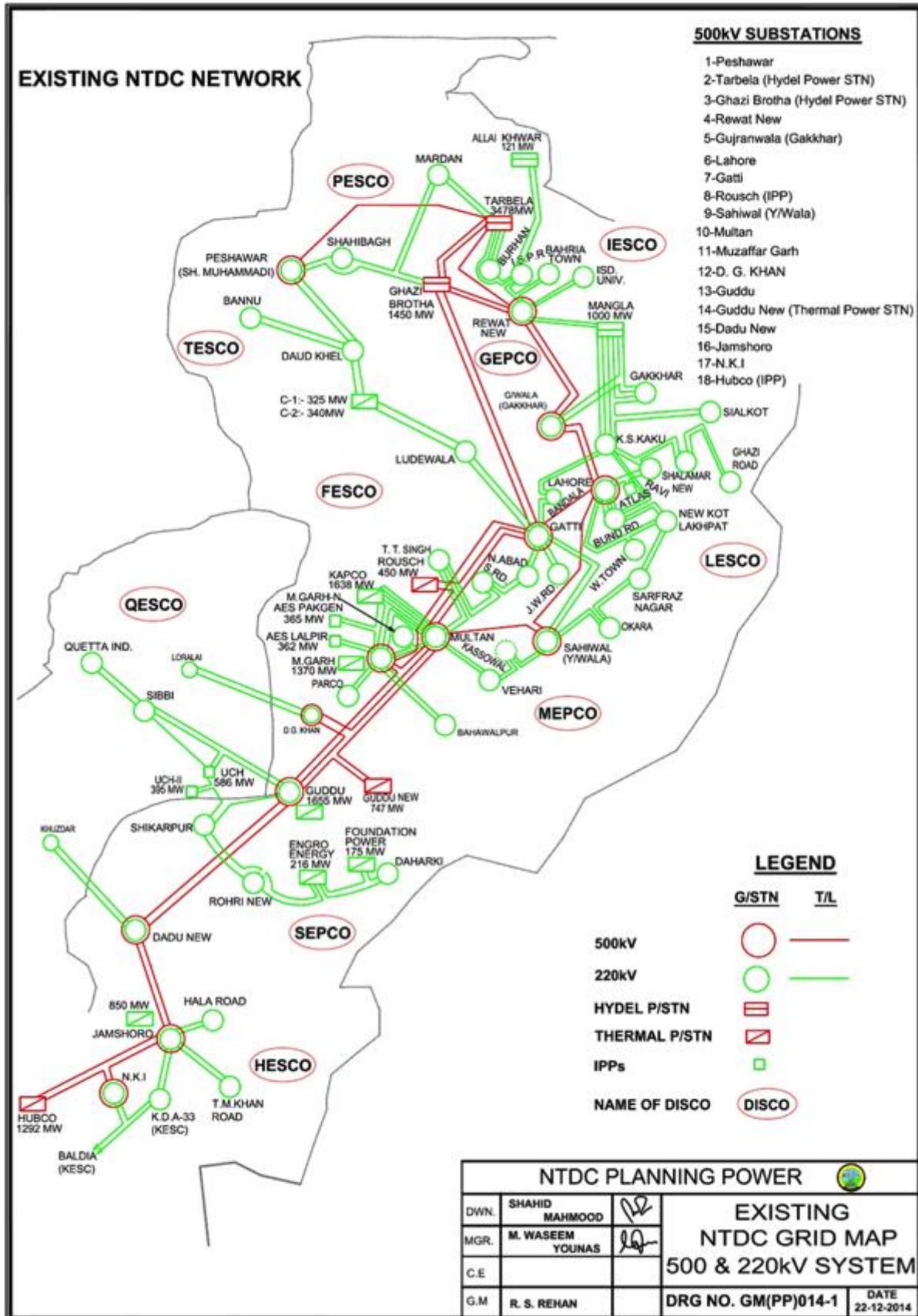


Figure:3.1: Existing NTDC Network

3.4 Project Objectives

65. Main objective of the proposed project is improvement in reliability of GSO system in Southern areas and one grid Station in northern area of NTDC network by replacement of out-dated/underrated equipment and installation of additional equipment including shunt reactors, protection relays, event recorder, fault locator & fault recorder etc. at various 500 & 220 kV Grid stations.
66. As a result of implementation of the proposed project the frequent trippings occurred due to underrated & out-dated equipment will be avoided and system will be provide stable power supply to the respective DISCO's. The proposed Grid Stations falling in the south zone of NTDC systems are shown in the following **Figure:3.2**.

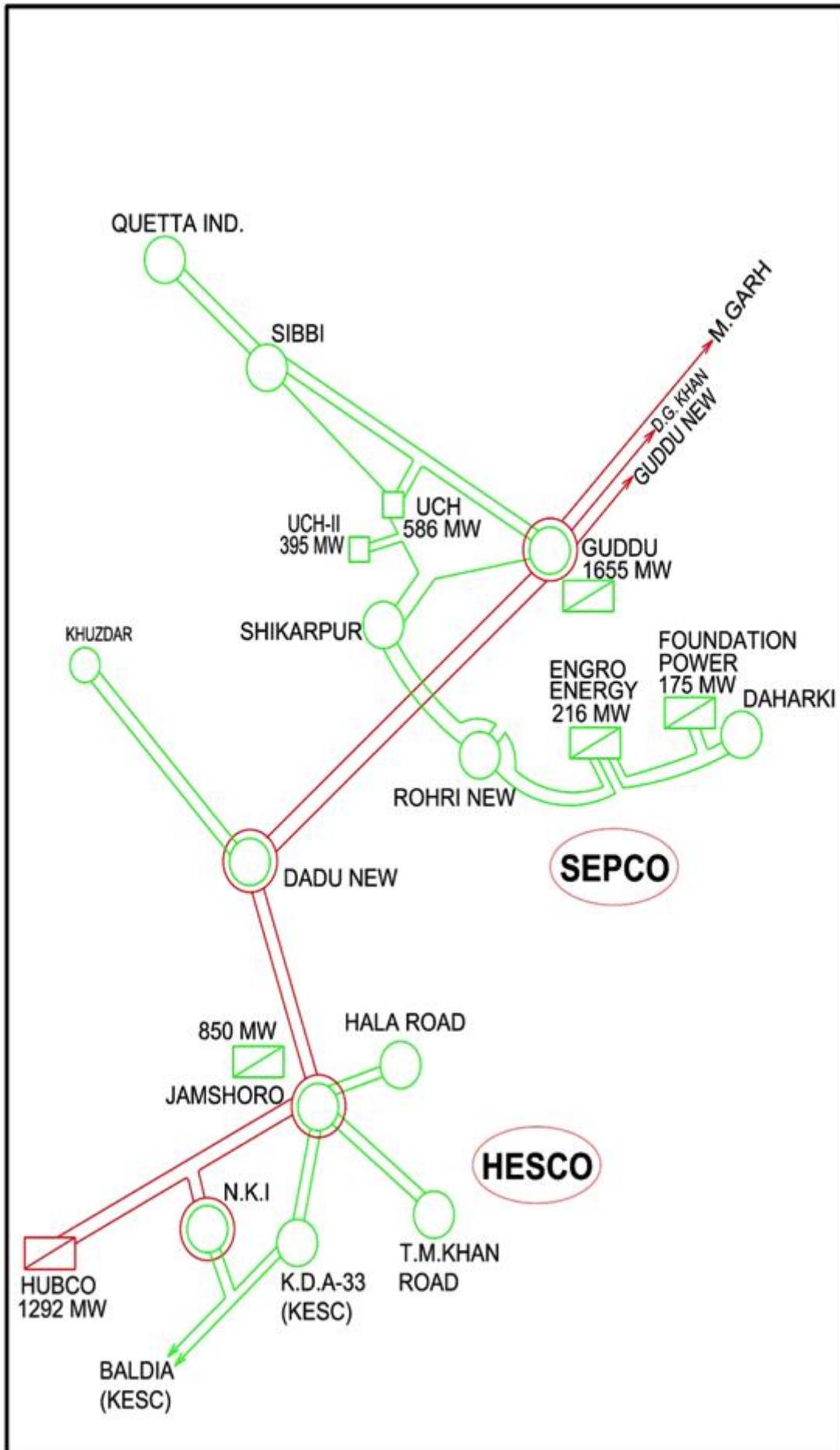


Figure:3.2: NTDC Grid Stations Proposed for Rehabilitation

3.5 Salient Features of the Project

67. Most of 500 & 220 kV grid stations located in southern areas of the country particularly in Sindh & Baluchistan Provinces are in operation since long. Some of the equipment installed at these grid stations including circuit breakers, Isolators, C.Ts & P.Ts etc. have been out dated and un-repairable as they have completed their useful life, therefore its replacement is required.
68. Moreover, due to increase in power demand of the area, some of the equipment of these grid stations have been under rated and causes the system constraints and interruptions for supply of power to the load centers. Therefore, replacement of this equipment is essentially required to remove the bottlenecks of the system in the area. Detail of equipment required to be replaced along with justification for replacement is given in **Table 3.1**.
69. In addition to the above, protection system of these grid stations is also required to be improved by installation of new protection relays along with the allied equipment including fault locators, fault recorder & event recorders etc. to avoid the frequent trippings.
70. Keeping in view of the above, rehabilitation of the following grid stations have been planned by replacement of the out-dated equipment and installation of additional equipment to overcome the system constraints in southern area of NTDC network:
 - xiii) 500 kV Jamshoro
 - xiv) 500 kV Dadu
 - xv) 500 kV Guddu
 - xvi) 500 kV NKI
 - xvii) 220 kV Hala Road
 - xviii) 220 kV Shikarpur
 - xix) 220 kV Sibbi
 - xx) 220 kV Quetta Industrial
 - xxi) 220 kV TM Khan Road (Hyderabad)
 - xxii) 220 kV Khuzdar
 - xxiii) 220kV Loralai

3.6 Scope of Work

71. The Grid Station wise replacement of existing equipment's are given in the following Table:3.1.

Table: 3.1: Work Scope of the NTDC Rehabilitation System

Sr. No.	Name of Grid Stations	Name of equipment	Quantity
1	500 kV Jamshoro	220kV Circuit Breakers	02

Sr. No.	Name of Grid Stations	Name of equipment	Quantity
		132kV Circuit Breakers	06
		500kV Current Transformer (CT)	01
		220kV CT	01
		132kV CT	01
		500kV CCVT (Capacitor Voltage Transformer)	01
		220kV CVT	02
		132kV Isolator	03
		132kV Power Transformers (PT)	02
		Fault Recorder	14
		Event Recorder	14
		Fault Locator	03
		Loss of Voltage Relay	01
		2	500 kV NKI Karachi
Event Recorder	04		
3	500 kVGuddu	500kV CT	02
		500kV CCVT	02
		Fault Recorder	13
		Event Recorder	13
		Fault Locator	04
		Under Frequency Relay	03
		Distance Protection Relay	01
4	220kV Hala Road Hyderabad	132kV Circuit Breakers	04
		220kV CT	01
		132kV CT	01
		132kV Isolator	04
		220kV L/Arrestor	01

Sr. No.	Name of Grid Stations	Name of equipment	Quantity
		132kV L/Arrestor	01
		Fault Recorder	02
		Event Recorder	02
		Fault Locator	02
		Distance Protection Relay	03
		Oversvoltage Relay	01
5	220kV TM Khan Road	Fault Recorder	02
		Event Recorder	02
6	220kV Shikarpur	Fault Recorder	05
		Event Recorder	05
		Distance Protection Relay	01
		Synchro Check Relay	01
		Overcurrent & Earth Fault Relay	02
7	220kV Khuzdar	Fault Recorder	02
		Event Recorder	02
		Over Current Relay	02
8	220kV Sibbi	220kV Circuit Breakers	01
		132kV Circuit Breakers	03
		220kV CVT	01
		132kV PT	01
		Fault Recorder	04
		Event Recorder	04
		Under Frequency Relay	02
		Distance Protection Relay	01
9	220kV Quetta	132kV Circuit Breakers	02
		Fault Recorder	04
		Event Recorder	04

Sr. No.	Name of Grid Stations	Name of equipment	Quantity
		Under Frequency Relay	02
		Over Voltage Relay	01
10	220kV Loralai	Fault Recorder	02
11	500kv Nokhar	Shunt Reactor	36X3
12	500 kV Dadu	Over current and earth fault relay	14
		220kV L/Arrestor	02
		Distance Protection Relay	04
		Fault Recorder	02
		Event Recorder	01
		Transformer Differential Relay	07

3.7 Categorization of the Project

72. Categorization is based on the most environmentally sensitive component of a subproject. The aspects of the subproject with potential for significant environmental impacts need to be assessed in detail and this environmental assessment has therefore focused on the significant impacts possible from the construction activities of the sub project.
73. Based on the findings of REA surveys and nature of the proposed interventions, the subprojects covered in this IEE are categorized as Category 'C' subprojects under ADB requirements as the proposed subproject does not have any environmentally sensitive receptors and this IEE report is based on that assumption. As per the classification of ADB, the sub-projects have been classified under Category C. However, to avoid any unforeseen adverse environment impacts, an umbrella IEE along with EMP has been prepared for all Grid Stations considered for equipment's replacement under the MFF this provides general guidelines on how to conduct these activities in an environmentally sound manner.

3.8 Decommissioning and Disposal of Materials

74. Decommissioning and disposal of discarded material/equipment from the subprojects will be recycled and reused within the NTDC system. No waste will be generated that can be classified as hazardous and requiring special disposal. In addition, in case any old equipment's are to be replaced, they are not going to be disposed off or discarded and would be recycled and reused within the NTDC system. As a policy, WAPDA has stopped using transformers that contain PCBs since 1969.

3.9 Proposed Schedule for Implementation

75. Designs arrangements, access, review of environmental management and construction processes could take several months. When the tendering and award of contract will take place. Civil works pertaining to foundation, shipment of equipment & its installation will commence before testing of equipment. At present, tentative implementation schedule is prepared (**Figure: 3.3**) for the project implementation. However, on approval of subprojects, a comprehensive schedule will be prepared and made a part of Initial Environment Examination (IEE) report.

Sr. No.	Description	2015-16												2016-17											
		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
1	Appointment of consultants, design, drawing and																								
2	Bidding, Evaluation & award of contract																								
3	Civil works																								
4	Manufacturing and shipment of equipment																								
5	Installation & Erection																								
6	Testing & commissioning																								

Figure 3.3: Tentative Works Schedule

4 DESCRIPTION OF THE ENVIRONMENT

4.1 Overview

76. This section describes the physical, biological and socio-economic environment in the project area. It also examines the existing environmental conditions of the project area to provide a baseline against which the project impacts can be measured and monitored in future.
77. The information provided in this section is both quantitative and qualitative and is based on primary and secondary data, collected through field surveys conducted specifically for this study and desk studies related to the project area.

4.2 Project Area Introduction

78. The project area is falling in Karachi, Hyderabad, Shikarpur and Guddu Districts of Sindh, Sibbi, Quetta, Loralai and Khuzdar Districts of Balochistan and Gujranawala District of Punjab Province.

4.3 Area of Influence (AOI)

79. The potential impacts of the Project on its surrounding physical and biological environment are expected averagely within the radius of 0.5km. For this, a study area of 0.5km around the Grid Station was considered to assess the baseline conditions in the areas likely to be affected by the sub-project due to its proximity to the Project site. This is referred to as the Study Area in this report.

4.4 Physiography

80. Sindh can be divided into four distinct parts topographically: (a) Kirthar range on the west; (b) a central alluvial plain bisected by the Indus River; (c) a desert belt in the east; and (d) the Indus delta in the South. The subprojects considered for rehabilitation under MFF in Sindh Province are falling in Kirthar range. The terrain of the project area in Guddu and Shikarpur is flat with alluvial and moving sand bodies.
81. Balochistan, the largest of the four provinces of Pakistan, spreads over an area of 347,190 Sq, Kms., forming 43.6 per cent of the total area of Pakistan. Broadly, Balochistan geographic area can be divided in to four distinct zones: Upper high lands, lower high lands, plains, and deserts. The upper highlands, known locally as Khorasan, rise as high as 3,700 meters, with valley floors about 1,500 meters above sea levels.
82. Geographically, Khuzdar District is mountainous consisting of numerous ridges and valleys of varying width. The important hill ranges are Jhalawan, Moda, Pab and Kirthar. Moola, Mosina, Nal and Kalachi are the main rivers in the district. Khuzdar city's elevation is about 1,237 meters above sea level.

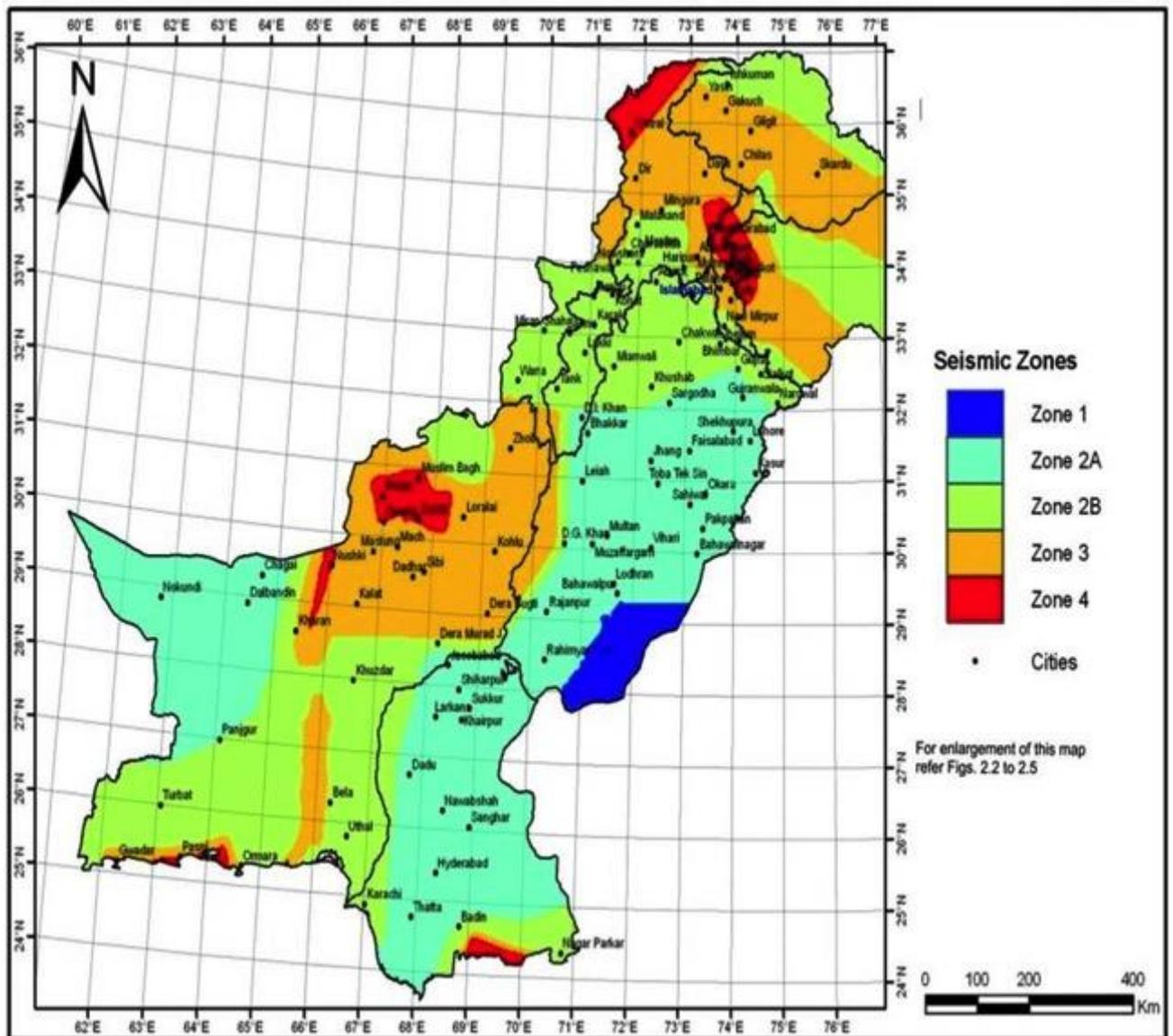
4.5 Geology

83. Pakistan geologically overlaps both with the Indian and the Eurasian tectonic plates. Sindh province lies on the north-western corner of the Indian plate. The Study Area lies on the southeastern fringe of the Kirthar range, a hill range that runs in the north to south direction for about 400 km along the Sindh-Balochistan provincial boundary. Primary lithology in the Study Area is of sedimentary origin, consisting of limestone with occasional shale and sandstone of Laki Formation. Laki Formation is very rich in fossils of Eocene age (56-34

million years ago). Study area mostly consists of flood plain deposits. Two major active fault lines located near the Study Area are Surjam Fault, about 30 km to the west and the Jhimpir Fault, about 25 km to the southwest. Maximum recorded earthquakes on the Surjam and Jhimpir Faults were 6.1 and 5.6 on the Richter scale, respectively¹.

4.6 Seismicity

84. The proposed Grid Stations are located in seismic zones 2A, 2B,3 and 4. The Quetta district is falling in Zone 4 which is called the High Damage Risk Zone and covers areas liable to MSK VIII while the subprojects in Sindh, Khuzdar, Loralai and Sibbi are falling in Zone 2A and 2B, which is liable to MSK VI or less and is classified as the Low Damage Risk Zone. . The seismic e is shown in **Figure 4.1**.



¹ Geology and tectonics of Pakistan, Kazmi. A. H and Jan. M. Q, 1997

4.7 Water Resources

85. In Sindh, major water bodies in the Study Area include the Indus River, Kalri Baghar canal and the under construction RBOD. Groundwater is not major source of drinking water in the Study Area due to high amount of salinity in the groundwater. While in Balochistan, the major water resources in the study area are groundwater and surface runoff. The water resources are briefly described below.

4.7.1 Surface Water Resources

86. Indus River is the main surface water source of the province. It has three major barrages in Sindh that divert approximately 48 million acre feet (MAF) (or 59.0 billion cubic meters-BCM) of water annually to the 14 main canal commands in Sindh.

87. The province of Sindh is having 81 percent of its irrigation area classified as waterlogged. In the last few decades the waterlogged area has increased in the province. While right side of the Indus River in Sindh is facing the problem of drought. The river has an average width of about 500 m during normal flow which increases to several kilometers during high floods. The width of the river at Kotri Barrage is one kilometer. Kotri Barrage, built in 1955, is used to divert water to irrigation canals and to provide protection against flood. The barrage has 44 bays and has the maximum design capacity to discharge 24,777 cumec (cubic meters per second). The average annual flow of Indus River at Kotri barrage is 1,787 cumec. Average monthly flow is highest in August when it exceeds 7,500 cumecs. In December, the leanest month, the average flow is 213 cumecs. The Irrigation Department that manages the canal system allows the existing power plant to abstract 1.3 cumec of water from the Indus River. Four canals originate from Kotri Barrage, Kalri Baghar Canal on the right bank and Akram Wah, Phuleli Canal, and Pinyari Canal on the Left Bank. Of these, Kalri Baghar Canal partly falls in the Study Area. It has a designed flow of 255 cumecs and had an average flow of 87 cumecs between 1986-87 season and 2003-04 seasons.

88. Part of the under-construction RBOD is also located in the Study Area. The channel is designed to carry saline water from water logged farmlands on the right back of Indus River to the sea. The channel is partly excavated and various excavated sections are not connected. Rainwater and seeped water from surrounding land has accumulated in the excavated channels.

89. The water resources in Balochistan are extremely scarce and virtually every perennial source is already being utilised. Balochistan can be divided into three hydrological regions: the Nari Basin, the Kharan closed Basin and the Mekran Coast. There are about 73 small or large rivers and streams constituting the three hydrological basins. Only about 30 per cent of this potential of rivers and streams are utilised through different schemes. The areas falling in the close proximity of the subproject are dependent on groundwater as well as surface water for irrigation use. The irrigation water is diverted from surface water resources such as flood flows and perennial base flows in rivers, sub-surface flow through river gravels and rarely the springs.

4.7.2 Ground Water Resources

90. More than 80 percent of the irrigated land in Sindh is underlain with brackish water unfit for agriculture. The shortage of irrigation water coupled with drought conditions in Sindh has increased the importance of groundwater exploitation wherever fresh water is available. Fresh groundwater is found mostly in a strip parallel to the left bank of Indus River and some pockets in other areas. The presence of rocky outcrop and shallow alluvium soil in the western part of the river rules out the possibility of any groundwater aquifer. More than

30,000 tube wells in private and public sector are installed for agriculture purpose. Rapid development of groundwater by private sector is endangering groundwater sustainability by further lowering the water table and inviting intrusion of saline water into fresh water aquifer. The alluvium, which predominantly consists of sand of various grades constitute an extensive groundwater reservoir in Pakistan.

91. Groundwater occurs in the unconsolidated deposits in Balochistan. Layers of gravel with sand, silt and clay constitute the aquifers. Generally, groundwater occurs under water table conditions but water is also found under artesian and semi-artesian conditions at few places in Quetta, Kuchlak, Mastung, Panjgur and Kachhi plain. The Groundwater resources in the Province also is important source of Irrigation particularly outside the canal zone. The subproject areas are dependent on groundwater for drinking as well as irrigation use.

4.8 Soil Morphology

92. Large quantitative of sediments is brought by Indus River in Sindh and is deposited along the Indus River banks and especially in the deltaic zone. Further hill torrents also bring silt and clay deposits in the lower reaches. These silts provide a highly fertile layer of soil to the region. The soils along the Indus River banks are silt and sandy loam. Outside the active flood plain, the soils are generally calcareous, loamy and silty clay. Most of the soils in the district of Thar are sandy. Moving sand dunes are also found in these districts. In Tharparkar area, the undulating flat plain is covered with variable soils mainly derived by erosion and residual weathering of the granites, granite gneisses and amphibolite's. While in the case of Dadu and Jamshoro, the soils in the plain near to subproject sites have homogenous porous structure, mainly silt and fine silt clayey, strongly calcareous with 18-20 % lime content uniformly distributed in the profile. Small patches contain shallow or very shallow, strongly calcareous, gravelly and stony loams. While the soils afford very sparse shrub and grass vegetation offering limited grazing, the rocky outcrop only has a water catchment value.
93. Most of the soils in Balochistan have a homogeneous porous structure conducive for plant growth. The soils have lime content ranges between 5 and 30 percent. The lime is uniformly distributed in most soils. The sandy soils in the province are extremely homogeneous with a lime content of 5 to 10 percent. The soils of river plains have a high agrarian potential.

4.9 Climate and Rainfall

94. The climate of Sindh is arid and hot. According to classification made by UNESCO, the region has been divided into three zones: Coastal- South of Thatta; Southern- from Thatta through Hyderabad to Nawabshah; and Northern-from Nawabshah to Jacobabad. In an average year, coastal region receives a maximum rainfall of 175-200mm.
95. Balochistan has semi-arid climate and is strongly influenced by topography. The climate is characterised by extreme of temperature ranging from very hot summer on the plains in east of the Province to freezing winter conditions in the mountainous north. The climate of the upper highlands of Balochistan is characterised by very cold winters and hot summers. In the lower highlands, winters vary from extremely cold in northern districts Ziarat, Quetta, Kalat, Muslim Baagh and Khanozai to milder conditions closer to the Makran coast. The desert climate is characterised by hot and very arid conditions. Occasionally strong windstorms make these areas very inhospitable. The climate of Khuzdar can be categorized as "warm summer and mild winter". The southern area of district is warmer than northern part. Annual average rainfall indicates semi-aridity in the area. The principal winds in the district are the northern (goorich), southern and south-eastern winds (nambi). The cessation of the goorich and garro in summer causes rust in the wheat crop and people have higher

risks of fever. Nimbi and gazgi winds are precursors of rain.

4.10 Temperature

96. The coldest season extends from December to February when dominating influence is the eastern winds. Mean monthly temperature during winters varies from 20°C near the coast to 14°C in the north. Forests are very rare in south of Nawabshah. Mean daily temperature rises rapidly from February onwards to its peak in May and June, rather earlier in the south than in the north. Mean maximum temperature reaches about 24°C in May in the south and as high as 45°C in June in the north. The severity of the heat varies from year to year - the highest temperature ever recorded on the subcontinent was 53°C at Jacobabad.
97. Winters are mild on the plains, with temperature never falling below freezing point. Summers are hot and dry, especially in the arid zones of Chagai and Kharan districts. The plains are also very hot in summer, with temperatures reaching 50 °C (122 °F). The record highest temperature, 53 °C (127 °F), was recorded in Sibi on 26 May 2010, exceeding the previous record, 52 °C (126 °F). Other hot areas includes, Turbat, and Dalbandin.

4.11 Humidity

98. The average humidity is 40-60% in the Sindh. Monthly rate of evaporation in the irrigated areas varies from 76mm in the north to 114mm in the south. Rainfall for the three months is less than 25mm... Winds are rather variable, being transitional from the northeast to southwest as the season develops. Humidity is at its lowest generally below 40%, but increases as the sea breeze becomes dominant. Evaporation is correspondingly at its highest exceeding 25mm in rocky desert areas.
99. July to mid-September is the monsoon season and is characterized comparatively by low day temperature, high humidity (over 60% in the south and 50% in the north), reduced evaporation (only 15 or 18mm at some stations in August) and a considerable increase in clouds in coastal areas. Occasional depressions from the east result in a 4 or 5-day period of rain and thunderstorm, especially in the south. The rainfall is very variable; instances have been recorded where a single day has considerably exceeded the highest annual average. Mid-September to November is the period of sea breeze with occasional north winds. Temperature rises slightly then falls back in November. Humidity falls to about 10 to 15% of the monsoon level and the evaporation decreases about 100mm in the north, 125mm in the south.
100. Generally, humidity is low in Balochistan ranging 40% and 50% but increases in the higher areas during the winter months under the influence of western depression and over most of the Balochistan in July and August when the monsoon penetrates the Province. Annual evapotranspiration often exceeds 2,000mm

4.12 Air Quality

101. Air quality in the sub-project area appears good based on observation during the study period. Domestic sources of air pollution, such as emissions from wood and kerosene burning stoves as well as small diesel standby generators in some households, are well dissipated. There are no other industrial pollution sources present in the vicinity except Jamshoro and Guddu Thermal Power Stations which are located close to the Guddu and Jamshoro Grid Stations.
102. The other major source of air pollution is dust arising from construction and other ground or soil disturbance. Near the access roads, when vehicles pass, dust levels will increase. The nearby roads to the proposed Grid Stations are mostly paved but dust levels are

elevated when vehicles pass intermittently over the roads based on field observations and may be high enough to obscure vision significantly based on the field observations.

4.13 Noise

103. Noise from vehicles and other powered mechanical equipment is intermittent. There are also the occasional calls to prayer from the PA systems at the local mosques but there are no significant disturbances to the quiet rural setting. However during the replacement/installation of the proposed equipment's, the proposed power expansion will use powered mechanical equipment. Subjective observations were made of background noise and also of individual vehicle pass by events. Based on professional experience background daytime noise levels are probably well below 55 dB(A) L90.

4.14 Biodiversity

4.14.1 Wildlife, Fisheries and Aquatic Biology

104. In Sindh Province, Pig and hog deer are found in woodland near the Indus River and hares are fairly common. Black and gray partridges are also found. Migratory birds use the Indus valley and in cold weather many varieties of duck and teal visit the district. The Indus contains a variety of fish. In the winter months when the river recedes, fish are caught in greater quantity. But none of these are falling in the AOI of selected subprojects. But there are no protected areas in the AOI of the subprojects selected for rehabilitation under MFF.

105. Mammals such as Markhor (wild sheep), leopards, wolves, hyena, rabbits, wild cats and porcupines are to be found in the Quetta region. Local birds species include partridge, warblers, shikra, the blue rock pigeon, rock nuthatch, golden eagle, sparrows, hawks, falcons and bearded vultures.

4.14.2 Protected Areas

106. In Pakistan there are several areas of land devoted to the preservation of biodiversity through the dedication of national parks and wildlife sanctuaries. Currently, there are 23 wildlife protected area in Sindh. Sindh, Balochistan and Punjab Wildlife Departments are the management authority of protected wildlife sanctuaries (including protected wetlands), game reserves and national parks. Government of Sindh, Balochistan and Punjab have promulgated legislation to protect these areas and their threatened species. As Sindh province is the major part of the study area, numbers of wetlands are present in Sindh province, 10 of which are declared wetlands of international importance (Ramsar Sites). There are no environmental sensitive sites in the respective district boundaries of the subprojects in Sindh except the Indus River Dolphin Reserve and Manchar Lake which are located in Guddu and Dadu respectively. Indus River between the Guddu Barrage and Sukkur Barrage (downstream of Guddu Barrage) is a very important habitat for Indus or Blind Dolphin. It is a critical natural habitat declared by the government as a protected area meeting the criteria of the World Conservation Union [IUCN] classifications. This part of the river contains almost 60% of entire population of this river dolphin which is endemic to Pakistan. However, some scientists are of the opinion that Indus dolphin is a sub-species of the Ganges dolphin of India. This reserved approximately at a distance of 2-4km from the proposed Guddu Grid Station. The areas of Manchar Lake are one of the largest fresh water lakes in Pakistan, situated in Dadu district. It is a vast natural depression flanked by Khirthar range in the west, Lakhi hills in south and river Indus in the east. On the north eastern side is the protective embankment. The lake is fed by two canals, the Aral Wah and the Danister from the river Indus. The lake also collects water from numerous small streams

in the Khirthar Mountains. The common large mammalian species are Asiatic jackal (*Canis aureus*), Red Fox (*Vulpes vulpes*), Jungle cat (*Felis chaus*), Small Indian mongoose (*Herpestes javanicus*), Grey mongoose (*Herpestes edwardsi*). While the small mammals are Five-striped Palm Squirrel (*Funambulus pennant*), Indian Gerbil (*Tatera indica*). The Desert hare (*Lepus nigricollis*) and Long-eared Hedgehog (*Hemiechinus collaris*) is also reported in the district. This site is located far away from the sub-project area.

107. The Hazarganji Chiltan National Park, 20 km (12 mi) south-west of Quetta, Markhors is a protected park area and is approximately 30km away from the proposed Quetta Industrial Area Grid Station.

108. There are no areas of wildlife significance near the sub-project area of influence in Balochistan and Punjab.

4.14.3 Forest Areas

109. The type and location of forest area falling in Sindh Province are shown in Figure 4.2.

MAP OF SINDH SHOWING VARIOUS FOREST TYPES

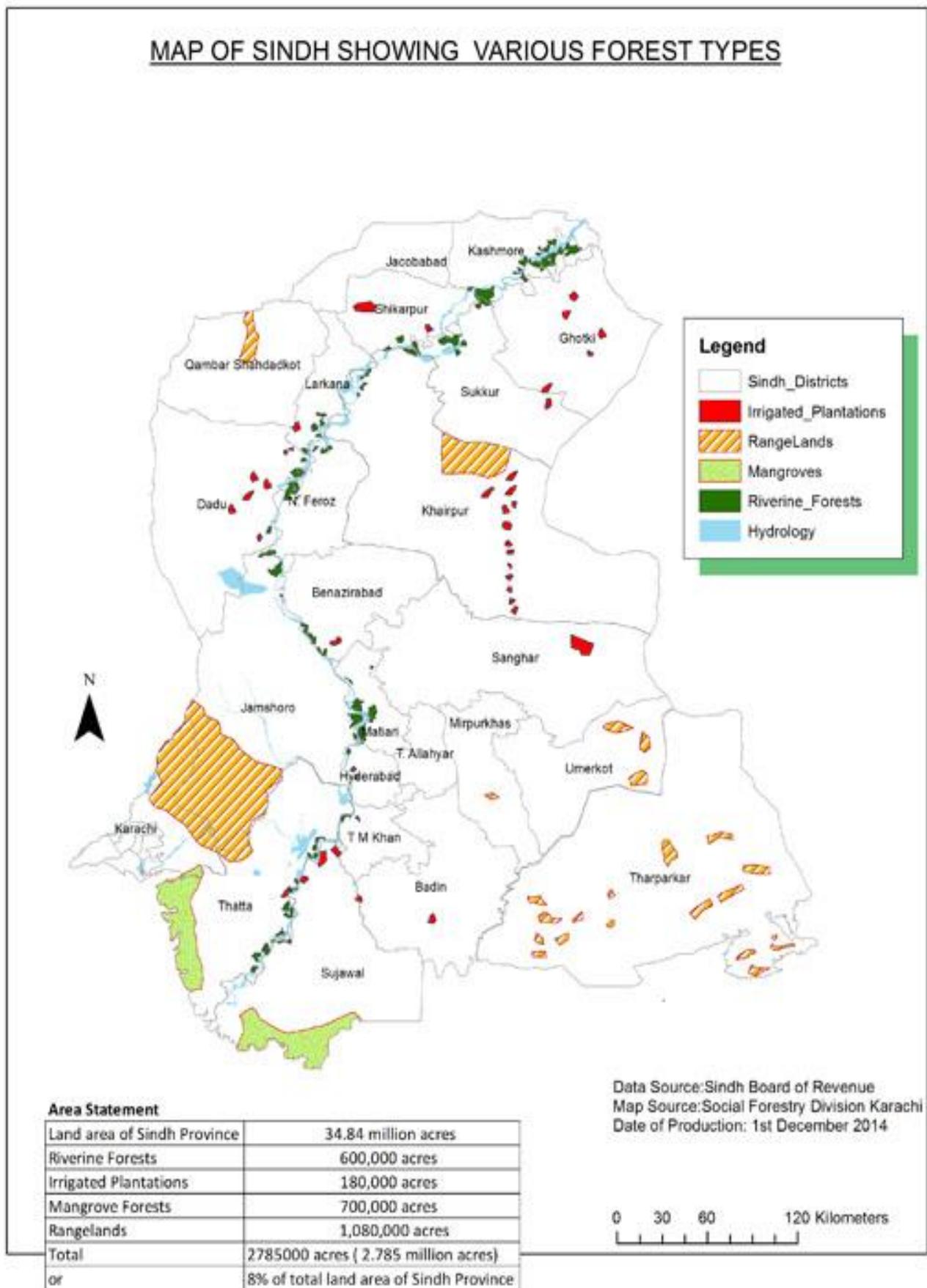


Figure 4.2: Type and Location of Reserved Forest Areas in Sindh

(Source: Forest Department Govt of Sindh)

110. The above Figure:4.2 is showing that none of the protected forest is falling in the proposed subproject areas.
111. According to Balochistan's Forest Department, the forestland and state protected forest area is 2,306,910 hectares. Juniper, Chilghoza Pine, Olive-Pistachia, Olive Acacia, Desert, Mangrove, Alien and Tropical Desert Thorn forests are located in different districts of Balochistan.
112. Similarly, Balochistan has both tropical thorn and mangrove forests in Gwadar, Pasni and Lasbela.
113. In the north of Balochistan, the Zhob and Sherani districts have unique forests of Pine-nuts and olive which are much valuable in terms of exporting and usage for medicines and other purposes. The type of forest in Khuzdar is Dry Sub-Tropical and temperate Semi-Evergreen Scrub Forest. The climax formation has reduced to scrub condition due to grazing and fuel wood pressures. Presently, it is with very open cover and with a moderate amount of bushes and grasses. Major tree species are Hapurse (*Juniperus excels polycarpus*), Zaihtoon (*Olea cuspidate*), Gawan (*Pistacia khinjak*), Phulai (*Accacia modesta*), Kabar (*Salvadora oleoides*), Kandi (*Prosopis specigera*), Pissi (*Zizyphus Jujuba*), Jangli Ber (*Zizyphus nummularia*), Kikar (*Accacia nolatica*) and (*Acacia jacquemontii*). There is only one Notified natural forest at Kera Dhori with a total area of 8,094 hectares. There is no reserved/protected forest areas in the AOI of the subprojects selected for rehabilitation under MFF.

4.14.4 Terrestrial Habitats, Forest and Protected Species

114. The sub-project area, which is dry, is dominated by rural suburbs and with various productive fields of monocultures that now dominate the agro-ecosystems present in the sub-project area. Common floral species with rooted vegetation are also present near most of the water bodies of the area. However there is very little vegetation in the AOI of proposed Grid Stations. In addition, there is no habitat in the AOI of the subprojects selected for rehabilitation under MFF.

4.14.5 Flora

115. The dominant flora in the subproject areas of Sind are in the arid zone consists of communities of deciduous and xerophytic trees and shrubs. Plants and trees with small leaves and thorny species are predominant. These include: Babul (*Acacia nilotica*), Nim (*Azadirachta indica*), Ber (*Zizyphus vulgaris* or *jujube*), Lai (*Tamarix Orientalis*), Kirrir (*Capparis aphylla*), and Kandi (*Prosopis cineraria*) and various species of mangroves (*Aegiceras majus*, *Brugiera gymnorhiza*, and *Ceriops candolleana* - Chauri/Kirari) and weeds in Indus Delta. Several types of water lilies are also found in waterlogged areas, surface drains, and on the periphery of lakes. In many places, the open water is dominated by submerged aquatic vegetation filling the whole water profile. The more common weeds and lilies include: *Typha Angustala*, *Juncus articulatus*, *Scipus Littotalis*, *Phragetes Kark*, and *Nyasphaea Lutus*.
116. A total of 225 species of flora have been identified in the Quetta region including pistachios, juniper, wild olives, wild ash and wild almonds. Also found are shrubs including wild fig, barberry, wild cherry, makhi and herbs such as *ephedra intermedia* and *gerardiana*.

4.15 Physical and Cultural Resources

117. There are no officially protected heritage sites or historic, religious or archeologically important sites located in the sub-project works areas. There are no major historic or

archaeological features of note within about 500 m of the works.

4.16 Socio-Economic Environment

4.16.1 Transportation and Tourism

118. All the district headquarters of proposed subprojects are linked with the rest of the country by rail and roads. The district headquarters are connected with metaled roads to its all subsidiary headquarters. All major villages within each district are connected with the district headquarters through metaled roads. Most of the districts are served by railway line which runs to other parts of the country. Provincial headquarters are connected with rest of the country by air.

119. There are many places of interest in each province which attract tourists but none is falling the AOI of the proposed sub-project.

4.16.2 Energy Sources

120. The distribution lines for electrical power run to a main grid sub-station in each district of the proposed subproject. The existing 500KV, 220KV and 132KV Grid Stations owned by NTDC, GESCO, HESCO and QESCO, transmits power to the load centres.

121. Reserves of fossil fuels the main sources of energy in Pakistan. In the study area there is no source of hydropower and other energy sources are progressively more common further away from the major towns. The biomass sourcing is concentrated on home garden production of fuel wood, the extraction of wood from forests, woodland, crop plantations and agricultural residues. The other significant energy sources in the area are kerosene and LPG. There are numerous petrol stations and LPG dealers in the district.

5 Environmental Impacts and Mitigation

5.1 General

122. This section discusses the potential environmental impacts of the proposed sub-project activities, predicts the magnitude of the impact, assesses significance, identifies mitigation measures to minimise adverse impacts, and evaluates the residual impacts of the project.

5.2 Methodology

123. Determining the area and significance of environmental impacts and their effects enables the identification of necessary mitigation and environmental enhancement measures as well as the related financial costs of mitigation. An impact can be either beneficial or adverse and is assessed by comparing the quality of the baseline conditions with the conditions when the project is under implementation or operation.

124. In order to describe the significance of an impact it is important to distinguish between two concepts, magnitude (of impact) and sensitivity (of receptors). The use of these two concepts for this IEE is outlined below.

125. The mitigation measures are devised using IFC guidelines, and in accordance with ADB SPS (2009) recommendations. Therefore, in formulating mitigation, reference has been made to the IFC Performance Standards, the IFC General EHS Guidelines and the IFC EHS Guidelines for Construction Materials Extractions. Where applicable, mitigation shall be included as specifications in the construction contract.

5.2 Corridor of Impact/Area of Influence

126. The Corridor of Impact or Area of Influence (Col/AOI) is the area within the radius of 0.5 km of the existing premises of Grid Stations in which there could be a direct impact. The Col falls within the footprint of the temporary and permanent works or the working area required for completing the works. Impacts would be due to replacement of equipment's and disturbance during construction. The Col must be cleared before commencement of construction activities.

5.3 Environmental Impacts

5.3.1 Detailed Design and Pre-Construction Phase

127. The EMP will be reviewed during the implementation phase at the detailed design stage in line with best practice as required by ADB. A check will be made at the detailed design stage (final decision for replacement/installation of equipment's) that the placement has been finalised as planned to ensure the location is as described in the IEE. If there are changes in project scope or location, these will be disclosed to concerned EPA and the IEE will be revised. The revised IEE and EMP will be resubmitted to ADB, incorporating any recommendations and requirements from EPA.

5.3.1.1 Project Disclosure

128. The preliminary design will be disclosed to the EPA and public consultations will be conducted based on the preliminary alignment designs acquired.

Environmentally Responsible Procurement (ERP)

- I. Aim to provide some enhancements in line with ADB policy on environmentally responsible procurement and avoid negative impacts.

5.3.1.2 Planning for Erosion Control

129. The designs or method of replacement/installation of that equipment's resulting erosion will provide for redistributing sheet flows from surfaces to reduce erosion and other impacts. Designs method of replacement/installation of that equipment's will also include adequate major and minor lead off drainage facilities to the nearest water courses, as necessary. In order to minimize and manage hydrologic flow at bridges and culverts during construction a Drainage Plan will also be prepared by the contractor to control construction runoff and prepare to prevent flooding.

5.3.1.3 Planning Construction camps

130. As the proposed work is only replacement/installation of equipments and the proposed interventions are on minor scale to be completed within short period. In case, If the establishment of camp was required, uncontrolled worker camp operations and stockpiling of construction materials is anticipated. The sites selected for worker camps and back up areas for stockpiling materials and equipment will be planned in advance in consultation with the local community and located to avoid the most productive agriculture and will use waste/barren land and non-agricultural plots as far as possible. Construction camps however will be on govt. owned land.

5.3.1.4 Temporary Traffic Management

131. There are also minor concerns about blocking existing roads and many other footpaths and tracks near the project site during construction. Therefore a provisional Temporary Pedestrian and Traffic Management plan will be prepared by the contractor while transporting the proposed equipment's and other associated construction material that can be updated by the contractors and agreed with ESIC cell one month prior to start of works.

5.3.1.5 Institutional strengthening and capacity building

132. The ESIC cell currently has few staff and there will be a need for more human resources as discussed earlier. A substantial amount of training will be undertaken in order to ensure that the Cell officials are trained to understand how to apply the EMP.

5.3.1.6 Preparing the Contractor(s) to Address Mitigation Measures

133. The contractor will be primed by including the EMP and environmental assessments in the bidding and contract documentation. The contractor(s) will be informed that they will be required to produce method statements and plans in advance as required in the EMP for, Temporary Pedestrian and Traffic Management Plan, Drainage Plan, Erosion Control Plan, Waste Management Plan and Noise, Occupational Health and Safety Plan and Dust Control Plan, and a schedule of costs for implementation of mitigation measures.

5.3.2 Construction Phase

5.3.2.1 Contractor Mobilization

134. The source of the construction impacts will mainly be from replacement/installation of equipment's, clearance of vegetation, construction of access, minor earthworks (in case

foundations for the equipment's were required). This section provides a brief explanation of each factor, also suggesting a line of action towards mitigation measures for the adverse impacts.

- **Orientation for Contractor**

135. Prior to the commencement of construction the contractor, all subcontractors and all his workers will need to be trained on the requirements for environmental management. In order to ensure that the contractor, subcontractors and workers understand and have the capacity to implement the environmental requirements and mitigation measures there will be regular and frequent training sessions and tool-box talks.

- **Advance planning of environmental mitigation measures**

136. The contractor will be required to produce method statements and plans in advance of commencement of construction as required in the EMP for:

- i) Drainage Management plan,
- ii) Temporary Pedestrian and Traffic Management plan,
- iii) Erosion Control and Temporary Drainage Plan,
- iv) Waste Management plan,
- v) Material Management Plan, if required,
- vi) Noise and Dust Control Plan, and
- vii) Occupational Health and Safety Plan.

137. All the above plans will be submitted one month in advance of any construction activities to ESIC cell to check and agree and verify requirements from EPA have been complied with.

5.3.2.2 Land Resources

- **Waste management and spoil disposal**

138. There may be in rare cases some surplus rock and soil based materials. The waste management plan (WMP) will be required to ensure waste from construction is managed properly and to reduce, reuse and recycle waste wherever possible. The contractor will prepare the WMP one month before the commencement of construction with disposal sites identified for agreement by project supervision consultants (ESIC/NTDC). The WMP will cover all aspects of construction waste disposal. It is preferred that government land is used for dumping of material. If private land is to be used for the purpose of dumping it shall commence only after written permission from the land owner is checked by the ESIC in NTDC.

- **Mitigation**

139. The mitigation measures in the waste management plan (WMP) will include but not necessarily be limited to:

- (i) Spoil will not be disposed of in rivers and streams or other natural drainage path,
- (ii) Spoil will not be disposed of on fragile slopes, flood ways, wetland, farmland, forest, religious or other culturally sensitive areas or areas where a livelihood is derived,
- (iii) Use surplus spoil for local repair works to fill eroded gullies and depression areas and degraded land in consultation with local community,
- (iv) Dispose of spoil will be to disused quarries and abandoned borrow pits.

Disposed spoil will be spread in 15cm and compacted to optimum moisture content, covered with topsoil, landscaped and provided with drainage and vegetation to prevent erosion following NTDC/GESU guidelines².

- **Soil erosion and surface runoff**

140. In the construction stages there is the potential for the works to have impact on local water resources. The works are not close to any major streams and rivers at any places and there are no crossings of significant tributaries. There are no potentially major impacts from all the works near the rivers and streams. The drainage designs for the Project should be cleared with the local drainage and irrigation authorities before works commence.

- **Mitigation**

141. Combinations of alternative methods should be considered including but not necessarily limited to:

- i) schedule work so clearing and grading are done during the time of minimum rainfall,
- ii) clear only areas essential for construction,
- iii) locate potential area pollutant sources away from steep slopes, water bodies, and other critical areas,
- iv) route construction traffic to avoid existing works or newly planted vegetation,
- v) protect natural vegetation with fencing, tree armoring, and retaining walls or tree wells.
- vi) stockpile topsoil and reapply to re-vegetate the site,
- vii) cover and stabilize topsoil stockpiles,
- viii) use wind erosion controls,
- ix) intercept runoff above disturbed slopes. Convey to permanent channel or storm drain.
- x) on long or steep, disturbed, or man-made slopes, construct benches, terraces, or ditches at regular intervals to intercept runoff,
- xi) use retaining walls,
- xii) use check dams,
- xiii) Install bioengineering in line with NTDC manuals and seed and fertilize,
- xiv) use seeding and mulch/mats,
- xv) use turfing,
- xvi) use wildflower cover.

142. Stockpiles should be covered before heavy rain to prevent wash out due to runoff. Stockpiles should not be located within 20m of water courses and there should be an intervening vegetated buffer to control any un-expected run-off. As a long-term benefit of the project, the drainage infrastructure may be able to be modified as water harvesting structures to collect water for irrigation and other uses and such options should be discussed and investigated at the detailed design stage.

- **Worker camps, maintenance yards and canteens operation**

143. Uncontrolled worker camp operations can cause significant impacts. The sites for worker

² Guide to Slope Protection Works—. NTDC GOP 2007.

camps will be planned in advance in consultation with the local community.

144. In consultation the public have expressed concerns about nuisances from construction camps. The main issues of concern are uncontrolled defecation by construction workers, unmanaged disposal of solid and liquid wastes into watercourses, natural drains and improper disposal of storm water and black water in the village areas. The contractors will therefore adopt good management practices to ensure that fuels and chemicals, raw sewage, wastewater effluent, and construction debris/scarified material is disposed of under controlled conditions to reduce the risk of contamination.

- **Mitigation**

145. Prior to the close out of the Project construction in area the worker camps will be removed and restored to the original condition as far as is reasonably practicable to the satisfaction of the and the local authority.

146. Before construction commences arrangements will be reconfirmed by the construction contractors and notified to ESIC Cell / NTDC for approval as follows.

- i) Confirm location of work camps in consultation with ESIC and local authorities with location subject to approval by the ESIC. If possible, camps shall not be located near settlements or near drinking water supply intakes,
- ii) Cutting of trees will not be allowed and removal of vegetation shall be minimized,
- iii) Water and sanitary facilities shall be provided for workers and employees,
- iv) Construction camps will be established in areas with adequate natural drainage channels in order to facilitate flow of the treated effluents.
- v) If the establishment of a camp is required for one month or more, portable lavatories or at least pit latrines will be installed and open defecation shall not be allowed and prevented by keeping lavatory facilities clean at all times.
- vi) Wastewater effluent from contractors' workshops and equipment washing yards will be passed through gravel/sand beds to remove oil/grease contaminants before discharging it into natural streams. Oil and grease residues shall be stored in drums awaiting disposal in line with the agreed Waste Management Plan.
- vii) Predictable wastewater effluent discharges from construction works shall have the necessary permits from EPA before the works commence.
- viii) Solid waste and sewage shall be managed according to the national and local regulations. As a rule, solid waste must not be dumped, buried or burned at or near the project site, but shall be disposed of to the nearest site approved by the local authority.
- ix) The Contractor shall organize and maintain a waste separation, collection and transport system.
- x) The Contractor shall document that all liquid and solid hazardous and nonhazardous waste are separated, collected and disposed off according to the given requirements and regulations.
- xi) At the conclusion of the project, all debris and waste shall be removed. All temporary structures, including office buildings, shelters and toilets shall be removed by the contractor and exposed areas shall be planted with suitable vegetation, to the satisfaction of the and the local authority.
- xii) The ESIC Cell shall inspect and report that the camp has been vacated and restored to pre-project conditions as far as is reasonably practicable.

- **Soil contamination**

147. Possible contamination of soil may occur from oils and chemicals at workshop areas, and equipment washing-yards. The contamination may limit the future use of land for

agricultural purposes.

- **Mitigation**

148. The following practices will be adopted to minimize the risk of soil contamination:

- i) The contractors will be required to instruct and train their workforce in the storage and handling of materials and chemicals that can potentially cause soil contamination.
- ii) If waste oils or other contaminants are accidentally spilled on open ground the waste including the top 2cm of any contaminated soil shall be disposed of as chemical waste to a disposal site acceptable to the NTDC and agreed with the local authority / community. Debris generated by the dismantling of existing structures will be recycled subject to the suitability of the material in line with the EMP.
- iii) Solid waste generated during construction and at worker campsites will be properly treated and safely disposed of only in demarcated waste disposal sites identified and agreed with the local community.
- iv) Control measures for oily residues, lubricants and refueling are prescribed in the EMP. The maintenance yards that will be created will have dedicated drainage which can capture run-off. Oily residues and fuel should be captured at source and refueling and maintenance should take place in dedicated areas away from surface water resources. With these measures in place no significant impacts should be arise in construction.

- **Contamination from Diesel and other oil spills from Construction machinery**

149. At places it may be inevitable and may exceed the maximum permissible limit. In case it is allowed to be as rule rather than an exception, the dumping site will be permanently damaged along with allied physical biological and social losses. This is mitigable through effective application of the maximum spill regulations.

150. "Guide Lines for Oil Spill Waste Minimization and Management issued by International Petroleum Industry Environmental Conservation Associate are as follows:-

- **Soil contaminated** by minor spills/leakages (defined as leaks from vehicles, machinery, equipment or storage containers such that the area and depth of soil contaminated is less than 10 sq ft and 3 inches respectively) is to be scraped and burnt in a burn pit.
- Moderate spills defined as spills of volume less than or equal to 200 liters is to be contained and controlled using shovels, sands and native soil. These equipments and materials are to be made available at camp sites during the operation. The contaminated soil is to be excavated and stored in a burn area lined with an impermeable base. Depending on the volume, the contaminated soil is either disposed-off through by specialized treatment such as bioremediation or through approved contractor.
- **Major spills** (defined as spills of volume much greater than 200 liters) require initiation of Emergency Response Procedures and Oil Spill Contingency Plan. These spills are to be handled and controlled according to the Plan and require special treatment such as bioremediation and through approved contractors.

151. Mitigation Contractor's contractual obligation to impose strict rules on his workers and labour and ensures that no spill are caused. If it the spills, do take place, it must be followed by the treatment prescribed above as per the degree of spill.

- **Damage to, roads, cross drainages** by machinery Such a situation can arise through carelessness of the heavy machinery drivers/operators. Such carelessness can cause considerable damage to paths, roads and drainages if the drivers/operators are not made aware, trained and bound to be careful. An effective sinology can reinforce the instructions to drivers. It is a concern of moderate significance but is mitigable through care and regulation.

- **Mitigation**

152. Contractor's contractual obligations to impose strict control over operators and drivers of all types of vehicles. If the damage take place, the contractor must be bound to carry out repair immediately.

- i) Discharge from unstable slope or leakage on construction. Such an impact can destroy the structure leading to unprecedented damage. Though significant, it can be set aside through a careful planning of the work. If such a situation does appear, it becomes highly significant though a mitigable impact.

- **Mitigation**

153. Contractor's contractual obligation is not to let such leakage develop. Should such leakage develop, the contractor must remain fully prepared to immediately control the discharge.

- i) Soil Compaction due to labour camps, and machinery yards The human and mechanical activity normally compact the soil and turns it nonproductive.
- ii) Mitigation Contractor's contractual obligation to mitigate the impact of compaction and leave the site almost in the same state in which it is occupied. Pictures of the area should be taken before handing it over to contractor which will help the RE to ensure an acceptable state of soil while getting the area back from the contractor.

5.3.3 Hydrology and Water Resources

- **Hydrological, drainage and irrigation impacts**

154. The Project will be designed not to interfere with the drainage on adjacent lands and paths and to prevent soil erosion and retain the existing irrigation system in the operational phase. However in the construction stages, there is the potential for the works to have impact on local water resources. The plans to avoid and retain such drainage and irrigation works shall be included in the Drainage Management Plan and the contractors will include plans for any necessary temporary drains to cater for worst case flow. The designs will also provide for protection of the works that are in progress and for redistributing flash flows from prepared surfaces during heavy rain to reduce erosion and other impacts. The contractor(s) will be required to have a drainage engineer / erosion control officer to check implementation of the temporary drainage mitigation on site and make modifications on a daily basis as necessary Mitigation

5.3.4 Air Quality and Noise Pollution

155. Dust and smoke and other pollutants due to contractor machinery and installing/replacing the equipment's are anticipated.

156. Mitigation Contractor's contractual obligation to keep the dust and smoke low by using machinery which is well maintenance and is almost noiseless. And all Kacha roads and paths are sprinkled with water many times a day.

- **Dust control**

157. The location of the residences, temples, schools, hospitals and civic cultural and other heritage sites has been reviewed above. Some of the residences in the settlements are close enough to be disturbed by dust. Water is available in the study area although surplus water may not always be available to suppress dust in the dry season. Therefore as a general approach it is recommended that if works are within 15m of any sensitive receivers, the contractor should install segregation between the works at the edge and the sensitive receivers. The segregation should be easily erectable 2.5m high tarpaulin sheet and

designed to retain dust and provide a temporary visual barrier to the works. Where dust is the major consideration the barrier can take the form of tarpaulins strung between two poles mounted on a concrete base. These can be moved along as the work proceeds.

- **Mitigation**

- i) If the working surfaces become dry and dusty, water will be sprinkled on the and exposed surfaces when work is carried out within 50m of the side SRs.
- ii) If works give rise to complaints over dust, the contractor shall investigate the cause and review and propose alternative mitigation measures before works recommence.
- iii) All heavy equipment and machinery will be fitted in full compliance with the national and local regulations.
- iv) Fuel-efficient and well-maintained haulage trucks will be employed to minimize exhaust emissions. Smoke belching vehicles and equipment will not be allowed and will be removed from the project.
- v) Vehicles transporting soil, sand and other construction materials will be covered with tarpaulin sheets to avoid impact from dust. Speeds limits will be established for vehicles within the works sites and on unpaved edge areas of the project

- Smoke from burning of waste material or burning firewood

A large number of big and small fires in the labour camp can produce smoke and smog which can cut off visibility, and cause suffocation along with causing diseases of the respiratory tract.

- **Mitigation**

158. Contractor's contractual obligation to use clean and smoke free fuel in the labour camp. Cutting and burning trees/shrubs for fuel shall be prohibited. Instead Gas Cylinders should be used in the labour camp for cooking purposes.

- **Noise**

159. Powered mechanical equipment such as generators, stabilizers and concrete-mixing plant can generate significant noise and vibration. Whereas various modern machines are acoustically designed to generate low noise levels there is not much evidence that acoustically insulated plant is available in Pakistan. The cumulative effects from several machines can be significant and may cause significant nuisances.

- **Mitigation**

160. To minimize impacts the contractors should be required by the Cell to;

- vi) maintain and service all equipment to minimize noise levels, and
- vii) locate equipment to minimize nuisances and
- viii) install acoustic insulation or use portable noise barriers where practicable to limit noise at sensitive receivers. Insulation should be provided to minimize noise impacts such that the measured noise at the edge of the works nearest residential areas will be less than 45 dB(A) Leq during night time (10 p.m. to 7 a.m.) and 55 dB(A) Leq at other times during the day.

5.3.5 Biological Resources

161. Damage to biological resources Flora, Fauna (Biota). No major change is expected in the habitat of the natural flora or fauna.

- **Mitigation**

162. Contractor's obligation not to cause any additional destruction to Flora and Fauna of the

area by respecting the limits of construction site and not to enter other territories. No unauthorized tree or bush cutting should be allowed. Should it be necessary, it should not be done without an express permission of the RE. If the number of trees is above a limit fixed by RE, professional advice should be obtained from local Forest officer.

- **Damage to Fisheries;**

163. The Proposed project will not result in any damage to fish population.

- **Impact on migratory birds**

164. The project site does not fall on the recognized route of globally recognized migratory water fowl or ducks. However a number of migratory birds do pass this way and stay for wintering in the river side. Since the water: land ratio is not going to change, there shall be no or slight influence of the replacement/installation on the temporary habitat of the migratory water birds.

- **Mitigation**

165. Contractor's contractual responsibility to facilities a regular inspection by the Wildlife Department to ensure that the process of construction does not cause any hindrance to the migratory birds.

5.3.6 Health & Safety

166. The health and safety of the workforce and NTDC staff is of major concern during replacement/installation of the proposed equipment's and O&M of the system.

- **Safety of the workforce**

167. While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.

168. The NTDC will follow the ICNIRP exposure limits for occupational exposure to electric and magnetic fields during replacement of the equipments.

169. In addition, the IFC Occupational Health and Safety guidelines shall also be followed. Section 2 of the IFC General EHS Guidelines provide guidance in terms of health and safety which should be adopted by the Contractor. In particular, the contractor's attention shall be drawn to the following sections:

- Section 2.1: General Facility Design & Operation
- Section 2.2: Communication and Training
 - OHS Training
 - Visitor Orientation
 - New Task Employee and Contractor Training
 - Basic OHS Training
 - Area Signage
- Section 2.3: Physical Hazards
 - Noise
 - Vibration
 - Eye Hazards
 - Welding/Hot Work
 - Working at Heights
- Section 2.4: Chemical Hazards
- Section 2.5 Biological Hazards
- Section 2.7: Personal Protective Equipment (PPE)

- Section 2.8:

- Confined Space
- Lone and Isolated Workers

170. The Contractor shall prepare a Health and Safety Plan which is relevant to his chosen methodology and incorporates section 2 of the IFC General EHS Guidelines. In addition, the plan shall include the following:

- Identification of potential hazards to workers, particularly those that may be life threatening
- Provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances
- Training of workers
- Documentation and reporting of occupational accidents, diseases and incidents
- Emergency prevention, preparedness and response arrangements – including details of emergency evacuation of labour following a life threatening accident to the nearest hospitals
- Provision of security

171. This plan must be submitted to the Engineer for approval prior to any works commencing on site.

172. If required, in order to maintain proper sanitation around construction sites, temporary toilets will need to be provided. Construction worker camps will not be located in settlement areas or near sensitive water resources.

173. The comfort and health of the workforce and surrounding local residents may be affected to some extent from emissions of dust, noise and construction litter. The chances of serious injury or accident during the construction activities are moderate and can be mitigated by safety training and monitoring. Insufficient toilet provisions may give encouragement to defecation in the open and may increase transfer of water or air borne diseases. Local labor will be used wherever possible and where worker camps are needed they will include proper sanitation facilities (at least pit latrines and showering facilities).

174. Existing health services in the localities near the project such as health posts and clinics have limited resources and may lack sufficient medicines and health personnel to accommodate any additional patients from the construction workforce.

175. Therefore in the construction stages the contractor shall provide first aid facilities for the workers on the and at the worker camps with at least one qualified first-aider.

- **Enhancements or changes in scope**

176. Opportunities for enhancements (or changes in scope) can be assessed prior to construction and proposed enhancements will be discussed with the local population to identify stewardship of any planting and also to serve as a vehicle for further public consultation at the implementation stage and to assist in public relations.

177. Where rock based materials, gravels and sands are extracted it is a requirement to rehabilitate the re-vegetation of these areas with indigenous species and this has been a concern of local people in the public consultation. Following the completion of the landscaping will take place and overall the appearance will be improved.

5.3.7 Operational and Management Phase

178. At operational phase the Project Manager shall develop a comprehensive operational and Management Manual and an effective monitoring plan. Mistakes at operational level or handling of operations by untrained staff can prove very risky and costly. Important points to be attended at operational stage are as follows: -

- Comprehensive O&M Rules as per ISO standards;
- Strict application of prescribed M&E plan;
- Continuous evaluation of design efficiencies;
- Understanding and training of Operational and Maintenance Manual;
- Annual Environmental Audit;
- Regular maintenance of engineering works (mechanical as well as civil);
- • Staff Welfare;
- Continued Public consultation and feed back on that;
- Continued attention towards Gender issues and women consultation;
- Refresher Training Courses for operational staff.

179. The project site seeks to provide a buffer distance from the corridor, keeping vehicles away from sensitive receivers in the operational phase as far as possible. It is difficult with a project of this magnitude to achieve an alignment that make sure all residences or commercial premises or schools will far enough away from the project not to be affected in any way by traffic emissions Therefore air quality will be monitored in the operational phase to provide reassurance of the sustainability of the sub project. NTDC/GoP will also prevent encroachment and enforce the exclusion zone and preserve the buffer distances to residences within the sub station.

180. Protection of water resources must also be monitored in the operational phase to reassure the public that the project does not make any long term impact on the water quality.

5.3.8 Socio-economic Impacts on the overall Project Area

5.3.8.1 Benefits of the Project and Analysis

181. As per PC-I of the NTDC South System, the G.M GSO NTDC office has communicated to the head office that various equipment installed at NTDC grid station have become depleted and need to be replaced. The out-dated material is resulting in frequent outages. The detail of outages and consequently energy monetary loss in year 2014-15 is as under:-

Total No. of Outages	=	161 Nos.
Total Duration of Outages	=	2323 hrs.
Total Loss of Energy (Units)	=	318610 MWh
Revenue Loss (In Millions)	=	Rs.5097 million

182. From NTDC point of view since NTDC tariff is demand based tariff, they have converted the above noted total loss of energy into MW of load lost i.e. 137.14 MW for the purpose of revenue impact on NTDC in our economic/financial analysis.

183. The analysis is based on constant values, i.e. UOSC (Rs.102.43/kW/month) as well as O&M cost during the project's useful economic life. Variation in power/energy cost, taxes and duties etc. imposed by the Government will be treated as pass through items.

184. The project's useful economic life has been assumed as 40 years.

185. The interest rates of 13.50% for local component and 15.00% for foreign component of cost have been used for IDC/Amortization purposes.

186. Nominal Discount rates of 12% & 14% have been used for Net Present Value calculations.

For Economic analysis, the real discount rates have been used considering 9% inflation.

187. Transmission losses @ 3% have been used for arriving at the net power.

5.3.8.2 Social Benefits

188. The power system equipment is subject to wear and tear with the passage of time. Also the equipment has some definite life and thus it needs replacement after its useful life. The old equipment result in frequent faults/trippings and power interruptions which hamper economic activity and production. Replacement of depleted equipment with new will reduce loss of load probability and resulting smooth and reliable power supply.

189. The continuity and reliability of electricity will be used for farm mechanization. The much needed requirements for tube wells electrification will be adequately met which will not only provide steady water supply for irrigation but as well as reduce the ground water reservoir level in water logged and salinity hit areas. The reclamation of land will help in maintaining the cropped areas and also production. The steady availability of motive power will provide incentive for the establishment of industries based on local raw materials, creating gainful employment opportunities to the increasing work force. This is envisaged to considerably alleviate disguised unemployment on the farms.

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

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

5.4 Management Structure and Manpower Requirements

192. The existing staff of NTDC will undertake the execution and operation of the project. Therefore no additional staff will be required for this project.

6 Environment Management Plan

6.1 Introduction

193. The Environmental Management Plan (EMP) for the subprojects covered under this IEE has been prepared keeping in view the anticipated environmental impacts during pre-construction, construction and operational stages of the project on the existing environmental conditions including air, soil, water, socio economic and wildlife of the project area and suggests appropriate measures to mitigate the potential adverse impacts and enhance the positive impacts.
194. The compliance monitoring of mitigation measures would be ensured through the implementation of the Environmental Monitoring Plan, reporting and feedback for identifying the necessary corrective actions.
195. The Contractor shall be responsible for the complete implementation of the mitigation measures detailed in this EMP.
196. The mitigation included in the EMP will be included as specification of the construction contract binding the Contractor to carry out the works assigned in accordance with EMP.

6.2 Objectives of the EMP

197. To facilitate the implementation of the mitigation measures, the EMP has been prepared to manage anticipated adverse environmental impacts due to the project interventions in a way, which minimises these adverse impacts on the environment and socio-economics of the Project area.
198. The specific objectives of the EMP are to:
 - Define the responsibilities of the project proponents, contractors, construction, supervision consultants and environmental monitors;
 - Facilitate the implementation of the mitigation measures identified in the EIA;
 - Define a monitoring mechanism and identify monitoring parameters;
 - Provide a procedure for timely action in the face of unanticipated environmental situation;
 - Mitigate the impacts identified during the present IEE and discussed in Chapter 5.
 - Maximise potential project benefits and control negative impacts;
 - Draw responsibilities for project proponent, contractors, and other members of the Project team for the environmental and social management of the Project;
 - Define a monitoring mechanism to ensure that the EMP achieves its desired objectives;
 - Ensure the complete implementation of all mitigation measures,
 - Ensure the effectiveness of the mitigation measures.
 - Maintain essential ecological process through preserving biodiversity, and
 - Assess training requirements for different stake holders at various levels.
199. A detailed EMP is provided in Table 6.1 that describes the respective sets of mitigation measures, monitoring and institutional arrangements to be followed during design, construction and operational stages of subprojects. The EMP also identifies the responsible parties to implement the various activities falling under EMP and to monitor its compliance.

6.3 Components of the EMP

200. The EMP has the following components.

- Organizational structure; roles and responsibilities
- Environmental monitoring plan
- Communication and documentation
- Traffic management
- Waste disposal
- Traffic Management
- Environmental training
- Restoration and Construction

6.4 Organizational Structure and Responsibilities

201. This section provides institutional arrangements for environmental management during the proposed activity and defines the roles and responsibility of the various Organizations/departments.

6.4.1 Management Approach

202. The responsibilities of different organizations/departments are summarized below:

6.4.1.1 Institutional Structure for Implementation and Operation of the Project

203. The proposed Project will be administrated by NTDC during the implementation stage as described in detail below, and the existing institutional setup of NTDC for implementation of the project is illustrated in Fig. 6.1. The existing organizational setup of NTDC for all the stages of the project (design, construction and operation) is fully integrated with handling of environment and social issues.

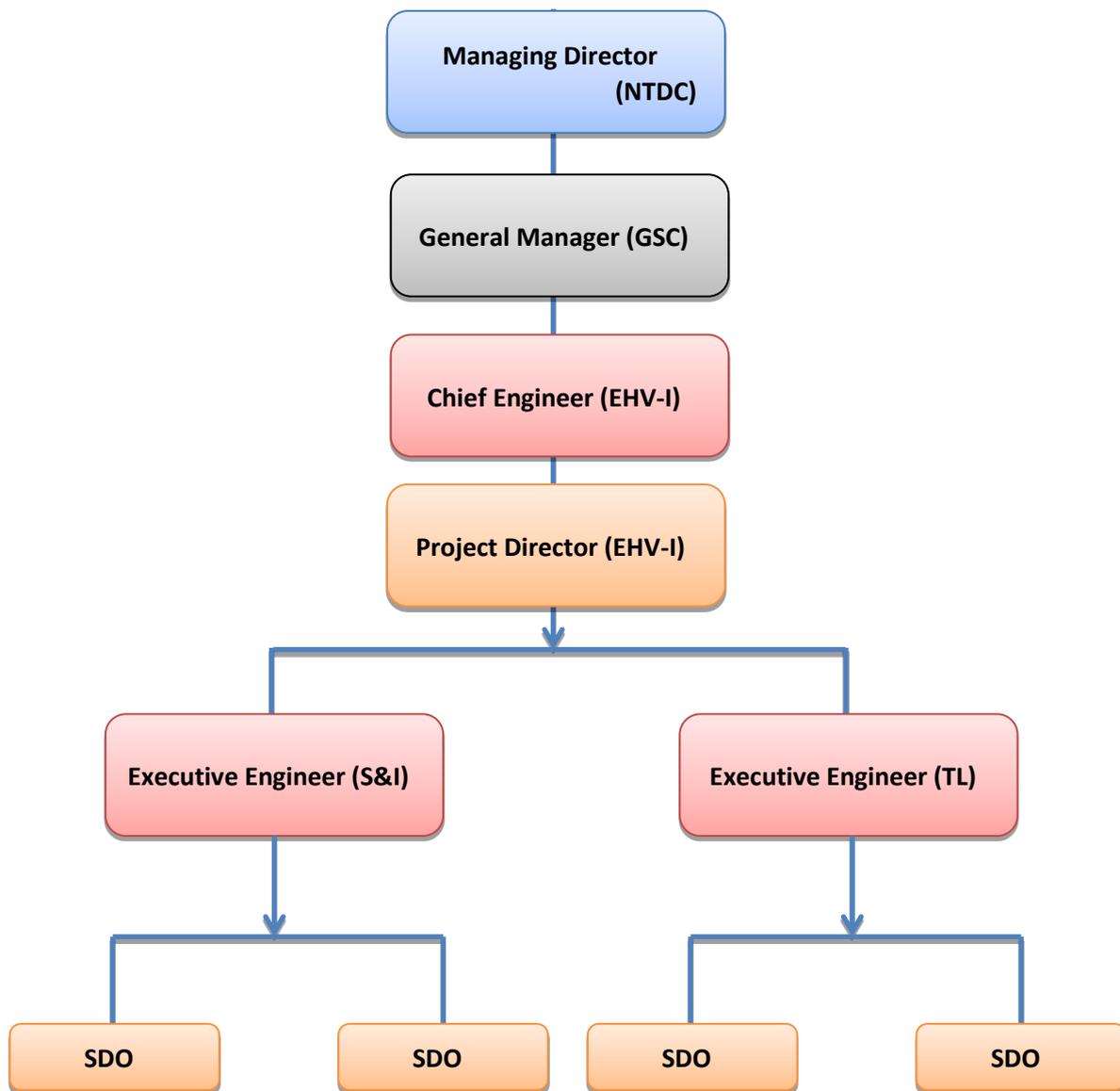


Figure 6.1: NTDC’s Institutional Setup for Project Implementation

204. The NTDC federal headquarter is based in Lahore, and is responsible for managing the project at the policy level. At the highest level, the Chief Engineer (EHV-I) will be responsible for day-to-day project management at project implementation stage. He will report directly to the General Manager (GSC), who will have ultimate responsibility for planning and managing implementation of the projects.
205. The Chief Engineer (EHV-I) will be assisted by Project Director, who will have overall responsibility for ensuring the project compliance with the EMP. The Project Director (PD) will be supported by two Executive Engineers i.e. Survey and Soil Investigations (SI) and Transmission Line Construction (TLC) who will further be assisted by the concerned Sub-Divisional Officers and their teams.
206. After completion of the Project, the Project will be handed over to the GSO Division of NTDC, which is working under the Chief Engineer (GSO). He reports to the General Manager (GSO) for operation and maintenance of grid stations and transmission lines. The Chief Engineer GSO will be supported by the Superintending Engineer for the proposed Project, who will also be assisted by Executive Engineer, Sub-Divisional Officer and his field team.

207. To ensure the community participation and to provide the environmentally and socially viable conditions, the Environment and Social Impact Cell of NTDC will extend its services and support the field teams. The Organogram of ESIC for the implementation of EMP is depicted in Fig. 6.2.

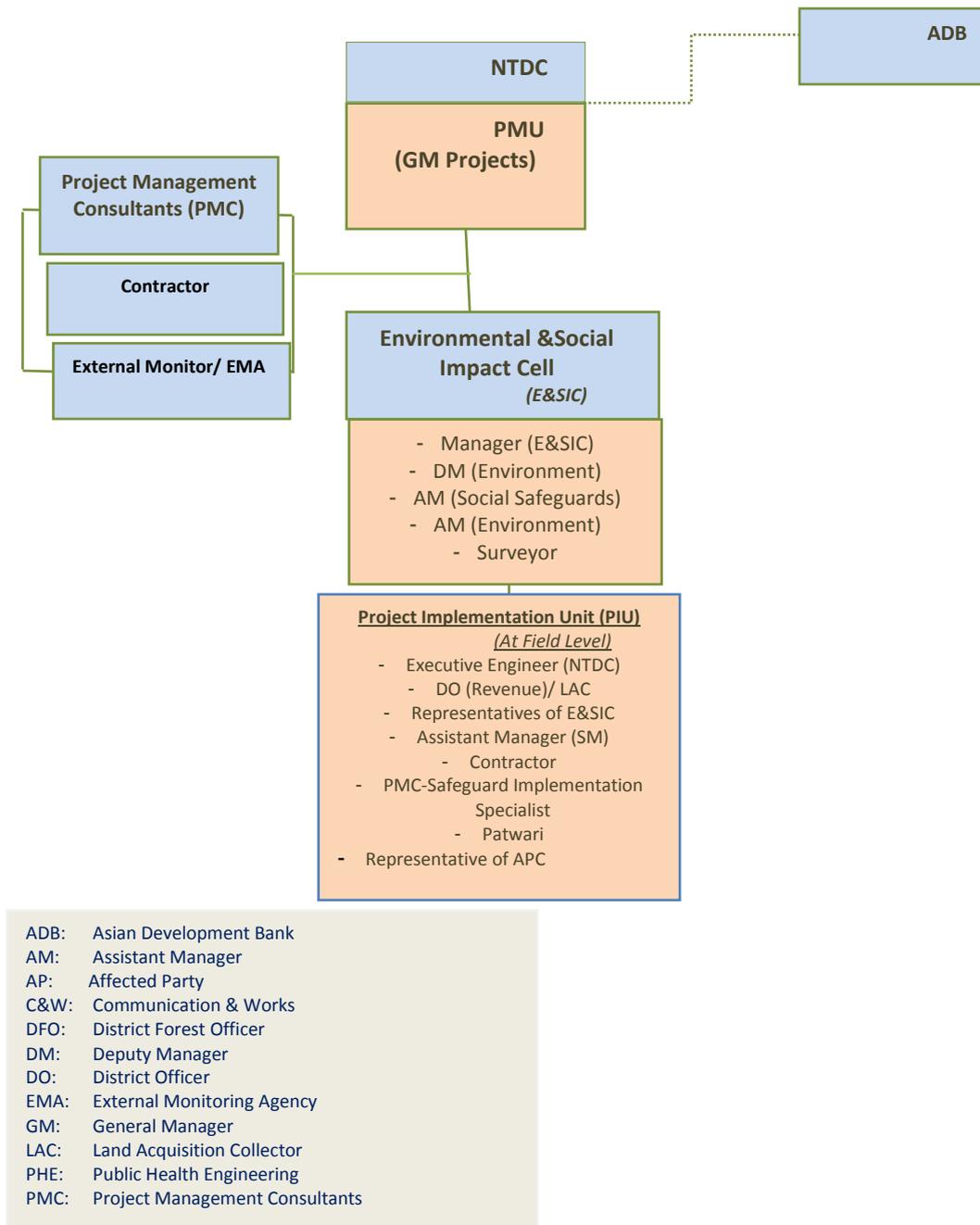


Figure 6.2: Organogram of NTDC Environment and Social Impact Cell

208. The EMP was prepared taking into account the capacity of the NTDC to conduct environmental assessments of the subprojects. But it is envisaged that the NTDC's Environmental and Social Impact Cell (ESIC) will conduct monitoring of subproject to check the compliance of EMP provisions and will obtain environmental approval from EPA Punjab. The ESIC is composed of one Manager, one Deputy Manager, two Assistant Managers and one surveyor (refer to Fig 7.2). Most of the environmental work is delegated to consultants. Specific areas for immediate attention are in EMP auditing, environmentally

responsible procurement, air, water and noise pollution management, Social and ecological impact mitigation. It is recommended that an environmental specialist should be made part of team of supervisory consultants for effective monitoring of EMP provisions.

209. The duties of the ESIC include, but are not limited to following:

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

6.5 Environmental Management Plan (EMP)

210. The EMP is presented in the following table, and includes both compliance and effects monitoring parameters. Compliance monitoring ensures the contractor's compliance with the mitigations proposed, while effects monitoring reviews the performance of the proposed mitigations with respect to reduction or prevention of social and environmental impacts.

6.6 ENVIRONMENTAL MONITORING PLAN

211. This section provides a Monitoring plan that identifies the roles and responsibilities of Project staff involved in environmental and social monitoring, and lists the parameters that will be used in the monitoring process. Table 6.2 presents the Monitoring plan for performance indicator.

Table 6.1: Summary of Environmental Management Plan-Matrix

Environmental Impacts	Objectives	Mitigation Measures Recommended	Timing to Implement Mitigation Measures	Locations to implement MM	Responsibility to implement MM	Monitoring
DESIGN PHASE						
Project disclosure	Ensure compliance with Provincial EPAs requirements	<p>Design all changes in project disclosed to EPA.</p> <p>Ensure all changes in project are included in the EMP.</p> <p>Determine whether changes in project need additional environmental assessment and carry out the environmental assessment, if necessary.</p>	Completion of detailed design.	All project alignment.	NTDC	ESIC Cell/ Environmental Specialist
Environmentally Responsible Procurement (ERP)	Ensure environmentally responsible procurement	<p>Require in procurement specifications that the proposed equipment's are to be free from PCB and other petroleum fractions that may be injurious to environment, human health or equipment.</p> <p>Choose non-polluting or enhancing methods. Contractor to submit Method Statement and schedule of environmental mitigation measures in response to EMP with</p>	Method statement during contractor selection, prior to contract signing. No later than prequalification or tender negotiations.	ESIC Cell to check contractors Method Statements include resources for mitigation measures during negotiations.	ESIC	ESIC Cell/ Environmental Specialist

		<p>tender. Include enhancements, techniques to reduce impacts.</p> <p>Contractual clauses included to tie the implementation of environmental mitigation measures to a performance bond.</p>				
Waste Disposal	<p>Ensure adequate disposal options for all waste including equipment's residually contaminated soils and scrap metal.</p>	<p>Create waste management policy and plan to identify sufficient locations for, storage and reuse of transformers/reactors and recycling of breaker oils and disposal of equipment's, residually contaminated soils and scrap metal.</p> <p>Safe disposal cost to be included in the contract.</p> <p>After agreement with local authority, designate disposal sites in the contract and cost unit disposal rates accordingly.</p>	<p>.Prior to detailed design stage no later than prequalification or tender negotiations.</p> <p>Include in contract</p>	<p>Locations approved by local waste disposal authorities</p>	<p>ESIC Cell with the design consultant.</p>	<p>NTDC</p>
Hazardous waste disposal	<p>To ensure safe disposal of hazardous waste in line with best practice.</p>	<p>Plan to prevent noise from G/S in the operational phase and conduct consultation with affected communities to</p>	<p>During tender preparation</p>	<p>All substations.</p>	<p>ESIC cell with the Design Consultant</p>	<p>NTDC</p>

		determine acceptability criteria for noise.				
Noise and air quality mitigation in design	Plan and design to ensure noise impacts are acceptable in operational phase.	<p>Follow up with detailed acoustic assessment for all residential, school, temple (other sensitive structures) within 50m of G/S base on measurement of existing equipment noise.</p> <p>If noise at sensitive receiver exceeds the WB/IFC standards of 55db(A) during the day (7am to 10pm) or 45dB(A) during the night time (10pm to 7am) then include design and installation of acoustic insulation measures to control noise at SRs.</p> <p>Install noise barrier to attenuate noise at schools and hospitals to below WB/IFC noise standards (see above) Prepare Air Quality and Noise Control plan for construction stage.</p>	During designing stage no later than pre-qualification or tender negotiations.	All locations where SRs are within 50m of proposed site ESIC	ESIC cell	NTDC /Environmental Specialist
Hydrological Impacts	To minimize hydrological and drainage impacts during constructions.	Assess expected hydrologic flow in all areas where it is sensitive, such as for irrigated lands taking	Before the commencement of construction activities/during detailed	Considered locations to be as identified in the Detailed Drainage	Contractor	NTDC / and ESIC Cell

		<p>into account changes due to climate change as predicted by accredited sources such as OECD.</p> <p>Ensure surface flows are controlled and facilitated through early re-provision of irrigation with appropriate drainage structures in the road base including bridges and culverts.</p> <p>Prepare Drainage Management Plan, to be completed and approved by NTDC in the DDS at least one month prior to construction.</p>	designing stage.	Report.		
Temporary drainage and erosion control	<p>Prevent runoff and control erosion.</p> <p>Include preliminary designs for Erosion Control in NTDC contract.</p>	<p>Identify locations for Erosion Control and Temporary Drainage around G/S.</p> <p>Include designs for EC and TD in contract (s)</p> <p>Agree detailed EC and TD plan with NTDC / ESIC at least one month prior to construction</p>	<p>During first month after contract is signed but before construction.</p> <p>Include in the NTDC contract.</p>	Locations based on drainage where slopes indicate erosion will be a problem based on observation	Contractor.	NTDC / and ESIC Cell.
Institutional strengthening and capacity building	Prepare ESIC Cell for implementation of EMP.	Develop strengthening plan for the environmental management by ESIC Cell as the Project rolls out.	As soon as practicable no later than one month before contract award.		NTDC	Environmental Specialist
Prepare	Full and effective	Prepare contractors to	During	Throughout	ESIC cell.	NTDC / and

contractors for implementation of EMP	implementation of environmental mitigation measures.	co-operate with the executing agency, project management, supervising consultants and local population in the mitigation of impacts. Include the approved IEE and the EMP in the contract documentation. Contracts must require full implementation of the EMP. Contractor to engage capable and trained	preconstruction no later than one month after contract award	the project		Environmental Specialist
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CONSTRUCTION PHASE

Orientation for Contractor, and Workers	To ensure that the Contractor, subcontractors and workers understand and have the capacity to ensure that the environmental requirements for mitigation measures are implemented.	Conducting special briefing and / or on-site training for the contractors and workers on the environmental requirement of the project. Record attendance and achievement. Conducting special briefing and training for Contractor on the environmental requirement of the project. Record attendance and achievement. Agreement on critical	Induction for all site agents and above before commencement of work. At early stages of construction for all construction employees as far as reasonably practicable.	All staff members in all categories. monthly induction and six month refresher course as necessary until contractors comply / improve	ESIC Cell and Contractor record details	ESIC Cell to observe and record success
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		<p>areas to be considered and necessary mitigation measures, among all parties who are involved in project activities.</p> <p>Periodic progress review sessions to be conducted every six months</p>				
Plans to control environmental and associated impacts	Avoid impacts from unplanned activities by penalizing contractors for not committing to properly planning works	<p>Drainage management plan,</p> <p>Temporary pedestrian and traffic management plan,</p> <p>Erosion control and temporary drainage plan,</p> <p>Materials management plan,</p> <p>Waste management plan; 6. Noise and dust control plan,</p> <p>Safety Plan</p> <p>Agreed schedule of costs for environmental mitigation measures (including maintenance where applicable). {N.B. Forest Clearance and compensatory planting plan is by NTDC}</p>	Deliverable in final form to NTDC one month before construction commences for any given stretch.	NTDC proposed project site.	Contractor	ESIC Cell.

Water quality	To prevent adverse water quality impacts due to negligence and ensure unavoidable impacts are managed effectively.	<p>Proper construction of TD and EC measures , maintenance and management including training of operators and other workers to avoid pollution of water bodies by the considerate operation of construction machinery and equipment and reporting and feedback by ESIC cell,</p> <p>Storage of lubricants, fuels and other hydrocarbons in self-contained dedicated enclosures >50m away from water bodies.</p> <p>No stockpiles next ling to water bodies.</p> <p>Proper disposal of solid waste from construction activities & worker camps.</p>	Prior to construction, 50m from water bodies Timing will depend on the construction timetable.	Relevant locations are construction within 50m of water body.	Contractor	ESIC Cell
Spoil disposal and construction waste disposal	To minimize the environmental impacts arising from generation of spoil waste, reuse where possible and provide adequate disposal options	<p>. Implement Waste Management Plan.</p> <p>Confirm conditions and safety of proposed disposal sites.</p> <p>Confirm amounts of</p>	<p>Before construction commences,</p> <p>Include in the contract.</p> <p>UPDATE Once a month</p>	Locations approved by ESIC Cell/ local authority. A list of temporary dumping sites to be prepared at the bidding	Contractor.	NTDC and ESIC Cell

	for unsuitable soils.	<p>surplus rock based materials that can be reused in the project or by other interested parties for public projects.</p> <p>Confirm sufficient locations in the contract for disposal</p> <p>In contracts specify locations for disposal of all construction waste and spoil at unit rates for measurement.</p> <p>Used oil and lubricants shall be recovered and reused or removed from the site in full compliance with the national and local regulations.</p> <p>Waste oil must not be burned. – Oil and solid waste disposal location to be agreed with NTDC and local authority.</p>		stage for agreement.		
Noise	To minimize noise level increases and ground vibrations during construction operations	The project equipment, particularly transformers to be installed at the grid stations will meet the noise standards (70 dB(A) for industrial	Maximum allowable noise levels WB/IFC standards of 55db(A) during the day (7am to 10pm) or 45dB(A) during the night	Strong follow up from ESIC Cell required to update locations monthly Potential noise	Contractor.	NTDC and ESIC Cell

		<p>zones day and night; 45 dB(A) night and 55 dB(A) daytime for residential areas.</p> <p>To minimize noise level increases and ground vibrations during construction operations.</p> <p>Install, maintain and monitor all requisite mitigation as per contract all transformers and machinery shall be fitted with acoustic insulation.</p>	time (10pm to 7am) .	impact locations will be within 100m near all settlements and towns.		
Air quality	To minimize effectively and avoid complaints due to the airborne particulate matter released to the atmosphere	<p>Control all dusty materials at source.</p> <p>Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions.</p> <p>Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions.</p> <p>Vehicles transporting soil, sand and other construction materials shall be covered.</p> <p>Limitations to speeds of</p>	<p>Dust control planning will be a line item in the approval of setting up dust producing activities.</p> <p>A schedule of spraying water to be revised monthly</p>	A list of locations to be included in contract and other sensitive areas identified during works	Contractor.	NTDC and ESIC Cell

		<p>such vehicles necessary.</p> <p>Transport through densely populated area should be avoided.</p> <p>Spray bare ground areas with water.</p>				
Soil Contamination	Contamination Avoid soil contamination	<p>Contractors to instruct and train workforce in the storage and handling of materials and chemicals that can potentially cause soil contamination.</p> <p>Accidentally spills on open ground including the top 2cm of any contaminated soil shall be disposed of as chemical waste to a disposal site acceptable to the local authority / community.</p>	Instruct before works commence and throughout all construction works.	NTDC proposed project site.	Contractor.	NTDC and ESIC Cell
Safety Precautions for Workers	To ensure physical safety of workers	<p>Follow the IFC OHS guidelines and ICNIRP exposure limits for occupational exposure to electric and magnetic fields during replacement of the equipment's.</p> <p>Submit Safety Plan one month before commencement of construction. 2. Providing adequate warning signs. 3.</p>	During construction	NTDC proposed project site.	Contractor.	NTDC and ESIC Cell

		Providing every worker with skull guard or hard hat and safety shoes. 4. Establish all relevant safety measures as required by law and good engineering practices. 5. The Contractor shall instruct his workers in health and safety matters, and require the workers to use the provided safety equipment.				
Grievance Redress	To ensure that the stakeholder or affected people's concerns, complaints and grievances about the project environmental performance will be received recorded and replied in a systematic way	Official in charge of people's grievance will be designated. A leaflet outlining environmental protection measures and listing grievance contact points will be distributed. Community leaders will be given detailed information on the grievance management process. NGOs will be informed in the same manner as the community leaders.	Throughout the project	Villages close to NTDC Grid Station sites.	Contractor	NTDC and ESIC Cell Grievance/Community Liaison Specialist
OPERATION PHASE						
Air Quality	To minimize and monitor air pollution and release of greenhouse gasses	Before installation of equipment ensure supplied equipment commissioning is free from CFCs as required in procurement	During operation	Grid Substations		NTDC and ESIC Cell

		specifications. 2. SF6 gas insulated equipment to be effectively leak free with nominal SF6 top up less than 1% per year. Monitor top up of SF6 and report annually				
Safety hazards	Impacts on physical health of the NTDC staff	<p>NTDC O&M staff will be provided essential protective gears and equipment.</p> <ul style="list-style-type: none"> • NTDC O&M staff will be provided safety training. • Refresher courses will be arranged on regular basis. • Firefighting equipment will be made available at the grid stations. 	During operation	Grid Substations		NTDC and ESIC Cell

Table 6.2: Environmental Monitoring Plan for Performance Indicators

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

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

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

6.7 Estimated Environmental and Social Management Costs

212. Table 6.3 provides the estimated costs for the compensation of trees damages and implementation of EMP. The compensation costs include the costs for cutting of trees due to construction of subproject. It should be noted that as referred earlier that the project is at a preliminary stage and detailed surveys including tower spotting is to be carried out for the project showing the actual position of the towers, so at this stage only tentative and lump sum amount has been allocated for the expected losses and is based on the environmental and social field surveys.
213. The cost for implementation of mitigation measures prescribed in Environmental Management Plan (EMP) has also been given. The mitigation measures include; water sprinkling, provision of PPEs to workers, arrangement of first aid kits at site, waste management etc.
214. The contractor will ensure that they have incorporated the budget required for implementing the requirements for environmental management.
215. The total estimated cost for the environmental and social management comes to about Pak Rs. 12,772,000. This is the cost of implementation of mitigation measures. Cost estimates of mitigation and other environmental management measures are summarized in Table 6.3.

Table 66.1: Estimated Environmental and Social Management Costs

Particulars	Details	Total Cost (PKR)
Staffing, audit and monitoring	1 person for 3 years ¹	2,160,000
Monitoring activities	As detailed under EMP ²	2,000,000
Mitigation measures	As prescribed under EMP and IEE ³	5,000,000
Contingency	3% contingency	274,800
Total		9,434,800

Note:

¹ @ rate of PKR 60,000/month

² Laboratory charges for: testing of construction materials; emissions measurements; and noise measurements.

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

ANNEXURE-I
Rapid Environmental Assessment Checklists

Rapid Environmental Assessment (REA) Checklist

Instructions:

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

Country/Project Title:

TA-8818 PAK: Power Transmission Enhancement Investment
Program-II-500kv NKI Karachi-Replacement of Fault and

Sector Division:

Energy Division, CWRD

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		X	
▪ Protected Area		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?		X	
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?		X	
▪ increased local air pollution due to rock crushing, cutting and filling?		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation? 	X		While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.
<ul style="list-style-type: none"> chemical pollution resulting from chemical clearing of vegetation for construction site? 		X	
<ul style="list-style-type: none"> noise and vibration due to blasting and other civil works? 		X	
<ul style="list-style-type: none"> dislocation or involuntary resettlement of people? 		X	
<ul style="list-style-type: none"> disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? 		X	
<ul style="list-style-type: none"> social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads? 		X	
<ul style="list-style-type: none"> hazardous driving conditions where construction interferes with pre-existing roads? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents? 		X	
<ul style="list-style-type: none"> dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines? 		X	
<ul style="list-style-type: none"> environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)? 		X	
<ul style="list-style-type: none"> facilitation of access to protected areas in case corridors traverse protected areas? 		X	
<ul style="list-style-type: none"> disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height? 		X	
<ul style="list-style-type: none"> large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		X	
<ul style="list-style-type: none"> social conflicts if workers from other regions or countries are hired? 		X	
<ul style="list-style-type: none"> poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 		X	
<ul style="list-style-type: none"> risks to community safety associated with maintenance of lines and related facilities? 		X	
<ul style="list-style-type: none"> community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization? 		X	
<ul style="list-style-type: none"> risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 		X	The works is restricted to the boundary of the NTDC system.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 		X	The works is restricted to the boundary of the NTDC system.

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? 			
<ul style="list-style-type: none"> Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 			
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 			
<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 			

Rapid Environmental Assessment (REA) Checklist

Instructions:

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- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

TA-8818 PAK: Power Transmission Enhancement Investment
 Program-II-500kv Jamshoro-Replacement of 220kv & 132kv
 Circuit Breaker,500kv CT,220kv CT,132kv CT,500kv
 CCVT.132kv Isolator.132kv PTs. Fault and Event Recorders.

Sector Division:

Energy Division, CWRD

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		X	
▪ Protected Area		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?		X	
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> increased local air pollution due to rock crushing, cutting and filling? 		X	
<ul style="list-style-type: none"> risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation? 	X		<p>The NTDC will follow the ICNIRP exposure limits for occupational exposure to electric and magnetic fields during replacement of the equipments.</p> <p>While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.</p>
<ul style="list-style-type: none"> chemical pollution resulting from chemical clearing of vegetation for construction site? 		X	
<ul style="list-style-type: none"> noise and vibration due to blasting and other civil works? 		X	
<ul style="list-style-type: none"> dislocation or involuntary resettlement of people? 		X	
<ul style="list-style-type: none"> disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? 		X	
<ul style="list-style-type: none"> social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads? 		X	
<ul style="list-style-type: none"> hazardous driving conditions where construction interferes with pre-existing roads? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents? 		X	
<ul style="list-style-type: none"> dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines? 		X	
<ul style="list-style-type: none"> environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)? 		X	
<ul style="list-style-type: none"> facilitation of access to protected areas in case corridors traverse protected areas? 		X	
<ul style="list-style-type: none"> disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height? 		X	
<ul style="list-style-type: none"> large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		X	
<ul style="list-style-type: none"> social conflicts if workers from other regions or countries are hired? 		X	
<ul style="list-style-type: none"> poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> risks to community safety associated with maintenance of lines and related facilities? 		X	
<ul style="list-style-type: none"> community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization? 		X	
<ul style="list-style-type: none"> risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 		X	The works is restricted to the boundary of the NTDC system.

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? 			
<ul style="list-style-type: none"> Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 			
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 			
<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 			

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- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

TA-8818 PAK: Power Transmission Enhancement Investment Program-II-220kv Halla Road-Replacement of 132kv Circuit Breaker, 220kv CT,132kv CT, 132kv Isolator,220kv L/Arrestor,132kv L/Arrestor, Fault and Event Recorders, Fault

Sector Division:

Energy Division, CWRD

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		X	
▪ Protected Area		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?		X	
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	

Screening Questions	Yes	No	Remarks
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?		X	
▪ increased local air pollution due to rock crushing, cutting and filling?		X	
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	X		While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.
▪ chemical pollution resulting from chemical clearing of vegetation for construction site?		X	
▪ noise and vibration due to blasting and other civil works?		X	
▪ dislocation or involuntary resettlement of people?		X	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		X	
▪ social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?		X	
▪ hazardous driving conditions where construction interferes with pre-existing roads?		X	The works is restricted to the boundary of the NTDC system.
▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?		X	
▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?		X	
▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		X	
▪ facilitation of access to protected areas in case corridors traverse protected areas?		X	
▪ disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height?		X	
▪ large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)?		X	
▪ social conflicts if workers from other regions or countries are hired?		X	
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?		X	
▪ risks to community safety associated with maintenance of lines and related facilities?		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization? 		X	
<ul style="list-style-type: none"> risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 			The works is restricted to the boundary of the NTDC system.

Climate Change and Disaster Risk Questions	Yes	No	Remarks
<p>The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.</p>			
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? 			
<ul style="list-style-type: none"> Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 			
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 			
<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 			

Rapid Environmental Assessment (REA) Checklist

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- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

TA-8818 PAK: Power Transmission Enhancement Investment
Program-II-220kv TM Khan Road-Replacement of Fault and

Sector Division:

Energy Division. CWRD

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		X	
▪ Protected Area		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?		X	
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?		X	
▪ increased local air pollution due to rock crushing, cutting and filling?		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation? 	X		While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.
<ul style="list-style-type: none"> chemical pollution resulting from chemical clearing of vegetation for construction site? 		X	
<ul style="list-style-type: none"> noise and vibration due to blasting and other civil works? 		X	
<ul style="list-style-type: none"> dislocation or involuntary resettlement of people? 		X	
<ul style="list-style-type: none"> disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? 		X	
<ul style="list-style-type: none"> social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads? 		X	
<ul style="list-style-type: none"> hazardous driving conditions where construction interferes with pre-existing roads? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents? 		X	
<ul style="list-style-type: none"> dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines? 		X	
<ul style="list-style-type: none"> environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)? 		X	
<ul style="list-style-type: none"> facilitation of access to protected areas in case corridors traverse protected areas? 		X	
<ul style="list-style-type: none"> disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height? 		X	
<ul style="list-style-type: none"> large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		X	
<ul style="list-style-type: none"> social conflicts if workers from other regions or countries are hired? 		X	
<ul style="list-style-type: none"> poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 		X	
<ul style="list-style-type: none"> risks to community safety associated with maintenance of lines and related facilities? 		X	
<ul style="list-style-type: none"> community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization? 		X	
<ul style="list-style-type: none"> risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 		X	The works is restricted to the boundary of the NTDC system.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 		X	The works is restricted to the boundary of the NTDC system.

Climate Change and Disaster Risk Questions	Yes	No	Remarks
<p>The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.</p>			
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? 			
<ul style="list-style-type: none"> Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 			
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 			
<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 			

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- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

TA-8818 PAK: Power Transmission Enhancement Investment Program-II-500kv Dadu-Replacement of 500kv Circuit Breaker,220kv Circuit Breaker,500kv CT,220kv CT,132kv CT,500kv CCVT,220kv CVT,500kv Isolator,220kv Isolator,132kv Isolator,220kv L/Arrestor,132kv L/Arrestor,

Sector Division:

Energy Division, CWRD

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		X	
▪ Protected Area		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?		X	
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	

Screening Questions	Yes	No	Remarks
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?		X	
▪ increased local air pollution due to rock crushing, cutting and filling?		X	
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	X		The NTDC will follow the ICNIRP exposure limits for occupational exposure to electric and magnetic fields. While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.
▪ chemical pollution resulting from chemical clearing of vegetation for construction site?		X	
▪ noise and vibration due to blasting and other civil works?		X	
▪ dislocation or involuntary resettlement of people?		X	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		X	
▪ social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?		X	
▪ hazardous driving conditions where construction interferes with pre-existing roads?		X	The works is restricted to the boundary of the NTDC system.
▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?		X	
▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?		X	
▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		X	
▪ facilitation of access to protected areas in case corridors traverse protected areas?		X	
▪ disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height?		X	
▪ large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)?		X	
▪ social conflicts if workers from other regions or countries are hired?		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> ▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 		X	
<ul style="list-style-type: none"> ▪ risks to community safety associated with maintenance of lines and related facilities? 		X	
<ul style="list-style-type: none"> ▪ community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization? 		X	
<ul style="list-style-type: none"> ▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> ▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 		X	The works is restricted to the boundary of the NTDC system.

Climate Change and Disaster Risk Questions	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
<ul style="list-style-type: none"> ▪ Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? 			
<ul style="list-style-type: none"> ▪ Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 			
<ul style="list-style-type: none"> ▪ Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 			
<ul style="list-style-type: none"> ▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 			

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- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

TA-8818 PAK: Power Transmission Enhancement Investment
Program-II-500kv Nokahr G/S-Installation of Shunt Reactors
3X37.

Sector Division:

Energy Division, CWRD

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		X	
▪ Protected Area		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?		X	
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> ▪ increased local air pollution due to rock crushing, cutting and filling? 		X	
<ul style="list-style-type: none"> ▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation? 	X		<p>The NTDC will follow the ICNIRP exposure limits for occupational exposure to electric and magnetic fields.</p> <p>While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.</p>
<ul style="list-style-type: none"> ▪ chemical pollution resulting from chemical clearing of vegetation for construction site? 		X	Foundation for installation of the proposed capacity Shunt Reactors are already available.
<ul style="list-style-type: none"> ▪ noise and vibration due to blasting and other civil works? 		X	
<ul style="list-style-type: none"> ▪ dislocation or involuntary resettlement of people? 		X	
<ul style="list-style-type: none"> ▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? 		X	
<ul style="list-style-type: none"> ▪ social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads? 		X	
<ul style="list-style-type: none"> ▪ hazardous driving conditions where construction interferes with pre-existing roads? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> ▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents? 		X	
<ul style="list-style-type: none"> ▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines? 		X	
<ul style="list-style-type: none"> ▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)? 		X	
<ul style="list-style-type: none"> ▪ facilitation of access to protected areas in case corridors traverse protected areas? 		X	
<ul style="list-style-type: none"> ▪ disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height? 		X	
<ul style="list-style-type: none"> ▪ large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		X	
<ul style="list-style-type: none"> ▪ social conflicts if workers from other regions or countries are hired? 		X	
<ul style="list-style-type: none"> ▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> risks to community safety associated with maintenance of lines and related facilities? 	X		As discussed above, the safety precautions are required to be followed during installation and maintenance of the system. Installation of fire extinguishers for the proposed Shunt Reactors is required by NTDC.
<ul style="list-style-type: none"> community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization? 		X	
<ul style="list-style-type: none"> risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 		X	The works is restricted to the boundary of the NTDC system.

Climate Change and Disaster Risk Questions	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? 			
<ul style="list-style-type: none"> Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 			
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 			
<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 			

Rapid Environmental Assessment (REA) Checklist

Instructions:

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

Country/Project Title:

TA-8818 PAK: Power Transmission Enhancement Investment
 Program-II-220kv Shikarpur-Replacement of Fault and Event
 Recorders, Distance Protection Relay, Overcurrent and Earth
 Fault Relay and installation of Synchro Check Relay.

Sector Division:

Energy Division. CWRD

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		X	
▪ Protected Area		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?		X	
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	

Screening Questions	Yes	No	Remarks
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?		X	
▪ increased local air pollution due to rock crushing, cutting and filling?		X	
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	X		While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.
▪ chemical pollution resulting from chemical clearing of vegetation for construction site?		X	
▪ noise and vibration due to blasting and other civil works?		X	
▪ dislocation or involuntary resettlement of people?		X	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		X	
▪ social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?		X	
▪ hazardous driving conditions where construction interferes with pre-existing roads?		X	The works is restricted to the boundary of the NTDC system.
▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?		X	
▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?		X	
▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		X	
▪ facilitation of access to protected areas in case corridors traverse protected areas?		X	
▪ disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height?		X	
▪ large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)?		X	
▪ social conflicts if workers from other regions or countries are hired?		X	
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?		X	
▪ risks to community safety associated with maintenance of lines and related facilities?		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization? 		X	
<ul style="list-style-type: none"> risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 		X	The works is restricted to the boundary of the NTDC system.

Climate Change and Disaster Risk Questions	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? 			
<ul style="list-style-type: none"> Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 			
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 			
<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 			

Rapid Environmental Assessment (REA) Checklist

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- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

TA-8818 PAK: Power Transmission Enhancement Investment
Program-II-500kv Guddu-Replacement of 500kv CT, 500kv

Sector Division:

Energy Division. CWRD

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		X	
▪ Protected Area		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?		X	
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	

Screening Questions	Yes	No	Remarks
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?		X	
▪ increased local air pollution due to rock crushing, cutting and filling?		X	
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	X		While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.
▪ chemical pollution resulting from chemical clearing of vegetation for construction site?		X	
▪ noise and vibration due to blasting and other civil works?		X	
▪ dislocation or involuntary resettlement of people?		X	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		X	
▪ social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?		X	
▪ hazardous driving conditions where construction interferes with pre-existing roads?		X	The works is restricted to the boundary of the NTDC system.
▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?		X	
▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?		X	
▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		X	
▪ facilitation of access to protected areas in case corridors traverse protected areas?		X	
▪ disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height?		X	
▪ large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)?		X	
▪ social conflicts if workers from other regions or countries are hired?		X	
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?		X	
▪ risks to community safety associated with maintenance of lines and related facilities?		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization? 		X	
<ul style="list-style-type: none"> risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 		X	The works is restricted to the boundary of the NTDC system.

Climate Change and Disaster Risk Questions	Yes	No	Remarks
<p>The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.</p>			
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? 			
<ul style="list-style-type: none"> Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 			
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 			
<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 			

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- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

TA-8818 PAK: Power Transmission Enhancement Investment
 Program-II-220kv Sibbi-Replacement of 220kv Circuit
 Breaker, 132kv Circuit Breaker, 220kv CVT, 132kv PT, Fault

Sector Division:

Energy Division. CWRD

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		X	
▪ Protected Area		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?		X	

Screening Questions	Yes	No	Remarks
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?		X	
▪ increased local air pollution due to rock crushing, cutting and filling?		X	
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	X		The NTDC will follow the ICNIRP exposure limits for occupational exposure to electric and magnetic fields during replacement of the equipments. While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.
▪ chemical pollution resulting from chemical clearing of vegetation for construction site?		X	
▪ noise and vibration due to blasting and other civil works?		X	
▪ dislocation or involuntary resettlement of people?		X	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		X	
▪ social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?		X	
▪ hazardous driving conditions where construction interferes with pre-existing roads?		X	The works is restricted to the boundary of the NTDC system.
▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?		X	
▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?		X	
▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		X	
▪ facilitation of access to protected areas in case corridors traverse protected areas?		X	
▪ disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height?		X	
▪ large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)?		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> social conflicts if workers from other regions or countries are hired? 		X	
<ul style="list-style-type: none"> poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 		X	
<ul style="list-style-type: none"> risks to community safety associated with maintenance of lines and related facilities? 		X	
<ul style="list-style-type: none"> community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization? 		X	
<ul style="list-style-type: none"> risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 		X	The works is restricted to the boundary of the NTDC system.

Climate Change and Disaster Risk Questions	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunamis or volcanic eruptions and climate changes (see Appendix I)? 			
<ul style="list-style-type: none"> Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 			
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 			
<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 			

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- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

TA-8818 PAK: Power Transmission Enhancement Investment
 Program-II-220kv Quetta-Replacement of 132kv Circuit
 Breaker, Fault and Event Recorders. Installation of Under

Sector Division:

Energy Division. CWRD

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		X	
▪ Protected Area		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> 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? 		X	
<ul style="list-style-type: none"> damage to sensitive coastal/marine habitats by construction of submarine cables? 		X	
<ul style="list-style-type: none"> deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction? 		X	
<ul style="list-style-type: none"> increased local air pollution due to rock crushing, cutting and filling? 		X	
<ul style="list-style-type: none"> risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation? 	X		While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.
<ul style="list-style-type: none"> chemical pollution resulting from chemical clearing of vegetation for construction site? 		X	
<ul style="list-style-type: none"> noise and vibration due to blasting and other civil works? 		X	
<ul style="list-style-type: none"> dislocation or involuntary resettlement of people? 		X	
<ul style="list-style-type: none"> disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? 		X	
<ul style="list-style-type: none"> social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads? 		X	
<ul style="list-style-type: none"> hazardous driving conditions where construction interferes with pre-existing roads? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents? 		X	
<ul style="list-style-type: none"> dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines? 		X	
<ul style="list-style-type: none"> environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)? 		X	
<ul style="list-style-type: none"> facilitation of access to protected areas in case corridors traverse protected areas? 		X	
<ul style="list-style-type: none"> disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height? 		X	
<ul style="list-style-type: none"> large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		X	
<ul style="list-style-type: none"> social conflicts if workers from other regions or countries are hired? 		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 		X	
<ul style="list-style-type: none"> risks to community safety associated with maintenance of lines and related facilities? 		X	
<ul style="list-style-type: none"> community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization? 		X	
<ul style="list-style-type: none"> risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 			The works is restricted to the boundary of the NTDC system.

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? 			
<ul style="list-style-type: none"> Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 			
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 			
<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 			

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- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

TA-8818 PAK: Power Transmission Enhancement Investment
Program-II-220kv Loralai-Replacement of Fault Recorder.

Sector Division:

Energy Division. CWRD

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		X	
▪ Protected Area		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> 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? 		X	
<ul style="list-style-type: none"> damage to sensitive coastal/marine habitats by construction of submarine cables? 		X	
<ul style="list-style-type: none"> deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction? 		X	
<ul style="list-style-type: none"> increased local air pollution due to rock crushing, cutting and filling? 		X	
<ul style="list-style-type: none"> risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation? 	X		While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.
<ul style="list-style-type: none"> chemical pollution resulting from chemical clearing of vegetation for construction site? 		X	
<ul style="list-style-type: none"> noise and vibration due to blasting and other civil works? 		X	
<ul style="list-style-type: none"> dislocation or involuntary resettlement of people? 		X	
<ul style="list-style-type: none"> disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? 		X	
<ul style="list-style-type: none"> social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads? 		X	
<ul style="list-style-type: none"> hazardous driving conditions where construction interferes with pre-existing roads? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents? 		X	
<ul style="list-style-type: none"> dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines? 		X	
<ul style="list-style-type: none"> environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)? 		X	
<ul style="list-style-type: none"> facilitation of access to protected areas in case corridors traverse protected areas? 		X	
<ul style="list-style-type: none"> disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height? 		X	
<ul style="list-style-type: none"> large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		X	
<ul style="list-style-type: none"> social conflicts if workers from other regions or countries are hired? 		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 		X	
<ul style="list-style-type: none"> risks to community safety associated with maintenance of lines and related facilities? 		X	
<ul style="list-style-type: none"> community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization? 		X	
<ul style="list-style-type: none"> risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 		X	The works is restricted to the boundary of the NTDC system.
<ul style="list-style-type: none"> community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 			The works is restricted to the boundary of the NTDC system.

Climate Change and Disaster Risk Questions	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? 			
<ul style="list-style-type: none"> Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 			
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 			
<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 			

Rapid Environmental Assessment (REA) Checklist

Instructions:

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

Country/Project Title:

TA-8818 PAK: Power Transmission Enhancement Investment Program-II-220kv Khuzdar-Replacement of Fault & Event Recorders and Overcurrent Relay.

Sector Division:

Energy Division. CWRD

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		X	
▪ Protected Area		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	

Screening Questions	Yes	No	Remarks
▪ encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	
▪ alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?		X	
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	
▪ deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?		X	
▪ increased local air pollution due to rock crushing, cutting and filling?		X	
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	X		While replacing the equipment's, the NTDC only allow trained and certified workers to install the equipment's. Prior to installation, the NTDC will deactivate the live power line leading to the equipment's.
▪ chemical pollution resulting from chemical clearing of vegetation for construction site?		X	
▪ noise and vibration due to blasting and other civil works?		X	
▪ dislocation or involuntary resettlement of people?		X	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		X	
▪ social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?		X	
▪ hazardous driving conditions where construction interferes with pre-existing roads?		X	The works is restricted to the boundary of the NTDC system.
▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?		X	
▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?		X	
▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		X	
▪ facilitation of access to protected areas in case corridors traverse protected areas?		X	
▪ disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height?		X	
▪ large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)?		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> social conflicts if workers from other regions or countries are hired? 		X	
<ul style="list-style-type: none"> poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 		X	
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<ul style="list-style-type: none"> community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 		X	The works is restricted to the boundary of the NTDC system.

Climate Change and Disaster Risk Questions	Yes	No	Remarks
<p>The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.</p>			
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunamis or volcanic eruptions and climate changes (see Appendix I)? 			
<ul style="list-style-type: none"> Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 			
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<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 			

ANNEXURE-II
Photographs of Project Areas

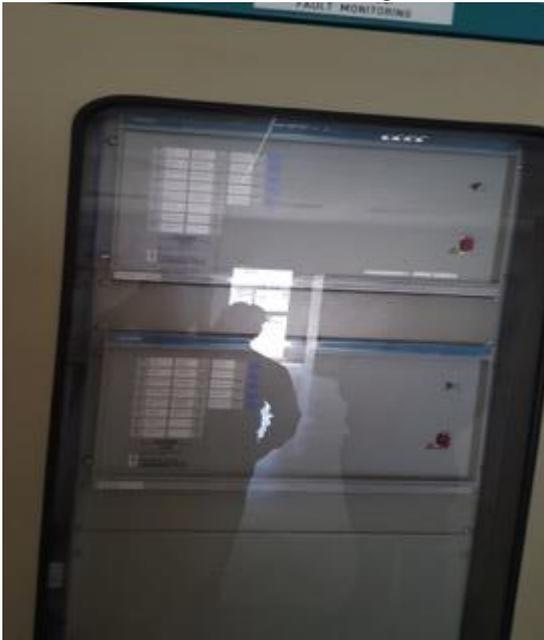
PHOTOGALLERY

SITE SPECIFIC PICTURES OF 12 GRID STATIONS IN SOUTH AREA OF NTDC SYSTEM
PROPOSED FOR REHABILITATION UNDER MFF II- Tranche-I

500kv NKI Karachi



Existing Event Recorders to be replaced



Existing Fault Recorder to be replaced



500kv Jamshoro



220 kv Circuit Breakers to be replaced



220 kv CVT to be replaced



Another view



500 kv CT



Another view



132kv CT



132kv Isolator



Existing Fault Recorder



Another Fault Recorder



Close View

220 kv Halla Road



Existing Over Voltage Relay to be replaced



Another view



Existing Distance Protection Relay



Another view



Existing Fault Recorder



Existing Event Recorder



Existing 132kv CT



Existing 132kv Isolator



Another view



Existing 220kv CT



Existing 220kv L/Arrestor



Close view



Existing 132kv L/Arrestor
220kv TM Khan Road



Existing Fault and Event Recorders



Another view



Another view
500kv Guddu



Existing 500kv CT



Another view



500kv CCVT



Another view



Existing Fault Locator



Existing Fault Recorder



Event Recorder



Protection Relay

500kv Dadu



Existing Shunt Reactor



Another view



132kv Circuit Breaker



500kv Circuit Breaker



Another view



Existing 500kv CT



Another view

220kv Shikarpur



Existing Event Recorder



Existing Event Recorder



Existing Distance Protection Relay



Close view

220 kv Sibbi



Existing 220kv Circuit Breaker



132kv Circuit Breaker



Another view



132 kv PT



Another view



Foundation for new 132kv PT Installation



Existing Fault Recorder reported out of order to be replaced



Another view



Existing Event Recorder reported out of order to be replaced

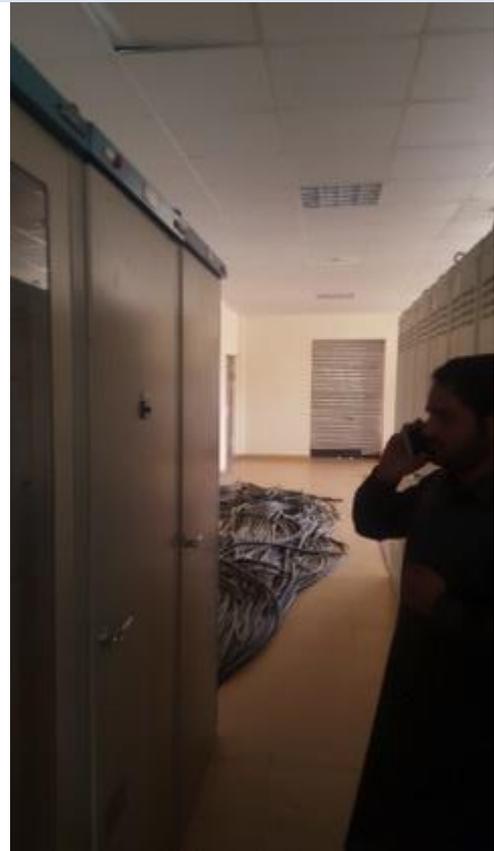


Another view

220 kv Loralai



Existing Fault Recorder report out of order to be replaced



Another view



Close view

220kv Quetta



Existing 132kv Circuit Breaker



Another view



Existing Fault Recorder



Existing Event Recorder



Existing Event Recorder



The site for the proposed Under Frequency Relay Installation



220kv Khuzdar



Existing Fault and Event Recorders



Existing Fault and Event Recorders



Existing Fault and Event Recorders