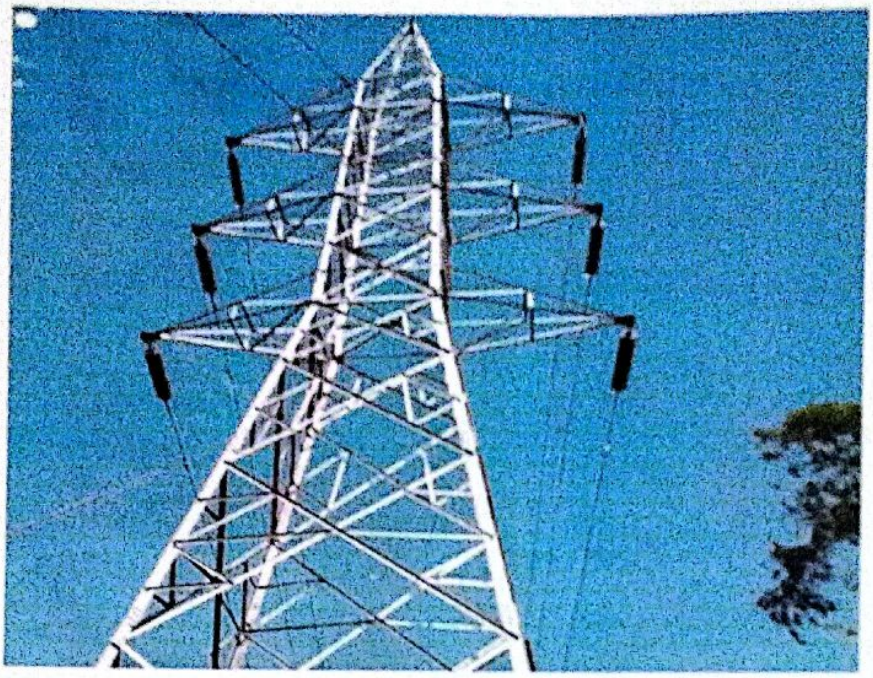
F-197(EA)-23

ISLAMABAD ELECTRIC SUPPLY COMPANY (IESCO)



Environmental Impact Assessment of 132 KV Transmission Line Project, PindiGheb to Lakkarmar, District Attock

Final Report

JULY 2023

ENVIRONSTECH
Suite # 04, Ground floor, Green Trust Tower, Blue Area, Sector F-6/1, Islamabad
Telephone: 051 2813096; Cell: 0344-5227414;
E-mail: environs.tech@gmail.com; Web: www.envrionstech.com

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Executive Summary

Title of the Project

This report presents the findings of "Environmental Impact Assessment (EIA) study which has been carried out for the 132 KV Transmission Line Project, PindiGheb to Lakkarmar, Attock.

The EIA study aims to identify the possible environmental and social impacts of the proposed project on its surrounding environment on both short and long-term basis, suggests mitigation measures and identifies the responsible agencies to implement the recommended mitigation measures through an Environmental Management Plan.

Location of the Project

The proposed 132 KV transmission line will originate from PindiGheb and end at Lakkarmar, district Attock.

Outline of the Project

IESCO intends to supply electricity to Lakkarmar from PindiGheb grid station to resolve the forced load shedding due to the currently overloaded system in order to decrease the load shedding time by providing an alternate source of electricity through 132 KV transmission line.

The route has been marked after a detailed survey and the profile and layout of the route has been approved by IESCO Authority. The total length of the transmission line is 45.260 KM and a total of 142 towers will be used. The conductor for transmission will be ACSR "LYNX".

The main objective of the project is to increase the efficiency, reliability, and quality of the electricity supply to Lakkarmar.

The total estimated cost of the project is Rs. 67.5millionand will be completed in 300 days after award of contract.

Physical Environment

Topography: District Attock is situated on the north by Haripur and Swabi districts of Khyber Pakhtunkhwa (KP), in the east by Rawalpindi district, by Chakwal district in the southeast, Mianwali district in the southwest, and by Kohat and Nowshera of KP in the west and northwest respectively.

Land use: The Transmission line route/corridor is mostly undulated barren and in some locations it is passes through agricultural land.

Surface Water: the area is rain feed no permanent water body passes along with or near project.

Ground Water: During consultation, the local community informed that the groundwater table in the project areas is from 100meters to 200 meters.

Climate: In PindiGheb and Lakkarmar, the summers are sweltering, humid, wet, and clear and the winters are short, cold, and mostly clear. Over the course of the year, the temperature typically varies from 2.9°C to 40°C .

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Air Quality: The main source of air and noise pollution in the project area is the emissions from vehicles. However, the concentration is not enough to exceed the PEQS limits for ambient air and noise.

The criteria of ambient air quality pollutants (NO_x, SO_2 PM, CO etc.) are expected to be within the acceptable limits adjacent to the project site.

Ecological Environment

Flora: The vegetation is a representative of Dry Subtropical Scrub Forest which is dominated by *Acacia modesta* (Phulai), *Ziziphusmauritiana* (Ber), etc.

The most common trees in district Attock are AmalTas (*Casiafistulla*), Chinar (Platanusorientalis),Phulai (*Acacia modesta*), Dharek (*Meliazardorachita*), Jangaliber (*Zizyphusmaurantiana*), Kiker (*Acacia nilotica*), Mulberry / Shahtoot (*Morus alba*), Safaida (*Eucalyptus camaldulensis*), Shisham (*Dalbergiasissoo*), Coconut (*Cocosnucifera*), Papeta (*Manilkarazapota*), Jaman (*Syzygiumcumini*), *Thevetiaperuviana* (PeliKaner), Shireen (*Albizialebbek*), Bamboo (*Bambusa*), Semal (*Bombaxceiba*), Palm (*Arecaceae*), Mango (Mangiferaindica), etc. These are planted along the roadsides and other green areas.

Fauna: The project area in its original form constitutes the habitat of wild fauna consisting of a host of animals and birds. Species found include: Jackal, Wild Hare, Hedgehog, Rat, Wild boar, Porcupine, Shikra, Grey partridge, Black Partridge, Quail, House Sparrow, House Crow, Koel, Common Myna, Spin Tailed Lizard, Krait etc.

Socio-Economic and Cultural Environment

District Attock is situated on the north by Haripur and Swabi districts of Khyber Pakhtunkhwa (KP), in the east by Rawalpindi district, by Chakwal district in the southeast, Mianwali district in the southwest, and by Kohat and Nowshera of KP in the west and northwest respectively.

District Attockhad an estimated population of 1.280 million people as per the census of 2017. Most of the houses are well constructed. The average growth rate is 2.07 %.

The main languages in the project area are Urdu, English, Punjabi, Pashto, Saraiki, while few people speak other languages too. The most widely spoken languages are Urdu and Punjabi. The literacy rate of the district is 49.3%.

The health care services provided by the public health sector in the District consists of 01 DHQ, 05 THQ Hospitals,05 Rural Health Centers, 63 Basic Health Units and 23 Dispensaries.

There exists no site of archaeological and cultural significance within the two kilometres radius of the project site.

All other amenities of life like electricity, natural gas, telephone, a police post, post office and bank, etc. are present near the Project area.

Public Consultation

Public consultation plays a vital role in studying the effects of the project on the stakeholders and in the successful implementation and execution of the proposed projects. Public involvement is a compulsory feature of environmental assessment, which leads to better and more acceptable decision-making. The overall objective of the consultation with stakeholders is to verify the environmental and social issues

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that have been presumed to arise and to identify those which are not known or are unique to the construction of 132 KV transmission line project.

Respondents in the majority showed a positive attitude towards the project. The viewpoints of respondents are as follows:

Majority of respondents showed a positive attitude towards the project location. They stated that the project would bring further eco-friendly development in the area. People appreciated the concept of eco-building when they were briefed about its significance towards a sustainable development.

Almost all respondents agreed that the project would create job opportunities for local populations. They viewed the project positively from an economic point of view.

Impacts and Mitigation Measures

Physical Environment

Impacts: Soil related issues include soil erosion, slope stability, and soil contamination. Land clearing, levelling, and grading, excavation and filling, construction activities and maintenance of equipment/vehicles may cause these issues. Soil may be contaminated because of fuel/oil/chemical spillage and leakage, and inappropriate waste (solid as well as liquid) disposal.

Construction machinery and project vehicles will release exhaust emissions, containing Carbon Monoxide (CO), Oxides of Sulfur (SOx), Oxides of Nitrogen (NOx), and Particulate Matter (PM). These emissions can deteriorate the ambient air quality in the immediate vicinity of the project site. Furthermore, construction activities such as excavation, land levelling, filling and vehicular movement on unpaved tracks may also cause fugitive dust emissions.

Noise and vibration will be generated by construction machinery and vehicles. The ground water resources of the project area can be contaminated by solid waste disposal, sewerage disposal, and equipment/vehicles maintenance, spillage/leakage of fuels, oils and chemical, and campsite sanitation facilities.

Mitigations: Soil erosion can be minimized during land clearing, levelling, and grading. Excavated slopes will not be left untreated/unattended for long durations. Appropriate slope stabilization measures will be taken per the design (i.e., stone pitching).

Temporary measures, such as construction of temporary walls, reinforced with brick lining bordering the construction areas to contain debris and spoil, will also be undertaken to avoid soil erosion and water contamination.

For the domestic sewage of contractor's camp, septic tanks with soakage pit will be constructed having adequate capacity. For the operational Phase, vertical SBR Plants have been proposed. Waste oils will be collected in drums and sold for the recycling.

The recyclable waste from the project site (such as cardboard, drums, broken/used parts, etc.) will be sold for recycling, and reused if necessary. The hazardous waste will be kept separate and handled according to the nature of the waste.

Ecological Environment

Impacts: The site preparation and construction activities may necessitate removal of the natural vegetation from the areas where project activities will be carried out

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resulting in damage and/or loss of vegetation and clearing of other indigenous and introduced species as well as undergrowth species, comprising bushes, grass, etc. Construction crew can also indulge in tree/shrub cutting to obtain fuel wood for the camp.

The loss of natural vegetation discussed above, and other project activities will potentially have adverse impacts on the faunal resources and habitats of the area. Smoke, chemicals, dust particles, and noise generated by heavy machinery are a scaring factor for wildlife. Rodents, hedgehogs, porcupines would lose their dwellings. In addition, the wildlife may be disturbed by illumination, and presence of the people.

Mitigations: The measures to restore natural vegetation loss in the area will benefit the area's fauna as well. The project staff will not be allowed to indulge in any hunting or trapping activities. Nighttime construction works will not be undertaken. Illumination levels at the site will be minimized, as far as possible.

Appropriate diffusers will be used to restrict the illumination within the project site. Blasting will not be undertaken at the site for excavation purposes. Porcupine population has increased, as it is not palatable because of its quills. Destruction of habitat and consequent check on the population of this pest may prove to be boon to maintain ecological balance.

Developmental activities and colonization of project site would be a positive step to keep down the number of this undesirable species at the desirable level from human point of view.

Environmental Management and Monitoring Plan (EMMP)

The purpose of the Environmental Management and Mitigation Plan (EMMP) is to minimize the potential environmental impacts due to the project. The EMMP reflects the commitment of IESCO to safeguard the environment as well as the surrounding population. The EMMP provides a delivery mechanism to address the adverse environmental impacts of the proposed project during its execution and operation, to enhance project benefits and to introduce standards of best practices to be adopted for all phases of the project.

The total environmental budget set out for the construction phase of the project is Rs. 1.18 million.

Conclusion and Recommendations

On the basis of the overall impact assessment, more specifically, nature and magnitude of the residual environmental impacts identified during present EIA, it is concluded that the 132 KV Transmission Line projects likely to cause environmental impacts mainly during its construction phase. However, these impacts can be mitigated provided the proposed activities are carried out as mentioned in the report, and the mitigation measures included in this report are completely and effectively implemented.

The project will directly improve the electricity supply to Lakkarmar and other villages in the vicinity of the project target area. There are no remaining issues that warrant further investigation. This EIA is considered adequate for the environmental and social justification of the project.

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Table of Contents

Executive Summary 1
Table of Contents 5
List of Tables 11
List of Figures 12
List of Abbreviation 13
List of Units 15
1 Introduction 16
1.1 Project Background and Overview 16
1.2 Brief Description, Nature, Size and Location of the Project 16
1.3 Purpose of Report 16
1.4 The Proponent 17
Source: Power System Statistics 44rd Edition-2020 (NTDC) 19
1.5 Details of Consultant 20
1.6 Environmental Impact Assessment 20
1.6.1 Purpose of the Report 20
1.6.2 Contact Persons 21
1.7 The Proponent (IESCO) 21
1.7.1 IESCO Area 22
1.7.2 IESCO Network of Transmission 24
1.7.3 Existing Transmission Lines 24
1.8 Approach and Methodology 27
1.8.1 Secondary Data Collection 27
1.8.2 Field Visits and Base Line Data Collection 27
1.8.3 Pubic Consultation 28
1.8.4 Review of Legal and Administrative Framework 28
1.8.5 Identification and evaluation of Impacts 28
1.8.6 Identification of Mitigation Measures 28
1.8.7 Development of Environmental Management and Monitoring Plan(EMMP) 28
1.8.8 Submission and Review of Draft Report 28
1.8.9 Final Report 29
1.9 Document Structure 29
1.10 Organization of the EIA Report 29
2. Policy, Legal and Administrative Framework 30

Scanned with CamScanner

2.1 Introduction 30
2.2 National Environmental Policy, 2005 30
2.3 Laws and Regulations 30
2.3.1 Punjab Environmental Protection Act, 1997 (Amended 2012) 30
2.3.2 PEPA (Review of IEE and EIA Regulations), 2000 31
2.4 Punjab Environmental Quality Standards (PEQS) 32
2.4.1 PEQS for Liquid Effluent 33
2.4.2 PEQS for Gaseous Emission 34
2.4.3 PEQS for Vehicular Emission 35
2.4.4 PEQS for Drinking Water, 2010 35
2.4.5 PEQS for Ambient Air and Noise 36
2.5 National Drinking Water Supply 2009 37
2.6 National Sanitation Policy 38
2.7 Punjab Local Government Ordinance, 2012 38
2.8 Cutting of Trees (Prohibition Act), 1975 38
2.9 Protection of Trees and Bush wood Act, 1949 38
2.10 Factories Act, 1934 38
2.1 The Telegraph Act, 1885 38
2.2 Pakistan Penal Code, 1860 39
2.3 Institutional Set-Up 39
2.19 Environmental Protection Agency's Environmental Guidelines 39
2.20 The implication of Legislations to the project 40
3 Project Description 41
3.1 Introduction 41
3.2 Type and Category of the Project 41
3.3 Objective of the Project 41
3.4 Project Location 41
3.5 Project Description 41
3.5.1 Transmission Line 43
3.6 Civil works, Equipment, and other Facilities 43
3.6.1 Civil Works 44
3.7 Design Aspects 44
3.7.1 Design Standards for Grid Station 46
3.7.2 Tower Structure for Transmission Line 46
..... 46

Scanned with CamScanner

3.7.3 Safety Parameters 46
3.8 Cost and Magnitude of Project 47
3.9 Project Activities Process Flow 48
3.9.1 Land Acquisition for Transmission Line 48
3.9.2 Construction Phase 48
3.9.3 Restoration and Rehabilitation after completion of Project 49
3.10 Government Approval 49
3.11 Project Time Schedule 49
3.12 Alternatives considered and Reasons for Rejection 50
3.12.1 No Project Option 50
3.12.2 Route Alternatives 50
3.12.3 Technical Alternatives 50
a. Type of Transmission Line Towers 50
Single Circuit vs. Double Circuit 50
Tower vs. Tubular Pole 50
4 Description of the Environment 53
4.1 Introduction 53
4.2 Attock 53
4.3 Physical Environment 53
4.3.1 Topography 53
4.3.2 Geology and Soil 53
4.3.3 Hydrology 53
4.3.4 Surface Water 53
4.3.5 Ground Water 54
4.3.6 Climate 54
4.3.7 Air Quality and Noise 54
4.3.8 Noise Level Monitoring 55
4.3.9 Seismology 56
4.3.10 Traffic and Transportation 57
4.4 Ecological Environment 57
4.4.1 Flora 57
4.4.2 Fauna 57
4.5 Socio-Cultural Environment 58
4.5.1 Attock District 58

Scanned with CamScanner

4.5.2 Sites of Archaeological and Cultural Significance 60
4.5.3 Other Facilities 60
5 Public Consultation 61
5.1 Objectives of Consultation 61
5.2 Methodology 61
5.3 Stakeholders Identification 62
5.4 Major Stakeholders Involved 62
5.5 Issues Discussed 62
5.6 Stakeholder's Consultations 62
5.6.1 Public Consultation 65
5.7 Concerns Regarding theProject 65
6 Impact Assessment and Mitigation Measures 67
6.1 Introduction 67
6.2 Environmental ImpactsAssessment Process 67
6.2.1 Potential Impacts 67
6.2.2 Impact Characterization 67
6.2.3 Identification of Mitigation Measures 69
6.3 Design Phase Potential Impacts 69
6.3.1 Electromagnetic Field (EMF) near Transmission Line may cause severe effects on human health 69
6.3.2 Change of Land use 70
6.3.3 Loss of Trees 71
6.3.4 Soil Erosion and Degradation 71
6.4 Construction Phase PotentialImpacts 71
6.4.1 Soil Erosion, Degradation and Contamination 71
6.4.2 Air Quality Deterioration 74
6.4.3 Noise Pollution and vibration 74
6.4.4 Surface Water and Groundwater Contamination 76
6.4.5 Water Consumption and Availability 77
6.4.6 Loss of Natural Vegetation 77
6.4.7 Damage to Wildlife 79
6.4.8 Pressure on Local resources / Infrastructure 80
6.4.9 Impact of Stacking and Disposal of Construction and Waste Material 80
6.4.10 Public Health and Safety 81

Scanned with CamScanner

6.4.11 Traffic Issues 83
6.5 Operational Phase Impacts 83
6.5.1 Soil and Water Contamination 83
6.5.2 Impacts on Biological Resources 84
6.5.3 Employment 85
6.6 Socio-Economic Impacts Assessment and their Mitigation 85
6.6.1 Design Phase Considerations 85
6.6.2 Construction Phase Impacts 86
6.6.3 Land Acquisition 86
6.6.4 Damage to Infrastructure 86
6.6.5 Noise and Vibration 87
6.6.6 Safety Hazards 87
6.6.7 Public Health Issues 88
6.6.8 Gender Issues 89
6.6.9 Child Labor 89
6.6.10 Impacts on Sites of Historical, Cultural, Archaeological or Religious Significance .. 89
6.6.11 Operational Phase 90
6.6.12 Safety Hazard 90
6.6.13 Public Health Issues 90
6.6.14 Agricultural loss 91
7 Environmental Management and Monitoring Plan 92
1.1 Purpose and Objectives of EMMP 92
7.1 Institutional Capacity 92
7.1.1 Pre-Construction Phase 92
7.1.2 Construction Phase 93
7.1.3 Operation Phase 94
7.2 Organizational Structure, Role and Responsibilities 94
7.2.1 Primary Responsibilities 94
7.2.2 Field Management and Quality Control 95
7.2.3 On-the-job Supervision and Monitoring 95
7.3 Environmental Management and Monitoring Plan (EMMP) 99
7.4 Solid Waste Management Plan 117
7.5 HSE Management Plan 117
7.6 Emergency Preparedness, Response and Site Evacuation Plan 119

Scanned with CamScanner

7.7 Fire Fighting Plan 120
7.8 Plantation Plan 120
7.9 Environmental Management &Monitoring Plan 121
7.9.1 Compliance Monitoring 125
7.9.2 Effects Monitoring 126
7.10 Training Program 126
7.11 Communication and Documentation 129
7.12 Grievance Redressal Mechanism 129
7.13 Change Management 130
7.13.1 Category 'A' Change 130
7.13.2 Category 'B' Change 130
7.13.3 Category 'C' Change 131
7.14 Environmental Budget 131
7.15 Post Project Monitoring 131
8 Conclusion and Recommendations 132
8.1 Introduction 132
8.2 Conclusions 132
8.3 Recommendations 132
Annexure-1: Terms of Reference 134
Annexure-2: References 135
Annexure-3: Glossary 136
Annexure-4: List of People met during EIA 138
Annexure- 5: Land Documents 139
Annexure-6: Ambient Air, Ground Water and Noise Quality Monitoring Results 140
Annexure-7: Flora and Fauna of Project Area 145

Scanned with CamScanner

List of Tables

Table 1.1:Energy Generation, Sold & Per Capita Consumption – PEPCO 18
Table 1.2: Name and Addresses of Proponents Representative and Consultant..... 21
Table 1.3: IESCO'S Technical Profile..... 24
Table 1.4: List of Transmission Lines 24
Table 2.1: PEQS for Liquid Effluent Discharge..... 33
Table 2.2: PEQS for Gaseous Emission..... 34
Table 2.3: PEQS for Vehicular Emission 35
Table 2.4:PEQS for Drinking Water Quality..... 35
Table 2.5: PEQS for Ambient Air..... 36
Table 2.6: PEQS for Noise 37
Table 3.1: Detail of Tower Type and Number 43
Table 3.2: Types of Tower Foundation 44
Table 4.1: Summary of Ambient Air Quality and Noise Results at the Project Site..... 56
Table 4.2: Educational Institutions 59
Table 4.3: Health Facilities 59
Table 5.1: Categories of Stakeholders Interviewed in the Project Area 62
Table 5.2: Stakeholders Opinions/Concerns/Issues/Suggestions..... 64
Table 7.1: Role and Responsibility Chart for the Proposed Project 97
Table 7.2: Environmental and Social Mitigation Plan (ESMP) for the Project..... 100
Table 7.3: Estimated Cost for the Implementation of Environmental Management and Monitoring Plan for Proposed Project..... 118
Table 7.4: Recommended Plant Species to be planted at the Project Site 120
Table 7.5: Tentative Cost of Equipment 121
Table 7.6: Maintenance Plan for first three months..... 121
Table 7.7: Environmental Management & Monitoring Plan for 132 KV Transmission Line. 123
Table 7.8: Estimated cost for the implementation of Environmental Monitoring Plan for 132 KV Grid Station and Transmission Line Project..... 125
Table 7.9: Framework for Environmental & Social Training Program 128
Table 7.10: Summary of Environmental Mitigation & Monitoring Cost 131
Table 8.1: Environmental Screening Matrix (mitigated) of 132 KV Transmission Line Project 132

Scanned with CamScanner

List of Figures

Figure 1.1: Map showing the area covered by IESCO 23
Figure 1.2: Map showing transmission network of IESCO 26
Figure 3.1:Route Map of the Transmission Line 42
Figure 3.2: Layout Plan 45
Figure 3.3:Permissible Conductor Clearance at 65° 46
Figure 3.4:Estimated Cost of the Project 47
Figure 3.5: Pictorial view of the Project Site 52
Figure 4.2: Pictorial Presentation of Floral Species at Project Site 60
Figure 5.1: Pictorial Presentation of Public and Stakeholder Consultation 66
Figure 6.1: Environmental Screening Matrix (un-mitigated) of 132 KV Transmission Line Project 68
Figure 7.1: Organizational Structure of PMU, IESCO 96

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List of Abbreviation

AEBs	Area Electricity Boards
AES	Area Electricity Supply
AM	Assistant Manager
Amsl	above Mean Sea Level
BOD	Biological Oxygen Demand
CEO	Chief Executive Officer
CED	Chief Engineer Development
CITES	Convention on International Trade in Endangered Species
COD	Chemical Oxygen Demand
DC	Deputy Commissioner
DCO	District Coordination Officer
DISCO	Distribution Company
EA	Environmental Assessment
EIA	Environmental Impact Assessment
ELR	Energy Loss Reduction
EMP	Environmental Management Plan
EMMP	Environmental Management and Monitoring Plan
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
ESG	Environmental and Social Guidelines
ESI	Environmental and Social Inspector
E&SS	Environmental and Social Safeguard
FESCO	Faisalabad Electric Supply Company
GoAJK	Government of Azad Jammu and Kashmir
GDP	Gross Domestic Product
GENCO	Generating Company
GEPCO	Gujranwala Electric Power Company
GIS	Geographical Information System
GIS	Gas Insulated Substation
GoP	Government of Pakistan
GRM	Grievance Redressal Mechanism
GSC	Grid Station Construction (Department)
GSO	Grid Station Operation (Department)
GS	Grid Station
GT Road	Grand Trunk Road
Ha	Hectare
HESCO	Hyderabad Electric Supply Company
HSE	Health Safety and Environment
HT	High tension
ICT	Islamabad Capital Territory
IEE	Initial Environmental Examination
IESCO	Islamabad Electric Supply Company
KTM	Kohinoor Textile Mill
LAA	Land Acquisition Act (of 1894)
LESCO	Lahore Electric Supply Company
LoS	Laws of Seas

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LPG	Liquefied Petroleum Gas
LT	Low Tension
MEA	Multilateral Environmental Agreements
MEPCO	Multan Electric Power Company
M&E	Monitoring and Evaluation
NEQS	National Environmental Quality Standards
NGO	Non-Government Organization
NOx	Oxides of Nitrogen
NTDC	National Transmission and Dispatch Company
OP	Operational Policy
O&M	Operation and Maintenance
PAPs	Project Affected Persons
PEQS	Punjab Environmental Quality Standards
PCB	Poly Chlorinated Biphenyl
PD	Project Director
POF	Pakistan Ordnance Factory
PEPA	Pakistan Environmental Protection Act
PM	Particulate matter
POP	Persistent Organic Pollutants
P&DD	Planning and Development Department
QESCO	Quetta Electric Supply Company
RoW	Right of Way
RP	Resettlement Plan
RPR	Resettlement Policy Register
RPF	Resettlement Policy Framework
SCR	Social Complaint Register
SDO	Sub Divisional Officer
SE	Senior Engineer
STG	Secondary Transmissionlineand Grids
T/L	Transmission Line
ToR	Terms of Reference
XEN	Executive Engineer
UNFCCC	United Nations Framework Convention on Climate Change
USEPA	United State Environmental Protection Agency
WAPDA	Water and Power Development Authority
WB	World Bank

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List of Units

%	Percent (age)
°C	Degree centigrade
cm	Centi meter
dB (A)	Decibel ('A' scale)
ft^2	Square foot
ft^3	Cubic foot
Km	Kilometer
Km/h	Kilometer/hour
m	Meter
m^2	Square meter
m3	Cubic meter
MT	Metric Ton
KM	Kilometer
KV	Kilo Volts
KWh	Kilo Watt hour (unit)
MAF	Million Acre Feet
MVA	Mega Volt Amperes
MW	Mega watts
ppb	Parts per billion
ppm	Parts per million
dB(A)	Decibels ('A' scale)

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1 Introduction

1.1 Project Background and Overview

The National Power Policy 2013 issued by the Government of Pakistan (herein referred to as Government) aims to develop an efficient and consumer-centric power generation, transmission and distribution system that meets the needs of the people and boosts the economy of the country in a sustainable and affordable manner. Targets of the prescribed policy include complete elimination of load shedding; decreasing the average cost of electricity generation to below 10 Pakistani Rupee /kWh; a decrease in transmission and distribution losses from 23 – 25% to 16%; an increase in revenue collection from 85% to 95%; and a reduction in the time required for decision making at the ministry level or other related departments to a minimum.

According tothe Pakistan Economic Survey2021–22, the installed electricity generation capacity reached 37,402 MW in the year 2020. The maximum total demand coming from residential and industrial estates stands at nearly 25,000 MW, whereas the transmission and distribution capacity is approximately 22,000 MW.

In order to meet the increasing electricity demand per capita, the existing electricity network (Secondary Transmission and Grid System) of IESCO needs to be expanded.

Much like the rest of the country, the areas under IESCO electricity supply network are facing a rapid increase in electricity consumption, owing to increasing population, urbanization, industrialization and increased per capita income in the recent decade. **Table 1.1** shows the increase in population, energy sold and per capita energy consumption changes that took place during 1981 – 2021 period.

The project will ensure a reliable supply of electricity to Lakkarmar, District Attock, resulting in load reduction on currently overloaded system, and improvement in the voltage profile as well as the system reliability.

1.2 Brief Description, Nature, Size and Location of the Project

IESCO intends to supply electricity to Lakkarmar from PindiGheb grid station to resolve the forced load shedding due to the currently overloaded system in order to decrease the load shedding time by providing an alternate source of electricity through 132 KV transmission line.

The route has been marked after a detailed survey and the profile and layout of the route has been approved by IESCO Authority. The total length of the transmission line is 45.260 KM and a total of 142towers will be used. The conductor for transmission will be ACSR "LYNX".

1.3 Purpose of Report

In order to comply with the regulatory requirement, IESCO hasacquired the services of M/s EnvironsTech Private Limited, anenvironmentalconsultancy firm, to carry out the Environmental Impact Assessment (EIA) of the project.

This report gives an overview of project description, potential environmental and social impact, their mitigation measures,enlists environment management plan and environmental monitoring plan along with budgetary requirements.

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1.4 The Proponent

IESCO is a public utility company, providing electricity to the Islamabad Capital Territory (ICT), Northern districts of the Punjab Province (Rawalpindi, Attock, Jhelum and Chakwal) and southern areas of Azad Jammu and Kashmir (AJK).

IESCO was registered in April 1998 under the Companies Ordinance 1984, Pakistan. Initially, it was working as one of the eight Area Electricity Boards (AEBs) of the Water and Power Development Authority (WAPDA). **Figure 1.1** shows the area/region covered by IESCO for electricity supply.

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Table 1.1:Energy Generation, Sold & Per Capita Consumption – PEPCO

Fiscal Year	Population of PEPCO	Number of Customers	Computed Peak Demand PEPCO	System Input Energy (Purchased by CPPA-G)	Energy Sale (Consumption)	Per Capita System Input Energy	Per Capita Consumption	Units Per Consumer	
								System Input Energy (kWh)	Sale (kWh)
	(In Million)		(MW)	(MkWh)	(MkWh)	(kWh)	(kWh)		
1981	79.04	3,269,945	2,473	12,862	9,068	163	115	3,933	2,773
1982	87.54	3,588,250	2,846	14,378	10,288	164	118	4,007	2,867
1983	90.30	3,901,419	3,163	16,093	11,587	178	128	4,125	2,970
1984	92.96	4,231,536	3,295	17,655	12,762	190	137	4,172	3,016
1985	95.67	4,523,970	3,791	18,376	13,756	192	144	4,062	3,041
1986	98.41	4,876,787	3,933	20,656	15,504	210	158	4,236	3,179
1987	101.18	5,278,686	4,325	23,228	17,405	230	175	4,400	3,362
1988	103.99	5,779,623	5,031	27,002	20,702	260	199	4,672	3,582
1989	106.84	6,419,167	5,440	28,410	21,982	266	206	4,426	3,424
1990	109.71	6,870,679	5,680	30,809	24,121	281	220	4,484	3,511
1991	112.61	7,260,721	6,090	33,580	26,585	298	236	4,625	3,662
1992	115.54	7,736,241	6,532	37,143	29,267	321	253	4,801	3,783
1993	118.50	8,175,750	7,522	39,854	31,272	336	264	4,875	3,825
1994	121.48	8,592,042	8,067	41,289	32,131	340	264	4,805	3,400
1995	124.49	9,067,276	8,252	44,932	35,032	361	281	4,955	3,864
1996	127.51	9,481,731	8,278	47,434	36,925	372	290	5,003	3,894
1997	130.56	9,868,612	8,552	49,564	38,529	380	295	5,022	3,904
1998	124.14	10,217,072	8,877	52,192	39,422	420	318	5,108	3,858
1999	125.59	10,799,635	9,191	52,752	38,900	420	310	4,885	3,602
2000	128.55	11,584,657	9,289	54,672	40,910	425	318	4,719	3,531
2001	131.58	12,166,344	9,628	57,282	43,384	435	330	4,708	3,566
2002	134.65	12,678,022	10,099	59,545	45,204	442	336	4,697	3,566
2003	137.75	13,318,233	10,484	62,694	47,421	455	344	4,707	3,561
2004	140.89	14,091,338	11,078	67,697	51,492	480	365	4,804	3,654

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2005	144.07	14,896,242	12,035	71,670	55,278	497	384	4,811	3,711
2006	147.29	15,911,161	13,212	80,404	62,405	546	424	5,053	3,922
2007	150.53	16,986,554	15,138	85,987	67,480	571	448	5,062	3,973
2008	153.82	17,955,366	16,838	84,584	66,539	550	433	4,711	3,706
2009	157.14	18,640,114	17,325	82,702	65,286	526	415	4,429	3,496
2010	160.49	19,582,224	17,847	87,115	68,878	543	429	4,449	3,517
2011	163.86	20,309,483	17,901	89,775	71,672	548	437	4,420	3,529
2012	167.24	21,046,611	18,280	88,987	71,368	532	427	4,228	3,391
2013	170.65	21,875,600	18,227	87,080	70,508	510	413	3,981	3,223
2014	140.09	22,587,870	19,966	93,777	76,543	539	440	4,152	3,389
2015	177.54	23,519,247	21,031	96,463	78,113	543	440	4,101	3,321
2016	180.99	24,516,699	22,559	100,871	81,737	557	452	4,114	3,334
2017	184.44	25,571,803	25,117	106,796	86,763	579	470	4,176	3,393
2018	186.05	27,016,545	26,031	120,062	97,197	645	522	4,444	3,596
2019	189.00	28,473,069	25,627	122,302	99,046	647	524	4,295	3,479
2020	190.89	29,957,422	25,622	122,451	98,407	641	516	4,088	3,285
2021	194.01	31,529,604	27,193	130,060	99,370	670	512	4,125	3,152

Source: Power System Statistics 40th Edition-2022 (NTDC)

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1.5 Details of Consultant

In order to comply with the regulatory requirement, to conduct impact assessment of the proposed Grid Station and Transmission lines. Hence, IESCO has acquired the services of M/s Environs Tech Pvt. Ltd an environmental consultancy firm, to carry out the Environmental Impact Assessment (EIA) of the project. The EIA study of proposed project is being prepared with a number of following specific objectives:

a. Collection of baseline information/data for assessment of impacts;
b. Ordering of information collected during previous investigations into a comprehensive environmental document;
c. Assessment and evaluation of the actual and potential environmental impact of the proposed development; and Development of Environmental Management Plan to identify the mitigation strategies targeted towards avoidance, minimization and rehabilitation of impacts.
d. The basic guiding principles of the Environmental Impact Assessment have been:
e. To inform decision makers and result in appropriate levels of environmental protection and community well-being;

This report gives an overview of project description, potential environmental and social impact, their mitigation measures, enlists environment management plan and environment monitoring plan along with budgetary requirements.

1.6 Environmental Impact Assessment

According to the Punjab Environmental Protection Act 1997, (Amended 2012), section 12 (1):

"No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof".

1.6.1 Purpose of the Report

The aims and objectives of the EIAof the purposed project are as follows:

- Identification of all significant potential impacts that may require detailed assessment,
- Identification and assessment of all potential major and minor impacts during pre-construction, construction and operational phases, conservation and sustainable use of natural resources,
- To assess the compliance status of the proposed activities with respect to the national environmental legislation,
- Propose mitigation measures to minimize, eliminate or to compensate the potential adverse impacts of the project that identified during the assessment, promotion of public awareness on environmental issues,

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- To carry out a social assessment, identify potential impacts and suggest mitigation measure.
- To prepare an Environmental Management and Monitoring Plan, and;
- To prepare an EIA document.

The Terms of Reference have been provided in **Annexure-2.**

1.6.2 Contact Persons

In case of further details or information regarding this EIA report, please contact the proponent's representative or the consultant at the addresses provided below:

Table 1.2: Name and Addresses of Proponents Representative and Consultant

Proponent's Representative	Consultant
Mr. Mohammed Yasin Additional Director, Environment & Social Safeguard Unit Islamabad Electric Supply Company, Islamabad (IESCO) Tel: 051- 9252036 Email: iescopmu@hotmail.com	**IjlalHussain** Chief Executive Officer EnvironsTech Suite # 04, Ground floor, Green Trust Tower, Blue Area, Sector F-5/1, Islamabad Contact Number: 0344-5227414; E-mail: environs.tech@gmail.com;

1.7 The Proponent (IESCO)

IESCO is a public utility company, providing electricity to the Islamabad Capital Territory (ICT), Northern districts of the Punjab Province (Rawalpindi, Attock, Jhelum and Chakwal) and southern area of Azad Jammu and Kashmir (AJK). IESCO was registered in April 1998 under the Companies Ordinance 1984, Pakistan. Initially, it was working as one of the eight Area Electricity Boards (AEBs) of the Water and Power Development Authority (WAPDA).

In 1958, WAPDA was established, having two wings: Water Wing and Power Wing. The Water Wing was (and still is) responsible for developing and managing large water reservoirs (Dam) and barrages to store water for country's agriculture demand and inter-like with all other sectors (social to industrial sector and production of hydroelectricity), while its Power Wing was a vertically integrated utility, responsible for generation, transmission and distribution of electricity throughout Pakistan (except for the City of Karachi, where the Karachi Electric Supply Company - KESC - performed a similar function).

Under its unbundling and restructuring program, WAPDA's Power Wing has been divided into nine distribution companies collectively called DISCOs, three generating companies collectively called GENCOs and a transmission company called National Transmission and Dispatch Company (NTDC). IESCO is one of the nine DISCOs. The areas of distribution of these DISCOs are:

- IESCO: Islamabad Electric Supply Company for Rawalpindi, Attock, Jhelum and Chakwal district of Northern Punjab and Southern area of Azad Jammu and Kashmir (AJK)

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- PESCO: Peshawar Electric Supply Company providing utility for the entire Khyber Pukhtunkhwa Northern parts of AJK and Gilgit-Baltistan.
- MEPCO: Multan Electric Power Company for the area of Multan, Sahiwal, Khanewal, Pakpattan, Vehari, Rahim Yar Khan, Muzaffargarh, Dera Ghazi Khan, Layyah, RajanPur, Bahawalpur, Bahawalnagar and Lodhran districts.
- GEPCO: Gujranwala Electric Power Company for districts of Gujranwala, Sialkot, MandiBahauddin, Hafizabad, Narowal and Gujrat districts.
- LESCO: Lahore Electric Supply Company is responsible for Lahore, Kasur, Sheikhupura and Okara districts.
- FESCO: Faisalabad Electric Supply Company for Faisalabad, Sargodha, Khushab, Jhang, Toba Tek Singh, Bhalwal, Mianwali and Bhakkar districts.
- HESCO: Hyderabad Electric Supply Company for Hyderabad, Nawab Shah, Sanghar, MirpurKhas, Umar Kot, Tharparkar, Badin and Thatta districts in Sindh Province.
- SEPCO: Sakkhar Electric Power Company is responsible for electricity supply to Jacobabad, Shikarpur, Ghotki, Larkan, DadauNowsheroferoz, Khairpur and Sakkhar districts of Sindh province.
- TESCO: Tribal Electric Supply Company is responsible for electricity supply to seven agencies and FRs that are situated along Afghanistan boundary. The seven agencies are, Kurram Agency, Orakzai Agency, Khyber Agency, North Waziristan Agency, South Waziristan Agency, Bajur Agency, Mohmand Agency. The Frontier Regions are FR Peshawar, FR Kohat, FR Bannu, FR Lakki, FR Dera Ismail Khan, FR Tank.
- QESCO: Quetta Electric Supply Company for the entire Balochistan Province, except Lasbela, which is covered by the KESC network.

1.7.1 IESCO Area

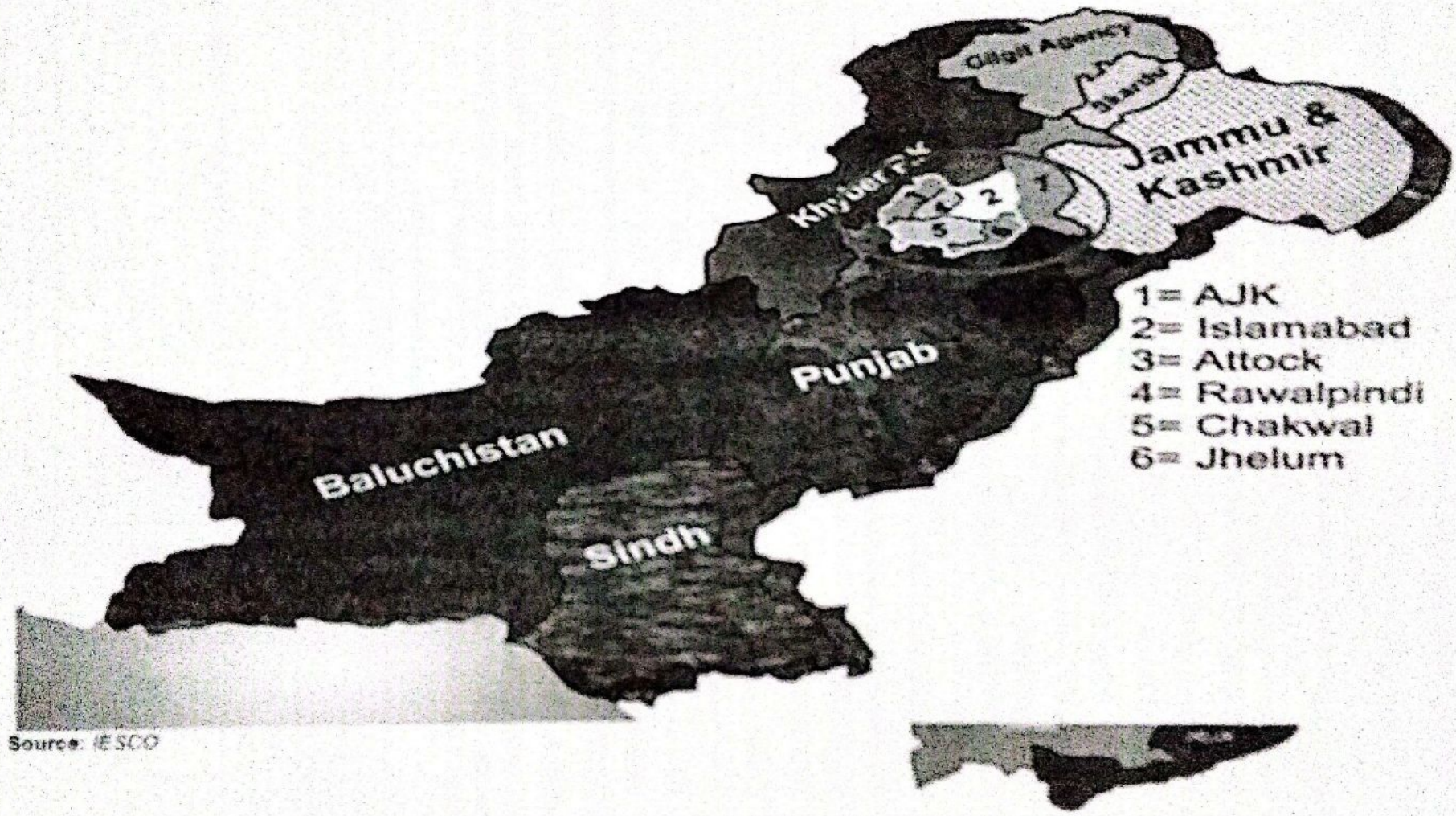
The area within the IESCO network comprises of the following distinct administrative units:

- Islamabad Capital Territory (ICT),
- Rawalpindi District,
- Jhelum District,
- Attock District, and
- Chakwal District
- Parts of AJK

Mianwali is included in IESCO-T&G Division network for construction works but for operational and commercial work, it falls in FESCO network. Similarly,Nathiagali is included in T & G Division of IESCO and is under the operational division of PESCO. **Figure 1.1**shows the geographical network of IESCO.

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Figure 1.1: Map showing the area covered by IESCO



Source: IESCO

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1.7.2 IESCO Network of Transmission

The key technical data of IESCO's system is provided in **Table 1.3.**

Table 1.3: IESCO'S Technical Profile

Description	Unit	Qty
Grid stations (Including NTDC)	Nos.	116
132 KV Grid stations	Nos.	88
66 KV Grid stations	Nos.	1
33 KV Grid stations	Nos.	2
Customer Grid stations (IESCO Maintained)	Nos.	14
Customer Grid stations (Customer Maintained)	Nos.	1
NTDC Grid stations	Nos.	5
Peak load demand – Recorded on 04-07-2019 (1100hrs)	MW	2,718
Power transformers (Numbers)	Nos.	274
Power transformers' installed capacity (MVA)	MVA	6,3979
Transmission line	Km	3,869
HT lines	Km	27,084
LT lines	Km	28,234
11 KV feeders	Nos.	1,275
Distribution transformers	Nos.	54,305
Distribution transformation capacity	MVA	4,456

Source: IESCO Company Profile, June 2023

1.7.3 Existing Transmission Lines

The IESCO system includes two 220-KV double circuits, seven 132-KV double circuits, thirteen 132-KV single circuit and four 66-KV single circuit transmission lines. A list of these transmission lines is provided in **Table 1.4.**

Table 1.4: List of Transmission Lines

No	Transmission Lines in IESCO's Region		
	Capacity	From	To
Double Circuit Transmission Lines			
1	220 KV Transmission Lines	Mangla	Burhan
		Tarbela	Burhan
2	132 KV Transmission Lines	Burhan	i) New Wah, ii) Zeropint, iii) Rawal& iv) AEC
		Mangla	AEC
		New Wah	Attock
		Attock	HIT
		HIT	Fecto

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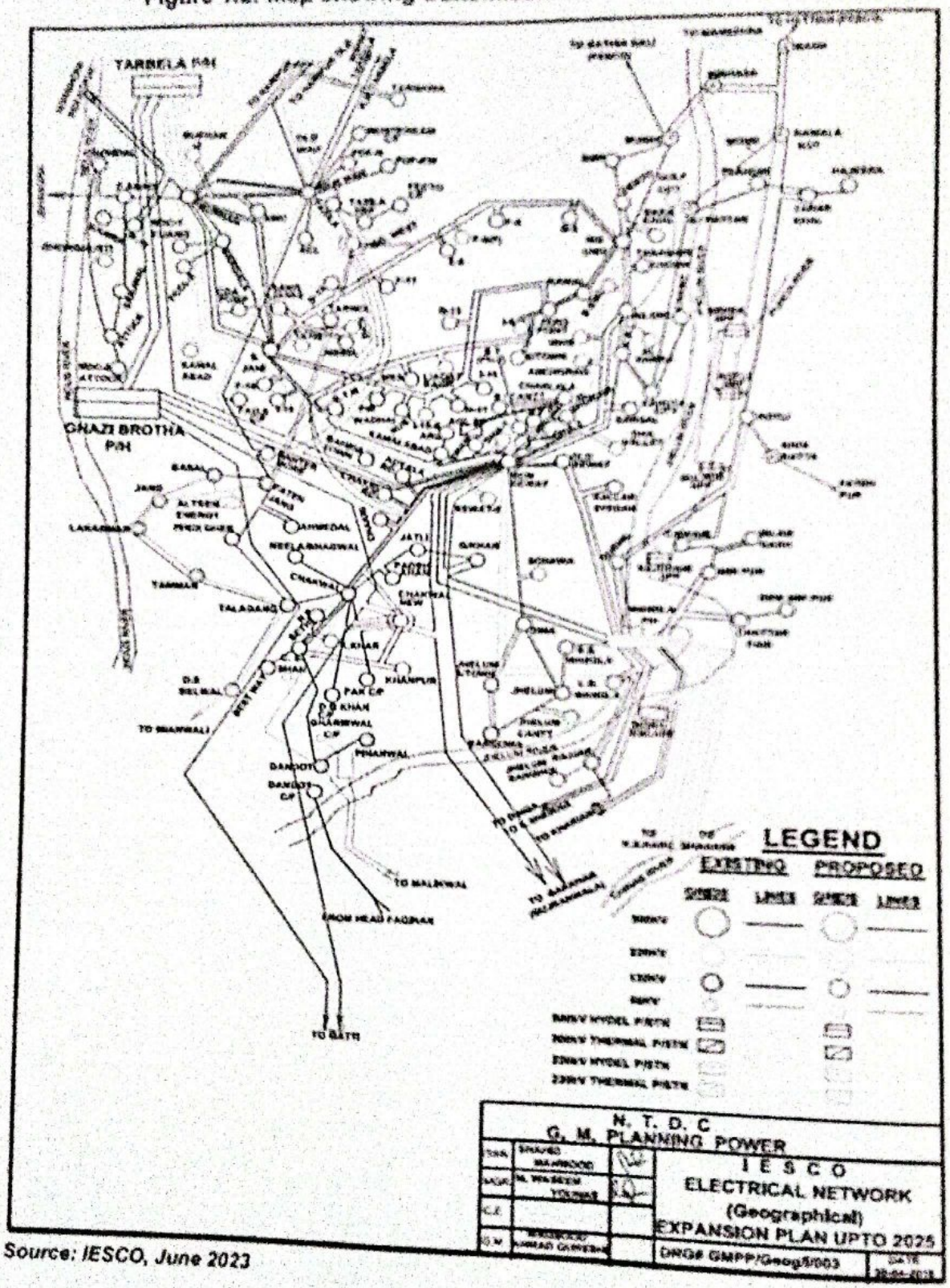
No	Capacity	Transmission Lines in IESCO's Region From	To
		Old Rewat	New Rewat
Single Circuit Transmission Lines			
3	132 KV Transmission Lines	Burhan	i) KTM, ii) BakraMandi, iii) Rewat, iv) Dina, v) Gujar Khan, vi) Jhelum, vii) Saragodah, viii) Mangla (R), ix) Mangla, x) Faqirabad, xi) Kamra and xii) Sanjwal
		BakraMandi	Attock Refinery
		AEC	i) Kahuta and ii) Rewat
		Kahuta	i) Kahuta City and ii) Azad Pattan
		Gujar Khan	Jatli and Chakwal
		Q.A University	Murree
		New Wah	i) POF East, North and West, ii) Taxila Cement Factory, and iii) Tarbela R & NC.
		Taxila	Fecto Cement
		Mangla	i) Mirpur and Kotli, ii) Mangla (L), iii) Rajar iv) Kharian and iv) Old Rawat
		New Wah	i) Fateh Jang, ii) Pindi Gheb, iii) Kalar Kahar, iv) Basal, v)Jand, vi) Lakarmar, and vii) Old Wah
		Chakwal	i) Chua Saidan Shah, ii) Dandot, ii) NoorpurSethi, and iii) Talagang
		Mianwali	i) Danda Shah Balawal, ii) Talagang, iii) Basal, iv) Tamman, v) Fateh Jang and vi) Ahmadal

Source: *IESCO*

The geographic reach of the transmission line in the IESCO network is shown in **Figure 1.2.**

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Figure 1.2: Map showing transmission network of IESCO



Source: IESCO, June 2023

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1.8 Approach and Methodology

A kick-off meeting was held with the officials of Project Management Unit IESCO to discuss and clarify issues, objectives, and scope of the study as well as the consultant's approach and methodology.

The following methodology was recommended for the purposed project:

- Review of governing legislation and statutory requirements,
- Description of the proposed project,
- Baseline environmental data collection,
- Stakeholder Consultations at various levels (institutional, NGOs, corporate sector and Grass root level i.e. affected peoples),
- Identification of potential environmental impacts,
- Evaluation of the significance of environmental impacts,
- Recommended mitigation measures and monitoring requirements,
- Development of Environmental Management and Monitoring Plan (EMMP); and
- Preparation of EIA report.

1.8.1 Secondary Data Collection

A detailed review of the literature was carried out with the focus primarily on existing environmental conditions in the project locations and impacts of such projects on the biotic and abiotic environment. The secondary data was collected for assessing the environmental conditions and trends for identifying the following:-

A) Physical Conditions: topography, geology, soils, surface and groundwater resources and climate.

B) Ecological Resources: flora and fauna, (particularly in respect of rare or endangered species), protected areas or other areas of significant environmental importance.

C) Human and Economic Development: settlements, socio-economic conditions, infrastructure and land use.

D) Heritage Aspects: sites of cultural, archaeological or historical significance.

IESCO provided all the available relevant documents for review and clear understanding of the project activities.

The list of documents reviewed for the EIA study is provided in **Annexure-2**and the glossary is provided in **Annexure-3**.

1.8.2 Field Visits and Base Line Data Collection

The consultant visited the project site for the collection of baseline data. The Rapid Social Appraisal method was applied to discover the facts (empirically verifiable observations or verifying the old facts) of the prevailing socio-economic and cultural conditions of the project area.

The data of flora and fauna of the project site was obtained during field visits. Meetings were held with expert Environmentalists from public and private institutions/organizations.

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1.8.3 Pubic Consultation

Roadside discussions were organized with the employees of the industries, which are in the immediate vicinity of the proposed grid station site. Meetings were held with the stakeholders such as IESCO, Environmental Practitioners, and their opinions and concerns regarding the project were solicited.

Annexure-4gives a list of persons and stakeholders met during EIA study.

1.8.4 Review of Legal and Administrative Framework

A review on all existing environmental legislative and administrative framework like relevant policies, rules, regulations, guidelines and standards of national, international and provincial and local levels were compiled and their implication on the project activities was identified.

1.8.5 Identification and evaluation of Impacts

The environmental impacts are broadly classified as physical, biological and socio-cultural, and then each broad category has been evaluated against its significance in terms of its severity and likelihood of its occurrence. The significance of the impacts has been assessed in terms of the effects on the natural ecosystem, level of public concern and conformity with legislative or statutory requirements The potential impacts thus predicated are further divided/categorized based on their duration (short and long term), reversibility, likelihood, consequence (minor, moderate or major) and significance (Low, medium or high). The aim of this task was to assess all associated risks with these impacts.

1.8.6 Identification of Mitigation Measures

The objective of identification of mitigation measures is i) to identify practices, technologies or activities that would prevent or minimize all significant environmental impacts and ii) propose physical and procedural controls to ensure that mitigation is effective. Based on the impact evaluation performed, changes or improved practices have been suggested, to prevent (where practical), and control unacceptable adverse impacts resulting from normal or extreme events.

1.8.7 Development of Environmental Management and Monitoring Plan (EMMP)

An Environmental Management and Monitoring Plan (EMMP) has been developed for effective implementation of the recommended mitigation measures of negative impacts during pre-construction, construction and operation phase. The EMMP also lays down procedures to be followed during the operation of the project and identifies the roles and responsibilities of all concerned personnel, including reporting in the operational phase.

1.8.8 Submission and Review of Draft Report

The consultant has submitted one hard and soft copy of the draft report to IESCO for their review. The objective was to give them an opportunity to review the findings of the study. Ambiguities regarding this study were clarified, and suggestions/ recommendations voiced for inclusion were added in the final report.

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1.8.9 Final Report

The consultant reviewed the feedback obtained from the IESCO and all the comments were incorporated in the draft report likewise. Two hard and soft copies of the final report were then submitted to IESCO.

1.9 Document Structure

The Environmental Impact Assessment study report presents findings and compiles all information into one document that includes the introduction of the project;policy, legal and administrative framework;project description;analysis of alternatives; existing environment, public consultation and communities concerns regarding the project, and Environmental Management and Monitoring Plan (EMMP).

1.10 Organization of the EIA Report

This report has been structured in the following manner:

Chapter 1 (*Introduction*) provides an overall introduction to the project and impact assessment methodology.

Chapter 2 (*Legal Framework)* describes the regulatory framework of Pakistan on the environment and its implications on the project.

Chapter 3 *(Project Description)* provides the description of the proposed project, its layout plan and associated activities, raw material details and utility requirement.

Chapter 4*(Description of the Environment*) provides a description of the micro-environment and macro-environment of the proposed project site. This chapter describes the physical, ecological and socio-economic resources land of the project area and surroundings.

Chapter 5 *(Public Consultation)* this chapter describes details of discussions held with primary and secondary stakeholders.

Chapter 6*(Impact Assessment and Mitigation Measures)* details the potential environmental and social impacts of the proposed project on the different features of the micro and macro-environment using the matrix method.

Chapter 7 *(Environmental Monitoring &Management Plan)* explains the mitigation measures proposed for the project in order to minimize the impacts to acceptable limits. It also describes the implementation of mitigation measures on ground and monitoring of environmental parameters against likely environmental impacts.

Chapter 8 *(Conclusion and Recommendation)* summarizes the report and presents its conclusions.

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2. Policy, Legal and Administrative Framework

2.1 Introduction

Pakistan being a signatory of multilateral international treaties has a comprehensive set of environmental legislation covering multiple environmental issues facing Pakistan like pollution of freshwater bodies and coastal water, air pollution, deforestation, loss of biodiversity, lack of proper waste management and climate changes. The basic policy and legislative framework along with detailed rules, regulations and guidelines required for the implementation of the policies and enforcement of legislation for the protection of the environment and overall biodiversity are in place.

The compliance status of the construction of 132 KV Transmission Linewas reviewed with reference to the legislation and existing legal framework on the environment in Pakistan and International level as described henceforth.

2.2 National Environmental Policy, 2005

The National Environment Policy (NEP) aims to protect, conserve and restore Pakistan's environment in order to improve the quality of life of the citizens through sustainable development. In NEP, the further sectorial guidelines, Energy Efficiency and Renewable directly related to building energy code for newly constructed buildings were introduced.

The NEP provides an overreaching with aframework for addressing the Environmental issues facing Pakistan, pollution of freshwater bodies and coastal waters, air pollution, lack of proper waste management, deforestation, loss of biodiversity, desertification, natural disasters and climate change. It also provides directions for addressing the cross-sectored issues as well the underline causes of Environmental degradation and meeting international obligations.

The NEP, while recognizing the goals and objectives of National Conservation Strategy, National Environmental Plan and other existing environment-related national policies, strategies and action plans provides broad guidelines to the Federal Government., Provincial Government, Federally Administered Territories and local Government for addressing environmental concerns and ensuring effective management of their environmental resources.

2.3 Laws and Regulations

Pakistan has several laws and regulations regarding the conservation and protection of the environment. However, the enactment of comprehensive legislation on the environment, in the form of an act of parliament, is a relatively new phenomenon. Most of the existing laws on environmental issues were enforced over an extended period of time and are context-specific. The laws relevant to the developmental projects are briefly reviewed below.

2.3.1 Punjab Environmental Protection Act, 1997 (Amended 2012)

After 18th Constitutional Amendment in the Constitution of Pakistan, the Federal Ministry of Environment has been dissolved, and thesubject of the environment has been handed over to provinces. EPA Punjab has formulated its own act. The major content of the act is same as of Pakistan Environmental Protection Act (PEPA), 1997. Minor amendments/changes have been made viz.

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- The Name of Act has been changed into "Punjab Environmental Protection (Amendment) Act, 2012".
- For the words "Federal Government", wherever occurring, the word "Government" shall be substituted.
- For the words "Federal Agency", wherever occurring, the words "Provincial Agency" shall be substituted; and
- For the word "National", wherever occurs, the word "Punjab" shall be substituted.

All the other clauses, sub-clauses, sections and sub-sections are almost the same.

The Punjab Environmental Protection Act, 1997 (Amended 2012) is the basic legislative tool empowering the Punjab government to frame regulations for the protection of the environment. The Act is applicable to a broad range of issues and extends to air, water, soil, marine and noise pollution, as well as the handling of hazardous waste.

The discharge or emission of any effluent, waste, air pollutant or noise in an amount, concentration or level in excess of the Punjab Environmental Quality Standards (PEQS) specified by the Punjab Environmental Protection Agency (Punjab EPA) has been prohibited under the Act, and penalties have been prescribed for those contravening the provisions of the Act.

The requirement for environmental assessment is laid out in Section 12 (1) of the Act. Under this section, "no proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof".

Section 12(6) of the Act states that this provision is applicable only to such categories of projects as Punjab Environmental Protection Agency (Review of IEE and EIA Regulations), 2012.

2.3.2 PEPA (Review of IEE and EIA Regulations), 2000

Pakistan Environmental Protection Agency (Review of IEE and EIA Regulations), 2000 (the Regulations) prepared by the Punjab Environmental Protection Agency under the powers conferred upon it by the Act, provide the necessary details on preparation, submission and review of the IEE and the EIA. Categorization of projects for IEE and EIA is one of the main components of the regulations.

Projects have been classified on the basis of the expected degree of adverse environmental impacts. Project types listed in Schedule-I are designated as potentially less damaging to the environment and those listed in Schedule-II as having potentially serious adverse effects. Schedule-I projects require an IEE to be conducted, provided they are not located in environmentally sensitive areas. For the Schedule-II projects, conducting an EIA is necessary. Salient features of the regulation, relevant to the proposed project are listed below:

Categories of projects requiring IEE and EIA are issued through two schedules attached to the Regulations.

- A fee, depending on the cost of the project, has been imposed for review of EIA and IEE.

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- The submittal is to be accompanied by an application in prescribed format included as schedule V of the Regulations.
- The EPA Punjab is bound to conduct preliminary scrutiny and reply within 10 days of submittal of the report a) confirming completeness, b) asking for additional information, or c) requiring additional studies.
- The EPA Punjab is required to make every effort to complete the review process for IEE within 45 days and of the EIA within 90 days, of the issue of the confirmation of completeness.
- EPA Punjab accords their approval subject to following conditions:
- Before commencing construction of the project, the proponent is required to submit an undertaking accepting the conditions.
- Before commencing operation of the project, the proponent is required to obtain from EPA Punjab a written confirmation of compliance with approval conditions and requirements of the IEE/ EIA.
- An EMMP is required to be submitted with the request for obtaining confirmation of compliance.
- The EPA Punjab are required to issue a confirmation of compliance within 15 days of receipt of the request and complete documentation.

The IEE/EIA approval will be valid for three years from the date of the accord.

A monitoring report is required to be submitted to the EPA Punjab after completion of construction, followed by annual monitoring reports during operations.

The project falls in Schedule-II of the regulations. Hence, this type of project needs an EIA to be conducted.

2.4 Punjab Environmental Quality Standards (PEQS)

The PEQS, promulgated under the PEPA 1997 (Amended 2012), specify the following standards:

The maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources.

- For power plants operating on oil and coal:
- Maximum allowable emission of Sulphur dioxide,
- The maximum allowable increment in the concentration of sulfur dioxide in the ambient air,
- The maximum allowable concentration of nitrogen oxides in ambient air, and
- Maximum allowable emission of nitrogen oxide for steam generators as a function of heat input.
- The maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment and sea (three separate sets of numbers).

The PEQS for liquid effluents discharged to inland waters, gaseous emission from industrial sources and emissions from motor vehicles are provided as on the following website. Website: http://epd.punjab.gov.pk/rules_regulations

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The Punjab Environmental Quality Standards (PEQS) specify the following standards:

- The maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged into 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 (02 parameters) in gaseous emissions from vehicle exhaust and noise emission from vehicles.
- Maximum allowable noise levels from vehicles.
- Ambient Noise and Air Quality Standards.

These standards also apply to the gaseous emissions and liquid effluents generated by the generator, process waste etc. The standards for vehicles will apply during the construction as well as operation phase of the project. Standards for air quality have not been prescribed as yet.

2.4.1 PEQS for Liquid Effluent

The Punjab Environmental Quality Standards (PEQS) for the discharge of effluent from industry are presented in **Table 2.1**.

Table 2.1: PEQS for Liquid Effluent Discharge

Parameters	Into Inland Waters	Into Sewage Treatment
Tempereture	=<3°C	=<3°C
pH Value	6-9	6-9
Biological Oxygen Demand $(BOD)_5$ at 20°C	80	250
Chemical Oxygen Demand (COD)	150	400
Total Suspended Solids (TSS)	200	400
Total Dissolved Solids (TDS)	3500	3500
Grease and Oil	10	10
Phenolic Compounds (as phenol)	0.1	0.3
Chlorides (as Cl')	1000	1000
Fluoride (as F')	10	10
Cyanide (CN') total	1.0	1.0
An-ionic Detergents (as MBAs)	2.0	20
Sulphate (SO'')	600	1000
Sulphide (S^{2-})	1.0	1.0
Ammonia (NH^3)	40	40
Pesticides	0.15	0.15
Cadmium (Cd)	0.1	0.1
Chromium (trivalent and hexavalent)	1.0	1.0
Copper (Cu)	1.0	1.0
Lead (Ni)	0.5	0.5
Mercury (Hg)	0.01	0.01

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Parameters	Into Inland Waters	Into Sewage Treatment
Selenium (Se)	0.5	0.5
Nickel (Ni)	1.0	1.0
Silver (Ag)	1.0	1.0
Total Toxic Metals	2.0	2.0
Zinc (Zn)	5.0	5.0
Arsenic (As)	1.0	1.0
Barium (Ba)	1.5	1.5
Iron (Fe)	8.0	8.0
Manganese (Mn)	1.5	1.5
Boron (B)	6.0	6.0
Chlorine (Cl_2)	1.0	1.0

Source: *PEQS, Punjab Environmental Protection Department*

2.4.2 PEQS for Gaseous Emission

The Punjab Environmental Quality Standards (PEQS) for permissible limits of gaseous emission from industry are presented in **Table 2.2.**

Table 2.2: PEQS for Gaseous Emission

Parameter	Source of Emission	Standard
Smoke	Smoke opacity not to exceed	40% or 2 Ringlemann Scale or equivalent smoke number
Particulate Matter	Boilers and Furnaces:	
	Oil Fired	300
	Coal-Fired	500
	Cement Kilns	300
	Grinding, crushing, clinker coolers and related processes, metallurgical processes, converters, blast furnaces and cupolas	500
Hydrogen Chloride	Any	400
Chlorine	Any	150
Hydrogen Fluoride	Any	150
Hydrogen Sulphide	Any	10
Sulphur Oxides	Sulfuric Acid/sulphonic Acid Plants	5000
	Other Plants except power plants operating an oil and coal	1700
Carbon Monoxide	Any	800
Lead	Any	50
Mercury	Any	10

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Parameter	Source of Emission	Standard
Cadmium	Any	20
Arsenic	Any	20
Copper	Any	50
Antimony	Any	20
Zinc	Any	200
Oxides of Nitrogen	Nitric Acid Manufacturing Unit	3000
	Other plants except for power plants operating on oil or coal:	
	Gas-fired	400
	Oil fired	600
	Coal-fired	1200

Source: *PEQS, Punjab Environmental Protection Department*

2.4.3 PEQS for Vehicular Emission

The Punjab Environmental Quality Standards (PEQS) for permissible limits of exhaust emissions from vehicles are presented in **Table 2.3.**

Table 2.3: PEQS for Vehicular Emission

Parameters	Standards (Maximum permissible limits)	Measuring Method
Smoke	40% or 2 on the Ringleman Scale During engine acceleration mode	To be compared with Ringleman chart at a distance of 6 meters or more
Carbon Monoxide	6%	Under idling conditions: non-dispersive infrared detection through the gasanalyzer.
Noise	85 dB (A)	A sound meter at 7.5 meters from the source

Source: *PEQS, Punjab Environmental Protection Department*

2.4.4 PEQS for Drinking Water, 2010

The Punjab Environmental Quality Standards (PEQS) for drinking water quality, 2016 are presented in **Table 2.4.**

Table 2.4:PEQS for Drinking Water Quality

Parameter	Standard values	WHO standards
Biological		
All water intended for drinking (E. Coli or Thermo-tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample.	Must not be detectable in any 100 ml sample.
Treated water is entering the distribution system (E. Coli or Thermo-tolerant Coliform and total Coliform bacteria)	Must not be detectable in any 100 ml sample.	Must not be detectable in any 100 ml sample.

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Parameter	Standard values	WHO standards
Treated water in the distribution system (E. Coli or Thermo-tolerant Coliform and total Coliform bacteria)	Must not be detectable in any 100 ml sample. In the case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample. In the case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.
Physical		
Color	≤ 15 TCU	≤ 15 TCU
Taste	Non-acceptable	Non-acceptable
Odour	Non-acceptable	Non-acceptable
Turbidity	< 5 NTU	< 5 NTU
Total hardness	< 500 mg/L	---
TDS	<1000	<1000
pH	6.5- 8.5	6.5- 8.5
Chemical		
Essential Organic	mg/Litre	mg/Litre
0Alminium	≤ 0.2	0.2
Antimony	≤ 0.005	0.02
Arsenic	≤ 0.05	0.01
Barium	0.7	0.7
Boron	0.3	0.3
Cadmium	0.01	0.003
Chloride	≤ 250	250
Chromium	≤ 0.05	0.05
Copper	2	2
Toxic Inorganic		mg/Litre
Cyanide	≤ 0.05	0.07
Flouride	≤ 1.5	1.5
Lead	≤ 0.05	0.01
Mangnese	≤ 0.5	0.5
Mercury	≤ 0.001	0.001
Nickel	≤ 0.02	0.02
Nitrate	≤ 50	50
Nitrite	≤ 3	3
Zinc	5	3
Pesticides mg/L		PSQCA No.4639-2004.page No 4 Table No. 3serial No. 20-58
Phenolic Compounds		<0.002
Polynuclear aromatic hydrocarbons		0.01
Radioactive		
Alpha emitters bq/L	0.1	0.1
Beta emitters	1	1

Source: *PEQS, Punjab Environmental Protection Department*

2.4.5 PEQS for Ambient Air and Noise

The Punjab Environmental Quality Standards (PEQS) for Ambient Air and Noise, 2016 are presented in **Table 2.5**and **2.6.**

Table 2.5: PEQS for Ambient Air

Pollutants	Time Weighted Average	Concentration in Ambient Air (ug/m^3)
Sulfur Dioxide (SO_2)	Annual Average*	80
	24 hrs**	120

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Pollutants	Time Weighted Average		Concentration In Ambient Air (ug/m³)
Oxides of Nitrogen gas (NO)	Annual	Average*	40
	24 hrs**		40
Oxides of Nitrogen gas (NO_2)	Annual	Average*	40
	24 hrs**		80
Ozone (O_3)	1 hour		130
Suspended Particulate Matter (SPM)	Annual Average*		360
	24 hrs**		500
Respirable Particulate Matter (PM_{10})	Annual Average*		120
	24 hrs**		150
Respirable Particulate Matter ($PM_{2.5}$)	Annual Average*		15
	24 hrs**		35
	1 hr		15
Lead (Pb)	Annual	Average*	1
	24 hrs**		1.5
Carbon monoxide (CO)	8 hrs		5 mg/m³
	1 hr		10 mg/m³

** *Annual Arithmetic mean of minimum 1040 measurements in a year taken twice a week 24 hourly at a uniform interval*

* *24 hourly /8 hourly values should be met 98 % of the year, 2 % of the time, it may exceed.*

Source: *PEQS, Punjab Environmental Protection Department*

Table 2.6: PEQS for Noise

Category of Area/ Zone	Limits In dB(A) Leq	
	Daytime	Night time
Residential area	55	45
Commercial area	65	55
Industrial area	75	65
Silence area	50	45

Source: *PEQS, Punjab Environmental Protection Department*

2.5 National Drinking Water Supply 2009

During September 2009 the government approved the National Drinking Water Policy that provides a framework for addressing the key issues and challenges facing Pakistan in the provision of safe drinking water to the people by 2025.

Drinking water is the constitutional responsibility of the provincial governments, and the specific provision function has been devolved to specially created agencies in cities and Towns and Tehsil Municipal Administrations under the Local Government Ordinance 2001.

Therefore, this policy framework is intending to guide and support the provincial and district governments in discharging their responsibility in this regard. The overall goal of the national drinking water policy is the following:

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- To ensure safe drinking water to the entire population at an affordable cost in an equitable, efficient and sustainable manner
- To ensure a reduction in the incidence of mortality and morbidity caused by water-borne diseases.

The policy is expected to be reviewed and updated every five years to examine its implementation and efficacy and to adapt it to the changing situation in the country

2.6 National Sanitation Policy

The National Sanitation Policy aims at providing adequate sanitation coverage for improving the quality of life of the people of Pakistan and to provide physical environment necessary for a healthy life. The Policy can be reached at

http://waterinfo.net.pk/sites/default/files/knowledge/National%20Sanitation%20Policy%202006.pdf

2.7 Punjab Local Government Ordinance, 2012

This ordinance, which is based upon the Punjab Local Government Ordinance of 2001 promulgated under the devolution plan, defines the roles of the district governments and also addresses the land use, conservation of natural vegetation, air, water and land pollution, disposal of solid waste and wastewater effluents, as well as matters relating to public health – aspects that are relevant to the proposed project.

2.8 Cutting of Trees (Prohibition Act), 1975

Section 3 of this Act states "No person shall, without the prior written approval of the local formation commander or an officer authorized by him in this behalf, cut fell or damage or cause to cut, fell or damage any tree."

2.9 Protection of Trees and Bush wood Act, 1949

This Act prohibits cutting of trees and bush wood without permission of the Forest Department.

2.10 Factories Act, 1934

The clauses relevant to the proposed project are those that address the health, safety and welfare of the workers, disposal of solid waste and effluents, and damage to private and public property. The Act also provides regulations for handling and disposing toxic and hazardous substances. The Pakistan Environmental Protection Act, 1997 (discussed above), supersedes parts of this Act pertaining to the environment and environmental degradation.

2.1 The Telegraph Act, 1885

The Telegraph Act ensures the compensation of damages to infrastructure and other property during the construction of any development project. The compensation of damages must be paid to the people affected within a fixed period. Any person not willing to follow the rules and regulations provided by this act shall be deemed to have committed an offence under section 188 of Pakistan Penal Code.

If any dispute arises as to the persons entitled to receive compensation, or as to the proportions in which the persons interested are entitled to share in it, the telegraph authority may pay into the Court of the District Judge such amount as he

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deems sufficient or, where all the disputing parties have in writing admitted the amount tendered to be sufficient or the amount has been determined under sub-section (3), that amount; and the District Judge, after giving notice to the parties and hearing such of them as desired to be heard, shall determine the persons entitled to receive the compensation or, as the case may be, the proportions in which the persons interested are entitled to share in it. Every determination of a dispute by a District Judge under sub-section (3) or sub-section (4) shall be final:

Provided that nothing in this sub-section shall affect the right of any person to recover by suit the whole or any part of any compensation paid by the telegraph authority, from the person who has received the same.

2.2 Pakistan Penal Code, 1860

This outlines the penalties for violations concerning pollution of air, water bodies and land. Sections 272 and 273 of this Act deal with the adulteration of food or drink. Noise pollution has been covered in Section 268, which defines and recognizes noise as a public nuisance. "A person is guilty of a public nuisance who does any act or is guilty of an illegal omission which causes any common injury, danger or annoyance to the public or to the people in general who dwell or occupy property in the vicinity, or which must necessarily cause injury, obstruction, danger or annoyance to persons who may have occasion to use any public right."

The code deals with the offences where public or private property or human lives are affected due to intentional or accidental misconduct of an individual or organization. The code also addresses control of noise, noxious emissions and disposal of effluents. Most of the environmental aspects of the code have been superseded by the Pakistan Environmental Protection Act, 1997.

2.3 Institutional Set-Up

The apex environmental body in the country is the Pakistan Environmental Protection Council (PEPC), presided by the Chief Executive of the Country. Other bodies include the Pakistan Environmental Protection Agency (Pak-EPA), provincial EPAs (for four provinces, AJK and Gilgit-Baltistan), and environmental tribunals.

The EPAs were first established under the 1983 Environmental Protection Ordinance; the PEPA 1997 further strengthened their powers. The EPAs have been empowered to receive and review the environmental assessment reports (IEEs and EIAs) of the proposed projects and provide their approval (or otherwise).

The 132 KV Transmission Line is located in District Attock. Therefore, the EIA reportwill be submitted to the Punjab Environmental Protection Department, Lahore for obtaining environmental approval for the project.

2.19 Environmental Protection Agency's Environmental Guidelines

The Pak EPA has prepared a set of guidelines for conducting environmental assessments. The package of regulations, of which the guidelines form a part, includes the PEPA 1997 and the NEQS. The guidelines themselves are listed below:

- Guidelines for the Preparation and Review of Environmental Reports,
- Guidelines for public consultation,
- Guidelines for Sensitive and Critical Areas, Sectorial Guidelines.

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It is stated in the Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000 that the EIA or IEE must be prepared, in the given prescribed, in accordance with the Pakistan Environmental Protection Agency guidelines.

The government of Pakistan has also framed guidelines for the preparation of IEE of Projects in various developmental sectors.

2.20 The Implication of Legislations to the project

Islamabad Electric Supply Company, being the proponent of the project will ensure that construction and operational phases of the project be carried out in accordance with the EIA report and Environmental Management Plan is effectively implemented.

The project will be subjected to four basic provisions relating to pollution control under the Punjab Environmental Protection Act, 1997 (Amended 2012), as contained in section 11, 13, 14 and 15 as follows:

- Section 11, prohibits discharge or emission of any effluent or waste or air pollutant or noise in excess of the PEQS, or the established ambient standards for air, water or land.
- Section 13, prohibits hazardous wastes.
- Section 14, prohibits the handling of hazardous substance except under a license or in accordance with the provision of any local law or international agreement.
- Section 15, prohibits the operation of motor vehicles for each air pollutant or noise is being emitted in excess of the PEQS or the established ambient standard.

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3 Project Description

3.1 Introduction

This Chapter provides a description of various components of the proposed project and their salient features, location, and phases.

3.2 Type and Category of the Project

According to the Pakistan Environmental Protection Act, 1997, section12 (1)

"No proponent of a project shall commence construction or operation unless he has filed with the Government Agency designated by Federal Environmental Protection Agency or Provincial Environmental Protection Agencies, as the case may be, or, where the project is likely to cause an adverse environmental effect an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof."

According to the Pakistan Environmental Protection Agency (Review of IEE and EIA Regulations) 2000:

"Transmission lines (11 KV & above) and Grid stations are in Energy projects of Schedule II, List of projects requiring an Environmental Impact Assessment."

The proposed project falls under the category of Schedule II as per IEE/EIA regulations 2000 and requires an EIA to be conducted.

3.3 Objective of the Project

The primary objective of the proposed project is to increase the efficiency, reliability and quality of the electricity supply to the Lakkarmar, Attock. In addition, the project aims to achieve:

- Strengthening of the electricity transmission network to reduce bottlenecks and improve system reliability and quality,
- Strengthening of the electricity distribution network to reduce losses and improvement in supply,
- The project will ensure the supply of electricity to the Lakkarmar,
- Load reduction on presently overloaded grid stations and transmission lines,
- Improvement in the voltage profile as well as the system reliability, and
- Decrease intechnical as well as commercial losses.

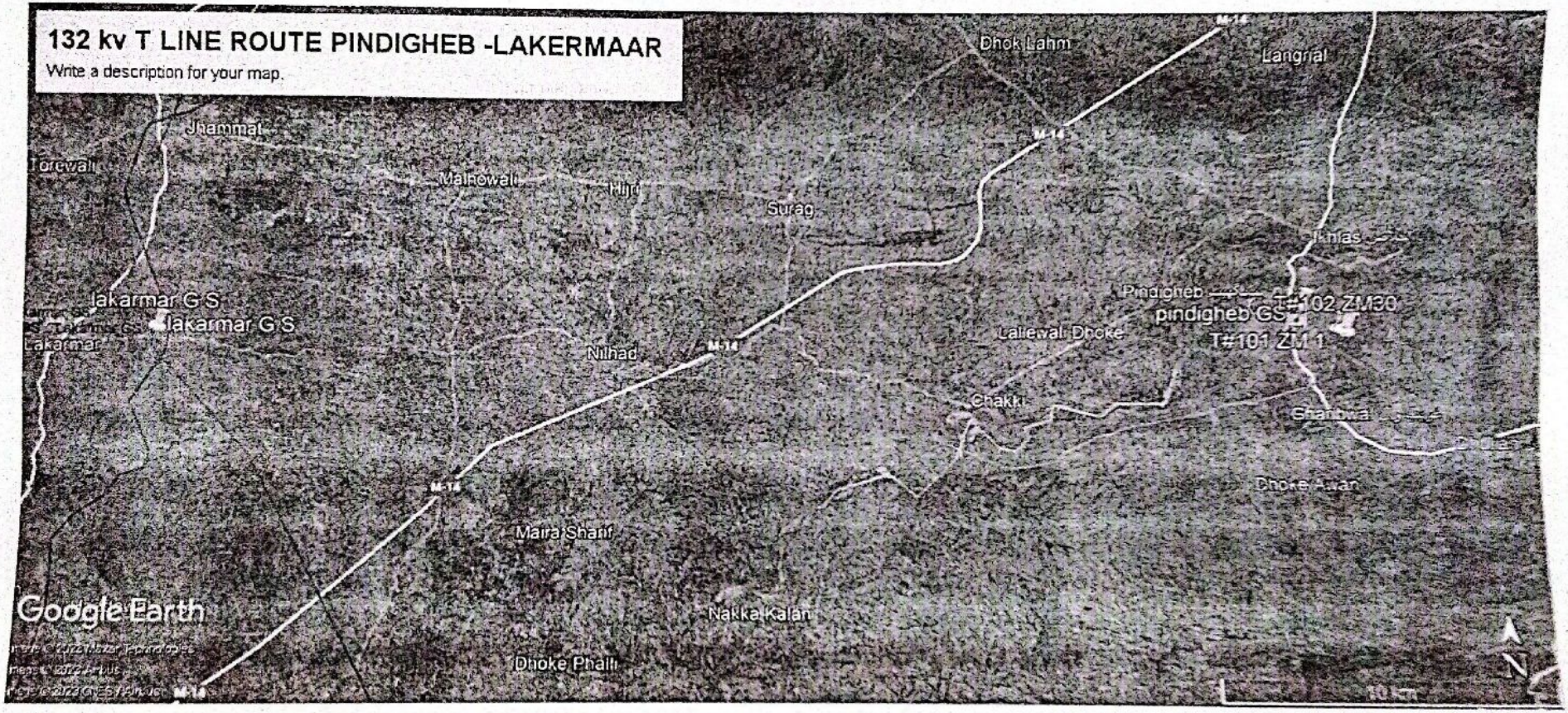
3.4 Project Location

The 132 KV transmission line will transmit electricity from PindiGheb grid station to Lakkarmar, District Attock.

The route mapis shown in **Figure 3.1**:

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Figure 3.1:Route Map of the Transmission Line



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3.5 Project Description

IESCO intends to supply electricity to Lakkarmar from PindiGheb grid station to resolve the forced load shedding due to the currently overloaded system in order to decrease the load shedding time by providing an alternate source of electricity through 132 KV transmission line.

The route has been marked after a detailed survey and the profile and layout of the route has been approved by Chief Engineer IESCO. The total length of the transmission line is 45.260 KM and a total of 142 towers will be erected. The conductor for transmission will be ACSR "LYNX".

The total estimated cost of the project is Rs.67.5 million and will be completed in 300 days after award of contract.

3.5.1 Transmission Line

Thetransmission line is 45.260 km, comprising of a total of 142 towers. The distance between towers is determined as per standards of IESCO. The range usually varies from 60m – 300m depending upon the site conditions.

The route of the transmission line is the most appropriate route to connect the proposed grid station at Lakkarmar with Pindi Gheb grid station.

The Grid Station Construction (GSC) Department along with Environment and Social Safeguard Section of PMU, IESCO has marked the route alignment of the proposed transmission line after careful consideration of the land use, ecological environment and nearby settlements along the route. The route alignment has limited vegetation cover; no trees will be cut down to make way for the transmission line.

Table 3.1: Detail of Tower Type and Number

S.No	Tower Type	New Proposed	Existing to be used	Total
1.	ZM-1	59	04	63
2.	ZM-1+3M	28	06	34
3.	ZM-1+6M	13	03	16
4.	ZM-30	15	04	19
5.	ZM-30+3M	09	---	09
6.	ZM-60	09	03	12
7.	ZM-60+3M	03	02	05
8.	EA+0+4	03	---	03
9.	EA+0+8	01	---	01
10.	EA+6+8 (Pile)	01	---	01
11.	EA+0+6	01	---	01
12.	EA+6+6	01	---	01
13.	SPD	----	01	01

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	Total	143	23	166

Width of Right of Way (RoW)

The width of RoW for T/L has been considered to be 8.8m, i.e. 4.4 m on either side from the Centre of transmission line and the area will be 70.56 m^2 (i.e. 8.4m x 8.4m) in case of tower spot.

Basic infrastructure facilities include civil work foundations for installation of towers.

The total estimated cost of the project is Rs. 67.5 million and will be completed in 300 days after the award of contract.

3.6 Civil works, Equipment, and other Facilities

3.6.1 Civil Works

Basic infrastructure facilities including civil work foundations for installation of towers will be required, for which necessary provision has been made in the cost estimate.

Keeping in view the prevailing normal soil strata of territories, information collected at site by the concerned surveyor, the following types of foundations are recommended for construction purpose of subject Transmission Line.

Table 3.2: Types of Tower Foundation

Tower	Foundation Type
ZM-1, ZM-1+3M, ZM-1+6M	Angle of repose A =20'
ZM-30, ZM-30+3M	Angle of repose A =20'
ZM-60, ZM-60+3M	Angle of repose A =20'
EA	Angle of repose A =20'
EA+6+8	Pile foundation dia 1200mm

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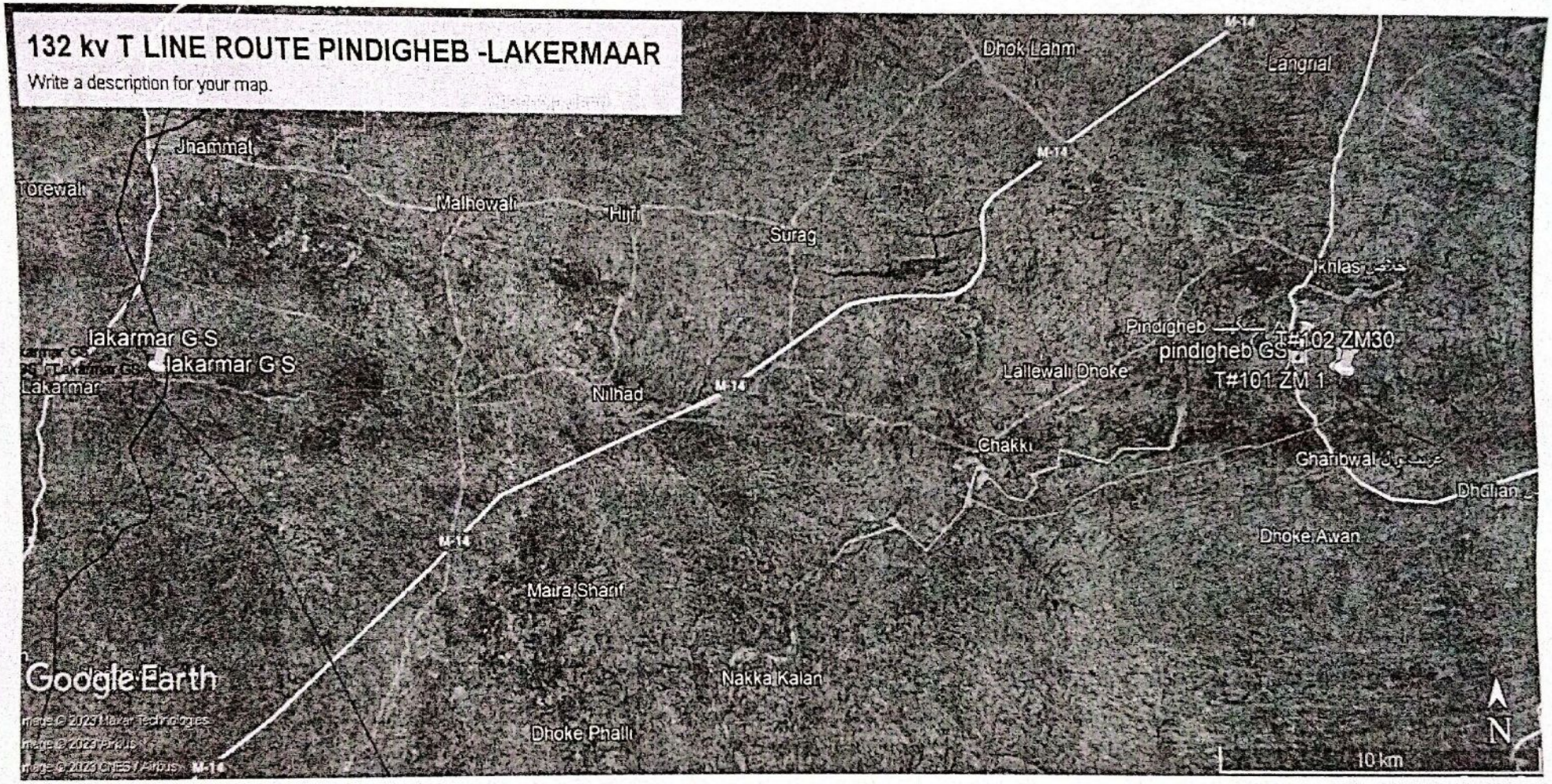


Figure 3.2: Layout Plan

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3.7 Design Aspects

3.7.1 Design Standards for Transmission Line

The design of associated Transmission Line is based on following parameters.

Figure 3.3: Permissible Conductor Clearance at 65°

S.No	Description	Clearance (m)
1.	Roads and Streets	9.0
2.	Cultivated land and traversed by vehicles	7.0
3.	Highways	9.0
4.	Railroads	9.0
5.	River at high flood	9.1
6.	Electrified railroad trolley wire	3.85
7.	Places accessible to pedestrians	7.0
8.	Building roofs not accessible to people	5.2
9.	Top of trees	9.0
10.	Canals	9.1

3.7.2 Tower Structure for Transmission Line

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

3.7.3 Safety Parameters

For EHV lines, safety considerations are of two types. One is related with the safety of the system, while others are those that are related to the public. It is for this reason that IESCO has adopted a 27 m wide (13.5 m either side from the centreline) corridor as the ROW for the allied 132 KV transmission line.

1. System Safety

Conductor to Tower/Pole Clearance:For the safety of the system, it is essential that any factor that may interrupt the power supply should be considered in the design. The clearance of the conductor from tower legs and trusses is of prime importance. Therefore, in the design, a minimum clearance of 1.55 m has been adopted under extreme wind conditions. This is based on regulations of GOP/WAPDA and minimum requirements of National Electric Safety Code (ANSI C2). With this clearance, there is 99% probability of withstanding switching surge of 3-sigma margin due to maximum over voltage under adverse climatic conditions.

Earthing of the System: This is to keep tower footings resistance less than 10 ohms. For this, two earth electrodes of copper-clad steel rods are sunk vertically into the ground to a minimum depth of 3 m and the locations where the required resistance not achieved crow footing will be done.

Lightning Performance: The tower geometry, clearance and insulation of the system are designed to perform safely within the permitted lightning intensities. In this respect, consideration has been given to the tower footing resistance and

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Isokeraunic level of the area. The accepted level is one trip out/ 100 km/ year due to lightning.

Work Uniform and Health and Safety Equipment: Transmission line construction is a special job and the labour working on such works requires special protective uniform and personal protection equipment to cope up with safety and health requirements. It will be ensured that the labour engaged in handling rough construction materials, mixing of concrete and handling transmission lines etc. shall have long boots, overall dresses, goggles, gloves, and safety hats. They will invariably have their company Identity Cards worn around their necks with the help of a ribbon. As an overall Safety, Health and Environment measure, anyone going into the construction area will also wear safety helmet and safety shoes. Special arrangements must be made for Fire Protection by way of providing appropriate type of fire extinguishers with fire fighting training to concerned personnel.

2. Public Safety

General Aspects: In view of public safety, IESCO has adopted a policy such that, the existing orchards having fruit trees with a height of not exceeding 2.5 m are allowed to remain under the lines. Similarly, open wells, including Persian wheels, can remain under the transmission lines. However, tube wells and peter pumps are not permitted under the high voltage conductors. This is because piping, and cranes used to refurbish such wells could come in contact with the lines. No residential or other public buildings like factory, school, hospital, etc. are permitted within the corridor. However, farm buildings, which are not used for residential purposes can remain under the high voltage lines, provided a 7.0 to 9.0 m minimum clearance is maintained. The height of the towers can be increased to accommodate such buildings.

Conductor to Ground Clearance: The conductor to ground clearance is desirable to be worked out based on over voltage due to switching surge. In this consideration, safe clearance is required to be provided for moving objects under the line with a height of 4.5 m, withstanding switching surge of 3-sigma margin with 99.7% probability under adverse atmospheric conditions. This should keep the maximum voltage gradient at ground level and maximum current induced in a person less than the internationally allowable values. As such, the total conductor to ground clearance shall in no way be less than 7.0 meters. This is in accordance with the regulations of Government of Pakistan (GOP) and NTDC practice.

3.8 Cost and Magnitude of Project

The estimated cost of the proposed project is PKR. 67.5 million. The breakup of the cost estimates is provided below in **Figure 3.4**.

Figure 3.4: Estimated Cost of the Project

No.	Project Component	Tentative Cost in Rs (Millions)
1.	**New Transmission line**	
	Length line 45.260 km Number oftowers 142 Conductor Rail Cost of electrical equipment and installation	

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No.	Project Component	Tentative Cost in Rs (Millions)
	Cost of civil works including contractor bid Departmental charges @ 26%	
Total Estimated Cost of the Project (PKR in Million)		**67.5**

Source: IESCO

3.9 Project Activities Process Flow

3.9.1 Land Acquisition for Transmission Line

GSC department of IESCO has allocated a fixed route from PindiGheb to Lakkarmar, Dstrict Attock. The total length of the transmission line is 45.260 KM with a total of 142 towers.

There is no issue of land acquisition or resettlement of the community as most of the the transmission line route does not pass through or along any human settlements and agricultural land. However, where the route passes through private property, the owner will be compensated as per the Telegraph Act.

According to the survey conducted, the transmission line will cross Chaki Mera Road, tower number 53 and 54 will be installed at each side of the road. Other major settlements on the transmission line route are Nilhad and Amanpura. The owner of agriculture land for their damages of crops will be compensated as per the Telegraph Act and safety measures will also be taken to ensure safety of the farmers working in the field.

3.9.2 Construction Phase

Construction of New Transmission Line

The sequence of activities which are carried out for the laying of transmission lines are as follow:

- First of all, a reconnaissance site visit is carried out by the GSC Department in order to determine feasible routes for the transmission line.
- The fixed route marked on the map and sent to the Design Department.
- The Design Department approves the route.
- The GSC carries out detailed survey (plain tabling as well as profiling) of the approved route.
- The results of the detailed survey are sent to the Design Department.
- The Design Department prepares a detailed design.
- Material is procured after tendering.
- Tendering for the construction works is carried out and contract awarded.
- After the award of contract, the contractor mobilizes and establishes a camp/site office usually within the boundary of existing grid stations (depending on the availability of space).
- Construction activities are started by demarcating the tower locations. Temporary Right of Way (RoW) is required along the transmission line route to carry out the construction activities. Additional temporary RoW is required for the route to

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access the transmission line corridor/tower locations during the construction phase.

- Subsequent to the above, excavation for tower foundation is carried using appropriate machinery, such as excavator etc. In the hilly/rocky areas, blasting is also sometimes needed for excavation. Once the excavation is complete, construction of the tower foundation is taken in hand and after that erection of tower is carried out followed by stringing of conductor and accessories (e.g. insulators, etc.) installation.
- After the completion of installation activities described above, testing is carried out. After that the line is commissioned and put into operation.

3.9.3 Restoration and Rehabilitation after completion of Project

The operation and maintenance (O&M) activities of grid stations and transmission lines are briefly described below.

A: Operation Activities

The transmission lines are managed round the clock and important parameters (such as voltage, load and power factor) are monitored. Daily log sheets are filled, recording the key data. Any non-compliance is recorded and concerned departments are informed for taking remedial measures.

B: Scheduled Maintenance

- Checking/testing of transformers (discussed below)
- Testing of breakers
- Testing of the protection system
- Transmission line patrolling
- Washing/replacement of insulators
- Emergency Maintenance
- Locating the fault
- Carrying out repairs or replacements, as needed
- Restoring the system to the normal operating conditions.

3.10 Government Approval

Presently, the project is in the planning phase. However, all the required government approvals have been acquired by IESCO. The transmission line route has been selected by the GSC department IESCO in consultation with the government of Punjab. The compensation for damages will be paid according to the Telegraph Act if the project activities cause any damage to any private property.

3.11 Project Time Schedule

The construction of Transmission Line will be completed in 300 days after the award of contract.

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3.12 Alternatives considered and Reasons for Rejection

3.12.1 No Project Option

The proposed project seeks to increase the efficiency, reliability and quality of the electricity supply to Lakkarmar.

It will also help to manage the secondary transmission and grid network of the IESCO system and provide the much-needed relief to the existing over-loaded IESCO system. This will also help in reduce load shedding and line losses and power breakdowns resulting in the reduction of financial loss to IESCO.

In case the proposed project is not undertaken, the IESCO system will not be able to cope with the increasing electricity demand in future, the existing system will remain over-loaded, line losses will also remain high, and the system reliability will progressively decrease, which may cause the industries stop operation due to low voltage and variation in the electricity supply.

In view of the above, the 'no project' option is not a preferred alternative.

3.12.2 Route Alternatives

A reconnaissance site visit was carried out by the GSC Department in order to determine feasible routes for the transmission line. However, in this case, the selected route is the only best possible route as it disturbs minimum flora fauna and local communities along its route. The basic considerations including land use, ecological environment and nearby settlements were taken in account while selecting the route for the transmission line.

3.12.3 Technical Alternatives

a. Type of Transmission Line Towers

Single Circuit vs. Double Circuit

For the 132-KV transmission line, there are two possible options for the type of the towers: single circuit and double circuit. The single circuit towers are designed for one circuit of the transmission line only, and there is no room for the second circuit in the future. On the other hand, using the double circuit towers provides the future expansion capacity on the same towers. The cost of the double circuit towers is slightly higher than the single circuit variants, however, in view of their expansion capacity, greater reliability, enabling transfer of more power over a particular distance, double-circuit towers are the preferred ones in this project.

Tower vs. Tubular Pole

The base of the transmission line towers is about $10m^2$, and finding this much space in congested urban areas may be a problem. For such applications, WAPDA/IESCO has been using tubular steel poles which require considerably less space. Since the current project is in a rural area, therefore there is no issue of space, which is why; the conventional towers will be preferred. The environmental and socio-economic aspect of the tubular pole includes a smaller footprint, compared to the conventional tower.

The preferred option would be to use the towers for the proposed project.

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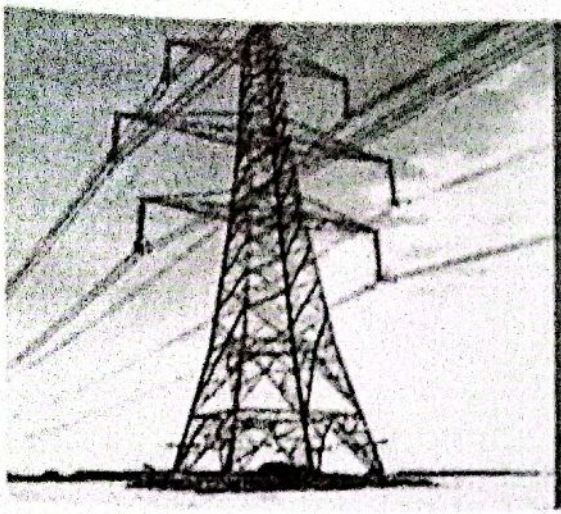


Exhibit-1: Conventional Tower

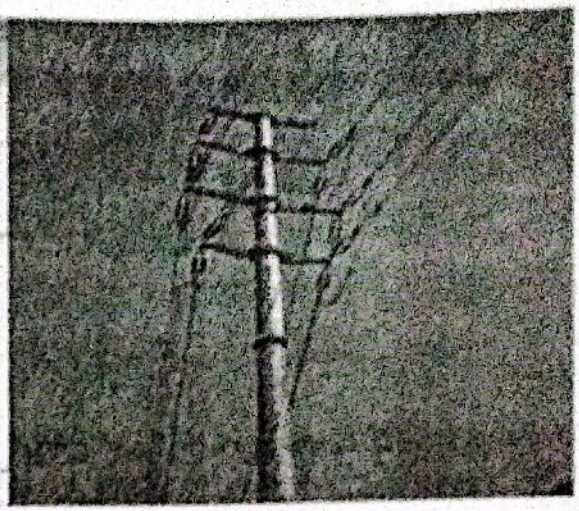


Exhibit-2: 132 KV Korean Tubular Pole

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Figure 3.5: Pictorial view of the Project Site

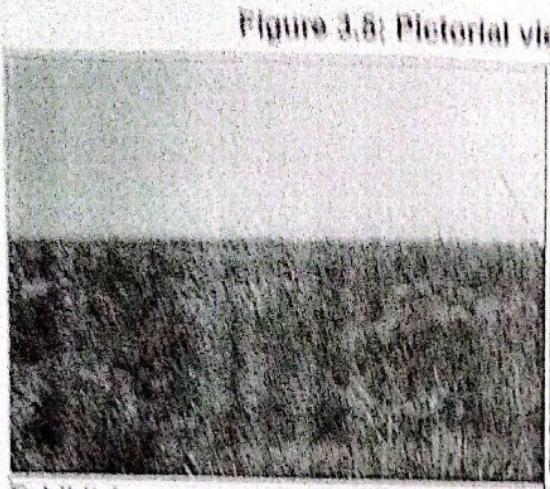


Exhibit 1:

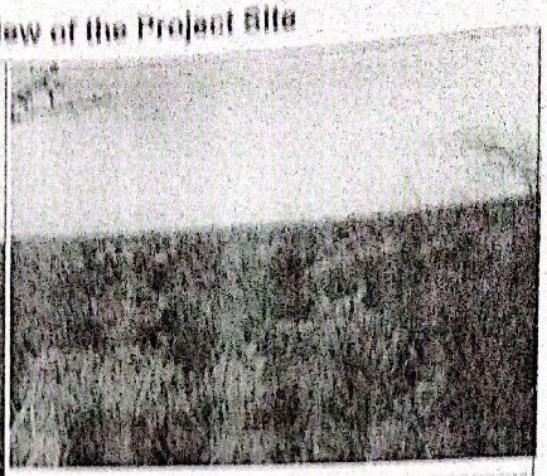


Exhibit 2:



Exhibit 3:

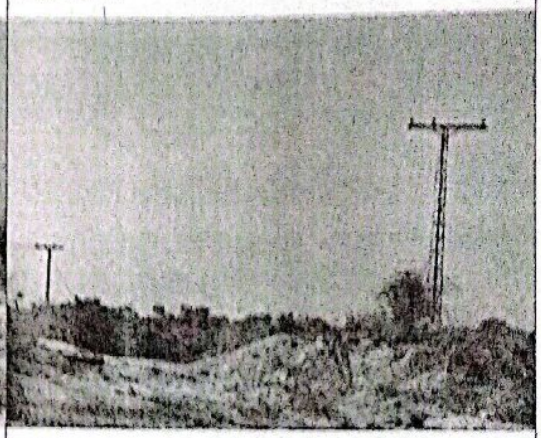


Exhibit 4:



Exhibit 5:

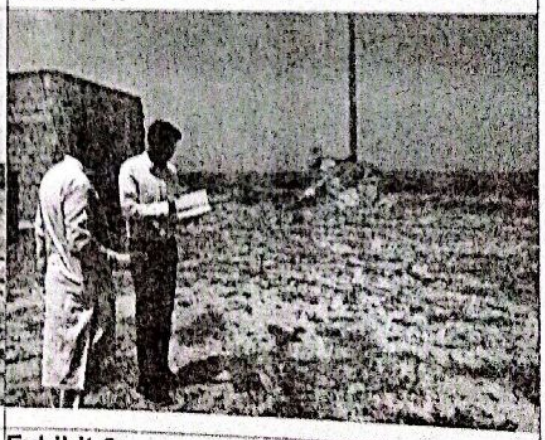


Exhibit 6:

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4 Description of the Environment

4.1 Introduction

This Chapter describes the existing environmental and socio-economic conditions of the project area. The Project area is the area falling within 1 km radius of the Project Site.

4.2 Attock

District Attock is situated on the north by Haripur and Swabi districts of Khyber Pakhtunkhwa (KP), in the east by Rawalpindi district, by Chakwal district in the southeast, Mianwali district in the southwest, and by Kohat and Nowshera of KP in the west and northwest respectively. Geographically, the District is mainly hills, plateaus, and dissected plains. The Indus River flows on the northern and western borders of the district. After Haripur, the Haro River passes through the north of the Tehsil of Attock where there is a flood plain with fertile soil.The district is divided into six tehsils; Attock, PindiGheb, Jand, HasanAbdal, Hazro and fateh Jang.

The project site is located Attock District.

4.3 Physical Environment

4.3.1 Topography

Physical features of the district exhibit a rich variety which is continental in dimensions. Here, all possible species of topography which physical processes could produce during the course of ages are located. These include mountains, forests, plateaus, valleys, ravines, torrents, streams, plains, etc. Nature has endowed the district with some beautiful scenery. Within the district, there are also areas fantastic, dreary, tumbled upside down, where there can be no human habitation for kilometres around. The Indus River flows along with the boundaries of this District.

4.3.2 Geology and Soil

The district is mainly hills, plateaus, and dissected plains. The Indus River flows on the northern and western borders of the district. After Haripur, the Haro River passes through the north of the Tehsil of Attock where there is a flood plain with fertile soil.

Most of the area is rain fed, however some area is irrigated through canal system.

4.3.3 Hydrology

The Hero River runs through northern and western borders of the district. Occasionally it overflows during the rainy season, causing considerable damage. The Indus river flows with the boundaries of the district and separate it from KPK province.

Although the mighty river indus flows alongwith its boundaries but the 70% area of district thrust for water and only feed when it is rain.

4.3.4 Surface Water

The only water body in the project area is Hero River, which flows north of the project site.

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4.3.5 Ground Water

During public consultation, the people of the project area told the team that groundwater table in the PindiGheb to Lakkarmar100 to 200 meters.

4.3.6 Climate

In Attock district, the summers are long, sweltering, muggy and sunny whereas the winters are short, cold, and mostly clear. Over the year, the temperature typically varies from 39°F to 104°F and is rarely below 34°F or above 111°F.

The District receives rainfall throughout the year at different intensities. More than half of the rain is received during the 31 days around August 01 with some heavy spells as well.

Attock City experiences extreme seasonal variation in the perceived humidity. The muggier period of the year lasts for 3.7 months, from June 13 to October 2, during which time the comfort level is muggy, oppressive, or miserable at least 23% of the time.

The windier part of the year lasts for 3.7 months, from May 6 to August 30, with average wind speeds of more than 4.7 miles per hour. The windiest day of the year was once recorded on July 20 with an average hourly wind speed of 5.7 miles per hour[1].

4.3.7 Air Quality and Noise

The ambient air quality monitoring was conducted for Punjab Environmental Quality Standards (PEQS) for Sulphur dioxide (SO_2), Oxide of Nitrogen (as NO), Oxide of Nitrogen (as NO_2), Ozone (O_3), Suspended Particulate Matter (as SPM), Respirable Particulate Matter (as PM_{10}), Respirable Particulate Matter (as $PM_{2.5}$), Lead (Pb) and Carbon Monoxide (CO) during 24 hours at the project site.

The noise level monitoring was conducted for 24 hours at the project site of 132 KV Transmission Line.

The ambient air quality and noise monitoring were carried out by Punjab EPD approved laboratory of SEAL, Lahore.

Ambient Air Quality Monitoring

Sulphur dioxide (SO_2): Sulphur dioxide (SO_2) is a colourless, poisonous gas with a strong odour and mostly present in Coal and petroleum containing Sulphur compounds.

The 24h average concentration of SO_2 at the monitoring site was 48.12 µg/m^3 which is in compliance with the PEQS (120 µg/m^3) of Pakistan.

The SO_2 concentration levels are well belowthe PEQS limits at the project sites.

Oxides of Nitrogen dioxide: Nitric oxide (nitrogen oxide, nitrogen monoxide) is a molecular, chemical compound with a chemical formula of NO. One of several oxides of nitrogen, it is a colourless gas under standard conditions. It is also

[1] https://attock.punjab.gov.pk/climate

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produced naturally by the extremely high air temperatures produced along the path of lightning in thunderstorms.

Nitric oxide should not be confused with nitrous oxide (N_2O), anaesthetic, or with nitrogen dioxide (NO_2), brown toxic gas and a major air pollutant, the latter being a product to which nitric oxide is rapidly oxidized in air.

The averaged (24h) concentration was (38.05µg/m^3) remained in compliance with PEQS (120 µg/m^3) at the ambient air quality monitoring site.

NO concentration levels are within the PEQS limits and well below the maximum permissible limits as per Punjab Environmental Quality Standards. There are no such industries releasing gaseous emissions near the project site and vehicular emissions are negligible as well.

Particulate Matter: Particulate matter (PM) is a solid matter from smoke, dust, fly ash, or condensing vapours that can remain suspended in the air for a long period of time. PM_{10} means the particulatematter is having an aerodynamic diameter of 10 micrometres while $PM_{2.5}$ means the particulatematter is having an aerodynamic diameter of 2.5 micrometres or less. Particulates include an array of atmospheric materials, carbon-based matter such as soot, ashes, windblown dirt, sand, soil dust, metals, and plant matter such as pollens. The composition of particulate matter varies with the place, season and weather conditions.

Fine PM can be sulfates, nitrates, organic matter (organic carbon compounds), elemental carbon (soot), and soil dust (crustal materials).

The time-averaged (24h) concentration of PM_{10} is 118.14µg/m^3, and $PM_{2.5}$ is 17.86µg/m^3 and were in compliance with the PEQS; 150µg/m^3 and 35 µg/m^3 respectively.

Carbon monoxide (CO): Carbon monoxide is an odourless, colourless and highly poisonous gas that has its major origin in the incomplete combustion of carbonaceous materials. Although industrial processes contribute to CO pollution levels, however, the principal source of CO is automobiles. The vehicular emissions may have caused a slight increase in the concentration of CO.

However, the averaged concentrations of CO at the project site were found to be 2.85 mg/m^3 which is within the PEQS (i.e. 5mg/m^3).

The SO_2, NO, NO_2, O_3,, PM_{10}, $PM_{2.5}$ and CO concentrations meet the PEQS limits.

4.3.8 Noise Level Monitoring

Ambient noise levels were also continuously recorded at the project site for 24 hours. The sound pressure level (dB) were frequency weighted on A-curve (dB (A)) and time-weighted (dB (A) L_{eq}) on an hourly basis.

The 24 hour monitoring period for noise with a one-hour interval is divided into two periods, i.e. daytime hours and nighttime hours. The project site is located in a rural area and there are no residential areas within 500m of the project site.

The noise level data for daytime was 54 dB(A) and 42 dB (A) at night time. The Noise level measured at the project site was within the PEQs Limit that is 65 dB(A) for the day and 55 dB(A) for the night.

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Conclusion of ambient air quality and noise level monitoring

The ambient air quality monitoring was carried out for 24h in July, 2023.

The laboratory report detailing the ambient air and noise level monitoring report is attached in **Annexure-8**.

The SO_2, NO, NO_2, O_3, $PM_{2.5}$, SPM, PM_{10}, CO concentration meets the PEQS limits. A summary of ambient air quality and noise levels results are given in**Table 4.1**below:

Table 4.1: Summary of Ambient Air Quality and Noise Results at the Project Site

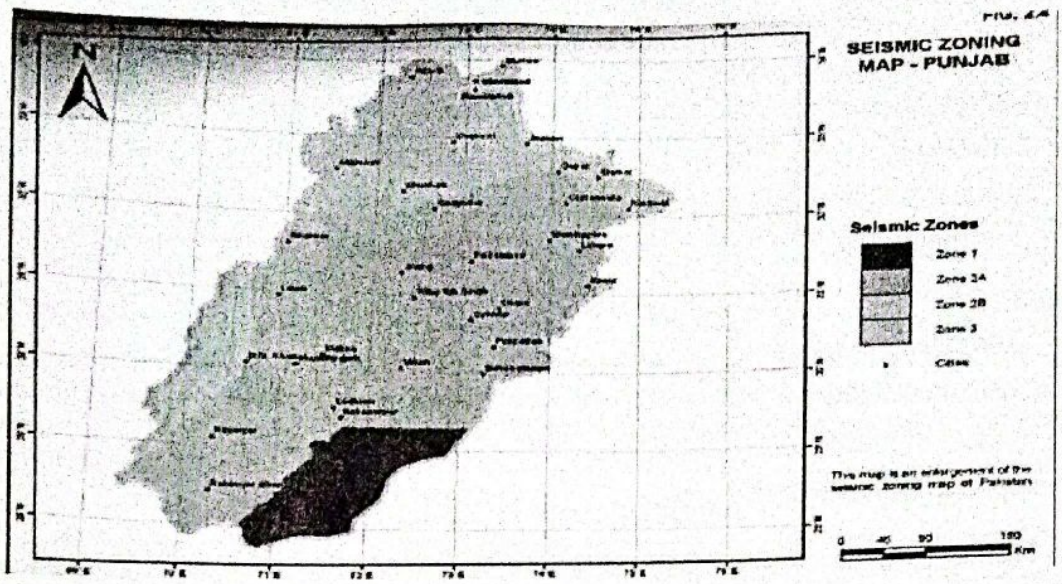
Parameter	Averaging Time		PEQS	Unit	Concentration at the Project Site
Sulphur dioxide (SO_2)	24 h		120	µg/m³	12.45
Nitric Oxide (NO)	24 h		40	µg/m³	11.4
Nitrogen dioxide (NO_2)	24 h		80	µg/m³	31.2
Particulate Matter (PM_{10})	24 h		150	µg/m³	86.2
Particulate Matter ($PM_{2.5}$)	24 h		35	µg/m³	15.3
Carbon monoxide (CO)	24 h		5	mg/m3	1.95
Noise	Day-time	6:00AM-10:00PM	75	dB(A)	56
	Night-time	11:00 PM-6:00AM	65		44

4.3.9 Seismology

The Project Area is located in Seismic Zone 2B, where 2B represents peak horizontal ground acceleration from 0.16 to 0.24g, where 2B represents upper moderate damage zone. **Figure 4.2**shows the seismic zoning map of Punjab with the Project Area falling under Seismic Zone-2B.

Figure 4.1: Seismic Zoning Map of Punjab

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4.3.10 Traffic and Transportation

The main roads links the Attock Districtare ancient Grand Trunk Road (N-5), Islamabad-Peshawar Motorway (M2), Rawalpind to Kohat Road. Currently M14 Motorway has been constructed under China Pakistan Economic Corridor project passes through the project area at PindiGheb. The public transport for travel within the district is diverse, ranging from taxis, auto-rickshaws, mini-buses to even tongas (horse-driven carriages). The Islamabad international airport is easily accessible from all Tehsils of the district. The railway network is also link the district to the other cities of the country.

4.4 Ecological Environment

4.4.1 Flora

The vegetation is a representative of Dry Subtropical Scrub Forest which is dominated by *Acacia modesta* (Phulai), *Ziziphusmauritiana* (Ber), etc.

The most common trees are AmalTas (*Casiafistulla*), Chinar (Platanusorientalis),Phulai (*Acacia modesta)*, Dharek (*Meliazardorachita)*, Jangaliber (*Zizyphusmaurantiana),* Kiker (*Acacia nilotica)*,Mulberry/Shahtoot (*Morus alba*), Safaida*(Eucalyptus camaldulensis*), Shisham*(Dalbergiasissoo*), Coconut *(Cocosnucifera)*, Papeta*(Manilkarazapota),*Jaman *(Syzygiumcumini),Thevetiaperuviana*(PeliKaner), Shireen(*Albizialebbek),* Bamboo (*Bambusa)*, Semal (*Bombaxceiba),* Palm (*Arecaceae)*, Mango (Mangiferaindica), etc. These are planted along the roadsides and other green areas.

4.4.2 Fauna

In its original form, the Dry Sub Tropical Semi Evergreen Scrub Forest constitutes the habitat of wild fauna consisting of a host of animals and birds. As the disturbances increased to a maximum level with complete inhabitation, wildlife abundance and diversity decreased to a minimum degree.

The species found in the district are:

Mammals

Canisaureus (Asian Jackal)

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Rattusrattus	(Rat)
Herpestesjavanicus	(Grey Mangoos)
Felischaus	(Jungle Cat)
Lepusnegricollis	Indian Hare)
Hystrixindica	Porcupine)

Reptiles

Calotesversicolor	Garden Lizard)
Eschiscarinatus	(Saw scaled viper)
Passer domesticus	House Sparrow)
Spalerosophisdiadema	Diadem Snake),
Uromastixhardwicki	Spiny Tailed Lizard),

Birds

Coturnixcoturnix	Quail)
Centropussinensis	Common Crow)
Alcedoatthis	Kingfisher)
Passer domesticus	House Sparrow)
Corvussplendons	House Crow)

A complete list of the flora and fauna of the district is given in **Annexure-7**.

4.5 Socio-Cultural Environment

4.5.1 Attock District

District Attock is situated on the north by Haripur and Swabi districts of Khyber Pakhtunkhwa (KP), in the east by Rawalpindi district, by Chakwal district in the southeast, Mianwali district in the southwest, and by Kohat and Nowshera of KP in the west and northwest respectively.

The health care services provided by the public health sector in the District consists of 01 DHQ, 05 THQ Hospitals,05 Rural Health Centers, 63 Basic Health Units and 23 Dispensaries.

There exists no site of archaeological and cultural significance within the two kilometres radius of the project site.

All other amenities of life like electricity, natural gas, telephone, a police post, post office and bank, etc. are present near the Project area.

Population and Ethnic Structure

The estimated population of district is 1.280 million people as per the census of 2017. Most of the houses are well constructed. The average growth rate is 2.07 %.

The literacy rate of the district is 49.3%.

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Almost all the population of the district is Muslim. There are very few Christian, Hindu/Sikh and Qadiani, schedule caste and other communities which are about 01 per cent of the total population.

Languages

The main languages in the project area are Urdu, English, Punjabi, Pashto, Saraiki, while few people speak other languages too. The most widely spoken languages are Urdu and Punjabi.

Education

District Attock has 49 to 51% literacy rate. There are many educational institutions in the project area. Higher secondary educational institutions for boys and girls are present with all basic infrastructure and highly qualified staff. The education facilities in the project area are extra ordinary.

Table 4.2: Educational Institutions

District	Education Status			
	Numbers			
	School	Colleges	Universities	Cadet Colleges
Attock	1,205	29	04	01

Public Health

Both public and private medical Centre. There are a number of hospitals.

The health care services provided by the public health sector in the District consists of 01 DHQ, 05 THQ Hospitals,05 Rural Health Centers, 63 Basic Health Units and 23 Dispensaries.

Table 4.3: Health Facilities

Sr. No	Number of Health Facilities	District Attock
1.	District Headquarters Hospitals	01
2.	Tehsil Headquarters Hospitals	05
3.	RHU	05
4.	Others (Sub Health Centers, Dispensaries and Private Facilities)	86

Drinking Water Supply

The underground water obtained through tube wells is used for drinking and domestic purposes. Plenty of underground water with low water table will fulfill the water demand of construction crews during construction Phase of the project.

Employment

Much like rest of the country, the male members of the family in the project area are the breadwinners. The mainly adopted professions are Government jobs (Civil & Military), work in Gulf and western countries, domestic agri work, cattle forming, fish forming, landlords, and property owners etc.

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4.5.2 Sites of Archaeological and Cultural Significance

The Attock district is rich in archeological and cultural significant sites including Attock Fort, old Gurdwara Sri Panja Sahib shrine etc.There exists no site of archaeological and cultural significance within the two kilometres radius of the project site.

4.5.3 Other Facilities

All other amenities of life like electricity, natural gas, telephone, a police post, post office and bank, etc. are present near the Project area.

Figure 4.1: Pictorial Presentation of Floral Species at Project Site

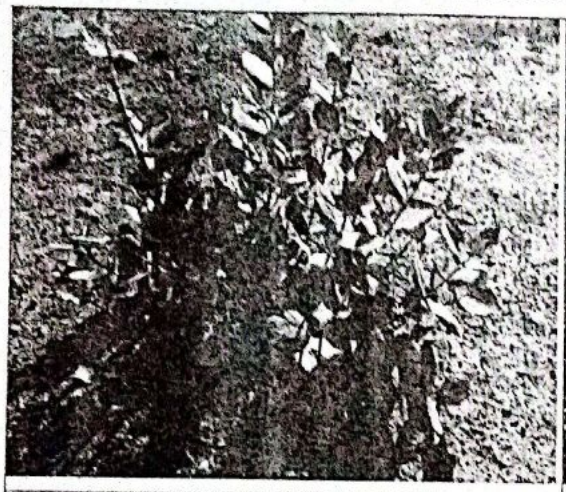


Exhibit 4.1: Silver Oak

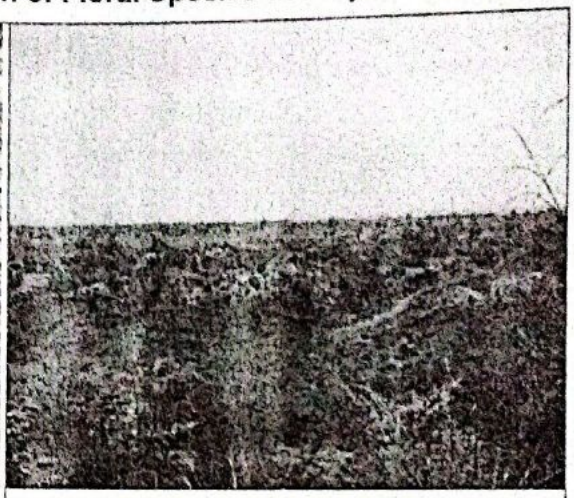


Exhibit 4.2:Common Shrubs

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5 Public Consultation

Public consultation plays a vital role in studying the effects of any development project on stakeholders and in its successful implementation and execution. It affords an opportunity to exchange knowledge with those who as members of the society are concerned with the Project, immediately or remotely. Referring particularly to a project related to environmental assessment, the involvement of the public is all the more essential, as it leads to better and more acceptable decision-making.

The overall objective of the consultation with the stakeholders is to help verify the environmental and social issues, besides technical ones, that have been presumed to arise and to identify those who are not known or are unique to the Project. In fact, discourse with many who have thoroughly observed the site conditions in the pre-developmental phase, goes a long way in updating the knowledge and understanding

The construction of Transmission Line,PindiGheb to Lakkarmar, District Attock, will create both positive and negatives impacts in and around the project site that may affect the local people and other stakeholders both directly and indirectly. The EIA team has done a detailed survey to find such impacts but it was necessary to involve all the stakeholders at the EIA stage.

Stakeholders concerns regarding various aspects, existing environment, and impacts of the project were pointed out and added to this EIA report.

5.1 Objectives of Consultation

Public consultation plays a vital role in studying the effects of the project on the stakeholders and in the successful implementation and execution of the proposed projects. Public involvement is a compulsory feature of environmental impact assessment, which leads to better and more acceptable decision-making. The overall objective of the consultation with stakeholders is to verify the environmental and social issues that have been presumed to arise and to identify those which are not known or are unique to the project.

The important general objectives of the consultation process are:

- Providing key project information to the stakeholders, and to solicit their views on the project's potential or perceived impacts,
- Identification of potential problems and needs,
- To devise the way for collaborative problem solving,
- Develop and maintain communication links between the project proponents and stakeholders, providing opportunities to the public to influence the project design in a positive manner, and
- Ensure that views and concerns of the stakeholders are incorporated into the project design and implementation with the objectives of reducing or offsetting negative impacts and enhancing benefits of the proposed project

5.2 Methodology

The consultant carried out public consultations with the stakeholder of multidimensional background at various locations around the proposed Project. The

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stake holder's consultation during this phase of the work targeted the project area, administrative, private offices, Govt. offices, shops, stores, etc. near the Project area.

Potential stakeholders for consultation and participation were identified and initial discussions were held with the owners of the private lands falling in the ROWs, people living in direct area of impact, household women, students, government and private employees.

Appraising the targeted stakeholders initially for the purpose of consultation and working out a schedule for holding regular consultation meetings;

5.3 Stakeholders Identification

Identification of the stakeholders of the proposed project plays a crucial role in the development and also assists in quantifying the role of different stakeholders involved. Impacts identified by the stakeholders are measured through matrix method and mitigation measures are proposed accordingly.

5.4 Major Stakeholders Involved

The stakeholders contacted during the survey belonged to different categories of people as shown in **Table 5.1.**

Table 5.1: Categories of Stakeholders Interviewed in the Project Area

No.	Stakeholder Category
1	Local People (living in the vicinity of transmission line)
3	Government Organizations
4	Non-Governmental Organizations/ Agencies
5	Environment & Social Experts (Public and Private Institutes/Academia)
6	Grass-root stakeholder discussions

5.5 Issues Discussed

Following issues were discussed during the stakeholder consultation:

- Overall activities of the project and their possible impacts;
- Possible impacts on nearby communities, natural vegetation, flora and fauna;
- Possible mitigation measures;
- Beneficial factors and involvement opportunities of the local people in the set of activities of Project; and
- Management of traffic during the construction and operational phase of the project.

5.6 Stakeholder's Consultations

There are two types of stakeholders, i.e. primary and secondary stakeholders. The primary stakeholders are the initial stakeholders, such as affected persons, the general public including women resided in villages in the vicinity of the sub-project area. Accordingly, the consultations were made with all primary stakeholders for sharing the information regarding the sub-project components, i.e. construction of foundations of towers and installation of transmission line and community feedback regarding the project. However, the consultative meetings were also held with the

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secondary stakeholders including the officials/ staff involved in planning& design, and management.

Meetings with major stakeholders were organized to discuss project-specific issues and their potential impacts on the local and regional environment. In these meetings, stakeholders were informed about the salient features of the project, its location, and its activities. Stakeholders consulted and their valuable suggestions and comments are described below:

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Table 5.2: Stakeholders Opinions/Concerns/Issues/Suggestions

Designation	Location	Opinions/Concerns/Issues/Suggestions
Mr. Mohammad Yasin, Addl. Director Environment and Social Safeguard Section	IESCO, Islamabad	The project is a part of a positive approach for towards economic growth of the country as a whole as it would provide reliable power supply. IESCO will make every effort to make the project sustainable and green as possible. The transmission line alignment has been established considering important factors like land use, ecological environment and nearby settlements along the route.
Mr. Rajesh Kumar, Deputy Director, Technical Services Wing	IESCO, Islamabad	He said the proposed project will improve the reliability of IESCO system and undisturbed supply of electricity to the Lakkarmar, thereby reducing the load shedding. The route of the transmission line is safest and passed though least congested areas. Furthermore, the line is passing through South-eastern side of the park. Transmission line of 132KV has no serious electromagnetic effects.
Mr.Sher Afzal, Addl. Deputy Director Environment and Social Safeguard Section		The project will improve the serviceability of IESCO for electricity supply. During constructional phases of the project, cutting of indigenous plant trees should be avoided. EMP should be given special consideration during construction phase to mitigate pollution. By establishment of a grid station the efficiency of electricity transmission will increase i.e. line losses will decrease. This will in turn reduce the carbon footprint on the environment.
Amir **Head Clerk** **Assistant Commissioner Office Pindigheb.**		IESCO should ensure that compensation be paid, if crop, tree or any structure damages occurred during construction period.
Muhammad Safeer **Local resident**		He said that during the construction phase the contractor should take measures for dust suppression and noise pollution as the project is to be installed near the residential area. Transmission Line route should be selected keeping in view the environmental parameters and it must not pass through any residential area and safe distance should be kept from ground level.
Zaffar Iqbal **Local resident of thatti sada shah**		Avoid tree cutting along the transmission line, IESCO should take proper measures including change of route alignment or increase the height of the poles to avoid cutting of trees.

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5.6.1 Public Consultation

The roadside discussions were held in communities along the route of the transmission line.

A summary of discussions held along with comments and suggestions are as follow:

- The existing system is overloaded all the year round and business-related activities have reduced due to unavailability of electricity.
- People promoted the idea of up-gradation of the existing electrical system, as they would be able to get a reliable supply of electricity and start their own business. This will also create employment opportunities for local people.
- Frequent load shedding and low voltage/ voltage fluctuation problems during the whole year, especially in summers and at night times is affecting the productivity of the industries.
- People complained that utility bills for electricity are very high as compared to consumption.
- Most of the respondents along the transmission line route proposed underground route for the transmission line.
- Proper mitigation plans should be adopted for this project.
- Work should be completed within the scheduled time
- In order to reduce the chances of risks associated with electricity accidents, IESCO should take into consideration that the passage of electricity distribution networks and lines away from houses and populated areas.
- It is foreseen that the proposed project will improve their living standards.
- There should be proper safety measures in case of any emergency.
- Environmental degradation will occur so plantation should be done around the project site to minimize its eye soaring aesthetic effects.

5.7 Concerns Regarding the Project

Based on the consultations with the affected persons and the general public, the following major concerns/ feedback were highlighted.

- About three-fourth of the total required unskilled/ semi-skilled labour should be taken from the local population. This opportunity will help to increase the household income of the local population of the project area.
- In some cases, local women are working in agriculture fields, so that their routine activities should not be disturbed due to the construction activities.
- RoW clearance for installation of towers and transmission line should be minimal at best possible extent.

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Figure 5.1: Pictorial Presentation of Public and Stakeholder Consultation

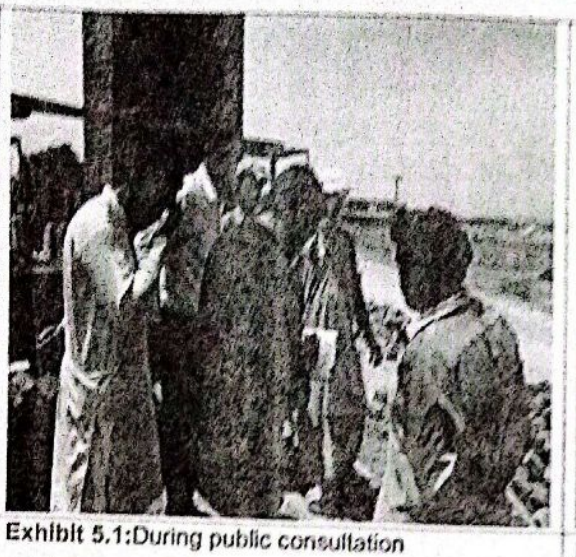


Exhibit 5.1:During public consultation

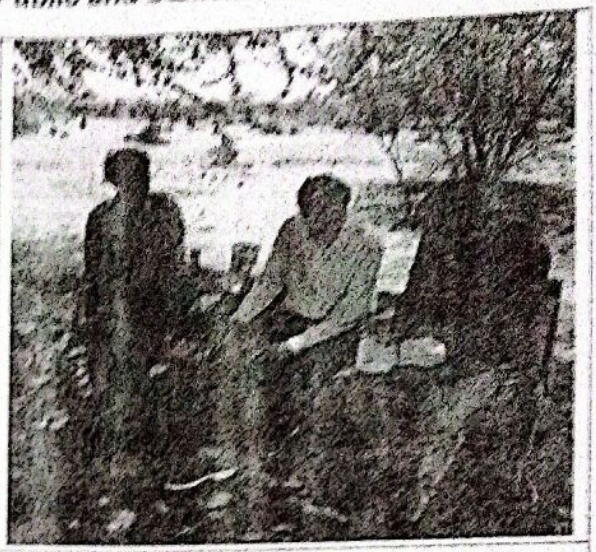


Exhibit 5.2:Recording the community concerns

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6 Impact Assessment and Mitigation Measures

6.1 Introduction

This Chapter provides;

a. Screening of the potential environmental and social impacts of the proposed project to assess the significance of the potential impacts of the project on the physical, biological and social environment of the project area, and

b. Proposemitigation measures to minimize if not eliminating the potentially adverse impacts.

Assessment of impacts depends on the nature and magnitude of the activity being undertaken and also on the type of pollution control measures that are envisaged as a part of the project proposal.

6.2 Environmental Impacts Assessment Process

This section provides the environmental impacts assessment process that was employed during the present EIA study.

6.2.1 Potential Impacts

Under this EIA study, the potential impacts that are likely to arise during design, construction and operational phases of the proposed project were identified. The potential impacts thus predicted were characterized as follows:

- High negative (adverse) impact,
- Low negative impact,
- Insignificant impact,
- No impact.
- Low positive impact, and
- High positive (beneficial) impact.

6.2.2 Impact Characterization

Once the potentially adverse impacts were identified as discussed above, these impacts were characterized. Various aspects of the impact characterization included:

- Nature (direct/indirect)
- Duration of impact (short term, medium term, long term)
- Geographical extent (local, regional)
- Timing (project phase: before, during and after construction)
- Reversibility of impact (reversible/irreversible)
- Likelihood of the impact (certain, likely, unlikely, rare)
- Impact consequence severity (severe, moderate, mild)
- Significance of impact (high, medium, low).

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Figure 6.1: Environmental Screening Matrix (un-mitigated) of 132 KV Transmission Line Project

	Physical Aspects					Biological Aspects		Socio-Economic Aspects								
	Soil Issues	Air Quality	Surface Water	Ground Water	Water Consumption	Natural Vegetation	Wildlife	Noise and vibration	Safety Hazard	Pressure on local Infrastructure	Public Health and Nuisance	Aesthetic Value	Gender Issues	Employment	Cultural Issues	Agriculture Loss
Design Phase																
Route Selection for Transmission Lines	-1	-1	-2	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	+2	-2	N
Equipment Selection	N	N	-1	-1	N	N	N	-1	-1	N	N	N	N	+2	N	N
Land Acquisition	N	N	N	N	N	N	N	N	N	-2	N	-2	N	+1	N	-2
Construction Phase																
Contractor's Mobilization	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Site Preparation	-1	-1	-2	-2	-1	-2	-2	-1	-1	-1	-1	-1	-1	+1	-1	-1
Contractor's Camp	-1	-2	-1	-1	-2	-2	-2	-1	-1	-1	-1	-1	0	0	-1	-1
Construction/civil work	-1	-1	-1	-1	-1	-2	-1	-2	-1	-1	-1	-2	-2	-2	-2	-1
Construction Materials Supply	-1	-2	-2	-1	-2	-1	-1	-2	-1	-1	-2	-2	-2	-2	-2	-2
Solid Waste Disposal	-1	-2	-1	-2	-2	-2	-2	-2	-1	N	-2	N	N	N	N	N
Liquid Waste Disposal	-1	-2	-1	-1	-2	-2	-2	-2	-1	N	-2	N	N	N	N	N
Demobilization of Contractor	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-1	-1
Operation Phase																
O & M	-2	N	-2	-2	-1	-2	-2	N	-2	N	-1	N	N	N	N	N

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6.2.3 Identification of Mitigation Measures

Subsequent to the impact characterization, appropriate mitigation measures were identified, in order to minimize if not completely eliminate the adverse impacts associated with project activities. Finally, the residual impacts were identified. The negative impacts predicted in this manner were the 'unmitigated' impacts.

Appropriate mitigation measures were recommended as part of this EIA, thus reducing the likelihood of occurrence and severity of the potentially adverse impacts. The negative impacts identified through this process are discussed below.

6.3 Design Phase Potential Impacts

The decisions made at the design phase of any project can be quite far-reaching. For the proposed project, the aspects which can be significant with respect to the environmental impacts include:

- Route selection for transmission lines
- Type of equipment.

The design phase activities can potentially cause the following environmental impacts:

- Electromagnetic Field near Transmission Line may cause effects on human health.
- Land-use change
- Soil and water contamination
- Loss of floral and faunal resources

These concerns and the measures to avoid/minimize them are discussed below.

6.3.1 Electromagnetic Field (EMF) near Transmission Line may cause severe effects on human health

Electric overhead lines are considered a source of power frequency, electric and magnetic fields, which may have a perceived health effect.

Exposure to electric and magnetic fields caused by transmission lines has been studied since the late 1970s. These fields occur whenever electricity is used. A magnetic field is created when electric current flows through any device including the electric wiring in a home. Every day we are exposed to many sources of EMF from vacuum cleaners, microwaves, computers, and fluorescent lights.

Electric and magnetic fields do induce voltage and currents in the human body but even directly beneath a high voltage transmission line, the induced currents are too small compared to the threshold for producing electrical effects in the human body.

The World Health Organization (WHO) has also concluded that the evidence from scientific research does not confirm the existence of any health consequences from exposure to the low level of EMF. Every day the human body is exposed to various sources of EMF and the induced levels of currents are too small to produce health effects.

The research to date has uncovered only weak and inconsistent associations between exposures and human health. To date the research has not been able to

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establish a cause-and-effect relationship between exposure to magnetic fields and human disease, nor a plausible biological mechanism by which exposure to EMF could cause disease. The magnetic fields produced by electricity do not have the energy necessary to break chemical bonds and cause DNA mutations.

Magnetic fields can be measured with a gauss meter. The magnitude of the magnetic field is related to current flow and line voltage. A 345-kV line will have a higher magnetic field than a 69-kV line. Furthermore, the magnetic fields quickly dissipate with distance from the transmission line.

The strength of both electric and magnetic fields is a function of the voltage, distance from the conductors to the ground and the lateral distance from the line to the receptor. However, the EMF decreases very rapidly with distance from the source and there should be no potential health risks for people living outside the 30 m (98 ft.) wide way leave the corridor.

A common method to reduce EMF is to bring the lines closer together. This causes the fields created by each of the three conductors to interfere with each other and produce a reduced total magnetic field. Magnetic fields generated by double-circuit lines are less than those generated by single-circuit lines because the magnetic fields interact and produce a lower total magnetic field. In addition, double-circuit poles are often taller resulting in less of a magnetic field at ground level.

The proposed transmission line originates from PindiGheb and ends at Lakkarmar.

The map of transmission line route has been provided in **Figure 3.1 & 3.2**. A total of 142 towers will be erected on the transmission line.

Mitigation Measures

No part of the feeding transmission line passes through any residential area and the transmission line will consist of the tower which is taller resulting less of a magnetic field at ground level.

6.3.2 Change of Land use

The route for the 45.206 km transmission line has been selected, keeping in view the current land of the areas through which it will pass.

No major change in the RoWs of transmission lines is expected as all area under transmission line will remain underuse as previously. The change in land use will be of a permanent nature.

Mitigation Measures

The negative environmental impacts related to the land-use change could be effectively minimized by making provisions for plantation of trees and landscaping of the surrounding areas. The land sliding can be mitigated by construction of terracing near the towers, constructing checks and retaining wall in the mountainous area and the areas along the drainage nullah to protect the poles from being damaged in monsoon season due to flooding. Furthermore, counter plantation in these areas can be helpful in reducing the land sliding and lesser damage during floods.

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6.3.3 Loss of Trees

There will not be any tree along the transmission line route. Though there is no major cutting of trees observed for construction of this project but still, IESCO has a tree plantation plan which will be implemented towards the end of the construction phase.

No trees are to be cut along the transmission line.

Mitigation Measures

- IESCO will ensure the plantation of 5 trees against one cut tree in RoW of transmission line
- IESCO should keep a close liaison with forest department and use special high elevation poles to avoid tree cutting in forest area
- IESCO has agreed to work on a plantation plan and plant around 1:5 ratio of different local speciesin the project area to compensate the loss of vegetation and trees (if occured) along the transmission line.
- A complete record will be maintained for any tree cutting or trimming.

6.3.4 Soil Erosion and Degradation

The other soil-related issues include, slope un-stability, steep slopes, poor site selection and soil contamination, Land erosion may lead to loss of soil fertility and loss of biodiversity, eroded material causes the siltation of the water bodies etc.

Mitigation Measures

The soil erosion and degradation impact can be minimized by adoptingStandard Operational Procedures (SOP's) of IESCO.

6.4 Construction Phase PotentialImpacts

The construction phase will be by far the most significant part of the proposed project with respect to environmental considerations, since most of the impacts are likely to take place during this period.The construction activities can potentially cause the following environmental impacts:

- Physical Environment
  - Soil erosion, degradation, contamination soil mixing and compaction
  - Air quality deterioration
  - Water contamination and consumption
- Biological Environment
- Loss of/damage to the natural vegetation of the area
- Loss of/damage to the wildlife of the area.

These impacts and their respective mitigation measures are discussed below.

6.4.1 Soil Erosion, Degradation and Contamination

The soil-related issues include soil erosion, slope stability, and soil contamination.

A: Soil erosion and degradation:

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Soil erosion is likely to take place in the mountainous areas caused by land clearing for construction camps, grid stations and transmission line towers; the subsequent construction activities; and the vehicular traffic on unpaved roads. Since the site for the new grid station is located in plain area, the possibility of soil erosion is minimized.

Construction activities and vehicle operation in such areas can potentially cause soil erosion and landslides. Land erosion may lead to loss of soil fertility and loss of biodiversity and eroded materials causes the siltation of water bodies etc.

B: Soil Contamination:

Soil may be contaminated as a result of fuel/oils/chemicals spillage and leakage, and inappropriate waste (solid as well as liquid) disposal. Soil contamination can in turn contaminate the drinking water sources also, thus negatively impacting the nearby settlements vegetation, fauna and livestock. This unmitigated impact is likely to take place at all project locations especially near settlements.

The unmitigated impacts related to soil erosion and contaminations are characterized below.

Nature:	Direct
Duration:	Short term
Geo extent:	Local
Reversibility:	Reversible in long run
Likelihood:	Likely
Consequence:	Moderate
Impact significance:	Medium to high

Mitigation Measures

A: Slope Degradation:

The following mitigation measures can be applied to minimize the impact of the project on the topography during the construction phase.

- The excavation of earth fills to be limited to approximate depth of 50 m to 100 m.
- Low embankments will be protected from erosion by planting indigenous grasses that can flourish under relatively dry conditions.
- High embankments i.e. over 2 meters will be protected by construction stone pitching or riprap across the embankments.
- Ditches or burrow pits that cannot be fully rehabilitated will be landscaped to minimize erosion and to avoid creating hazards for people.

B: Soil Erosion:

The following are recommended mitigation measures for soil erosion;

- Cut and fill at the proposed site will be carefully designed, and ideally should balance. The extracted soil/material will be used to fill and level the grid area.

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- Construction camp will be in a stable and flat area, requiring minimal removal of vegetation and levelling. The contractor(s) will obtain approval from the IESCO, for this purpose.
- Embankments and excavated slopes will not be left untreated/unattended for long durations. Appropriate slope stabilization measures will be taken per the design (e.g., stone pitching).
- Vehicular traffic on unpaved roads will be avoided as far as possible. Operation of vehicles and machinery close to the water bodies will be minimized.
- After the completion of tower foundation particularly on the above-mentioned slopes, additional stone pitching around the foundation will be carried out, where required, to avoid any subsequent soil erosion/land sliding. Post-construction monitoring of such sites will be carried out to detect early signs of any soil erosion/land sliding.
- The construction work will not be undertaken during the rainy season.
- After the completion of the construction works, the transmission line route, campsite and other construction sites will be completely restored. No debris, surplus construction material or any garbage should be left behind.
- Photographic record will be maintained for pre-project, during-construction and post-construction condition of the site (grid station and transmission line).

C: Soil Contamination:

The following are recommended mitigation measures for soil contamination;

- Vehicles and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.
- For the domestic sewage from the construction camp and office, appropriate treatment and disposal system, such as septic tank with soakage pit, will be constructed having adequate capacity.
- The contractor(s) will submit to the IESCO the plans for the camp layout and waste disposal system and obtain approval.
- Waste oils will be collected in drums and sold to the recycling contractor.
- The inert recyclable waste from the site (such as cardboard, drums, broken/used parts, etc.) will be sold to recycling contractor.
- The hazardous waste will be kept separate and handled according to the nature of the waste.
- Domestic solid waste from the contractor's camp will be disposed of in a manner that will not cause any type of soil contamination. The waste disposal plan submitted by the contractor(s) will also address the solid waste issue.

Residual Impacts

Appropriate construction practices and management actions as listed above will greatly minimize the soil erosion and contamination. The significance of the residual impacts is therefore expected to be 'low'. The environmental monitoring will ensure compliance to the above mitigation measures and their adequacy, as well as significance of the residual impacts.

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6.4.2 Air Quality Deterioration

Construction machinery and project vehicles will release exhaust emissions, containing carbon monoxide (CO), sulfur dioxide (SO_2), oxides of nitrogen (NO_x), and particulate matter (PM). These emissions can deteriorate the ambient air quality in the immediate vicinity of the project site. Furthermore, construction activities such as excavation, levelling, filling and vehicular movement on unpaved tracks may also cause fugitive dust emissions. Noxious vapours from oils, glues, thinners, paints, treated woods, plastics, cleaners and other hazardous chemicals that are widely used on construction sites, also contribute to air pollution.

The unmitigated impacts related to air quality deterioration are characterized below.

Nature:	Direct
Duration:	Short term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Likely
Consequence:	Minor
Impact significance:	Medium

Mitigation Measures

The following mitigation measures will minimize the emissions and their impacts:

- Air quality analysis of the site will be conducted before mobilization of the construction crew, in order to establish baseline data of the ambient air quality.
- Construction machinery, generators and vehicles will be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.
- Fugitive dust emissions will be minimized by appropriate methods, such as spraying water on soil, where required and appropriate. Since water availability is an issue and there is only one boring system installed at the site, it is recommended that the wastewater from kitchen and washing area of the construction camp may be used for water spraying.
- There will be no unnecessary mobility of the project vehicles and if unavoidable, speed will be reduced to 15 km/h to avoid excessive dust emissions.

Residual Impacts

The above measures will reduce the magnitude of the adverse impacts of the project on the ambient air quality, but will not eliminate them completely. However, since the settlements are away from the project site, the significance of the residual impacts on the air quality is expected to be low.

The environmental monitoring will ensure compliance to the above mitigation measures and their adequacy, as well as significance of the residual impacts.

6.4.3 Noise Pollution and vibration

Noise is perceived as one of the most undesirable consequences of construction activity. Though the level of discomfort caused by noise is subjective, the most

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commonly reported impacts of increased noise levels are interference in oral communication and disturbance in sleep, headache, fatigue etc.

Due to the various construction activities, there will be short-term noise impacts in the immediate vicinity of the project site and also on workers. The construction activities include:

- Operation of DG sets, concreting and mixing,
- Excavation for foundations with driller,
- Construction plant and heavy vehicle movement.

Since the project site include mostly open areas, the impact of noise pollution is perceived to be minimum. The unmitigated impacts related to noise pollution are characterized below.

Nature:	Direct
Duration:	Short term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Likely
Consequence:	Minor
Impact significance:	low

Mitigation Measures

Mitigation measures mentioned below will be adopted to minimize the noise impacts on the community. Noise abatement measures will achieve 55 dB(A) to 45 dB(A) during Day and night times respectively according to WB environmental guidelines for communities. These measures include, but are not limited to the following:

- A careful approach will be adopted to minimize the noise and vibration impacts. The construction machinery and trucks used in the project needs to be properly tuned and serviced to avoid undue noise hazards.
- Selection of up to date and well-maintained plant or equipment with reduced noise levels, ensured by suitable in-built damping.
- Use of heavy machinery will be restricted at night, except for any emergency, for which the contractor will take prior approval.
- Confining excessively noisy work to normal working hours in the day, as far as possible.
- Heavy machinery like percussion hammers and drills will not be used during night without prior approval of the client.
- Contractor will comply with submitted work schedule. Keeping noisy operations away from sensitive points; implement regular maintenance and repairs; and employ strict implementation of operation procedures.
- Low vibration level machinery will be used, and a system of regular maintenance and repairs needs to be employed.

Residual Impact

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With the implementation of above mitigation measures, the residual noise and vibration impact will be "very low".

6.4.4 Surface Water and Groundwater Contamination

The project activities that can contaminate soil may also contaminate the surface water and groundwater. These include:

- Disposal of construction waste,
- Solid waste disposal from construction camp,
- Waste effluents disposal,
- Equipment/vehicle maintenance,
- Spillage/leakage of fuels, oils and chemicals.

In addition, vehicles and construction machinery operation near water bodies can potentially contaminate the surface water. There is a manual hand pump installed at the project site, which is the only source of water available as of now.

The only surface water body near the project site is the seasonal drainage nullah.

These impacts will be encountered at all of the site during the construction phase of the project.

The unmitigated impacts of the proposed construction activities on the water quality of the area are characterized below.

Nature:	Direct and indirect
Duration:	Short to medium term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Likely
Consequence:	Major
Impact significance:	High

Mitigation Measures

The mitigation measures recommended to forestall soil contamination will also prevent water surface and groundwater contamination. Additional mitigation measures are given below.

- The groundwater quality analysis of the grid station site will be conducted before mobilization of the construction crew, in order to establish baseline conditions of the water quality at this location.
- Groundwater quality analysis will be carried out three times at the project site; before mobilization of construction crew, during construction phase and after the completion of the project.

Residual Measures

If the recommended mitigation measures are effectively employed, the project activities are unlikely to contaminate the water resources of the area in any significant manner. The residual impacts of the project on the water quality will

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therefore be negligible. The environmental monitoring will ensure compliance to the above mitigation measures and their adequacy, as well as significance of the residual impacts.

6.4.5 Water Consumption and Availability

Water consumption during the construction phase (camp operation and construction activities) can reduce the water availability, particularly in water-scarce areas.

Heavy vehicles and machinery movement near groundwater wells can potentially damage them.

The above-unmitigated impacts related to water consumption and availabilityare characterized as follows.

Nature:	Direct and indirect
Duration:	Short term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Likely
Consequence:	Moderate
Impact significance:	Medium.

Mitigation Measures

- Astute planning will be employed to conserve water at the construction site and camp. Water will be procured in a manner that least affects the local communities. Wastewater recycling will be carried out for water sprinkling and gardening purposes.
- The contractor(s) will submit daily water consumption rate to IESCO.
- Extreme care will be taken when working close to wells and watercourses; crossing of heavy machinery and vehicles will be allowed only if this is safe. Any damage caused by the project activities should be repaired.

Residual Measures

Despite the above measures, the water availability may be hampered during the construction phase. The significance of this impact is expected to be from low to medium.

6.4.6 Loss of Natural Vegetation

The transmission line passes through areas of diverse geography having variety of natural vegetation, but no trees will be cut down along the transmission line. These include:

- Clearing of all vegetation in an area of 10sq-metersat the tower foundations of the transmission line, in order to construct the foundations for this segment.

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- Cutting of the trees and loss of natural vegetation (Only Shrubs in this case) can lead to loss of biodiversity, soil erosion and associated impacts. The aesthetic value of the area may also be negatively impacted as a result of removing the vegetation, but it will be in an area of 10sq-meters

Some other impacts envisaged are:

For clearing the vegetation under the transmission lines, chemical herbicides are also sometimes used. Indiscriminate usage of this method can cause significant loss of biodiversity. Construction crew can also indulge in tree/shrub cutting to obtain fuel wood.

The unmitigated impacts of the proposed activities on the floral resources of the area are characterized below.

Nature:	Direct
Duration:	Medium to long term
Geo extent:	Local
Reversibility:	Reversible in medium to long term
Likelihood:	Possibly
Consequence:	Low
Impact significance:	Low

Mitigation Measures

The following mitigation measures will minimize negative impacts on the floral resource of the area:

- Clearing of natural vegetation will be minimized as far as possible during the transmission line works.
- Herbicides will not be used to clear vegetation along the transmission line route (or at other project locations).
- It will be ensured to reach the transmission line tower location without developing any new tracks. The existing tracks will be used to transport equipment, material and personnel, except for a few poles having no access in the hilly areas. Vehicles will not be operated off-track in this area.
- For the transmission line route, vegetation clearing plan will be prepared and submitted to IESCO for approval. A complete record will be maintained for any tree cutting or trimming. The record will include: the number, species, type, size, age, condition and photograph of the trees to be cut/trimmed.
- Indigenous tree species will be selected for plantation in consultation with Forest Department; in particular, Eucalyptus trees will not be used in any case.
- The construction crew will be provided with LPG for cooking (and heating, if required). Use of fuel wood will not be allowed.
- No fires will be allowed inside the forest area.
- Indigenous tree species will be selected for plantation; Eucalyptus trees will not be used in any case.

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Residual Impact

The impacts of most parts of the project activities on the natural vegetation will not be significant to start with. Re-plantation takes time, and mortality is also an issue. With the help of the proposed mitigation measures described above, these impacts will decrease considerably. However, these impacts cannot be completely mitigated, and there will be some residual impacts of this component of the proposed project on the vegetation of the area. The significance of these residual impacts is expected to be "low".

The significance of residual impact for this section will be "low".

The environmental monitoring will ensure compliance to the above mitigation measures and their adequacy, as well as significance of the residual impacts.

6.4.7 Damage to Wildlife

The possible impacts of the proposed project on the wildlife resources are mostly associated with the damage to the natural vegetation. The proposed project activities may have adverse effects on the wildlife of the areahaving some wildlife species still surviving despite severe pressures from increasing human habitation, deforestationand solid waste disposal.

Damage to the vegetation and other construction activities can potentially cause disturbance to the wildlife of the area, causing them to leave the area or move other areas within the park. In addition, the construction crew can also indulge in hunting and/or harassing of wildlife when the electricity poles will be erected.

The unmitigated impacts of the proposed activities on the faunal resources of the area are characterized below.

Nature:	Direct
Duration:	Medium to long term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Possibly
Consequence:	Moderate
Impact significance:	Medium.

Mitigation Measures

- Measures to protect and rehabilitate floral resources of the area discussed in section above will also protect the wildlife resources of the area.
- No nighttime activities will be carried out in this area. Work in this area should be carried out in coordination with the Wildlife Department.
- Vehicle movement will be limited to the existing tracks in the above area.
- The measures to prevent soil and water contamination will forestall any adverse impact on the faunal resources of the area.
- Garbage will not be left in the open places.
- The project staff will not be allowed to indulge in any hunting activities.

Residual Impact

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Despite the above mitigation measures, there will be some residual impacts of the project on the faunal resources of the area. However, these impacts will be of temporary nature and are mostly reversible; hence their significance is expected to be low to medium.

6.4.8 Pressure on Local resources / Infrastructure

During the construction stage, demand for basic amenities such as water and power for the construction labor along with the requirement of construction activities will put pressure on the existing recourses and infrastructure. Considering the nature and the magnitude of the project, impact shall be short term and high in magnitude and are limited to construction phase only.

The unmitigated impacts related to pressure on local infrastructure are characterized below.

Nature:	Direct
Duration:	Short term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Likely
Consequence:	Minor
Impact significance:	Medium

Mitigation Measures

IESCO and its contractors, will engage skilled and unskilled personnel during construction activities (where required and possible) from the local communities of each project site to reduce the pressure on local infrastructure.

Residual Measures

Despite the above measures, the pressure on local infrastructure may be hampered during the construction phase. The significance of this impact is expected to be from low to negligible.

6.4.9 Impact of Stacking and Disposal of Construction and Waste Material

Improper stacking and disposal of construction waste is likely to adversely affect the aesthetic value of the project area. The severity of such impact will depend upon the magnitude and type of construction waste and can be minimized by exercising proper waste disposal mechanisms.

During the grid station and transmission lines construction / erection phase this impact is very likely.

The unmitigated impacts related to staking and disposal of construction and waste material are characterized below:

Nature:	Direct
Duration:	Short term
Geo extent:	Local
Reversibility:	Reversible

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Likelihood:	Likely
Consequence:	Minor
Impact significance:	High

Mitigation Measures

- Stacking of construction materials will be confined to the project site only and suitable enclosure will be provided, hence no impacts on surrounding areas are envisaged.
- To avoid waste, reduce, reuse and recycle policy shall be adopted.
- Construction waste material dumping at proper site. Contractor(s)must remove all construction waste and dispose that properly.
- Re-plantation and landscaping of disposal sites consistent with acceptable aesthetic values for the surrounding landscape.

6.4.10 Public Health and Safety

During construction activities, the public health is of major concern. At the project sites, the working staff and visitors may encounter physical injuries and psychological, physiological and infectious diseases due to unsafe working practices, exposure to dust and chemicals, improper waste disposal, improper hygiene and sanitation. This impact will be of concern at the project site.

Project activities that have potential impact on public health are:

- Environmental conditions created by the project which may lead to physical injuries or deterioration in health of people passing by and living in the vicinity of the construction activities.(e.g., un-safe working condition, trespassing during execution work, dust emissions etc.).
- Increased incidence of communicable and vector-borne diseases attributable to construction activities represents a potentially serious health threat to project personnel and people in the vicinity.
- Construction activities may result in an increased movement of heavy vehicles for the transport of construction materials and equipment increases the risk of traffic-related accidents and injuries to workers and local communities.
- Risks may arise from potential contact with hazardous materials, buildings that are under construction or excavations and structures which may pose falling and entrapment hazards.
- Potential for increased incidence of communicable diseases such as sexually transmitted (STDs), HIV/AIDS, Hepatitis etc during the construction phase due to labor mobility.

The unmitigated impacts related to public health and safety is characterized below.

Nature:	Direct
Duration:	Short term
Geo extent:	Local
Reversibility:	Reversible

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Likelihood:	Likely
Consequence:	Major
Impact significance:	High

Mitigation Measures

The mitigation measures during the construction phase will include:

- Obligatory insurance against accidents for workers.
- The contractors should provide proper occupation health and safety training before starting the construction activities.
- Provision of first aid box at all the project/ campsite and provision of first aid training to specified work staff to counter emergency situations.
- Contractor(s) shall inform IESCO about safety measures taken by them(HSE plan) including firefighting equipment's placed, safe storage of hazardous material, availability of first aid, security fencing and contingency measures in case of accidents.
- Work safety measures and good workmanship practices are to be followed by the contractor to ensure on health risks for labors.
- IESCO shall ensure that each contractor has provided proper PPEs to the workers and that the PPEs are properly utilized during the work.
- Protection devices will be provided to the workers operating in the vicinity of high noise generating machines.
- Provision of adequate sanitation, washing, cooking, and dormitory facilities to workers.
- Provision of protective clothing for labors handling hazardous material e.g., hard hats, adequate footwear for bituminous pavement works etc.
- IESCO and its contractors shall follow the IESCO safety code.
- Timely public notification on planned construction work.
- The incidence of road accidents involving project vehicles during construction should be minimized through a combination of education and awareness-raising, and the adoption of traffic safety procedures/ defensive driving.
- IESCO Engineers/ contractors should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with the project site under construction and decommissioning.
- Risk management strategies may include:
    - Restricting access to the site, through a combination of institutional and administrative controls, with a focus on high-risk structures or areas depending on site-specific situations, including fencing, signage, and communication of risks to the visitors of the park.
    - Removing hazardous conditions on construction site that cannot be controlled effectively with site access restrictions, such as covering openings to small, confined spaces, or locked storage of hazardous materials.

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- To prevent communicable diseases, the contractor's staff will be restricted from un-necessary mobility in the communities. IESCO shall also arrange awareness regarding the communicable diseases and STDs.
- Initiatives to involve a combination of behavioral and environmental modifications in the workers to address social and environmental aspects that can potentially have impact on the local communities.

6.4.11 Traffic Issues

During construction phase of the proposed project, there will be movement of light and heavy vehicles to the proposed transmission line route. The unmitigated impacts related to traffic issues are characterized below.

Nature:	Direct
Duration:	Short term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Likely
Consequence:	Minor
Impact significance:	Medium

Mitigation Measure

Following measures will be taken to mitigate the impacts due to interruption of traffic anticipated during the construction period:

- Coordinated planning of traffic diversions in accordance with the construction program with advance warning to the affected residents and road users.
- Provision of appropriate signage at work site and roads where necessary.
- The movement of contractors' vehicles and transportation of construction material shall be planned in such a way that it does not coincide with heavy traffic time i.e., office and school timings.
- Provision of appropriate signage at work site and roads where necessary.

6.5 Operational Phase Impacts

The O&M activities of the electricity network are environmentally begun by nature, and result in very few impacts, which are listed below.

- Contamination of soil and water as a result of inappropriate waste disposal at the grid stations (domestic solid waste, sewage, repair and maintenance waste, waste oils and chemicals, etc.)
- Contamination of soil and water as a result of leakage of transformer oil.
- Damage to natural vegetation and wildlife during the transmission line patrolling and maintenance activities

6.5.1 Soil and Water Contamination

The O&M activities of the grid station generate several types of wastes, which can cause soil and water contamination. These are listed below.

- Domestic solid waste from the grid station.

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- Sewage from the grid station.
- Wastes from the repair and maintenance activities (discarded equipment and parts, packing materials, used oils and chemicals, cotton rags and the likes).

In addition, leakage and spillage of transformer oil can contaminate soil, surface water and eventually, groundwater.

These impacts can potentially occur at the entire grid station included in the proposed project. These unmitigated impacts related to soil and water contamination are characterized below.

Nature:	Direct and indirect
Duration:	Short to medium term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Likely
Consequence:	Major
Impact significance:	High

Mitigation Measures

The following mitigation measures will greatly minimize, if not prevent, the impacts of the proposed project's O&M activities on the soil and water resources of the area:

- Waste oils and chemicals will be disposed in accordance with their respective Material Safety Data Sheet (MSDS). MSDS will be made available at the grid stations and maintenance workshops.
- Non-toxic recyclable waste (such as cardboard) will be given away for recycling.
- Toxic waste will be stored separately; such areas will be marked and incinerated at an appropriate double chamber incinerator.

Residual Impact

With the help of the mitigation measures described above, the O&M activities will not have any significant impact on the soil or water resources of the area.

6.5.2 Impacts on Biological Resources

The O&M activities will not have any interaction with the biological resources of the project area. However, the transmission line maintenance activities can potentially damage natural vegetation and habitat. The tall trees under the transmission line will need to be trimmed, in order to avoid any short-circuiting, sparking and/or damage to the conductor.

The potential impacts of the O&M activities on the wildlife resources of the area are essentially of two types: damage to the habitat as a result of loss of vegetation; and direct disturbance/threat to the wildlife species as a result of human presence, equipment/vehicle operation and noise. These unmitigated impacts related to biological resources are characterized below.

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Nature:	Direct and indirect
Duration:	Medium to long term
Geo extent:	Local
Reversibility:	Mostly Reversible (at least in medium to long term)
Likelihood:	Possibly
Consequence:	Moderate
Impact significance:	Medium

Mitigation Measures

The following mitigation measures will greatly minimize, if not prevent, the impacts of the proposed project's O&M activities on the biological resources of the area:

- IESCO will use special towers and pass the conductor above the trees, particularly under the forested segment, in order to maintain a safe clearance between the trees/branches and the transmission line. This will prevent the electrocution hazard for the people passing by; and wildlife, while also avoids any forest fires that can be caused by the sparking between the live transmission line and tree branches.
- Herbicides will not be used to clear/control vegetation under the transmission line.
- The nighttime maintenance works will be avoided as far as possible.

Residual Impact

With the help of the mitigation measures described above, the O&M activities are not expected to have any significant impact on the biological resources of the area.

6.5.3 Employment

The operation of the proposed project will accelerate the business activity in the project area and will provide employment to locals that will have positive impact on the local economy thereby improving the quality of life in the project area.

6.6 Socio-Economic Impacts Assessment and their Mitigation

The social screening checklist was used to identify the key social issues associated with the proposed project and type of mitigation measures required to address them.

Screening of the socioeconomic impacts of the proposed project was carried out during the EIA, using the framework and the social screening checklist provided by IESCO in TORs.Much like the environmental concerns, the socio-economic impacts were also characterized using the same method.

6.6.1 Design Phase Considerations

Much like the environmental considerations during the design of the proposed project discussed in Section 7.3, the following aspects of the project can have bearing on its socio-economic performance:

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- Site selection for grid stations
- Route selection for transmission lines
- Tower-type selection.

6.6.2 Construction Phase Impacts

Much like the environmental impacts described in Section 7.4, most of the socio-economic concerns will also arise during the construction phase of the proposed project.

The key socioeconomic concerns of the construction phase as identified with the help of the screening process are as follows:

- Land acquisition for transmission line route
- Damage to infrastructure
- Blocked access
- Noise and vibration
- Safety hazard
- Public health
- Gender issues
- Impacts on archaeological, cultural, historical or religious significance.

6.6.3 Land Acquisition

The route of the transmission line has been finalized and the affectees will be compensated asper the telegraph Act.

Mitigation Measures

The following mitigation measures are proposed to avoid potential losses due to land acquisition:

- IESCO should obtain formal allotment letter from concerned authorities for the allocation of land.
- Operation of project vehicles and construction machinery outside the RoWwill be avoided. Attempts will be made to use existing katcha tracksto access the transmission line corridor/pole locations. Damage to flora will be compensated by implementation of the plantation plan.

Residual Impacts

The residual impacts associated with the acquisition of land are therefore expected to be low.

The social monitoring will ensure compliance to the above mitigation measures and their adequacy, as well as significance of the residual impacts.

6.6.4 Damage to Infrastructure

The laying of transmission lines do not require removal of any existing infrastructure. However, there could be some inadvertent damage to the roadsand other structures during the construction activities and associated vehicular traffic.

The infrastructure may be damaged at all of the project sites, particularly along the transmission line corridor and access route.

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The unmitigated impacts related to the damaged infrastructure are characterized as 'medium'

Mitigation Measures

- All damaged infrastructure will be restored to original or better condition.

Residual Impact

Following the implementation of the above-recommended measure, there will be negligible level of residual impact.

The social monitoring will ensure compliance to the above mitigation measures and their adequacy, as well as significance of the residual impacts.

6.6.5 Noise and Vibration

The construction activities and project vehicle movement at the project site can cause noise and vibration. The entire transmission line tower locations are away from the communities, hence issues related to noise and vibration are not expected to arise.

The unmitigated impacts related to the noise and vibrations are characterized as 'medium'.

Mitigation Measures

- Vehicle speeds will be kept low, and horns will not be used.
- Vehicles will have exhaust silencers to minimize noise generation.
- Nighttime traffic will be avoided within the project area.
- Movement of all project vehicles and personnel will be restricted to within work areas, to avoid noise disturbance.
- Working hours for construction activities will be limited to between 8 am and 6 pm.
- Grievance redressal mechanism will be put in place to address the community complaints.

Residual Impact

With the implementation of above measures, the significance of the residual noise impacts will be low.

The social monitoring will ensure compliance to the above mitigation measures and their adequacy, as well as significance of the residual impacts.

6.6.6 Safety Hazards

The construction activities will involve operation of heavy construction machinery, vehicular traffic, excavation and filling operations. These activities may pose some safety hazards to the people passing by and living in the immediate vicinity. The fuel storage at the campsites may also pose safety hazards for the surrounding population. During the testing and commissioning of the transmission line, the people living nearbywill be exposed to the electrocution risk. The unmitigated impacts related to the safety hazards are characterized as 'high'.

Mitigation Measures

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- The construction site will have protective fencing to avoid any unauthorized entry.
- The project drivers will be trained for defensive driving skills
- Vehicular speeds within the project area will be kept low to minimize safety hazards.
- Camp site will be selected with IESCO's approval.
- Firefighting equipment will be made available at the camp.
- The camp staff will be provided firefighting training.
- All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.
- Liaison with the concerned authorities will be maintained before commencing the testing commissioning of the system. Protective fencing will be used where appropriate/possible.
- Warning signs will be used at the appropriate locations.

Residual Impact

There will be a low level of residual impact of safety hazards associated with the vehicular traffic. The safety hazard issue with the construction activities will be negligible. The safety hazard during the testing and commissioning of the system will be from "low to medium".

The social monitoring will ensure compliance to the above mitigation measures and their adequacy, as well as significance of the residual impact.

6.6.7 Public Health Issues

The public health concerns to be addressed during the design phase of the proposed project have been discussed earlier. There will be some similar concerns during the construction phase as well, primarily associated with the operation of the construction camp.

The public health issues can potentially arise at all of the project sites, particularly the grid stations and campsites.

The unmitigated impacts related to the public health are characterized as 'high'.

Mitigation Measures

The following mitigation measures will minimize the public health concerns during the construction phase of the project:

- The construction camp will have septic tank with soaking pit of adequate size.
- Camps should be at least 500 m from any groundwater wells used by the park.
- The construction camp will have appropriate solid waste disposal mechanism.
- The construction camp and site office will be provided with first-aid kits.
- The construction crew will be provided awareness for the transmissible diseases (such as HIV/AIDS, hepatitis B and C).

Residual Impacts

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With the help of the above measures, the public health concerns during the project construction phase can be reasonably addressed. The significance of the residual impacts is therefore expected to be "negligible".

The social monitoring will ensure compliance to the above mitigation measures and their adequacy, as well as significance of the residual impacts.

6.6.8 Gender Issues

The project works to be carried out within or near the rural communities may cause disturbance to the women. Similarly, the construction camp operation and vehicular traffic may also cause some hindrance to women mobility. In particular, these issues can potentially arise at the locations nearby the grid station.

The unmitigated impacts related to the gender issues are characterized as 'medium'.

Mitigation Measures

- Campsite for construction will be decided in consultation with IESCO and concerned government authorities.
- The people living near to the construction site will be informed and consulted before commencing works inside or near the communities.
- Strict code of conduct will be maintained by the construction crew. Local norms will be respected.

Residual Impact

Despite the implementation of the above mitigation measures, there will be a low to moderate level of residual impact associated with the gender issues.

The social monitoring will ensure compliance to the above mitigation measures and their adequacy, as well as significance of the residual impacts.

6.6.9 Child Labor

Although the use of child labour is not prevalent in the construction works such as those involved in the proposed project, however, the provisions of the Child Labor Act will still be made part of the construction contracts, in order to ensure that no child labour is employed at the project site or campsite.

6.6.10 Impacts on Sites of Historical, Cultural, Archaeological or Religious Significance

No sites of Historical, Cultural, Archaeological or Religious significance are known to exist at or in the immediate vicinity of the project site that is known at this stage. However, during the construction works of the project, particularly, excavation, such sites or artefacts may be discovered.

The unmitigated impacts on the sites of historical, cultural, archaeological or religious significance are characterized as 'medium'.

Mitigation Measures

- In case of discovery of any sites or artifacts of historical, cultural, archaeological, or religious significance, the work will be stopped at that site.

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- The federal archaeological department will be notified immediately, and their advice will be sought before resumption of the construction activities at such site.

6.6.11 Operational Phase

Much like the environmental issues associated with the O&M activities; there are very few socio-economic concerns which are expected during the operational phase of the proposed project. These concerns are listed below.

- Safety hazards
- Public health
- Loss of agriculture.

6.6.12 Safety Hazard

The transmission line will pose electrocution risk to the IESCO staff as well as the people living in the immediate vicinity of the grid station and transmission line route.

Mitigation Measures

Design aspects of this issue have been discussed earlier, which will forestall major causes of electrocution. Additional measures are provided below.

- IESCO's O&M staff will be provided with essential protective gears and equipment.
- IESCO's O&M staff will be provided safety training. Refresher courses will be arranged on regular basis.
- Firefighting equipment will be made available at the grid stations.
- The Emergency Response Plan (ERP) will be made available for the grid station. Its salient points will be displayed at prominent places within the grid station. The O&M staff will be given training on the ERP. The Environmental and Social Safeguard (E&S) Section will review the ERP and with respect to the environmental and social considerations and recommend changes if needed. The ERP will include procedure to inform the nearby communities in case of fire in the grid station.
- Appropriate signage on safety precautions will be installed at the key locations.
- IESCO SOPs will be followed and work will be carried out in line with IESCO Safety Code.
- The trees under the transmission lines will be regularly trimmed in order to maintain 8 m clearance.

Residual Impacts

Despite the implementation of the above measures, there will be some residual safety hazards associated with the operation of the system. The significance of this impact is expected to be "medium".

6.6.13 Public Health Issues

There are the following three distinct types of public health concerns associated with the operation of the proposed project:

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- Inappropriate solid waste and sewage disposal from grid station.
- Electromagnetic (EM) radiation caused by the high-tension transmission lines.

Mitigation Measures

- The concerns associated with the waste disposal and transformer oil leakage and their mitigation measures have been adequately discussed and addressed in above few sections. All these measures need to be adopted to avoid public health issues.
- Studies have shown that there is a weak evidence of health risk associated with the exposure to power-frequency fields. However, since the proposed transmission line route has been selected to ensure maximum clearance from nearby settlements, there will not be any significant risk of EM radiation exposure.

During the repair and maintenance activities on the transmission lines, the nearby crops can potentially be damaged.

Mitigation Measures

The following mitigation measures will address the concerns associated with the loss of agriculture during the O&M phase of the project:

- Damage to the crops will be avoided during the transmission line patrolling.
- Any damage during repair and maintenance activities will be compensated.
- Liaison with the nearby communities will be maintained in this regard.
- The grievance redressal mechanism will be maintained on continuous basis.

Residual Impacts

With the help of the above mitigation measures, the concerns associated with the loss of agriculture will be reasonably addressed and there will be negligible residual impacts.

6.6.14 Agricultural loss

During the construction, repair and maintenance activities on the transmission lines, the nearby crops can potentially be damaged.

Mitigation Measures

The following mitigation measures will address the concerns associated with the loss of agriculture during the construction and O&M phase of the project:

- Damage to the crops will be avoided during the transmission line patrolling.
- Any damage during repair and maintenance activities will be compensated.

Residual Impacts

With the help of the above mitigation measures, the concerns associated with the loss of agriculture will be reasonably addressed and there will be negligible residual impacts.

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7 Environmental Management and Monitoring Plan

This Chapter presents the Implementation mechanism for the environmental and social mitigation measures identified during the present EIA study. The EMMP reflects the commitment of the proponent (IESCO) to safeguard the environment as well as the surrounding population during the execution of proposed project.

1.1 Purpose and Objectives of EMMP

This Environmental Management and Monitoring Plan (EMMP) provides the delivery mechanism to address the adverse environmental as well as social impacts of the proposed project during its execution, to enhance project benefits, and to introduce standards of good practice to be adopted for all project works.

The primary objectives of the EMMP are to:

- To facilitate the implementation of the earlier identified mitigation measures,
- To develop a proper monitoring mechanism and identify requisite monitoring parameters to confirm effectiveness of the proposed mitigation measures,
- To ensure the complete implementation of all mitigation measures and ensure the effectiveness of the mitigation measures.
- To define the responsibilities of the project proponent IESCO, Project engineers and contractors, and provide a means of effectively communicating environmental issues among them,
- To provide a mechanism for taking timely action in the face of unanticipated environmental or social situations, and;
- Identify environmental as well as social training requirements at various levels.

7.1 Institutional Capacity

The overall responsibility for compliance with the environmental management plan rests with the project proponentsi.e. IESCO.

IESCO has already established a Project Management Unit (PMU) with Environmental and Social Safeguard (E&S) section within its Organization, as its part to handle the environmental and socio-economic matters during the proposed project, other future projects as well as its routine operations. The E&S will provide advisory services to the project and other IESCO departments/division/directorate. Currently, the E&S has one Additional Dy. DirectorEnvironment and one Additional Dy. DirectorSocial Impact under the supervision of AdditionalDirector, Environmental and Social Safeguard (E&S). The strength can be increased in future as required.

7.1.1 Pre-Construction Phase

Approvals

Islamabad Electrical Supply Company Limited (IESCO) will obtain all the relevant clearances and necessary approvals required by the Government of Pakistan prior to commencing the project activities, including obtaining No Objection Certificate (NOC) from the Punjab-EPD.

Change Management

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Following the approval of the EIA, if any aspect of the operation or requirements of the EIA needs to be changed, IESCO will categorize the change in accordance with the EMMP and take appropriate measures thereon.

Contractual Provision

Adherence to the requirements of the EIA and EMMP in terms of environmental mitigation will be required from all project contractors and thus EMMP will form part of their contractors with Islamabad Electrical Supply Company Limited (IESCO).

7.1.2 Construction Phase

The organizational roles and responsibilities are summarized below:

IESCO

The overall responsibility for compliance with the environmental management plan rests with the project proponents (IESCO).

Environmental and Social Safeguard (E&SS) Section/Unit

The E&SSunit will provide overall supervision and advisory services during the construction phase of the project. The E&SS unit will supervise the IESCO's environmental monitors (discussed below) and will also advise GSC Directorate, and other IESCO departments on environmental and social matters during the project.

Engineers, Contractors/Sub Contractors

The contractor(s) will be responsible for the construction activities of the project. The contractor(s) will be responsible for the complete implementation of the EMMP and the mitigation measures detailed in the EMMP and EIA. The contractor(s) will also be subjected to certain liabilities under the environmental laws of the country, and under its contract with IESCO.

The GSC directorate of IESCO will monitor the contractors and ensure implementation of the EMMP and EIA.

Other essential features of the institutional arrangement proposed for the project are:

- IESCO will ensure that the contractor will appoint Environmental and Social Inspectors/Officers (ESIs/ESOs) for overseeing and monitoring the entire implementation of the EMMP and EIA.
- The EMMP as well as environmental management requirements and specifications will be included in all contracts of IESCO and its contractors/consultants.
- Each contractor will be required to appoint a dedicated field Environmental and Social Monitor (ESM) at the project site.
- All activities related to project will be defined located and in documented form.
- IESCO, through the E&SS unit, will cooperate with regulatory agencies (such as the Punjab EPD) and other stakeholders who may want to send their own teams to monitor the project activities and IESCO will facilitate them during their visits.

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Punjab-EPD

The Environmental Protection Department, Government of Punjab, will periodically visit the project site to monitor the compliance of environmental protection measures detailed in the EIA report.

7.1.3 Operation Phase

During the operation phase of the proposed project, environmental and socioeconomic management will become a routine function, as an integral part of the O&M activities. The E&SSunit will be the focal point for all matters relating to environmental and socioeconomic issues during the routine operations of the Organization. The E&Sunit will advise various departments within IESCO for environmental and socioeconomic issues. The E&S unit will develop an environmental and socio-economic management system for the Company, defining roles and responsibilities of various departments and their respective staff.

7.2 Organizational Structure, Role and Responsibilities

This section describes the organizational structure required for managing the environmental as well as social aspects of the proposed project. Also defined in this section are the roles and responsibilities of the various role-players during the project. The **Figure 7.1** shows the Management structure of IESCO.

7.2.1 Primary Responsibilities

The primary responsibilities for the environmental performance of the project proponents Islamabad Electrical Supply Company limited (IESCO), the engineering consultant section, and the contractors will be assumed by their respective highest-ranking officers during the project.

- The Chief Engineer (Development) of the proponents will be responsible for the company's compliance with the EIA and EMMP throughout the project
- The GSC Directorate and E&SS section PMU will be responsible for the project's compliance with the EIA and EMMP throughout the project.
- The Additional Dy. Director Environment/Social Impact, IESCO will have to monitor project activities in the project area.
- The GC & T&G Divisions (or the Supervision Consultant, if IESCO chooses to employ one) will be responsible for ensuring that the contractors adhere to the quality requirements and other commitments including implementation of the EMMP and EIA.
- The contractor(s) will be responsible for the implementation of the EMMP during field execution in the project area and will report to the GSC directorate and E&S unit.
- The E&S unit will coordinate with relevant government departments (Punjab EPD) and other stakeholders.
- They should keep a record of all non-conformance observed and report these along with actions to the IESCO management for further action.
- They will also have to report any impacts anticipated along with their recommendations for further action.

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7.2.2 Field Management and Quality Control

- Carrying out construction activities in an environmentally and socially sound manner during the construction phase will be the responsibility of the site managers of the contractor(s).
- The GSC's Site Engineer will be responsible for the environmental and social soundness of all construction activities.
- The Engineering Consultant section, the Project Engineer will be responsible to ensure the overall environmental soundness of all construction activities. He will ensure the implementation of the EMMP.

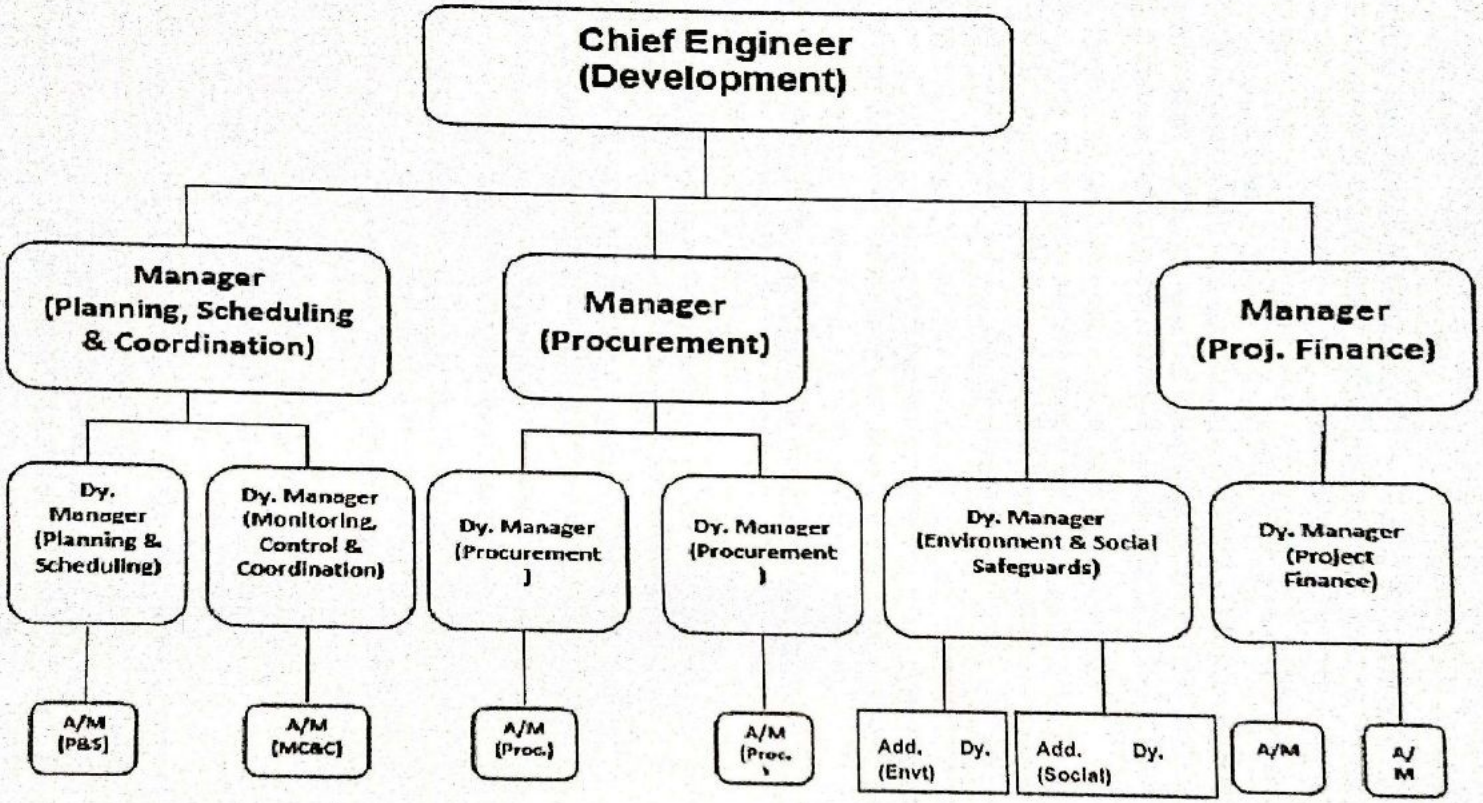
7.2.3 On-the-job Supervision and Monitoring

- The ESM of each contractor will be responsible for the implementation of the EMMP during construction works. He will also be responsible for communication with and the training of their respective construction and camp crews in all aspects of the EMMP.
- The ESI of GSC directorate, IESCO will ensure implementation of the EMMP in the field is being carried out by the contractor(s). He will also coordinate with Site Engineer, the contractor's project management and ESM of each contractor. ESI will be part of IESCO's site team.
- If any monitoring teams from government departments or from NGOs visit the field during the field activities, the ESI will be responsible for coordinating their visits.

The responsibilities of various role-players are summarized in **Table 7.1**.

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Figure 7.1: Organizational Structure of PMU, IESCO



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Table 7.1: Role and Responsibility Chart for the Proposed Project

No.	Department/ Division/ Cell	Role	Responsibility
1	IESCO	Chief Executive Officer (CEO)	The CEO is the supreme authority in the organization All kind of decision will be taken by him or any person on his behalf
2	General Manager/Chief Engineer (Development)	Head of PMU& GSC	Fulfil IESCO's obligations as laid out various project documents. Ensure that the construction is carried out within the agreed timeframe according to satisfactory HSE and technical standards.
3	GSC, IESCO	Project Director	Responsible for overall construction work Facilitate field management of contractors; Report regularly to the Chief Engineer (Development).
4	GC Division (XEN office), T&G Division (XEN office),	Deputy Director Grid Station Construction	Ensure that the entire project is conducted in an environment and social friendly manner. Facilitate field management of contractors; Report regularly to the Project Director.
		Deputy Director Transmission Lines Construction	Responsible for the T/L works Ensure that the entire project is conducted in an environment and social friendly manner. Facilitate field management of contractors; Report regularly to the Project Director.
		Deputy Director Civil Works	Responsible for the civil works Ensure that the entire project is conducted in an environment and social friendly manner. Facilitate field management of contractors; Report regularly to the Project Director.
5	Environmental and Social Safeguard Section (E&S) / ESI	Addl. Director E&S.	Advise GSC and other IESCO departments on matters relating to environment and social aspects of the project. Responsible for overall environmental issues regarding to the project Advice and support Environment and Social Impact officer for the implementation of EIA and EMMP.

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No.	Department/ Division/ Cell	Role	Responsibility
			Report regularly to the Chief Engineer (Development).
		Additional Deputy Directors Environment & Social Impact	Responsible for the implementation of EMMP in the field, Coordinate with other level of GSC Division, Take proper action on non-compliance, Also provide training to GSC staff, Advice and support ESI for the implementation of EIA and EMMP. Report regularly to the Deputy Manager Environment.
6	Contractors related to all works i-e grid station construction, Transmission line and Civil works	Site Manager	Manage construction activities, manage construction crew, camp crew and other site personnel, in an environmentally responsible manner. Liaise with GSC's Project Manager, and; Liaise with GSC's Site Incharge.

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7.3 Environmental Management and Monitoring Plan (EMMP)

The purpose of the EMMP is to minimize the potential environmental and social impacts due to the proposed project. The EMMP reflects the commitment of the proponent to safeguard the physical, ecological and socio-economic environment as well as the surrounding population. The EMMP lists all the potential effects of each activity of the project and their associated mitigation measures identified in the EIA. For each project activity, the following information is presented in the plan:

- A listing of the potential impact associated with that project activity,
- A comprehensive listing of mitigation measures (actions),
- The person(s) responsible for ensuring the full implementation of the action,
- The person(s) responsible for monitoring the action,
- The timing of the implementation of the action to ensure that the objectives of mitigation are fully met.

The mitigation plan for the construction and operational phase of the proposed project is presented in **Table 7.2**.

It should be emphasized that the mitigation measures will have to be translated into environmental as well as social requirements and specifications to be made part of the contracts for the construction activities, with legal binding.

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Table 7.2: Environmental and Social Mitigation Plan (ESMP) for the Project

Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
A. Design and Pre-construction Phase					
Change of Land Use					
Land Use Change	Land use and cutting of Natural Vegetation	Careful selection of route for T/lines, Soil characteristics must be considered, High fertile land to be avoided. Avoid obvious scars and blemishes on the landscape;	Pre-construction Phase	GSC Division	PD GSC IESCO
Loss of Natural Vegetation					
Loss of Natural Vegetation	Cutting of trees	Re-plantation plan should be considered in design phase The landscaping of burrow areas and disposal sites consistent with acceptable aesthetic values for the surrounding landscape.	Pre-construction Phase	Design Engineer & GSC Directorate & E&S Section	PD GSC and E&S Section IESCO
Shifting of Utilities					
Basic Utilities Shifting	Existing Utilities	The existing utilities should be rehabilitated before construction to avoid any inconvenience to the residents of the project area or provide them with alternative arrangement during the construction period.	Pre-construction Phase	GSC Division	PD GSC IESCO
Impact on Archaeological Property					
Significant Property	Cultural, aesthetic, archaeological sites	No Cultural, aesthetic, archaeological sites fall in RoW of transmission lines, In the event of such finding, the Contractor has the duty to secure the site against any intrusion until the archaeological expert will decide on further action.	Pre-construction Phase	Design Engineer &GSC Division	PD GSC IESCO
Waste Management Plan					
Waste Management Plan	Waste Disposal	Implement waste management plan that identifies and characterizes every waste arising associated with proposed activities and which identifies the procedures for collection, handling & disposal of each waste.	Prior to site clearance	Design Engineer &GSC Division	PD GSC IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
Non-Routine Events					
Non-routine events and accidental releases	Mock drills and records of the same	Plan to be drawn up, considering likely emergencies and steps required to prevent/limit consequences. Follow the SCR Plan.	Prior to site clearance	Design Engineer &GSC Division	PD GSC IESCO
Land Acquisition Issues					
Transmission Lines Construction	Land Acquisition	The route of transmission line has been selected keeping in view the human settlements and agricultural land.	Pre-construction Phase	GSC Division	PD GSC IESCO
B. Construction Phase					
B1. Construction Camp Site Selection Issue					
Site selection	Acceptability to public/owner; interferences	Contractor need obtain necessary permission for camp site from the relevant authorities Construction camp will be located in a stable and flat area, requiring minimal removal of vegetation and levelling. Constrictors shall prepare a waste disposal plan for camp site and submit to ESI for his approval. ESI's approval will be obtained for camp location.	A selection stage for Camp Site	GSC Division/Contractor	E&S Section IESCO
Site clearing and preparation, and re-installation works after contract completion	Loss of vegetation and assets on the selected land, and dissatisfaction on rehabilitation measures after completion	All efforts during the design stage should be made to minimize the removal of existing macro-plants at camp site Contractor will provide plan for removal & rehabilitation of site upon completion Photographical and botanical inventory of vegetation before clearing the site Compensatory plantation to be scheduled when construction works near end; for each tree removed 10 new shall be planted	While establishing Camp Site	GSC Division/Contractor	E&S Section IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
Contractor Mobilization and Demobilization	Soil Erosion and Contamination	Vehicular traffic on unpaved roads will be avoided as for as possible. Operation of vehicles and machinery close to the water bodies will be minimized. Vehicles and equipment will not be repaired on the site. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.	During Construction Phase	GSC Division/Contractor	E&S Section IESCO
Sanitation & waste disposal facilities at camp	Soil and water contamination, Health risks to workforce and public if not properly managed	The sewage system for such camp will be properly designed i.e., septic tank with soakage pit to receive all sanitary wastewater. Sewage treatment facility will be designed and located to ensure that no water pollution takes place. Lined wash areas will be constructed within the campsite or at site approved by the ESI, for the receipt of wash waters from construction machinery. For the domestic sewage, appropriate treatment and disposal system will be constructed having adequate capacity. Domestic solid waste from the construction camp will be disposed in a manner that does not cause soil contamination.	Throughout operation of work camp	GSC Division/Contractor	E&S Section IESCO
		The inert recyclable waste from the site (such as cardboard, drums, broken/used parts etc.) will be sold to recycling contractors. The hazardous waste will be kept separate and handled according to the nature of the waste. Waste oil will be collected in drums and sold to the recycling contractors. Contractor will prepare a waste disposal plan and submit to ESI for his approval.			
Work safety and hygienic conditions	Health risks if work conditions provide unsafe and/or unfavorable work	Obligatory insurance against accidents to work labors Providing basic First Aid training to specified work staff, and basic medical service and supplies to workers Layout plan for camp site, to be approved by the ESI indicating safety measures taken by the contractor, e.g., firefighting	At establishment of camp site	GSC Division/Contractor	E&S Section IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
	conditions	equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents. Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for labors, Protection devices (earmuffs) will be provided to the workers operating in the vicinity of high noise generating machines, Provision of adequate sanitation, washing, cooking. and dormitory facilities including light up to satisfaction approved by the ESI, Proper maintenance of facilities for workers will be monitored by ESM, Regular pest control measures at the campsite. Protective fencing to be installed around the camp to avoid any accidents. Firefighting equipment will be made available at the camp. The camp staff will be provided firefighting training. All safety precautions will be taken to transport, handle, and store hazardous substances, such as fuel.			
Campsite location	Public Health	Camps will be at least 500 m from any groundwater wells used by the community. The construction crew will be provided awareness for the transmissible diseases (such as HIV/AIDS, hepatitis B and C).	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Campsite security	Security hazards and related conflicts in the project area.	Proper storage and fencing/locking of storage rooms containing hazardous material Employment of guard for storage rooms. Provision of adequate security against sabotage petrol pilfering and theft.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Generation of construction waste material	Contamination of soil from construction wastes and quarry	All waste will be disposed of as desired and the site will be restored back to its original conditions before handing over. Non-bituminous wastes from construction crew activities will be dumped in sites approved by the ESI, in line with the legal	Throughout construction period	GSC Division/Contractor	E&S Section IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
	materials	prescriptions for dump sites, and covered with a layer of the conserved topsoil. Bituminous wastes, if produced will be disposed of in an identified dumping site approved by ESI.			
Movement of vehicles in the construction site and along the haulage routes	Soil compaction and alteration of percolation and vegetation pattern. Damage to properties and utilities	Construction vehicles, machinery and equipment will move, or be stationed in the designated RoW, to avoid unnecessary compaction of soil. Damages will be instantly repaired and/or compensated at Contractor's obligation Water and soil quality will be monitored as envisaged in the Environmental Monitoring Plan	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Movement, maintenance and fueling of construction vehicles	Contamination of soil and groundwater from fuel and lubricants	Construction vehicles and equipment will be properly maintained and refueled in such a way that oil/diesel spillage does not contaminate the soil. Fuel storage and refueling sites will be kept away from drainage channels. Oil and grease traps will be provided at fueling locations, to prevent contamination of water. Unusable debris shall be dumped in nearest landfill sites if available, on other hand then on an approved designated site by IESCO, or local administration. Operation of vehicles close to the water channels, water reservoirs will be minimized. Waste oil and oil-soaked cotton/cloth shall be sold off to authorized vendors Water quality will be monitored as envisaged in the Environmental Monitoring Plan as discussed in chapter 8 Slopes of embankment leading to water bodies will be modified and screened so that contaminants do not enter the water bodies.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Waste material	Contamination of soil/water and	If spoil material develops, pits will be used after examination on	Throughout construction	GSC	E&S Section

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
disposal sites	impact on landscape value	possible soil and water contamination risks. Spoils will then be covered with sandy conglomerates.	period	Division/Contractor	IESCO
Soil related Issues					
Contractor Mobilization and Demobilization	Soil Erosion and Contamination	Vehicular traffic on unpaved roads will be avoided as for as possible. Operation of vehicles and machinery close to the water channels, water reservoir will be minimized. Vehicles and equipment will not be repaired on the site. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Construction Camp Establishment and Operation	Soil Erosion Contamination	Land clearing, levelling, and grading will be minimized, and carried out in a manner to minimize soil erosion. All temporary structures will be demolished, land levelled and re-contoured to the original condition or better.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Construction work for T/L.	Loss of top fertile soil.	The excavation of earth fills to be limited to approximate depth of 50 m to 100 m. Low embankments should be protected from erosion by planting indigenous grasses that can flourish under relatively dry conditions. High embankments i.e., over 2 meters should be protected by construction stone pitching or riprap across the embankments. Ditches or burrow pits that cannot be fully rehabilitated should be landscaped to minimize erosion and avoid creating hazards for people.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Construction work T/L	Soil erosion	Cut and fill at the proposed sites will be carefully designed, and ideally should balance each other. The surplus soil, if any, will be disposed at places approved by IESCO. Such sites will be selected after surveying the area and ensuring that soil deposition will not have any significant impacts, such as loss of productive land, blocked access, natural vegetation and disturbance to drainage	Throughout construction period	GSC Division/Contractor	E&S Section IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
		Appropriate measures will be taken to avoid soil erosion during the excavation of transmission line poles foundations, particularly within the park area. These include temporary embankments to protect excavated soil, stone pitching and placing gabions. The surplus soil will be disposed as stated above. After the completion of tower foundations particularly on the above-mentioned slopes, additional stone pitching around the foundation will be carried out, where required, to avoid any subsequent soil erosion/land sliding. Post-construction monitoring of such sites will be carried out to detect early signs of any soil erosion/land sliding. The construction works for transmission line route will not be undertaken during the rainy season. After the completion of the construction work, the transmission line route, campsites and other construction sites will be completely restored. No debris, surplus construction material or any garbage will be left behind. Photographic record will be maintained for pre-project, during-construction and post-construction condition of the sites (grid station, transmission line route, camp and access roads).			
Construction work for T/L	Soil contamination due to leakage, spoilage etc.	Vehicles and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination. For the domestic sewage from the construction camp and office, appropriate treatment and disposal system, such as septic tanks and soaking pits, will be constructed having adequate capacity. The contractor(s) will submit the plans for the camp layout and waste disposal system to the IESCO and obtain approval. As stated above, the camp will preferably be established inside the near the grid station site. Waste oils will be collected in drums and sold to the recycling contractors. Domestic solid waste from the construction camp will be disposed	Throughout construction period	GSC Division/Contractor	E&S Section IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
		in a manner that does not cause soil contamination. The waste disposal plan submitted by the contractor(s) will also address the solid waste.			
Soil and Burrow Material, Cut and Fill					
Construction work for T/L	Borrow pit land lease agreement	The Contractor must obtain any necessary permission for burrow pits from the competent authorities.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Water-related Issues					
Use of water for construction and consumption	Conflict with local water demand	The contractor will make arrangements for water required for construction in such a way that the water availability and supply to nearby communities remain unaffected. For construction purposes, water shall be drawn from surface water bodies on priority and as available.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Construction work for T/L	Surface water contamination	For the domestic sewage, appropriate treatment and disposal system will be constructed having adequate capacity. Waste oils will be collected in drums and sold to the recycling contractors. The inert recyclable waste from the site (such as cardboard, drums, broken/used parts, etc.) will be sold to recycling contractors. The hazardous waste will be kept separate and handled according to the nature of the waste. Domestic solid waste from the construction camp will be disposed in a manner that does not cause soil contamination.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Construction work for T/L	Water Consumption	Water will be obtained from the source approved by the ESI. Astute planning will be employed to conserve water at the construction sites and camp. Water will be procured in manner that least affects the local communities. Wastewater recycling will be carried out for sprinkling and gardening purposes.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Waste Disposal Issues					

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
Spillage of liquid wastes	Risk of polluting surface and groundwater from liquid waste spillage, drainage and runoff from construction sites	Application of good engineering and construction practices. The contractor should ensure that construction debris do not find their way into streams which may get clogged. Work on riverbanks will be kept to a minimum, and retaining walls be constructed. To maintain surface water flow/drainage, proper mitigation measures will be taken along the road, like drainage structure along urban settlements. If spillage occurs, it will be disposed of in an identified dumping site approved by ESI. Contractor will prepare a waste disposal plan and submit to ESI for his approval.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Disposal of Solid waste		Proper and safe waste disposal designated site by ESI or ESM. Contractor will prepare a waste disposal plan and submit to ESI for his approval.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Air Quality related Issues					
Vehicular movement and running of machineries	Emission from construction vehicles and machinery, causing public health risks, nuisance and other impacts on the biophysical environment	The diversion road will be regularly water-sprayed to minimize the dust generation: Schedules will be adjusted to actual needs, determined by the ESI. Vehicle trips to be minimize to the extent possible All vehicles, equipment and machinery used for construction will be regularly maintained to ensure that the pollution emission levels conform to the PEQS. All equipment is operated within specified design parameters. Air quality parameters will be monitored at determined sites and schedule determined by the ESI. Ambient air quality within the premises of camp site and grid station should be monitored.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
Transportation of materials, and other construction activities that create dust and emissions	Dust and emissions from machines causing health risk to operators; Impacts on biophysical environment	Vehicles delivering loose and fine materials, like sand and fine aggregates, should be covered by sheets to reduce spills on existing road. Ambient air quality monitoring is carried out in accordance with the EMMP. If monitored parameters are above prescribed PEQS limits, suitable control measures must be taken. Any dry, dusty materials stored in sealed containers or prevented from blowing. Compaction of soil during various construction activities.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Construction work for T/L	Air Quality Deterioration	Vehicular traffic on unpaved roads will be avoided as far as possible. Operation of vehicles and machinery close to the water channels, water reservoir will be minimized. Vehicles and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Noise, Vibration Dust Related Issues					
Construction work for T/L	Noise due to construction activities, vehicular movement etc.	Vehicles will have exhaust mufflers (silencers) to minimize noise generation. Nighttime traffic will be avoided near the communities. Local population will be taken in confidence if such work is unavoidable. Vehicular traffic through the communities will be avoided as far as possible. Vehicle speeds will be kept low, and horns will not be used while passing through or near the community.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Running of construction machinery	Noise from vehicles, other machinery and equipment	List of all noise-generating machinery onsite along with age to be prepared. Equipment to be maintained in good working order The plant and equipment used for construction will strictly conform to noise standards specified in the PEQS. Vehicles and equipment used will be fitted as applicable, with	Throughout construction period	GSC Division/Contractor	E&S Section IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
		silencers and properly maintained. Work at night be minimized In urban settlements construction activities will be restricted to be carried out between 6 am and 8 p.m. Implement good working practices (equipment selection and siting) to minimize noise and also reduce its impacts on human health (earmuffs, safe distances, and enclosures). No machinery running when not required Acoustic mufflers/enclosures to be provided in large engines In accordance with the Environmental Monitoring Plan noise measurements will be carried out at locations and schedule specified to ensure the effectiveness of mitigation measures. Vehicle trips to be minimized to the extent possible All equipment operated within specified design parameters. The noise level will not exceed the permissible limit both during day and night times			
Vehicular movement	Traffic congestion and accidents	The movement of vehicles caring construction material should be restricted during daytime to reduce traffic load and inconvenience to the local people.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Vehicular movement	Safety Hazards	Road signage will be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic. Project drivers will be trained on defensive driving. Vehicle speeds near/ within the communities will be kept low, to avoid safety hazard and dust emissions.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Construction work for T/L	Vibration due to construction activities, vehicular movement etc.	Selection of up to date and well-maintained plant or equipment with reduce noise levels ensured by suitable in-built damping techniques or appropriate muffing devices. Confining excessively noisy work to normal working hours in the day, as far as possible.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
		Providing the construction workers with suitable hearing protection like earmuffs and training them in their use. Preferably, restricting construction vehicles movement during nighttime. Heavy machinery like percussion hammers and drills should not be used during nighttime without prior approval of the client. Contractors should comply with submitted work schedule. Keeping noisy operations away from sensitive points; Implement regular maintenance and repairs; and employ strict implementation of operation procedures. Noise barriers in sensitive areas (in front of schools, hospitals, university, mosques).			
Construction work for T/L	Dust due to construction activities, vehicular movement etc.	Roads and path should be regularly sprayed with water during dry weather. All excavation work should be sprinkled with water. Construction workers should be provided with masks for protection against the inhalation of dust. Vehicle speed in the project area should be prescribed and controlled accordingly.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Fauna and Flora Resources Issues					
Construction work for T/L	Loss of Vegetation	Clearing of natural vegetation will be minimized as far as possible during the transmission line works. For the transmission line route, a tree cutting plan will be prepared and submitted to IESCO for approval. A complete record will be maintained for any tree cutting or trimming. The record will include: the number, species, type, size, age, condition and photograph of the trees to be cut/trimmed. Indigenous tree species will be selected for plantation; in particular, Eucalyptus trees will not be used in any case. Cleaning natural vegetation will be avoided as far as possible. The camp will be established in a natural clearing, outside	Throughout construction period	GSC Division/Contractor	E&S Section IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
		forested areas. Complete record will be maintained for any tree cutting. The construction crew will be provided. With LPG as cooking (and heating, if required) fuel. Use of fuelwood will not be allowed. No herbicide will be used to clear vegetation			
Construction work and illegal hunting by worker	Damage the habitat and, danger to wildlife, disturbance of ecosystem	Measures to protect and rehabilitate floral resources of the area discussed in section above will also protect the wildlife resources of the area. No nighttime activities will be carried out in this area. The works in this area will be carried out in coordination with the Forest and Wildlife departments. Vehicle movement will be limited to the existing tracks in the above area. The measures to prevent soil and water contamination will forestall any adverse impact on the faunal resources of the area. Garbage will not be left in the open places. The project staff will not be allowed to indulge in any hunting activities.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Health and Safety of Workers					
Hygiene related issues during construction phase		Obligatory insurance of workers against accidents. Providing basic medical training to specified work staff and basic medical service and supplies to workers. Layout plan for camp site, indicating safety measures taken by the contractor, e.g., firefighting equipment, safe storage of hazardous material, first aid, security, fencing and contingency measures in case of accidents. Work safety measures and good workmanship practices are to be followed by the contractor to ensure on health risks for laborer. Protection devices should be provided to the workers operating in	Throughout construction period	GSC Division/Contractor	E&S Section IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
		the vicinity of high noise generating machines. Provision of adequate sanitation, washing, cooking, and dormitory facilities to workers. Provision of protective clothing for labors handling hazardous material e.g., hard hats, adequate footwear for bituminous pavement works etc. Adequate signage, lightning devices, barriers, and person with the flags during construction to manage traffic at construction sites. Timely public notification on planned construction works.			
Social and Gender Issues					
Construction work for T/L	Social and Gender Issues	Construction crew will avoid entering the villages and settlements. Local social norms and practices will be respected. No child labor will be employed. Road signage will be fixed at appropriate locations to reduce safety hazards associated with project-related vehicular traffic. Project drivers will be trained on defensive driving. Vehicle speeds near/within the community will be kept low, to avoid safety hazard and dust emissions. The communities near the transmission line route will be informed about the construction activities. Protective fencing will be installed where required. Before commencing the testing commissioning of the system, the nearby community will be informed. Protective fencing will be used where appropriate/possible.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
Construction work for T/L	Blocked Access	In case of the blockage of the existing routes, alternate routes will be identified in consultation with affected communities.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Socio-Economic Issues					
Construction work for T/L	Loss of Agriculture	Temporary RoW has been allocated	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Sites of Historical, Cultural, Archeological or Religious Significance					
Construction work for T/L	Sites of Historical, Cultural, Archeological or Religious Significance	Construction activities will be carried out after consultation with the nearby/relevant community. In case of discovery of any sites or artifacts of historical, cultural, archaeological, or religious significance, the work will be stopped at that site. The provincial and federal archaeological departments will be notified immediately, and their advice will be sought before resumption of the construction activities at such sites.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Aesthetic Value					
	Aesthetic Value	Transmission lines and feeders will be constructed after astute planning, in order to avoid dense concentration of electrical lines. Tree plantation will be carried inside and at the periphery of the grid stations, without compromising the safety aspects (i.e., required clearances will be maintained). For this purpose, provisions will be made in the site layout of the grid stations.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO
Damage to Infrastructure					
Construction work for T/L	Damage to Infrastructure	Avoid damaging the local infrastructure, If any infrastructure will be damaged by the project activity, then it will be recorded.	Throughout construction period	GSC Division/Contractor	E&S Section IESCO

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
		All damaged infrastructure will be restored to original or better condition after construction activities.			
Operational Phase					
Water-related Issues					

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Activities and Actions	Issue/ Component	Proposed Mitigation Measures	Timeframe	Institutional Responsibility	
				Implementation	Supervision
C4. Emergency Measures					
Emergency measure	Emergency preparedness such as fire fighting	Fire protection and safety measures to take care of fire and explosion hazards, to be assessed and steps taken for their prevention.	Throughout Operationalperiod	GSC Division/Contractor	A E&S Section IESCO

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7.4 Solid Waste Management Plan

Construction Phase: Several solid waste bins will be placed at site camp for the collection of solid waste.

IESCO will collaborate with the local solid waste management authority for collection, transportation and disposal of solid waste generated.

Empty chemical drums, iron cuttings, etc. will be collected separately at the project site within an area marked as "Scrap Yard". After suitable time frame, scrap will be sold to recycling contractor.

The construction waste generated will be recycled to the extent possible. Open burning of solid waste will not be allowed. The waste will be transported to the nearest waste disposal site, allocated by the government of Punjab.

The solid waste will be temporarily stored in the colour coding bins placed outside the building premises at a designed place.

7.5 HSE Management Plan

- Health Safety and Environment (HSE) induction/orientation will be provided to all workforce at the project site.
- Assembly point will be established for the gathering of workforce regarding daily HSE Toolbox Talk at the project site.
- HSE Toolbox Meeting will be held by HSE Manager on a weekly basis.
- Special education sessions will be conducted properly at the site.
- Daily walkthrough will be conducted at the project site.
- All the Mandatory PPE's (Safety Helmet, Safety Jacket, Safety Shoes, Coverall, Full body Harness, Safety Goggles, Earplug, Earmuff, Dust mask/Special, Safety Gloves, Masks etc.).
- Proper and safe scaffolding will be provided at the site for safe work at height.
- All the heavy machinery will be inspected properly at the site.
- All Cranes and lifting gears will be inspected/checked on regular basis.
- Inspection & Tagging system will be maintained at the project site.
- Safety signage will be provided at the project site.
- Fire posts will be established at the project site at easy approach location.
- Waste will be maintained properly.
- HSE Signboard will be installed at the project site for an Emergency response.
- Rest area & smoking zones will be established at the site.
- Regular First Aid Center along with all required medicines 24/7 will be available at the project site.
- Paramedic (dispensers) will be deployed at first-aid post for day & night shift
- In-house training will be conducted at the project site.

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The contractor will develop his HSE policy, roles and responsibilities of HSE Manager and staff. It also provides information about HSE objectives, Personal Protective Equipment (PPE's) to be used at the site, first aid training and communication and documentation regarding HSE.

- First Aid Boxes: First aid boxes will be provided at all active construction sites to cope up the emergency situations. Usually, a typical first aid box mainly contains antibiotics, basic medicines, cotton, bandages, sunny plast, healing balms, pyodine, spirit, pain killer, etc.
- PPEs: Site Engineer and HSE Manager will be responsible for providing PPEs to all workers.
- Safety Signs: Relevant safety signboards will be displayed on the worksites and labour camps to make aware / train workers about safety rules. Mainly safety signs include signs of speed limits, electric spark, etc.
- TBTs: Tool Box Talks (TBTs) will be delivered on a regular basis and when a new team of workers start a new activity like shuttering, steel fixing, steel cutting, steel bending, scaffolding, concrete pouring, mechanical works, electrical works, etc. at sites to promote safety culture.
- Water Sprinkling: Dust pollution will be controlled with water sprinkling and minimizes the risk of adverse impacts of dust on workers and surrounding areas. Water sprinkling will be carried out regularly to minimize dust pollution and avoiding creating slush.
- Barricading: The contractor will put up barricade tape at all the active work sites. Hard barricading (scaffolding pipes) will be used to cover exposed areas where excavation is more than 10 feet. Training: Safety training will be delivered by HSE Manager to achieve its objectives. Trainings will be conducted for capacity building of employees / workers / labour / sub-contractors to make them well effective to respond in any kind of emergency.

The breakup cost for the safety of workers is described in**Table 7.3.**

Table 7.3: Estimated Cost for the Implementation of Environmental Management and Monitoring Plan for Proposed Project

Sr No	Item	Quantity	Unit Cost (Rs.)	Total Cost (Rs.)
Personal Protective Equipment (A)				
1	Dust Masks	2000	10	20,000
2	Safety Shoes	120	2000	240,000
3	Gloves	600	200	120,000
4	First Aid Box	1	3000	3,000
5	Ear Plugs	600	50	30,000
6	Safety Helmets	100	1000	100,000
Others (B)				
7	Provision of Dust Bins	15	1000	15,000
8	Warning Tape	25	500	12,500

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9	Safety Cones	10	1000	10,000
10	Safety Sign Boards	20	1500	30,000
11	Raincoat	50	1000	50,000
			Total (A + B)	630,500

- Time Required for Construction Period = 300 days
- Number of Labor Required for Construction = up to 50
- Personal Protective Equipment PPEs
- Dust Musk: 1 Dust Mask to be used in a week by each labourer
- Safety Shoes: 1 Safety shoe for six months for each labourer
- Gloves 2 pairs of gloves for each labourer for a month
- First Aid Box 1 first aid box for every 50 labourers'
- Ear Plug 1 set of earplug to be used for 1 month for each labourer
- Safety Helmet 1 safety helmet for each labourer for 12 months
- Safety Jackets 2 safety Jackets (Hi-Vis) for each labourer for 12 months
- Dust Bin: Rough estimate
- Water Sprinkling the whole construction period
- Rain Cost: 1 Raincoat for each labourer

7.6 Emergency Preparedness, Response and Site Evacuation Plan

- The Contractor will always be ready for response in any kind of emergency at the project site.
- Special assembly points will be established at the project site (offices & site).
- The emergency siren will be installed at assembly points.
- Contact numbers of emergency response team will be circulated at the project site.
- Close coordination will be carried out with 1122 in the case of any serious injury/accident.
- Close coordination will be carried out with all law enforcement agencies (police) in case of an aggressive mob of people in the shape of any kind of protest.
- Emergency response drill will be carried out once in a month for provision of awareness to the workforce at the project site.
- First Aid Boxes will be available at project site around the clock.
- Experienced and qualified paramedic staff will be available at First Aid Post at the site under the command of HSE Manager.
- Fully equipped Ambulance will be available at the project site along with all mandatory items (Oxygen cylinder, Statures & First Aid Box)
- All the new entrants will be oriented by HSE Manager regarding the required awareness towards the hazardous and risky situation and control.
- The entire workforce will be provided with all mandatory PPEs for the risk-free environment.
- Special in-housetraining (TBT) will be conducted by HSE Manager regarding the awareness towards any emergency condition and control.
- Proper water sprinkling will be carried out at service road along with the project site for dust control to avoid any hazardous and risky situation which can be a cause of transport emergency.

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7.7 Fire Fighting Plan

The campsite will be equipped with fire extinguishers as well as communication equipment for contacting the appropriate emergency response teams.

At all the campsites should be equipt with emergency alarms. Persons will be nominated to ring the emergency alarm in case of any emergency or any emergency risk.

All the camp residents will be trained and well communicated how to respond to the emergency alarm and reach assembly point immediately. Workers will be trained to respond an emergency alarm as discussed below:

- If the alarm rings for 20 seconds, only once, then it is less severe emergency;
- If it rings for 20 seconds thrice after intervals, then it is medium to severe high emergency, but it can be much severe; and
- If it rings for 60 seconds or more continuously, then the emergency is most severe so, everyone should respond to it immediately, evacuate the workplace and move towards the assembly point.

Proper evacuation routes will be designated, nominated and well communicated to all. All the workers will be trained to follow the evacuation routes and reach the assembly point in case of an emergency.

7.8 Plantation Plan

In order to improve the environment and aesthetical essence of the project site; a plantation plan is being recommended.

According to the plantation plan, It is recommended that the plantation plan should include ornamental plants for beautification and fruits trees along the boundary of the grid station.

The practice of plantation of mature plants will be an effective compensation against the expected damages to the existing vegetation.

The IESCO will have the provision of staff and budget for the implementation of plantation plan.

The plantation of recommended indigenous species will be planted in pits at spacing 7ft x 7ft. The recommendations about the new plantations are based upon the calculations that these will not be less than hundred times than the cut trees during the developmental phase. The loss of vegetation along the transmission line route will be compensated as per The Telegraph Act 1885.

The plantation plan consists of trees, shrubs and indoor plant which are recommended.

The project area is sub-tropical scrub forest ecosystem. Predominantly occupied by Kau, Phulai, Ber, and Sanatha, and shrub species. However, following are some tree species recommended which suits to the project area, include.

Table 7.4: Recommended Plant Species to be planted at the Project Site

Sr.#	Local Name of Plant	Scientific Name

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1	Guava	*Psidiumguajava*
2	Kikar	*Acacia nilotica*
3	Ber	*Zizyphusmauritshiana*
4	Orange	Citrus X sinensis
5	Shisham	*Dalbergiasissoo*
6	Neem	*Azadirachtaindica*
7	Semal	*Bombaxceiba*
8	Kachnar	*Bauhinia variegata*
9	Lemon	Citrus × limon
10	Alstonia	*Alstoniascholaris*

Plantation Plan Cost

The cost of plantation includes the cost of equipment, labour, and plants purchase and maintenance cost for first three months of plantation. The total estimated cost of implementation of plantation plan is Rs.300,000.

The tentative cost of equipment for is given below in **Table 7.5**and maintenance plan for three months is given in **Table 7.6.**

Table 7.5: Tentative Cost of Equipment

Sr. #	Description	Qty.	At Rate (PKR)	Cost in PKR
1	Grub hoe (earth digging tool) and others	Lump-sum	Lump-sum	50,000
2	Cost of Plantation on bare slopes	Lump-sum	50 per plant	200,000
3	Maintenance Cost	Lump-sum	Lump-sum	50,000
	Grand Total Cost			300,000

Table 7.6: Maintenance Plan for first three months

Sr. #	Description		February	March	April
1	Layout/ pits formation/clearing site				
2	Planting of Saplings				
3	Weeding/maintenance	3 months			

7.9 Environmental Management &Monitoring Plan

The Environmental Management & Monitoring Plan (EMMP) will ensure that mitigation measures are being implemented and that these are effective to provide a delivery mechanism to address the adverse environmental impacts of the proposed project during its execution and operation phases of the project.

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The Monitoring plan will be a monitoring tool for the mitigation measures to be implemented during the different phases of project. The primary objectives of the EMMP are to:

- Ensure that the mitigation measures included in the EIA are being implemented completely,
- Ensure the effectiveness of the mitigation measures in minimizing the project's impacts on social and environmental resources.
- Timely identification of any undue/ unanticipated adverse impact, so that a remedial action is taken

The IESCO will make necessary arrangements to monitor the key environmental parameters during the construction and operational phase against the standard parameters, it will include

- The number of trees cut as part of the development works,
- Quantity of water used,
- Monitoring of water quality in project area and sites respectively,
- Air quality monitoring in project area,
- Record of waste produced, record of waste disposal, and;
- Project-related vehicular traffic.

The key responsibilities are;

- The Deputy Manager E&SS, IESCO will make necessary arrangements to monitor the key environmental parameters during the construction and operation phases.
- The Additional Deputy DirectorEnvironment/Social Impact, IESCO will have to monitor project activities in the project area.
- They should keep a record of all non-conformance observed and report these along with actions to the IESCO management for further action.
- They will also have to report any impacts anticipated along with his recommendations for further action.

To achieve above mentioned objectives the following monitoring program will be implemented. An EMMPis provided in **Table 7.7**, at the end of this chapter.

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Table 7.7: Environmental Management & Monitoring Plan for 132 KV Transmission Line

Environmental Component	Project Stages	Parameters	Locations	Frequency	Standards	Implementation	Supervision	Documentation
Water Quality	Construction	pH, BOD, COD, TDS, TSS, DO, NH_x, coliforms hardness, nitrate, hydrocarbon, Pb	Perennial and seasonal streams near to grid stations and IESCO's staff colony.	Quarterly	WHO and PEQS	Contractor/ESM	E&S, IESCO	Completed record of sampling and Analysis
Noise Levels	Construction	dB (A)	At construction sites, campsite and densely populated area	Twice in 8 hours at selected sites at 1 m, 7.5 m, 15 m, and 50 m from right-of-way, Quarterly	EPA Ambient Noise standards	Contractor/ESM	E&S, IESCO	Completed Record
Dust Emissions	Construction	Visual Checks	At construction sites, campsite and densely populated area, project roads	Twice in 8 Hours and routine monitoring	-	Contractor/ESM	E&S, IESCO	Completed Record
Public Grievance	Construction	Social parameter	At nearby Communities	Throughout the field activities	Social parameter	ESI	Additional. DyDirector Environment & Social Safeguard Section	Completed Record

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Environmental Component	Project Stages	Parameters	Locations	Frequency	Standards	Implementation	Supervision	Documentation
Plantation along route	Construction	Visual inspection of plant species survival rate and status of maintenance	At sites where plantation was carried out (2) At site within right of- way	(1) One month after plantation (2) One year after plantation 1 month, 3 months 6 months, and 12 months after Planting	75 % survival rate	ESI	Additional. DyDirector Environment & Social Safeguard Section	Completed Record
	Operation	Visual inspection of plant species survival rate and status of maintenance	At sites where plantation was carried out	(1) 2.5 years after plantation	75% survival rate	ESI	Additional. DyDirector Environment	Completed Record
Safety and Traffic Rules Compliance	Operation	(1) Faulty, overloaded and speeding vehicles (2)Inspection of signage	Along Ninth Avenue	Quarterly basis, for one year	To be determined	ESI	Additional. DyDirector Environment & Social Safeguard Section	Completed Record

Key:

dBA = *decibels (measured in the audible range)* **USEPA =** *United States Environmental Protection Agency*

WHO = *World Health Organization* **EPA =** *Environmental Protection Authority,*

PEQS = *Punjab Environmental Quality Standards* **ROW=** *Right-of-Way*

PM10 = *Particulate Matter smaller than about 10 micrometres,*

SPM = *Suspended Particulate Matter*

TSS = *Total Suspended Solids*

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Table 7.8: Estimated cost for the implementation of Environmental Monitoring Plan for 132 KV Grid Station and Transmission Line Project

Environmental Monitoring Activities	Units/ No. of Samples	Unit Cost specification	Cost (Rs)
Construction phase			
Ambient air quality monitoring	1 (24 months project)	@ 50,000 per sample for 24 hr monitoring	25,000
Ambient water quality monitoring Quarterly basis	3	@ 20,000 per sample	60,000
Noise levels, quarterly basis	3	@ 5,000 per sample	15,000
		Total	**100,000**

7.9.1 Compliance Monitoring

The compliance monitoring of the project activities is principally a tool to ensure that the environmental and social control measures required in the EIA are strictly adhered to, during the project activities.

Various aspects of the EIA compliance monitoring will be to:

- Systematically observe the activities undertaken by the contractors (and sub-contractors) or any other person associated with the project.
- Verify that the activities are undertaken in compliance with the EIA and EMMP.
- Document and communicate the observations to the concerned person(s) of the contractors, GSC Department and E&S unit, so that any corrective measures, if required, can be taken in a timely fashion.
- Maintain a record of all incidents of environmental and social significance and related actions and corrective measures.
- Maintain contact with the communities, solicit their views and concerns, and discuss them during the project progress meetings.
- Prepare periodic reports of the environmental and social performance of project.

The mitigation plan will be used as a management and monitoring tool for compliance monitoring. Inspection will be done using checklists prepared by the respective contractors, on the basis of the EMMP.

Compliance monitoring will be the responsibility of all organizations involved in the field activities. It will be carried out by the following:

- Grid Station Construction (GC) Division of IESCO,
- Transmission & Grids (T&G) Division of IESCO,
- Contractors of the Project,
- Environmental and Social Inspector (ESI) of Contractor(s),
- Environmental and Social Monitor/Officer (ESM/ESO) of GSC Directorate, IESCO.

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7.9.2 Effects Monitoring

The EIA predicts the impacts of the proposed project on the basis of information available at the time of conducting the assessment and the natural processes that link various environmental and social parameters. Based on this prediction, mitigation measures are introduced such that the predicted residual effects do not exceed acceptable levels. However, there is always an element of uncertainty in such predictions due to an insufficient grasp of the processes, limitations in prediction techniques, or inadequate data on the environment. This is true for the physical, biological, as well as socio-economic environment. Consequently, it is possible that even if the mitigation measures are implemented fully, the negative impacts of the project may exceed acceptable limits.

In order to address the above concerns, effects monitoring will be undertaken during the project activities, with the overall objective of proper management of environmental and social risks and uncertainties. Broadly, effects monitoring has the following objectives:

- To verify that the impacts of the proposed project are within acceptable limits, thus establishing credibility (public assurance)
- To immediately warn the project proponents (and the regulatory agencies, if required) of unanticipated adverse impact or sudden changes in impact trends so that corrective actions can be undertaken, which may include modifications in the proposed activities, or the inclusion of modified or additional mitigation measures
- To provide information to plan and control the timing, location, and level of certain project activities so that the effects are minimized.
- To facilitate research and development by documenting the effects of the proposed project that can be used to validate impact-prediction techniques and provide a basis for more accurate predictions of future projects.

The monitoring will be done during construction and operational phase comprise of the following parameters:

- Soil erosion
- Water quality
- Water consumption and availability
- Air quality
- Noise
- Socioeconomic aspects
- Grievance Monitoring

7.10 Training Program

The key objective of the training program is to ensure that the requirement of EMP is clearly understood and followed throughout the project. The training shall cover the following areas:

- Environmental sensitivity of the project area.
- EMP communication and documentation requirement.
- Vegetation and community issues and their mitigation measures.

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- Safe construction practices
- Use of Personal Protective Equipment's (PPEs)
- Environmentally sound construction practices
- Vehicular safety.
- Site restoration requirement.
- Solid Waste Disposal

IESCO will be primarily responsible for providing training to all project personnel. A lump sum fee of Rs. 150,000 has been set aside for Environmental & Social Training Program.

The details about the program are shown in **Table 7.9**.

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Table 7.9: Framework for Environmental & Social Training Program

Type of Training	Training Description	Period	Duration	Training By	Trainee
Occupational Health and Safety	Training should be provided to aware staff to conform to safety codes	Before Commencement of Project Activities	Full day	External Sources	Site Supervisor, Site Engineer.
Environment & Social Laws, Regulations, procedure and guidelines of the government	The training should detail the laws and regulation concerning the environment, Labour laws and compliance with government regulation.	Before Commencement of Project Activities	Full day	External Sources	Company manager, Site Supervisors, Site Engineers.
Occupational Health & Safety	Health, safety and hygiene. Proper usage of Personal Protective Equipment (PPE's), Precautions to be taken for working in confined areas.	Before Construction Activities	Full Day	Site Supervisor, Site Engineer	Workers
Solid Waste Management	Waste segregation, identification of Hazardous Waste, Use of PPEs and waste Handling	Before Commencement of Project Activities	Full Day	External Sources	Relevant workers and staff
Health Safety and Environmental Auditing	Health Safety and Environmental Audits, Reporting Requirements	Before Commencement of Project Activities	Full Day	External Sources	Relevant Department
Implementation of environmental management and monitoring plan	Explanation of Environment Management and Monitoring Program	Quarterly. As soon as the project activities start	Full Day	External Sources	Site Supervisor, Site Engineer

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7.11 Communication and Documentation

An effective mechanism for storing and communicating environmental and social information during the project is an essential requirement of EMMP. The key features of such type of a mechanism are:

- Recording and maintenance of all information generated during the monitoring in a predetermined format.
- Communicating the information to a central location.
- Storing raw information in a central database.
- Processing the information to produce periodic reports.

7.12 Grievance Redressal Mechanism

An attempt has been made during the present EIA to identify all potential impacts of the proposed project, to identify all Project Affected Persons (PAPS), to provide mitigation measures to address the potential impacts, and to chart out a mechanism to implement these mitigation measures.

However during the project implementation, the stakeholders (mostly the communities in the vicinity of the project sites/transmission line route) may still have some grievances with respect to the project activities, their impacts and other mitigation measures.

In order to address the above eventualities, the Grievance Redressal Mechanism (GRM) has been devised. The main objective of the GRM will be to provide a mechanism to mediate conflict and cut down on lengthy litigation, which often delays the infrastructure projects such as the present project. It will also facilitate people who might have objections or concerns about their assistance, a public forum to raise their objections and through conflict resolution, address these issues adequately.

Under the GRM, the contractor will maintain the Social Complaint Register (SCR) at the sites to document all complaints received from the project affected persons and local communities. The information recorded in the Register will include date of the complaint, particulars of the complainant, description of the grievance, actions to be taken, the person responsible to take the action, follow up requirements and the target date for the implementation of the mitigation measure. The register will also record the actual measures taken to mitigate these concerns.

As soon as a complaint is received, the contractor will record it in the complaint register and will refer it to the concerned SDO/XEN, if it could not be addressed by the contractor. The SDO/XEN will respond and resolve the issue within 15 days of the complaint filed. If the issue is not resolved then it will be referred to Project Director GSC, who will address the issue within 15 days of the referral. In case the complaint could not be solved at Project Director's office then General Manager / Chief Engineer Development will be approached, and the issue will be addressed within one month. For any reason, if the complainant is not satisfied then he/she has the right to approach the court. Once the remedial action is decided, implementation responsibility as well as schedule will be determined.

The proposed remedial action will be documented in the SCR, with complete details (by whom and by when). The proposed remedial action will be shared with

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the complainant. Similarly, the actual action taken will also be documented in the register and shared with the complainant. The complainant's views on the remedial action taken will also be documented in the register.

The SCR will be reviewed during the fortnightly meetings at the site. The progress on the remedial actions will also be reviewed during the meetings.

7.13 Change Management

The EIA for the proposed operation recognizes that changes in the operation or the EMMP may be required during the operation and therefore provides a Change Management Plan to manage such changes. Overall responsibility for the preparation of change management statements will lie with Islamabad Electrical Supply Company Limited (IESCO).

- Category A changes,
- Category B changes, and;
- Category C changes.

These categories are defined below further one by one.

7.13.1 Category 'A' Change

The 'Category A' change is one that leads to a significant departure from the project described in the EIA and consequently requires a reassessment of the environmental and socioeconomic impacts associated with the change. In such an instance, IESCO will be required to conduct a fresh EIA of the changed portion of the project, and send the report of this assessment to the relevant agencies for approval (EPA). Examples of such changes are provided below.

- Change in the transmission line route by more than 2 km of the original alignment. Or change in the route by less than 2 km, but the changed route has environmental and/or social sensitivity more than the original route.
- Increase in the transmission line length exceeding 20 % of the original design. Or increase in length by less than 20% but involving areas which are more sensitive - environmentally and/or socially - than the original route.

7.13.2 Category 'B' Change

The category 'B' change is one that may entail project activities not significantly different from those described in the EIA, which may result in project effects whose overall magnitude would be similar to the assessment made in this report. In case of such changes, the ESI (with assistance from the E&S) will be required to reassess the environmental and socioeconomic impacts of the activity, specify additional mitigation measures, if necessary, and report the changes to the relevant agencies (Contractors, E&S, Punjab EPA). Examples of such changes are provided below.

- Changes in the transmission line route by more than 500 m of the original alignment, but not exceeding 2 km, provided that the changed route does not have environmental or social sensitivity more than the original area.
- Increase in the transmission line length exceeding 10 % of the original design, but not exceeding 20%, provided that the extended route does not have environmental or social sensitivity more than the original area.

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- Such changes will necessitate site surveys for the transmission line route or grid station sites, by the environmental and socioeconomic experts. A site-specific assessment for any additional environmental as well as socio-economic issues will need to be carried out. Complete record of the surveys and assessment will be maintained.

7.13.3 Category 'C' Change

A Category-C change is one that is of little consequence to the EIA findings. This type of change does not result in effects beyond those already assessed in the EIA; rather it may be made onsite to minimize the impact of an activity, such as re-aligning a particular section of the transmission line to avoid cutting a tree, or relocating construction campsites to minimize clearing vegetation. The only action required for such changes will be to document the change.

7.14 Environmental Budget

The cost required to effectively implement the mitigation measures is important for the sustainability of the Project in the operational phase of the Project.

The summary of the cost of monitoring environment and mitigation cost is shown in **Table 7.10**.

Table 7.10: Summary of Environmental Mitigation & Monitoring Cost

Activity	Basis	Cost (Rs)
Environmental Monitoring Cost	Ambient Air, Noise and Water Quality Monitoring	100,000
HSE Management Plan	For Construction Phase	630,500
Plantation Plan	Plantation of Trees	300,000
Training Program	Trainings about environment protection of the project site	150,000
	Grand Total	**11,80,500**

7.15 Post Project Monitoring

The Project Manager or his representative shall prepare a brief post-project report describing the conduct of the actual operation, any changes from the operation for which approval was obtained, the degree to which the recommendations of the EIA were adhered to, any damages to the environment and the mitigation or compensation provided, and monitoring information of scientific or environmental interest that is not propriety in nature. This report should be submitted to the Environmental Protection Department, Punjab Pakistan.

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8 Conclusion and Recommendations

8.1 Introduction

This Chapter presents the assessment of the possible environmental impacts of 132 KV Transmission Line Project, PindiGheb to Lakkarmar, district Attock. The study presents the purpose of the EIA as to the description of the site, the impact of the project during and after implementation, the mitigation measures and residual impacts.

The EIA also includes the justification and detailed description of the project, with an evaluation of the potential impacts and effects on the environment including economic and social consequences. This Chapter describes the conclusion and recommendation of the EIA study of the project.

8.2 Conclusions

The major conclusions of the EIA are:

- The potential impacts during construction phase includes soil erosion, degradation, contamination soil mixing and compaction; air quality deterioration; noise pollution and vibration; water contamination and consumption; loss of/damage to the natural vegetation of the area; loss of /damage to the wildlife of the area and public health and safety.
- The significant environmental management issues during operational phase include soil and water contamination; safety hazards; public health and loss of agriculture.
- The project construction and operational activities can potentially affect the natural resources of the area. These adverse impacts can be largely reduced by implementing the appropriate mitigation measures, which has been discussed in this report.

8.3 Recommendations

On the basis of the overall impact assessment, more specifically, nature and magnitude of the residual environmental impacts identified during present EIA, it is concluded that 132 KV transmission line Project, is likely to cause environmental impacts mainly during its construction phase. However, these impacts can be mitigated provided the proposed activities are carried out as mentioned in the report, and the mitigation measures included in this report are completely and effectively implemented.

The project will directly improve electricity supply to Lakkarmar, district Attock.

There are no remaining issues that warrant further investigation. This EIA is considered as adequate for the environmental and social justification of the project.

Table 8.1: Environmental Screening Matrix (mlitigated) of 132 KV Transmission Line Project

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	Physical Aspect					Biological Aspects		Socio-Economic Aspects										
	Soil Issues	Air Quality	Surface Water	Ground Water	Water Consumption	Natural Vegetation	Wildlife	Noise and vibration	Safety Hazard	Pressure on local Infrastructure	Public Health and Nuisance	Aesthetic Value	Gender Issues	Employment	Cultural Issues	Blocked Accessed Routes	Compensation	Agriculture Loss
Project Siting																		
Visual Impacts		N			N	-1	N					N	N	+2	+2	N	N	N
Cumulative Impacts		N	N	N	N			N		N		+2	+2	+2	+2	N	N	N
Design Phase																		
Route Selection for Transmission Lines		N			N	-1	-1			N		N	N	+2	N	N	N	N
Equipment Selection	N	N	N	N	N	N	N	N		N	N	N	N	+2	N	N	N	N
Construction Phase																		
Land Acquisition	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Contractor's Mobilization														+2			N	N
Site Preparation						-1	-1							+2	N	N	N	N
Contractor's Camp						-1	-1	-1		N		N	N			N	N	N
Construction of Infrastructure						-1				N							N	N
Construction Materials Supply					N					N	N	N	N		N	N	N	N
Solid Waste Disposal	N	N		N	N			N		N	N	N	N	N	N	N	N	N
Liquid Waste Disposal	-1	N	-1	-1	N	N	N	N	-1	N	N	N	N	N	N	N	N	N
Immobilization of Contractor														+2			N	N
Operational Phase																		
O & M	0	N	0	0	N	N	N	N		N		N	N	N	N	N	N	N

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Annexure-1: Terms of Reference

An EIA will be carried out for all stages of the projects, i.e. preconstruction, construction and post-construction with the following objectives:

- Establishing the environmental baseline in the study area and identifying any significant environmental issue.
- Assessing these impacts and providing for the requisite avoidance, mitigation and compensation measures.
- Integrating the identified environmental issues in the project planning and design.
- Developing appropriate management plans for implementing, monitoring and reporting of the environmental mitigation and enhancement measures suggested.
- Give presentation during a public hearing of the EIA of the 132 KV Transmission Line Project and respond to queries generated by Punjab EPD until issuance of the NOC.

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Annexure-2: References

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Annexure-3: Glossary

Air pollution	Air is made up of a number of gases, mostly nitrogen and oxygen and, in smaller amounts, water vapour, carbon dioxide and argon and other trace gases. Air pollution occurs when harmful chemicals and particles are emitted to the air – due to human activity or natural forces – at a concentration that interferes with human health or welfare or that harms the environment in other ways.
Ambient air quality	Ambient air quality refers to the quality of outdoor air in our surrounding environment. It is typically measured near ground level, away from direct sources of pollution.
Archaeology	The study of human history and prehistory through the excavation of sites and the analysis of artefacts and other physical remains.
Biodiversity	The variety of plant and animal life in the world or in a particular habitat, a high level of which is usually considered to be important and desirable.
Bye-law	A rule made by a local authority to govern activities within the area it controls. Examples include bye-laws covering waste disposal, traffic or public events or signs.
Carbon dioxide (CO_2)	A colourless gas that is naturally produced by animals and people in the exhaled air and the decay of plants.
Carbon monoxide	A highly poisonous, odourless, tasteless and colourless gas that is formed when carbon material burns without enough oxygen.
Climate	The pattern of weather in a particular region over a set period of time, usually 30 years.
Compost	A rich soil-like material produced from decayed plants and other organic matter, such as food and animal waste, that decomposes (breaks down) naturally.
Conservation	Preserving or protecting animals and resources such as minerals, water and plants through planned action (such as breeding endangered species) or non-action (such as not letting taps run unnecessarily).
Deforestation	The reduction of trees in a wood or forest due to natural forces or human activity such as burning or logging.
Electromagnetic Field	Electromagnetic fields are a combination of invisible electric and magnetic fields of force. They are generated by natural phenomena like the Earth's magnetic field but also by human activities, mainly through the use of electricity.
Effluent	Liquid wastes such as sewage and liquid waste from industries.
Energy efficiency	Actions to save fuels, for example, better building design, changing production processes, developing better transport policies, using better road vehicles and using insulation and double glazing in homes.
EIA	An environmental impact assessment (EIA) is an analytical process that systematically examines the possible environmental consequences of the implementation of projects, programs and policies.
EMP	An environmental management plan (EMP) is a site-specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation.
Fauna	The animals of a particular region, habitat, or geological period.

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Flora	The plants of a particular region, habitat, or geological period.
Habitat	The area occupied by a community or species (a group of animals or plants), such as a forest floor, desert or seashore.
Initial Environmental Examination	Initial environmental examinations describe the environmental condition of a project, including potential impact, formulation of mitigation measures, and preparation of institutional requirements and environmental monitoring.
Grid Station	An electrical Power grid station is an interconnection point between two transmission ring circuits, often between two geographic regions. They might have a transformer, depending on the possibly different voltages, so that the voltage levels can be adjusted as needed.
PEQS	The Punjab Environmental Quality Standards (PEQS) are quality standards to regulate the air emissions and effluents of industry and other big polluters.
Noise Pollution	Noises that disturb the environment and people's ability to enjoy it, for example continually sounding house alarms, loud music, air conditioning or other electrical units and aircraft or motor engines.
Seismology	The branch of science concerned with earthquakes and related phenomena.
Topography	The arrangement of the natural and artificial physical features of an area.

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Annexure-4: List of People met during EIA

No.		Name of Person	Designation
1	IESCO, Islamabad	Mr. Muhammad Yasin	Addl Director, Environmental& Social Safeguard Section, IESCO
2		Mr. Rajesh Kumar	Deputy Director, Design wing, IESCO
3		Mr. Zia Mehmood	Addl. PD (GSC), IESCO
		Mr. Sher Afzal	Addl. Dy Director,Environment & Social Safeguard Section, IESCO
4	Stakeholders		
5			
6			
		Name	**Contact**
7	Public Consultation	Mohammad Safeer	0300-2873563
8		Mian Mohammad	0331-5965648
9		Zaffar Iqbal	0335-8873608
10		Mohammad Ahsan	0331-5302962
11		Mohammad Umair	0347-9922058
13			

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Annexure- 5: Land Documents

No land acquisition required, so no Land is being acquired

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Annexure-6: Ambient Air, Ground Water and Noise Quality Monitoring Results

SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

SPA CERTIFIED

ISO 9001:2015

AMBIENT AIR MONITORING REPORT

Project Name:	132 KV Transmission Line Pindi Gheb to Lakkarmar Project	**Location:**	Pindi Gheb, District Attock
Monitoring Point:	Mid of Project	**Monitoring Time:**	24 Hour
Starting Date:	06-07-2023	**Reporting Date:**	15-07-2023
Monitoring By:	SEAL	**Reference No.:**	SEAL/Lab/2023/AA/001

Results: -

Sr. No.	Parameter	Method	Unit	Results	PEQS
1	Particulate Matter (PM_{10})	40 CFR Part 50, App J (US-EPA)	$\mu g/m^3$	118.14	150
2	Carbon monoxide (CO)	40 CFR Part 50, App. C (US-EPA)	mg/m^3	2.85	5
3	Oxides of Nitrogen NOx (NO & NO_2)	40 CFR Part 50, App F (US-EPA)	$\mu g/m^3$	38.05	120
4	Sulphur dioxide SOx(SO_2)	EQSA-0197-114 (US-EPA)	$\mu g/m^3$	48.12	120
5	Particulate Matter ($PM_{2.5}$)	40 CFR Part 50, App J (US-EPA)	$\mu g/m^3$	17.86	35

PEQS: Punjab Environmental Quality Standards

Note:

- Quality was assured through self-calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.

ANALYZED BY	REVIEWED BY	APPROVED BY
Lab Analyst	Assistant Lab Manager	Lab Manager

HEAD OFFICE :
Plot # 12, Water Avenue, Green View Society, Off Kache Jail Road, Kot Lakhpat, Lahore, Pakistan. Phones : +92-42-35922295-98, Fax : +92-42-35922296
Email: info@seal.com.pk | nihalasghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
Office No. M-06-07 in Fort Sultan opp. Air Port Telephone Exchange, Shahrah-e-Faisal, Karachi, Pakistan. Phone : 92-300-9768799
Email : karachi@seal.com.pk

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

ISO 9001:2015

GROUND WATER ANALYSIS REPORT

Project Name: 132 KV Transmission Line Pindi Gheb to Lakkarmar Project
Location: Pindi Gheb, District Attock
Sampling Point: Tap Water
Sampling Date: 06-07-2023
Nature of Sample: Ground Water
Date of Completion: 15-07-2023
Temp. & Humidity 23-27 C° & 50-70 %
Reference No.: SEAL/Lab/2023/GW/001
Sampling By: SEAL
Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
1	pH	APHA 4500-H+ B	--	6.87	6.5-8.5
2	Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	772	1000
3	Chloride	4500- APHA Cl B	mg/l	133.74	250
4	Fluoride	APHA 4500-F D	mg/l	0.43	1.5
5	Taste	APHA 2120 B	Object. /unobj.	Unobject.	Unobject.
6	Odour	APHA 2120 B	Object. /unobj.	Unobject.	Unobject.
7	Colour	APHA 2120 B	TCU	0.79	15
8	Nitrate (as NO_3)	APHA 4500-NO_3^- E	mg/l	0.3	50
9	Nitrite (as NO_2)	APHA 4500-NO_2^- B	mg/l	0.1	3
10	Lead	APHA-Pb B	mg/l	BDL	0.05
11	Total Hardness as $CaCO_3$	APHA 2340 C	mg/l	167.84	500
12	Turbidity	APHA 2130 B	NTU	0.1	5
13	Zinc	APHA 3500-Zn B	mg/l	0.05	5
14	Aluminum	APHA 3111 D	mg/l	BDL	0.2
15	Chromium	APHA 3500-Cr B	mg/l	BDL	0.050
16	Cadmium	APHA 3500-Cd D	mg/l	0.001	0.01
17	Copper	APHA 3500-Cu C	mg/l	0.57	2
18	Boron	APHA 4500-B C	mg/l	0.031	0.300
19	Barium	APHA 3111 B	mg/l	0.045	0.700

Page 1 of 2

HEAD OFFICE :
Plot # 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Lahore, Pakistan. Phones : +92-42-35927295-96, Fax : +92-42-35922296
Email: info@seal.com.pk | nihalasghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
Office No. M-06-07 in Fort Bullion opp. Air Port Telephone Exchange, Shahrah-e-Faisal, Karachi, Pakistan. Phone : 92-300-9766799
Email : karachi@seal.com.pk

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

ISO 9001:2015

Project Name:	132 KV Transmission Line Pindi Gheb to Lakkarmar Project	**Location:**	Pindi Gheb, District Attock
Sampling Point:	Tap Water	**Nature of Sample:**	Ground Water
Sampling Date:	06-07-2023	**Date of Completion:**	15-07-2023
		Temp. & Humidity	23-27 C^0 & 50-70 %
Sampling By:	SEAL	**Reference No.:**	SEAL/Lab/2023/GW/001

Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
20	Antimony	APHA 3114 C	mg/l	0.002	0.020
21	Arsenic	APHA 3114 C	mg/l	0.012	0.050
22	Cyanide	APHA 4500-CN D	mg/l	0.006	0.05
23	Mercury	APHA 3112	mg/l	BDL	0.001
24	Nickel	APHA 3111 B	mg/l	0.004	0.020
25	Residual Chlorine	APHA 4500-Cl_2	mg/l	0.32	0.2 – 0.5
26	Total Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
27	Thermo Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
28	E. coli	APHA 9222 C	Number/100ml	0	0/100 ml

PEQS = Punjab Environmental Quality Standards
BDL (Below Detection Limit)
APHA = American Public Health Association

Note:

- This report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- Consequently, the laboratory is absolved of its responsibility for any claim that may result through the use by the client or others of the results appearing in this report.
- The left-over samples (if so available) shall be retained for 10 days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiation.

ANALYZED BY	REVIEWED BY	APPROVED BY
Lab Analyst	Assistant Lab Manager	Lab Manager

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HEAD OFFICE :
Plot # 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Lahore, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922296
Email: info@seal.com.pk | nihalasghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
Office No. M-06-07 in Fort Sultan opp. Air Port Telephone Exchange, Shahrah-e-Faisal, Karachi, Pakistan. Phone : 92-300-9768799
Email : karachi@seal.com.pk

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NOISE LEVEL MONITORING REPORT

Project Name:	132 KV Transmission Line Pindi Gheb to Lakkarmar Project	**Location:**	Pindi Gheb, District Attock
Monitoring Point:	Mid of Site		
Monitoring Date:	06-07-2023	**Reporting Date:**	15-07-2023
Monitoring By:	Solution Environmental & Analytical Laboratory	**Reference No.:**	SEAL/LAB/2023/AA/091

Results: -

Sr. No.	Time	Noise dB(A)		PEQS
1	12:00 PM	58.4	Day Time	65
2	01:00 PM	56.2		
3	02:00 PM	52.6		
4	03:00 PM	54.5		
5	04:00 PM	51.4		
6	05:00 PM	58.5		
7	06:00 PM	56.1		
8	07:00 PM	55.4		
9	08:00 PM	57.6		
10	09:00 PM	54.2		
11	10:00 PM	58.4		
12	11:00 PM	50.2	Night Time	55
13	12:00 AM	52.2		

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Plot # 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Lahore, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922298
Email: info@seal.com.pk | nihalsghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
Office No. M-06-07 in Fort Sultan opp. Air Port Telephone Exchange, Shahrah-e-Faisal, Karachi, Pakistan. Phone : 92-300-9768799
Email : karachi@seal.com.pk

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14	01:00 AM	42.4	Night Time	55
15	02:00 AM	40.8		
16	03:00 AM	44.1		
17	04:00 AM	46.5		
18	05:00 AM	42.6		
19	06:00 AM	40.9		
20	07:00 AM	56.7	Day Time	65
21	08:00 AM	52.6		
22	09:00 AM	55.7		
23	10:00 AM	53.5		
24	11:00 AM	56.2		
Average Noise Level		51.98 dB(A) Leq		

PEQS: Punjab Environmental Quality Standards

Note:

- The average noise levels describe the overall ambient noise levels of the points.
- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report in not valid for any negotiation.

ANALYZED BY	REVIEWED BY	APPROVED BY
Lab Analyst	Assistant Lab Manager	Lab Manager

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Email : karachi@seal.com.pk

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Annexure-7: Flora and Fauna of Project Area

S. #	Common Name	Scientific Name	Form*
1.	Ak.	*Calotropis procera.*	Sh
2.	Aksan.	*Withania somnifera.*	Sh
3.	Anar.	*Punica granatum.*	T
4.	Anjan.	*Cenchrus ciliaris.*	Gr
5.	Ban Kewra.	*Agave americana.*	Sh
6.	Bathu.	*Chenopodium album.*	H
7.	Beladona.	*Atropa belladona.*	H
8.	Ber.	*Zizyphus jujuba.*	T
9.	Bhabber.	*Eulaliopsis binata.*	Gr
10.	Bhaikar.	*Adhatoda vasica.*	Sh
11.	Bhakara.	*Tribulus terrestris.*	H
12.	Bhang.	*Cannabis sativa.*	Us
13.	Chhichhri.	*Plectranthus rugosus.*	Sh
14.	Chhimber.	*Eleusine flagellifera.*	Gr
15.	Chhitar Thor.	*Opuntia monacantha.*	Sh
16.	Chiraita.	*Swertia chirata.*	H
17.	Dab.	*Eragrostis cynosuroides.*	Gr
18.	Danda Thor.	*Euphorbia royleana.*	Sh
19.	Dhamian.	*Fagonia bruguieri.*	Gr
20.	Dhamman.	*Grewia oppositifolia.*	T
21.	Dhatura.	*Datura metel.*	Sh
22.	Farash.	*Tamarix articulate.*	T
23.	Gugal.	*Commiphora mukul.*	T
24.	Hermal.	*Peganum harmala.*	Us
25.	Itt Sitt.	*Boerhaevia diffusa.*	Us
26.	Jungli Gulab.	*Rosa moschata.*	Cl
27.	Jungli Piyaz.	*Urginea indica.*	H
28.	Jungli Podina.	*Mentha sylvestris.*	H
29.	Jhinjin.	*Setaria verticillata.*	Gr
30.	Kachmach, Makoh.	*Solanum nigrum.*	Us
31.	Kahi.	*Saccharum spontaneum.*	Gr
32.	Kahu.	*Olea cuspidata.*	T
33.	Kandi.	*Prosopis spicigera.*	T
34.	Kaner.	*Nerium odorum.*	Sh
35.	Kandiari.	*Solanum indicum.*	Sh
36.	Karir.	*Capparis aphylla.*	T

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S. #	Common Name	Scientific Name	Form*
37.	Khaar.	*Haloxylon recurvum.*	Us
38.	Khabbal.	*Cynodon dactylon.*	Gr
39.	Khawi.	*Cymbopogon jawarancusa.*	Gr
40.	Khip.	*Leptadenia spartium.*	Sh
41.	Kikar.	*Acacia arabica.*	T
42.	Kikri.	*Acacia jacquemontii.*	T
43.	Kundar, Dib.	*Typha angustifolia.*	Gr
44.	Laidha Booti.	*Xanthium strumarium.*	Sh
45.	Lana.	*Suaeda fruticosa.*	Sh
46.	Lani.	*Salsola foetida.*	Sh
47.	Lasoora.	*Cordia myxa.*	T
48.	Lumbh.	*Aristida depressa.*	Gr
49.	Luni.	*Cotoneaster bacillaris.*	T
50.	Malla.	*Zizyphus nummularia.*	Sh
51.	Panch Phuli.	*Lantana camara.*	Sh
52.	Pattaka.	*Abutilon bidentatum.*	Us
53.	Pattaki.	*Gymnosporia royleana.*	Sh
54.	Phagwara.	*Ficus palmata.*	T
55.	Phulai.	*Acacia modesta.*	T
56.	Pilchhi.	*Tamarix dioica.*	Sh
57.	Pit Papara.	*Fumaria excelsior.*	H
58.	Puth Kanda.	*Achyranthes aspera.*	Us
59.	Sanatha.	*Dodonaea viscosa.*	Sh
60.	Sanp Booti.	*Arisoema wallichianum.*	H
61.	Sariala.	*Andropogon contortus.*	Gr
62.	Sarkanda.	*Sachhrum munja.*	Gr
63.	Sawank.	*Echinochloa columnum.*	Gr
64.	Walliati Ak.	*Ipomoea crassicaulis.*	Sh
65.	Willaiti Jand.	*Prosopis glandulosa.*	T
66.	Willaiti Jand.	*Prosopis juliflora.*	T
67.	Willaiti Kikar.	*Acacia farnesiana.*	T

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Fauna:

List of Mammals

S. #	English Name.	Scientific Name.	Status.
1.	Asiatic Jackal.	*Canis aureus.*	Migratory/Rare.
2.	Common Leopard.	*Panthera pardus.*	- do -
3.	Common Otter.	*Lutra lutra.*	- do -
4.	Common Yellow-bellied Bat.	*Scotophilus heathii.*	- do -
5.	Crested Porcupine.	*Hystrix cristatus.*	Resident & Common.
6.	Desert Hare.	*Lepus nigricollis.*	- do -
7.	Field Mouse.	*Mus booduga.*	- do -
8.	Field Rat.	*Millardia meltada.*	- do -
9.	Five-stripped Palm Squirrel.	*Funambulus pennantii.*	- do -
10.	Fruit Bat.	*Rousettus leschenaultia.*	- do -
11.	Horseshoe Bat.	*Rhinolophus blasii.*	- do -
12.	House Mouse.	*Mus musculus.*	- do -
13.	House Rat.	*Rattus rattus.*	- do -
14.	House Shrew.	*Suncus murinus.*	- do -
15.	Indian False Vampire.	*Megaderma lyra.*	- do -
16.	Indian Fox.	*Vulpes bengalensis.*	- do -
17.	Indian Gerbil.	*Tatera indica.*	- do -
18.	Indian Grey Mongoose.	*Herpestes edwardsi.*	- do -
19.	Jungle Cat.	*Felis chaus.*	- do -
20.	Kuhl's Pipistrelle.	*Pipistrellus kuhlii.*	- do -
21.	Large Rat-tailed Bat.	*Rhinopoma microphyllum.*	- do -
22.	Leaf-nosed Bat.	*Hipposideros fulvus.*	- do -
23.	Long-eared Hedgehog.	*Hemiechinus collaris.*	- do -
24.	Pangolin / Scaly Anteater.	*Manis crassicaudata.*	- do -
25.	Pipistrelle.	*Pipistrellus ceylonicus.*	- do -
26.	Punjab Urial.	*Ovis vegnei punjabiensis.*	Resident/Rare.
27.	Pygmy Gerbil.	*Gerbillus nanus.*	- do -
28.	Ratel / Honey Badger.	*Mellivora capensis.*	- do -
29.	Short-tailed Mole Rat.	*Nesokia indica.*	- do -
30.	Small Indian Civet.	*Viverricula indica.*	- do -
31.	Small Indian Mongoose.	*Herpestes javanicus.*	- do -
32.	Small Rat-tailed Bat.	*Rhinopoma hardwickii.*	- do -
33.	Stripped Hyaena.	*Hyaena hyaena.*	- do -
34.	Wild Boar.	*Sus scrofa.*	Resident & Common.

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List of Reptiles

1.	Common Spiny-tailed Lizard.	*Uromastyx hardwickii.*
2.	Fan Toe-tip Gecko.	*Ptyodactylus homolepis.*
3.	Indian Cobra.	*Naja naja naja.*
4.	Indian Gamma Snake.	*Boiga trigonata trigonata.*
5.	Indian House Gecko.	*Hemidactylus brooki.*
6.	Indian Monitor.	*Varanus bengalensis.*
7.	Indian Python.	*Python molurus molurus.*
8.	Indian Sand Boa.	*Eryx johnii jhrii.*
9.	Krait.	*Bungarus caeruleus.*
10.	Oxus Cobra.	*Naja naja oxiana.*
11.	Rohtas Fort Gecko.	*Tenuidactylus rohtasfortai.*
12.	Russell's Viper.	*Daboia russelii russelii.*
13.	Salt Range Rock Gecko.	*Cyrtodactylus montiumsalsorum.*
14.	Saw-scaled Viper.	*Echis carinatus pyramidum.*
15.	Sharp-tailed Spider Gecko.	*Rhinogecko femoralis.*
16.	Soan Sakasser Gecko.	*Tenuidactylus indusoani.*
17.	Yellow Monitor.	*Varanus flavescens.*
18.	Yellow-bellied House Gecko.	*Hemidactylus flaviviridis.*
19.	Yellow-tailed Sand Lizard.	*Acanthodactylus micropholis.*

List of Birds:

S. #	English Name.	Scientific Name.	Status.
1.	Alexandrine Parakeet.	*Psittacula eupatria.*	Migratory & Frequent.
2.	Ashy-crowned Finch Lark	*Eremopterix grisea.*	Resident & Common.
3.	Bank Myna.	*Acridotheres ginginianus.*	- do -
4.	Baya Weaver.	*Ploceus philippinus.*	- do -
5.	Bay-back Shrike.	*Lanius vittatus.*	- do -
6.	Black Drango.	*Dicrurus macrocercus.*	- do -
7.	Black Partridge.	*Fracolinus francolinus.*	- do -
8.	Black-bellied Tern.	*Sterna acuticauda.*	Migratory & Common.
9.	Black-crowned Heron.	*Nycticorax nycticorax.*	- do -
10.	Black-winged Kite.	*Elanus caeruleus.*	Resident & Common.
11.	Blue Kingfisher.	*Alcedo atthis.*	- do -
12.	Blue Rock Pigeon.	*Columbia livia.*	- do -
13.	Brahminy Kite.	*Haliastur Indus.*	- do -

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S. #	English Name.	Scientific Name.	Status.
14.	Cattle Egret.	*Babulcus ibis.*	- do -
15.	Chakor.	*Alectoris chukar.*	Resident & Frequent.
16.	Cliff Swallow.	*Hirundo fluvicola.*	- do -
17.	Collared Owl.	*Otus bakkamoeua.*	Resident & Common.
18.	Common Babbler.	*Turdoides caudatus.*	Resident & Common.
19.	Common Crow Pheasant.	*Centropus sinensis.*	- do -
20.	Common Heron.	*Ardea cinrea.*	Migratory & Common.
21.	Common Myna.	*Acridotheres tristis.*	Resident & Common.
22.	Common Pochard.	*Aythya ferina.*	Migratory & Occasional.
23.	Common Quail.	*Coturnix coturnix.*	Migratory & Common.
24.	Common Snipe.	*Gallinago gallinago.*	Resident & Common.
25.	Common Swallow.	*Hirundo rustica.*	Migratory & Common.
26.	Common Teal.	*Anas crecca.*	- do -
27.	Coot.	*Fulica atra.*	Migratory & Common.
28.	Black Coot.	*Porphyrio prophyrio.*	- do -
29.	Crested Cuckoo.	*Clamator jacobinus.*	- do -
30.	Crested Lark.	*Galerida cristata.*	- do -
31.	Fan-tailed Warbler.	*Cisticola juncidis.*	Resident & Common.
32.	Demoiselle Crane.	*Anthropoides virgo.*	Migratory/Rare.
33.	Egyptian Vulture.	*Neophron percnopterus.*	Resident & Common.
34.	Eurasian Kestrel.	*Falco tinnunculus.*	- do -
35.	Fantail Flycatcher.	*Rhipidura aureola.*	- do -
36.	Flamingo.	*Phoenicopterus ruber.*	Migratory & Frequent.
37.	Gadwall.	*Anas strepera.*	- do -
38.	Garganey.	*Anas querquedula.*	- do -
39.	Golden Oriole.	*Oriolus oriolus.*	- do -
40.	Golden-backed Woodpecker.	*Dinopium benghalense.*	Resident & Common.
41.	Gray Partridge.	*Francolinus pondicrianus.*	- do -
42.	Great Cormorant.	*Phalacrocorax sinensis.*	Migratory & Frequent.
43.	Horned Owl.	*Bubo coromandus.*	- do -
44.	Honey Buzzard.	*Pernis apivorus.*	Migratory & Common.
45.	Hoopoe.	*Upupa epops.*	Resident/Rare.
46.	Houbara Bustard.	*Chlamydotis undulata macqueenii.*	Migratory/Rare.
47.	House Crow.	*Corvus splendens.*	Resident & Common.
48.	House Sparrow.	*Passer domesticus.*	- do -
49.	House Swift.	*Apus affinis.*	- do -

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S. #	English Name.	Scientific Name.	Status.
50.	Imperial Sand Grouse.	*Pterocles orientalis.*	Migratory & Frequent.
51.	Indian Cormorant.	*Phalacrocorax fusciollis.*	Resident & Common.
52.	Indian Courser.	*Cursorius coromandelicus.*	Resident/Rare.
53.	Indian Peafowl.	*Pavo cristatus.*	- do –
54.	Indian Robin.	*Saxicoloides fulicata.*	Resident & Common.
55.	Brown Roller.	*Coracias benghalensis.*	- do -
56.	Indian Sand Grouse.	*Pterocles exustus.*	Migratory & Common.
57.	Indian Swallow.	*Hirundo fluvicola.*	Resident & Common.
58.	Indian Tree-pie.	*Dendrocitta vagabunda.*	- do -
59.	Intermediate Egret.	*Egretta intermedia.*	Migratory & Common.
60.	Isabellian Wheateater.	*Oenanthe isabellina.*	- do -
61.	Jungle Sparrow.	*Passer pyrrhonotus.*	Migratory & Common.
62.	Koel.	*Eudynamys scolopacea.*	Migratory & Common.
63.	Large Egret.	*Egretta alba.*	- do -
64.	Lesser Whitethroat.	*Sylvia curruca.*	- do -
65.	Little Brown Dove.	*Streptopelia senegalensis.*	- do -
66.	Little Egret.	*Egretta garzetta.*	Resident & Common.
67.	Little Grebe.	*Tachybaptus ruficollis.*	- do -
68.	Little Green Bee-eater.	*Merops orientalis.*	- do -
69.	Little Ringed Plover.	*Charadnus dubius.*	Migratory & Common.
70.	Little Stint.	*Calidris minuta.*	- do -
71.	Long-legged Buzzard.	*Buteo rufinus.*	- do -
72.	Luggar Falcon.	*Falco juggar.*	- do -
73.	Mallard.	*Anas platyrynchos.*	- do -
74.	Marsh Harrier.	*Circus aeruginosus.*	Migratory & Common.
75.	Marsh Sandpiper.	*Tringa stagnatilis.*	- do -
76.	Moorhen.	*Gallinula chloropus.*	Resident & Common.
77.	Osprey.	*Pondion halliaetus.*	Migratory/Rare.
78.	Paddyfield Pipit.	*Anthus novaeseelandiae.*	Resident & Common.
79.	Painted Snipe.	*Rostratula beghalensis.*	- do -
80.	Pallid Harrier.	*Circus maerourus.*	Migratory & Frequent.
81.	Pariah Kite.	*Milvus migrans govinda.*	Resident & Common.
82.	Peregrine Falcon.	*Falco peregrines.*	Migratory & Frequent.
83.	Pheasant-tailed Jacana.	*Hydrophasianus chirurgus*	- do -
84.	Pied Kingfisher.	*Ceryle rudis.*	Resident & Frequent.
85.	Pied Woodpecker.	*Dendrocopos assimilis.*	- do -
86.	Pintail.	*Anas acuta.*	Migratory & Common.

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S. #	English Name.	Scientific Name.	Status.
87.	Plum-headed Parakeet.	*Psittacula cynocephali.*	Migratory & Frequent.
88.	Pond Heron.	*Ardeola gragii.*	Resident & Common.
89.	Purple Gallinule.	*Porphyrio porphyrio.*	- do -
90.	Purple Sunbird.	*Nectarinia asiatica.*	- do -
91.	Red Munia.	*Estrilda amandava.*	- do -
92.	Red Turtle Dove.	*Streptopelia tranquebarica*	Migratory & Common.
93.	Red-headed Merlin / Turumtee.	*Falco chicquera.*	Resident & Common.
94.	Red-vented Bulbul.	*Pycnonotus cafer.*	- do -
95.	Red-wattled Lapwing.	*Hoplopterus indicus.*	- do -
96.	Ringed Dove.	*Sterptopelia decaocta.*	- do -
97.	Rose-ringed Parakeet.	*Psittacula krameri.*	Resident & Common.
98.	Ruddy Shelduck.	*Tadoma ferruginea.*	Migratory/Rare.
99.	Rufous-fronted Warbler.	*Prinia buchanani.*	Migratory & Common.
100.	Saker Falcon.	*Falco cherrug.*	Migratory/Rare.
101.	Sand Martin.	*Riparia paludicola.*	Resident & Common.
102.	See-see Partridge.	*Ammoperdix griseogularis.*	Resident & Common.
103.	Shikra.	*Accipiter badius.*	- do -
104.	Short-eared Owl.	*Asio flammeus.*	Migratory/Rare.
105.	Sky Lark.	*Alauda gulgula.*	Migratory & Frequent.
106.	Spoonbill.	*Platalea leucorodia.*	Migratory & Common.
107.	Spotted Little Owl.	*Athene brama.*	- do -
108.	Spotted Owlet.	*Athene brama.*	- do -
109.	Tawny Eagle.	*Aquila rapax.*	- do -
110.	Tawny Pipit.	*Anthus campestris.*	- do -
111.	Tree Warbler.	*Hippolais scita.*	Migratory/Rare.
112.	Water Rail.	*Rallus aquaticus.*	- do -
113.	White-backed Vulture.	*Gyps bengalensis.*	Resident/Rare.
114.	White-breasted Kingfisher.	*Halocyon smyrnensis.*	- do -
115.	White-breasted Waterhen.	*Amaurornis phoenicurus.*	Migratory & Common.
116.	White-cheeked Bulbul.	*Pycnonotus leucogenys.*	Resident & Common.
117.	White-eyed Buzzard.	*Butastur teesa.*	Migratory & Common.
118.	White-necked Stork.	*Ciconia episcopus.*	- do -
119.	Wigeon.	*Anas penelope.*	- do -
120.	Wren Warbler.	*Prinia subflava.*	- do -
121.	Yellow Wagtail.	*Motacilla flava.*	- do -
122.	Yellow-crowned Pied Woodpecker.	*Dendrocopos maharattensis.*	- do -

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S. #	English Name.	Scientific Name.	Status.
123.	Yellow-eyed Babbler.	*Chrysomma sinense.*	- do -
124.	Yellow-footed Green Pigeon.	*Treron phoenicoptera.*	- do -
125.	Yellow-fronted Woodpecker.	*Dendrocopos mahrattensis.*	Resident/Rare.

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