Initial Environmental Examination

May 2016

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

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

Power Transmission Enhancement Investment Programme II

TA 8818 (PAK)

Initial Environmental Examination

Extension and Augmentation Subprojects in
Sahiwal, Lahore South & Rewat

May 2016

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

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CURRENCY EQUIVALENTS

As of 16th April 2016 Currency Unit – Pak Rupees (Pak Rs.)

Pak Rs 1.00 = $ 0.009 US$1.00 = Pak Rs. 105.8

Acronyms

ADB	Asian Development Bank
NTDC	National Transmission & Despatch Company Limited
DGS	Distribution Grid Substation
SPS	Safeguard Policy Statement
DoF	Department of Forests
EA	Environmental Assessment
DISCO	Independent electricity distribution company
EARF	Environment Assessment Review Framework
EAAC	Environmental Assessment Advisory Committee
EPA	Environmental Protection Agency
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
EA	Executing Agency
IA	Implementing Agency
GoP	Government of Pakistan
IEE	Initial Environmental Examination
LESCO	Lahore Electricity Supply Company
MEPCO	Multan Electric Power Company
IESCO	Islamabad Electric Supply Company
LAA	Land Acquisition Act (of 1984)
LARP	Land Acquisition and Resettlement Plan
Leq	Equivalent sound pressure level
NEQS	National Environmental Quality Standards
NGO	Non Governmental Organization
O&M	Operation & Maintenance
PC	Public consultation
PAP	Project Affected Person
PEPA	Punjab Environmental Protection Agency
PEPAct	Pakistan Environment Protection Act 1997
RP	Resettlement Plan
REA	Rapid Environmental Assessment

EXECUTIVE SUMMARY

This Initial Environmental Examination (IEE) has been conducted for three extension and augmentation sub-projects under the Tranche 1 of NTDC Power Transmission Enhancement Investment Program II (MFF) under TA 8818 of the Asian Development Bank (ADB).

The specific activities to be conducted at each of the sub-projects are as follows:

Rewat Sub-station (located in Murree Tehsil, Rawalpindi district of Punjab province)

- One 220/132 kV 250 MVA transformer along with allied equipment for extension at Rewat.
- Replacement of one existing 220/132 kV 160 MVA transformers by one 220/132 kV 250 MVA T/Fs.

Sahiwal Grid Station (located in Sahiwal tehsil in Sahiwal district in Punjab province)

- 1x600 MVA, 500/220 kV transformer along with allied equipment and accessories.

Lahore South Grid Station (located in Raiwind Tehsil, Kasur district of Punjab province

- 1x750 MVA 500/ 220 kV Transformer along with allied equipment and accessories.
- Two 500 kV Line Bays to accommodate power transfer from a double circuit line coming into Lahore South.

NTDC has been nominated by Ministry of Water and Power (MOWP) to act as the Executing Agency (EA) and Implementing Agency (IA) for work in its own area. Since these projects will involve work within an existing sub-station to improve the network performance, the sole stakeholder is tNTDC.

These MFF Tranche 1 sub-projects 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-projects will be people, companies, and government and non-government agencies in Pakistan that use power distribution services directly and indirectly.

Sufficient space and basic infrastructure are available within the existing sub-stations/grid stations. However, civil works for the installation of proposed equipment (transformers & allied equipment, line bays etc.) will be conducted in a limited space. The extension sub-projects will involve the delivery and connection of an additional transformer in line with other transformers within the available space in an existing sub-station/grid station.

The augmentation sub-projects will replace an existing transformer in an existing sub-station/grid station with a transformer of a higher capacity. The transformer that is replaced will not be wasted but will be removed and transferred to another facility where it will be reconditioned, stored and eventually transferred to another sub-station/ grid station to be reused.

Detailed field visits to each of the three sub-project sites were conducted and existing primary data was collected which along with any secondary data already available was used to develop a clear picture of the environmental and social aspects of the project development landscape for the purpose of this study.

No significant adverse environmental impacts have been predicted with the expected negative impacts being local in nature and low in magnitude. There are very few possibilities of adverse impacts on the physical, biological or socio-economic environment of project area since all works will be conducted within the existing boundaries of the sub-projects.

Although limited in magnitude, there are some possibilities of producing adverse environmental impacts, which must be mitigated at the earliest. The limiting of noise levels during construction and operation of the project, proper disposal of any solid and liquid waste, preservation of air quality by limiting dust and toxic gas emissions from equipment and vehicle exhaust are some of the measures prescribed for the mitigation of impacts. Similarly, capacity development of all project staff to implement recommended mitigation measures are also prescribed.

An action plan with clear roles and responsibilities of stakeholders has been provided in the report. The relevant 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.

Mitigation will be assured by a program of environmental monitoring conducted during construction and operation 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.

Therefore, the proposed sub-projects are unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with design, construction, and operation 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 Project as Category ‘B’ is confirmed. It is concluded that the proposed sub-projects should proceed, with appropriate mitigation measures and monitoring programs identified in the IEE.

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

Table of Content

ANNEXURES

Annexure-I Rapid Environmental Assessment Checklists

Annexure-II NEQS Guidelines and WHO Standards

Annexure-III Photographs of Project Area

Annexure-IV Typical Bunds for Transformers

Annexure-V Public Consultations Details

List of Figures

List of Tables

1 Introduction

1.1 Overview

1. This document is the Initial Environmental Examination (IEE) for three extension and augmentation sub-projects under the Tranche 1 of NTDC Power Transmission Enhancement Investment Program II (MFF). This IEE was prepared under TA 8818 of the Asian Development Bank (ADB) Power Transmission Enhancement Investment Program II (PTEIP II)..

2. .

   The activities include extension (additional transformers) and augmentation (replacement of transformers with higher capacity) distribution line extensions, new and replacement of distribution lines, additional sub-stations, transformer protection and other non network activities such as automatic meter reading, construction equipment and computerized accounting. New distribution lines to and from various network facilities are also being installed.

3.

4. The **Figure 1.1** below depicts the general locations of the three sub-project sites i.e. Rewat, Lahore South and Sahiwal.

5. This Initial Environmental Examination (IEE) report presents the screening of potential environmental impacts of the proposed project 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.

1.2 Environmental Category of the Project

6. According to ADB's Safeguard Policy Statement (SPS) 2009, Rapid Environmental Assessments (REAs) Checklists were prepared for each of the three sub-projects (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, Power distribution enhancement and development type projects, they are limited to expansion of already developed facilities, have typically 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 IEE:

7. This IEE study has included field reconnaissance for all three of the subprojects with surveys taking place from February to March 2016. The Study area for each subproject was the sub-station and immediate environs. The areas inside

the sub-stations for improvement works were identified and the sensitive receivers immediately adjacent to the sub-stations were recorded, including any irrigation facilities, water supply, habitable structures, schools, health facilities, hospitals, religious places and sites of heritage or archaeological importance and critical areas[5] within about 50m of the edge of the sub-station boundary walls.

8. The study process began with scoping and field reconnaissance during which REAs were carried out to establish the potential impacts and categorization of network enhancement activities. The environmental impacts and concerns requiring further study in the environmental assessment were then identified.

The methodology of the IEE study was then elaborated in order to address all interests. Subsequently, both primary and secondary baseline environmental data was collected and the intensity and likely location of impacts were identified with relation to the sensitive receivers; based on the work expected to be carried out at each site. The significance of impacts from the power transmission expansion works was assessed and, for those impacts requiring mitigation, measures were proposed to reduce impacts to within acceptable limits.

9. All the extension and augmentation projects covered in this IEE will only involve work within an existing sub-station to either, (i) replace an existing transformer with one of a higher capacity (augmentation), (ii) add a transformer (extension) or (iii) add line bays. Therefore, since these projects involve work within an existing sub-station to improve the network performance, the sole stakeholder is NTDC.

Therefore, the requirement for public consultation (PC) can be seen to be satisfied by consultation with the relevant NTDC personnel, who are clearly in support of their own project. Therefore under ADB requirements, the need for environmental assessment process to include meaningful public consultation during the completion of the draft IEE can be seen to be satisfied by the support of NTDC for their own projects.

10. The significance of impacts from the proposed 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.

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

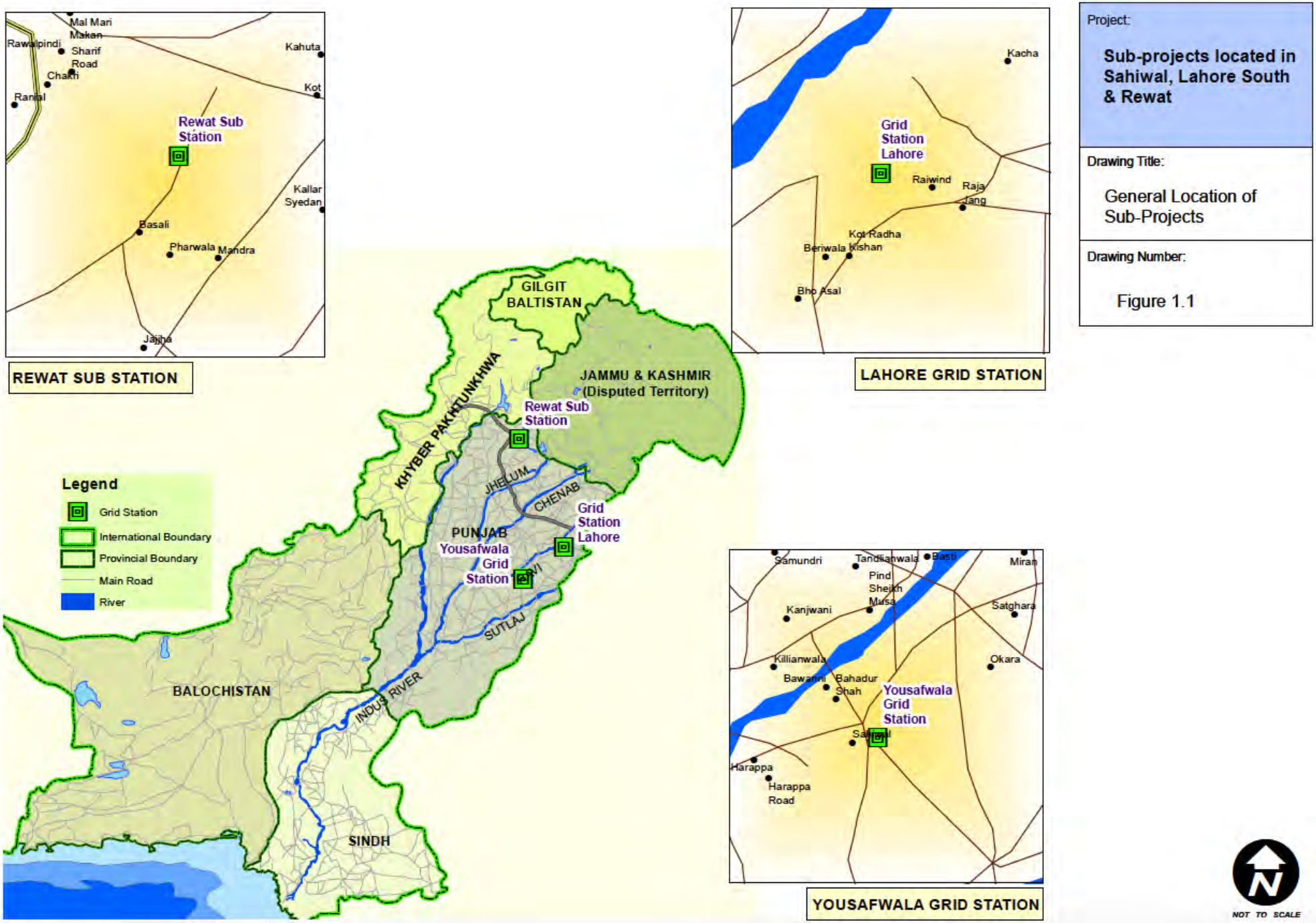
1.4 Structure of Report

12. This report reviews information on existing environmental attributes of the areas around the study area. Geological, hydrological and ecological features, air quality, noise, water quality, soils, social and economic aspects and cultural

resources are included. The report predicts the probable impacts on the environment due to the proposed enhancement and expansion of the three sub-projects.

13. This IEE also proposes various environmental management measures. Details of all background environmental quality, environmental impact/pollutant generating activities, pollution sources, pollution control equipment, predicted environmental quality and related aspects have been provided in this report. References are presented as footnotes throughout the text. Following this introduction the report follows ADB guidelines and includes:

- *Description of the Project*
- *Description of Environmental and Social Conditions*
- *Assessment of Environmental Impacts and Mitigation Measures*
- *Institutional Requirements Environmental Management Plan*
- *Public Consultation*
- *Findings, Recommendations and Conclusions*



Project:

Sub-projects located in Sahiwal, Lahore South & Rewat

Drawing Title:

General Location of Sub-Projects

Drawing Number:

Figure 1.1

2 Policy and Legal Framework in Pakistan

2.1 General

14. This section provides an overview of the policy framework and national legislation that applies to the proposed sub-projects. The sub-projects are 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

15. 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-projects are pollution prevention and abatement and increasing energy efficiency while conserving biodiversity.

16. 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

17. 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

18. 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

19. 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-projects 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

20. 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;

21. 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's Safeguard Policy Statement (SPS), 2009

22. 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.

23. All 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).

24. As a result of the completion of the REA checklists, the three sub-projects have been together classified as Category ‘‘B’’ and thus a detailed and comprehensive IEE study has been prepared including the EMP.

2.8 Other Environment Related Legislations

25. 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
Punjab Environmental Protection Act, 2012	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.
Pakistan Environmental Protection act (PEPA) 1997	Basic legislative tool empowering the Government of Pakistan to frame and enforce regulations for the protection of environment. The PEPA 1997 is broadly applicable to air, water, soil, marine and noise pollution, and handling of hazardous wastes. Penalties have been prescribed for those contravening provisions of the Act. Under section 12 of the PEPA 1997, no project involving construction activities or any change in the physical environment can be undertaken unless an IEE or EIA is conducted and a report submitted to the federal or provincial EPA.

Legislation/Guideline	Description
Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, (2000)	The Regulation classifies projects on the basis of expected degree of adverse environmental impacts and lists them in two separate schedules. Schedule I lists projects that may not have significant environmental impacts and therefore require an IEE. Schedule II lists projects of potentially significant environmental impacts requiring preparation of an EIA. The Regulations also require that all projects located in environmentally sensitive areas require preparation of an EIA. It also lists projects not requiring either an EIA or an IEE.
National Environmental Quality Standards (1993 and 2000)	The NEQS specify standards for industrial and municipal effluents, gaseous emissions, ambient air requirements and emission levels for Sulfur dioxide and Nitrogen oxide, vehicular emissions and noise levels. The PEPA specifies the imposition of a pollution charge in case of non-compliance with the NEQS. The standards were last revised in 2000.
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 forest is situated in the three Project areas.
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 project.
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 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,

Legislation/Guideline	Description
	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 Conservation	There is a well-established framework for environmental 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 Project.
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.
INTERNATIONAL ENVIRONMENTAL GUIDELINES	
ADB's Safeguard Policy Statement (SPS), 2009	ADB's Safeguard Policy Statement (SPS), 2009 provides guidelines for environmental assessments of development projects. These guidelines help prospective projects identify impacts they will have on various environmental receptors. The guidelines call for carrying out EIAs or IEEs of projects based on severity of their impacts.

3 Description of the Project

3.1 Type of Project

26. The sub-projects in this IEE are all improvements to the existing equipment that supports the power distribution network at three (3) existing distribution grid sub-stations/grid stations that have been prioritized by NTDC and selected to be included in the MFF Tranche I.

27. The sub-projects include two 'extension' and one 'extension and augmentation' activities (**Table 3.1**). The environmental assessments that have been carried out follow *ADB SPS 2009* and GoP's environmental assessment regulations and guidelines.

Table 3.1: Details of Sub-projects

Project Name	Brief Description
Extension at 500 kV Lahore South Grid Station	▪ 1x750 MVA 500/220kV Transformer along with allied equipment and accessories. ▪ Two 500kV Line Bays
Extension at 500 kV Sahiwal Grid Station	▪ 1x600 MVA, 500/220 kV transformer along with allied equipment and accessories.
Extension & Augmentation of 500/220kV Rewat Substation	▪ One 220/132 kV 250MVA transformer along with allied equipment for extension at Rewat. ▪ Replacement of one existing 220/132kV 160 MVA transformers by one 220/132 kV 250MVA T/Fs.

3.2 Objective of Sub-Projects

28. The objective of conducting the proposed activities at the three sub-projects is to enhance the respective capacities of the NTDCL system through extension and/or augmentation at the three sub-stations/grid stations. The development of the proposed project will also result in:

- Increase in the transformation capacity to meet future load growth.
- Improvement in power supply position of relevant DISCOs.
- Improvement in reliability of NTDCL system networks.

3.3 Categorization of Sub-Projects

29. Categorization is based on the most environmentally sensitive component of the Project and therefore the three sub-projects at the existing sub-stations/grid stations are categorized as Category 'B'.

30. At this stage, the methods to install new transformers or replace existing transformers or add Line Bays are fairly well defined. There are a few, if any, potentially significant environmental impacts and the works will be conducted within the three sub-stations/grid stations and will not encroach on any land outside the sub-stations/grid station. There is no foreseeable significant disturbance outside the sub-stations/grid stations and waste disposal shall not involve significant impacts if routine environmental management procedures and engineering controls are implemented thoroughly.

31. The aspects of the three sub-projects with potential for any likely environmental impacts have been assessed, focusing on significant impacts from the extension and augmentation and any knock on effects from impacts such as waste disposal.

3.4 Need for Sub-Projects

32. 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.

33. These MFF Tranche 1 sub-projects 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-projects 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-projects 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.

34. In order 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.[1]

35. 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.

[1] NTDC (2014), 'PC-1 document for Sub-projects'

36. The proposed scheme of extension and augmentation will help remove power shortage problem of these three areas, provide relief to overloaded transformers in the vicinity and improve the voltage profile and significant loss reduction.

3.5 Location and Scale of Project

37. The extension and augmentation projects will all be within the three existing sub-station/grid stations (**Figures 3.1, 3.2 and 3.3**) and will not encroach on any land outside the sub-stations/grid stations.

38. **Rewat Substation:** This substation is located in Murree tehsil in Rawalpindi district of Punjab province. Its location map is provided as **Figure 3.1** below.

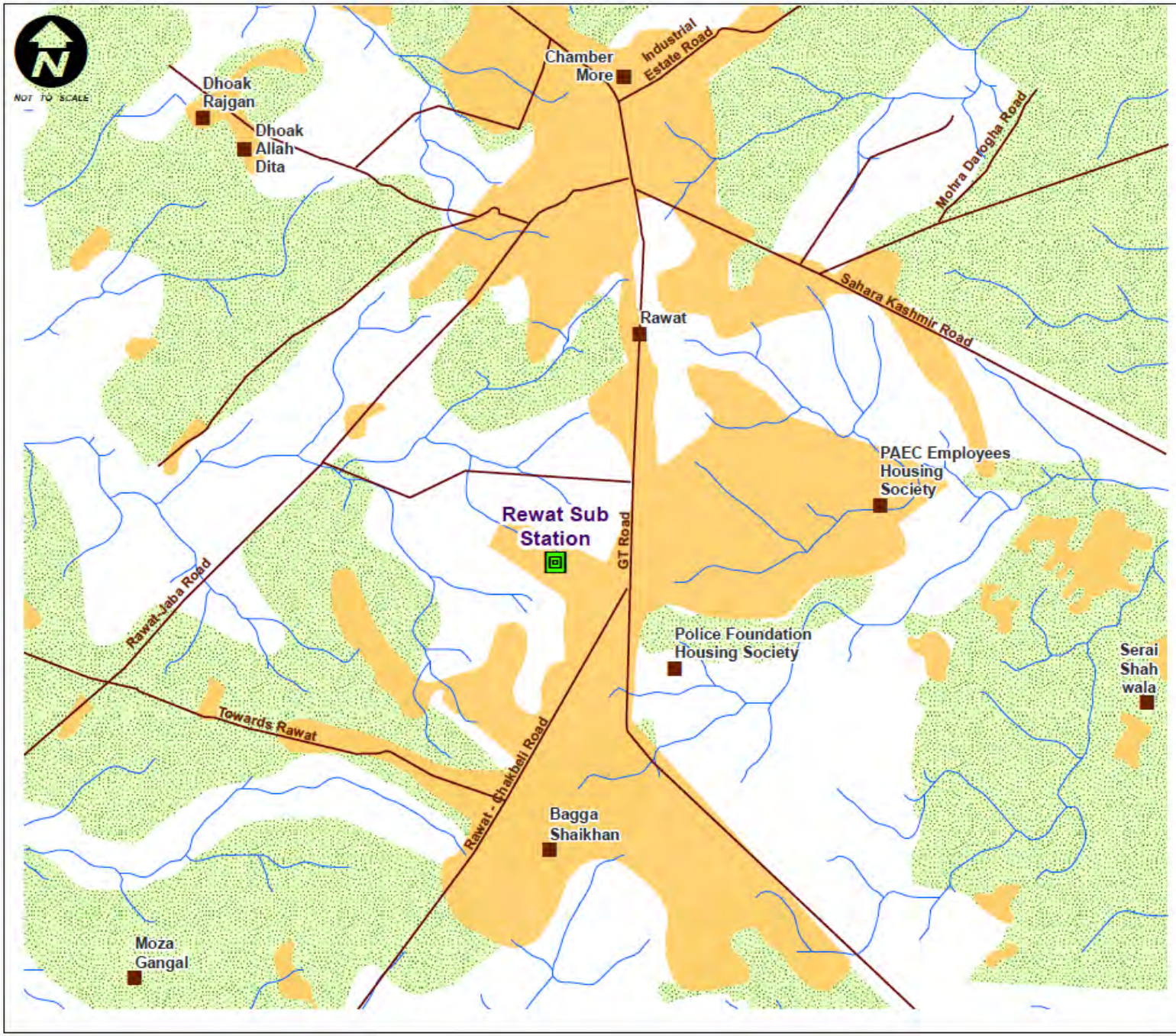
39. **Lahore South Grid Station:** This Grid station is an extension of a newly built substation and is located next to the Manga Raiwind road. This Grid station is located in Tehsil Raiwind in Kasur District of Punjab province. Its location map is provided as **Figure 3.2** below.

40. **Sahiwal Grid Station:** This Grid station is located in Sahiwal tehsil in Punjab province of Pakistan. Its location map is provided as **Figure 3.3** below.

41. Sufficient space and basic infrastructure are available within the existing sub-stations/grid stations. However, civil works for the installation of proposed equipment (transformers & allied equipment, line bays etc.) will be conducted in a limited space.

42. The extension sub-projects will involve the delivery and connection of an additional transformer in line with other transformers within the available space in an existing sub-station/grid station.

43. The augmentation sub-projects will replace an existing transformer in an existing sub-station/grid station with a transformer of a higher capacity. The transformer that is replaced will not be wasted but will be removed and transferred to another facility where it will be reconditioned, stored and eventually transferred to another sub-station/ grid station to be reused.



Project:

Extension & Augmentation of 500/220 kV Rewat Substation

Drawing Title:

Project Area Map of Rewat Sub-project

Drawing Number:

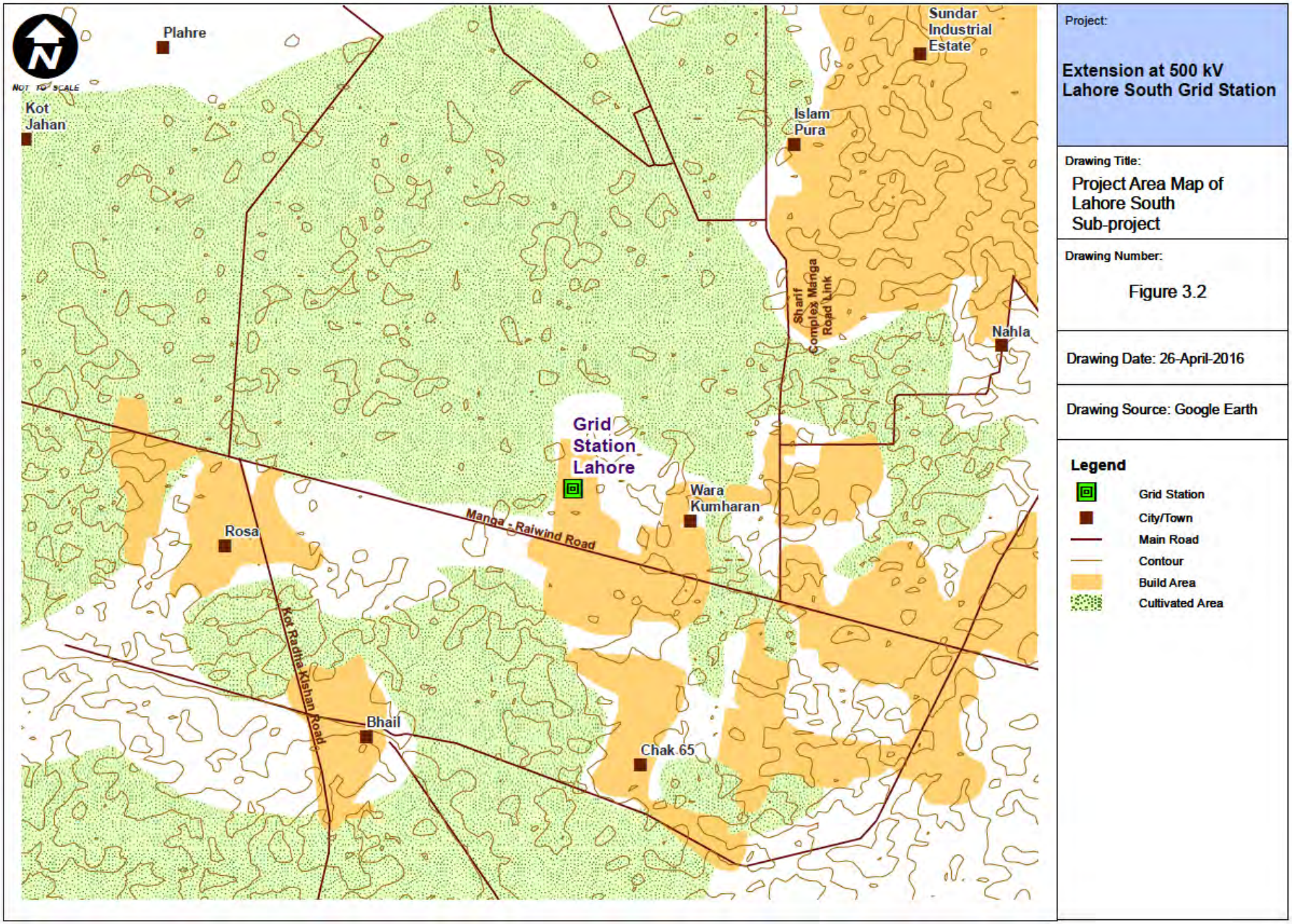
Figure 3.1

Drawing Date: 26-April-2016

Drawing Source: Google Earth

Legend

- Grid Station
- City/Town
- Main Road
- Streams Network
- Build Area
- Cultivated Area


NOT TO SCALE
Plahre
Kot Jahan
Sundar Industrial Estate
Islam Pura
Sharif Complex Manga Road Link
Nahla
Grid Station Lahore
Wara Kumharan
Manga - Raiwind Road
Rosa
Kot Radha Kishan Road
Bhail
Chak 65
Project:
Extension at 500 kV Lahore South Grid Station
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Project Area Map of Lahore South Sub-project
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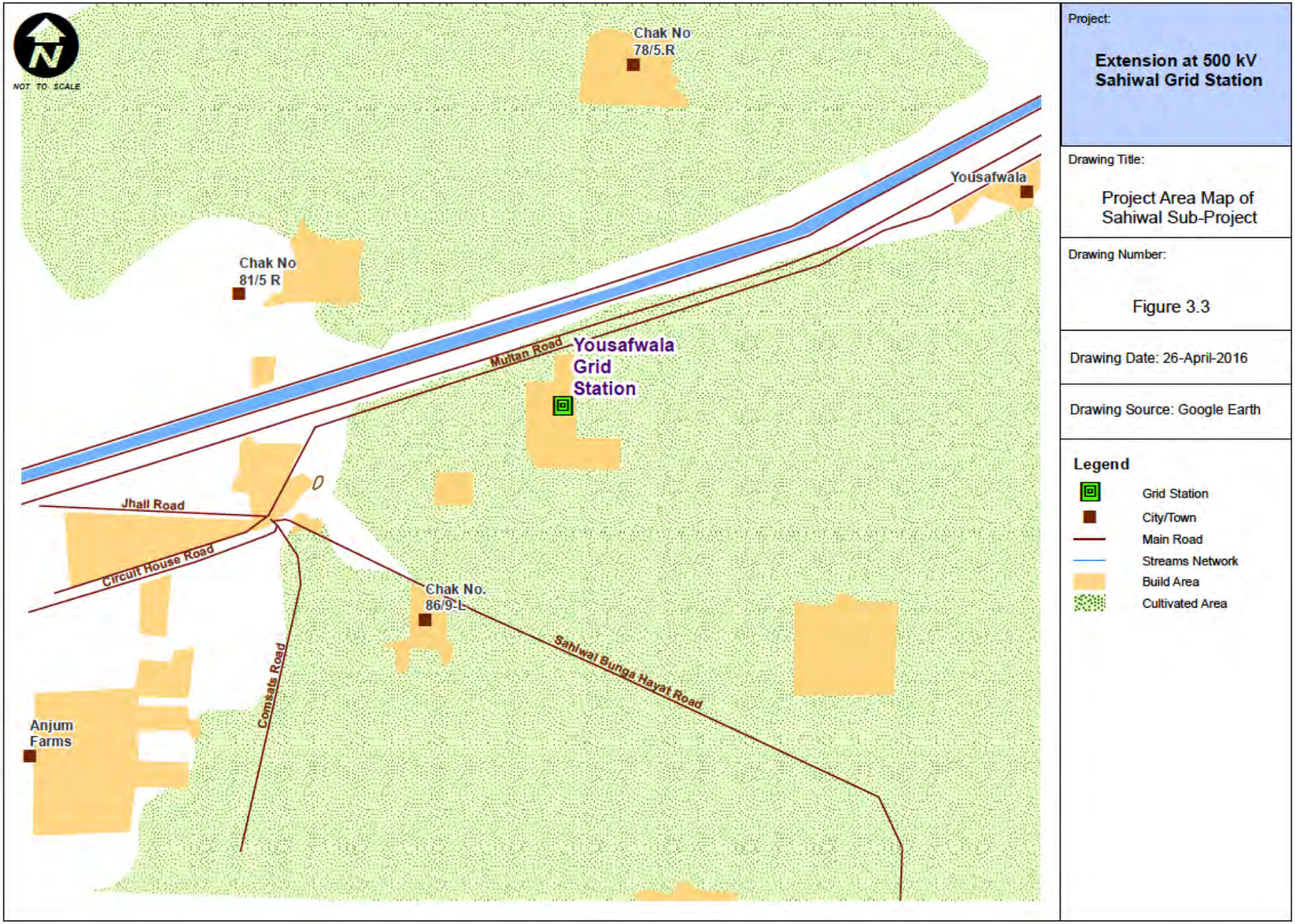
Drawing Date: 26-April-2016
Drawing Source: Google Earth
Legend
Grid Station
City/Town
Main Road
Contour
Build Area
Cultivated Area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Grid
Station
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Circuit House Road
Chak No.
86/9-L
Comsats Road
Sahiwal Bunga Hayat Road
Anjum
Farms
Project:
Extension at 500 kV
Sahiwal Grid Station
Drawing Title:
Project Area Map of
Sahiwal Sub-Project
Drawing Number:
Figure 3.3
Drawing Date: 26-April-2016
Drawing Source: Google Earth
Legend
Grid Station
City/Town
Main Road
Streams Network
Build Area
Cultivated Area

3.6 Key Components of Sub-Projects

44. **Rewat Sub-station:** The activities to be conducted for this sub-project are as follows:

- One 220/132 kV 250 MVA transformer along with allied equipment for extension at Rewat.
- Replacement of one existing 220/132 kV 160 MVA transformers by one 220/132 kV 250 MVA T/Fs.

45. **Sahiwal Grid Station:** The activities to be conducted for this sub-project are as follows:

- 1x600 MVA, 500/220 kV transformer along with allied equipment and accessories.

46. **Lahore South Grid Station:** The activities to be conducted for this sub-project are as follows:

- 1x750 MVA 500/ 220 kV Transformer along with allied equipment and accessories.
- Two 500 kV Line Bays to accommodate power transfer from a double circuit line coming into Lahore South.

3.7 Project Alternatives

3.7.1 Management Alternatives

No Project Alternative

47. 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.

48. The proposed sub-projects seek to upgrade the existing sub-stations/grid stations through extension and/or augmentation. The proposed works will provide the requisite relief to the over-loaded system, while also accommodating additional load. The proposed works will also reduce the line losses and power breakdowns.

49. In case these proposed sub-projects are not conducted, the system will not be able to cope with the increasing demand, the existing system will remain overloaded, line losses will remain high and the system reliability will progressively decrease, with increasing pressure on the system. The power utility will also forego the opportunity

of increasing its consumers as well as revenue associated with the system expansion.

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

3.7.2 Siting Alternative

50. The proposed works at the three sub-projects are planned to be executed at the existing grid station, hence no siting alternatives need be considered.

3.7.3 Technical Alternatives

Type of Transformer Oil

51. Traditionally, transformer oil is meant for providing insulation and cooling of the transformers winding – used to contain poly-chlorinated biphenyls (PCB), a man made chemical known for its highly toxic, and more importantly, chemical stability. Hence, this chemical would not decompose or disintegrate naturally. Due to this property of PCB, it was included in the group of chemicals collectively known as persistent organic pollutants (POPs).

52. Although production and use of the PCB containing transformer oil is not allowed anymore in the west, it is still being used locally. In view of their extremely harmful effects, use of this oil is not preferred option for all applications, including the proposed sub-projects. NTDC specifications for the procurement of transformers clearly mention that the transformer oil should be PCB free. Hence, the equipment purchased as part of these proposed sub-projects would be PCB-free.

3.8 Decommissioning and Disposal of Materials

53. Decommissioning and disposal of discarded material from the subprojects will be recycled and reused within the NTDC system. No waste will be generated that can be classified as hazardous and requiring special disposal. In addition, in cases where any old transformers are to be replaced, they shall not be disposed off or discarded and would be recycled and reused within the NTDC system.

As a policy, WAPDA has stopped using transformers that contain PCBs since 1969.

4 Description of Environment

4.1 General

54. The proposed sub-projects are spread over Punjab province with the Lahore South and Sahiwal sub-projects located in close proximity while the Rewat sub-project is located in the outskirts of Rawalpindi city. The Rewat sub-station is located in Murree tehsil in Rawalpindi district of Punjab province while the Lahore South Grid station is located in Tehsil Raiwind in Kasur district of Punjab province. The Sahiwal Grid station is located in Sahiwal tehsil of Sahiwal district of Punjab province.

55. Since the general characteristics of the project areas of the Lahore South and Sahiwal sub-projects are generally very similar, thus they can be combined while the Rewat sub-project can be categorized separately as shown below:

- **Project Area Environment 'A'**: Rewat Sub-Project
- **Project Area Environment 'B':** Lahore South & Sahiwal Sub-projects

56. The detailed description of both these types of Project Area environments are provided separately below.

Project Area Environment 'A': Rewat Sub-Project

4.2 Physical Resources

4.2.1 Topography

57. The area is of late Pleistocene age derived from mixed calcareous stratification. The sub-project site consists of generally flat land will minimal vegetation cover.

4.2.2 Climate

58. The sub-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 summers, June is the hottest while January is the coldest month of the year.

59. 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.

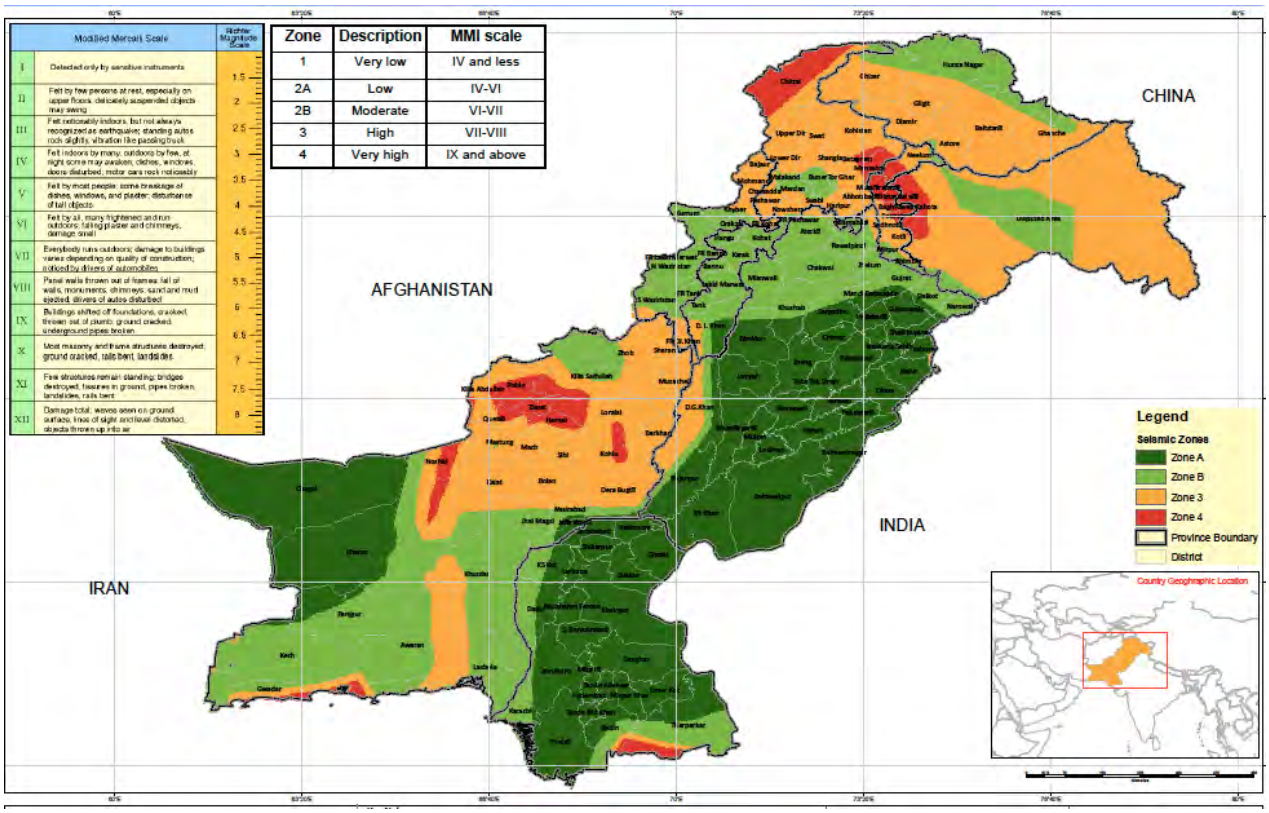
4.2.3 Geology and Soils

60. 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.

4.2.4 Seismology

61. As the sub-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 of 2 and 3 on the Richter scale are experienced from time to time. The seismic zone map of Pakistan is shown in **Figure 4.1** below. As can be observed, the project location lies in the green colored 'Zone 2B' which depicts moderate risk.

Figure 4.1: Seismic Zones of Pakistan



4.2.5 Surface and Groundwater

62. The nearest water body to the project location is the Nullah Lai, flowing through Rawalpindi city with a catchment area of approximately 235 km^2.

63. 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.

4.2.6 Noise

64. Ambient noise levels are generally quite high in the project area due to the GT road with a high volume of traffic throughout the day with a minor reduction in traffic volume observed during nighttime. Noise level measurements along the GT road recorded at three different sampling points showed the average ambient noise level recorded along the GT road to be 74 dB (A).

4.3 Ecological Resources

4.3.1 Flora

65. The flora present in the sub-project area is provided in the **Table 4.1** below.

Table 4.1: Existing Flora in Rewat Sub-Project Area

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			
Karir, Tree	Prosopis spicigera	**Dailay, Shrub/Small Tree**	Capparies aphylla
Peeloo, Tree	Salvadora oboides	**Nalla, Shrub**	Zizyphus mummularia
Wun, Tree	Salvodora persica		

4.3.2 Fauna (Regional)

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

Table 4.2: Existing Fauna in Project Area

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

4.4 Human and Economic Development

4.4.1 Adjacent Communities

67. The inhabitants in the area fall into socioeconomic strata varying from poor to rich. The entire area in the vicinity of the project has 4 primary schools (2 for girls and 2 for boys), 2 secondary schools (1 for boys and 1 for girls) and 1 college for boys,

mosques, health care centre, veterinary clinics and a large number of small grocery markets. The inhabitants have access to clean drinking water from hand pumps and motor operated pumps. There are inadequate health and sanitation facilities. Much of the area is dotted with agricultural fields which support both crop and livestock production, including cattle, goats and sheep. The majority of farmers within the immediate area appear to prefer horticulture to traditional agronomic crops. Sugarcane is raised for sugar mills. Along the G.T road, there 130 plant nurseries that supply ornamental plants all over the country.

4.4.2 Administrative Setup

68. The sub-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).

4.4.3 Religion

69. 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.

4.4.4 Languages

70. The mother tongue in the area is Punjabi with Urdu spoken as the national language. Majority of the communities possess basic English skills while Pushto is also spoken to some extent.

4.4.5 Occupations

71. The majority of males and females work in agricultural field 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.

4.4.6 Education

72. 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.

4.4.7 Archaeological and Cultural Heritage

73. 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.

4.4.8 Health Care

74. There is a Basic Health Unit (BHU) in the sub-project area being run by the GoP. No arrangement for antenatal problems exists. There are 2 Hakims (traditional doctors) and 1 Homeopathic practitioner. The inhabitants have to travel to Rawalpindi or Islamabad as the nearest major cities if treatment is sought for any serious medical problems.

4.4.9 Energy Supplies

75. 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.

4.4.10 Communication

76. Majority of the community members posses 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.

4.5 Climate Vulnerability of Sub-Project

77. The activities to be conducted for development of the 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.

Project Area Environment 'B': Lahore South & Sahiwal Sub-projects

4.6 Topography, Geography, Geology and Soils

78. The Sahiwal and Kasur districts have no hills or mountains of any kind. The general height of the area is 150-200m above sea level. The only minerals of value are Kallar and Kankar. They are used to to manufacture crude saltpeter and also as manure for top dressing of young cotton and tobacco plants. The soil is very different in character and generally inclined to be dry. However, it is rich in plant nutrients.

4.7 Climate and Hydrology

79. There is negligible variation of altitude above sea level in the area over which these two sub-projects are located, which means no variation between the climates of these two sub-project areas. The climate in general is typical of that of Central Punjab.

80. The maximum temperature in summers reaches 51°C. In winters, the minimum temperature is 1°C. The mean maximum and minimum temperatures in summers are 41°C and 27°C, while in winters it is 19°C and 4°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.

81. The rainy season starts in July and ends in September. Annual rainfall is 628.7 mm. More rain occurs in July and August than any other months. Most of the winter rains are received in the months of January, February and March.

4.8 Groundwater and Water Supply

82. Around 6.5 percent of the housing units in these two districts are using piped water with the majority of these having this facility in their own houses. The majority (over 90 percent) are using hand pumps for obtaining potable water. Just 0.2 percent of the households are using potable water taken out from wells. Irrigation canals, tube wells and wells (Persian wheels) are the main source of irrigation.

83. The canal network consists of Sahiwal canal, Rangpur canal and the tail of the Thal canal. All the canals are seasonal and supply irrigation water during summers and for a very short period during winters. The agriculture therefore depends on irrigation through tube wells or wells. Tube wells are sunk in public as well as private sector. There are over 1700 tube wells installed privately for irrigation, which are being operated through subsidy given by the agriculture department. In the public sector, there are over 18,000 tube wells engaged in irrigation activity.

84. Irrigation supplies are seasonal and tube wells are installed. The strata of the project areas of these two sub-projects are water bearing with sandy deposits, giving groundwater potential throughout the district. The water table is not seasonal and dug wells do not generally run dry. Ground water sources exist in the area and potable water is available. The local population is generally reliant on supply from the hand pumps in rural areas while in urban areas, the population is using drinking water from piped water supply schemes.

4.9 Surface Water

Rivers and Tributaries

85. Sahiwal can be divided by rivers and two major canals flowing through the district with riverine area and the canal irrigated plain both present in the district. The riverine area of the district lies close to the river, which flows in the North-West

direction, along its border with Okara. The land in this area is irrigated by non-perennial canals. During the summer monsoons, the area is generally inundated by the river water. The canal irrigated area is a plain which has been brought under cultivation by the canals.

4.10 Air Quality

86. The air quality in these two sub-project areas appears good based on observation during the study period. Emissions, if any, shall be controlled at source under the EMP. There will be a few items of powered mechanical equipment to be used in the proposed works that may give rise to limited quantities of dust and other emissions. However, these should be minor and easily dissipated. 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.

87. Although there are some industries in the project areas of the two sub-projects, however there are no other industrial pollution sources. The project areas are 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 two project areas appeared good during the study period.

88. Generally, the air quality in the subproject areas appeared good during the study period. It should be possible to control and manage emissions from project activities at source, under the EMP.

4.11 Noise and Vibration

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 but there are no significant disturbances to the typical setting.

90. Noise from construction of the improvements to substations/grid stations is not covered under any regulation. However, in order to keep in line with best international practice, it is recommended that no construction should be allowed during night time (9 PM to 6 AM) and 70dB(A) Leq should be the criterion at other times during the day measured at the boundaries of land from which construction noise is emitted.

91. Noise and vibration from compaction during construction of foundations may be a significant local impact, but there are no habitations so close to the works that they would be expected to be affected significantly.

4.12 Ecological Resources

Existing Fauna

92. Wild pig is extremely common, particularly in Sahiwal district, especially on the banks of the river. Ravine deer is found on the banks of the river Indus. Other

mammals found occasionally include jackals, foxes, porcupines and mongoose etc and smaller animals and rodents such as squirrels, rats, mice and bats. Reptiles and amphibians include many kinds of lizards, geckos, and snakes, frogs, toads, and turtles etc. Common species of birds found in these two districts include the common house sparrow, crow, pigeon, dove, yellow and white eyed myenas, weaver bird, parrot, quail, humming bird, babblers, bulbul, the Indian roller, Indian robin, common kite, herons and egrets etc. Some water birds such as pintail, mallard, and teal etc, and seasonal visitors like swallows, bee-eaters, quails and starlings etc. are also present in these two districts. Some local fishing takes place in these districts.

Vegetation Cover and Trees

93. Flora of these two districts have been greatly modified by human interventions. Few of the old open forests of small trees and shrubs now remain in Rakhs or portions of forests, which are kept as grazing grounds for cattle etc.

94. Among fruit trees grown in these two districts, mango, guava and orange are important and are grown in the form of gardens. The mangoes are superior in quality and are largely produced and exported. Mango gardens are common all over these two districts, but those around the towns of Sahiwal are particularly productive. Talhi (Dalbergia sissoo), Kikar (Acacia arbica), Sharin (Albizzia lebbek), Jand (Prospopis spicigera), Beri (Zizyphus jajaba) and the Phog are the major plants grown all over these two districts.

95. There is wild growth of mesquite bushes and some eucalyptus trees in the project areas but natural forest cover in these two districts has been significantly reduced in the past. Some of the older stands of trees, especially fruit trees, still survive the onslaught of urbanization on this previously natural and agricultural area.

96. Typically, land adjacent to substations is agricultural land. The extension works will be carried out in vacant areas allocated for the purpose in the yards of the sub-stations/grid stations, which are normally covered with cobbles and stones. Augmentation will take place by replacing a transformer on the existing foundation.

Protected and Religious Trees

97. There are no protected or religious trees at the two sub-station/grid station sites. The works, however, must deal with any trees that need to be lopped or removed for safety reasons, with the necessary permissions.

4.13 Economic Development

4.13.1 Agriculture and Industries

98. **Cropping Pattern:** Cotton, Wheat, Rice and sugar cane are the cash crops of these two districts. Amongst the fruits, mango and guava are also sources of income for the agriculture community.

99. **Horticulture:** The main fruits grown in the area are mangoes, citrus and orange gardens found in both districts. However, these districts are famous for mangoes.

100. Industries in these two districts include cotton ginning and pressing, tanning, textile spinning, weaving, leather products, garments, pharmaceuticals, flour mills, food processing, oil mills, cold storage, potato, tobacco, vegetable ghee/cooking oil and chip board etc. In Sahiwal district, the Zebu dairy breed of cattle has originated from here and are found now throughout the tropics.

101. Both these districts are not linked by air with other parts of the country with the closest airport being the Multan airport.

4.14 Energy Sources

102. More than 78 percent of the housing units are using wood as cooking fuel in their houses while about 4 percent are using gas for their use. About 2 percent are using kerosene oil and remaining 16 percent are using other sources of cooking fuel in their houses.

4.15 Social and Cultural Resources

4.15.1 Communities and Employment

103. Both these districts are predominantly Muslims i.e. 99 percent. The next highest percentage is of Christians with 0.3 percent followed by other communities such as Ahmadi and Hindu (Jati) etc. There is a small difference in proportion of population of Muslims between rural and urban areas. Christians are mostly living in urban areas representing 0.5 percent as compared to 0.2 percent in rural areas.

104. Saraiki is the predominant language being spoken in these two districts, representing 86 percent of the population, followed by Punjabi (7 percent), Urdu (2 percent) and Pashto (1 percent). The remaining people speak Sindhi, Balochi, Bravi and Dari etc.

105. The average total economically active population is 89.3 percent as registered in the 1998 Census survey for these two districts.. Nearly three fifths i.e. 60.8 percent were self employed, 19.5 percent were private employees and 5 percent were Government employees. Unpaid family helpers were recorded at 1.07 percent. The difference in proportions of employed population was significant between the genders and urban and rural residences.

5 Potential Environmental Impacts and Mitigation Measures

106. This chapter presents the potential environmental impacts related to construction and operation phases of the proposed sub-projects. 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

107. The Tranche 1 extension and augmentation sub-projects will involve extension/augmentation of facilities within existing sub-stations/grid stations and in all three cases, the sensitive receivers (SR) are set well back from the power equipment outside the sub-station/grid station boundaries.

108. 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, if any, in the spirit of the environmental assessments process.

In this section, the potential environmental impacts are reviewed. If impacts are predicted to be significant enough to exceed accepted environmental standards, mitigation is proposed in order to reduce residual impact to acceptable levels and achieve the expected outcomes of the sub-projects being implemented. Therefore, it is essential that a proper analysis is carried out during the project planning period. In this regard, the impact prediction plays a vital role as these predictions are used for developing mitigation measures and any alternative options, if appropriate. Once the detailed designs are completed, the impacts and mitigation measures will need to be further reviewed to take account of how the contracts are set up and in the light of any fine tuning of the sub-projects.

109. The environmental management plan (**Table 6.4**) 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 feed back and provide updated mitigation requirements for any significant unpredicted impacts. The analysis primarily focuses on the key environmental issues likely to arise from each 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.

The EMP plan must be reviewed when the sub-projects reach 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

110. During the preparation of the construction phase for these three sub-projects, 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.

The effective implementation of the EMP will be audited as part of the loan conditions and the executing agency (NTDC) must be prepared for this. In this regard, the project must fulfill the requirements of the law and guidance prepared by the relevant EPAs on the environmental aspects of power projects and the recommendations already made for sub-projects in this IEE and under Pakistan's PEPA Act law.

111. Based on the visits to the sub-project sites, it has been observed that no residences and/or schools are close enough to the three sub-projects to result in any potential impacts in the construction stage from disturbance or significant noise and dust. Water is available at the three sub-project areas to suppress dust at any location in the dry season. However, major dust impacts shall not arise from the scale of works envisaged.

5.3 Prevention of Ground Contamination

112. Best international practice includes control measures to contain oily residues. Transformer oil and lubricants that may be released in the operational stage from maintenance and from a catastrophic failure that would result in loss of all transformer oil. Transformer oil is supplied in drums from an imported source and tap tanks are topped up as necessary on site. There are also facilities in some sub-project maintenance yards for recycling (dehydrating) oil for breakers.

113. The transformers, transformer oil stocks and the transformer oil dehydration machines are not installed on impervious surfaces. Therefore, in order to be in line with best international practice, some mitigation measures are required to prevent soil contamination.

114. The areas upon which the new transformers, transformer oil stocks and the transformer oil dehydration machines will be located should have an impervious surface with bunds and high enough edges to capture 110% of the total volume of oil that is housed within the bunded area **(Annexure IV).** Oil and oily residues should therefore be captured at source and maintenance should take place in these dedicated areas away from surface water resources.

With such mitigation installed, no impacts should arise at any of the sub-projects. A programe to introduce bunding in all substations should be introduced in the medium to long term as the transformers are upgraded or replaced as resources permit.

5.4 Cultural Heritage, Religious Sites, Social Infrastructure

115. The location of cultural and other heritage sites with respect to the sub-projects has been reviewed in **Section 3**. No temples or religious sites are in close proximity to the works in the sub-station/grid station as to cause a nuisance. There will be sufficient buffer distance between the works and the SR such that no major significant impact would be expected from the works.

However, provision should be made for public consultation to be undertaken at the implementation stage to ensure no nuisances arise.

116. The clinic/hospitals are all well separated from the boundary walls of the sub-projects/grid stations and there will be sufficient buffer distance between the works and the SR such that no major significant impact would be expected from the works. However, consideration should be made not to construct at night to avoid nuisances.

117. There are no schools or communities residing in close proximity to the boundary walls of the sub-projects. This along with considering the limited scale of the works for the proposed sub-projects, no significant impacts can be expected from the works, particularly in terms of noise, vibration and dust. However, provision should be made for public consultation to be undertaken at the implementation stage to ensure no nuisances arise.

5.5 Potential Environmental Impacts during Construction

5.5.1 Encroachment, Landscape and Physical Disfiguration

118. The extent of Tranche 1 extension and augmentation sub-projects is well within the existing boundary walls of each sub-station/grid station. Therefore, no additional encroachment, landscape or impacts associated with physical disfiguration of the rural landscape are expected from the construction activity.

119. Potential disfiguration of the landscape can however result from the uncontrolled excavation of raw materials such as rock, gravel and sand from neighboring areas. Extraction of rock-based materials is not necessary for these sub-projects and is already banned by the authorities except under license.

5.5.2 Cut and Fill and Waste Disposal

120. The Tranche 1 extension and augmentation sub-projects should not require any significant cutting and filling but minor excavations and piling may be required in some of the sub-stations/grid stations where the new transformers are to be located to create the footings.

121. Mitigation measures must focus on the minimization of impacts. If surplus materials arise from the removal of the existing surfaces, these can be used elsewhere at each sub-project before sourcing additional soil rock, gravel or sand extraction is considered. The use of this immediately available material will minimize

the need for additional rock based materials extraction. The extraction of raw materials should be minimized by the re-use on-site for landscaping of all rock and soil based materials extracted for excavation of foundations etc.

122. If off-site disposal of surplus materials is necessary, this must also be negotiated through local authority approvals prior to the commencement of construction.

123. Contractual clauses should be included to require each Contractor to produce a materials management plan (one month before construction commences) to identify all sources of cement and aggregates and to balance cut and fill. The plan should clearly state the methods to be employed prior to and during the extraction of materials and all the mitigation measures to be employed to mitigate nuisances to local residents. Mitigation measures shall seek to control the impacts at source in the first place. The Construction Supervising Consultant (engineer) shall be responsible to update the cut and fill estimates and create Materials Master Plan to facilitate materials exchange between the different contracts in the Tranche 1 sub-projects to provide an overall balance for materials and minimize impacts on local resources.

5.5.3 Trees, Ecology and Protected Areas

124. During the field visits and surveys at the three sub-project sites, it was observed that there are no trees present at the project site where the activity needs to be conducted and thus, there shall not be any need for disturbance of trees.

125. If for some unforeseen reason, any trees do need to be removed, permission shall be obtained from the forest authority after written justification.

126. A requirement shall be inserted in the Contracts that no trees are to be cut in the sub-stations/grid stations without the written permission from the Supervising Consultant who may permit the removal of trees, if unavoidable, on safety and technical engineering grounds after written justification.

5.5.4 Hydrology, Sedimentation, Soil Erosion

127. The Tranche 1 extension and augmentation sub-projects are all on flat sites and should only require minor excavations and piling. Therefore, there is little potential for the works to have impact on local water resources. There should not be any need for erosion control and there should not be any significant runoff from stockpiles.

5.5.5 Air pollution from Rock Crushing, Cut, Fill & Asphalt

128. Field observations indicate that ambient air quality is generally acceptable considering the rural and urban fringe environments where the Tranche 1 sub-

projects are located. Any local emissions from powered mechanical equipment needed for the construction will to be rapidly dispersed and no impacts are expected.

129. Major earthworks are not envisaged but minor excavations and piling will be required at the sub-stations/grid stations where the new transformers are to be located and to create the footings and bunds for containment of leaked oily waste. Where earthworks are required, they will contribute to increasing dust. However, the scale of the works at any one location is not likely to cause excessive dust. Therefore, dust control from works at this scale should be easy to achieve at little extra cost in order to avoid complaints of dust nuisances. The following mitigation measures should be carried out as a matter of good housekeeping:

(i) Dust suppression facilities (backpack water sprayer) shall be available where earth and cement works are required.

(ii) Areas of construction (especially where the works are within 20m of the sensitive receptors, if applicable) shall be maintained damp by watering the construction area.

(iii) Construction materials (sand, gravel, and rocks) and spoil materials will be transported in trucks covered with tarpaulins.

(iv) Storage piles will be at least 30m downwind of the nearest human settlements.

(v) All vehicles (e.g. trucks, equipment, and other vehicles that support construction works) shall be well maintained and not emit dark or smoky emissions in excess of the limits described in the NEQS.

130. The need for large stockpiles should be minimized by careful planning of the supply of materials from controlled sources. If large stockpiles (>25m^3) are necessary, they should be enclosed with side barriers and covered with tarpaulins when not in use and at the end of the working day to enclose dust.

131. Bitumen will not generally be required. If bituminous compounds are to be applied by hand labor methods and melted in heaters, the fuel used shall be kerosene, diesel or gas fuel. Fuel wood shall not be used for heating bitumen; neither should bitumen be used as fuel.

132. Bitumen drums should be stored in a dedicated area, not scattered around the sub-projects and any small accidental spills of bitumen or chemicals should be cleaned up immediately. The waste including the top 2cm of any contaminated soil shall be disposed of as chemical waste to an approved landfill or approved local authority disposal site.

5.5.6 Noise, Vibration and Blasting

133. There will be no requirement for blasting for the Tranche 1 extension and augmentation sub-projects. Based on the specific methods for replacement and

installation of transformers or line bays with regard to supporting civil works, piling should not be needed and would not be a preferred method for foundations in vibration sensitive sub-stations/grid stations. Therefore, noise and vibration should not be an issue during the construction activity.

134. Nevertheless, steps may need to be taken to minimize noise from mechanical equipment such as generators, stabilizers and concrete-mixing plant. The cumulative effects from several machines can be significant and may cause significant nuisances. To minimize impacts, the contractors should be required to: maintain and service all equipment to minimize noise levels; locate equipment to minimize nuisances; and if needed, install acoustic insulation or use portable noise barriers where practicable to limit noise at sensitive receivers. Insulation should be provided to minimize noise impacts such that the measured noise at the edge of the works nearest residential areas will be less than 45 dB(A) Leq during night time (10 p.m. to 7 a.m.) and 55 dB(A) Leq at other times during the day.

5.5.7 Sanitation, Solid Waste Disposal, Communicable Diseases

135. The main issues of concern are uncontrolled disposal of waste by construction workers, unmanaged disposal of solid and liquid wastes into watercourses and natural drains. There should not be any significant amounts of waste from the works and because the works will be under close supervision of the relevant NTDC authority within the sub-station/grid station, these issues can be controlled at source.

136. In order to maintain proper sanitation around construction sites, since a small workforce will be engaged for these activities that are limited in scale, these workers will be allowed to use the flush toilet facilities in the sub-station control buildings.

137. Vectors such as mosquitoes should not be a significant consideration bearing in mind the type and scale of works for the sub-projects.

5.5.8 Vehicle and Equipment Exhaust

138. The emissions from vehicles and combustion processes in generators and other construction equipment result in exhaust gases that can affect the ambient air quality locally and pose a health hazard particularly for communities resident in proximity to the project site.

139. 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.

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

5.5.9 Vegetation and Wildlife Loss

141. The vegetation at the sub-project sites is mostly thin and consists primarily of grasses. The construction of the sub-project facilities will require minimal vegetation

removal, if any. Thus, no significant residual impact on the natural vegetation of the area is anticipated.

142. The impact of sub-project activities on the wildlife in the area will be insignificant as all activities will be conducted within the existing boundaries of the sub-station/grid station. Also, all the sub-project areas have a long area of human occupation, to which most of the animal species have adapted over time.

143. It will be ensured that willful killing; trapping and trade of faunal species will be strictly prohibited.

144. Burning of vegetation as fuel will be prohibited.

5.6 Potential Environmental Impacts during Operation

5.6.1 Air pollution and Noise from the enhanced operations

145. Based on observations of many different types of transformers at numerous extension and augmentation sub-project sites, noise and vibration should not be a nuisance to any nearby SRs. The incremental addition to noise levels from the addition of a transformer and allied equipment or line bays will not cause a significant disturbing effect for the SRs in the vicinity of the sub-projects.

146. Some switchgear that may be installed may contain SF6. Typically, losses of the SF6 gas are very minor in the operational phase but it is noted that all halogenated gases can potentially accrue “greenhouse gas effects” if they are released in significant quantities. However, well-installed SF6 equipment should not leak significant amounts of gas and any possible leakage is checked routinely from all such equipment. Six monthly reports are generally made in case there is a need for SF6 to be topped up. The maintenance of the equipment should be geared to achieve a gradual reduction in SF6 usage (leakage) which can therefore be monitored to slowly eradicate any such impacts. If SF6 leakage becomes excessive, the respective equipment will be overhauled to reduce and subsequently eliminate the leakage.

147. If there is a suspicion that there has been a leak of sulphur hexafluoride or by products at any substation or grid station, the immediate area should be evacuated. Also, the controlling engineer must be informed, pending investigation by an authorized person. The atmospheric environmental impacts from SF6 can be mitigated and are not expected to be significant.

5.6.2 Pollution from Oily Run-off, Fuel Spills and Dangerous Goods

148. Control measures will be needed for oily residues such as transformer oil and lubricants. Transformer oil is supplied in drums from an imported source and tap tanks are topped up as necessary on site. There are facilities in some sub-project maintenance yards for recycling (dehydrating) oil for breakers. However, the areas

upon which these recycling facilities are located have no dedicated drainage, which can capture run-off.

Oily residues and fuel should be captured at source and refueling and maintenance should take place in dedicated areas away from surface water resources. No significant impacts should be allowed to arise in sub-projects.

149. If for some reason there are oily releases, they should be cleaned up immediately. The waste including the top 2cm of any contaminated soil should be disposed of as chemical waste to an approved landfill or approved local authority disposal site.

5.6.3 Enhancement

150. Environmental enhancements are not a major consideration within these numerous extension and augmentation sub-project sites. 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 on all sites as far as practicable.

6 Institutional Requirements & Environmental Management Plan

6.1 Introduction

151. The Environmental Management and Monitoring Plan (EMP) is developed to eliminate and/or mitigate the impacts envisaged at the design, construction and operation stages.

152. The detailed EMP provided in this section as **Table 6.4** ensures that the three sub-projects have 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 each 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)

153. 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

154. 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

155. During the construction phase, the overall responsibility for the implementation and monitoring of the EMP rests with the Project Director (PD). The PD through assistance from the Supervision Consultant's Environmental staff and the Environment team of NTDC, will supervise the implementation of the proposed mitigation measures and monitor the implementation progress in the field.

156. The specific roles and responsibilities for environmental management are provided in **Table 6.4** below.

6.5 Institutional Arrangements

157. The proposed project environmental management plan will require involvement of the following organizations for its implementation:

- The Project Management Unit (PMU), which will be established at NTDC, this PMU will be the project proponent and owners of the EMP;
- Project Contractors as executors of the EMP;
- Project Environment Officer (PEO) as environmental monitor of the execution of the EMP.

6.5.1 Role of NTDC's ESIC

158. It is envisaged that the NTDC's Environmental and Social Impact Cell (ESIC) will conduct monitoring of subproject to check the compliance of EMP provisions and will obtain environmental approval from EPA Punjab. 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.

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

- Provide review and technical support to PMU, including review of papers, feasibility studies, appraisal reports and other relevant documents from the perspective of environment and land acquisition and resettlement management, on assignment basis.
- Supervise and scrutinize the consultants' hiring process for environmental and social documents preparation.
- Oversee construction contractors for monitoring and implementing mitigation measures.

- Prepare and implement environment policy guidelines and environmental good practices.
- Provide awareness training workshop on environmental and social issues related to power transmission to PIU staff.
- Prepare bi- annual progress reports on environmental and social safeguards for submission to ADB.
- Provide training workshops on environment safeguards matters.
- Prepare EIAs/IEEs of new projects.
- Seek environmental approvals (NOCs) from respective EPA.

6.5.2 Role of Project Contractor

160. The project contractor will be responsible for following items:

- Implementation of, or adherence to, all provisions of the IEE and EMP;
- 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 Monitoring Parameters

161. A monitoring plan for the construction and operation phases of the project, indicating environmental parameters, frequency and applicable standards is provided below as **Table 6.1** below. Standards set under the NEQS and WHO for the key receptors is also provided as Annexure II.

162. During the pre-construction period, the monitoring activities will focus on (i) checking the contractor's bidding documents, particularly to ensure that all necessary environmental requirements have been included; and (ii) checking that the contract documents' references to environmental mitigation measures requirements have been incorporated as part of contractor's assignment and making sure that any advance works are carried out in good time.

163. During the construction period, the monitoring activities will focus on ensuring that environmental mitigation measures are implemented, and some performance indicators will be monitored to record the Sub-projects environmental performance and to guide any remedial action to address unexpected impacts. Monitoring activities during project operation will focus on recording environmental performance and proposing remedial actions to address unexpected impacts.

164. At this stage, due to the modest scale of these new sub-projects that will be conducted within the boundaries of the existing sub-stations/grid stations, the construction and operational impacts will be manageable. No insurmountable impacts are predicted, providing that the EMP is implemented to its full extent as required in the Contract documents. However, experience suggests that some Contractors may not be familiar with this approach or may be reluctant to carry out

some measures. In order that the Contractors are fully aware of the implications of the EMP and to ensure compliance, it is recommended that environmental measures be costed separately in the tender documentation and that payment milestones are linked to environmental performance, vis a vis the carrying out of the EMP.

165. The effective implementation of the EMP will be audited as part of the loan conditions and the executing agency must be prepared for this. In this regard tNTDC (the IA) must be prepared to guide the design engineers and Contractors on the environmental aspects.

Table 6.1: Environmental Monitoring Plan for each Sub-Project

No.	Environmental Monitoring Tasks	Implementation Responsibility	Implementation Schedule
1	**Design Phase**		
1.1	Audit project bidding documents to ensure IEE and EMP is included.	NTDC	Prior to issuance of bidding documents
1.2	Monitor the performance of environmental training and briefings and environmental awareness of project staff and NTDC	NTDC	Ongoing, prior to and during implementation of Works
2	**Construction Phase**		
2.1	Monitor thorough implementation of detailed EMP	NTDC	During all phases of sub-projects
2.2	Commissioning phase monitoring of as built equipment versus environmental performance criteria	NTDC	At commissioning
3	**Operation and Maintenance Phase**		
3.1	Observations during routine maintenance inspections of facilities. Inspections will include monitoring implementation of operational mitigation measures versus environmental criteria specified in EMP, waste management and operational noise.	NTDC	As per inspection schedules of NTDC

Table 6.2: Capacity Development and Training Programme for each Sub-Project

Provided by	Organized by	Contents	No. of training events	Duration	Cost (PKR)
Pre-construction Phase Monitoring Consultants/Organizations offering specialized services in environmental management and monitoring	Project Director	Short seminars and courses on: Environmental Management Plan and Environmental Monitoring Plan	One seminar for Contractor management staff and NTDC project staff	1 day each	50,000
Construction Phase Monitoring Consultants/Organizations offering specialized services in social management and monitoring	Project Director	Short seminar on Environmental risks associated with construction phase. Development of Environmental Performance Indicators Occupational Health and Safety (OHS) issues	One seminar for Contractor management staff and NTDC project staff dealing in social issues	1 day each	50,000
		Total			**100,000 PKR (PKR 0.1 million)**

6.7 Environmental Management Costs

166. The cost estimates for monitoring during the construction and operation phases are provided below in **Table 6.3** below.

Table 6.3: Summary of Estimated Costs for EMP Implementation for each Sub-Project

Item	Sub-Item	Estimated Total Cost (PKR)	Estimated Total Cost (USD)
Monitoring Activities	As detailed under EMP	200,000	2000
Mitigation Measures	As prescribed under EMP and IEE	200,000	2000
Contingency	3% Contingency	13,500	135
Total			**4135**

Table 6.4: Environmental Management and Monitoring Plan

Project Activities	Section	Impact	Mitigation Measures Recommended	Responsibility		Timing
				Execution	Monitoring	
Design Considerations	1.1	Soil Erosion	• Areas having unstable soil will be avoided for foundation of power transformers at existing grid stations sites. In unavoidable circumstances, soil stabilization is required to avoid the uneven settlement.	GSC	Environment & Safeguard Cell (ESC)	BC: during detailed designing of the project
	1.2	Soil and water Contamination	• Identify sufficient locations for disposal of transformer oil, unsuitable soils and scrap metal etc. • Designate disposal sites in Contracts for cost unit disposal rates accordingly. • Transformer procured for proposed sub-projects will be PCB- free • Leaked oil collection arrangement (such as a channel and a drain pit below the transformers) will be incorporated in the design of the transformer foundations at the sub-stations/grid stations.	GSC	ESC	BC
	1.3	Safety hazards and public health concerns	• All safety precautions will be taken to minimize the safety hazards and risk of accidental electrocution. These will include double periphery walls at existing grid stations and appropriate clearance (between the live wires/connectors and the buildings/structures).	GSC	ESC	BC
	1.4	Noise emissions	• The project equipment, particularly transformers to be installed at the sub-stations/grid stations will meet the noise standards (70 dB(A)) for industrial zones day and night; 45 dB(A) night and 55 dB(A) daytime for residential areas).	GSC	ESC	BC

Project Activities	Section	Impact	Mitigation Measures Recommended	Responsibility		Timing
				Execution	Monitoring	
	1.5	Waste disposal	• Disposal options for all waste, residually contaminated soils, scrap metal agreed with NTDC and local authority. • Transformers containing PCB based oil will not be used.			
Construction Phase	2.1	Orientation for Contractor and Workers	• Engage environmental specialist to monitor the progress in light of all environmental statutory and recommended obligations • Conduct special briefing for managers and/or on-site training for the Contractors and workers on the environmental requirement of each sub-project • Agreement on critical areas to be considered and necessary mitigation measures, among all parties that are involved in the project activities. • Continuous progress review and refresher sessions to be followed	CSC & NTDC	NTDC	DC
	2.2	Dust emissions	• Water will be sprinkled daily of during obvious dust problem on all exposed surfaces to suppress emission of dust. • Construction materials susceptible to dust formation will be transported in securely covered trucks to prevent dust emissions during transportation. • Aggregate material will be delivered to batching plant in damp condition and water sprays will be applied, if needed, to reduce dust emissions. • Minimum distance of 30 meters will be	GSC	CSC and NTDC	DC

Project Activities	Section	Impact	Mitigation Measures Recommended	Responsibility		Timing
				Execution	Monitoring	
			maintained between potential sources of dust such as material stockpiles and batching plants and community.			
Construction Phase (Continued…)	2.3	Construction Waste Disposal	Waste management plan to be submitted to the CSC and approved by NTDC one month prior to starting of works. • Estimating the amounts and types of construction waste to be generated by the activity • Investigating whether the waste can be reused in the project or by other interested parties • Identifying potential safe disposal sites close to the project sites, or those designated sites in the Contract. • 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 burnt. Disposal location to be agreed with local authorities/EPA. • Waste transformer insulating oil to be recycled, reconditioned or reused at an appropriate sub-station or other facility • Machinery should be properly maintained to minimize oil spill during the	GSC	CSC and NTDC	DC

Project Activities	Section	Impact	Mitigation Measures Recommended	Responsibility		Timing
				Execution	Monitoring	
			construction • Solid waste should be disposed at an approved solid waste facility since open burning is illegal and contrary to good environmental practice			
	2.4	Safety Precautions for Workers	• Providing adequate warning signs • Providing workers with skull guard or hard hat and hard toe cap shoes • 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.	GSC	CSC and NTDC	BC, DC
Construction Phase (Continued…)	2.5	Vehicle and equipment exhaust	• All vehicles, generators and other equipment will be properly tuned and maintained in good working condition to minimize emission of pollutants. • Stack height of generators will be at least 3 meters above the ground.	GSC	CSC and NTDC	DC
	2.6	Vegetation and Wildlife Loss	• Willful killing, trapping and trade of faunal species will be strictly prohibited. • Tree plantation will be undertaken at project site to compensate for vegetation lost during construction. • Burning of vegetation as fuel will be prohibited.	GSC	CSC and NTDC	DC

Project Activities	Section	Impact	Mitigation Measures Recommended	Responsibility		Timing
				Execution	Monitoring	
	2.7	Noise	• Maintain and service all equipment to minimize noise levels. • Locate equipment to minimize nuisances. • Install acoustic insulation or use portable noise barriers where practicable to limit noise at sensitive receivers. • All transformers and machinery shall be fitted with acoustic insulation.	GSC	CSC and NTDC	
Operation Phase **Operation Phase (Continued…)**	3.1	Air Pollution	• All switchgear equipment must be well installed and properly insulated to prevent any SF6 leakage • Six monthly reports must be made in case there is a need for SF6 to be topped up • Routine maintenance of switchgear equipment must be conducted. • If SF6 leakage becomes excessive, the respective equipment will be overhauled to reduce and subsequently eliminate the leakage. • If there is a suspicion of an SF6 or its byproducts leak, the immediate area should be evacuated. Also, controlling engineer must be informed, pending investigation by an authorized person.	O&M Contractor	NTDC	DO
	3.2	Pollution from Oily Run-off, Fuel Spills and Dangerous Goods	• Oily residues and fuel should be captured at source. • Refueling and maintenance should take place in dedicated areas away from surface water resources. • If any oily releases, they should be cleaned up immediately.	O&M Contractor	NTDC	DO

Project Activities	Section	Impact	Mitigation Measures Recommended	Responsibility		Timing
				Execution	Monitoring	
			• Waste including the top 2 cm of any contaminated soil should be disposed of as chemical waste to an approved landfill or approved local authority disposal site.			
	3.3	Enhancement	• Create some local hard and soft landscaping and planting of fruit trees and shrubs	O&M Contractor	NTDC	DO

NTDC : National Transmission and Despatch Company

BC : Before Construction

DC : During Construction

DO : During Operation

CSC : Construction Supervision Consultant

GSC : Grid Station Construction (department)

7 Public Consultation and Information Disclosure

7.1 Public Consultations

167. The Tranche 1 extension and augmentation sub-projects the whole of each sub-project in design, construction and operational stages is only likely to affect the areas within the sub-station/grid station premises. There are unlikely to be any significant impacts outside the boundaries of the sub-projects except for perhaps temporary minor inconveniences to traffic when new transformers are transported to site.

168. Since NTDC will be the major relevant stakeholder, during the public consultations with their management, it is confirmed that NTDC are in favor of and support their own sub-project proposals. However, some consultation was also conducted with residents and other stakeholders near the relevant NTDC extension and augmentation sub-projects and the major concerns of the public, based on consultation at the sub-station/grid station projects, seems to be to get employment during the construction phases.

8 Grievance Redress Mechanism

8.1 General

169. 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-projects. 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

170. NTDC will facilitate the establishment of a Grievance Redress Committee (GRC) and Grievance Focal Points (GFPs) at project location prior to the Contractor's mobilization to site. The functions of the GRC and GFPs are to address concerns and grievances of the local communities and affected parties as necessary.

171. The GRC will be headed by the Project Director and its members will include Deputy/Assistant Director of NTDC's environment unit, Environmental Specialist of the Supervision Consultant and the Contractor's Environment, Health and Safety (EHS) officer. The role 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 Grievance Redress Mechanism (GRM).

172. NTDC will assist the project affected communities/villages identify local representatives to act as GFPs. The GFPs will be responsible for i) acting as community representatives in formal meetings between the project team and the local community he/she represents and ii) communicating the community members' grievances and concerns to the contractor during project implementation.

173. A pre-mobilization public consultation meeting will be convened by NTDC's Environment Specialist and attended by GFPs, Supervision Consultant, Contractor, NTDC representative and other interested parties (e.g. district level representatives, NGOs). The objectives of the meeting will be as follows:

- Introduction of key personnel of each stakeholder including roles and responsibilities,
- Presentation of project information of immediate concern to the communities by the contractor (timing and location of specific construction activities, design issues, access constraints etc.) This will include a brief summary of the EMP - its purpose and implementation arrangements;
- Establishment and clarification of the GRM to be implemented during project implementation including proactive public relations activities proposed by the project team, Supervision Consultant and contractor to ensure that communities

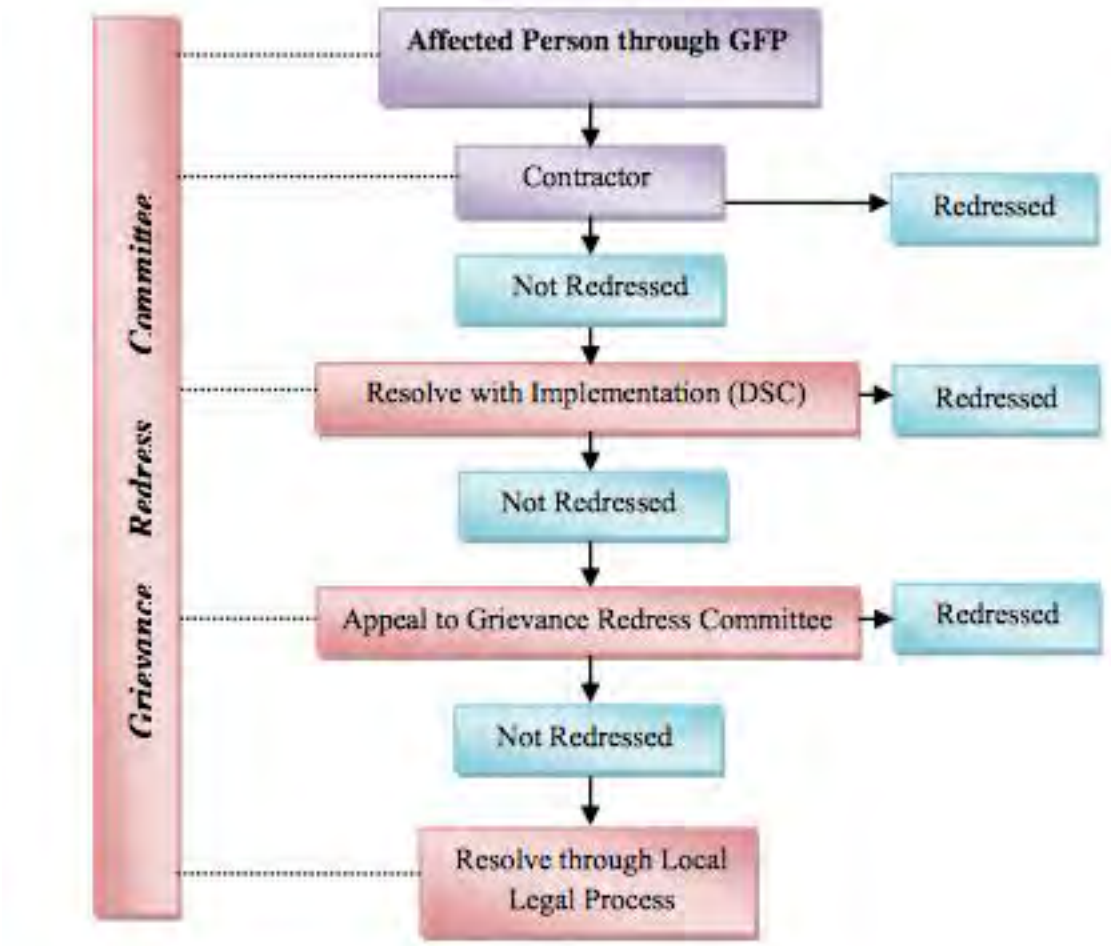
are continually advised of project progress and associated constraints throughout project implementation;

- Elicit and address the immediate concerns of the community based on information provided above.

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

- 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 Supervision Consultant'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 two 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 two 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.
- 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.

Figure 8.1: Grievance Redress Mechanism



9 Conclusions and Recommendations

175. The development of the three proposed extension and/or augmentation sub-projects is of national significance and is of critical importance considering the significant energy deficit being faced by the country since several years. All works at each of the sub-projects are to be conducted within the boundaries of the existing sub-stations/grid stations, thus the scope of work is very limited and any resulting impacts are minimal and temporary in nature.

176. Primary and secondary data has been used to assess the environmental impacts of the Project. This IEE report highlights any potential environmental impacts associated with the three sub-projects and recommends mitigation measures, wherever felt necessary. All environmental impacts associated with these three sub-projects need to be properly mitigated, wherever required, through the existing institutional arrangements described in this report.

177. The majority of the environmental impacts, however minimal and temporary in nature, are associated with the construction phase of the sub-projects. 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.

178. This IEE concludes that no significant negative environmental impacts are likely to occur due to construction and normal operations of the proposed sub-projects, 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.

179. These three sub-projects jointly have 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 project and a full EIA is not required.

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ANNEXURE-I

Rapid Environmental Assessment Checklists

Rapid Environmental Assessment (REA) Checklist

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to Environment and Safeguards Division (RSES) for endorsement by Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

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

Country/Project Title: Extension & Augmentation of 500/220 kV Rewat Substation

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…			

Screening Questions	Yes	No	Remarks
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	The project site is located within the existing sub station boundary and the Scope of work will be limited and thus no significant impacts are expected.
▪ 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	All activities will be conducted within existing sub station boundary and thus no alteration of surface water hydrology is expected to take place.
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	The Scope of work for this 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	Most labor will be engaged from neighboring areas and thus minimal worker camps will need to be set up. However, any camps developed will be located within the walls of the existing sub station. Any waste generated shall be disposed off in accordance with applicable NEQS guidelines.
▪ increased local air pollution due to rock crushing, cutting and filling?		X	The Scope of work for this project will not result in any such 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	The project site is located within walls of existing sub station and no notable vegetation is present that will require removal. Also, 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. Noise levels generated due to any civil work conducted is expected to be within allowable NEQS guidelines.
▪ dislocation or involuntary resettlement of people?		X	All activities will be conducted within the existing sub station boundary.
▪ 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	Not Applicable
▪ hazardous driving conditions where construction interferes with pre-existing roads?		X	Not Applicable
▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?		X	Not Applicable
▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?		X	Not Applicable
▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		X	Not Applicable
▪ 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
▪ 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 scope of work will be limited with local labor mostly engaged and thus no large population influx is expected.
▪ 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.
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?		X	Most labor will be engaged from neighboring areas and thus minimal worker camps will need to be set up. However, any camps developed will be located within the walls of the existing sub station. Any waste generated shall be disposed off in accordance with applicable NEQS guidelines.
▪ risks to community safety associated with maintenance of lines and related facilities?		X	Not Applicable
▪ community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization?		X	Not Applicable

Screening Questions	Yes	No	Remarks
▪ 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. Also, any fuel or chemicals used shall be disposed off in accordance with NEQS Guidelines.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		X	The works will be conducted within the existing boundary of the sub station and thus no hazard is expected to be posed to the neighboring communities.

Rapid Environmental Assessment (REA) Checklist

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(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

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

Country/Project Title: Extension at 500 kV Lahore South Grid 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

Screening Questions	Yes	No	Remarks
B. Potential Environmental Impacts Will the Project cause…			
▪ encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		X	The project site is located within the existing Grid station boundary and the Scope of work will be limited and thus no significant impacts are expected.
▪ 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	All activities will be conducted within existing Grid station boundary and thus no alteration of surface water hydrology is expected to take place.
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	The Scope of work for this 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	Most labor will be engaged from neighboring areas and thus minimal worker camps will need to be set up. However, any camps developed will be located within the walls of the existing Grid station. Any waste generated shall be disposed off in accordance with applicable NEQS guidelines.
▪ increased local air pollution due to rock crushing, cutting and filling?		X	The Scope of work for this project will not result in any such 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	The project site is located within walls of existing grid station and no notable vegetation is present that will require removal. Also, 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. Noise levels generated due to any civil work conducted is expected to be within allowable NEQS guidelines.
▪ dislocation or involuntary resettlement of people?		X	All activities will be conducted within existing Grid station boundary.

Screening Questions	Yes	No	Remarks
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		X	Not Applicable
▪ social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?		X	Not Applicable
▪ hazardous driving conditions where construction interferes with pre-existing roads?		X	Not Applicable
▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?		X	Not Applicable
▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?		X	Not Applicable
▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		X	Not Applicable
▪ 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
▪ 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 scope of work will be limited with local labor mostly engaged and thus no large population influx is expected.
▪ 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.
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?		X	Most labor will be engaged from neighboring areas and thus minimal worker camps will need to be set up. However, any camps developed will be located within the walls of the existing Grid station. Any waste generated shall be disposed off in accordance with applicable NEQS guidelines.
▪ risks to community safety associated with maintenance of lines and related facilities?		X	Not Applicable

Screening Questions	Yes	No	Remarks
▪ 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. Also, any fuel or chemicals used shall be disposed off in accordance with NEQS Guidelines.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		X	The works will be conducted within the existing boundary of the Grid station and thus no hazard is expected to be posed to the neighboring communities.

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(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

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

Country/Project Title: Extension at 500 kV Sahiwal Grid 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	The project site is located within the existing Grid station boundary and the Scope of work will be limited and thus no significant impacts are expected.

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	All activities will be conducted within existing Grid station boundary and thus no alteration of surface water hydrology is expected to take place.
▪ damage to sensitive coastal/marine habitats by construction of submarine cables?		X	The Scope of work for this 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	Most labor will be engaged from neighboring areas and thus minimal worker camps will need to be set up. However, any camps developed will be located within the walls of the existing Grid station. Any waste generated shall be disposed off in accordance with applicable NEQS guidelines.
▪ increased local air pollution due to rock crushing, cutting and filling?		X	The Scope of work for this project will not result in any such 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	The project site is located within walls of existing grid station and no notable vegetation is present that will require removal. Also, 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. Noise levels generated due to any civil work conducted is expected to be within allowable NEQS guidelines.
▪ dislocation or involuntary resettlement of people?		X	All activities will be conducted within existing Grid station boundary.
▪ 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	Not Applicable
▪ hazardous driving conditions where construction interferes with pre-existing roads?		X	Not Applicable
▪ creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?		X	Not Applicable
▪ dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?		X	Not Applicable
▪ environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		X	Not Applicable
▪ 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
▪ 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 scope of work will be limited with local labor mostly engaged and thus no large population influx is expected.
▪ 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.
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?		X	Most labor will be engaged from neighboring areas and thus minimal worker camps will need to be set up. However, any camps developed will be located within the walls of the existing Grid station. Any waste generated shall be disposed off in accordance with applicable NEQS guidelines.
▪ risks to community safety associated with maintenance of lines and related facilities?		X	Not Applicable
▪ community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization?		X	Not Applicable

Screening Questions	Yes	No	Remarks
▪ 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. Also, any fuel or chemicals used shall be disposed off in accordance with NEQS Guidelines.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		X	The works will be conducted within the existing boundary of the Grid station and thus no hazard is expected to be posed to the neighboring communities.

ANNEXURE-II

NEQS Guidelines and WHO Standards

Insert NEQS and WHO Standards

(Replace Page)

ANNEXURE-III

Photographs of Project Areas

Sahiwal Sub-project - Existing Infrastructure and Environment

Photograph 0-1: Transmission Infrastructure at the Sahiwal Sub-project site

Photograph 0-2: Entrance to Sahiwal Sub-project site

Photograph 0-3: Transmission and distribution infrastructure components at the site

Photograph 0-4: Landscaping with green plants and paved walkways at the sub-project site

Photograph 0-5: Location for proposed works at site with no vegetation removal necessary

Photograph 0-6: Proposed location for works lying within existing sub-station boundary

Photograph 0-7: Existing power infrastructure at site with concrete walls constructed to isolate and protect equipment in case of fires etc.

Photograph 0-8: Sub-project site contains leveled and plain area with no vegetation present

Lahore South Sub-project - Existing Infrastructure and Environment

Photograph 0-9: Lahore South Sub-project site seen from a distance surrounded by empty plots of land

Photograph 0-10: Sub-project site consists of even terrain with power infrastructure being constructed seen in the distance

Photograph 0-11: Sub-project site contains leveled and plain area with only some wild grasses present

Photograph 0-12: Paving of the roads within the project site has yet to be conducted since the construction work is underway

Photograph 0-13: Some landscaping being conducted through planting of some plants

Photograph 0-14: Power infrastructure of sub-project site seen in the distance with no communities or sensitive receptors residing in close proximity to the site

Rewat Sub-project - Existing Infrastructure and Environment

Photograph 0-15: 160 MVA Transformer to be replaced as part of proposed activity

Photograph 0-16: Existing transmission and distribution infrastructure at site

Photograph 0-17: Location on site for placing of new transformers after necessary earth works and concreting etc.

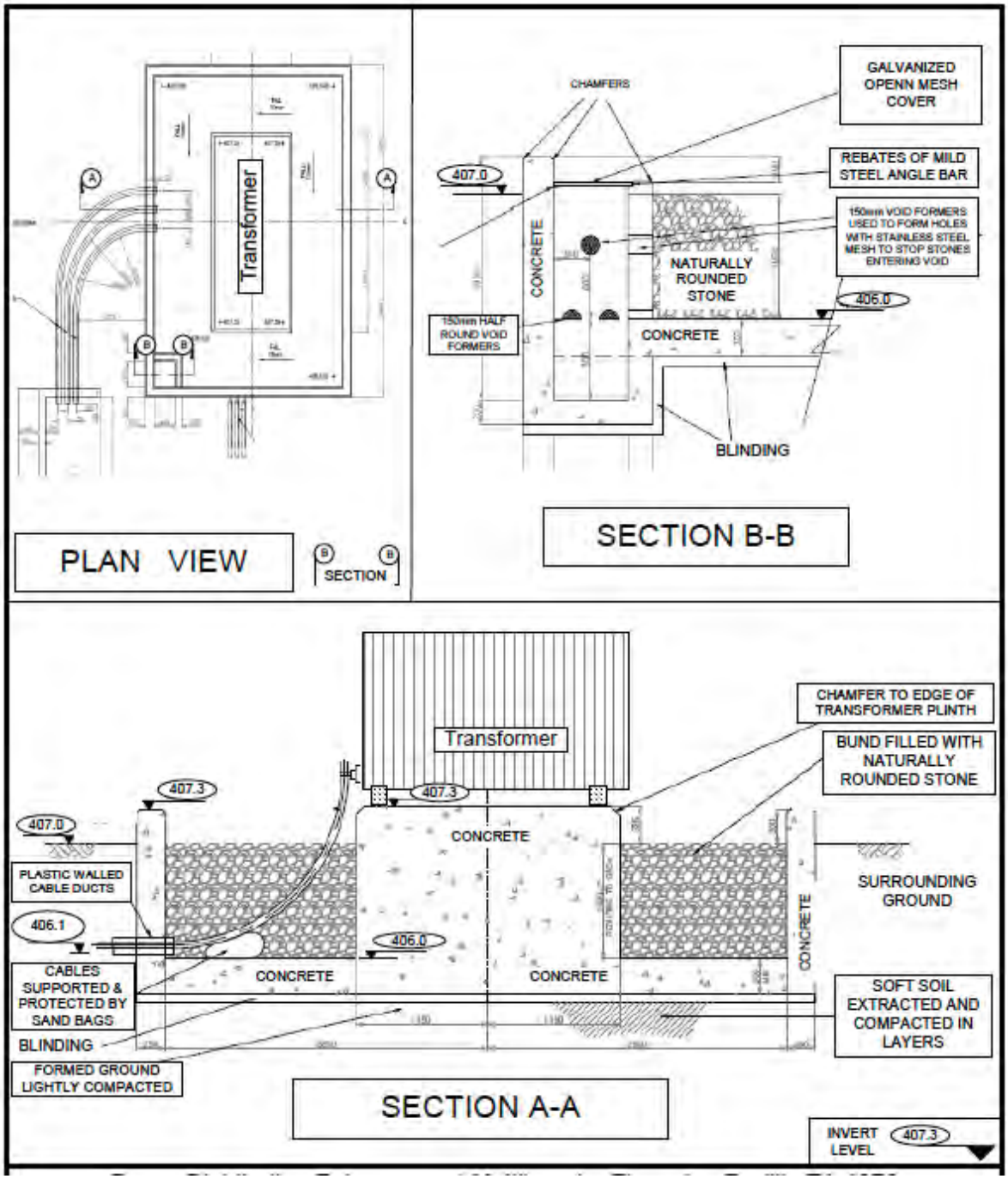
Photograph 0-18: Plain area on site with no vegetation except for some wild grass

Photograph 0-19: Transformer and power infrastructure on site

Photograph 0-20: Transformers on site along with other allied components

ANNEXURE-IV

Typical Bunds for Transformers



ANNEXURE

List of Participants of Public Consultations

Public Consultations for Extension and Augmentation Sub-Projects in Rewat, Sahiwal and Lahore South			
Participant Name & Name of Village	**Location**	**Comment/Issues or Concerns expressed/Suggestions and Requests**	**Proposed Actions/Measures to address concerns**
Mr Gulab Khan (Moza Gangal) **Mr Nazar Khan (Moza Gangal)** **Mr Aula Khan (Bagga Shaikhan)** **Mr Musa Jaan Khan (Bagga Shaikhan)** **Mr Haji Zhareef Khan (Dhok Rajgan)** **Mr Haji Akram Khan (Dhok Rajgan)** **Mr Jumma Khan (Dhok Allah Dita)** **Mr Saleem Khan (Dhok Allah Dita)**	Rewat	▪ The community residents at all three sub-project locations are generally glad the respective project activities will be conducted. ▪ The residents expressed hope that the increase in transmission and distribution capacity will reduce the amount of load shedding faced by them and will result in a reduction of the energy deficit in the country. ▪ The community residents mentioned that since all the construction work will be conducted within the existing boundaries of the grid stations/sub-stations, thus they do not expect any sort of disturbance to them from the planned scope of work. ▪ The community residents mentioned that it should be ensured that a transparent hiring policy is implemented with preference given to residents of the project area to enable them to benefit from the project work that is to be conducted.	None Required
Mr Azhar Hussain (Chak 81/5 R) **Mr Muhammad Ajmal (Chak 81/5 R)** **Mr. Mohammad Zia Satti (Chak 86/9)** **Mr Wazir Khan (Chak 86/9)** **Mr Hakeem Khan (Chak 78/5R)** **Mr Akhtar Muhammad (Chak 78/5R)**	Yousafwala (Sahiwal)		
Mr Sheikh Naeem (Chak 65) **Mr Mohammad Shahbaz (Chak 65)** **Mr Kamran Saeed (Bhail)** **Mr Sheikh Sohail (Bhail)** **Mr Mirza Anjam (Rosa)**	Manga Raiwind (Lahore South)		