Initial Environmental Examination

May 2018

PAK: Proposed Multi-tranche Financing Facility-II (MFF-II) Power Transmission Enhancement Investment Program Tranche 3

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

Power Transmission Enhancement Investment Programme II Tranche 3

Initial Environmental Examination

Sub-Project 2: 500 kV Maira Switching Station

May 2018

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

CURRENCY EQUIVALENTS

As of 16th May 2018	Currency Unit – Pak Rupees (Pak Rs.)
Pak Rs 1.00 = $ 0.00865	US$1.00 = Pak Rs. 115.61

CONVERSIONS

1 meter = 3.28 feet

1 hectare = 2.47 acre

LOCAL TERMINOLOGY

Kacha	Weak structure (composed of mud/clay)
Pakka	Robust/strong structure (composed of bricks/concrete)
Tehsil	Area of land with a city or town that serves as its administrative centre

Acronyms

ADB	Asian Development Bank
NTDC	National Transmission & Despatch Company Limited
SPS	Safeguard Policy Statement
ESIC	Environment and Social Impact Cell
MFF	Multi-Tranche Financing Facility
NCS	National Conservation Strategy
OPGW	Optical Ground Wire
HVDC	High Voltage Direct Current
PTEIP	Power Transmission Enhancement Investment Program
NEP	National Environmental Policy
ILO	International Labor Organization
EHV	Extra High Voltage
EPA	Environmental Protection Agency
USEPA	United States Environmental Protection Agency
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
EA	Executing Agency
PMU	Project Management Unit
IA	Implementing Agency
GoP	Government of Pakistan
IEE	Initial Environmental Examination
LARP	Land Acquisition and Resettlement Plan
Leq	Equivalent sound pressure level
NEQS	National Environmental Quality Standards
NGO	Non Governmental Organization
WHO	World Health Organization

O&M	Operation & Maintenance
PC	Public consultation
PEPA	Punjab Environmental Protection Agency
PEPC	Pakistan Environmental Protection Council
PEPAct	Pakistan Environment Protection Act 1997
RP	Resettlement Plan
LPG	Liquefied Petroleum Gas
RoW	Right of Way
WAPDA	Water and Power Development Authority
IFC	International Finance Corporation
FI	Financial Intermediary
EMF	Electro-magnetic Field
CSC	Construction Supervision Consultant
ICNIRP	Non-Ionizing Radiation Protection
WB	World Bank
ANSI	American National Standards Institute
PCO	Public Call Office
G.T	Grand Trunk
OHL	Overhead Lines
SSEMP	Site Specific Environmental Management Plan
EC	Erosion Control
REA	Rapid Environmental Assessment

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EXECUTIVE SUMMARY

1. Under Tranche III of the MFF II, the sub-project 2 i.e. '500 kV Maira Switching Station' consists of the following activities:

    - Eight 500 kV line bays with four shunt reactor banks.

2. The site for this switching station has been finalized after an assessment of three preliminary sites with the selected site being located in a vacant plot of land located in a rural setting with no sensitive receptors located in the project area. Once the site has been cleared, the civil works will be conducted on this identified site, which shall be limited in nature since they will be confined to the boundaries of the switching station and will not result in any significant long-term impacts.

3. This sub-project will contribute to the improvement of the overall performance of the power distribution sector, improving distribution efficiency, broadly widening access to power to drive economic opportunities. The major beneficiaries of this sub-project will be the general public and the industry in the country and all other consumers that use power distribution services directly or indirectly.

4. The NTDC focal staff conducted public consultations with the key receptors within the project area of the identified switching station site. Primary and available secondary data was used to develop a clear picture of the environmental and social aspects of the sub-project development landscape for the purpose of this study.

5. The physical environment was observed within a project area of 4 sq. kilometers of the switching station site. Only a handful of trees shall be cut during clearing of the site for development of the switching station.

6. The proper disposal of any solid and liquid waste, preservation of air quality by limiting dust and gas emissions from construction equipment and vehicle exhaust are some of the other measures which need to be taken.

7. An action plan with clear roles and responsibilities of stakeholders has been provided in the report. NTDC, Project Contractor and the Construction Supervision Consultant are the major stakeholders responsible for this plan. This action plan must be implemented prior to commencement of construction work.

8. Mitigation will be assured by a program of environmental monitoring conducted during construction to ensure that all measures in the EMP are implemented and to determine whether the environment is protected as intended. This will include observations on-site, document checks, and interviews with workers and beneficiaries and any requirements for remedial action will be reported.

9. Therefore, the proposed sub-project is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with design and construction can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and

procedures. Based on the findings of this IEE, the classification of the sub-project as Category ‘B’ is confirmed. It is concluded that the proposed project should proceed, with appropriate mitigation measures and monitoring programs identified in the IEE.

10. As a result of this IEE study, it has been determined that no adverse or harmful impacts of any significance are expected. The sub-project falls under the Category ‘B’ of ADB's Guidelines and thus an IEE is sufficient.

1 Introduction

1.1 Overview

11. Under Tranche III of the MFF II, the sub-project 2 i.e. '500 kV Maira Switching Station'' consists of the following activities:

    - Eight 500 kV line bays with four shunt reactor banks.

12. The GoP has requested the Asian Development Bank (ADB) to provide finance for the proposed sub-project, to help fulfill the overall objective of the MFF to encourage economic growth and improve transmission efficiency by creating a series of national improvements.

13. The project is part of the NTDC's overall power development program and is proposed to strengthen the transmission system to fulfill the need of secure, safe and reliable power supply and to meet not only the existing requirement but also the future demand of the country for sustained economic growth.

14. This Initial Environmental Examination (IEE) report presents the screening of potential environmental impacts of the proposed scope of work and contains the mitigation measures in order to eliminate or reduce the negative impacts to an acceptable level, describes the institutional requirements and provides an environmental management plan for the scope of works listed above.

1.2 Environmental Category of the Project

15. According to ADB's Safeguard Policy Statement (SPS) 2009, a Rapid Environmental Assessment (REA) Checklist was prepared for the activities to be conducted for the sub-project 2 (Annexure-I). The Pakistan Environmental Protection Agency's "Guidelines for the Preparation and Review of Environmental Reports (2000)" were also consulted. Based on the initial findings, the proposed activities under this sub-project have been classified as Category 'B'. Thus, an IEE has been conducted.

1.3 Scope of IEE Study and Personnel

The following methodology was employed for this study:

16. This IEE study has included field reconnaissance within the project area (an area of 2 km x 2 km) with surveys taking place during March 2018 to assess whether any sensitive receptors are located in the area and to map them.

17. The physical environment was observed within a project area of 4 sq. kilometers around the project boundary.

18. The study process began with scoping and field reconnaissance during which the REA was carried out to establish any potential impacts resulting from the development of the works. The environmental impacts and concerns requiring further study in the environmental assessment were then identified. The methodology of the

IEE study was then elaborated in order to address all interests. Subsequently, secondary baseline environmental data was collected and the intensity and likely location of impacts were identified with relation to any sensitive receptors; based on the construction activities to be carried out. The significance of impacts was assessed and, for those impacts requiring mitigation, measures were proposed to reduce impacts to within acceptable limits.

19. The significance of impacts from the proposed works at the sub-project were then assessed and for those impacts requiring mitigation, suitable measures were proposed to reduce impacts to within acceptable limits as per local and international applicable regulations.

20. A detailed environmental management and monitoring plan was developed to ensure compliance to the proposed measures during the development of the sub-project.

1.4 Structure of Report

21. This report reviews information on environmental attributes in the project area Physical, ecological features, social and economic aspects and cultural resources are included. The report predicts potential impacts on the environment due to the proposed sub-project.

22. This IEE report contains the following chapters:

- Introduction
- Policy and Legal Framework
- Description of the Project
- Description of Environmental and Social Conditions
- Assessment of Environmental Impacts and Mitigation Measures
- Institutional Requirements Environmental Management Plan
- Public Consultation
- Grievance Redressal Mechanism
- Conclusions and Recommendations
- References

Project:

Sub-project 2: 500 Kv Maira Switching Station

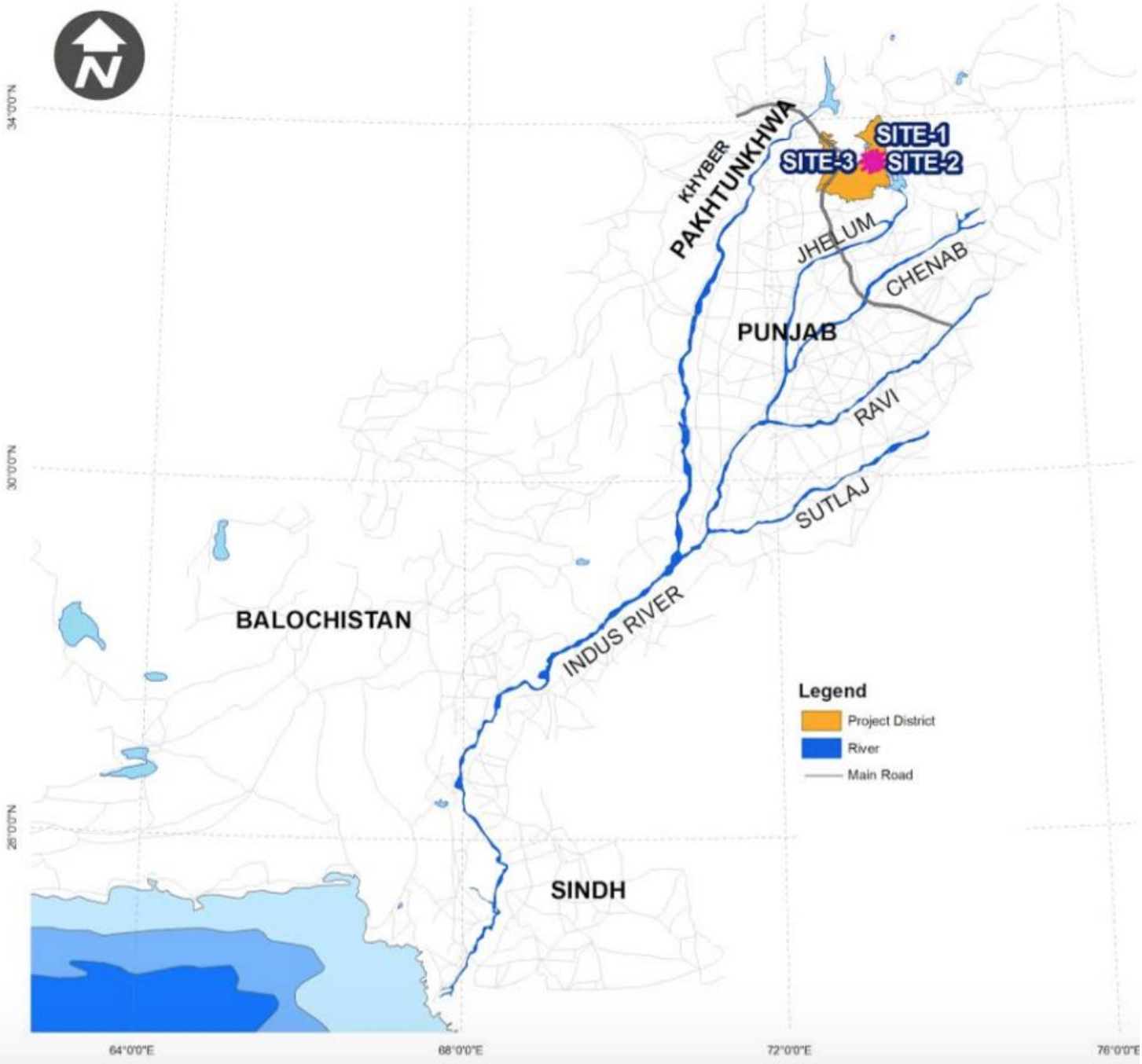
Drawing Title:

Key Map

Drawing Number:

Figure 1.1

Drawing Date: April 2018



2 Policy and Legal Framework in Pakistan

2.1 General

23. This section provides an overview of the policy framework and national legislation that applies to the scope of work to be conducted under the proposed sub-project 2. This sub-project is expected to comply with all national legislation relating to environment in Pakistan, and to obtain all the regulatory clearances required.

2.2 National Policy and Legal Framework

24. The Pakistan National Conservation Strategy (NCS) that was approved by the federal cabinet in March 1992 is the principal policy document on environmental issues in the country (EUAD/IUCN, 1992). The NCS outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources. 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 sub-project are pollution prevention and abatement and increasing energy efficiency while conserving biodiversity.

25. Prior to the adoption of the 18th Constitutional Amendment, the Pakistan Environmental Protection Act (PEPA) 1997 was the governing law for environmental conservation in the country. Under PEPA 1997, the Pakistan Environmental Protection Council (PEPC) and Pak EPA were primarily responsible for administering PEPA 1997. Post the adoption of the 18th Constitutional Amendment in 2011, the subject of environment was devolved and the provinces have been empowered for environmental protection and conservation. Subsequently, the Punjab government amended PEPA 1997 as Punjab Environmental Protection (Amendment) Act 2012, and Punjab EPA (PEPA) is responsible for ensuring the implementation of provisions of the Act in Punjab’s territorial jurisdiction. PEPA is also required to ensure compliance with the NEQS and establish monitoring and evaluation systems.

2.3 Regulations for Environmental Assessment, Pakistan EPA

26. Under Section 12 (and subsequent amendment) of the PEPA (1997), a project falling under any category specified in Schedule I of the IEE/EIA Regulations (SRO 339 (I0/2000), requires the proponent of the project to file an IEE with the concerned provincial EPA. Projects falling under any category specified in Schedule II require the proponent to file an EIA with the provincial agency, which is responsible for its review and accordance of approval or request any additional information deemed necessary.

2.4 Regulatory Clearances, Punjab EPA

27. Post adoption of the 18th Constitutional Amendment in 2011, the subject of environment was devolved and the provinces have been empowered for

environmental protection and conservation. Subsequently, the Punjab government amended PEPA 1997 as Punjab Environmental Protection Act 2012, and Punjab EPA (PEPA) is responsible for ensuring the implementation of provisions of the Act in Punjab's territorial jurisdiction. PEPA is also required to ensure compliance with the NEQS and establish monitoring and evaluation systems. In accordance with provincial regulatory requirements, an IEE/EIA satisfying the requirements of the Punjab Environmental Protection Act (2012) is to be submitted to Punjab environmental protection agency (PEPA) for review and approval, and subsequent issuance of NOC before the commencement of construction.

2.5 Guidelines for Environmental Assessment, Pakistan EPA

28. The Pak-EPA has published a set of environmental guidelines for conducting environmental assessments and the environmental management of different types of development projects. The guidelines that are relevant to the proposed sub-project are listed below:

    - Guidelines for the Preparation and Review of Environmental Reports, Pakistan, EPA1997;
    - Guidelines for Public Consultations; Pakistan EPA May 1997;

2.6 National Environmental Quality Standards (NEQS) 2000

29. The National Environmental Quality Standards (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 and noise emission from vehicles;
    - Maximum allowable noise levels from vehicles;

30. These standards apply to the gaseous emissions and liquid effluents discharged by batching plants, campsites and construction machinery. The standards for vehicles will apply only during the construction phase of the project. Standards for ambient air quality have also been prescribed.

2.7 ADB Policies

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

31. 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 established and provided in **Chapter 8**.

32. 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).

33. As a result of the completion of the REA checklist, the scope of work to be conducted under the sub-project 2 has been classified as Category ''B'' and thus a detailed and comprehensive IEE study has been prepared, including an EMP.

2.7.2 ADB's Public Communication Policy 2011

34. The PCP aims to enhance stakeholders' trust in and ability to engage with ADB, and thereby increase the development impact of ADB operations. The policy promotes transparency, accountability, and participatory development. It establishes the disclosure requirements for documents ADB produces or requires to be produced.

2.7.3 ADB's Accountability Mechanism Policy 2012

35. The objectives of the Accountability Mechanism is providing an independent and effective forum for people adversely affected by ADB-assisted projects to voice their concerns and seek solutions to their problems, and to request compliance review of the alleged noncompliance by ADB with its operational policies and procedures that may have caused, or is likely to cause, them direct and material harm. The Accountability Mechanism a "last resort" mechanism.

2.8 Other Environment Related Legislations

36. The **Table 2.1** provides a summary of all legislations, guidelines, conventions and corporate requirements.

Table 2.1: Environmental Guidelines and Legislations

Legislation/Guideline	Description
National Environmental Policy (2005) (NEP)	NEP is the primary policy of Government of Pakistan addressing environmental issues. The broad Goal of NEP is, "to protect, conserve and restore Pakistan's environment in order to improve the quality of life of the citizens through sustainable development". The NEP identifies a set of sectoral and cross-sectoral guidelines to achieve its goal of sustainable development. It also suggests various policy instruments to overcome the environmental problems throughout the country.
The Forest Act (1927)	The Act empowers the provincial forest departments to declare any forest area as reserved or protected. It empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce, quarrying and felling, lopping and topping of trees, branches in reserved and protected forests. No protected forests are located in the project areas of sub-project 2.
Punjab Wildlife Protection Ordinance, 1972	It empowers the government to declare certain areas reserved for the protection of wildlife and control activities within in these areas. It also provides protection to endangered species of wildlife. As no activities are planned in these areas, no provision of this law is applicable to the proposed sub-project 2.
The Antiquities Act (1975)	It ensures the protection of Pakistan's cultural resources. The Act defines "antiquities" as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the GOP to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the subproject proponents are obligated to ensure that no activity is undertaken in the proximity of a protected antiquity, report to the Department of Archaeology, GOP, any archaeological discovery made during the course of the sub-project.
Pakistan Penal Code (1860)	It authorizes fines, imprisonment or both for voluntary corruption or fouling of public springs or reservoirs so as to make them less fit for ordinary use.
NATIONAL ENVIRONMENTAL AND CONSERVATION STRATEGIES	
National Conservation Strategy	Before the approval of NEP, the National Conservation Strategy (NCS) was considered as the Government's primary policy document on national environmental issues. At the moment, this strategy just exists as a national conservation program. The NCS identifies 14 core areas including conservation of biodiversity, pollution prevention and abatement, soil and water conservation and preservation of cultural heritage and recommends immediate attention to these core areas.
Biodiversity Action Plan	The plan recognizes IEE/EIA as an effective tool for identifying and assessing the effects of a proposed operation on biodiversity.
Environment and	There is a well-established framework for environmental

Legislation/Guideline	Description
Conservation	management in Pakistan. The Ministry of Environment deals with environment and biological resources. Within the ministry, the NCS unit established in 1992 is responsible for overseeing the implementation of the strategy. Two organizations, the Pakistan Environmental Protection Council (PEPC) and the Pak EPA are primarily responsible for administering the provisions of the PEPA, 1997. The PEPC oversees the functioning of the Pak EPA. Its members include representatives of the government, industry, non-governmental organizations and the private sector. The Pak EPA is required to ensure compliance with the NEQS, establish monitoring and evaluation systems, and both identify the need to and institution of legislations whenever necessary. It is thus the primary implementing agency in the hierarchy. The Provincial Environmental Protection Agencies are formed by the respective provinces.
INTERNATIONAL CONVENTIONS	
The Convention on Conservation of Migratory Species of Wild Animals (1981.21)	The Convention requires countries to take action to avoid endangering migratory species. The term "migratory species" refers to the species of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries. The parties are also required to promote or cooperate with other countries in matters of research on migratory species. There are no endangered species of plant life or animal life in the vicinity of the sub-project 2.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973)	The convention requires Pakistan to impose strict regulation (including penalization, confiscation of the specimen) regarding trade of all species threatened with extinction or that may become so, in order not to endanger their survival further.
International Union for Conservation of Nature and Natural Resources Red List (2000)	Lists wildlife species experiencing various levels of threats internationally. Some of the species indicated in the IUCN red list are also present in the wetlands of Pakistan.
Kyoto Protocol/Paris Agreement	SF_6 gas is listed in the Kyoto Protocol as one of the six greenhouse gases subject to monitoring. SF6 has to be used in closed systems in order to avoid emissions. 194 member states agreed to extend the Kyoto protocol until 2020 with the aim of reducing the emission of greenhouse gases. The Paris Convention agreed to reduce climate-damaging greenhouses gases under the United Nations Framework Convention on Climate Change (UNFCCC) as of 2020. 195 member states negotiated and adopted this agreement on the twenty-first session of the Conference of the Parties under the framework convention on climate change in Paris on 12 December 2015.
IEC 62271-4 directive	This directive stipulates SF_6 gas recovery down to a final vacuum of < 20 mbar. The IEC requirements are exceeded by far when using DILO devices as DILO service carts enable a final vacuum of < 1 mbar depending on the type of device.
IEC 60480 guideline	This guideline stipulates the limit values for the re-use of SF_6 gas in medium and high voltage switchgear.
EMF Exposure limits by IFC for 'general public' and 'occupational	These exposure limits have been provided for monitoring of EMF limits in order to prevent any adverse health effects in the general public as well as amongst workers.

Legislation/Guideline	Description
exposure'	

2.9 Comparison of International and Local Environmental Legislations

37. The ADB SPS requires application of pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards. The SPS states that when host country regulations differ from these standards, the EA will achieve whichever is more stringent.

38. A comparison of applicable local and international guidelines for ambient air quality has been provided in **Table 2.5** below. In the case of most pollutants, the NEQS standards for ambient air quality are more stringent in comparison to USEPA and WHO/IFC standards. The applicable and most stringent parameters for each respective pollutant are highlighted in green.

39. Similar to the standards for air quality, the comparison of noise standards provided in **Table 2.6** clearly shows that NEQS standards for noise are more stringent in comparison to the WHO/IFC standards. The only exception is the daytime noise level standard for Industrial areas where the World Bank/IFC standard is more stringent (70 dB(A)) in comparison to NEQS (75 dB(A)) and so for this particular parameter, the WHO/IFC standard will be used. Apart from this one exception, the NEQS standards have been used for this sub-project 2.

40. As far as regulations regarding other environmental parameters are concerned such as acceptable effluent disposal parameters, the local regulations i.e. NEQS take precedence over any other international regulations such as WHO/IFC since these specific IFC standards only cover a limited number of parameters relating to effluent disposal etc and the NEQS are generally more stringent.

2.10 Implications of national policies and regulations on proposed project

41. The Pak-EPA formulated regulations in 2000 for 'Review of IEE and EIA' which categorise development projects under three schedules - Schedules I, II and III. Projects are classified on the basis of expected degree and magnitude of environmental impacts and the level of environmental assessment required is determined from the schedule under which the project is categorised.

42. The projects listed in Schedule-I include those where the range of environmental issues is comparatively narrow and the issues can be understood and managed through less extensive analysis. Schedule-I projects require an IEE to be conducted, rather than a full-fledged EIA, provided that the project is not located in an environmentally sensitive area.

43. The proposed sub-project 2 has been categorized as Schedule-I and thus an IEE study has been conducted.

44. This IEE study will be submitted to the Punjab EPA (PEPA) for review and comments. The PEPA will respond within 10 working days from receipt of the IEE report and confirm the completeness of the report for detailed review or request additional information to be provided in order for the review to take place.

45. The PEPA will make every effort to review the IEE report within 45 days of the issuance of completeness of the report. Upon completion of the review, an NOC will be issued, with conditions from the EPA if felt necessary.

2.11 Implications of ADB's safeguard policies on proposed project

46. The objectives of ADB's safeguards are to:

    - avoid adverse impacts of projects on the environment and affected people, where possible;
    - minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
    - help borrowers/clients to strengthen their safeguard systems.

47. ADB's SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

    - environmental safeguards,
    - involuntary resettlement safeguards, and
    - Indigenous Peoples safeguards.

48. The objective of the environmental safeguards is to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process. ADB's policy principles are summarized in **Table 2.4** below.

2.12 EMF Exposure Guidelines

49. Although there is public and scientific concern over the potential health effects associated with exposure to EMF (not only high voltage power lines and substations, but also from everyday household uses of electricity), there is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmissions lines and equipment.

50. However, while the evidence of adverse health risks is weak, it is still sufficient to warrant limited concern. **Table 2.2** lists exposure limits for general public exposure to electric and magnetic fields published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) while **Table 2.3** provides the exposure limits for occupational exposure.

51. It is important to mention that no national guidelines on EMF exposure exist at present.

Table 2.2: ICNIRP exposure limits for general public exposure to electric and magnetic fields

Frequency	Electric Field (V/m)	Magnetic Field (uT)
50 Hz	5000	100
60 Hz	4150	83

Source: ICNIRP (1998): "Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz).

Table 2.3: ICNIRP exposure limits for occupational exposure to electric and magnetic fields

Frequency	Electric Field (V/m)	Magnetic Field (uT)
50 Hz	10,000	500
60 Hz	8300	415

Source: ICNIRP (1998): "Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz).

Table 2.4: ADB Policy Principles

	Policy principle	Summary
1	Screening and categorization	Screening process initiated early to determine the appropriate extent and type of environmental assessment.
2	Environmental assessment	Conduct an environmental assessment to identify potential impacts and risks in the context of the project's area of influence.
3	Alternatives	Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts, including no project alternative.
4	Impact mitigation	Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse impacts and enhance positive impacts. Prepare an environmental

		management plan (EMP).
5	Public consultations	Carry out meaningful consultation with affected people and facilitate their informed participation. Involve stakeholders early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation. Establish a grievance redress mechanism.
6	Disclosure of environmental assessment	Disclose a draft environmental assessment in a timely manner, in an accessible place and in a form and language(s) understandable to stakeholders. Disclose the final environmental assessment to stakeholders.
7	Environmental management plan	Implement the EMP and monitor its effectiveness. Document monitoring results, and disclose monitoring reports.
8	Biodiversity	Do not implement project activities in areas of critical habitats.
9	Pollution prevention	Apply pollution prevention and control technologies and practices consistent with international good practices. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges. Avoid the use of hazardous materials subject to international bans or phaseouts.
10	Occupational health and safety Community safety.	Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities
11	Physical cultural resources	Conserve physical cultural resources and avoid destroying or damaging them. Provide for the use of “chance find” procedures.

Table 2.5: Comparison of International and local Air Quality Standards*

Pollutants	USEPA		WHO/IFC		Pak. NEQS	
	Avg. Time	Standard	Avg. Time	Standard	Avg. Time	Standard
SO_2	3 hrs 1 hr	0.5 ppm 75 ppb	24 hr 10 min	20 ug/m^3 500 ug/m^3	Annual Mean 24 hrs	80 ug/m^3 120 ug/m^3
CO	8 hrs 1 hr	9 ppm (11 mg/m^3) 35 ppm (43 mg/m^3)	-	-	8 hrs 1 hr	5 mg/m^3 10 mg/m^3
NO_2	Annual Mean 1 hr	100 ug/m^3 (53 ppb) 100 ppb	1 yr 1 hr	40 ug/m^3 200 ug/m^3	Annual Mean 24 hrs	40 ug/m^3 80 ug/m^3
O_3	8 hrs	0.07ppm (148 ug/m^3)	8 hrs	100 ug/m^3	1 hr	130 ug/m^3
TSP	-	-	-	-	Annual Mean 24 hrs	360 ug/m^3 500 ug/m^3
PM_{10}	24 hrs	150 ug/m^3	1 yr	20 ug/m^3	Annual Mean	120 ug/m^3

			24 hr	50 ug/m^3	24 hrs	150 ug/m^3
$PM_{2.5}$	Annual Mean 24 hrs	15 ug/m^3 35 ug/m^3	1 yr 24 hr	10 ug/m^3 25 ug/m^3	Annual Average 24 hrs 1 hr	15 ug/m^3 35 ug/m^3 15 ug/m^3

*: The standards highlighted in green for each respective pollutant are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed project.

Table 2.6: Comparison of International and Local Noise Standards*

Category of Area/Zone	Limit in dB(A) Leq			
	NEQS		WHO/IFC	
	Day Time	Night Time	Day Time	Night Time
Residential area (A)	55	45	55	45
Commercial area (B)	65	55	70	70
Industrial area (C)	75	65	70	70
Silence zone (D)	50	45	55	45

*: The standards highlighted in green for each respective Area/Zone are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed project.

3 Description of the Project

3.1 General

52. This chapter provides an overview of the scope of work to be conducted under the sub-project 2 for development of the Maira switching station. The safety parameters to be followed by NTDC (WAPDA) during construction and operation stages are also provided.

3.2 Scope of Work

53. Maira Switching Station is a part of Phase-1 of integrated transmission interconnection scheme for evacuation of hydropower from 870 MW Suki Kinari HPP, 1100 MW Kohala HPP, and 640 MW Mahl HPP via 500 kV double circuit transmission lines, which are scheduled to commission in December 2022, June 2024 and December 2024 respectively. The optimum arrangement for the power evacuation is for the individual power lines from each power plant to be brought to a switching station at a convenient location and the dispersal of this power therefrom to the load centers at Lahore and Islamabad. This is system rationalization based on a least cost solution. The scope of work under Maira Switching Station will consist of the following activities:

    - Eight 500 kV line bays with four shunt reactor banks.

3.3 Categorization of Sub-Project

54. This switching station has yet to be constructed and only the proposed site has been finalized to date. Once this station has been constructed, the installation of the electronic hardware mentioned above shall be conducted.

55. Once the plot of land identified for development of the switching station has been cleared and leveled, the civil works for development of the station along with installation of the electronic equipment will all be conducted within the boundaries of the station. Thus, any potential impacts shall be limited to the construction phase and will be limited in nature.

56. The **Figure 3.1** shows the station location and the proximity of this station to the different receptors lying in the project area.

57. The aspects of the sub-project with potential for significant environmental impacts were assessed in detail and environmental assessment has focused on potential significant impacts from the construction aspects as well as consultation by the NTDC staff with the local communities in the sub-project area.

58. Based on the proposed scope of project works and assessment conducted of potential impacts during the different project phases, this sub-project is categorized as Category ‘B’.

3.4 Scope of Environmental Assessment

59. The scope of this study includes the Maira Switching Station. The 500 kV transmission lines connecting the Station with the HPPs are not associated facilities to this sub-project as their viability and existance do not depend exclusively on the switching station. Therefore, environmental assessment of the other transmission lines will be completed separately.

3.5 Need for Sub-Project

60. Pakistan is a country with an economy of improving performance with a wide network of power distribution. However, the standards and conditions of the power distribution are inadequate to meet rapidly growing power demand. This situation limits reliable power distribution and therefore the contribution of the power sector to national development and economic growth. To cope with the constraints, the existing power distribution infrastructure has to be improved and upgraded. The overall contribution of power infrastructure also requires institutional arrangements and capacity that support strategic management of the sector, and planning and management of investments.

61. This sub-project will contribute to the improvement of the overall performance of the power distribution sector, improving distribution efficiency, broadly widening access to power to drive economic opportunities. The beneficiaries of the sub-project will be people, companies, and government and non-government agencies in Pakistan that use power distribution services directly and indirectly. Communities indirectly served by the sub-project will benefit from improved, secure faster distribution services. Power users will benefit in terms of secure power and improved power safety and potentially increased productivity.

62. To achieve economic growth and poverty reduction, it is essential to ensure a reliable power supply to an increasing number of industrial, agricultural, commercial and domestic consumers. Average increase in power demand of country during next 10 years is about 4.96% per annum. To cope with this growth in demand, additional capacity will be required annually.

63. As a result of this enhancement, additional capacity of NTDC transmission system is required which will also result in overall power system efficiency and stability to deliver adequate and quality power to the consumers.

3.6 Cost of Sub-project

64. The estimated cost of this sub-project is **PKR 3,397.37 million**. The detailed breakdown of capital cost estimates from the PC-1 are provided in **Table 3.1** below.

Table 3.1: Capital Cost Estimate of Sub-project 2*

Sr. No.	Description	Total Estimated Cost (MRs.)			
		Local	FEC	Duty	Total

500 kV Maira Switching Station				
500 kV Switching Station at Maira with eight line bays and four shunt reactor banks	565.5	2,506.08	325.79	**3,397.37**

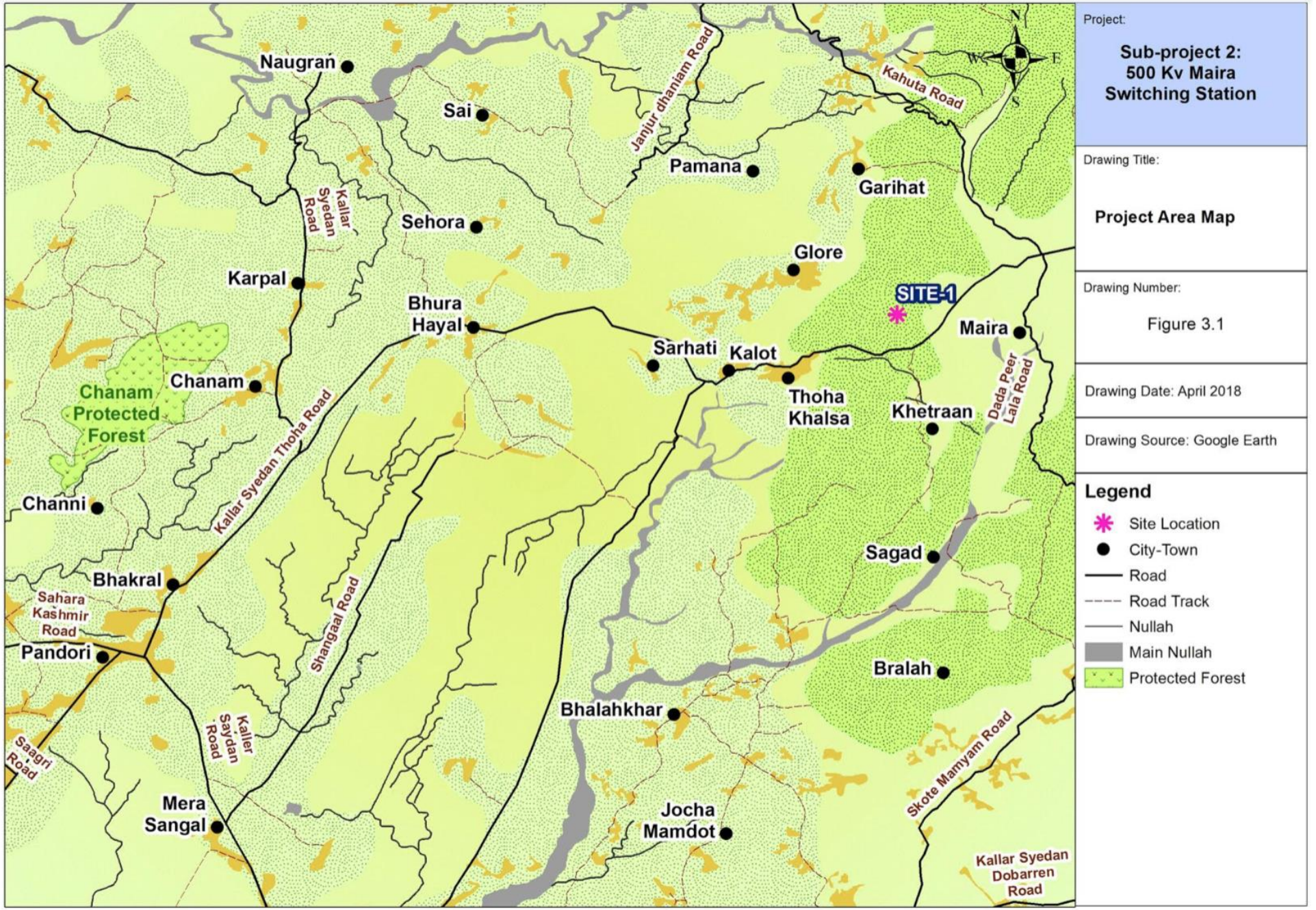
Source: *: PC-1

3.7 Equipment & Machinery

65. The equipment to be used for construction of the proposed switching station is provided in **Table 3.2** below.

Table 3.2: Equipment for Maira Switching Station

Sr. No.	Item	Unit	Qty.
500 kV Switching Station			
1.	Circuit Breaker	Set	3
2.	Bus Isolator	Set	6
3.	Line Isolator	Set	2
4.	C.T	No.	12
5.	CVT	No.	6
6.	Lightning arrestor	No.	6


Naugran
Sai
Janjur dhaniam Road
Kahuta Road
Pamana
Garihat
Kallar Syedan Road
Sehora
Glore
Karpal
SITE-1
Bhura Hayal
Maira
Sarhati
Kalot
Chanam
Chanam Protected Forest
Thoha Khalsa
Khetraan
Dada Peer Laia Road
Kallar Syedan Thoha Road
Channi
Sagad
Bhakral
Sahara Kashmir Road
Shangaal Road
Pandori
Bralah
Bhalahkhar
Kaller Saydan Road
Saagri Road
Skote Mamyam Road
Mera Sangal
Jocha Mamdot
Kallar Syedan Dobarren Road
N
W
E
S
Project:
Sub-project 2: 500 Kv Maira Switching Station
Drawing Title:
Project Area Map
Drawing Number:
Figure 3.1
Drawing Date: April 2018
Drawing Source: Google Earth
Legend
Site Location
City-Town
Road
Road Track
Nullah
Main Nullah
Protected Forest

3.8 Project Alternatives

66. This sub-project of Tranche 3 of MFF-II will contribute to the improvement of the overall performance of the power transmission sector, improving transmission efficiency, broadly widening access to power to drive economic opportunities. The beneficiaries of the subproject will be people, companies, and government and non-government agencies in Pakistan that use power transmission services. Power users will benefit in terms of secure power and improved power safety and potentially increased productivity.

67. Reliable supply of power to industrial, agricultural, commercial and domestic consumers is a lifeline for development and production in these key sectors, which owe a significant contribution in economic growth of the country alleviating poverty. Statistics demonstrate an average increase of 5.30 % per annum in power demand of the country during next 10 years.

3.8.1 No Project Alternative

68. Electricity demand has been increasing during the past several years and this trend is expected to continue as a result of the on-going economic uplift in the country. The key factors fueling the increasing power demand include increasing population, rapid urbanization, industrialization, improvement in per capita income and village electrification. In order to match the increasing trend in the power demand, regular investments in various segments of the power network generation, transmission and distribution is vitally important. Otherwise, the gap between the supply and demand will continue to increase.

69. In the absence of the sub-project, the potential for interruptions to power supply will increase and socio-economic development of the province could be affected in the short to medium term. In an un-enhanced state, the wear and tear on existing facilities will rise. In the short term, the power supply would improve and more reliable access to secure power would be available.

In consideration of all the rationale provided above, the 'No Project' option is not a preferred alternative.

3.8.2 Alternative Construction Methods

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

3.8.3 Alternative Switching Station locations

71. Two other alternative locations were assessed prior to finalizing the proposed site for the switching station. The major criteria while selecting the switching station location was as follows:

    (i) To identify a location with the least sensitive receptors near the identified site.

    (ii) To identify a location which minimizes the respective distances of the different transmission lines and provides an optimized scenario.

    As can be observed in **Figure 3.1**, the Site 2 is near the Chanam protected forest along with a number of other villages and thus was not felt to be a viable location for development of the station. Similarly, Site 3 was also assessed to not be too accessible and is alos located near a few villages and thus was not assessed to be a viable option.

    The selected Site 1 is felt to be the most suitable location from both the perspectives mentioned above since it is located within a sparely populated area and also minimizes the transmission line lengths as far as possible.

3.9 Proposed Schedule for Implementation

72. There will be some land acquisition for the development of the station. Designs, power transmission arrangements, access, review of environmental management and construction processes will also need to be completed. The Project Proponent (NTDC) plans to have this tranche-III sub-project commenced by 2018-19 and completed by 2022-23 after completing the necessary arrangements.

4 Description of Environment

4.1 General

73. The proposed sub-project 2 consists of development of a switching station at Maira in Rawalpindi district in Punjab province of Pakistan. The detailed description of the project area environment is provided below.

4.2 Physical Resources

4.2.1 Topography

74. The project site consists of generally flat land will minimal vegetation cover. Only minor filling and leveling will be required as a part of the site preparation. The average altitude is 750-760 meters above sea level.

4.2.2 Climate & Air Quality [1]

75. The project location is located in a humid subtropical climate with long and very hot summers, a monsoon and short, mild and wet winters. Rawalpindi's weather has historically been known to change rather quickly due to its proximity to Himalayas and the Pir Panjal Range. The average annual rainfall is abundant at 1,106 mm (43.5 in), most of which falls in the monsoon season. However, frontal cloud bands also bring quite significant rainfall in the winter. In summer, June is the hottest month, while in winter, January is the coldest month of the year.

76. Throughout the year, about 89 thunderstorms are experienced, which is the highest frequency of thunderstorms in Punjab province. High volumes of rainfall are also experienced during the monsoon season. On a typical day, the city hosts windy afternoons (40 km per hour (25 mph) but usually calm to light breeze (Beaufort scale) wind conditions are observed after midnight. The mean annual wind speed of Rawalpindi is roughly 12 km per hour (7.5 mph) at 10 m standard height.

77. The mean maximum and minimum temperatures in summers are 40°C and 27°C, while in winters it is 19°C and 10°C respectively. The summer season starts from April and continues till October. May, June and July are the hottest months. The winter season on the other hand starts from November and continues till March. December, January and February are the coldest months as shown in **Figure 4.1** below.

78. The rainy season starts in July and ends in September. Annual rainfall is 175 mm. More rain occurs in July and August than any other months. Most of the winter rains

[1] https://en.climate-data.org/location/3511/
https://www.meteoblue.com/en/weather/forecast/modelclimate/jauharabad_pakistan_1165221

are received in the months of July, August and September. Winter rainfalls are rare and scanty as shown in **Figure 4.2** below.

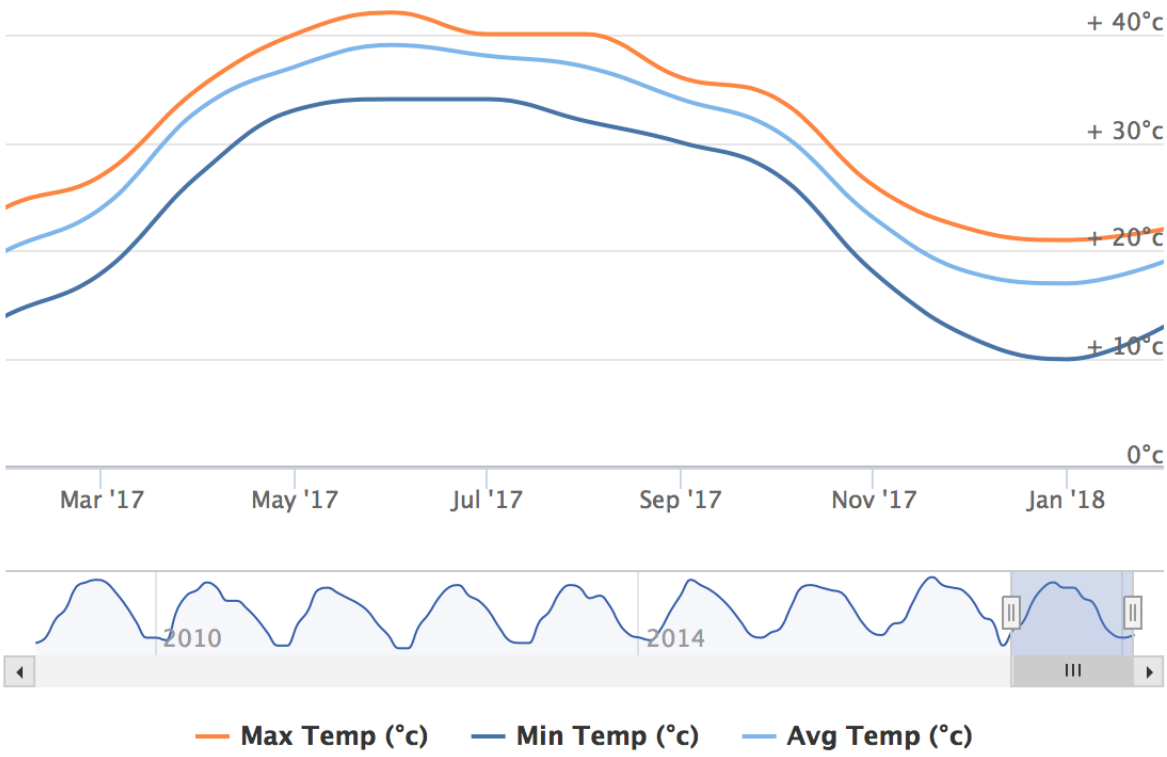
79. The relative humidity during the rainy season is as high as 45%. During the dry months, it falls below 23%. The average daily relative humidity for July is around 41% as shown in **Figure 4.3** below.

80. The air quality in the sub-project corridor appears good based on observations 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 minor.

81. The project area corridor is distant from major sources of air pollution such as industries or urban type traffic, domestic sources such as burning of wood and kerosene stoves etc. or fugitive sources such as burning of solid wastes. Air quality in the project corridor appeared good during the study period. It should be possible to control and manage emissions from project activities at source, under the EMP.

82. The activities to be conducted for development of the sub-project or its subsequent operation are not expected to result in any increase in vulnerability to climate related impacts such as floods, cyclone winds etc. This is largely due to the nature of the project, which does not involve contribution to global warming or climate change in any way.

Figure 4.1: Annual variation in Temperature in Project Area[2]



[2] https://www.worldweatheronline.com/lang/en-pk/maira-weather-averages/punjab/pk.aspx

Figure 4.2: Annual variation in Rainfall in Project Area[3]

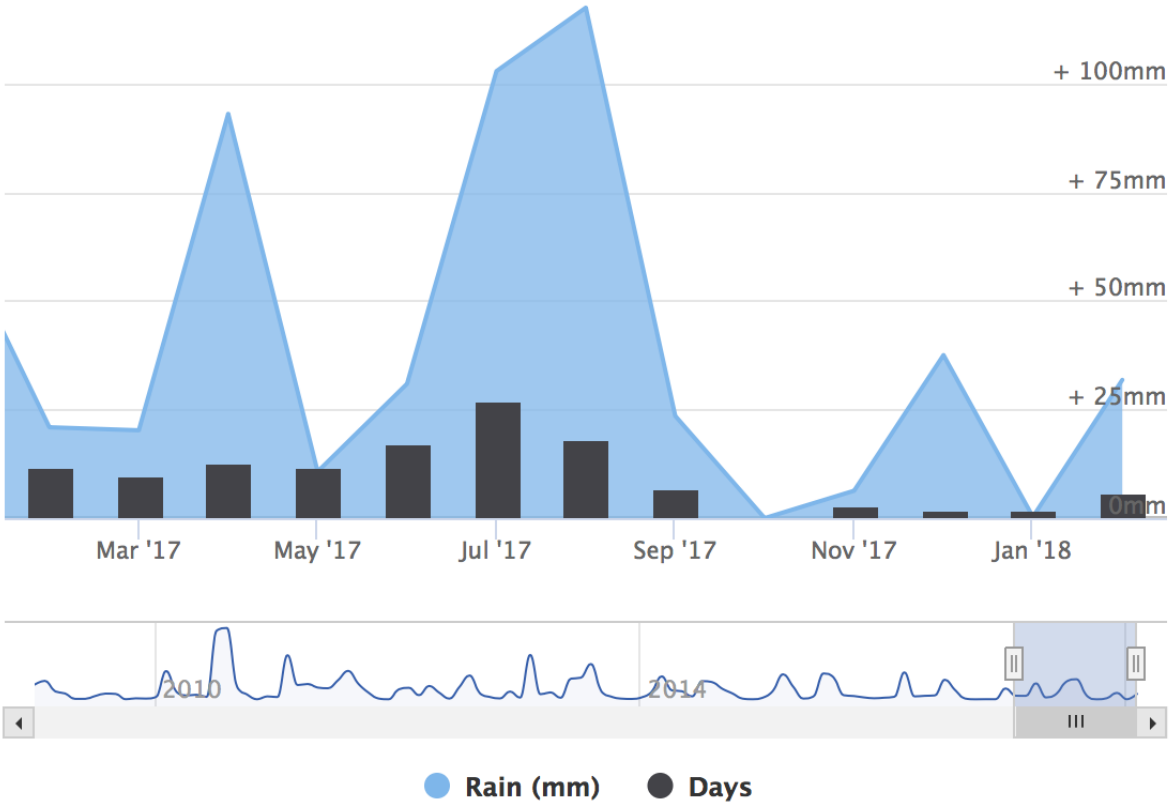
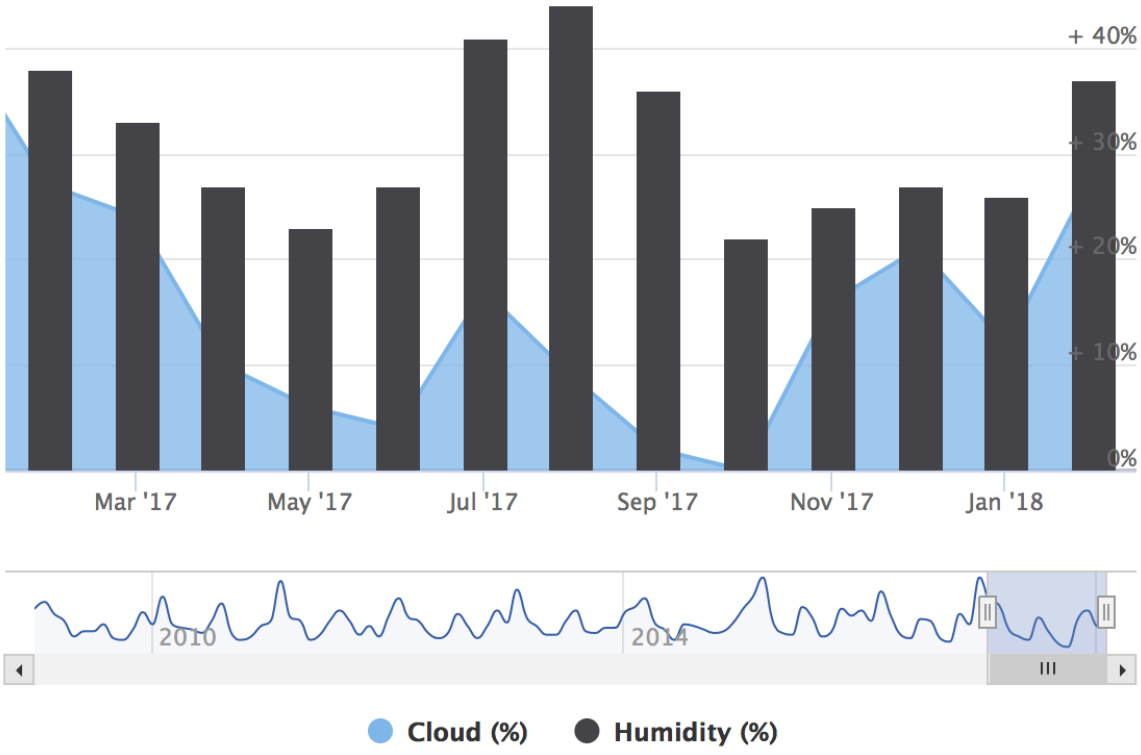


Figure 4.3: Annual variation in Humidity in Project Area[4]



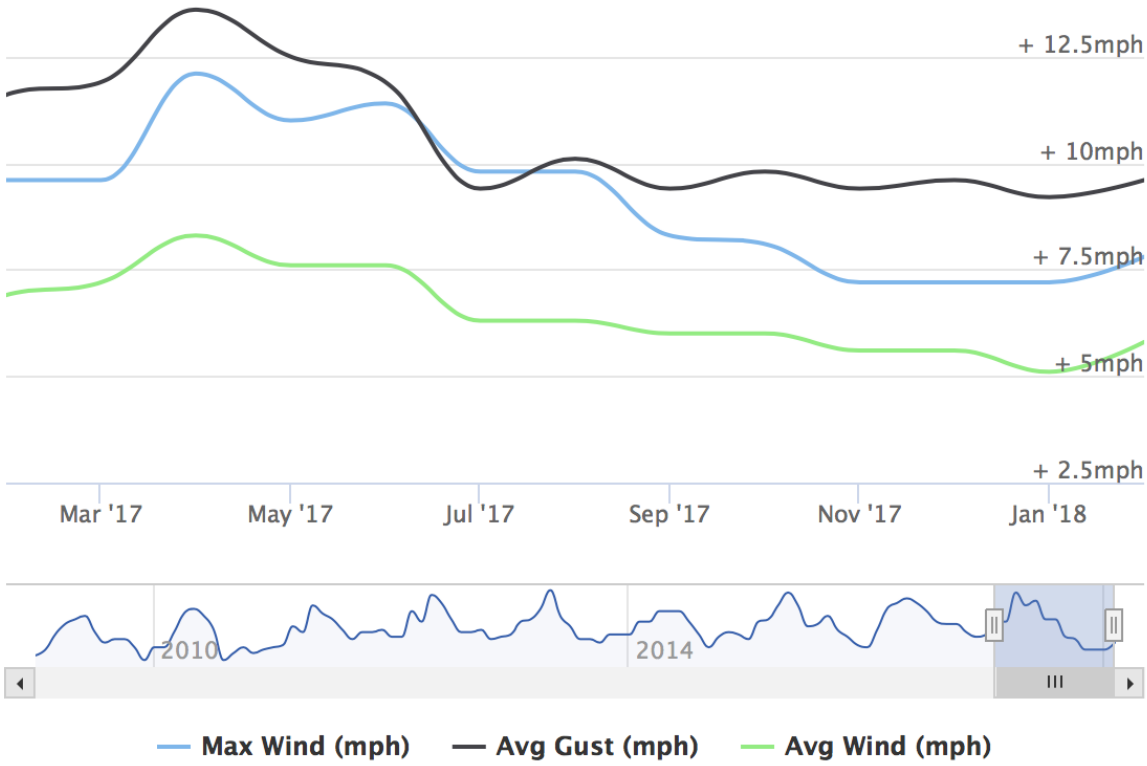
[3] https://www.worldweatheronline.com/lang/en-pk/ maira -weather-averages/punjab/pk.aspx

[4] https://www.worldweatheronline.com/lang/en-pk/ maira -weather-averages/punjab/pk.aspx

4.2.3 Wind velocity[5]

83. The average daily wind speed in July has been recorded to be around 6.3 mph (10.1 km/h). In recent years, the maximum sustained wind speed has reached 12.2 mph (19.6 km/h). Prevalent wind velocity is 10 to 12.8 mph as shown in **Figure 4.4** below.

Figure 4.4: Annual variation in Wind Speeds in Project Area[6]



4.2.4 Geology and Soils[7]

84. The area is of late Pleistocene age derived from mixed calcareous stratification. The surface layer of soil is either hard clay or brown colored loam, which is about one meter deep. It is followed by about one meter thick fine silt sand and fine sand. Below this layer, there is a six-meter layer of fine sand bed with traces of silt. The clayey topsoil has plasticity index between 6.3 and 6.9 percent. The topsoil is generally fertile and yields to multi-cropping system. N-value of soil (penetration resistance) in the area varies between 4 and 18 but on average, it is near 10. Average unconfined strength of cohesive soils varies from 0.82 and 1 ton/sft. Intermolecular cohesion for cohesive soils ranges from 1.0 and 6.8 PSI. The bearing capacity of the soil ranges between 0.700 ton/sft and 1.47 ton/sft.

4.2.5 Seismology

85. As the project area is located towards the middle of the western part of Indian tectonic plate, it is not active seismically. However, occasionally tremors in the range

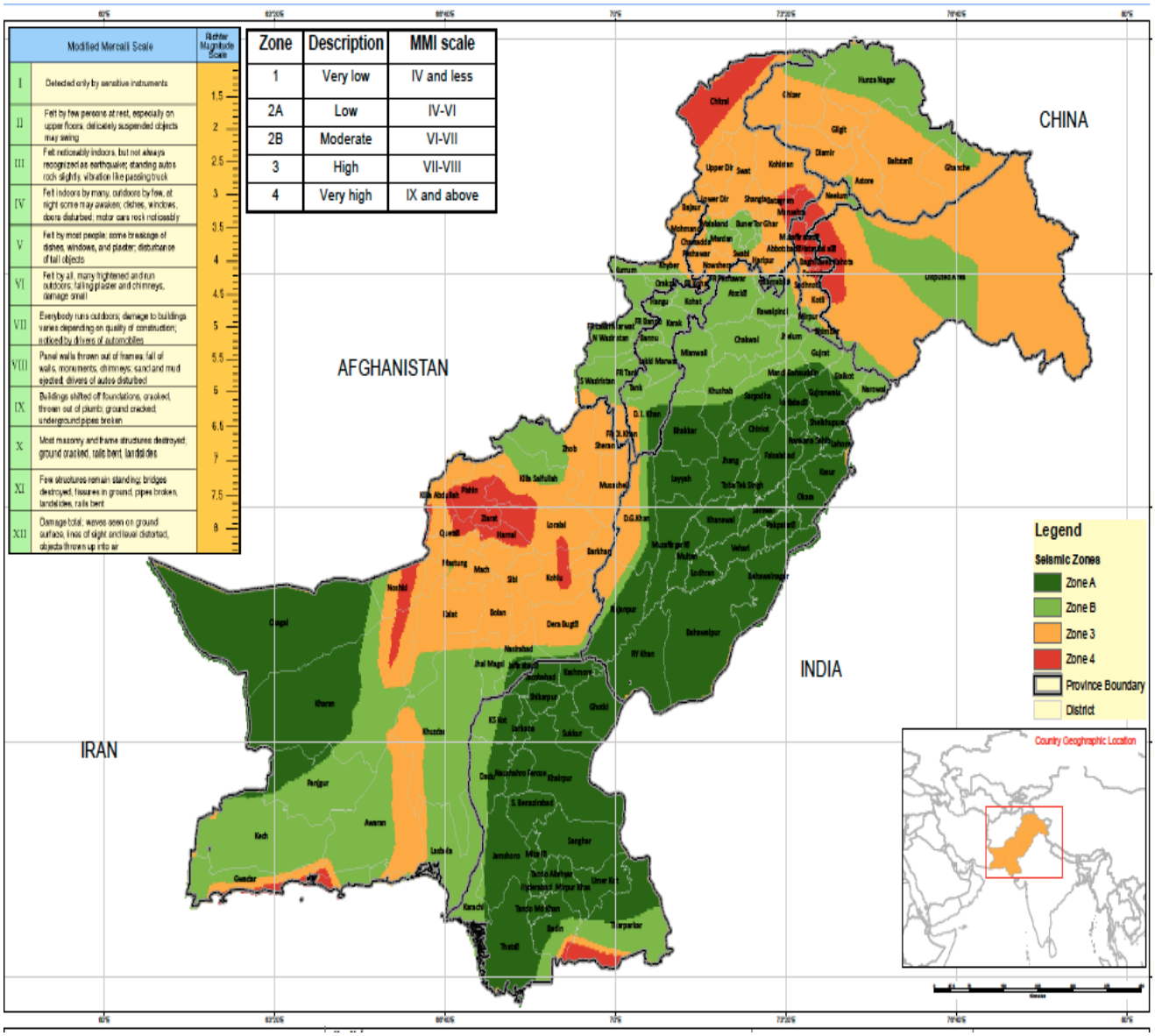
[5] https://www.meteoblue.com/en/weather/forecast/modelclimate/ maira _pakistan_1165221

[6] https://www.worldweatheronline.com/lang/en-pk/ maira -weather-averages/punjab/pk.aspx

[7] Geologicla Survey of Pakistan, www.gsp.com.pk

of 2 and 3 on the Richter scale are experienced from time to time. The seismic zone map of Pakistan is shown in **Figure 4.5** below. As can be observed, the project location lies in the green colored 'Zone 2B' which depicts moderate risk.

Figure 4.5: Seismic Zones of Pakistan



4.2.6 Surface and Groundwater

86. The project area is dominated by Jhelum River Basin and its tributories. Kanshi River rises from Maira nullah located in the Kahuta hills (in about 1 km from the project area to the east), traverses east part of the Potwar Plateu and drains into Mangla Reservoir. The source of the river is monsoon rain and seepage water. The characteristic features of the Kanshi River are a small catchment area, and high amount of silt carried to the reservoir.

87. There is no significant surface water body present within the project area that can be used for provision of water to meet the project's operational requirements.

88. Boring of tube wells to obtain underground water is standard practice being implemented by residents in the area to ensure continuous supply of water. Sufficient underground water reserves with rapid recharge in the project area are evident since no shortage of water has ever been experienced by the residents, even during the summer seasons despite scarcity of rains.

4.2.7 Noise

89. 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, however, there are no significant disturbances to the typical setting.

4.3 Ecological Resources

4.3.1 Flora

90. The habitat is mostly modified due to human interventions in the area for many decades. The flora dominating the sub-project area listed in the **Table 4.1**.

Table 4.1: Dominating Flora in Project Area[8]

Existing Flora			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Wheat	Triticum aestium	**Buganvilla, Chimber**	Bougain villea
Sorgam	Sorgam	**Jacaranda Tree**	Jacaranda minosifolia
Cotton	Gossipium hirsuitun	**Mesquette/Devi Tree**	Prospis juliflora
Maize	Zea Maize	**Dabh Grass**	Desmotrachya bipinnata
Sufaida Tree	Eucalyptus camaldulensis	**Kikar/Babul Tree**	Acacia nilotica
Dharek/Bakain, Tree	Melia azedarach	**Akk, Shrub**	Calotropis procera
Sheesham/Talli, Tree	Dalbergia sissoo	**Khabbal, Grass**	Cynodon dactylon
Jaman Tree	Seizium jumbolana	**Simal, Tree**	Bombax ceiba
Ber Tree	Zizyphus jujuba	**Peepal, Tree**	Ficus relifiosa
Flora of Tropical Thorny Zone to be replaced			
Karir, Tree	Prosopis spicigera	**Dailay, Shrub/Small Tree**	Capparies aphylla
Peeloo, Tree	Salvadora oboides	**Nalla, Shrub**	Zizyphus mummularia
Wun, Tree	Salvodora persica		

91. Trees will be enumerated species-wise and compensatory plantation will be arranged along roads and paths through forestry. To replace the removed trees, sufficient

[8] http://uu.urbanunit.gov.pk/Documents/Publications/0/115.pdf

areas will be identified to allow plantation of trees at a rate of 5:1. Moreover, owners of the affected trees will be paid compensation for their loss.

4.3.2 Fauna

92. The immediate and surrounding area of the project has been under human interference for a long time and, therefore, many wildlife species have already shifted to other sites where they could find protection. The species left behind are those which have either adjusted with the present state of habitat or have adapted so they keep migrating between alternate habitats to strike their best balance with physical, biological or human factors of environment. No threatened species were observed to be present in the project area.

93. The fauna present in the project area is provided in the **Table 4.2** below.

Table 4.2: Existing Fauna in Project Area[9]

Mammals (Regional)			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Jungle Cat	Felis chaus	**Hare/Siah**	Lepus nigricolus
Mongoose/Neola	Herpestes anropunctatus	**Ludhar/Other**	Lutra persipiciliata
Gheese/House Shrew	Suncus marinus	**Wild boar/Soor/Khinzeer**	Sus scrofa
Bat/Changadar	Pipistralius terwis	**Jachal/Gidder**	Canis auries
Black Rat	Ratus ratus	**Fox/Loori**	Vulpe bengalensis
House Rat	Mus musculus	**Hedge Hog**	Hemiechinus Sp.
Mole Rat	Bandicota bengalensis	**Porcupine/She**	Hystrise indirca
Squirrel/Gulehri	Fumbulus penanti		
Birds (Regional)			
Dove/Common Dove	Streptophelia senegalusis	**Indian Sand Martuis**	Riparia paludicola
Dove/Common Dove	Streptophelia tranquefabria	**Indian River Term**	Sterna auranlia
Larks	Mirfa erythroptra	**Black Partridge**	Francolinus francolinus
Larks	Erimopterix grisea	**Common Babler/Bagla/Chakkira**	Turdoides candatus
Larks	Calaendrella cristata	**Neel Kanth**	Gracius garrulous
Weaver Bird	Ploceus phillipinus	**Grey Partridge**	Pyeronotus xythopygos
Jungle Pigeon	Teron walia	**Shrieks/Lali/Myna**	Passeriformes Sp.

[9] http://uu.urbanunit.gov.pk/Documents/Publications/0/115.pdf

Crow	Corcives abyssinica	**Owl**	Bubo africanus
Sparrow	Passer Sp.	**Black Rock Pigeon**	Columbia livia
Reptiles			
Indian Cobra	Naja naja		

Protected and Religious Trees

94. There are no protected or religious trees in the project area of the station site. The works, however, must deal with any trees that need to be lopped or removed for safety reasons, with the necessary permissions and compensation if required.

4.3.3 Protected Areas/National Sanctuaries

95. There is no protected area in the vicinity of the sub-project area.

4.3.4 Game Reserves & Wildlife Sanctuaries

96. No game reserves and wildlife sanctuaries exist in the vicinity of the project area.

4.4 Socioeconomic Resources

4.4.1 Population and Communities

97. Rawalpindi district occupies an area of 5.3 thousand km^2 with the total estimated population at 5.4 million (2017). The settlements located in vicinity of the project area are:

- Thoha Khalsa, 2km to the west (est. population 6.5 thousand)
- Maira, 1 km to the east (est. population 2.9 thousand)
- Nalla, 1.5 km to the north-east (est. population
- Glore, 2 km to the north-west (est.population

4.4.2 Human and Economic Development

Administrative Setup

98. The Project area is well connected to a number of important roads and areas of Rawalpindi and Islamabad. Private cars, public transport including vans and buses are the primary means of transport within the area. There is a high volume of vehicular movement. The people of the area have an elected Nazim and Naib Nazim, a District Coordinating Officer (DCO) assisted by a Deputy District Officer (DDO) and Executive District Officer (EDO).

Religion

99. The project area consists primarily of Muslim communities with a few minorities residing in peace and harmony. The area has no past record of communal riots or presence of any terrorist activity within the immediate area.

Languages

100. The mother tongue in the area is Punjabi with Urdu spoken as the national language.

Occupations

101. The majority of males and females work in agricultural fields as labor. A considerable number of poor families also work on brick kilns as an inherited family profession. Others work in trade, agri-marketing and other low-income professions such as cobblers, barbers, motorcycle mechanics and vendors.

Education

102. The literacy rates for males and females are below 40%, which is surprising considering the presence of educational institutions. There has been an increase in literacy in these communities compared to the earlier generations whose literacy rate was considerably lower.

Archaeological and Cultural Heritage

103. No archaeological or cultural heritage has been observed during the survey and neither was it reported. However, if at any stage any archaeological or physical heritage is discovered, it shall be managed as per established protocol from the department of Museum and Archaeology, GOP.

Health Care

104. There are a few Basic Health Units (BHUs) in the sub-project area being run by the GoP. No arrangement for antenatal problems exists. There are a few Hakims (traditional doctors) and Homeopathic practitioners. The inhabitants have to travel to Rawalpindi or Islamabad as the nearest major cities if treatment is sought for any serious medical problems.

Energy Supplies

105. Almost all villages in the sub-project area are connected to the WAPDA grid. Unfortunately, only 20 percent of the households have been provided Sui gas connections while the remaining communities are forced to use LPG cylinders or firewood. Some poor communities also use cow dung for cooking purposes.

Communication

106. Majority of the community members possess cellular phones. PTCL line is present in the area but is not used commonly except in Public Call offices (PCOs). Some youth is IT literate and use desktop computers and have access to the

internet. Postal service is available in all villages in the area. On special occasions, messages are also conveyed through word of mouth or on mosque loud speakers. Less than 10% of the community members have televisions at home while over 60 percent of the communities use radios to stay updated.

4.4.3 Economic Development

Agriculture, Livestock and Industries

107. Majority of the population of the project area is linked with agriculture, followed by business, livestock and labor works.

108. Livestock breeding is one of the main pursuits and means of livelihood of the communities in the project area. Buffalo, sheep, goats and cows are common livestock animals and serve as an important source of income.

109. Roads are the means of transportation for the movement of both people and goods in the district and connect the areas with other parts of the country. These project area district is connected with other parts of the country through the G.T road as well as the Motorway (M-2). The nearest airport is located in Rawalpindi, located at a distance of approximately 50 kilometers.

110. **Horticulture:** The main fruits grown in this project district are Jaman, falsa, malta, kino, fruiter, sweet lemon, plum, mulberry, guava and pomegranate. The principal vegetables grown in the district are onions, potatoes, ginger, egg plant, arum, lady finger, spinach, mint, tomato, turnip, carrot, cauliflower, bitter gourd, garlic, pea, reddish and cucumber etc.

111. **Industry**: This project district has made considerable progress in light as well as heavy industries. There are large industrial units e.g. chemicals, food products, textiles and engineering.

5 Potential Environmental Impacts and Mitigation Measures

112. This chapter presents the potential environmental impacts related to pre-construction, construction and operation phases of the proposed sub-project 2: 500kV Maira Switching Station. Following is a description of the environmental impacts and the proposed mitigation measures to minimize the negative impacts, if any.

5.1 Project Location Impact Assessment and Mitigation

113. The location and scale of the works are very important in predicting the environmental impacts. This process of impact prediction is the core of the IEE process. It is critical that the recommendations and mitigation measures are carried out according to the conditions on the ground in the affected areas in the spirit of the environmental assessment process.

114. The environmental management plan (**Table 6.1**) has been compiled based on the available information and shall be reviewed in due course at project inception and through construction in order to receive feedback and provide updated mitigation requirements for any significant unpredicted impacts. The analysis primarily focuses on the key environmental issues likely to arise from the sub-project implementation, to prescribe mitigation measures to be integrated in the project design, to design monitoring and evaluation schedules to be implemented during sub-project construction and to estimate costs required for implementing sub-project mitigation measures.

115. The EMP plan must be reviewed when the sub-project reaches the inception stage by the project management team and be approved before any construction activity is initiated, to take account of any subsequent changes and fine tuning of the proposals.

5.2 General Approach to Mitigation

116. During the preparation of the construction phase for this sub-project, the future contractors must be notified and prepared to co-operate with the executing agency, project management, supervising consultants and local population in the mitigation of impacts. Furthermore, the contractor must be primed through bidding stages and the contract documentation to implement the EMP in full and be ready to engage trained environmental management staff to audit the effectiveness and review mitigation measures as the project proceeds.

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

5.3 Potential Environmental Impacts during Pre-Construction Stage

5.3.1 Impact due to Land Acquisition

Impact assessment

118. In accordance with the draft Land Asquisition and Resettlement Plan the construction of substation requires permanent acquisition of about 80 acres of private land (uncultivated) and about 27 wood trees to be removed. The table Table 5.1. below summarizes impacts of switching station on affected families (AFs) and Displaced Persons (DPs). A total of 43 families (731 DPs) are estimated to be affected. No one will be displaced from housing or lose 10% or more of any productive asset.

Table 5.1: Overall Summary of LARP Impacts of SS

Serial #	Sub Projects Impacts	Unit	Quantity Affected	Ownership and present use	AFs	DPs	Remarks
1	Land permanently acquired	Acres	80	Private land non-cultivated	43	731	These are the affected families
2	Wood trees to be cut – down	Nos.	27	Private trees on the non-cultivated land	11	77	Multiple counts. These are same AFs who are losing the land.

Mitigation measures

119. The acquisition of this plot of land shall be conducted in accordance with the LARP, which has been developed in accordance with ADB SPS 2009 regulations, and it shall be ensured that the entire land acquisition process is completely fair and transparent. The estimated land price proposed in the LARP is Rs. 2.0 million/ acre. Thus, total estimated land price for 80 acres of land is Rs. 184 million including 15% compulsory acquisition charges. Other cost of affected trees is Rs. 0.08 million. Thus, overall estimated cost of land, land based assets are Rs. 198.53 million (US$ 1.73 Million). NTDC is responsible to provide this cost to PIU which will be paid to the AFs based on the compensation disbursement schedule in line with schedule of switching station construction.

5.3.2 Cultural Heritage & Religious Sites

Impact assessment

120. The location of cultural and other heritage sites with respect to the sub-project has been reviewed in Chapter 4. No temples or religious sites are near the proposed

switching station site to cause a nuisance. However, in case the need arises, the 'Chance find' procedures are provided as **Annexure VII.**

Mitigation measures

No measures required except application of the Chance find procedures, if warranted.

5.3.3 Soil Contamination

Impact assessment

121. It must be ensured that the development of the switching station does not contaminate the soil in the project area.

Mitigation measures

122. The following measures will be implemented:

- The containment and bunds under all newly installed transformers will be designed to retain all transformer oil contents.
- Contingency measures will be developed to recondition or dispose of any oil released during an emergency.

5.3.4 Encroachment, Landscape and Physical Disfiguration

Impact assessment

123. The extent of the station development is moderate and will not extend beyond the location proposed. No significant landscape impacts are expected from construction of the station.

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

Mitigation measures

No measures required.

5.3.5 Waste Disposal

Impact assessment

125. In order to ensure adequate disposal options for all waste including unsuitable soils, scrap metal etc.

Mitigation measures

126. The following measures shall be implemented:

- Identify suitable locations for disposal of transformer oils, unsuitable soils, and scrap metal “cradle to grave”.
- Include in contracts for unit rates for re-measurement for disposal.
- Designate disposal sites in the contract and cost unit disposal rates accordingly.

5.3.6 Site Specific EMP

Impact assessment

127. The absence of a site specific EMP will make it difficult for the project Contractor(s) to effectively mitigate possible impacts resulting from the project development.

Mitigation measures

128. The following measures shall be taken:

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

5.4 Potential Environmental Impacts during Construction Stage

129. The summary of the key potential impacts during the Construction phase is provided in **Table 5.1** below.

Table 5.1: Summary of key potential Impacts during Construction Phase

S/No.	Environmental Aspect	Potential Issue from Environmental Aspect	Potential of Impact	Mitigation Measures
1	Ambient Air Quality	Fugitive dust from site preparation, excavation, material handling &	Dust emissions expected at work site	Regular water sprinkling on the exposed surfaces

		other construction activities at site. Exhaust gases from construction equipment and machinery, and vehicles	and in its vicinity. Minor and short-term impact expected, which will be temporary in nature. Due to long distance between construction site and settlements risks of air quality impacts are remote	to reduce dust emissions and proper maintenance of all equipment at regular intervals to minimize impact of exhaust emissions
2	Noise	Noise generated from construction activities, operation of construction machinery, equipment and their movement.	Noise levels expected to vary during activity based upon the nature of work being conducted. Higher noise levels expected at site but minor impact expected at key receptors. Impact expected to be short term in nature.	Necessary control equipment and techniques to be applied to control noise levels and limit their nuisance effects
3	Community Safety	The village communities, particularly children, might not exercise due care during movement of heavy machinery and during the civil works, resulting in a high potential of accidents taking place.	Kids might have accidents either through accidents with construction vehicles or by getting hurt/electrocuted during the electrical works at the station.	(i) Awareness workshops must be conducted prior to commencement of works in the project area (ii) Work site must be cordoned off to villagers, particularly children. (iii) Construction vehicles must ensure controlling of speed limits to prevent accidents with village communities, particularly children.
4	Water flow modification and water quality, availability of technical and drinking water	Surface runoff from project site of oil/fuel and waste spills as well as improper disposal of debris and discharge of sewage from labor camp. Water flow modification by substation.	Minor negative impact on water quality is expected. Monsoon rains can cause soil erosion on switching station construction site	Construction methods and techniques and mechanism for disposal of effluent to be designed for proper drainage and control of discharge

5	Solid Waste	Disposal of excavated soil, construction debris and other waste including domestic waste, which can cause soil contamination and other health and safety issues.	Minor negative impact expected.	Proper solid waste management programme to be designed and implemented
6	Land Use	Soil excavation of agricultural land at station site requiring rehabilitation	Minor negative impact expected	Excavation and rehabilitation to be conducted as per EMP.
7	Soils	Excavation activity leading to topsoil removal and erosion.	Minor negative impact expected	Necessary measures to be taken to replace removed soil as per EMP.
8	Flora & Fauna	Habitat disturbance during construction activity.	Project is being developed in a rural environment with scarce flora and fauna present in project area. Minor and short term impact expected	Necessary steps to be taken to minimize ecological disturbance wherever applicable, particularly the prohibition of cutting trees. .
9	Socio-economy	Increase in job opportunities expected for residents of neighboring areas. .	Overall positive impact expected	Fair and transparent hiring policy must be maintained for the project. Project sustainability must be ensured through regular and proper maintenance of infrastructure.
10	Traffic condition	Vehicle movement and possibility of traffic congestion on the road.	Minor negative impact	Traffic management plan to be prepared and implemented one month before commencement of construction work

Physical Resources

5.4.1 Air Quality

Impact assessment

130. The project can potentially affect air quality by fugitive dust and emissions from the construction machinery, and vehicular traffic during the construction phase. Air pollution can cause long-term negative heath effects, and respiratory deseases. Emissions may be carried over long distances, depending on wind speed and direction, the temperature of the surrounding air, and atmospheric stability.

131. The potential sources of air pollution during the construction phase are as follows:

- Dust from earthworks such as earthmoving, leveling, grading, excavation, and other works on construction sites.
- Earth haulage trucks that generate dust, particularly during transportation, loading and unloading processes.
- Noxious gases emission by construction equipment and vehicles including batching plants that will be set up at the proposed switching station site to lay the foundations.

132. In this instance, however, as the distances to nearest settlements are quaite large (1 km to Maira, 1.8 km to Thoha Kaisa, and 1.7 km to Glore) and average velosities of wind are comparatively low no negative impacts are anticipated to air quality of those settlements. will can only potentially affect the workers at the project site.

Mitigation measures

133. The following measures are proposed to reduce air quality deterioration:

- Concrete batching plants will be located at a minimum distance of 500 meters from any residences and will be equipped with dust control equipment such as fabric filters or wet scrubbers to reduce the level of dust emissions.
- Where dust emissions are high, katcha tracks will be overlain with shingle or surface treated. Where necessary, dust emissions will be reduced by a regular sprinkling of water for keeping the dust settled, at least twice a day.
- Haul-trucks carrying sand, aggregate and other materials will be kept covered with tarpaulin to help contain construction materials being transported within the body of each carrier between the sites.
- Ensure proper tuning of the construction vehicles.
- The construction material will be stored in the boundary wall and no disturbance to surrounding areas is expected. The contractor will be, however, required to provide a traffic management plan before commencement of work at site.
- The need for large stockpiles should be minimized by careful planning of the supply of materials from controlled sources.
- It shall be ensured that all vehicles, generators and other equipment used during

the construction will be properly tuned and maintained in good working condition to minimize emission of pollutants.

- The stack height of generators will be at least 3 meters above the ground.

Management and Monitoring

- NTDC will set up a system to monitor the air quality in the project area of the switching station site in accordance with the applicable NEQS and IFC EHS air quality guidelines. The system will cover protocols for sampling and analysis, assessment of air quality at sensitive locations, reporting, and information sharing.
- The applicable NEQS/international regulations for gaseous emissions generated by the construction vehicles, equipment and machinery will be enforced during the construction works. Contractor should make sure that all equipment and vehicles are tested for emissions. Regular maintenance of equipment and vehicles will also control the incomplete combustion.

5.4.2 Noise

Impact assessment

134. There will be no requirement for blasting for this subproject activity. It is anticipated that powered mechanical equipment and machinery and some local labor with hand tools will be used to execute the subproject works. Powered mechanical equipment and machinery can generate significant noise and vibration. The cumulative effects from several machines can also be significant.

135. There are no sensitive receptors in the project area that might be affected by high noise levels resulting from the construction of the switching station. However, the labor working at the project site might be affected by prolonged exposure to high noise levels.

Mitigation measures

136. The following mitigation measures are proposed:

- To minimize noise impacts, the Contractor for this subproject shall be requested by the Construction Supervision Consultants (Engineer) to provide evidence and certification that all equipment to be used for construction is fitted with the necessary air pollution and noise dampening devices to meet EPA requirements.
- Construction shall not be allowed during nighttime (9 PM to 6 AM).
- Temporary noise barriers shall be installed for workers working more than eight hours a day during construction activities. Noise levels from construction activity can be reduced by regular maintenance of machinery. Noise can be controlled

through engineering controls e.g. hammering actions can be substituted by hydraulic.

- Ensure the workers are wearing PPEs (ear plugs, ear muffs etc.) where engineering control is not applicable to reduce the impact of noise.

Management and Monitoring

- Noise will be controlled by monitoring at 3m from the boundary wall of any residential unit at a height of 1.5 m.

5.4.3 Soil Contamination

Impact assessment

137. Lands may get contaminated from the spillage of chemicals like fuels, solvents, oils, paints and other construction chemicals and concrete. This sometimes happens when these materials are transported in open or loosely capped containers. Unmanaged sewage can also contribute to contamination of soil.

138. The possible contamination of soil by oils and chemicals at campsites, workshop areas, and equipment washing-yards may limit the future use of land for vegetation purposes.

Mitigation measures

139. The measures provided below shall be implemented:

- It will be ensured that spill prevention trays are provided and used during refueling. Also, on-site maintenance of construction vehicles and equipment will be avoided as far as possible. In case on-site maintenance is unavoidable, tarpaulin or other impermeable material will be spread on the ground to prevent contamination of soil.
- Fuels, lubricants and chemicals will be stored in covered bounded areas, underlain with impervious lining. Appropriate arrangements, including shovels, plastic bags and absorbent materials will be available near fuel and oil storage areas.
- Solid waste generated at the campsites will be properly segregated, treated and safely disposed of only in the demarcated waste disposal sites.
- Proper drainage system shall be constructed to ensure proper disposal of sewage and wastewater, which will offset any impact on soil. Sewage will be connected to sewage network for offsite treatment or will be connected to septic tank.

Management and Monitoring

- Regular inspections will be carried out to detect leakages in construction vehicles and equipment and all vehicles will be washed in external commercial facilities.

5.4.4 Construction waste disposal

Impact assessment

140. The waste to be generated during the construction works at site consists of sand, cement, bricks, mortar, scap metal, used oil and lubricants etc. and must be properly disposed in accordance with local applicable NEQS guidelines and environmental best practices.

Mitigation measures

141. The following measures shall be implemented:

- Waste management plan to be submitted to the CSC and approved by MC one month prior to starting works.
- Estimating the amounts and types of construction waste to be generated by the project prior to commencement of the works.
- Investigating whether the waste can be reused in the project or by other interested parties.
- Identifying potential safe disposal sites close to the project or those designated sites in the contract.
- Investigating the environmental conditions of the disposal sites and recommendation of most suitable and safest sites.
- Piling up of loose material should be done in segregated areas to arrest washing out of soil. Debris shall not be left where it may be carried by water to downstream flood plains, dams, lagoons etc.
- Used oil and lubricants shall be recovered and reused or removed from the site in full compliance with the national and local regulations.
- Oily wastes must not be burned. Disposal location to be agreed with local authorities/EPA.
- Machinery must be properly maintained to minimize oil spill during the construction.
- Solid waste must be disposed at an approved solid waste facility, open burning is illegal and contrary to good environmental practice.

5.4.5 Impact on Water Resources

Use of Local Water Supplies

Impact assessment

142. There is no scarcity of water in the project area. However, use of local water supplies for construction purpose can create a big issue. The locals may not want to share their water supplies as they were concerned that sharing will disturb their agricultural activities and water will get contaminated.

Mitigation measures

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

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

Contamination of Groundwater

Impact assessment

144. Subsurface water resources may be contaminated by fuel and chemical spills, or by unmanaged solid waste and effluents generated by the kitchens and toilets at construction campsites.

Mitigation measures

145. Good management practices will be adopted to ensure that fuels and chemicals, raw sewage and wastewater effluent are disposed of in a controlled manner to reduce the risk of contamination. These measures are as described below:

- Best engineered drainage channels will be established in the construction camps to facilitate the flow of the treated effluents.
- Soakage pits and septic tanks will be established for the treatment of sewage effluents.
- Wastewater effluent from the contractors' workshops and equipment washing-yards will be passed through gravel/sand beds to remove oil/grease contaminants.

- Any oil contaminated gravel/sand left after the construction activity will be handed over to a pre-approved third party that shall be responsible for incineration and/or disposal of this material in accordance with NEQS and international best practices.

5.4.6 Soil Erosion

Impact assessment

146. Soil erosion may occur as a result of improper runoff drawn from the equipment washing-yards and improper management of construction activities. In addition, soil erosion could also take place due to denudating of land, compaction and other types of construction works.

Mitigation measures

147. The following measures shall be implemented:

- Good engineering practices will help control soil erosion both at the construction sites and in peripheral areas, particularly along the haul tracks. Controlled and well-managed vehicular movement, excavation, vegetation and regular water sprinkling will reduce the chances of soil erosion.
- Schedule works in sensitive areas (e.g. rivers) for dry season.
- Back-fill should be compacted properly in accordance with design standards and graded to original contours where possible.
- Cut areas should be treated against flow acceleration while filled areas should be carefully designed to avoid improper drainage.
- Stockpiles should not be formed within such distances behind excavated or natural slopes that would reduce the stability of the slopes.
- In the short-term, either temporary or permanent drainage works shall protect all areas susceptible to erosion.
- Measures shall be taken to prevent pounding of surface water and scouring of slopes. Newly eroded channels shall be backfilled and restored to natural contours.
- Contractor shall arrange to adopt suitable measures to minimize soil erosion during the construction period. Contractor should consult concerned authorities in the area before deciding mitigation measures.
- Clearing of green surface cover to be minimized during site preparation.

5.4.7 Handling, transportation and storage of Construction materials

Impact assessment

148. The different types of construction materials that shall be transported will consist of cement, bricks, steel, wood, plastic and electronic components for installation at the station.

149. The improper transportation of these construction materials could lead to significant issues with the risk of accidents for the communities residing along the roads leading to the selected station site.

150. Furthermore, improper handling and storage of the construction materials could pose a significant issue for the area with the risk of contamination of soil and ground water resources highly likely.

Mitigation measures

151. The following measures shall be implemented:

In order to minimize and or avoid adverse environmental impacts arising out of construction material exploitation, handling, transportation and storage measures to be taken in line with any EPA conditions/recommendations in approval:

- Conditions that apply for selecting sites for material exploitation.
- Conditions that apply to timing and use of roads for material transport.
- Conditions that apply for maintenance of vehicles used in material transport or construction.
- Conditions that apply for selection of sites for material storage.
- Conditions that apply for aggregate production.
- Conditions that apply for handling hazardous or dangerous materials such as oil, lubricants and toxic chemicals.

5.4.8 Work camp operation and location

Impact assessment

152. The operation of work camps can adversely affect the surrounding environment and residents in the area if local regulations and internationally accepted best practices are not implemented. The lacks of proper arrangements to cater to sanitation and hygiene along with improper handling and disposal of wastewater and solid water can create a significant negative impact on the environment of the project area. Also, the spread of disease also takes place if hygienic conditions are not maintained at the camps.

153. Since about 80-100 laborers will be engaged for construction of the work camp, if the camp operation is not managed properly in line with best practices, a high possibility of spread of disease and long term impacts on the environment of the project area exist.

Mitigation measures

154. The following measures shall be implemented:

- Identify location of work camps in consultation with local authorities. The location shall be subject to approval by the NTDC. If possible, camps shall not be located near settlements or near drinking water supply intakes.
- Water and sanitary facilities (at least pit latrines) shall be provided for employees. Worker camp and latrine sites to be backfilled and marked upon vacation of the sites.
- 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 off to the nearest sanitary landfill or site having complied with the necessary permission of local authority permission.
- The Contractor shall organize and maintain a waste separation, collection and transport system.
- Toilets will be self contained or shall be disposed off to a septic tank and no toilets will be located within 100 meters of any groundwater well.
- The Contractor shall document that all liquid and solid hazardous and non-hazardous waste are separated, collected and disposed of according to the given requirements and regulations.
- 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.
- Exposed areas shall be planted with suitable vegetation.
- NTDC and Supervising Engineer shall inspect and report that the camp has been vacated and restored to pre-project conditions.

Impact on Ecological Resources

5.4.9 Flora

Impact assessment

155. It is anticipated that impacts of the project on flora will be from minimal to site-specific. The site of the proposed switching station is covered by mostly grass and shrubs with some smaller trees. There are no rare or endangered flora species. Due to nature of vegetation its clearing will be done manually or using limited special equipment. The cut schubs and trees will be collected and removed from the site. The top soil that contains roots and organic matter will be removed from the site as well.

156. Fugitive dust from the construction site can also affect crops and trees in the vicinity of the project area. The dustfall can damage plant tissue and reduce rate of photosynthesis, transpiration and growth and so on. In this instance, however, it is expected that due to limited character of the construction activities, and chemically inert dust effect of dust on the commercial crop in the area will be low.

Mitigation measures

157. The following measures shall be implemented:

- A requirement shall be inserted in the contracts that no trees are to be cut on the construction site or in proximity to it, without the written permission from the supervising consultant.
- In addition to this, the contractor will be required to spray water twice or thrice a day (as per need) to avoid dispersal of dust on the adjacent commercial crops and other vegetation.
- The contractor's staff and labor will be strictly directed not to damage any vegetation such as trees or bushes.
- Clearing of green surface cover for construction, for borrow of for development, cutting trees and other important vegetation during construction should be minimized.

Management and monitoring

- To replace any removed trees, sufficient areas will be identified to allow plantation of trees at a rate of 5:1. Moreover, owners of the affected trees will be paid compensation for their loss.

5.4.10 Wildlife and Fauna

Impact assessment

158. Mammals, Amphibians, birds and reptiles could be disturbed with the clearance of flora. Birds can easily fly away to any trees outside the project area. Moreover, grazing activity of animals could also be disturbed.

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

Mitigation measures

160. The following mitigation measures should be implemented:

- Vehicle speed will be controlled to avoid incidental mortality of small mammals and reptiles.
- Staff working on the project will be given clear orders, not to shoot or trap any bird or animal.
- Lights used in the camps will be kept to the minimum requirement. Upward scattering lights will preferably be used.
- There will be adjacent areas available for grazing; hence the grazing activity of animals will not be affected.

Socio-economic Environment

5.4.11 Impact on local communities/Workforce

Impact assessment

161. The communities in the project area will be affected during the construction phase as follows:

- During the construction phase, the general mobility of the local residents and their livestock in and around the project area is likely to be hindered.
- Unmonitored construction activities, e.g. excavation, equipment movement etc. may create accident risks.
- Usage of community's common resources like potable water, fuel wood etc. by contractor's workforce may create conflicts between the community and the contractor.
- Induction of outside workers in the contractor's labor force may cause cultural issues with the local communities.
- Increase in crime as a result of contractor's workers trying to rob the local communities.

162. The presence of migrant construction workers inevitably causes some degree of social unease and even active disputes with the local community as a result of cultural differences.

Mitigation measures

163. The following measures must be implemented to ensure community safety:

- Awareness workshops must be conducted prior to commencement of works in the project area of the switching station
- Work sites must be cordoned off to villagers, particularly children.
- Construction vehicles must ensure controlling of speed limits to prevent accidents with village communities, particularly children.

164. Potential social conflict will be contained by implementing the measures listed below:

- Temporarily and for short duration, the contractor has to select specific timings for construction activities so as to cause least botheration to the local population considering their peak movement hours.
- Approval from the local administration will be obtained before using the local resources such as wood and water.
- The contractors will be required to maintain close liaison with the local communities to ensure that any potential conflicts related to common resource utilization for the project purposes are resolved quickly.
- Contractor will take care of the local community and sensitivity towards the local customs and traditions will be encouraged.
- Effective construction controls by the contractor to avoid inconvenience to the locals due to noise, smoke and fugitive dust.
- Good relations with the local communities will be promoted by encouraging contractors to provide opportunities for skilled and unskilled employment to the locals, as well as on-the-job training in construction for young people. Contractor will restrict his permanent staff to mix with the locals to avoid any social problems.
- Local vendors will be provided with regular business by purchasing campsite goods and services from them.
- The Contractor will warn the workers not to involve in any theft activities and if anyone found guilty of such activities, he will have to pay heavy penalty and would be handed over to police. Similarly, at the time of hiring, Contractor has to take care that the workers should be of good repute. The Contractor camp will be properly fenced and main gate will be locked at night with a security guard to check the theft issues from community side.
- Providing adequate warning signs.
- Providing workers with skull guard or hard hat.
- Contractor shall instruct his workers in health and safety matters, and require the workers to use the provided safety equipment.
- Establish all relevant safety measures as required by law and good engineering

practices.

5.4.12 Traffic condition

Impact assessment

165. The unregulated movement of construction machinery and equipment during the construction phase of the project could lead to a higher risk of accidents and pose a major disturbance to the local communities and residents in the area.

166. The existing road leading to the selected site is considerably narrow and will pose a challenge for smooth and uncongested movement of construction equipment and machinery.

Mitigation measures

167. The following measures shall be implemented:

- Submit temporary haul and access routes plan, one month prior to start of works.
- Formulate and implementation of a plan of alternate routes for heavy vehicles.
- Vicinity of schools and hospitals to be considered.
- Installation of traffic warning signs, and enforcing traffic regulations during transportation of materials and equipment and machinery. Conditions of roads and bridges to be considered.
- Widening/upgrading of access paths/roads

5.4.13 Indigenous, Vulnerable and Women headed Households

Impact assessment

168. During the field survey for the sub-project, no indigenous group of people was identified, which comes under the definition of 'Indigenous people'. Also, no vulnerable or women headed households were identified. Thus, no such impact is envisaged during the implementation of the sub-project.

Mitigation measures

No measures required.

5.4.14 Public Health and Safety Hazards

Impact assessment

169. Construction of the station will require large number of workers who will obviously be accommodated in congested temporary camps. This scenario may lead to spreading of diseases like Malaria, Cholera, Typhoid, Hepatitis A, B and C etc.

170. Occurrence of accidents/incidents during the construction stage is a common phenomenon as evident from previous experience of NTDC.

Mitigation measures

171. The following mitigation measures shall be implemented:

- In construction camps, amenities of life including clean food, water and sanitation facilities must be provided. Contractor will arrange first aid boxes in the temporary camps. Routine medical check-ups of all the field staff including unskilled labor needs to be conducted by an MBBS doctor.
- The other source of pollution from the camps will be from garbage and waste. Apparently, there are no solid waste disposals facilities in the villages located in the vicinity of the road and solid waste will have to be disposed of at a safe site.
- Compliance with the safety precautions for construction workers as per International Labor Organization (ILO) Convention No. 62, as far as applicable to the project contract, should be ensured.
  - Workers should be trained in construction safety procedures and environmental awareness. Proper handling of combustibles, flammable material and good housekeeping practices will be required to avoid fire hazard. Smoking will be prohibited at or around work areas where fire hazards are present. Signs will be put up, saying ‘NO SMOKING’ or ‘NO OPEN FLAMES’.
- Equipping all construction workers with PPEs such as safety boots, helmets, gloves, and protective masks, and monitoring their proper and sustained usage.
- Contractor will ensure the provision of medicines, first aid kits, vehicle, etc. at the camp site.
- Safety lookouts will be built to prevent people and vehicles from passing at the time of excavation and other activities of such sort.
- Cordon off the work areas where necessary.
- It is recommended that NTDC at the planning stage of the project shall plan necessary arrangements in the form of earthing system to avoid accidents.
- Solid and hazardous waste generated shall be disposed to a suitably licensed landfill, potentially transporting it outside the project area, if felt necessary.

5.4.15 Sanitation, Solid Waste Disposal, Communicable Diseases

Impact assessment

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

Mitigation measures

173. The proposed mitigation measures are as follows:

- In order to maintain proper sanitation around the construction site, access to the nearby lavatories will be allowed or provision of temporary toilets will be made. Construction worker camps will be necessary, based on the scale of the works needed. The construction camp will be provided with toilets with soakage pits or portable lavatories or at least pit latrines.
- Disposal of surplus materials must also be negotiated through local authority approvals prior to the commencement of construction.
- If surplus materials arise from the removal of the existing surfaces from specific areas, it will be used elsewhere on the subproject before additional soil, rock, gravel or sand is brought in. The use of immediately available material will generally minimize the need for additional rock based materials extraction from outside.
- Contractual clauses will require the contractor to produce a materials management plan (one month before construction commences) to identify all sources of cement and aggregates and to balance cut and fill. The plan should clearly state the methods to be employed prior to and during the extraction of materials and all the mitigation measures to be employed to mitigate nuisances to local residents. Financial compensation shall not be allowed as mitigation for environmental impacts or environmental nuisance.
- Contractual clauses will require the contractor to produce a solid waste management plan so that proper disposal of waste can be ensured.

5.4.16 Disease Vectors

Impact assessment

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

Mitigation measures

175. The following mitigation measure can be implemented:

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

accumulation of surface water ponds.

5.5 Potential Environmental Impacts during Operation

5.5.1 Waste (Oil in transformers)

Impact assessment

176. The improper disposal of oily waste from the transformers can lead to significant health hazards with the risk of serious diseases resulting from contamination of the water supplies.

Mitigation measures

177. Any oil or oily waste produced due to maintenance of transformers on the station must be properly disposed off in line with international best practices through handing over to a licensed third party contractor.

5.5.2 Occupational Health and Safety

Impact assessment

178. The high voltage equipment in the project area and at times near certain communities pose a real threat if any kids or community members do not realize the danger and choose to climb any towers next to the station.

179. The staff of NTDC that will be required to climb the towers next to the station for maintenance of the equipment are at considerable threat of falling from the towers or being electrocuted if they are not wearing the proper equipment or following the established protocol.

Mitigation measures

180. It shall be ensured that a public awareness campaign is developed and implemented to educate the local communities regarding the dangers posed by exposure to the high voltage contained in the equipment installed in the station and the transmission lines leading to the station.

181. All NTDC staff conducting maintenance of the transmission lines shall ensure that they wear protective equipment such as goggles, rubber boots, protective jacket and also carefully follow all standard protocols to ensure their safety while working on the towers.

182. All NTDC staff shall also use protective harnesses to ensure they are protected from falling from the towers.

183. All NTDC staff shall avoid working on the towers in bad weather conditions, particularly during rain and high winds.

5.5.3 Effect of Electro Magnetic Field (EMF)

Impact assessment

184. According to the 2007 IFC's Environmental, Health and Safety Guidelines for Electric Power Transmission and Generation despite public and scientific concern over likely health impacts related to exposure to EMF, there is no empirical data showing negative helth effects from exposure to typical EMF level from power transmission lines and equipment. Even though the evidence of negative health risks is flimsy, some limited concerns can be warrented. .

Mitigation Measures

185. The following measures shall be implemented:

- Since the project has been planned in the least populated area, even if some effects due to EMF are envisaged, these will be minimal due to safe distance since no residences are generally located within the project area.
- Similarly, a vertical clearance required as per international standards will also be maintained, especially near any populated areas.
- During the operation stage, check will be kept by the NTDC that no construction will be allowed within 100 meters of the station.

5.5.4 Impacts on Ecological Resources

Impact assessment

186. No tree cutting is to take place during the operation stage. On the other hand, tree plantation, on the ratio of 5:1 will improve the ecological habitat and environmental conditions of the project area and thus enable the scared away avifauna to return to this area. New plantations will not only compensate for the loss of trees during construction, but will also add to the aesthetics of the area. There will be healthy and positive impacts on flora and fauna during the operation stage.

Mitigation measures

No measures required.

5.5.5 Enhancement

Impact assessment

187. Environmental enhancements are not a major consideration for this sub-project. However, it is noted that it is common practice at many such sites to create some local hard and soft landscaping and successful planting of fruit trees and shrubs has been accomplished in many sites. This practice should be encouraged as far as practicable.

Mitigation measures

No measures required.

5.6 Cumulative impacts

188. There are no other infrastructure projects being planned in the project area. At the MFF level, multiple projects shall be conducted under the Tranche III. However, the locations of these sub-projects is significantly scattered across the country and thus no cumulative impacts are envisaged.

5.7 Environmental and Social Benefits of The Project

189. Although there will be some insignificant and temporary negative effects of the sub-project during implementation and operation stage, but many positive effects on environment and social settings of the area are also expected. Load shedding is a serious issue these days due to huge difference in production and demand of electricity. The major positive impacts of the proposed sub-project on environment and social settings of the project area include:

- Availability of the electricity will be ensured as per demand of the area.
- Expansion of industries expected due to availability of electricity.
- Better quality of life will be available to the citizens.

6 Institutional Requirements & Environmental Management Plan

6.1 Introduction

190. The Environmental Management Plan (EMP) is developed to minimize and/or mitigate the impacts envisaged at the design, construction and operation stages. The EMP provided as **Table 6.1** covers the development of the Maira Switching station.

191. This EMP shall ensure that the proposed sub-project has no detrimental effect on the surrounding environment. The Plan shall act as a guideline for incorporating environmental measures to be carried out by the contractors engaged by NTDC, as well as for other parties concerned for mitigating possible impacts associated with the sub-project and will form part of the Contract documents to be considered alongside the specifications. This Plan shall act as the Environmental Monitoring Plan during construction and operational phases of the Project, and will allow for prompt implementation of effective corrective measures.

6.2 Environmental Management Plan (EMP)

192. The EMP attached with this report ensures the following:

- Delivery of the prescribed environmental outcomes during all phases of the Project;
- Formulating a system for compliance with applicable legislative and non-legislative requirements and obligations and commitments for the Project;
- Ensure that project design process incorporates best practice environmental design and sustainability principles to minimize potential impacts of construction and operation on the environment and community.
- Ensure that the construction work procedures minimize potential impacts on the environment and community.
- Develop, implement and monitor measures that minimize pollution and optimize resource use.

6.3 Objectives of EMP

193. The EMP provides a delivery mechanism to address potential impacts of the project activities, to enhance project benefits and to outline standardized good practice to be adopted for all project works. The EMP has been prepared with the objectives of:

- Defining the roles and responsibilities of the project proponent for the implementation of EMP and identifying areas where these roles and responsibilities can be shared with other parties involved in the execution and

monitoring of the project;

- Outlining mitigation measures required for avoiding or minimizing potential negative impacts assessed by environmental study;
- Developing a monitoring mechanism and identifying requisite monitoring parameters to confirm effectiveness of the mitigation measures recommended in the study;
- Defining the requirements for communication, documentation, training, monitoring, management and implementation of the mitigation measures.

6.4 Environmental Management/Monitoring and Reporting

194. The proposed sub-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.

195. 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.

196. 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.

197. 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.

198. 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.

199. 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**.

200. The specific roles and responsibilities for environmental management are provided in **Tables 6.1** and **6.2** below.

Figure 6.1: NTDC's Institutional Setup for Project Implementation

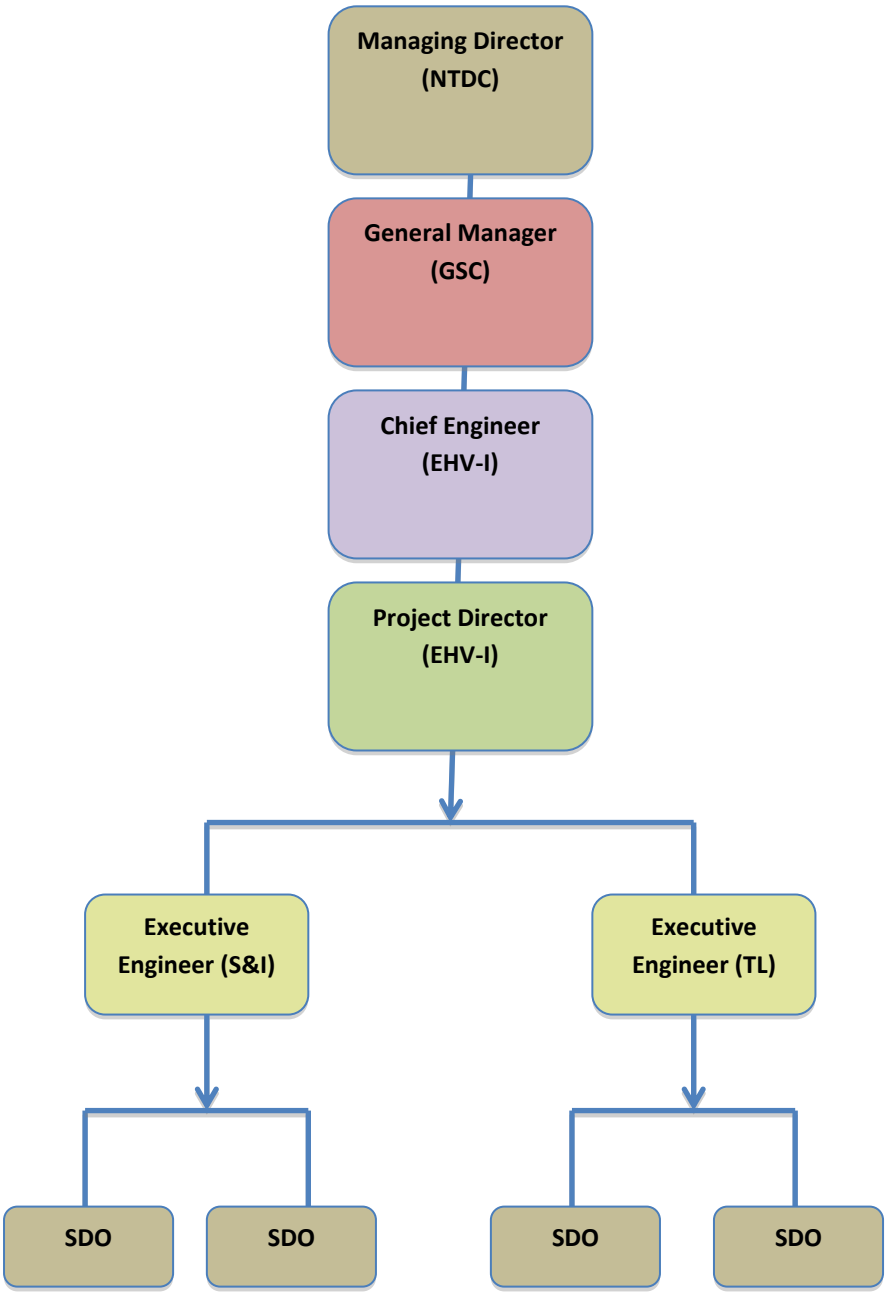
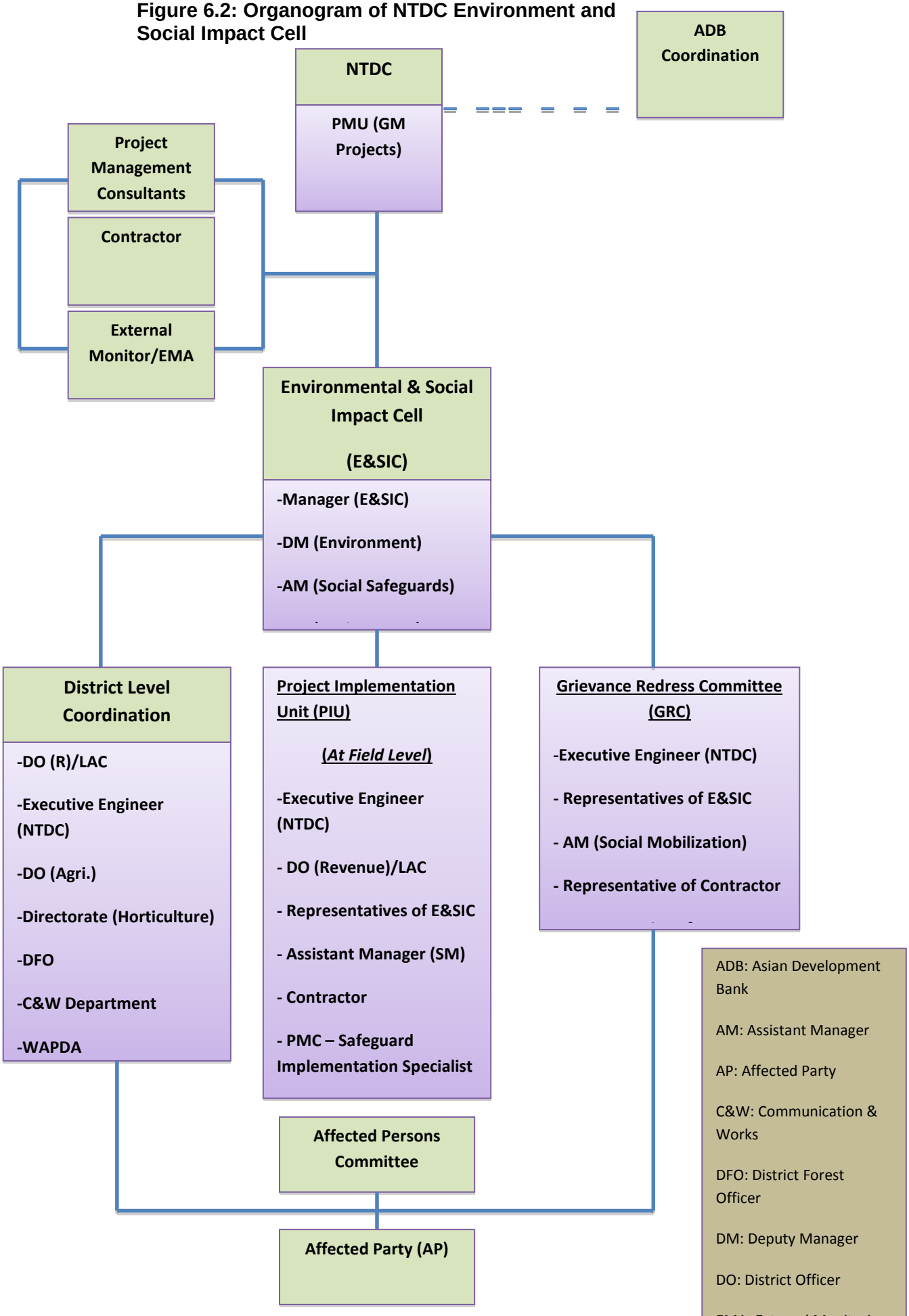


Figure 6.2: Organogram of NTDC Environment and Social Impact Cell



201. The EMP was prepared considering the capacity of the NTDC to conduct environmental assessments of the subproject. But it is envisaged that the NTDC's Environmental and Social Impact Cell (ESIC) will conduct monitoring of the subproject to check the compliance of EMP provisions and will obtain environmental approval from EPA Punjab.

202. The ESIC is composed of one Manager, one Deputy Manager, and two Assistant Managers (refer to **Fig 6.2**). 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.

203. The duties of the ESIC include, but are not limited to the 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.
- Liaising with the PIUs and seeking their help to solve the environment related issues of project implementation.
- Providing awareness-training workshop on environmental and social issues related to power transmission to PIU staff.
- Preparation of bi-annual progress reports on environmental and social safeguards for submission to ADB.
- Conduct seminars / local training workshops on environment safeguards matters with the help of NGOs / PIU / IFIs, etc. and
- Prepare EIAs/IEEs of new projects.
- Seek environmental approvals (NOCs) from respective EPA

6.4.1 Environmental and Social Monitoring by ESIC

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

- Assist in valuation of the trees, crops etc. and negotiation with the owners.
- Assist in checking genuine ownerships of the claimants, in consultation with the Revenue staff for prompt payment to the affectees.
- Assist the Contractor for the timely payments of negotiated price.
- Check that the Contractor backfills, compacts, and leaves the ground in the original condition after excavation of pits for subsurface investigations, and for the tower footings.
- Keep checks and controls so that the pollution of land and water resources due to the spills of lubricants, fuel, chemicals, and other wastes does not take place.
- Monitor, that pollution of wetlands is not excessive during the excavation for the tower footings.
- To see that the Contractor keeps the damages to the minimum during the substation construction especially while making tracks for accessibility and that the damage is rectified properly.
- All the existing tracks, roads, water courses are left in the original shape after completion of the construction activities.
- Monitor that the Contractor uses such working methodology so as not to cause disturbance to the communities by fugitive dust, noise, fumes, etc.
- Monitor that the Contractor adjusts his working hours during the stringing activities in such a manner that it causes least inconvenience to the local population.
- To ensure that the Contractor keeps first aid kits, medicines, safety gadgets at site for taking care of possible mishaps to the workers or other persons.
- To keep the working site/camps tidy so as to avoid unhealthy impacts on the work force.

The environmental monitoring plan is provided as **Table 6.2.**

Table 6.1: Environmental Management Plan for Maira Switching Station

Environmental Concern	Objectives	Mitigation Measures (MM) recommended	Timing to implement MM	Location to implement MM	Responsibility	
					Implementation	Monitoring
Pre-Construction/Design Stage						
Impact due to land acquisition	To ensure the compensation for acquisition of land is paid to all stakeholders	Acquisition of this plot of land shall be conducted in accordance with the LARP, which has been developed in accordance with ADB SPS 2009, and it shall be ensured that the entire land acquisition process is completely fair and transparent.	Prior to commencement of construction activity	Any affected land lying within station site boundary	NTDC	NTDC and ADB
Soil contamination	It must be ensured that switching station does not contaminate the soil in the project area.	▪ The containment and bunds under all newly installed transformers will be designed to retain all transformer oil contents. ▪ Contingency measures will be developed to recondition or dispose of any oil released during an emergency.	Prior to commencement of construction activity	Project site and surrounding areas within project area	NTDC	NTDC and ADB
Waste Disposal	Ensure adequate disposal options for all waste including unsuitable soils, scrap metal.	▪ Identify suitable locations for disposal of transformer oils, unsuitable soils, scrap metal “cradle to grave”. ▪ Include in contracts for unit rates for re-measurement for disposal. ▪ Designate disposal sites in the contract and cost unit disposal rates accordingly.	1. During designing stage, no later than pre-qualification or tender negotiations. 2. Include in the contract.	Locations approved by ADB and NTDC and waste disposal local authorities.	NTDC with the design consultant	NTDC and ADB
Site-specific	To ensure any potential site	▪ Define boundaries of the plan	Prior to	Prior to commencement	Contractor	NTDC

environmental management plan	specific impacts are appropriately mitigated through necessary measures.	▪ Identify sensitive receptors & environmental values ▪ Specify construction activities ▪ Conduct risk assessment ▪ Assign environmental management measures ▪ Prepare monitoring plan ▪ Prepare site plans ▪ Prepare environmental work plan	construction	of Construction		
Construction Stage						
Air Quality	To minimize impacts of construction activity on air quality, and, as a consequence, on human health. Avoid complaints due to the airborne particulate matter released to the atmosphere.	▪ Concrete batching plants will be located at a minimum distance of 500 meters from any residences and will be equipped with dust control equipment such as fabric filters or wet scrubbers to reduce the level of dust emissions. ▪ The applicable NEQS/international regulations for gaseous emissions generated by the construction vehicles, equipment and machinery will be enforced during the construction works. Contractor should make sure that all equipment and vehicles are tested for emissions. Regular maintenance of equipment and vehicles will also control the incomplete combustion.	During Construction	Project area	Contractor	NTDC & CSC

		▪ Where dust emissions are high, katcha tracks will be overlain with shingle or surface treated. Where necessary, dust emissions will be reduced by a regular sprinkling of water for keeping the dust settled, at least twice a day. ▪ Haul-trucks carrying sand, aggregate and other materials will be kept covered with tarpaulin to help contain construction materials being transported within the body of each carrier between the sites. ▪ NTDC will set up a system to monitor the air quality in project area in accordance with the applicable NEQS and IFC EHS air quality guidelines. The system will cover protocols for sampling and analysis, assessment of air quality in project area, reporting, and information sharing. ▪ Ensure proper tuning of the construction vehicles. ▪ The construction material will be stored in the boundary wall and no disturbance to surrounding areas is expected. The contractor will be required to provide a traffic management plan before commencement of work at				

		site. ▪ The need for large stockpiles should be minimized by careful planning of the supply of materials from controlled sources.				
Vehicle and Equipment Exhaust	To ensure the emissions resulting from construction vehicles and equipment do not exceed applicable air quality guidelines	▪ It shall be ensured that all vehicles, generators and other equipment used during the construction will be properly tuned and maintained in good working condition in order to minimize emission of pollutants. ▪ The stack height of generators will be at least 3 meters above the ground.	During Construction	At different work sites in the project area	Contractor	NTDC & CSC
Noise	To minimize noise level increases and ground vibrations during construction phase.	▪ Contractor shall provide evidence and certification that all equipment to be used for construction is fitted with the necessary air pollution and noise dampening devices to meet EPA requirements. ▪ Construction shall not be allowed during nighttime (9 PM to 6 AM). ▪ Noise barriers shall be installed for workers working more than eight hours a day during construction activities. Noise levels from construction activity can be reduced by regular	During Construction	Project area	Contractor shall meet the acceptable standards	NTDC & CSC

		maintenance of machinery. Noise can be controlled through engineering controls e.g. hammering actions can be substituted by hydraulic. ▪ Ensure the workers are wearing PPEs (ear plugs, ear muffs etc.) where engineering control is not applicable to reduce the impact of noise.				
Soil Contamination	To ensure no soil contamination takes place due to construction activities	▪ It will be ensured that spill prevention trays are provided and used during refueling. Also, on-site maintenance of construction vehicles and equipment will be avoided as far as possible. In case on-site maintenance is unavoidable, tarpaulin or other impermeable material will be spread on the ground to prevent contamination of soil. ▪ Regular inspections will be carried out to detect leakages in construction vehicles and equipment and all vehicles will be washed in external commercial facilities. ▪ Fuels, lubricants and chemicals will be stored in covered bounded areas, underlain with impervious lining. Appropriate arrangements, including	During Construction	At all construction sites within project area	Contractor	NTDC and CSC

		shovels, plastic bags and absorbent materials will be available near fuel and oil storage areas. ▪ Solid waste generated at the campsites will be properly segregated, treated and safely disposed of only in the demarcated waste disposal sites. ▪ Proper drainage system shall be constructed to ensure proper disposal of sewage and wastewater, which will offset any impact on soil. Sewage will be connected to sewage network for offsite treatment or will be connected to septic tank.				
Water Resources	To prevent conservation of water resources in project area	▪ Approval from the local administration and representatives of the concerned departments will be obtained before using local water resources. ▪ Camps will be located away from community-owned water resources to prevent contamination. ▪ The contractors will be required to maintain close liaison with local communities to ensure that any potential conflicts relating to the common resource utilization for the project purposes are resolved quickly.	During Construction	At all construction sites within project area	Contractor	NTDC and CSC

		▪ Guidelines will be established to minimize the wastage of water during the construction activities and at campsites. ▪ Good management practices will be adopted to ensure that fuels and chemicals, raw sewage and wastewater effluent are disposed of in a controlled manner to reduce the risk of contamination. ▪ Best engineered drainage channels will be established in the construction camps in order to facilitate the flow of the treated effluents. ▪ Soakage pits and septic tanks will be established for the treatment of sewage effluents. ▪ Any oil contaminated gravel/sand left after the construction activity will be handed over to a pre-approved third party				
Soil Erosion/ Surface Run-off	To minimize soil erosion due to the construction activities and creation of access tracks for project vehicles.	▪ Schedule works in sensitive areas (e.g. rivers) for dry season. ▪ Temporary erosion control plan one month before commencement of works. ▪ Back-fill should be compacted properly in accordance with design standards and graded to original contours where	During Construction	1. Locations based on history of flooding problems. 2. A list of sensitive areas during construction to be prepared by the detail design consultant in consideration with the cut and fill, land reclamation, borrow areas etc.	Contractor	NTDC/ CSC

		possible. ▪ Cut areas should be treated against flow acceleration while filled areas should be carefully designed to avoid improper drainage. ▪ Stockpiles should not be formed within such distances behind excavated or natural slopes that would reduce the stability of the slopes. ▪ In the short-term, either temporary or permanent drainage works shall protect all areas susceptible to erosion. ▪ Measures shall be taken to prevent pounding of surface water and scouring of slopes. Newly eroded channels shall be backfilled and restored to natural contours. ▪ Contractor should arrange to adopt suitable measures to minimize soil erosion during the construction period. Contractor should consult concerned authorities in the area before deciding mitigation measures. ▪ Clearing of green surface cover to be minimized during site preparation.		3. Locations of all culverts, irrigation channels, road and highway.		
Handling, Transportation	To minimize contamination	▪ In order to minimize and or avoid adverse	During Construction	1. List of borrow areas to be prepared one month prior to construction and	Contractor	NTDC & CSC

and Storage of Construction Materials	of the surroundings (Due to Implementation of works, concrete and crushing plants).	environmental impacts arising out of construction material exploitation, handling, transportation and storage measures to be taken in line with any EPA conditions/recommendations in approval. ▪ Conditions that apply for selecting sites for material exploitation. ▪ Conditions that apply to timing and use of roads for material transport. ▪ Conditions that apply for maintenance of vehicles used in material transport or construction. ▪ Conditions that apply for selection of sites for material storage. ▪ Conditions that apply for aggregate production. ▪ Conditions that apply for handling hazardous or dangerous materials such as oil, lubricants and toxic chemicals.		to be approved by CSC. 2. List of routes of transport of construction material is to be prepared for the contract and agreed one month prior to construction. 3. Report of vehicle conditions is available. 4. Map of locations of storage is prepared by the contractor. 5. Environmental accident checklist and a list of banned substances are included in the contractor's manual.		
Construction Waste Disposal	Minimize the impacts from the disposal of construction waste.	▪ Waste management plan to be submitted to the CSC and approved by MC one month prior to starting works. ▪ Estimating the amounts and types of construction waste to be generated by the project. ▪ Investigating whether the	During Construction	A list of temporary stockpiling areas and more permanent dumping areas to be prepared at the contract stage for agreement.	Contractor	NTDC & CSC

		waste can be reused in the project or by other interested parties. ▪ Identifying potential safe disposal sites close to the project or those designated sites in the contract. ▪ Investigating the environmental conditions of the disposal sites and recommendation of most suitable and safest sites. ▪ Piling up of loose material should be done in segregated areas to arrest washing out of soil. Debris shall not be left where it may be carried by water to downstream flood plains, dams, lagoons etc. ▪ Used oil and lubricants shall be recovered and reused or removed from the site in full compliance with the national and local regulations. ▪ Oily wastes must not be burned. Disposal location to be agreed with local authorities/EPA. ▪ Machinery should be properly maintained to minimize oil spill during the construction. ▪ Solid waste should be disposed at an approved solid waste facility, open burning is illegal and contrary to good				

		environmental practice				
Work Camp Operation and Location	To ensure that the operation of work camps does not adversely affect the surrounding environment and residents in the area.	▪ Identify location of work camps in consultation with local authorities. The location shall be subject to approval by the NTDC. If possible, camps shall not be located near settlements or near drinking water supply intakes. ▪ Water and sanitary facilities (at least pit latrines) shall be provided for employees. Worker camp and latrine sites to be backfilled and marked upon vacation of the sites. ▪ 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 off to the nearest sanitary landfill or site having complied with the necessary permission of local authority permission. ▪ The Contractor shall organize and maintain a waste separation, collection and transport system. ▪ The Contractor shall document that all liquid and solid hazardous and non-	During Construction	Location Map is prepared by the Contractor.	Contractor	NTDC/ MC

		hazardous waste are separated, collected and disposed of according to the given requirements and regulations. ▪ 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. ▪ Exposed areas shall be planted with suitable vegetation. ▪ NTDC and Supervising Engineer shall inspect and report that the camp has been vacated and restored to pre-project conditions.				
Flora	To avoid , minimize, and mitigate negative impacts due to removing of landmark, sentinel and specimen trees as well as green vegetation and surface cover.	▪ To replace the removed trees, sufficient areas will be identified to allow plantation of trees at a rate of 5:1. Moreover, owners of the affected trees will be paid compensation for their loss. ▪ A requirement shall be inserted in the contracts that no trees are to be cut on the proposed project site or outside, without the written permission from the supervising consultant. ▪ In addition to this, the contractor will be required to spray water twice or	Rerouting and site identification during design stage and other matters during construction of relevant activities	Map to be compiled by the design consultant during detailed design and CSC to update as necessary.	Design consultant, Contractor and CSC	NTDC/CSC

		thrice a day (as per need) to avoid dispersal of dust on the adjacent commercial crops and vegetation. ▪ The contractor's staff and labor will be strictly directed not to damage any vegetation such as trees or bushes. ▪ Clearing of green surface cover for construction, for borrow of for development, cutting trees and other important vegetation during construction should be minimized.				
Fauna	To protect fauna within the project area	▪ Vehicle speed will be controlled to avoid incidental mortality of small mammals and reptiles. ▪ Staff working on the project will be given clear orders, not to shoot or trap any bird or animal. ▪ Lights used in the camps will be kept to a minimum. Upward scattering lights will preferably be used. ▪ There will be adjacent areas available for grazing; hence the grazing activity of animals will not be affected.	During Construction	Within project area and at work camps	Contractor	NTDC & CSC
Impact on Local Communities/ Workforce	To ensure local communities are not adversely impacted by the	▪ Awareness workshops must be conducted prior to commencement of works in the project area of the switching station ▪ Work sites must be cordoned off to villagers,	During Construction	Within project area	Contractor	NTDC & CSC

	construction activity	particularly children. ▪ Construction vehicles must ensure controlling of speed limits to prevent accidents with village communities, particularly children. ▪ Temporarily and for short duration, the contractor has to select specific timings for construction activities so as to cause least botheration to the local population considering their peak movement hours. ▪ Approval from the local administration will be obtained before using the local resources such as wood and water. ▪ The contractors will be required to maintain close liaison with the local communities to ensure that any potential conflicts related to common resource utilization for the project purposes are resolved quickly. ▪ Contractor will take care of the local community and sensitivity towards the local customs and traditions will be encouraged. ▪ Effective construction controls by the contractor to avoid inconvenience to the locals due to noise, smoke and fugitive dust. ▪ Good relations with the				

		local communities will be promoted by encouraging contractors to provide opportunities for skilled and unskilled employment to the locals, as well as on-the-job training in construction for young people. Contractor will restrict his permanent staff to mix with the locals to avoid any social problems. ▪ Local vendors will be provided with regular business by purchasing campsite goods and services from them. ▪ The Contractor will warn the workers not to involve in any theft activities and if anyone found guilty of such activities, he will have to pay heavy penalty and would be handed over to police. Similarly, at the time of hiring, Contractor has to take care that the workers should be of good repute. The Contractor camp will be properly fenced and main gate will be locked at night with a security guard to check the theft issues from community side. ▪ Providing adequate warning signs. ▪ Providing workers with skull guard or hardhat. ▪ Contractor shall instruct his				

		workers in health and safety matters, and require the workers to use the provided safety equipment. ▪ Establish all relevant safety measures as required by law and good engineering practices.				
Safety Precautions for the Workers	To ensure safety of workers	▪ Providing adequate warning signs. ▪ Providing workers with skull guard or hard hat. ▪ Contractor shall instruct his workers in health and safety matters, and require the workers to use the provided safety equipment. ▪ Establish all relevant safety measures as required by law and good engineering practices.	Prior to commencement and during construction	Location to be identified by the CSC with Contractor.	Contractor	NTDC/ CSC
Traffic Condition	Minimize disturbance of vehicular traffic and pedestrians during haulage of construction materials, spoil and equipment and machinery, blocking access roads during works	▪ Submit temporary haul and access routes plan, one month prior to start of works. ▪ Formulate and implementation of a plan of alternate routes for heavy vehicles. ▪ Installation of traffic warning signs, and enforcing traffic regulations during transportation of materials and equipment and machinery. Conditions of roads and bridges to be considered.	Prior to and throughout construction.	The most important locations to be identified and listed.	Contractor and Engineer	NTDC & CSC

		▪ Widening/upgrading of access paths/roads				
Public Health and Safety	To ensure safety of the public during the construction activity	▪ In construction camps, amenities of life including clean food, water and sanitation facilities must be provided. Contractor will arrange first aid boxes in the temporary camps. Routine medical check-ups of all the field staff including unskilled labor needs to be conducted by an MBBS doctor. ▪ The other source of pollution from the camps will be from garbage and waste. Apparently, there are no solid waste disposals facilities in the villages located in the vicinity of the road and solid waste will have to be disposed of at a safe site. ▪ Compliance with the safety precautions for construction workers as per International Labor Organization (ILO) Convention No. 62, as far as applicable to the project contract, should be ensured. ▪ Workers should be trained in construction safety procedures and environmental awareness. ▪ Equipping all construction workers with PPEs such as safety boots, helmets,	During Construction	All along project corridor and at work camps	Contractor	NTDC & CSC

		gloves, and protective masks, and monitoring their proper and sustained usage. ▪ Contractor will ensure the provision of medicines, first aid kits, vehicle, etc. at the campsite. ▪ Safety lookouts will be built to prevent people and vehicles from passing at the time of excavation and other activities of such sort. ▪ Cordon off the work areas where necessary. ▪ It is recommended that NTDC at the planning stage of the project shall plan necessary arrangements in the form of earthing system to avoid accidents. ▪ Adequate facilities shall be provided in terms of drinking water that meets standards, number of toilets per worker with running water, stocked first aid kit and trained first aider at each tower location etc. ▪ Solid and hazardous waste generated shall be disposed to a suitably licensed landfill, potentially transporting it outside the project area, if felt necessary.				

Sanitation, Solid Waste Disposal & Communicable diseases	To ensure proper sanitation and solid waste disposal as per applicable national regulations and international best practices.	▪ Access to nearby lavatories will be allowed or provision of temporary toilets will be made. Construction worker camps will be necessary, based on the scale of the works needed. The construction camp will be provided with toilets with soakage pits or portable lavatories or at least pit latrines. ▪ Disposal of surplus materials must also be negotiated through local authority approvals prior to the commencement of construction. ▪ If surplus materials arise from the removal of the existing surfaces from specific areas, it will be used elsewhere on the subproject before additional soil, rock, gravel or sand is brought in. The use of immediately available material will generally minimize the need for additional rock based materials extraction from outside. ▪ Contractual clauses will require the contractor to produce a materials management plan (one month before construction commences) to identify all sources of cement and	During Construction	Within project area and at work camps	Contractor	NTDC & CSC

		aggregates and to balance cut and fill. The plan should clearly state the methods to be employed prior to and during the extraction of materials and all the mitigation measures to be employed to mitigate nuisances to local residents. Financial compensation shall not be allowed as mitigation for environmental impacts or environmental nuisance. ▪ Contractual clauses will require the contractor to produce a solid waste management plan so that proper disposal of waste can be ensured.				
Disease Vectors	To ensure breeding grounds for different diseases are not developed.	Temporary and permanent drainage facilities should therefore be designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water ponds.	During Construction	At different locations within project area	Contractor	NTDC & CSC

CSC : Construction Supervision Consultant

NTDC : National Transmission and Despatch Company

ADB : Asian Development Bank

FLAGGING

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

Table 6.2: Environmental Monitoring Plan for Sub-Project 2

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
Pre-Construction/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 project locations.	Contractor	Initially NTDC Cell / later Contractor cost	NTDC, ESIC cell / Environment al Specialist	ESIC cell staff cost
Project disclosure	Design changes notified	During detailed design by Contractor.	Complete on of detailed design.	NTDC proposed project locations.	Contractor	Contractor cost	NTDC, ESIC cell / Environment al 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 / Environment al Specialist	ESIC cell staff cost

Environmental Concern	Performance Indicator (PI)	Frequency to Monitor	Timing to Check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Responsible PI Supervision	Cost of Supervision
Waste disposal	Disposal options for all waste, residually contaminated soils, scrap metal agreed with NTDC and local authority.	1. Monthly or as required in waste management plan to identify sufficient locations for, storage and reuse of transformers and recycling of breaker oils and disposal of transformer oil, residually contaminated soils and scrap metal 2. Include in contracts for unit rates for re-measurement for disposal. 3. After agreement with local authority, designate disposal sites in the contract and cost unit disposal rates accordingly.	1.Prior to detailed design stage no later than prequalification on or tender negotiate ones 2. Include in contract	Locations approved by local waste disposal authorities	NTDC cell with the design/supervision consultant.	ESIC cell	ESIC cell	NTDC

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
Noise and air quality mitigation in design.	Design changes included in IEE (supplementary) & EMP approved by provincial EPAs	During detailed design by Contractor	Complete on of detailed design	As defined in IEE (supplementary) & EMP	NTDC Cell / Contractor	Contractor cost	NTDC / /Environment specialist	NTDC Cell staff cost
Hydrological Impacts	Temporary Drainage	During detailed design by Contractor and monthly to cover any unidentified impacts	One month before commencement of construction	Considered locations to be as identified in the Detailed Drainage Report	Contractor	Contractor cost	NTDC / and NTDC Project Cell	NTDC Cell Staff Cost
Planning construction camps	Use of land agreed with surrounding residents & villages.	During detailed design updated by Contractor monthly to cover any unidentified impacts.	One month before construction commences.	Locations agreed NTDC cell in consultation with community and the Contractor	Contractor NTDC Cell facilitates.	Contractor cost	NTDC / and NTDC Project Cell.	NTDC Cell staff cost
Traffic Condition	Temporary Pedestrian and Traffic Management Plan agreed.	During detailed design updated by Contractor monthly to cover any unidentified impacts.	One month before construction commences.	Locations agreed with NTDC cell in consultation with community and the Contractor.	Contractor	Contractor cost	NTDC / and NTDC Project Cell.	NTDC Cell staff cost
Institutional strengthening and capacity building	Strengthening plan agreed for NTDC cell.	Once	As soon as practicable	Throughout the project	NTDC Project Cell	NTDC Cell staff cost	NTDC / and / Environment al Specialist.	NTDC Cell staff cost
Construction Phase								

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
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

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
Plans to control environmental impacts	1. Drainage Management plan 2. Temp. Pedestrian & Traffic Management plan, 3. Erosion Control & Temp. Drainage plan 4. Materials Management plan, 5. Waste Management plan; 6. Noise and Dust Control plan, 7. Safety Plan 8. Agreed schedule of costs for environmental mitigation.{N.B. Forest Clearance and Compensatory Planting plan is prepared by NTDC cell} 9. A tree management plan will be implemented.	Deliverable in final form to NTDC cell one month before construction commences for any given stretch.	One month before construction commencement	All of NTDC Project sites	Contractor	Contractor cost	NTDC Project Cell	NTDC Cell staff cost
Spoil disposal and construction waste disposal	1. Use of land agreed with surrounding residents & villages. 2. Waste Management Plan implemented. 3 No open burning of waste.	Monthly (line item when commencing construction).	Prior to construction. Update monthly.	NTDC proposed project site	Contractor	Contractor cost	NTDC and NTDC Cell	NTDC Cell staff cost

Environmental Concern	Performance Indicator (PI)	Frequency to Monitor	Timing to Check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Responsible PI Supervision	Cost of Supervision
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 for residential areas -55 dB(A) day time	At and around NTDC proposed sites	Contractor should maintain the accepted standards	Contractor cost	NTDC / NTDC Project Cell will monitor sample activities	NTDC Cell staff cost
Air quality	Dust and emission control plan implemented	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	At and around NTDC proposed sites	Contractor Independent laboratory	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 sites	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 sites	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 sites	Contractor	Contractor cost	NTDC and NTDC Cell	NTDC Cell staff cost
Operation Phase								

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
Vegetation within ROW	Number of plants and trees planted along ROW	Quarterly	During operation	At and around NTDC proposed sites	Contractor	Contractor cost	NTDC and NTDC Cell	NTDC Cell staff cost
Occupational Health and Safety	(i) Number of public awareness sessions implemented and number of community members made aware. (ii) Number of accidents in a month from local communities or NTDC staff working on TL.	Quarterly	During operation	At and around NTDC proposed sites	Contractor	Contractor cost	NTDC and NTDC Cell	NTDC Cell staff cost

6.5 Institutional Arrangements

205. The proposed project environmental management plan will require involvement of the following stakeholders in their specific roles.

6.5.1 Role and Responsibilities of Project Management Consultant (PMC)

206. A Construction Supervision Consultant (CSC) appointed by NTDC will be designated as the "Engineer/Project Manager". The CSC will be responsible for:

- Supervising the Project's Contractors and ensuring that all the contractual obligations related to the design and construction, as well as environmental and social compliance are met;
- Ensuring that the day-to-day construction activities are carried out in an environmentally and socially sound and sustainable manner and developing 'good practices' construction guidelines to assist the Contractors and NTDC staff in implementing the EMP; and
- Assisting the Chief Engineer (EHV-II) in coordinating with the EPAs, provincial agriculture, forest and Wildlife departments, NGOs/CBOs and other public/private sector organizations.

6.5.2 Role and Responsibilities of Project Contractor

207. For the proposed Project, NTDC will appoint Contractor(s) for construction and other project activities. The Contractor(s) will be responsible for the physical execution / implementation of EMP, or adherence to all the provisions of the IEE and EMP and any environmental or other code of conduct required by PEPA. Overall responsibility for the Contractor's environmental performance will rest with the NTDC.

208. The project contractor will also responsible for following items:

- Implementation of, or adherence to, all provisions of the IEE and EMP;
- Contractor will prepare and submit the SSEMPs required according to the EMP, which will be approved at least ten days before the start construction activity.
- Contractor's environmental performance will rest with the person holding the highest management position within the contractor's organization. Reporting to their management, the contractor's site managers will be responsible for the effective implementation of the EMP.

6.6 Estimated Environmental and Social Management Costs

209. The **Table 6.3** provides the estimated costs for the implementation of EMP. The compensation costs include the costs for cutting of trees due to construction of the subproject 3. 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.

Table 6.3: Estimated Costs for EMP Implementation

Item	Sub-Item	Estimated Total Cost (PKR)
Staffing, audit and monitoring	For entire project construction phase[1]	**600,000 (5357 USD)**
Monitoring Activities	As detailed under EMP[2]	**240,000 (2143 USD)**
Mitigation Measures	As prescribed under EMP and IEE[3]	**500,000 (4464 USD)**
	(i) Water Sprinkling	200,000
	(ii) Tree replanting	150,000
	(iii) Waste Management	150,000
Contingency	5% Contingency	**67,000 (598 USD)**
Total		**1,407,000 (12,563 USD)**

Note:

1 @ rate of PKR 60,000/month

2 Laboratory charges for: testing of construction materials; water quality tests; ambient air tests; emissions measurements; and noise measurements. (Please refer to Table 6.3 above for monitoring plan).

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

7 Public Consultation and Information Disclosure

7.1 Stakeholder's Consultations

210. There are two types of stakeholders in the sub-project area i.e. primary and secondary stakeholders. The primary stakeholders are the initial stakeholders, such as affected persons, general public including women resided in villages in the vicinity of the sub-project area. A total of 7 consultations were conducted with the DPs and local community.

211. Accordingly, the consultations were conducted with all primary stakeholders for sharing the information regarding this sub-project i.e. construction of 500 kV G/S at Maira with four shunt reactor banks.

7.2 Public Consultations

212. A total of seven different consultations (consisting of 27 participants) were carried out with the DPs and other local community to share the information about the sub-project and record their concerns/feedback associated with this sub-project. In this context, the DPs shared their point of view regarding payment on the loss of their land, crops and trees, as they had concerns regarding the true assessment of compensation.

213. The list of public consultations conducted in the villages of the sub-project is provided in **Table 7.1** below.

Table 7.1: List of Public Consultations

1	31-3-2018	Maira	DPs & Local Community	- Muhammad Tahir - Junaid Iqbal - Muhammad Zubair - Muhammad Aslam - Muhammad Shafiq
2	01-04-2018	Maira	DPs	- Faiz Ali - Qurban Ali - Gulzar Ahmad - Fazal Dad Khan
3	05-04-2018	Maira	DPS& General Public	- Muhammad Saeed - Muhammad Dawood - Muhammad Abdullah - Muhammad Razaq - Ali Zer
4	06-04-2018	Maira	DPs	- Muhammad Safdar - Rasool Bhaksh - Ikram Khan
5	06-04-2018	Maira	DPs & General	- Farooq Azim - Aftab Ali - Muhammad Aslam

			Public	- Muhammad Rafiq
6	10-04-2018	Maira	DPs	- Muhammad Farooq - Muhammad Afzal - Muhammad Zubair
7	10-04-2018	Maira	DPs	- Junaid Iqbal - Muhammad Tahir - Abdur Rehman

7.3 Concerns Regarding the Sub-project

214. During the field surveys, the people were asked about their views regarding the proposed sub-project. In general, the local community has positive attitude towards the implementation of this proposed sub-project and feel it will help in reducing the shortage of electricity in the area and creating employment opportunities for the local people.

Consultations with DPs

215. Consultation is a continuous process that commenced at the project preparatory stage and will continue till project completion. Based on the consultations with the displaced person and general public, a number of concerns were highlighted and accordingly some feedbacks were also provided. The main concerns include the compensation of land for the DPs of grid station since they were demanding the compensation as per current market value of the land. Also, they demanded compensation for the trees at current market rates and disbursement should be made prior to the start of civil works and employment to the local peoples should be provided. RoW clearance for undertaking the project activities should be minimized to the best possible extent.

Redressal of Farmer Concerns

216. Compensation for the loss of land and trees will be estimated by the concerned department keeping in view the current market rates and payment will be made prior to start of civil works and one-third of unskilled labor will be engaged from local community especially DPs.

217. The redressal of DPs/ local community concerns is tabulated as shown in **Table 7.2** below.

Table 7.2: DPs Community Concerns and Redressal

Concerns	Redress	Responsibility
Employment in the project should be provided to increase livelihood of residents of project area.	Preference will be given to engage local people, especially DPs in the project related jobs.	NTDC, PMU & Contractor

The impact of electromagnetic induction increases during the rainy days.	It is required to avoid any field activity by the local people during rainy days to prevent accidents.	NTDC, PMU, ESIC, Consultant & Local Representatives
Compensation should be made before the start of civil work.	As per ADB policy no civil work will be started before the disbursement of compensation to all DPs.	PMU, NTDC & ESIC -
The land to be acquired for the Switching Station is along the road, hence the compensation should be worked out as per the future potential of the land use especially in context with the commercialization and husing schemes owing to located near the road.	Efforts will be made to acquire the land through the private negotiation.	NTDC, PMU & ESIC
There should be the provision of basic necessatieis of life like education, health and water supply for the local people.	Efforts will be made to make the provision in the project for these facilities	NTDC, PMU & ESIC
Medical treatment is the dire need of the area, hence local must have access from the faclitiy provided to project staff based on the Grid station.	Same as above	NTDC, PMU & ESIC
The residents of the area are facing the acutue shortage of drinking water especially in dry season; the project should fulfill this demand.	Same as above	NTDC, PMU & ESIC
Land compensation should be provided for the installation of T/Ls & Towers (in/out of the Switching station	The land for towers and T/Ls is not used on permanent basis, how the compensation is made for the crops and structures fall in the ROW	NTDC, PMU & ESIC

Information Disclosure

218. A draft LARP in English has been prepared and will be disclosed on the ADB website, while the one in local language (Urdu) will be disclosed in the EA website and in local administrative offices. Disclosure is a condition for LARP approval.

219. Furthermore, the LARP will also be disclosed in local language to the DPs and some other key local persons resided in the vicinity of the sub-project, so that each DP is able to understand the sub-project activities, i.e. the sub-project, cut-off date, eligibility for entitlement of compensation, methods of measurement, price assessment & valuation of losses, payment of compensation, community complaints redress system, budget and monitoring & evaluation.

220. The PIU will keep the DPs informed about the impacts and entitlement of compensation and facilitate in addressing grievance (s) of the DPs as well as local community members. Finally, there will be on-site community/ DPs gathering to monitor the entitled disbursement of the compensation to the DP.

221. A copy of the information brochure will also be placed at PIU at field level and in PMU at sub-project level for ready reference.

7.4 Information Brochure

222. A copy of information brochure in local language will be distributed to AFs, as disclosure is a condition for LARP approval.

223. Subsequent to the stakeholder identification, guidelines and questionnaires (**Annexure IV**) were prepared for conducting the focus group discussions/meetings, which were arranged through contacting the key persons from the community, such as village heads and patwaris. Records of the public consultations are provided as **Annexure II**.

8 Grievance Redress Mechanism

8.1 General

224. In order to receive and facilitate the resolution of affected peoples' (AP) concerns, complaints and grievances about the Project's environmental performance, a Grievance Redress Mechanism (GRM) will be established at the sub-project. The GRM will address the APs' concerns and complaints proactively and promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the APs at no costs and without retribution. The mechanism will not impede access to the country's judicial or administrative remedies.

8.2 Redress Committee, Focal Points, Complaints Reporting, Recording and Monitoring

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

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

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

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

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

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

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

230. Following the pre-mobilization public consultation meeting, environmental complaints associated with the construction activity will be routinely handled through the GRM as explained below and shown schematically in **Figure 8.1**:

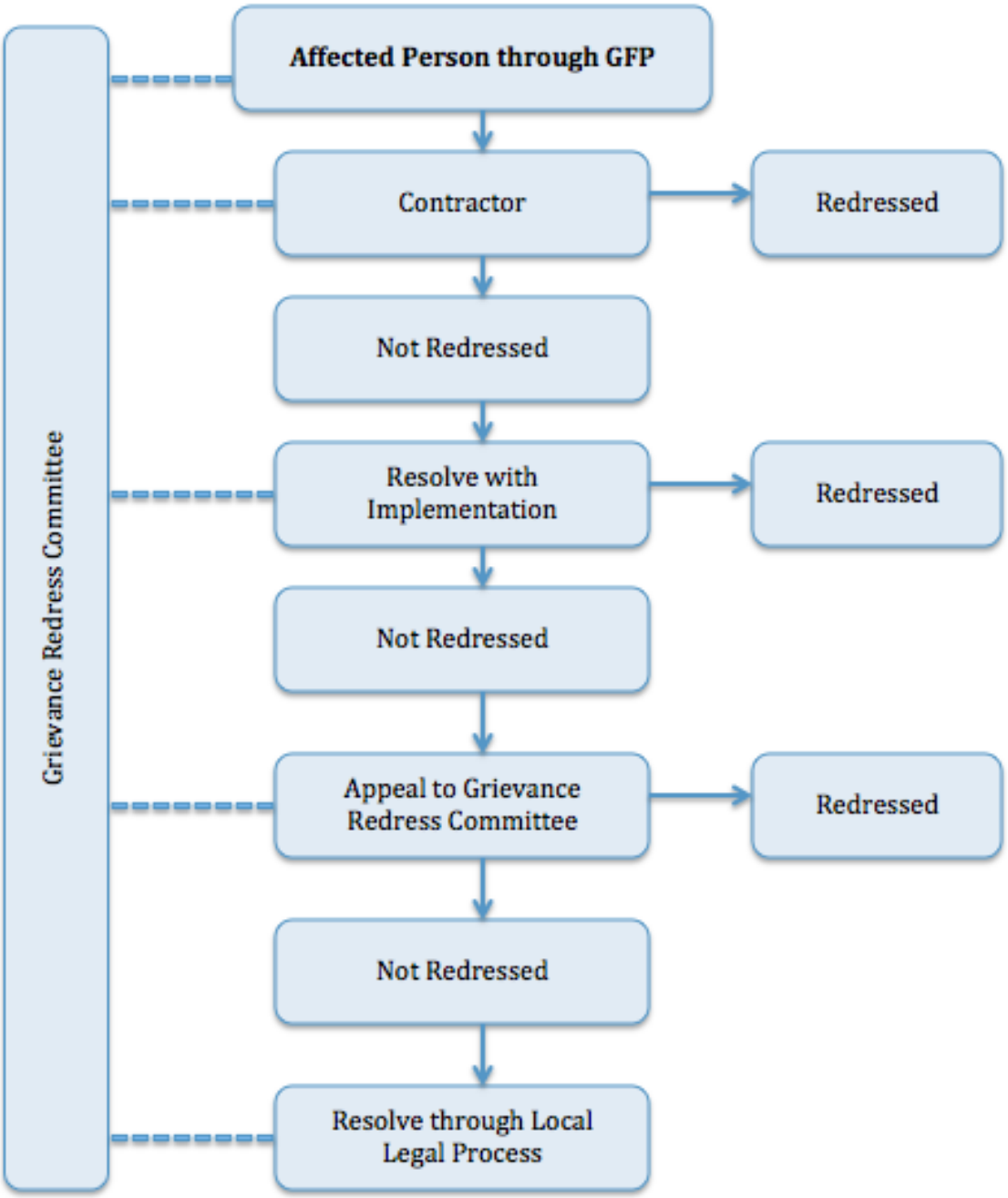
- Individuals will lodge their environmental complaint/grievance with their respective community's nominated GFP.
- The GFP will bring the individual's complaint to the attention of the Contractor.
- The Contractor will record the complaint in the onsite Environmental Complaints Register (ECR) in the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

Environmental Complaints Register.

- Should the complaint not be resolved through the GRC, the issue will be adjudicated through local legal processes.

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

Figure 8.1: Grievance Redress Mechanism



9 Conclusions and Recommendations

9.1 Conclusion

232. The development of the proposed scope of work for sub-project 2 is of national significance and is of critical importance considering the significant energy deficit being faced by the country since several years.

233. Primary and secondary data has been used to assess the environmental impacts of the activities to be conducted for this sub-project. This IEE report highlights any potential environmental impacts associated with the development of the sub-project works and recommends mitigation measures, wherever felt necessary. All environmental impacts associated with the sub-project development need to be properly mitigated, wherever required, through the existing institutional arrangements described in this report.

234. The majority of the environmental impacts, however minimal and temporary in nature, are associated with the construction phase of the sub-project. The implementation of mitigation measures during this period will be the responsibility of the Contractor. Therefore, the required environmental mitigation measures will have to be clearly defined in the bidding and Contract documents, and appropriately qualified environmental staff retained by the Consultant to supervise the implementation process.

235. This IEE concludes that no significant negative environmental impacts are likely to occur due to construction and normal operations of the proposed sub-project, provided mitigation measures are implemented and the proposed monitoring program is adequately carried out. The EMP includes measures to minimize project impacts due to noise and air pollution, waste generation etc.

236. The sub-project has been assigned environmental category ‘B’ in accordance with the ADB’s Safeguard Policy Statement (SPS) 2009 and Schedule II as per PEPA, IEE and EIA Gazette Notification, 2000. Thus, this IEE report with the associated EMP is regarded as sufficient environmental assessment of this sub-project and a full EIA is not required.

9.2 Recommendations

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

- Soil erosion and contamination, water contamination, air pollution and high noise levels should be controlled with the use of good engineering practices.

- Contractor should develop plan such as traffic management, solid waste management and material management etc. before commencing the construction activities.
- Fair and negotiated compensation in accordance with the prevailing market prices should be made for the land to be purchased for development of the switching station.
- The Contractor will have to adopt some suitable timing for the construction activities so as to cause the least disturbance to the local communities, particularly women, considering their peak movement hours.
- Contractor should take due care of the local community and its sensitivity towards local customs and traditions.
- EMP proposed in Chapter 6 shall be implemented in its true letter and spirit.

10 References

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ANNEXURE-I

Rapid Environmental Assessment Checklist

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: **Sub-project 2: 500 kV Maira Switching Station**

Sector Division: Power Transmission

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site		X	Not Applicable
▪ Protected Area		X	Not Applicable
▪ Wetland		X	Not Applicable
▪ Mangrove		X	Not Applicable
▪ Estuarine		X	Not Applicable
▪ Buffer zone of protected area		X	Not Applicable
▪ Special area for protecting biodiversity		X	Not Applicable
B. Potential Environmental Impacts Will the Project cause…			
▪ Encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?	X		No historical site(s) located in project area. Landscape will be disrupted and waste will be generated but will be managed through implementation of EMP.

Screening Questions	Yes	No	Remarks
▪ Encroachment on precious ecosystem (e.g. sensitive or protected areas)?		X	Not Applicable
▪ 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	Not Applicable
▪ Damage to sensitive coastal/marine habitats by construction of submarine cables?		X	The Scope of work for this sub-project will not result in any such impacts.
▪ Deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?	X		Potential construction related impacts such as silt run off, solid waste and effluent generation from worker camps etc. might take place. However, necessary mitigation measures will ensure no long-term impacts take place.
▪ Increased local air pollution due to rock crushing, cutting and filling?	X		Potential air pollution could take place due to different activities to be conducted during the construction phase. However, appropriate mitigation measures will be implemented to prevent any long-term impacts.
▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	X		Certain minor risks are expected during the project construction phase since high voltage electrical equipment will need to be installed. Necessary mitigation measures will be provided in the EMP to mitigate any possible impacts.
▪ Chemical pollution resulting from chemical clearing of vegetation for construction site?		X	No such risks are expected since as a general policy, NTDC does not use chemicals for clearing of vegetation.
▪ Noise and vibration due to blasting and other civil works?	X		Blasting is not involved in the proposed scope of works for this sub-project. High noise levels might be generated during the construction phase due to movement of heavy machinery and use of heavy equipment. However, any potential impacts will be mitigated by implementing the EMP.
▪ Dislocation or involuntary resettlement of people?		X	No dislocation or resettlement of people is expected for this sub-project.
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		X	Not Applicable

Screening Questions	Yes	No	Remarks
▪ Social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?	X		The civil works along with movement of heavy machinery along pre-existing roads might pose a temporary inconvenience to the living conditions in the project area. Implementation of necessary traffic management measures in the EMP will mitigate any potentially significant impacts.
▪ Hazardous driving conditions where construction interferes with pre-existing roads?	X		The movement of heavy machinery along pre-existing roads might pose a temporary inconvenience to the living conditions in the project area. Implementation of necessary traffic management measures in the EMP will mitigate any potentially significant impacts.
▪ Creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?	X		The potential of creation of temporary breeding habitats for disease vectors does exist during the construction phase of the sub-project. However, necessary measures will be implemented as per the EMP to prevent any long-term impacts.
▪ Dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?		X	Not Applicable since this sub-project only involves development of a Switching station.
▪ Environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		X	Not Applicable since this sub-project only involves development of a Switching station.
▪ Facilitation of access to protected areas in case corridors traverse protected areas?		X	Not Applicable
▪ Disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height?		X	Not applicable since NTDC does not use any herbicide or vegetation control or removal.
▪ Large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)?		X	The sub-project construction will aim to engage local labor as far as possible apart from engaging technical NTDC staff. Thus, no large population influx is foreseen.
▪ Social conflicts if workers from other regions or countries are hired?		X	Local labor will mostly be engaged and thus no potential conflicts are expected.

Screening Questions	Yes	No	Remarks
▪ Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?	X		The possibility of poor sanitation and resulting transmission of diseases from workers to the local populations is remote, yet does exist. Thus necessary provisions in the EMP shall be provided to ensure any waste generated is disposed off in accordance with applicable NEQS guidelines.
▪ Risks to community safety associated with maintenance of lines and related facilities?		X	Although high voltage equipment will be installed at the switching station, the risk to community safety does not exist since any maintenance activities will be conducted within the boundaries of the switching station.
▪ Community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization?		X	Not Applicable
▪ 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		No explosives will be involved in the proposed Scope of Work. However, other materials such as fuel, oil etc. will be kept in the construction camps only. Transport and disposal of such materials will be according to protective measures provided in EMP. Therefore, risk to community health and safety is manageable by maintaining H&S protocols.
▪ 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 risk to community safety does not exist since all sub-project related activities will be conducted within the boundaries of the switching station.

ANNEXURE-II

Record of Public Consultations

Public Consultations for 500 KV Maira Switching Station (conducted during March & April 2018)				
1	31-3-2018	Maira	DPs & Local Community	- Muhammad Tahir - Junaid Iqbal - Muhammad Zubair - Muhammad Aslam - Muhammad Shafiq
2	01-04-2018	Maira	DPs	- Faiz Ali - Qurban Ali - Gulzar Ahmad - Fazal Dad Khan
3	05-04-2018	Maira	DPS& General Public	- Muhammad Saeed - Muhammad Dawood - Muhammad Abdullah - Muhammad Razaq - Ali Zer
4	06-04-2018	Maira	DPs	- Muhammad Safdar - Rasool Bhaksh - Ikram Khan
5	06-04-2018	Maira	DPs & General Public	- Farooq Azim - Aftab Ali - Muhammad Aslam - Muhammad Rafiq
6	10-04-2018	Maira	DPs	- Muhammad Farooq - Muhammad Afzal - Muhammad Zubair
7	10-04-2018	Maira	DPs	- Junaid Iqbal - Muhammad Tahir - Abdur Rehman

ANNEXURE-III

Field Questionnaire

.

Serial No. _____

Interviewer's Name _____

Date _____

Name of the Respondent _____

Father's Name _____

Age (years) _____

Education _____

Q.1 Name of Tehsil: آپ کے علاقے کی تحصیل کا نام کیا ہے؟

_____

Q.2 Name of Union Council: آپ کی یونین کونسل کا نام کیا ہے؟

_____

Q.3 Name of Valley: آپ کی وادی کا نام کیا ہے؟

_____

Q.4 Name of the Village: آپ کے گاؤں کا نام کیا ہے؟

_____

Q.5 Names of Tribes in the Village: آپ کے گاؤں میں کون سے قبیلے ہیں؟ نام بتائیں

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

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

1		4	
2		5	
3		6	

Q.7 Accessibility from main road to Village:

Track	Un metalled Road	Metalled Road	Other (Specify)

Q.8 Distance from tarred road to Village: _____Km گاؤں سے سڑک تک فاصلہ؟

Q.9 Approximate area of the Village: _____(km^2) آپ کے گاؤں کا کل رقبہ تقریباً کتنے مربع کلومیٹر ہے؟

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

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

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

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

Q.13 Institutional Facilities Available in the Village. آپ کے گاؤں میں درج ذیل میں سے کونسی سہولیات موجود ہیں؟

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

g.	Others					

Q.14 Means of Transport Available in the Village. آپ کے گاؤں میں کونسے ٹرانسپورٹ کے ذرائع موجود ہیں؟

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

Q.15 Civic Facilities Available in the Village آپ کے گاؤں میں روزمرہ زندگی کی کونسی سہولیات موجود ہیں؟

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

Q. 16 Source of Water in the Village

آپ کے گاؤں میں کونسے پانی کے ذرائع ہیں؟

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

Q.17 If Channel,

1 Katcha	2 Partly Lined	3 Completely Lined

Q.18 Nature of water supply آپ کے گاؤں کو پانی کس طرح مہیا کیا جاتا ہے؟

1. Public		Mode of supply of water:	(a) Self Carried (b) Tapped

2. Private			(c) By Channel (d) By Tanker

Q. 19 Common Diseases in the Village آپ کے گاؤں میں عموماً کونسی بیماریاں پائی جاتی ہیں؟

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

Q.20 Does a Child Birth Attendant Available in the Village? کیا آپ کے گاؤں میں بچے کی پیدائش کے لیے دائی موجود ہے؟

1. Yes ☐ 2. No ☐

Q.21 If Yes: اگر ہے تو کیا وہ تربیت یافتہ ہے یا غیر تربیت یافتہ؟ 1 Trained ☐ 2 Untrained ☐

Q. 22 Does any NGO exist in the Village? کیا آپ کے گاؤں میں کوئی غیر سرکاری فلاحی تنظیمیں کام کر رہی ہیں؟

1. Yes ☐ 2. No ☐

Q.23 If Yes:

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

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

کیا آپ کے گاؤں میں کوئی بڑے ترقیاتی پروگرام چل رہے ہیں؟ اگر ہاں تو براہ مہربانی ان کے نام بتائیں؟

1. _____
2. _____
3. _____

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

a. Owner Tribes ☐ b. Non Owner Tribes ☐ c. Individual ☐

d. Others (Specify) _____

Q.26 Who has the right to allow the people to get benefits from natural resources? (Forest trees, Mountains, Pastures, Herbs etc)?

ان قدرتی وسائل سے نفع حاصل کرنے کے لیے اجازت دینے کا حق کس کو حاصل ہے؟

a. Owner Tribes ☐ b. Non Owner Tribes ☐ c. Owner ☐

d. None ☐ e. Others (Specify) _____

Q.27 Who has the rights of selling and purchasing the agriculture land, residential and commercial property? آپ کے گاؤں میں زرعی زمین، رہائشی اور کمرشل جائیداد کی خرید و فروخت کا حق کس کو حاصل ہے؟

a. Owner Tribes ☐ Non Owner Tribes ☐ c. Individual ☐

d. Anyone ☐ e. Others (Specify) _____

Q.28 What are the preferences to sell the personal immoveable property like houses, agriculture land, shops etc. to:

ذاتی جائیداد مثلاً گھر، زرعی زمین اور دکانیں وغیرہ بیچنے کے لئے درج ذیل میں سے کس کو ترجیح دی جاتی ہے؟

a. Owner Tribes ☐ b. Non Owner Tribes ☐

c. Immediate Neighbor ☐ d. Anyone ☐

e. Others (Specify) _____

Q.29 What are the prevalent units of measurement of agricultural land in your village? آپ کے گاؤں میں زرعی زمین کی پیمائش کے لئے درج ذیل میں سے کونسے پیمانے استعمال کئے جاتے ہیں؟

a. Marlas ☐ b. Kanals ☐ c. Acres ☐

d. Jarib ☐ e. Sq Feet ☐ f. Sq. Haath ☐

g. Others (Specify) _____

Q.30 What are the prevalent units of measurement of agricultural produce in your village? آپ کے گاؤں میں زرعی اجناس کی پیداوار ناپنے تولنے کے لئے درج ذیل میں سے کونسے پیمانے استعمال کئے جاتے ہیں؟

a. Kilogram ☐ b. Maunds ☐ c. Haa ☐

d. Sinn ☐ e. Others (Specify)_____

Q.31 Who are the influential in your village?

آپ کے گاؤں میں درج ذیل میں سے کون سے لوگ معتبر اصحاب ہوتے ہیں؟

a. Head of the Tribe	☐	b. Councilors	☐
c. Religious Scholars	☐	d. Heads of Families	☐
e. Government Servants	☐	f. Numberdar	☐

g. Others (Specify) _____

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

آپ کے گاؤں میں جائیداد، قدرتی وسائل کے استعمال سے متعلق معاملات اور تنازعات درج ذیل میں سے کن طریقوں سے حل کئے جاتے ہیں؟

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

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

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

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

Q.34 What are the reasons of local migration in your village? مقامی نقل مکانی کی کوئی بڑی وجوہات ہیں؟

a. _____

b. _____

c. _____

Q.35 What are the major problems of your area? آپ کے گاؤں میں درپیش کوئی بڑے مسائل ہیں؟

Sr.No	Types of Problems	Proposed Solutions

A		
B		
C		
D		
E		
F		

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

کیا آپ کے گاؤں میں اثار قدیمہ سے متعلق یادگاریں/مقامات/اشیا موجود ہیں؟

1. Yes ☐ 2. No ☐

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

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

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

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

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

اگر نہیں تو لوگ اپنی اجناس اور جانور کہاں فروخت کرتے ہیں؟

Grains	
Livestock	

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

آپ کے گاؤں میں درج ذیل میں سے عام طور پر کونسے درخت پائے جاتے ہیں؟

Fruit Trees	
Forest/wood Trees	

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

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

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

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

ANNEXURE-IV

NEQS Guidelines and WHO Standards

National Environmental Quality Standards for Gaseous Emission

Parameter	Source of Emission	Existing Standards	Revised Standards
Smoke	Smoke Opacity not to exceed	40% or 2 on Ringlemann scale	40% or 2 on Ringlemann scale or equivalent number
Particulate matter	a) Boilers and furnaces Oil fired Coal fired Cement Kilns b) Grinding crushing, clinker, coolers and related processes, metallurgical processes, converter, blast furnaces and cupolas	 300 500 200 500	 300 500 300 500
Hydrogen Chloride	Any	400	400
Chlorine	Any	150	150
Hydrogen Flouride	Any	150	150
Hydrogen Sulphide	Any	10	10
Sulphur oxides	Sulfuric acids/sulfuric acid plants Other plants	400 400	5000 1700
Lead	Any	50	50
Mercury	Any	10	10
Cadmium	Any	20	20
Arsenic	Any	20	20
Copper	Any	50	50
Antimony	20	20	20
Zinc	Any	200	200
Oxides of Nitrogen	Nitric Acid Manufacturing Unit Gas Fired Oil Fired Coal Fired	400 400	400 400 600 1200

WHO Guideline Values for Community Noise in Specific Environment

Specific Environment	LA eq (dB)	LAmax Fast (db)
Out door living area	55	
School class rooms and pre-schools (indoor)	35	
School Playground (outdoors)	35	
Hospitals Ward rooms (indoor	30 30	40
Hospital Treatment rooms (indoors)	#1	
Industrial, commercial, shopping and traffic areas (indoors and out doors)	70	110

#1– as low as Possible

WHO Drinking Water Quality Standards

Sr. No.	Constituent, mg/L	Recommended limit (1961 European)
1	Ammonia	0.5
2	Chlorides	350
3	Copper	0.05[a]
4	Flourides	1.5
5	Iron	0.1
6	Magnesium [b]	125[b]
7	Nitrates	50
8	Oxygen	5.0
9	Phenols	0.001
10	Sulphates	250
11	Zinc	5.0

a Maybe higher for new piping
b if 250mg/L SO_4 is present, Mg not to exceed 30mg/L

ANNEXURE-V

Brochure

بجلی گھر / ترسیلاتی تاریں (گرڈ سٹیشن / ٹرانسمشن لائن)

ماحولیاتی انتظامی منصوبہ

ممکنہ ماحولیاتی اثرات	طریقہ ہائے تدارک/انسدادی اقدامات	ذرائع تدارک	ذمہ دار محکمہ/ادارہ	سپرویژن
	دوران تعمیر			
1 آمدورفت کی گزرگاہوں کی ابتری، تیز ڈھلوان کی وجہ سے زمینی کٹاؤ اور منصوبہ کے مختلف مراحل کا جائزہ۔	پہنچنے کے نئے راستوں کے ساتھ ڈھلوان و پین سٹاک وغیرہ کیلئے - زمینی کٹاؤ کو کم کرنے کیلئے پانی کے بہاؤ کے صحیح راستے بنانا - سخت / پکی دیواریں، نیز دوسرے نئے دوسرا سامان کا استعمال تاکہ خالی جگہیں پر ہو سکیں - شہر کے ساتھ اور پین سٹاک کے ساتھ درخت لگانا وغیرہ	محتاط نگرانی کرنا	ٹھیکیدار اور ماحولیاتی انجینئر	این-ٹی-ڈی-سی
2 ریت، مٹی، پتھر وغیرہ کی وجہ سے زمینی سطح کا نیچے ہونا / خراب ہو جانا۔	- مٹی، ریت، پتھر وغیرہ زرعی زمین سے نہیں لینا اور صرف بنجر، فالتو، اور دریا سے لینا ہے۔ - پیداواری زمین کو بچانا ضروری ہے۔ - جن جگہوں سے مٹی، ریت، پتھر لیا ہے اسکو ہموار کرنا اور اصلی حالت میں لانا ضروری ہے۔	کنٹریکٹ / ٹھیکہ میں شرائط لکھی ہوئی ہیں محتاط نگرانی	ٹھیکیدار اور ماحولیاتی انجینئر	این-ٹی-ڈی-سی
3 تعمیراتی سامان حاصل ہونے والی جگہ کا جائزہ لینا۔	- وہ جگہ جہاں سے پتھر وغیرہ کا حصول ہو پہلے سے اس کام کے لیے استعمال ہوتی ہو لائسنس یافتہ ہو اور محکمہ ماحولیات سے اجازت شدہ ہو۔ اگر نئی جگہ سے ریت، بجری، اور مٹی حاصل ہو تو با قاعدہ محکمہ جاتی اجازت کے بعد شروع ہو	محتاط نگرانی	ٹھیکیدار اور ماحولیاتی انجینئر	این-ٹی-ڈی-سی
4 تعمیراتی سامان کی حالت کا جائزہ، دوران تعمیر پانی کی ترسیل و رکاوٹ، پانی کی کوالٹی اور پانی میں آلودگی کا اندازہ کرنا۔	- پٹرول، موبل آئل وغیرہ کو پائپ کے ذریعے سے دور رکھنا اور سامان کی مکمل حفاظت۔ پانی کے ذرائع کی مکمل حفاظت خاص کر سردی میں جب دریا میں پانی کی مقدار کم ہوتی ہے ان جگہوں کی حفاظت جہاں فالتو سامان رکھا ہو۔ اس کے علاوہ فالتو پٹرولیم سامان کو صحیح طریقے سے اکٹھا کرنا اور مخصوص جگہوں میں جمع کرنا	محتاط نگرانی / معاہدے کی شرائط کے مطابق	کنسلٹنٹ	این-ٹی-ڈی-سی
5 دوران تعمیر نکاسی آب، سیلابی لائن اور نالیوں کے کام میں انتشار رہنا	- بارش کے پانی کی صحیح نکاسی، آبپاشی اور پینے کے پانی کے ذرائع کو اگر نقصان ہو تو دوبارہ تعمیر یا بحال کرنا	مکمل منصوبہ بندی	ٹھیکیدار، کنسلٹنٹ اور شیڈو	این-ٹی-ڈی-سی
6 رہائشی کالونی / کیمپ کے سماجی اثرات اور ضائع شدہ پانی وغیرہ کے ماحولیاتی اثرات کا جائزہ۔	- تعمیراتی لوگوں کی رہائش دیہات / گاؤں سے دور ہونی چاہیے۔ - رہائشی جگہوں میں پانی کی نکاسی کا صحیح نظام ہو اور کوڑا کرکٹ کیلئے جگہیں مختص ہونی چاہئیں۔	محتاط نگرانی، ٹھیکیدار کے معاہدے کی شرائط کے مطابق	ٹھیکیدار، کنسلٹنٹ	این-ٹی-ڈی-سی
7 تعمیراتی کام میں استعمال ہونے والی گاڑیوں اور سامان سے نکلنے والے دھوئیں سے فضائی آلودگی پیدا ہونا۔	- مذکورہ گاڑیوں اور سامان سے آلودگی پاکستان آلودگی کے متعین شدہ معیار کے مطابق ہو۔ - آلودگی کی مکمل نگرانی کی جائے۔	محتاط نگرانی	ٹھیکیدار، کنسلٹنٹ	محکمہ ماحولیات
8 گرد و غبار کے ذرات کی وجہ سے مزدور اور عوام کی صحت پر پڑنے والے اثرات کا جائزہ۔	- کرشنگ اور کنکریٹ پلانٹ آبادی سے کافی دور ہو - مذکورہ اثرات سے تمام ممکنہ بچاؤ کے طریقے اپنانا، خاص کر کرشنگ پلانٹ، ڈیم اور پین سٹاک سائیٹ اور بیچنگ پلانٹ وغیرہ۔ اسکے علاوہ متاثرہ پانی کا چھڑکاؤ خاص کر سردیوں اور مکسنگ سائیٹ پر، سامان والی تمام گاڑیوں کو ڈھکنا شامل ہے	محتاط نگرانی	ٹھیکیدار، کنسلٹنٹ	محکمہ ماحولیات
9 گاڑیوں، تعمیراتی سامان سے پیدا شدہ شور کے اثرات کا جائزہ لینا۔	- تمام تعمیراتی مشینری اور گاڑیوں کا شور پاکستان انوائرمنٹل کوالٹی سٹینڈرڈز کے مطابق ہو جبکہ عام گاڑیوں میں شور کنٹرول کرنے کا آلہ نصب ہو۔ اسکے علاوہ تمام مزدوروں کو شور سے بچنے کا آلات مہیا کرنے ہیں۔	محتاط نگرانی	ٹھیکیدار، کنسلٹنٹ	محکمہ ماحولیات
10 منصوبہ کے مختلف مراحل میں استعمال ہونے والے بارود کے شور کے اثرات کا جائزہ۔	- بارودی کام پاکستانی قانون کے مطابق ہو اور نزدیکی باسیوں کو پہلے سے مطلع کرنا، بلاسٹنگ سے متعلقہ مزدوروں کو تمام بچاؤ کے آلات مہیا کرنا ہے	محتاط نگرانی	ٹھیکیدار، کنسلٹنٹ	محکمہ ماحولیات
11 تعمیراتی کاموں کی وجہ سے درختوں اور دیگر پودوں کا ضائع ہو جانا۔	- کوئی بھی پودا محکمہ جنگلات کی منظوری کے بغیر نہ کاٹا جائے اور جو درخت کاٹا جائے اسکا معاوضہ دیا جائے اور اسکی جگہ نئے پودے بھی لگائے جائیں۔	محتاط منصوبہ بندی	ٹھیکیدار، کنسلٹنٹ	محکمہ ماحولیات
12 جنگلی حیات پر منصوبہ پر کام کرنے والے لوگوں کے ممکنہ اثرات۔	- تعمیراتی کاموں کے مزدوروں کو جنگلی حیات سے بچاؤ کی تربیت دینا اور کسی قسم کے شکار کرنے پر پابندی عائد کرنا	محتاط منصوبہ بندی اور نگرانی	ٹھیکیدار، کنسلٹنٹ	محکمہ ماحولیات
13 تعمیراتی کام میں ممکنہ حادثات کا جائزہ لینا۔	- بلاسٹنگ کی جگہوں پر بچاؤ کے نشانات اور سائن بورڈ، تمام مزدوروں کو ہیلمٹ، ماسک اور حفاظتی جیکٹ مہیا کرنا، ابتدائی طبی امداد کا انتظام کرنا، ڈرائیوروں کو اپنی حفاظت کی تعلیم دینا، ٹریفک کا صحیح انتظام کرنا، تمام احتیاطی تدابیر کی عام لوگوں میں تشہیر کرنا جس میں جگہوں کی نشان دہی اور ممکنہ خطرات بتانا شامل ہو	محتاط نگرانی جس میں محکمہ جنگلات کو بھی شامل کیا جائے ٹھیکیدار خصوصی طور پر اپنے لوگوں کا خیال کرے۔	ٹھیکیدار، کنسلٹنٹ	محکمہ ماحولیات
14 تعمیراتی کام کا عوام کے استعمال کے ذرائع کو نقصان پہنچانا۔	عام عوام کے استعمال کے ذرائع پانی کی پائپ، ٹیلیفون لائن، بجلی کے پول بچانا لازم ہے۔ اگر تبدیل کرنا ہو تو وہاں موجود آبادی کے مشورے سے کام کیا جائے۔	کنٹریکٹ میں ان باتوں کا تعین کرنا اور اس کی نگرانی کرنا۔	ٹھیکیدار، کنسلٹنٹ	محکمہ ماحولیات
	منصوبے کی تکمیل کے بعد چلنے کی حالت میں			
تیز ڈھلوانی علاقے میں زمین کا کٹاؤ اور ہریالی کا کم ہو جانا۔	- درختوں اور دیگر پودہ جات کی مکمل حفاظت کرنا، تمام پراجیکٹ کی جگہوں میں نئے پودے لگانا۔	صوبے کے محکمہ جنگلات کے تعاون سے۔	این-ٹی-ڈی-سی	این-ٹی-ڈی-سی

ANNEXURE-VI

ARCHAEOLOGICAL CHANCE FIND PROCEDURES

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Background

The purpose of this document is to address the possibility of archaeological deposits becoming exposed during ground altering activities within the project area and to provide protocols to follow in the case of a chance archaeological find to ensure that archaeological sites are documented and protected as required.

The Antiquities Act, 1975, protects archaeological sites, whether on Government owned or private land. They are non-renewable, very susceptible to disturbance and are finite in number. Archaeological sites are an important resource that is protected for their historical, cultural, scientific and educational value to the general public and local communities. Impacts to archaeological sites must be avoided or managed by development proponents. The objectives of this 'Archaeological Chance Find Procedure' are to promote preservation of archaeological data while minimizing disruption of construction scheduling. It is recommended that due to the moderate archaeological potential of some areas within the project area, all on site personnel and contractors be informed of the Archaeological Chance Find Procedure and have access to a copy while on site.

Potential Impacts to Archaeological Sites

Developments that involve excavation, movement, or disturbance of soils have the potential to impact archaeological materials, if present. Activities such as road construction, land clearing, and excavation are all examples of activities that may adversely affect archaeological deposits.

Relevant Legislation

It ensures the protection, preservation, development and maintenance of antiquities in the entire country. The Act defines "antiquities" as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the Govt of Punjab to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the subproject proponents are obligated to ensure that no activity is undertaken in the proximity of a protected antiquity, report to the Department of Archaeology, GoP, any archaeological discovery made during the course of the project.

Remedies and Penalties

The Antiquities Act, 1975 provides for heritage inspection or investigation orders, temporary

protection orders, civil remedies and penalties to limit contraventions. These powers provide:

‘’A contravention of any provision of this Act or the rules shall, where no punishment has been specifically provided be punishable with rigorous imprisonment for a term which may extend to two years, or with fine up to rupees ten hundred thousand, or with both. ‘’

Archaeological ‘Chance Find’ Procedure

If you believe that you may have encountered any archaeological materials, stop work in the area and follow the procedure below.

The following ‘chance-find’ principles will be implemented by the contractor throughout the construction works to account for any undiscovered items identified during construction works:

(i) Workers will be trained in the location of heritage zones within the construction area and in the identification of potential items of heritage significance.

(ii) Should any potential items be located, the site supervisor will be immediately contacted and work will be temporarily stopped in that area.

(iii) If the site supervisor determines that the item is of potential significance, an officer from the department of Archaeology (DoA), GoP will be invited to inspect the site and work will be stopped until DoA has responded to this invitation.

(iv) Work will not re-commence in this location until agreement has been reached between DoA and NTDC as to any required mitigation measures, which may include excavation and recovery of the item.

(v) A precautionary approach will be adopted in the application of these procedures.

Detailed Procedural Steps

- If the Director, department of Archaeology receives any information or otherwise has the knowledge of the discovery or existence of an antiquity of which there is no owner, he shall, after satisfying himself as to the correctness of the information or knowledge, take such steps with the approval of the Government, as he may consider necessary for the custody, preservation and protection of the antiquity.
- Whoever discovers, or finds accidentally, any movable antiquity shall inform forth with the Directorate within seven days of its being discovered or found.
- If, within seven days of his being informed, the Director decides to take over the antiquity for purposes of custody, preservation and protection, the person discovering or finding it shall hand it over to the Director or a person authorized by him in writing.

- Where the Director decides to take over an antiquity, he may pay to the person by whom it is handed over to him such cash reward as may be decided in consultation with the Advisory Committee.
- If any person, who discovers or finds any movable antiquity contravenes the provisions of the Act, he shall be punishable with imprisonment for a term which may extend to five (05) years, or with fine not less than fifteen hundred thousand rupees or with both and the Court convicting such person shall direct that the antiquity in respect of which such contravention has taken place shall stand forfeited to Government.
- The Director or any officer authorized by him with police assistance may, after giving reasonable notice, enter into, inspect and examine any premises, place or area which or the sub-soil of which he may have reason to believe to be, or to contain an antiquity and may cause any site, building, object or any antiquity or the remains of any antiquity in such premises, place or area to be photographed, copied or reproduced by any process suitable for the purpose.
- The owner or occupier of the premises, place or area shall afford all reasonable opportunity and assistance to the Director.
- No photograph, copy of reproduction taken or made shall be sold or offered for sale except by or with the consent of the owner of the object of which the photograph, copy or the reproduction has been taken or made.
- Where substantial damage is caused to any property as a result of the inspection, the Director shall pay to the owner thereof reasonable compensation for the damage in consultation with the Advisory Committee.
- If the Director after conducting an inquiry, has reasonable grounds to believe that any land contains any antiquity, he may approach the Government to direct the Revenue Department to acquire such land or any part thereof and the Revenue Department shall thereupon acquire such land or part under the Land Acquisition Act, 1894 (I of 1894), as for a public purpose.