

**ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT (ESIA)
CONSTRUCTION OF NEW 132KV GARDEN TOWN GRID STATION
ALONG WITH TRANSMISSION LINE COMPONENT GUJRANWALA**



Report Submitted by:

**Gujranwala Electric Power Company (GEPCO)
Gujranwala-PAKISTAN**



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LIST OF ABBREVIATIONS

<u>Abbreviation</u>	<u>Description</u>
AC	Assistant Commissioner
AM	Assistant Manager
AOI	Area of Influence
AP	Affected Person
BCP	Building Code of Pakistan
CCR	Community Complaint Register
CFC	Chloroflouro Carbon
CO	Carbon Monoxide
GSC	Construction Supervision Consultant
D/C	Double Circuit
DCO	District Coordination Officer
DFO	Divisional Forest Officer
DISCO	Distribution Company
DEO	District Environment Officer
COI	Corridor of Influence
DoF	Department of Forests
DTL	Distribution Transmission line
DGS	Distribution Grid Station
AIS	Air Insulated Switchgear
DIZ	Direct Impact Zone
EA	Environmental Assessment
EARF	Environment Assessment Review Framework
EIA	Environment Impact Assessment
EMMP	Environmental Management and Monitoring Plan
GDP	Gross Domestic Product
GOP	Government of Pakistan
GIS	Geographic Information System
EA	Environmental Assessment
EA	Executing Agency
EC	Erosion Control
ESIA	Environmental & Social Impact Assessment
EMF	Electro-Magnetic Field
EPA	Environmental Protection Agency
ESC	Environment & Social Cell
ESS	Environment & Social Safeguards
GIS	Geographical Information System
GoP	Government of Pakistan
GRC	Grievance Redress Committee
GRS	Grievance Redress System
GRM	Grievance Redressal Mechanism
GS	Grid Station
GST	General Sales Tax
GEPCO	Gujranwala Electric Power Company
IEE	Initial Environmental Examination
ILO	International Labor Organization
KV	Kilo-Volts
LAC	Land Acquisition Collector
Leq	Equivalent Sound Pressure Level
MOWP	Ministry of Water and Power
MPL	Maximum Permissible Level
MM	Mitigating Measures
NEQS	National Environmental Quality Standards
NGO	Non-Governmental Organization
NO	Oxides of Nitrogen

NOC	No Objection Certificate
PC	Public Consultation
PCBs	Polychlorinated Biphenyls
PEPA	Pakistan Environmental Protection Act 1997
P&E	Planning & Engineering Directorate
PM	Particulate Matter
PMU	Project Management Unit
PPMS	Project Performance Monitoring System
REA	Rapid Environmental Assessment
RoW	Right of Way
Rupee, PKR	Unit of Pakistan currency
SO _x	Oxides of Sulphur
SPS	Safeguard Policy Statement
SRs	Sensitive Receivers
TD	Temporary Drainage
TL	Transmission Line
STG	Secondary Transmission Grid
SIA	Social Impact Assessment
S-P	Sub-project
TOR	Terms of Reference
Rupee, PKR	Unit of Pakistan Currency, \$US approx. Rs.285

1. EXECUTIVE SUMMARY

1.1 Introduction

Considering the increasing demand of energy and current shortfalls, Government is planning to construct new 132kV Grid Stations and associated Transmission Lines (T/Ls), which are acutely required to meet the growing demand of electricity and also to strengthen the existing transmission system. The proposed sub-projects under the 8th Secondary Transmission & Grid (STG) Program are part of GEPCO Power Sector Expansion Program. The main objectives of this program is to provide adequate facilities for reliable and stable transmission of electrical power, keeping in view the growing demand of domestic, commercial, industrial and agricultural customers of Gujranwala Electric Power Company (GEPCO). This Environmental & Social Impact Assessment (ESIA) Study Report represents the sub-project for Construction of 01 No. of New 132kV Garden Town Grid Stations & Associated Transmission Line (132kV) in Gujranwala District (Province of Punjab).

1.2 Legislative and Regulatory Requirements

This report has been prepared to ensure compliances with National Regulation, provides an analysis of the environmental impacts and mitigation measures during the project's construction phase. The policy directives and required procedures ensure that assessment of the environmental consequences of program; activities and substantive amendments are in full compliance with the requirements of this Federal Regulation, its underlying legislation, out of court. The national legislation relating to the environment in Pakistan in order to obtain the required regulatory clearances is provided as under:

- The Pakistan National Conservation Strategy (NCS), which outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources.
- Pakistan Environment Protection Act 1997, which empowers the Pak-EPA to delegate powers to the Provincial EPAs, identifies categories of projects to which the IEE/EIA provisions will apply, develop guidelines for conducting IEE and EIAs and procedures for their submission, review and approval, develop environmental emission standards for parameters such as air, water and noise, etc.
- The National Environmental Quality Standards (NEQS), 2010 specify the maximum allowable concentrations of pollutants in municipal and liquid industrial effluents, maximum allowable concentration of pollutants in gaseous emissions from industrial sources, etc.
- The other provincial and departmental applicable laws and regulations include Forest Act 1927. The Telegraph Act, 1910 which makes a provision of installing poles/towers

without acquiring any land, Provincial Wildlife (Protection, Preservation, Conservation and Management) Acts, Ordinances and Rules (Act, 1972), Antiquities Act, 1973 Provincial Local Government Ordinances, 2001, etc.

1.3 Description of the Project

The sub-project scope includes construction of new 132KV Garden Town Grid Station and its energization with existing 132KV Gakhar-Aroop Grw. Transmission Line passing near grid station site in district Gujranwala through GEPCO own resources.

1.4 Environmental and Social Baseline Conditions

The physical environment was observed within 0.20 KM from either side of the project site. RoW is generally considered 30 meters, 15 meters either side of the Transmission Line. While there are no RoW issues involved as energization of grid station will be carried out with existing 132 kV Gakhar-Aroop Grw T/ Line passing near grid station site.

1.5 Impacts Assessment & Mitigation Measures

This segment identifies the potential environmental and social impacts due to the implementation of the proposed project on the physical, ecological and socio-economic environment. This Chapter also suggests/proposes the mitigation measures that will help to avoid, reduce and mitigate the project's adverse environmental and social impacts due to the construction activities.

The impacts of the proposed project are divided into one (01) major component which is given below:-

Sr. No.	Proposed Substation	Type	Scope of Work
1.	Garden Town G/S	AIS	Two(02) 40 MVA power transformers, Two(02) transformers bays, Two(2) lines bays, One(1) PT Bays, &PLC communication system
2.	New 132kV Associated T/Line	D/C	Existing Gakhar-Aroop Grw T/ Line : Km

1.5.1 Social and Cultural Environment:

The major social impacts will include disturbance to accessibility, communicable diseases, and security of public as well as workers. So to resolve the social conflicts, proper mitigation measures have been proposed.

1.5.2 Environmental and Social Risk Assessment:

An effort has also been made to assess the environmental and social risks during the construction as well as operation stages. Proper mitigations (where required) have also been proposed.

1.5.3 Environmental and Social Benefits of the Project:

Along with negative impacts of the Project, some major expected positive impacts have also been identified including availability of continuous electricity supply as per demand, installation of industry, employment opportunities and other linked benefits.

1.6 Stakeholders and Public Consultations

In accordance with National & International guidelines, the consultation process was carried out to share the information with the stakeholders/public on the proposed works and the expected impacts on the physical, biological and especially socio-economic conditions of the project corridor. At various locations along the project site, stakeholders/public consultations were carried out along the project corridor. Most of the public were in favor of the project. There were no major concerns/issues raised by the stakeholders as the construction of Garden Town grid station will be carried out entirely inside 32 Kanals one piece of land which is GEPCO's possession. The minor concerns/ issues were regarding Conflicts due to the uses of common resources by the contractor, Nuisance created during the construction activities and compensation/ rehabilitation for losses to ensure accessibility to the access, pathways by local community.

1.7 Environmental Management and Monitoring Plan

A comprehensive environmental management and monitoring plan (EMMP) has been prepared to effectively manage and monitor the environmental and social impacts of the project. The salient features of EMMP are as under:

1.7.1 Environmental Management Plan:

To manage the environmental and social impacts of the Project, significant negative impacts and their mitigations have been covered in this section. For the ease to understand and identify the impacts and to implement their mitigations, a mitigation matrix has been developed as a ready reference for the proponent and contractor to minimize the negative impacts or to manage activities in such a manner to avoid any adverse negative impact.

1.7.2 Environmental and Social Monitoring Plan:

Keeping in view the impacts and existing institutional setup of GEPCO, and environmental and social management plan has been developed. Environment and Social Cell (ESC) of GEPCO will be responsible for the overall environmental and social issues of the project. Responsibilities have been assigned to each key player of the project including Client, Consultant and Contractor. The total preliminary estimated project cost is Rs. 1000 Millions or Rs. 1 Billion Pakistani. The estimated cost for environmental and social management has been estimated as 5% of the total project cost that is 50 Million Pak Rs.

1.8 Compensation Policy Framework

This framework is based on the laws of Pakistan and summarizes the main components of a policy framework prepared specifically for the proposed project. All the detailed surveys and other requirements related to the compensation, rehabilitation covered under Resettlement Plan.

1.9 Conclusion and Recommendations

The implementation of the proposed project will have many positive impacts for the Country and on the population residing within the COI. Some of the major positive impacts of the proposed project are:

- Construction of new Grid Station will improve distribution of electricity, voltage profile and provide relief to existing Grid Stations in district Gujranwala.
- Unskilled and skilled jobs will be created.
- Development of business and Expansion of the industrial base is expected due to the increase in the availability of electricity in the national grid.

Apart from the positive impacts of the project, the proposed substation will also have few minor adverse environmental and social impacts arising during the construction and operational stages. Most of these adverse impacts during construction are of a temporary nature. These potential impacts can be avoided or mitigated by adopting suitable mitigation or remedial measures as mentioned in this Report. As a conclusion of the study, the Grid Station will not cause potentially significant environmental and social adverse impacts on the local environment after the implementation of mitigation measures. Considering the current electricity situation and the efforts being made by the Government of Pakistan to generate, transmit and distribute electricity to cope with forced load shedding, the construction of Garden Town 132kV Grid Station to provide relief to local overloaded grid stations is a prerequisite. It is suggested that the construction of proposed Grid Station should be implemented as soon as possible after all necessary approvals, design provisions and the implementation of EMMP and RP.

1.10 Environment and Social Safeguard Cost

The estimated cost for environmental and social management has been estimated as 5% of the total project cost that is 50 Million Pak Rs.

2. INTRODUCTION

2.1 Project Background

This document is the Environmental & Social Impact Assessment (ESIA) for 132kV Garden Town Grid Station and Associated Transmission Line Project. This will present the results and conclusion of environmental assessment for the proposed construction of Grid Station and transmission line of GEPCO. The project is being executed by GEPCO, which is responsible for the design and construction of the required improvements of grid station. Most of the contracts have been evaluated and awarded by GEPCO. The load flow studies were conducted on the proposed interconnection scheme of the project.

This Environmental & Social Impact Assessment (ESIA) report presents the screening of potential environmental impacts of the proposed project and contains the mitigation measures in order to eliminate or reduce the negative/adverse impacts to an acceptable level, describes the institutional requirements and provides an environmental and social management plan. There is neither land acquisition involved nor is any resettlement required of the project.

2.2 Scope of the EIA Study and Personnel

The study area included the identification of irrigation facilities, water supply, habitable structures, schools, health facilities, hospitals, religious places and sites of heritage or archaeological importance and critical areas (if any) within about 100meters of Grid Station and Transmission line. The works are generally envisaged to involve construction of the AIS, Construction of the bases, foundation pads and towers to support the distribution line will be carried out also under the same sub-project by GEPCO and supervised by the GEPCO management.

The field studies were undertaken by the subproject's environment team with experience of environmental assessment for power sector distribution side subprojects in Pakistan. The team conducted preliminary scoping survey, assessment activities and coordinated the field sampling and analysis, and was also responsible to supervise collection of information and co-ordinate the various public consultation activities. Dy. Manager Environment & Social Safeguards provided leadership and guidance in planning the field work and in finalization of the report. The environmental team also benefited from technical support and other information on the impacts of the proposed power works provided in feasibility summaries prepared with GEPCO dealing with engineering, power distribution, socio-economic, re-settlement and institutional aspects.

A scoping and field reconnaissance was conducted on the subproject site, during which a Rapid Environmental Assessment was carried out to establish the potential impacts and categorization of subproject activities.

Public consultation (PC) was carried out in January 2023, in line with GEPCO SOP guideline. Under EPA requirements the environmental assessment process must also include meaningful public consultation during the completion of ESIA. In this ESIA the PC process included verbal disclosure of the sub-subproject works as a vehicle for discussion. Consultations were conducted with local families and communities around and Grid Station site mostly in local places.

2.3 Study Objectives

The proposed project is the part of GEPCO Distribution Sector Expansion Program. The main objective of this program is to provide adequate facilities for reliable and stable transmission of electrical power, keeping in view the growing demand of domestic, commercial, industrial and agricultural customers of Gujranwala Electric Power Company (GEPCO). This document is the ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT for the Construction, of new 132KV Garden Town Grid Station along with Associated Transmission Line Component in District Gujranwala through GEPCO own resources.

2.4 Need for the Proposed Project

The standards and conditions of the power distribution system in Pakistan are inadequate to meet rapidly growing demand for electrical power. This situation limits national development and economic growth. To cope with the constraints, the existing power distribution infrastructure has to be improved and upgraded. The overall contribution of power infrastructure also requires institutional arrangements and capacity that support strategic management of the sector, and planning and management of investments. Overall the proposed 8th Secondary Transmission & Grid (STG) Program has been designed to address both investment and institutional aspects in the electrical power sector. Power demands in the Gujranwala area have increased rapidly, especially in summer months, so that the existing 132 kV grid stations are unable to cope up with the increasing demands of the domestic, commercial and industrial sectors. Therefore, GEPCO has planned to construct new 132kV Garden Town grid station.

2.5 The Proponent

This ESIA presents the results and conclusions of environmental & social impact assessment for construction of new 132KV Garden Town Grid Station submitted by GEPCO Environmental and Social Safeguard Cell. Under GoP regulations, the Pakistan Environmental Protection Agency Review of Environmental Impact Assessment and Environmental Impact Assessment Regulations (2000) categorize development subprojects into two schedules according to their potential environmental impact. The proponents of subprojects that have reasonably foreseeable impacts are required to submit an EIA for their respective subprojects (Schedule-I). The proponents of subprojects that have more adverse environmental impacts (Schedule-II) are required to submit an environmental impact assessment (EIA). Distribution lines and Station

are included under energy subprojects, an IEE is required for sub transmission/ distribution lines of 11kV and less and large distribution subprojects (Schedule-I). EIA is required by GoP for all subprojects involving sub transmission/ distribution lines of 11kV and above and for AIS Stations (Schedule-II). The detailed EIA process in Pakistan is shown in Figure 1.

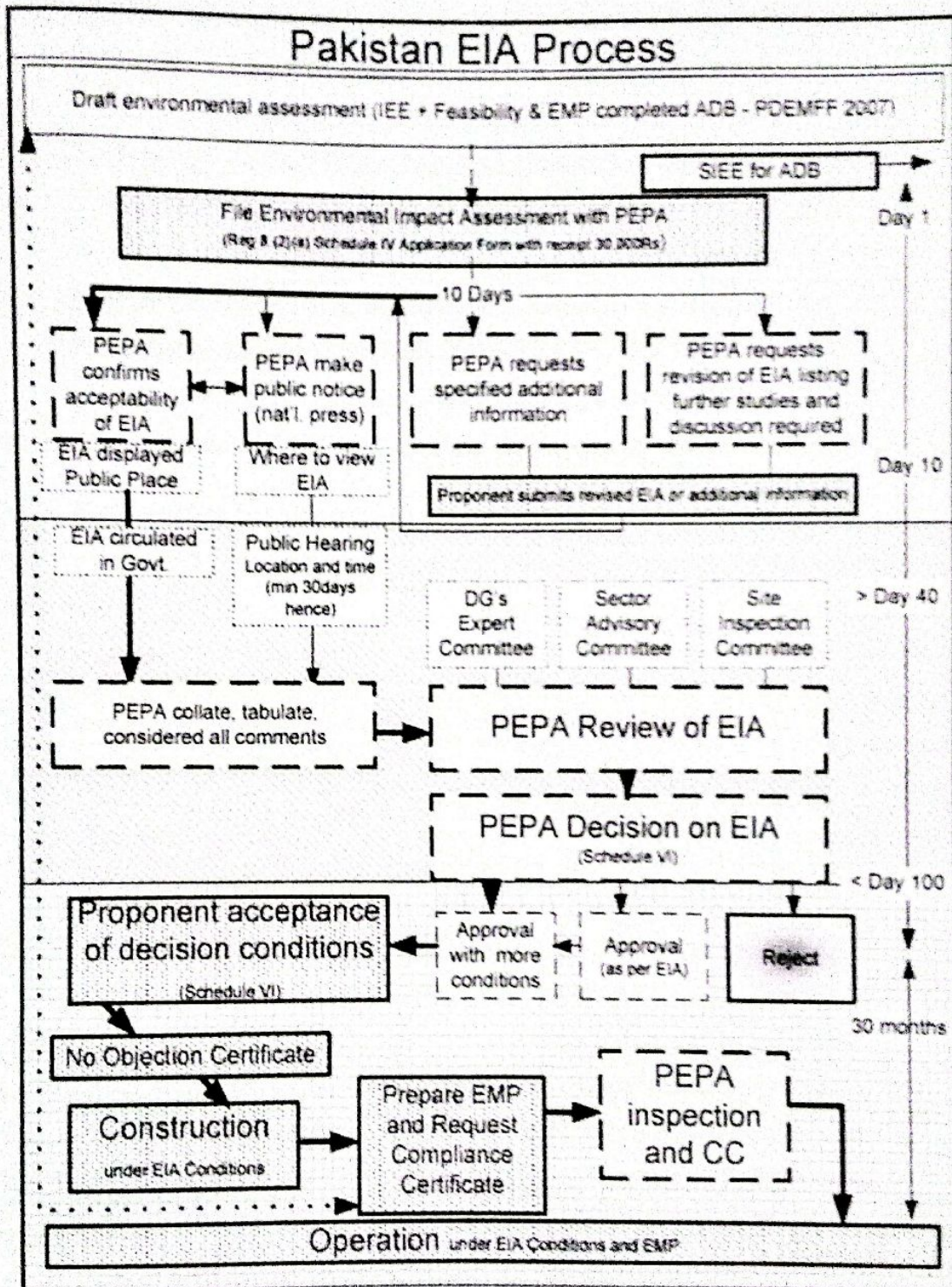


Figure 1: EIA process in Pakistan

2.6 Study Approach & Methodology

Environment and Social Cell PMU GEPCO have envisaged the following study approach related to environmental and social safeguard studies in the light of discussions held with the PMU GEPCO:

- Review of national and local guidelines, laws and policies;
- Review of all relevant existing data, studies, reports and drawings;
- Minimize and avoid the environmental and resettlement effects during design;
- Identification of the most environmentally and socially feasible T/L route;
- Collection of baseline data related to Physical, Ecological and Social/Cultural/Environmental aspects;
- Identification, evaluation and categorization of the potential significant adverse physical, ecological and socio-economic impacts on the local environment during the construction and operational stages of the proposed T/L;
- Recommend appropriate environmental and social mitigation measures for the identified adverse impacts and monitoring plans to address them;
- Review the capability of the GEPCO staff for the development of the Environment Management and Monitoring Plan (EMMP);
- Preparation of EMMP;
- Determine the regulatory procedures and protection measures needed to obtain Environmental and forestry clearances from the concerned departments;
- Provide technical assistance to GEPCO for the issuance of 'No Objection Certificate' (NOC)/ Environmental Approval from the EPA Punjab; and
- Prepare future line of action/further studies required such as Resettlement Plan (RP) Land Acquisition and Resettlement Plan (LARP) etc.

The methodology involved the identification of irrigation facilities, water supply, habitat structures, schools, health facilities, hospitals, religious places and sites of heritage archaeological importance and critical areas (if any) within about 100 meters of Grid Station. The Transmission line will be avoided during all stages. The works are generally envisaged to involve construction of the AIS, Construction of the bases, foundation pads and towers support the distribution line will be carried out also under the same sub-project by GEPCO and supervised by the GEPCO management.

2.7 Structure of Report

This ESIA reviews information on existing environmental attributes of the Study Area. Geological, hydrological and ecological features, air quality, noise, water quality, soils, socio and economic aspects and cultural resources are included. The report predicts the probable

impacts on the environment due to the proposed subproject enhancement and expansion. This ESIA also proposes various environmental management measures. Details of all background environmental quality, environmental impacts/ pollutants generating activities, pollution sources, predicted environmental quality and related aspects have been provided in this report. References are presented as footnotes throughout the text. Following this introduction the report follows Environmental Protection Agency (EPA) guidelines and includes:

- Description of the project
- Description of Environmental and Social Conditions
- Assessment of Environmental Impacts and Mitigation Measures
- Environmental Monitoring Plan
- Public Consultation
- Recommendations and Conclusions

3. PROJECT DESCRIPTION

3.1 Rationale of the Proposed Project

GEPCO is providing electricity to Gujranwala city and nearby towns. Domestic, commercial and industrial power demand of the area is increasing rapidly like all other areas of Punjab. Due to the increased power demand of the area the existing grid stations have become overloaded and insufficient, and there is need to improve the power supply of the city and surrounding towns and villages. For this purpose GEPCO is planning to construct a new 132kV Grid Station along with 132Kv Feeding T/Line Component in Gujranwala. The new 132kV grid station will be linked to the existing Gakhar–Aroop Grw. 132kV double circuit 3Km T/line approximately 18 No. of Poles. Grid station will be constructed.

No.	Proposed Substation	Type	Scope of Work
1	Garden Town G.S	AIS	Two (02) 40 MVA power transformers Two (02) transformers bays Two (2) lines bays One (1) PT Bays

3.2 Objectives of the Proposed Project

The main objective of the project is providing relief to local consumers against tripping and forced electricity shutdown/ breakdowns. The proposed scheme for construction of 132kV Garden Town substation has been prepared for dispersal of power from existing 132KV Transmission Line passing near grid station in district Gujranwala.

The benefits associated with the proposed project primarily include:

- To promote stable electricity power supply
- Improvement in voltage profile of GEPCO.
- Reduction in transmission line losses of GEPCO.
- Improvement in reliability of GEPCO networks at/around project area.
- Reduction in the loading of power transformers at 132kV substations

3.3 Location and Scale of Project

This ESIA has included field reconnaissance of the sub-project site and its surroundings. It is located in Gujranwala City (Figure 2) AIS grid station site location is determined by committee, comprising of professionals from:-planning & engineering; design; construction operation; environment & social, formations of the PMU GEPCO. The committee selects the best site based, from a number of alternatives, on the following considerations: technically and socially acceptable alternative; least social impacts; soil; and atmospheric conditions that are not likely to impose a higher cost or damage the planned facilities; acceptable living conditions for staff members (health, education, water etc.); reasonable access conditions to allow movement of heavy equipment; reasonable access conditions to allow incoming and outgoing transmission lines right of way.

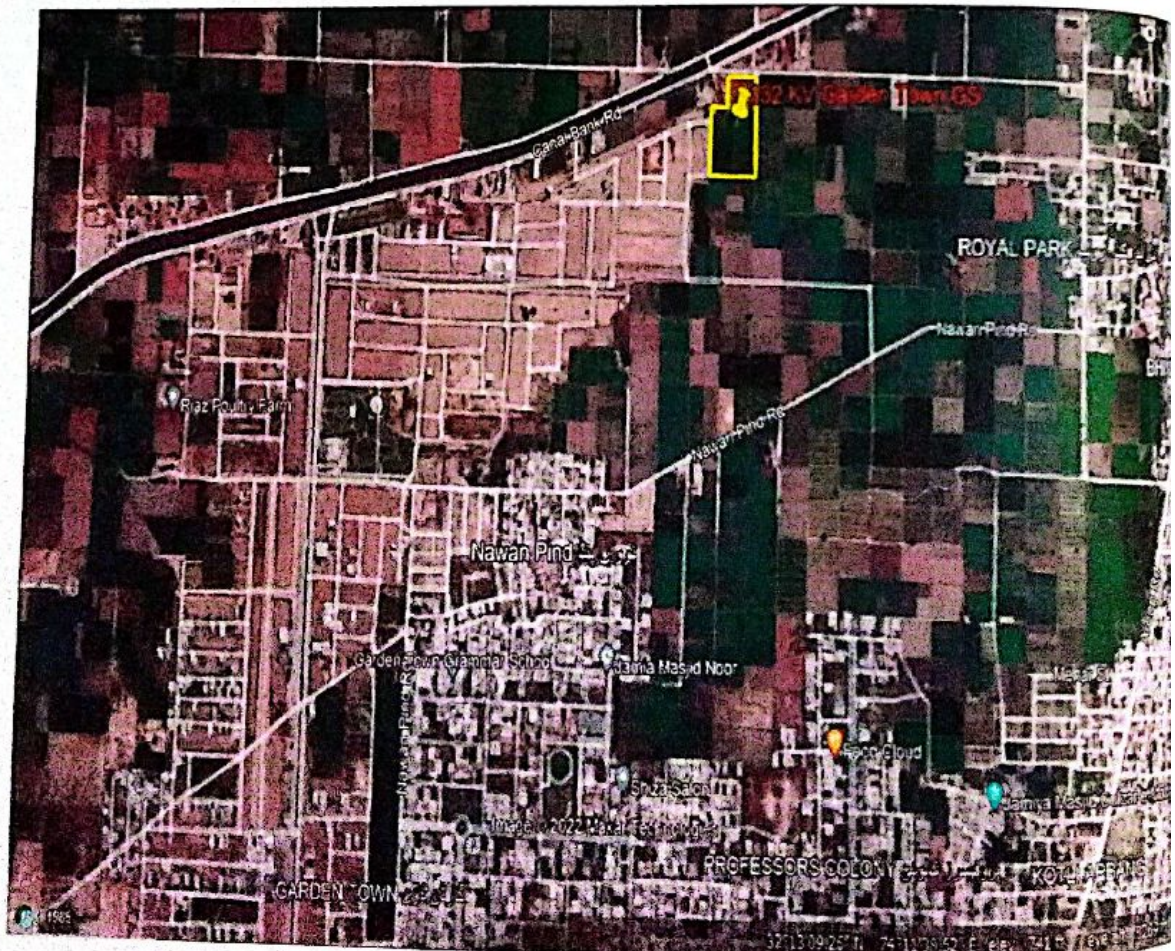


Figure 02: Location of Sub-project

The Garden Town Grid Station will involve the construction of a new 132kV AIS substation and connection with already existing nearby Gakhar-Aroop double circuit T/Line 3 KM. The designs for the 8th STG projects will be designed by GEPCO. The design of T/line is based on the following parameters:-

Permissible Conductor Clearances at 65°C

Sr. No	Description	Clearance m
1	Cultivated land traversed by vehicles	6.7
2	Roads and Streets	7.9
3	Communication and power lines	
	power lines up to 66 kV	2.7
	power lines up to 33 kV	2.7
4	Highways	7.9
5	Railroads	7.9
6	Electrified railroads trolley wire	3.85
7	River at high flood	9.1
8	places accessible to pedestrians only	7.9
9	Building roofs not accessible to people	5.2
10	Tops of trees (Orchards)	5
11	Canals	9.1

3.4 Project Administrative Jurisdiction

Power demands in the Gujranwala area of GEPCO jurisdiction (Fig 3) have increased rapidly, especially in summer months, so that the existing 132 kV AIS are unable to cope up with the increasing demands of the domestic, commercial and industrial sectors.

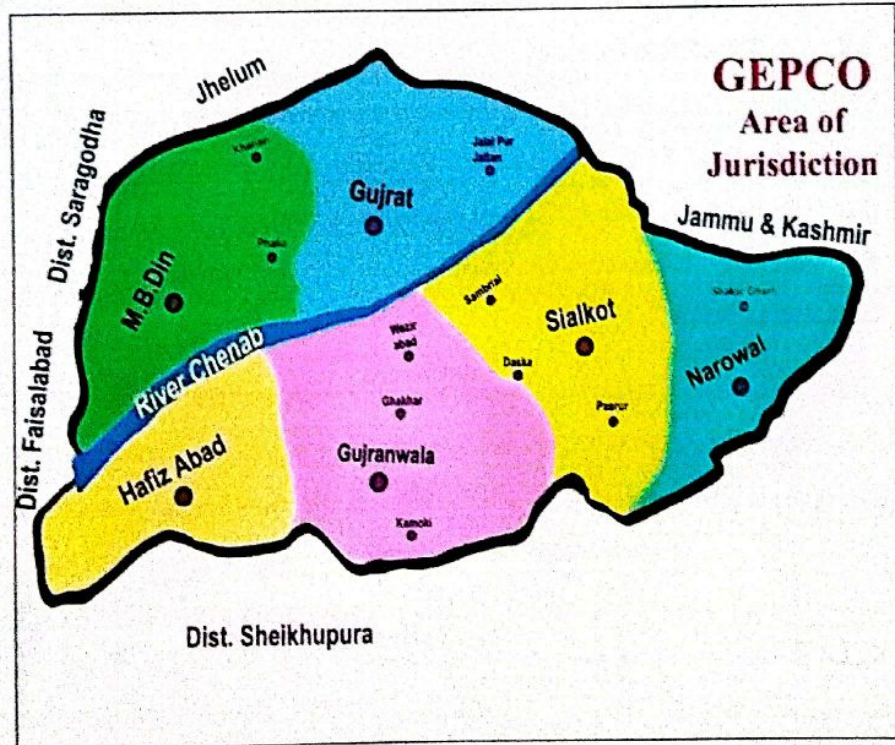


Figure 3: Jurisdiction map of GEPCO

3.5 Categorization of the Project

The site for the AIS, as well as the existing route of the nearby T/Line, is located in a rural setting, with no settlements and agricultural area around the site. The Garden Town 132kV station falls under Schedule-II.

3.6 Need for the Project

The standards and conditions of the power distribution system in Pakistan are inadequate to meet rapidly growing demand for electrical power. This situation limits national development and economic growth. To cope with the constraints, the existing power distribution infrastructure has to be improved and upgraded. The overall contribution of power infrastructure also requires institutional arrangements and capacity that support strategic management of the sector, and planning and management of investments. Power demands in the Gujranwala area, GEPCO jurisdiction have increased rapidly, especially in summer months, so that the existing 132 kV AIS Grid Stations are unable to cope up with the increasing demands of the domestic commercial and industrial sectors.

3.7 Proposed Schedule for Implementation

Designs of the AIS and T/Line equipment layout, review of environmental management and construction processes could take several months. When the detailed designs are complete, tendering and award of contract will take place over a period of about three to six months. The construction period will follow and best estimates indicate about eighteen months to two years.

3.8 Cost of the Project

Civil works foundations for installation of equipment's, construction of control house building and installation of 01 No. tower will be required for construction of Grid Station. Necessary provision has been made in the cost estimates accordingly.

Equipment & Machinery: Detail of equipment's and machinery required for Grid Station is tabulated as below:

Sr. No.	Equipment	Unit	Quantity
1	Circuit Breaker	No.	4
2	Bus Isolator Set	Set	2
4	132kV C.T for transformer	No.	06
5	132kV C.T for line	No.	06
	132kV P.T	No.	03
6	132kV Lightning arrestor	No.	06
7	132kV power transformers 20/26 MVA	No.	02
8	132kV line isolator	Set	02
9	132kV isolator for PT bay	Set	01
Total Estimated Cost			1000 Millions PKR

From above tabulated equipment and their cost, an estimated total cost of 132 kV Garden Town Grid Station is calculated PK Rs. 1000 Million/ 01 Billion.

3.9 Land Acquisition

The 32 Kanals one piece of land for construction of New 132 kV Garden Town AIS Grid Station is in GEPCO possession. No additional land is neither required nor purchased or acquired by GEPCO for construction of substation. As per existing GEPCO/ WAPDA policy, land is not acquired on permanent basis for installation of 132kV Transmission line, only crops compensation is being made to affected persons on account of loss of agricultural crops and trees at three stages i.e. foundation, erection and stringing.

3.10 Construction Methods

The construction methods involve civil works foundations for installation of grid station equipment, installation & erections and its testing & commissioning. Thus, the impacts from construction activities are very manageable from the environmental viewpoint. The present assumption is that the transmission lines 3KM will be completed as planned on the defined alignment and site. The crop/ tree/ building/ structure damages compensation will be paid accordingly.

4. SCREENING OF ENVIRONMENTAL IMPACTS & ITS MITIGATION MEASURES

4.1 Pre-Construction and Construction Stages

Pre-construction:-About 32 Kanals one piece of land has already been possessed by the GEPCO to construct the 132kV Garden Town grid station. All the land is cultivated and is owned by GEPCO. The area of influence is 100% rural.

Construction: During this stage, impacts on environment are expected to be encountered due to the following major factors:

- i. **Air:** Some particulate matters may get into the air due to excavation and movement of heavy construction machinery. However, the large particles of the dust will redeposit in the adjoining areas of the site. In addition the dust particles will also disperse into the air as a result of wave action, wind speed and air temperature.
- ii. **Noise:** Construction/ erection activities at site would cause substantial increase in the noise level due to excessive use of different construction and erection machines. However, the high level of noise and vibration are only site specific and short term and would not be significant. Further, high sound level would have no detrimental effects as most of the transportation activities shall take place during night hours. The existing ambient noise level measured at site in January 2023 ranges between 50- 55 dB.

3.5 Categorization of the Project

The site for the AIS, as well as the existing route of the nearby T/Line, is located in a rural setting, with no settlements and agricultural area around the site. The Garden Town 132kV substation falls under Schedule-II.

3.6 Need for the Project

The standards and conditions of the power distribution system in Pakistan are inadequate to meet rapidly growing demand for electrical power. This situation limits national development and economic growth. To cope with the constraints, the existing power distribution infrastructure has to be improved and upgraded. The overall contribution of power infrastructure also requires institutional arrangements and capacity that support strategic management of the sector, and planning and management of investments. Power demands in the Gujranwala area under GEPCO jurisdiction have increased rapidly, especially in summer months, so that the existing 132 kV AIS Grid Stations are unable to cope up with the increasing demands of the domestic commercial and industrial sectors.

3.7 Proposed Schedule for Implementation

Designs of the AIS and T/Line equipment layout, review of environmental management and construction processes could take several months. When the detailed designs are complete tendering and award of contract will take place over a period of about three to six months. The construction period will follow and best estimates indicate about eighteen months to two years.

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Sr. No.	Equipment	Unit	Quantity
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6	132kV Lightning arrestor	No.	06
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8	132kV line isolator	Set	02
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Total Estimated Cost			1000 Millions PKR

From above tabulated equipment and their cost, an estimated total cost of 132 kV Garden Town Grid Station is calculated PK Rs. 1000 Million/ 01 Billion.

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3.10 Construction Methods

The construction methods involve civil works foundations for installation of grid station equipment, installation & erections and its testing & commissioning. Thus, the impacts from construction activities are very manageable from the environmental viewpoint. The present assumption is that the transmission lines 3KM will be completed as planned on the defined alignment and site. The crop tree building/ structure damages compensation will be paid accordingly.

4. SCREENING OF ENVIRONMENTAL IMPACTS & ITS MITIGATION MEASURES

4.1 Pre-Construction and Construction Stages

Pre-construction:—About 32 Kanals one piece of land has already been possessed by the GEPCO to construct the 132kV Garden Town grid station. All the land is cultivated and is owned by GEPCO. The area of influence is 100% rural.

Construction: During this stage, impacts on environment are expected to be encountered due to the following major factors:

- i. **Air:** Some particulate matters may get into the air due to excavation and movement of heavy construction machinery. However, the large particles of the dust will redeposit in the adjoining areas of the site. In addition the dust particles will also disperse into the air as a result of wave action, wind speed and air temperature.
- ii. **Noise:** Construction/ erection activities at site would cause substantial increase in the noise level due to excessive use of different construction and erection machines. However, the high level of noise and vibration are only site specific and short term and would not be significant. Further, high sound level would have no detrimental effects as most of the transportation activities shall take place during night hours. The existing ambient noise level measured at site in January 2023 ranges between 50– 55 dB.

- iii. **Soil Removal:** No major digging activities of soil are foreseen except the excavation of land for the construction of foundation. The excavation material for the foundations of Transmission lines would be backfilled in the project area.
- iv. **Soil Erosion:** The site area is flat having mild slope just sufficient for irrigating the land and is vegetated. The wind velocity ranges from 3 to 6 KMs@ hour during most of the year. It is therefore anticipated that soil erosion would not take place during construction phase.
- v. **Drainage and Surface Water Changes:** The drainage would be done through the district government sewerage system which has been approved by concerned Tehsil Municipal Authority (TMA office). As such no inflow of waste water or sewerage is envisaged during implementation of the project.
- vi. **Wildlife:** During the site survey, it revealed that no habitation of significant wild life exists near the project site.
- vii. **Secondary Development:** This would help in improving the socio-economic aspects of the area through decrease in fluctuation in voltage and inflow of employees being hired during operation of the project.

Operational Stage: The effects of the proposed plant pollutants on the environment are neither on air and nor on water and land. As no large sources of combustion derived air pollutant emissions within 50 km of proposed site of plant exists, background concentrations of SO_2 , NO_x and particulates matters were assumed to be essentially zero. The only envisaged impacts of the project are electromagnetic field generated due to transmission lines.

- i. **Air Pollution:-**The proper HSE program shall be implemented as described in the emergency plan during the operation phase of the project.
- ii. **Air Quality:-**Ambient air quality at the proposed site was tested in the January 2021. The results of existing air quality are given in Annexure A. Since the values are typical of clean air, the above assumption regarding zero background concentration appears valid.
- iii. **Gaseous Emissions:** No high concentration of gases is envisaged by the unit.
- iv. **Air Dispersion Model:** Air quality impacts were predicted using International Environmental Protection Agency's approved dispersion model, i.e. Gaussian model. The model was used to compute daily average values of ground concentration for a given set of dispersion parameters and wind velocity and direction. The model can be used to assess pollutant concentration from a variety of sources associated with an industrial source complex. The model can account for plume rise, settling and dry deposition of particles and a limited terrain adjustment. It is suited for use in areas with flat or rolling

terrain below the stack height and provides reasonable concentration estimates up to the distance of 50 km from the source of emission.

- v. **Water Pollution, Surface and Ground water:** No surface water pollution shall be envisaged due to dry process and no natural surface water course passes through the area.
- vi. **Waste Water Disposal:** No waste water shall be produced during the operation phase except toilet waste water which will be within the NEQs.
- vii. **Solid & Oil Waste:** No solid waste shall be produced during operation of the plant, however, during construction stage solid waste produces shall be debris and excavated material which may be dumped into low laying area of project site or nearby areas.
- ix. **Noise:** The design noise level for the plant will be 45 dBA at 01 meter distance from the equipment. Noise levels "design noise generators may produce the high noise than that of ambient noise level. Protective devices, like ear muffs, would be provided to the workers to minimize the high noise level effects if any.

4.2 Occupational Health and Safety

Health and Safety is one the major concern of both local and international administration in project. Project has following three activities at construction phase;

- Excavation/ foundation
- Erection
- Stringing

The detailed health and safety plan is responsibility of GEPCO environmental manager and usually are site specific, but must contain the following at minimum:-

- Information concerning the Construction site and, if appropriate, information complementing the preliminary statement;
- General measures for site organization;
- Reference to possible risks and description of works that may affect health and safety of workers;
- Specific safety measures for jobs which carry risks, collective and individual protection measures;
- Organization of the construction site, including methods for the storage of materials, placement of the equipment's pertaining to contractors and subcontractors;
- Coordination measures set out by the coordinators of health and safety matters and obligations which derive from such measures;
- General measures to ensure maintenance and cleaning of the site;

- Practical tips on first aid, people evacuation and organizational measures taken with the regard;
- Cooperation rules between contractors, subcontractors and independent workers regarding the safety and health measures.

4.3 Health and Safety Plan Specific for each Contractor or Subcontractor

- Each contractor or sub-contractor working on the building site must prepare their own health and safety plan which must be in line with the health and safety plan of the construction site and which shall contain the following:
- Name and address of contractor/subcontractor;
- Number of workers on the construction site;
- Name of the person appointed to conduct the works, if the case;
- Duration of the works and scheduled starting date;
- Analysis of execution processes that may affect the health and safety of workers and other participants on the building site;
- Evaluation of predictable risks relating to working process, materials, working equipment and harmful substances which are being used, site organization;
- Measures to ensure the health and safety of workers.

4.4 Coordination Register

The coordinators for health and safety matters must record in the coordination register:

- Name and address of contractors, subcontractors and the date upon which each of them accessed the site;
- Number of workers on the site and the estimated time for the completion of works;
- Important events that must be taken into consideration for the finalization of the project: the works, findings and decisions which were adopted;
- Observations, information and suggestions regarding labor health and safety, which have been brought to the attention of the beneficiary, the project manager, or those who will intervene on the site, as well as their answers;
- Observations and suggestions of contractors and subcontractors regarding labor health and safety & any breaches of the health and safety plan;
- Reports regarding inspections on construction site, instructions that must be communicated;
- Incidents and accidents on the building site. In addition the working staff of the project will be properly trained to abide by the safety regulations.

4.5 Hazards

The quality of ground water is suitable for human use and no hazard is expected for potable water quality. Proper safety measures for handling the hazardous chemicals required for the operation of plant, as discussed in Health and Safety Manual would be taken by the operation staff. The storage for these chemicals would be provided with all safety equipment as required by International safety rules and standards. Plant operation and shut down is not expected to cause any hazard to the environment.

Impacts of 132kV Transmission Line:-The spacing of conductors is determined by considerations, which are partly electrical and partly mechanical. Usually conductors will swing synchronously (in phase) with the wind, but with long spans and small size of conductors, there is always possibility of the conductors swinging non-synchronously, and the size of the conductor and the maximum sag at the center of the span are factors, which should be taken into account in determining the phase distance apart at which they should strung. As a rule of thumb, minimum horizontal spacing between conductors should not be less than 1% of the span length in order to minimize the risk of phases coming into contact with each other during swing. Tower top clearance is the vertical clearance between earth wire and top conductor, which is governed by the angle of shielding. The shield angle varies from about 250 to 300, depending on the configuration of conductors. Tower top clearance shall be taken 1.5 and 2.25 meters for 132 kV and 220kV respectively. It could be clearly noted that safety of margin is at least 3 times to cater for any negative impacts of magnetic field generated due to 132kV Transmission Lines.

5. ENVIRONMENTAL MANAGEMENT & MONITORING PROGRAM

The environmental protection and enhancement are achieved in various ways. These approaches should begin right at the embryonic stage, i.e. i) project location, ii) design, specifications and tender/contract documents, iii) construction activities and iv) post completion activities i.e. operation and maintenance stage. Appropriate environmental management measures are required to be exercised in a cascade order by GEPCO at each stage of the project.

In this way, it is envisaged that the project will achieve maximum ongoing cost-effectiveness, environmental sustainability and social soundness, far beyond the end of implementation of the project. All the stages of the project have to be managed by adopting the proposed environmental mitigation measures, where, besides engineering aspects, due importance is to be accorded to mitigation measures which make a perfect blending with the surrounding ecosystem.

The key environmental and social issues which have already been discussed, its details provided as under:

- i. Impacts on Crops and Trees
- ii. Contamination of air, water and soil during the construction activities
- iii. Borrowing of aggregate materials
- iv. Soil erosion and soil contamination
- v. Impact of noise generated by vehicles, machinery and equipment during construction activities
- vi. Impact on community and work force safety as a result of accident hazards during the construction and operation of the project
- vii. Vegetation clearing for tower foundations and establishment of camp facilities

An Environmental Management Plan is provided below, which establishes the linkages between the environmental and social impacts, mitigation strategy and the agencies responsible for execution.

Environmental Management & Monitoring Plan-Matrix

Environmental concern	Objectives	Mitigation Measures Recommended	Timing to implement MM	Locations to implement MM	Resp. Imp MM	Resp. mon MM
DESIGN STAGE						
1.Social Impacts	To ensure that the adverse impacts due to the property acquisition and resettlement are mitigated according to the RP.	1. Social preparation completed (January 2023). Resettlement plan/ compensation etc in place IN CASE UNFORESEEN ADDITIONAL LAND IS REQUIRED 2. Acquisition of lands completed to minimize the uncertainty of people. 3. Completed implementation of RP to provide compensation and assistance to the APs. 4. GEPCO to select a site that will not affect any public in property or house such that no additional land is required. 5. All the payments / entitlements are paid according to the Entitlement Matrix, prepared according to the RP. 6. All the impacts identified by the EIA are incorporated in to the project as well as the RP and relevant entitlements included into the Entitlement Matrix.	Before the construction of the AIS and all the included structures, the APs to be given sufficient time with compensation money and to resettle satisfactorily.	Affected Families will be compensated by GEPCO through the concerned District Revenue Department and Land Acquisition Collectors.	GEPCO ESC/ LACs	GEPCO
2.Hydrological Impacts	To minimize hydrological and drainage impacts during constructions.	1. Hydrological flow in areas where it is sensitive, such as water courses or bridges and culverts. 2. Design of adequate major and minor culverts facilities will be completed	Before the commencement of construction activities/during design stage	If lines or station are relocated near water courses, culverts or bridges in the design stage reports	GEPCO ESC with the Design Department/ Consultant	GEPCO
3.Noise barriers	Ensure cumulative noise impacts are acceptable in construction and operational phase.	1. Conduct detailed acoustic assessment for all residential, school, (other sensitive structures) within 50m of AIS PROJECT and line. 2. If noise at sensitive receiver exceeds the permissible limit, the construction activities should be mitigated, monitored and controlled. 3. If noise at sensitive receiver exceeds the permissible limit, the design to include acoustic mitigation (noise barrier or relocation of noisy equipment) and monitoring.	1. During detailed design stage. No later than pre-qualification or tender negotiations. 2. Include acoustic specification in the contract.	Noise sensitive locations identified in the EIA/ESIA/EMP or as required / approved by PEPA.	GEPCO ESC with the design consultant	GEPCO ESC and GSC (if any).
4.Waste disposal	Ensure adequate disposal options for all waste including	1. Create waste management policy and plan to identify sufficient locations for, storage and reuse of transformers and recycling of breaker oils and disposal of transformer oil,	1.Prior to detailed design stage no later than pre-	GEPCO ESC. Locations approved by EPA and GEPCO	GEPCO ESC and EPA with	GEPCO ESC and GSC

Environmental concern	Objectives	Mitigation Measures Recommended	Timing to implement MM	Locations to implement MM	Resp. Imp MM	Resp. mon MM
	transformer oil, residually contaminated soils, and scrap materials.	residually contaminated soils and scrap metal "cradle to grave". 2. Include in contracts for unit rates for re-measurement for disposal. 3. Designate disposal sites in the contract and cost unit disposal rates accordingly.	qualification or tender negotiations 2. Include in contract.	and local waste disposal authorities.	the design consultant.	
5. Temporary drainage and erosion control	Include mitigation in preliminary designs for erosion control and temporary drainage.	1. Identify locations where drainage or irrigation crossing RoW may be affected by works. 2. Include protection works in contract as a payment milestone(s).	During designing stage no later than pre-qualification or tender negotiations.	Locations based on drainage or irrigation crossing RoW near AIS PROJECT.	GEPCO ESC and design consultant.	GEPCO ESC and GSC
6. Contract clauses	Ensure requirements and recommendations of environmental assessment are included in the contracts.	1. Include EMP Matrix in tender documentation and make contractors responsible to implement mitigation measures by reference to EIA in contract. 2. Include preparation of EMP review and method statement WM plan, TD and EC Plan in contract as a payment milestone(s). 3. Require environmental accident checklist and a list of controlled chemicals / substances to be included in the contractor's work method statement and tender documentation.	1. During tender preparation. 2. No later than pre-qualification or tender negotiations 3. In bidding documents as evaluation criteria.	Noise sensitive locations identified in the ESIA/EMP or as required / approved by PEPA.	GEPCO ESC with the design consultant	GEPCO ESC and GSC (if any).
CONSTRUCTION STAGE						
1. Hydrology And Drainage Aspects	To ensure the proper implementation of any requirements mentioned in EPA conditions of approval letter in relation to Hydrology of the project.	1. Consideration of weather conditions when particular construction activities are undertaken. 2. Limitations on excavation depths in use of recharge areas for material exploitation or spoil disposal. 3. Use of landscaping as an integrated component of construction activity as an erosion control measure. 4. Minimizing the removal of vegetative cover as much as possible and providing for its restoration where construction sites have been cleared of such areas.	Prepare a thorough drainage management plan to be approved by GSC one month prior to a commencement of construction Proper timetable prepared in consideration with the climatic	1. Locations of each construction activity to be listed by the GSC engineer. 2. Special locations are identified on the site by the contractor to minimize disturbances. 3. A list of locations of irrigation channels / drains to	1. Contractor supervised by GSC or to actively supervise and enforce.	GEPCO ESC

Environmental concern	Objectives	Mitigation Measures Recommended	Timing to implement MM	Locations to implement MM	Resp. Imp MM	Resp. mon MM
			conditions of the area, the different construction activities mentioned here to be guided.	be compiled and included in the contract.		
2. Orientation for Contractor, and Workers	To ensure that the GSC contractor and workers understand and have the capacity to ensure the Environmental requirements and implementation of mitigation measures.	1. GEPCO ESC environmental specialist to monitor and progress all environmental statutory and recommended obligations. 2 Conduct special briefing for managers and / or on-site training for the contractors and workers on the environmental requirement of the project. Record attendance and achievement test for contractors site agents. 3. Agreement on critical areas to be considered and necessary mitigation measures, among all parties who are involved in project activities. 4. Continuous progress review and refresher sessions to be followed.	Induction course for all site agents and above including <u>all relevant GEPCO</u> staff / new project staff before commencement of work. At early stages of construction for all construction employees as far as reasonably practicable.	All staff members in all categories. Monthly induction and six month refresher course as necessary until contractor complies.	GEPCO ESC, Contractor and the GSC and record details.	GEPCO & GSC to observe and record success.
3. Water quality	To prevent adverse water quality impacts due to negligence and ensure unavoidable impacts are managed effectively. Ensure adverse impacts on water quality caused by construction activities are minimized.	Compile temporary drainage management plan one month before commencement of works. 1. Proper installation of temporary drainage and erosion control before works within 50m of water bodies. 2. Proper maintenance and management construction of TD and EC measures, including training of operators and other workers to avoid pollution of water bodies by the considerate operation of construction machinery and equipment. 3. Storage of lubricants, fuels and other hydrocarbons in self-contained dedicated enclosures >50m away from water bodies. 4. Proper disposal of solid waste from construction activities. 5. Cover the construction material and spoil stockpiles with a suitable material to reduce material loss and sedimentation and avoid stockpiling near to water bodies.	1 month prior to construction.	1. 50m from water bodies 2. Relevant locations to be determined in the detailed project design.	1. Contractor (GEPCO ESC & GSC to enforce). 2. Contractor has to check water quality and report to GEPCO. 3. GSC supervises	GEPCO review results

Environmental concern	Objectives	Mitigation Measures Recommended	Timing to implement MM	Locations to implement MM	Resp. Imp MM	Resp. mon MM
		6. Topsoil stripped material shall not be stored where natural drainage will be disrupted. 7. Borrow sites (if required) should not be close to sources of drinking water.			implementation activities.	
4. Air quality	To minimize dust effectively and avoid complaints due to the airborne particulate matter released to the atmosphere.	CONTROL ALL DUSTY MATERIALS AT SOURCE. 1. All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations. (Relevant regulations are in the Motor vehicles fitness rules and Highway Act). 2. Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions. 3. Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions. 4. Vehicles transporting soil, sand and other construction materials shall be covered. Limitations to speeds of such vehicles necessary. Transport through densely populated area should be avoided. 5. To plan to minimize the dust within the vicinity of orchards and fruit farms. 6. Spraying of bare areas with water. 7. Concrete plants, to be controlled in line with statutory requirements should not be close to sensitive receptors.	During all construction.	1. Construction sites within 100m of sensitive receivers. 2. A list of locations to be included in contract and other sensitive areas identified by the GSC along the ROW during works.	Contractor should maintain acceptable standard GSC to supervise activities.	GEPCO ESC / GSC
5. Ground Vibration	To minimize ground vibrations during construction.	1. Review requirements for piling and use of powered mechanical equipment within 100m of SRs. 2. Review conditions of buildings and conduct public consultation with SRs to establish less sensitive time for works involving piling and schedule works accordingly. 3. Non-percussive piling methods to be used wherever practicable. 4. Percussive piling shall be conducted in daylight hours. 5. Hammer- type percussive pile driving operations shall not be allowed at night time.	1 month prior to construction.	1. Construction sites within 100m of sensitive receivers. 2. A list of locations to be included in contract and other sensitive areas identified by the GSC along the ROW during works.	Contractor should maintain the acceptable standards GSC to supervise relevant activities.	GEPCO ESC / GSC
6. Noise	To minimize noise increases during construction.	1. Review requirements for use of powered mechanical equipment within 100m of SRs. 2. Conduct public consultation with SRs to establish less sensitive time for works and schedule works accordingly.	1 month prior to construction.	1. Construction sites within 100m of sensitive receivers.	Contractor should maintain the acceptable	GEPCO ESC / GSC

Environmental concern	Objectives	Mitigation Measures Recommended	Timing to implement MM	Locations to implement MM	Resp. Imp MM	Resp. mon MM
		3. All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations and with effective silencing apparatus to minimize noise. 4. Heavy equipment shall be operated only in daylight hours. 5. Construction equipment, which generates excessive noise, shall be enclosed or fitted with effective silencing apparatus to minimize noise. 7. Well-maintained haulage trucks will be used with speed controls. 8. Contractor shall take adequate measures to minimize noise nuisance in the vicinity of construction sites by way of adopting available acoustic methods.		2. A list of locations to be included in contract and other sensitive areas identified by the GSC along the ROW during works.	standards GSC to supervise relevant activities.	
7. Soil Erosion / Surface Run-off	Prevent adverse water quality impacts due to negligence and ensure unavoidable impacts are managed effectively. To minimize soil erosion due to the construction activities of towers, stringing of conductors and creation of access tracks for project vehicles.	SCHEDULE WORKS IN SENSITIVE AREAS (e.g. NEAR RIVERS) FOR DRY SEASON 1. In the short-term, temporary drainage and erosion control plan to be presented with tender. Temporary drainage and erosion control plan one month before commencement of works to protect all areas susceptible to erosion. (Permanent drainage works shall be in the final design). 2. Installation of TD and EC before works construction within 50m of water bodies. 3. Clearing of green surface cover to be minimized during site preparation. 5. Meaningful water quality monitoring up and downstream at any tower site during construction within a river or stream bed. Rapid reporting and feedback to GSC. 5. Back-fill should be compacted properly in accordance with GEPCO design standards and graded to original contours where possible. 6. Cut areas should be treated against flow acceleration while filled areas should be carefully designed to avoid improper drainage. 7. Stockpiles should not be formed within such distances behind excavated or natural slopes that would reduce the stability of the slopes or cause shippage. 8. Measures shall be taken to prevent ponds of surface water and scouring of slopes. Newly eroded channels shall be	1 month prior to construction because the area can be subject to unseasonal heavy rain. Plan before and during construction (cut and fill, land reclamation etc.) while considering the climatic conditions.	1. Locations based on history of flooding problems indicated by local authorities. 2. A list of sensitive areas during construction to be prepared by the detail design consultant in consideration with the cut and fill, land reclamation, borrow areas etc. 3. Locations of all rivers, streams, culverts, irrigation channels, roads and highways.	Contractor and GSC	GEPCO ESC GSC

Environmental concern	Objectives	Mitigation Measures Recommended	Timing to implement MM	Locations to implement MM	Resp. Imp MM	Resp. mon MM
		backfilled and restored to natural contours. 9. Contractor should arrange to monitor and adjust working and adopt suitable measures to minimize soil erosion during the construction period. Contractor's TD and EC plan should be endorsed and monitored by GSC after consulting with concerned authorities. 10. Replanting trees to be done before the site is vacated and handed back to GEPCO with appropriate trees (other vegetation cover as appropriate) to ensure interception of rainwater and the deceleration of surface run-off.				
8. Exploitation, Handling, Transportation and Storage of Construction materials	To minimize disruption and contamination of the surroundings, minimize and or avoid adverse environmental impacts arising out of construction material exploitation, handling, transportation and storage by using sources that comply with EPA license conditions	(consider also for future trances if civil works) 1. Use only EPA licensed sites for raw materials in order to minimize adverse environmental impacts. 2. Measures to be taken in line with any EPA license conditions, recommendations and approval to be applied to the subproject activities using the licensed source including: • Conditions that apply for selecting sites for material exploitation. • Conditions that apply to timing and use of roads for material transport. • Conditions that apply for maintenance of vehicles used in material transport or construction. • Conditions that apply for selection of sites for material storage. • Conditions that apply for aggregate production. • Conditions that apply for handling hazardous or dangerous materials such as oil, lubricants and toxic chemicals.	month prior to starting of works. Update monthly.	1. List of borrow areas to be prepared with tender stage contractors method statement and updated one month prior to construction. 2. List of routes of transport of construction material is to be prepared for the contract and agreed one month prior to construction. 3. Map of locations of storage is prepared by the contractor.	Contractor and GSC to agree format of reporting	GEPCO ESC / GSC
9. Construction Waste Disposal	Minimize the impacts from the disposal of construction waste.	1. Waste management plan to be submitted to the GSC and approved by GEPCO ESC one month prior to starting of works. WMP shall estimate the amounts and types of construction waste to be generated by the project. 2. Investigating whether the waste can be reused in the project or by other interested parties without any residual environmental impact.	One month prior to starting of works. Update monthly	1. Dumping: A list of temporary stockpiling areas and more permanent dumping areas to be prepared at the contract stage for	1. Contractor 2-11. GSC and GEPCO ESC should supervise and take action to	GEPCO/ GSC

Environmental concern	Objectives	Mitigation Measures Recommended	Timing to implement MM	Locations to implement MM	Resp. Imp MM	Resp. mon MM
		3 Identifying potential safe disposal sites close to the project, or those designated sites in the contract. 4 Investigating the environmental conditions of the disposal sites and recommendation of most suitable and safest sites. 5. Piling up of loose material should be done in segregated areas to arrest washing out of soil. Debris shall not be left where it may be carried by water to downstream flood plains, dams, lagoons or other water bodies. 6. Used oil and lubricants shall be recovered and reused or removed from the site in full compliance with the national and local regulations. 7. Oily wastes must not be burned. Disposal location to be agreed with local authorities/EPA. 8. Waste breaker insulating oil to be recycled, reconditioned, or reused at GEPCO facility. 9. Machinery should be properly maintained to minimize oil spill during the construction. 10. Machinery should be maintained in a dedicated area over drip trays to avoid soil contamination from residual oil spill during maintenance. 11 Solid waste should be disposed at an approved solid waste facility and not by open burning which is illegal and contrary to good environmental practice.	One month prior to starting of works. Update monthly	agreement A list of temporary stockpiling areas and more permanent dumping areas to be prepared at the contract stage for agreement (in W M Plan)	ensure that contractor's complete relevant activities according to EIA / EIA / EMP requirement & NEQS.	
10. Work Camp Operation and Location (if required)	To ensure that the operation of work camps does not adversely affect the surrounding environment and residents in the area.	1. Identify location of work camps in consultation with local authorities. The location shall be subject to approval by the GEPCO. If possible, camps shall not be located near settlements or near drinking water supply intakes. 2. Cutting of trees shall not be permitted and removal of vegetation shall be minimized. 3. Water and sanitary facilities (at least pit latrines) shall be provided for employees. Worker camp and latrine sites to be backfilled and marked upon vacation of the sites. 4. Solid waste and sewage shall be managed according to the national and local regulations. As a rule, solid waste must not be dumped, buried or burned at or near the project site, but shall be disposed of to the nearest sanitary landfill or site having complied with the necessary permits of local authority	UPDATE Once a month	Location Map is prepared by the Contractor.	Contractor	GEPCO ESC / GSC

Environmental concern	Objectives	Mitigation Measures Recommended	Timing to implement MM	Locations to implement MM	Resp. Imp MM	Resp. mon MM
		permission. 5. The Contractor shall organize and maintain a waste separation, collection and transport system. 6. The Contractor shall document that all liquid and solid hazardous and non-hazardous waste are separated, collected and disposed of according to the given requirements and regulations. 7. At the conclusion of the project, all debris and waste shall be removed. All temporary structures, including office buildings, shelters and toilets shall be removed. 8 Exposed areas shall be planted with suitable vegetation. 9.GEPCO and Construction Supervising Consultant shall inspect and report that the camp has been vacated and restored to pre-project conditions.				
11. Loss of Trees and Vegetation Cover of the Areas for Towers and Temporary Work-space	To avoid negative impacts due to removing of landmark, sentinel and specimen trees as well as green vegetation and surface cover.	1. Tree location and condition survey to be completed one month before tender. 2. The route for the distribution line should be selected so as to prevent the loss or damage to any orchard trees or other trees. Use of higher towers to be preferred to avoid trees cutting. 3. Clearing of green surface vegetation cover for construction, borrow of soil for development, cutting trees and other important vegetation during construction should be minimized by careful alignment. Written technical Justification for tree felling included in tree survey. 4. At completion all debris and waste shall be removed and not burned. 5. The contractor's staff and Labor will be strictly directed not to damage any vegetation such as trees or bushes outside immediate work areas. Trees shall not be cut for fuel or works timber. 6. Land holders will be paid compensation for their standing trees in accordance with prevailing market rates (RP). The land holders will be allowed to salvage the wood of the affected trees. 7. The contractor will plant three (3) suitable new trees	Route design and site identification (1 & 2) during design stage and other matters during construction of relevant activities	Tree survey to be completed one month before tender at relevant Locations with a Map to be compiled prior to tender by the design consultant / GEPCO ESC during detailed design and GSC to update as necessary.	Design Consultant, Contractor and GSC	GEPCO ESC / GSC

Environmental concern	Objectives	Mitigation Measures Recommended	Timing to implement MM	Locations to implement MM	Resp. Imp MM	Resp. mon MM
		outside the 30 meter corridor of the transmission line in lieu of one (1) tree removed. 8. Landscaping and road verges to be re-installed on completion. 9. Compensatory planting of trees/shrubs/ornamental plants (at a rate of 3:1) in line with best international practice. 10. After work completion all temporary structures, including office buildings, shelters and toilets shall be removed.				
12. Safety Precautions for the Workers	To ensure safety of workers	1. Providing induction safety training for all staff adequate warning signs in health and safety matters, and require the workers to use the provided safety equipment. 2. Providing workers with skull guard or hard hat and hard toe shoes.	Prior to commencement and during construction	Location to be identified by the GSC with contractor.	Contractor and GSC	GEPCO / GSC
13. Traffic Condition	Minimize disturbance of vehicular traffic and pedestrians during haulage of construction materials and equipment.	1. Submit temporary haul and access routes plan one month prior to start of works. 2. Routes in vicinity of schools and hospitals to be avoided.	Prior to and throughout the construction.	The most important locations to be identified and listed. Relevant plans of the Contractor on traffic arrangements to be made available.	Contractor and GSC	GEPCO / ESC / GSC
14. Social Impacts	To ensure minimum impacts from construction Labor force. on public health.	1. Potential for spread of vector borne and communicable diseases from Labor camps shall be avoided (worker awareness orientation and appropriate sanitation should be maintained). 2. Complaints of the people on construction nuisance / damage close to ROW to be considered and responded to promptly. 3. Contractor should make alternative arrangements to avoid local community impacts.	Complaints of public to be solved as soon as possible	All subprojects all Transmission lines	Contractor and the GSC	GEPCO / GSC
15. Institutional Strengthening and Capacity Building	To ensure that GEPCO officials are trained to understand and to appreciate EMP	Capacity building activities were taken by Environmental Officer in Transmission line. Environmental Management Unit (EMU) was setup with in GEPCO under Director Operations in Transmission line. Development of strengthening plan for the EMU should be taken up with resources.	Initiate preconstruction and continue beyond project completion.	Awareness training for all management and senior staff in GEPCO at senior engineer and above in PMU and related units.	GEPCO / ESC	GEPCO / ESC

Environmental concern	Objectives	Mitigation Measures Recommended	Timing to Implement MM	Locations to Implement MM	Resp. Imp MM	Resp. mon MM
OPERATIONAL STAGE						
1. Air Quality	Minimize air quality impacts	No significant Impacts. Monitor designs and plans for all future Transmission lines.	Operational phase	all subprojects in future Transmission lines	GEPCO	GEPCO ESC
2.Noise	Minimize noise impacts	No significant Impacts Transmission line. Acoustic designs checking and plan for all future Transmission lines.	Operational phase	all subprojects in future Transmission lines	GEPCO	GEPCO ESC
3. Waste disposal	Minimize improper waste disposal	Continue waste management arrangements in operational phase of all subprojects and GEPCO activities.	Operational phase	all subprojects in future Transmission lines	GEPCO	GEPCO ESC
4.Compensatory tree planting	Maintain survival of trees planted	Employ landscaping contractor to monitor, water and feed replacement saplings and replace dead specimens as necessary.	Operational phase	all subprojects in future Transmission lines	GEPCO	GEPCO ESC
5.Landslides and soil erosion	Avoid landslips and loss of productive land	No significant Impacts in Transmission line. Review designs checking and plan for all future Transmission lines.	Operational phase	all subprojects in future Transmission lines	GEPCO	GEPCO ESC
6. Water quality	Minimize water quality impacts	No significant Impacts in Transmission line. Review designs checking and plan for all future Transmission lines.	Operational phase	all subprojects in future Transmission lines	GEPCO	GEPCO ESC
7.Crops and vegetation	Monitor impacts from maintaining tree clearance under transmission lines	Track growth of large trees under the conductors.	Operational phase	all subprojects in future Transmission lines	GEPCO	GEPCO ESC
8.Social safety Impacts	Ensure no encroachments / construction under the transmission line. No violation of clearance spaces.	Necessary signboards with limits of height clearances to be placed all along the line. Identify and prevent any illegal encroachments under the AIS Projects.	Operational phase	all subprojects in future Transmission lines	GEPCO	GEPCO ESC

RP= Resettlement Plan AP= Affected Persons. LAC = Local Authority Council TD = Temporary drainage. EC = Erosion control. WM = waste management. GSC = Grid System Construction or equivalent. AIS PROJECT = Transmission line GSS = Grid Station. NEQS=National Environmental Quality Standards

5.1 Environmental and Social Monitoring Plan

This section provides a monitoring plan that identifies the roles and responsibilities of the project staff involved in environmental and social monitoring under the proposed project and list the parameters that will be used in the monitoring process.

5.2 Objectives

The main objectives of the pre-construction and construction phase monitoring plans will be:

- The compensation for loss of assets will be monitored during the pre-construction activities as per latest rates announced by the government as every year rates have to be revised by the government. This aspect will be strictly monitored.
- Monitor the actual impact of the construction activities on the project corridor's physical, biological and socio-economic receptors. This will indicate the adequacy of the EIA.
- Recommend mitigation measures for any unexpected impact or where the impact level exceeds that anticipated in the EIA.
- Ensure compliance with legal and community obligations including safety at construction sites.
- Monitor the impacts on land, water resources, air quality, noise level and cutting of trees in the project area as described in the EMP.

The main objectives of environmental monitoring during the operation phase will be to:

- Appraise the adequacy of the EIA with respect to the project's predicted long-term impact on the corridor's physical, biological and socio-economic environment.
- Evaluate the effectiveness of the mitigation measures proposed in the EMP, and recommend improvements, if necessary.
- Compile periodic accident data to support analysis that will help to minimize the future risks.

5.3 Institutional Structure for Implementation & Operation of Project

The proposed project will be administrated by GEPCO during the implementation stage as described in detail below, and the existing GEPCO institutional setup/ Organogram for implementation of the project is illustrated in Figure 8. The existing organizational setup of GEPCO for all the stages of the project (design, construction and operation) is fully integrated with handling of environment and social issues. GEPCO has established the Environmental and Social Cell (ESC) manned by three professionals and supporting staff. The GEPCO instructional arrangement with respect to social and environmental monitoring and implementation is presented as follows:-

5.3.1 Distribution Companies (DISCOs)

GEPCO one of the DISCOs, as the implementing agency (IA) bears the overall responsibility for the preparation, implementation and financing of all tasks set out in this ESIA, as well as inter-agency coordination required for the implementation of the sub-projects. As such, it takes care of the preparation/updating and implementation of the Environmental & Social Impact Assessment (ESIA) and Resettlement Plan (RP), and internal monitoring and evaluation activities. Institutionally, GEPCO like other DISCOs typically have three functional divisions namely, the Planning, Projects and Grid System Construction divisions.

5.3.2 Planning Division/ Planning & Engineering Directorate (P&E)

The Planning Divisions responsible for preparation of PC-1, for preparation of load forecast and feeder analysis. The division is responsible for preparation of the Energy Loss Reduction (ELR) work orders. Formerly subproject preparation and keeping liaison with the Government of Pakistan and the donor agencies if any. But lately the activity has been shifted to the Office of Chief Engineer Development.

5.3.3 Chief Engineer Development

The former Projects Division has now been named as the Office of Chief Engineer Development (OCED)/ Development Directorate/ Project Management Unit (PMU), is responsible for the overall planning, management and coordination of the approved subprojects. The OCED/ PMU is currently being assisted by the Environmental & Social Officers responsible for ESIA preparation, in preparing the identified sub-projects in line with the EPA/ agency guidelines/policies. The OCED/ Development Directorate contains a specially created cell to take care of the safeguards related activities, namely, the Environmental and Social Cell (ESC) headed by a Deputy Manager (E&S), and assisted by two Assistant Managers, Environmental and Social, respectively. The Assistant Manager Social is responsible for the preparation/updating, implementation and internal monitoring of the sub-project LARP/Resettlement Plan, with assistance from DISCO LAC and PIC Resettlement Expert. To support the ESC, to carry out its responsibilities, PMU GEPCO have social and environmental experts to assist GEPCO in revising and updating the ESIA, RP/ LARP as and when required, and then in its implementation.

5.3.4 Grid System Construction (GSC)

The Grid System Construction (GSC) is responsible for implementing the approved sub-projects, including construction/improvement of grid stations and transmission lines. This office is headed by the Project Director (GSC), and it will establish Project Implementation Units (PMUs), comprising Engineers and Patwari, at the respective towns of each Subproject. The GSC has an in-house Land Acquisition Collector (LAC) to take care of the land acquisition and resettlement activities.

The GEPCO LAC, along with field Patwaris, in addition to implementation of the RP activities, will provide in-field assistance to the Resettlement Experts of ESC and PIC in updating, revision and internal monitoring of the LARPs. Which normally works as an independent entity, but in case of local needs like price updating, grievance redress, etc., may involve the local Union Councils and other leaders at the local levels, and/or the District LACs and Province Board of Revenue for addressing broader level matters and resolving permanent Land Acquisition issues (not applicable to this Subproject). This will be provided technical assistance by the Resettlement Experts included in both ESC and PIC teams.

5.3.5 District Government

The district government have jurisdiction for land administration, valuation and acquisition. At the provincial level these functions rest on the Province Board of Revenue while at the district level they rest on the District Land Acquisition Collector (District LAC). Within LAC office the Patwari (land records clerk), carry out specific roles such as titles identification and verification required by the GEPCO LAC.

5.3.6 Responsibility for Internal Monitoring

The proposed project will be administrated by PMU GEPCO. The existing institutional and organizational setup of GEPCO for implementation of the project for all the stages of the project (design, construction and operation) is fully integrated with handling of environment and social issues. PMU GEPCO has established the Environmental and Social Impacts Cell (ESC) manned by three professionals and supporting staff. The GEPCO instructional arrangement with respect to social and environmental monitoring and implementation is presented as follows:

The EMMP was prepared taking into account the capacity of the GEPCO to conduct environmental & social assessments of the sub-projects. But it is envisaged that the GEPCO Environmental and Social Cell (ESC) will conduct monitoring of sub-project to check the compliance of EMMP provisions and will obtain environmental approval from EPA Punjab. The ESC is composed of one Dy. Manager, and two Assistant Managers. Most of the environmental work is delegated to consultants. Specific areas for immediate attention are in EMMP auditing, environmentally responsible procurement, air, water and noise pollution management, Social and ecological impact mitigation. It is recommended that an environmental specialist should be made part of team of supervisory consultants for effective monitoring of EMMP provisions.

5.3.7 Role and Responsibilities of Contractor

For the proposed project, GEPCO will appoint Contractor(s) for construction and other project activities. The Contractor(s) will be responsible for the physical execution / implementation of EMMP, or adherence to all the provisions of the ESIA and EMMP and any environmental or other code of conduct required by EPA. Overall responsibility for the Contractor's

environmental performance will rest with the GEPCO. The project contractor will also be responsible for following items:

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

5.3.8 Environmental and Social Monitoring by ESC

The general monitoring responsibilities of the GEPCO Environment and Social Cell will consist of:

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

The duties of the ESC include but not limited to followings:

- Provide review and technical support to PMU, including review of papers, feasibility studies, appraisal reports and other relevant documents from the perspective of environment and land acquisition and resettlement management, on assignment basis.
- Supervise and scrutinize the consultants hiring process for environmental and social documents preparation.
- Oversight of construction contractors for monitoring and implementing mitigation measures.
- Preparing and implementing environment policy guidelines and environmental good practices.
- Liaising with the PMUs and seeking their help to solve the environment related issues of project implementation.
- Providing awareness training workshop on environmental and social issues related to power transmission to PMU staff.
- Preparation of monthly/quarterly progress report on environmental and social safeguards for submission to financing agencies.
- Conduct seminars / local training workshops on environment safeguards matters with the help of NGOs / PMU etc. and
- Prepare ESIA/TEEs of new projects.
- Seek Environmental Approvals/ (NOCs) from EPA Punjab.

The Environmental Monitoring Plan for Performance Indicators (Matrix) is provided as under;

Environmental Monitoring Plan for Performance Indicators

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Resp. PI supervision	Cost of Supervision
DESIGN and - PRECONSTRUCTION STAGE								
1. Review of EMMP	Environmental Management Monitoring Plan (EMMP) is reviewed	During detailed design (later monthly by Contractor to cover any unidentified impacts)	By completion of detailed design.	All project alignment	Contractor	Initially GEPCO Cell / later Contractor cost	GEPCO, ESC cell /	ESC GEPCO
2. Social Impacts and Resettlement	Inventory of losses, Property acquisition, compensation and resettlement completed to RP requirements.	<i>Completed prior to commencement of construction</i>	Before removal of houses and structures.	APs according to RP & LAFC.	GEPCO Cell	GEPCO	GEPCO, ESC cell	ESC GEPCO
3. Project disclosure	Design changes notified	During detailed design by Contractor to cover any access roads and alignment changes, additional Villages.	Completion of detailed design.	All project alignment.	Contractor	Contractor	GEPCO & ESC cell /	ESC GEPCO
4. Environmentally Responsible Procurement. (ERP)	Contract follows GEPCO SOP/ Guidelines on ERP. Performance bond. Deposited Contractual clauses include implementation of environmental mitigation measures tied to a <i>performance bond</i> .	Once, before Contract is signed.	Before Contract is signed.	Method Statements include resources for mitigation measures.	GEPCO Project Cell.	Contractor	GEPCO ESC cell /	ESC GEPCO
5. Waste disposal	Disposal options for all waste transformer oil, residually contaminated soils, scrap metal agreed with GEPCO and local authority.	Monthly or as required in waste management plan to identify sufficient locations for, storage and reuse of transformers and recycling of breaker oils and disposal of transformer oil,	1. Prior to detailed design stage no later than pre-qualification or tender negotiations 2. Include in contract.	Locations approved by local waste disposal authorities.	GEPCO cell with the design consultant.	ESC cell	ESC cell	GEPCO

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Resp. for supervision	Cost of supervision
		residually contaminated soils and scrap metal "cradle to grave". 2. Include in contracts for unit rates for re-measurement for disposal. 3. After agreement with local authority, designate disposal sites in the contract and cost unit disposal rates accordingly.						
6. Noise and air quality mitigation in design.	Design changes included in ESIA (supplementary) & EMMP approved by M&E Consultant.	During detailed design by Contractor	Completion of detailed design	As defined in EIA (supplementary) & EMMP	GEPCO Cell Contractor	Contractor	GEPCO	EMC
7. Hydrological Impacts	Temporary Drainage Management plan.	During detailed design by Contractor and monthly to cover any unidentified impacts	One month before commencement of construction	Consistent locations as to be identified in the Detailed Drainage Report.	Contractor	Contractor	GEPCO	EMC
9. Temporary drainage and erosion control	Erosion Control and Temporary Drainage completed.	During detailed design updated by Contractor monthly to cover any unidentified impacts.	One month before construction commences	All stream and river crossings and where slopes indicate erosion will be a problem.	Contractor	Contractor	GEPCO	EMC
10. Planning construction camps	Use of land agreed with surrounding residents & Villages.	During detailed design updated by Contractor monthly to cover any unidentified impacts.	One month before construction commences	Locations agreed DISCO'S and in consultation with community and the Contractor.	Contractor DISCO'S Cell Facilities	Contractor	GEPCO	EMC

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Resp. PI supervision	Cost of Supervision
13. Traffic Condition	Temporary Pedestrian and Traffic Management Plan agreed.	During detailed design updated by Contractor monthly to cover any unidentified impacts.	One month before construction commences.	Locations agreed with GEPCO cell in consultation with community and the Contractor.	Contractor	Contractor	GEPCO PMU Cell	ESC GEPCO
15. Institutional strengthening and capacity building	1. Strengthening plan agreed for GEPCO cell. 2. International environment specialist (IES) 3. Increase staffing of GEPCO Cell. 4. Train GEPCO Cell officials.	1. Once, 2. Once 3. Ongoing 4. Ongoing	1. As soon as practicable 2, 3, 4. No later than one month before Contract award.	Throughout the project	GEPCO Project Cell.	GEPCO Cell staff	GEPCO PMU Cell	ESC GEPCO
CONSTRUCTION STAGE								
1. Orientation for Contractor, and Workers	1. Contractor agreed to provide training to professional staff and workers. 2. Special briefing and training for Contractor completed. 3. Periodic progress review sessions.	1. Once 2. Ongoing 3. Ongoing	1. Before contract is signed 2. Before construction areas are opened up 3. Every six months	All BOT staff members in all categories. monthly induction and six month refresher course	Contractor with IES assistance and record details.	Contractor	GEPCO PMU Cell to observe record success	ESC GEPCO
2. Plans to control environmental impacts	1. Drainage Management plan 2. Temp. Pedestrian & Traffic Management plan, 3. Erosion Control & Temp. Drainage plan 4. Materials Management plan, 5. Waste Management plan; 6. Noise and Dust Control plan, 7. Safety Plan 8. Agreed schedule of costs for environmental mitigation. {N.B. Forest Clearance and Compensatory Planting plan is prepared by GEPCO	Deliverable in final form to GEPCO cell one month before construction commences for any given stretch.	One month before construction commences.	All of GEPCO alignment.	Contractor	Contractor	GEPCO PMU Cell.	ESC GEPCO

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Resp. PI supervision	Cost of Supervision
	cell}							
5. Water quality	Meaningful water quality monitoring up and downstream during construction within 100m of rivers. Rapid reporting and feedback by GEPCO.	Once (line item when opening up construction near water bodies).	During detailed design by Contractor and update to cover any unidentified impacts.	Locations to be provided with the detailed design including all bridges during construction within 100m of rivers	Independent experienced laboratory.	Contractor	GEPCO Cell	ESC GEPCO
6. Water Resources	1. Availability of water acceptable to community. No complaints. 2. Guidelines established to minimize the water wastage during construction operations and at worker camps.	1. Monthly 2. Monthly	Prior to submission of progress reports.	All local water supply resources and rivers.	Contractor	Contractor	GEPCO Cell	ESC GEPCO
8. Spoil disposal and construction waste disposal	1. Use of land agreed with surrounding residents & Villages. 2. Waste Management Plan implemented. 3. No open burning	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All GEPCO alignment.	Contractor	Contractor	GEPCO Cell	ESC GEPCO
10. Noise	Noise mitigation measures implemented in line with guidelines for noise reduction from ISO/TR11688-1:1995(E)	Monthly (line item when opening up construction).	Maximum allowable noise levels are 70dB(A)Leq.	All GEPCO alignment.	Contractor should maintain the accepted standards	Contractor	GEPCO Project Cell will monitor sample activities.	ESC GEPCO
11. Air quality	Noise and dust control plan implemented.	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All GEPCO alignment.	Contractor	Contractor	GEPCO Cell	ESC GEPCO
13. Soil Contamination	Contractors workforce to instructed and train handling of chemicals	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All GEPCO alignment.	Contractor	Contractor	GEPCO Cell	ESC GEPCO
14. Work Camp Location and	1. Use of land agreed with surrounding residents & Villages.	Monthly (line item when opening up	Prior to construction.	All GEPCO alignment.	Contractor	Contractor	GEPCO Cell	ESC GEPCO

Environmental concern	Performance indicator (PI)	Frequency to monitor	Timing to check PI	Locations to implement PI	Responsible to implement PI	Cost of Implementation	Resp. PI supervision	Cost of Supervision
Operation	2. Waste Management Plan implemented. 3. No open burning	construction).	Update monthly.					
19. Safety Precautions for Workers	Safety Plan submitted	Once (update monthly as necessary)	One month before construction and update quarterly.	All GEPCO alignment.	Contractor.	Contractor	GEPCO / (ESC cell to actively supervise and enforce.	ESC GEPCO
20. Social Impacts	1. Local labor is used and workforce 2. Local educated people for office work. 3. Complaints on construction nuisance damages close to ROW are responded to promptly by the Contractor. 4. Quarterly meetings with local VILLAGE for liaison purposes to monitor complaints.	Monthly (line item when opening up construction).	During construction. Update monthly.	All GEPCO alignment.	Contractor	Contractor	GEPCO Cell	ESC GEPCO
21. Enhancements	Contractor has included for some enhancements in detailed designs Including planting of trees in addition to bioengineering such as in median	Once (update monthly as necessary)	One month before construction and update quarterly.	All GEPCO alignment.	Contractor.	Contractor	GEPCO Cell to actively supervise and enforce.	ESC GEPCO
OPERATIONAL STAGE								
1. Air Quality	1. Roadworthiness of vehicles on GEPCO. 2. Monitor NO ₂ and PM ₁₀ as indicators.	1. Roadworthiness of vehicles on GEPCO Daily during operations 2. Yearly intervals for 3 years after opening for reassurance.	During operation.	5 locations on GEPCO alignment nearest settlements.	Contractor	Contractor	GEPCO ESC Cell	ESC GEPCO
2. crops and vegetation	1. Follow up on Tree Clearance and Compensatory Planting Plan. 2. Records on survival of planted	1) Quarterly 2) Quarterly 3) Quarterly	1) Throughout project 2) Each of	All GEPCO alignment.	Contractor	ESC Cell	GEPCO	ESC GEPCO

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

LAFC = Land Acquisition Compensation Fixation Committee. **DDS**=Detailed design stage. Based on EIA/IEE reports to be revised at DDS, RAP, SIA and other engineering considerations may change, **EIA**=environmental impact Assessment. **EMP**=, environmental management action plan = environnemental management plan, **EPA**= Environnemental Protection Agency. **TD** = Temporary drainage. **EC** = Erosion control. **NGO** = Non-government organization. GEPCO PMU cell checks that processes have been completed and signed off before moving to construction stage.

5.4 Project Monitoring Activities During The Project Cycle:

The Activities at various stages of the project cycle have been summarized in the table for reference for consultants as presented below;

Monitoring Program for 8th STG Projects

	Monitoring Parameter	Timing	Responsibility
DESIGN PHASE			
1.	Audit project bidding documents to ensure EIA and EMMP is included	Prior to issue of bidding documents	GEPCO through PM management unit
2.	Monitor that the selection process and final alignment selection process and its environmental compliance with EMMP	Prior to GEPCO approval of contractor's detail alignment survey	GEPCO through PM management unit
3.	Monitor contractor's detail project design to ensure relevant environmental mitigation measures in EMMP have been included	Prior to GEPCO approval of contractor's detail alignment survey	GEPCO through PM management unit
4.	Monitor through implementation of detail environmental guidelines for construction works including procurement management, works and closing operation	Prior to GEPCO approval of contractor's detail design	GEPCO through PM management unit
5.	Review the mineral, construction materials and waste management	Prior to GEPCO approval of contractor's detail design	GEPCO through PM management unit
6.	Audit detail design of facilities and installation to ensure standard	Prior to GEPCO approval of contractor's detail design	GEPCO through PM management unit

Monitoring Program for 8th STG Projects (Continued)

CONSTRUCTION PHASE				
	Monitoring Parameters	Monitoring Locations	Timing	Responsibility
1	Observation of soil erosion	Construction sites, campsites	During routine monitoring	PMU
2	Water quality	At wells and surface water bodies near grid station and construction campsites	Before mobilization	Contractor PM
		Selected local wells	Once every two months	Contractor PM
		Selected locations at nearby surface water bodies		Contractor PM
3	Water consumption	Construction sites, campsite	Daily	Contractor PM
4	Checks for any damage to water course, groundwater wells	Construction sites	During routine monitoring	PMU
5	Ambient air quality	Construction sites, campsites	Before mobilization	Contractor PM
		Construction sites, campsites	Once every two months	Contractor PM

6	Checks for exhaust emissions	Construction sites, campsites	During routine monitoring	Contractor/PMU
	Checks for dust emissions	Construction sites, campsites, project roads	During routine monitoring	Contractor/PMU
7	Noise	At nearby communities	Fortnightly/ during the construction activities causing noise	Contractor/PMU
8	Public concerns	At nearby communities	Throughout the field activities.	PMU

Monitoring Program for 8th STG Projects (continued)

OPERATIONAL PHASE				
	Monitoring Parameters	Monitoring Locations	Timing	Responsibility
1	Compensatory tree planting	Selected sites for plantation of trees	After construction phase	GEPCO
2	Crops and vegetation	Land under the transmission line	During routine maintenance	GEPCO
3	Social safety Impacts	Population along transmission line	During routine maintenance	GEPCO

5.5 Estimated Environmental & Social Management Costs

The cost of mitigation measures include; water sprinkling, provision of Personal Protective Equipment's (PPEs) to workers, arrangement of first aid kits at site, firefighting equipment's, waste management. The compensation costs include the costs for cutting of trees due to construction of subproject. It should be noted that as referred earlier that the project is at a preliminary stage and detailed surveys including tower spotting is to be carried out for the project showing the actual position of the towers, so at this stage only tentative and lump sum amount has been allocated for the expected losses and is based on the environmental and social field surveys. The cost for implementation of mitigation measures prescribed in Environmental Management Plan (EMP) has also been given. The total estimated cost for the environmental and social management comes to about 50 Millions Pak Rs. that is 5% of the total project cost. This includes the cost of environmental implementation of mitigation measure.

6. INVOLVEMENT OF STAKEHOLDERS/ PUBLIC CONSULTATION

6.1 General

Stakeholders, especially the local population, involvement is an important feature of environmental assessment and can lead to a better and more acceptable decision-making regarding the Project design and implementation. The Pakistan Environmental Protection Act (PEPA) specifies stakeholder consultation process is an integral part of environmental assessment, and thus makes it mandatory. PEPA guidelines for environmental assessment, other international donors require that stakeholders such as affected groups and non-governmental organizations (NGO's) should be consulted as a part of the environmental assessment of the projects. The primary purpose of this provision is to protect the interests of affected communities, especially the poor and vulnerable groups.

During the field surveys of the proposed project, a series of meetings and consultations were held with the local community and other stakeholders. During these meetings, the consultants explained the project objectives in details to the potential affected persons and other stakeholders. Consequent upon these conversations/ briefings by the consultant, potential affected persons and other stakeholders shared their concerns and suggestions, related to environmental impacts and even come up mitigation measures which were documented by consultants' team on the spot carefully to enhance the project acceptability on social grounds. During field visits of the project area, public consultations and scoping sessions were carried out at various locations in the project area to fulfill the national as well as donor requirements. The feedbacks and issues raised during the consultation were recorded and documented while developing the strategy. Consultations with Government departments were mostly related to proposed T/L route alignment, legal requirements, associated impacts, lessons learned during implementation of previous projects, availability of requisite baseline information, specific requirements, information regarding any future development plans, coordination between various concerned departments.

6.2 Identification of Main Stakeholders

Under the proposed sub-project, public consultation was carried out for all accessible places within the Corridor of Influence (COI). These consultations were carried out during the baseline survey. The major categories participated in public consultation were local GEPCO employees, representatives from other government departments EPD, Forest, local population, community groups, landowners, businessmen, tenants, women, vulnerable groups and potential Project affected persons (PAPs) belonging to the COI. Consultations were conducted inside the Garhi Town housing scheme and villages around the proposed G/S and associated transmission line.

Public consultations are helpful for collecting socio-environmental information, understanding the likely impacts, determining community and individual preferences, selecting project alternatives. The feedbacks and issues raised during the consultation were recorded and documented for developing the strategy.

6.3 Public Consultation Process

There is also a requirement for ongoing consultation for Resettlement Plan/ damages Compensation. The project neither involves permanent displacement nor resettlement. It is expected that this process will continue throughout all stages of the subproject in order to accommodate stakeholders' aspirations and to orient the stakeholders positively towards the project implementation and where possible to harness cooperation over access issues in order to facilitate timely completion.

6.4 Approach to Public Consultation

The public consultation process with various stakeholders has been approached so as to involve public and other stakeholders at the earliest stages. Public consultation has taken place during the planning and design and viewpoints of the stakeholders have been taken into account and their concerns and suggestions for possible improvements have been included where appropriate. Much of the public consultation process to date has revolved around concerns for the mitigation of construction impacts and the possible side effects from the proximity of high voltage power lines and the sub-project and its equipment.

Role of Concerned Agencies/ Departments

Project Stakeholder	Name	Roles
National Authorities	EPA	Recently due to the 18 th amendment Pak EPA has delegated all Powers to the provincial EPAs. Now the Provincial EPAs in case the Govt. of Punjab are the responsible for the protection of the Environment as per Punjab EPA Act, 1997 (Amended 2012) and all its provisions.
	GEPCO	• GEPCO is the Project Proponent of the proposed sub-project. • GEPCO operates and maintains 132 KV Grid Stations, 132kV T/Ls in Central Punjab;
Provincial Authorities (Punjab Province)	Punjab Environmental Protection Agency	• PEPA is the regulatory authorities and mainly responsible for the development and implementation of the environmental policies and strategies in order to integrate the environmental issues and sustainable development approaches into the legal and regulatory frameworks. • EPAs are responsible for the issuance of NOC of the Proposed Project. • EPA Punjab is responsible for the compliance of EMMP and NOC provision during the construction and operation stages of the Project.
***	Agriculture Department	• Ensuring food security, Improving soil health • Enhancing productivity through better varieties and improved management practices • Promoting high value crops, fruits and vegetables • Promoting export of high value agricultural products • Promoting efficient use of water and other inputs • Ensuring fair returns for the growers in marketing of their produce

Project Stakeholder	Name	Roles
	Forest Department	• Protection, improvement and maintenance of existing forests • Increase forests by planting new trees • Extension and advisory services to the general public about plantation
	Wildlife Department	• To save and protect wildlife
	Fisheries Department	• Conservation of fisheries resources • Management and development of resources on scientific basis • Extension services to private sector

6.5 Informal Group Discussions and Scoping Sessions

Consultations were initiated during January, 2023 alongside the socio-economic survey. Consultation was done through meetings in the whole Study Area. Under the proposed Project public consultations with the locals were carried out in town. Total 02 major consultation meetings (01 with male gender and 01 with female gender) were held, with 80 participants (40 males and 40 females), from local population, community groups, landowners, businessmen, tenants, and potential project affected persons (PAPs). Majority of the participants were mature/adult/elderly persons as per the local culture, elders have the right regarding decision, participated in these consultations. Young people were also present during consultations, but their participation was limited. Interview and scoping session methods were adopted for public consultations. Consultations were carried out with various groups of population (men, women, youth and elders). Besides this, number of relevant officers/officials were contacted, bilateral discussions carried out and documented accordingly.

6.6 Project Related Meetings with Government Officials

Following officials on District level were consulted:

List of Consultations with the Government Officials

Sr. No	Designation	Contact
1-	XEN 132kV Transmission Line Construction T.L.C (GSC)	03183991854
2-	SDO 132 kV T.L (GSC)	03183991856
3-	P.D (GSC)	03183991850
4-	AD Agri Ext Gujranwala	03332840837
5-	Inspector EPA Gujranwala	03003044629
6-	DFO Gujranwala	03002189388
7-	Tech Officer Buildings Gujranwala	0559200663
8-	DD Agri Ext Gujranwala	03322741461
9-	Dy. Conservator Wildlife Gujranwala	03008370349

6.7 Commonly Raised Concerns of the Stakeholders

Project related concerns and suggestions are related to the willingness of people to accept project, livelihood, electricity and compensation/relocation/resettlement while concerns include drinking water supply and sewerage, health facilities, road infrastructures, education, water issues, agriculture and security. Following are the main concerns of the locals fall in the COL.

Project Stakeholder	Name	Roles
	Forest Department	- Protection, improvement and maintenance of existing forests - Increase forests by planting new trees - Extension and advisory services to the general public about plantation
	Wildlife Department	To save and protect wildlife
	Fisheries Department	- Conservation of fisheries reservoirs - Management and development of resources on scientific lines - Extension services to private sector

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3-	P.D (GSC)	03183991850
4-	AD Agri Ext Gujranwala	03332840837
5-	Inspector EPA Gujranwala	03003044629
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9-	Dy. Conservator Wildlife Gujranwala	03008370349

6.7 Commonly Raised Concerns of the Stakeholders

Project related concerns and suggestions are related to the willingness of people to accept project, livelihood, electricity and compensation/relocation/resettlement while concerns include drinking water supply and sewerage, health facilities, road infrastructures, education, water issues, agriculture and security. Following is the main concerns of the locals fall in the COI:

- Compensation for loss of crops due to the project activities should be provided;
- Crops compensation should be provided in case of affected crops ;
- Compensation of trees should also be given;
- Project should provide the cheap electricity to the local people especially affected persons;
- There should be transparent and fair compensation;
- All actions associated with the project should be through proper consultations;
- There should be a continuous community consultation program throughout the project implementation period;
- There should be employment opportunities for skilled and unskilled local people, preference should be given to the project affected persons;

6.8 People's Willingness

People in the COI are quite happy with this Project. Most of the people along COI promised their cooperation and support for the proposed Project. According to respondent, such projects are important for the prosperity of people and country. People even demanded that this Project should be implemented as soon as possible. For the consulted communities this Project is more attractive than adverse impacts. Few respondents are even willing to bear minor losses due to this Project. Very few people have negative views about government Projects, as according to them land value would be reduced due to the construction of T/L in the Project Area. Development Project in Area would be ceased due to the construction of Towers.

Women have also shown positive approach towards the proposed Project, as it will help in the development of country by providing more electricity. Most of the women showed their expression to expand the extent of their work and responsibilities; due to lack of opportunities, mobility, illiteracy and poverty. Though they have access to information and agricultural knowledge about farming and livestock activities which has come to them through word of mouth and over time, their main obstacle is their exclusion from using their knowledge and information.

6.9 Privacy

Women have discussed their privacy issues, as according to them when outsiders will come into their area during construction phase they will have to restrict their mobility.

6.10 Employment

It was demanded by the locals that Govt. should provide job opportunities of literate women in education and health sectors. Women demanded that if possible during construction stage of the project their male member should be provided skilled and unskilled job opportunities.

6.11 Results of Public Consultation

The community generally supports the construction of the project and said that project is necessary under the current local conditions. Construction work should be completed in a timely manner. The local poor people predominantly requested for unskilled and semi-skilled jobs on project basis with the contractors during implementation of the project. No land acquisition and resettlement is involved in this subproject. However, compensation will be paid to the concerned parties/ local land owners under the towers and where the loss of some trees and for damaged crops is expected.

The Proponent should coordinate with local authorities during all project activities to ensure good working order to attain the desirable goals of the project.

- The Proponent must address the environmental issues through protection measures.
- The employer is supposed to care the national and international laws and guidelines, especially in the implementation process.
- Take part in the implementation of environmental protection programs in the province.
- The Proponent must liaise with the local administration and authorities to ensure smooth and needful particularly with reference to the law and order and even the social security.
- Well implement social policies in locality.
- The Proponent is to be committed to take measures to control and mitigate negative impacts that may occur during the construction and operation phase of the project and comply with the Environmental Protection Act under the current regulations.

On the basis of the consultations so far, it appears that the project will have no insurmountable environmental and social impacts but GEPCO will have to make sure that mitigation measures suggested in the ESIA report be implemented in true letter and spirit.

7. ASSESSING IMPACTS

7.1 Pre-Construction and Construction Stages

Pre-construction: 32 Kanals one piece of land has been possessed by GEPCO to construct the 132kV Garden Town grid station. All the land is cultivated and is owned by GEPCO. The area of influence is 100% rural.

Construction: During this stage, impacts on environment are expected to be encountered due to the following major factors:

- i. **Air:** Some particulate matters may get into the air due to excavation and movement of heavy construction machinery. However, the large particles of the dust will redeposit in the adjoining areas of the site. In addition the dust particles will also disperse into the air as a result of wave action, wind speed and air temperature.
- ii. **Noise:** Construction/ erection activities at site would cause substantial increase in the noise level due to excessive use of different construction and erection machines. However, the high level of noise and vibration are only site specific and short term and would not be significant. Further, high sound level would have no detrimental effects as most of the transportation activities shall take place during night hours. The existing ambient noise level measured at site in January 2023 ranges between 50–55 dB.
- iii. **Soil Removal:** No major digging activities of soil are foreseen except the excavation of land for the construction of foundation. The excavation material for the foundations and Transmission lines would be backfilled in the project area.
- iv. **Soil Erosion:** The site area is flat having mild slope just sufficient for irrigating the land and is vegetated. The wind velocity ranges from 3 to 6 KMs@ hour during most of the year. It is therefore anticipated that soil erosion would not take place during construction phase.
- v. **Drainage and Surface Water Changes:** The drainage would be done through city district government sewerage system which has been approved by concerned Tehsil Municipal Authority (TMA office). As such no inflow of waste water or sewerage is envisaged during implementation of the project.
- vi. **Wildlife:** During the site survey, it revealed that no habitation of significant wild life exists near the project site.
- vii. **Secondary Development:** This would help in improving the socio-economic aspects of the area through decrease in fluctuation in voltage and inflow of employees being hired during operation of the project.

Operational Stage: The effects of the proposed plant pollutants on the environment are negligible on air and not on water and land. As no large sources of combustion derived air pollutant emissions within 50 km of proposed site of plant exists, background concentrations of SO_2 , NO_x and particulates matters were assumed to be essentially zero. The only envisaged impacts of project are electromagnetic field generated due to transmission lines.

- i. **Air Pollution:** The proper HSE program shall be implemented as described in the emergency plan during the operation phase of the project.
- ii. **Air Quality:** Ambient air quality at the proposed site was tested in the January 2010. The results of existing air quality are given in Annex-A. Since the values are typical of clean air, the above assumption regarding zero background concentration appears valid.
- iii. **Gaseous Emissions:** No high concentration of gases is envisaged by the unit.
- iv. **Air Dispersion Model:** Air quality impacts were predicted using International Environmental Protection Agency's approved dispersion model, i.e. Gaussian model. The model was used to compute daily average values of ground concentration for a given set of dispersion parameters and wind velocity and direction. The model can be used to assess pollutant concentration from a variety of sources associated with an industrial source complex. The model can account for plume rise, settling and dry deposition of particles and a limited terrain adjustment. It is suited for use in areas with flat or rolling terrain below the stack height and provides reasonable concentration estimates up to a distance of 50 km from the source of emission.
- v. **Water Pollution, Surface and Ground water:** No surface water pollution shall be envisaged due to dry process and no natural surface water course passes through the area.
- vi. **Waste water Disposal:** No waste water shall be produced during the operation phase except toilet waste water which will be within the NEQs.
- vii. **Solid and oil waste:** No solid waste shall be produced during operation of the plant; however, during construction stage solid waste produced shall be debris and excavated material which may be dumped into low lying area of project site or nearby areas.
- viii. **Noise:** The design noise level for the plant will be 45 dBA at 01 m distance from the equipment. Noise levels "design noise generators may produce the high noise than the ambient noise level. Protective devices, like ear muffs, would be provided to the workers to minimize the high noise level effects if any.

7.2 Impacts of 132kV Transmission line

The spacing of conductors is determined by considerations, which are partly electrical and partly mechanical. Usually conductors will swing synchronously (in phase) with the wind, but on long spans and small size of conductors, there is always possibility of the conductors swinging

non-synchronously, and the size of the conductor and the maximum sag at the center of the span are factors, which should be taken into account in determining the phase distance apart at which they should strung. As a rule of thumb, minimum horizontal spacing between conductors should not be less than 1% of the span length in order to minimize the risk of phases coming into contact with each other during swing.

Tower top clearance is the vertical clearance between earth wire and top conductor, which is governed by the angle of shielding. The shield angle varies from about 250 to 300, depending on the configuration of conductors. Tower top clearance shall be taken 1.5 and 2.25 meters for 132 kV and 220kV respectively. It could be clearly noted that safety of margin is at least 3 times to cater for any negative impacts of magnetic field generated due to transmission lines.

7.3 General Characteristics of Project Area

The Garden Town Grid Station 132kV AIS will be linked /connected to the existing passing 132kV Gakhar-Aroop double circuit transmission line. Grid station will be constructed on 32-Kanals one piece of land which has already been in GEPCO possession. Domestic, commercial and industrial power demand of the area is increasing rapidly like all other areas of Punjab. Due to the increased power demand of the area the existing grid stations have become overloaded and insufficient, and there is need to improve the power supply of the city and surrounding towns and villages.

7.4 Physical Resources

7.4.1 Topography, Geography, Geology, and Soils

Gujranwala is 226 meters (744 ft) above sea level, sharing borders with Ghakhar Mandi and several towns and villages. About 80 kilometers (50 mi) south is the provincial capital, Lahore. The district can broadly be divided into two parts. The low-lying areas close to the Chenab River and the Dekh nullah and upland between the two. Canal irrigation has, however, made the wastelands fit for cultivation. The main types of soil in the district are (i) Gora, an artificial soil highly manure, commonly found around villages and wells; (ii) Rohi, the finest natural soil and stiff clay dark/reddish dark in color; (iii) Doshair or Missi which is a fine clay soil; (iii) Maira, which is of less loam with less clay than sand; (iv) Tibba, which is inferior maira; (v) Kallar, which is a sour and barren clay unsuitable for cultivation within adequate suitable treatment and (vi) Bela of the river in soil is a fine alluvial soil mixed with sand.

7.4.2 Climate and Hydrology

Gujranwala has a hot semi-arid climate and changes throughout the year. During summer (June to September), the temperature reaches 36–42 °C (97–108 °F). The coolest months are usually November to February, when the temperature can drop to an average of 7 °C (45 °F). The highest-precipitation months are usually July and August when the monsoon reaches the Punjab.

During the other months, the average rainfall is about 25 millimeter's (0.98 in). October to March have little rainfall.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high °C (°F)	19.1 (66.4)	22.1 (71.8)	27.4 (81.3)	33.7 (92.7)	39.0 (102.2)	40.8 (105.4)	36.1 (97.0)	34.6 (94.3)	35.0 (95.0)	33.0 (91.4)	27.0 (80.6)	23.7 (74.7)
Daily mean °C (°F)	12.2 (54.0)	15.0 (59.0)	20.3 (68.5)	26.0 (78.8)	31.0 (87.8)	33.8 (92.8)	31.4 (88.5)	30.2 (86.4)	29.5 (85.1)	25.4 (77.7)	18.6 (65.5)	12.5 (54.5)
Average low °C (°F)	5.3 (41.5)	8.0 (46.4)	13.3 (55.9)	18.4 (65.1)	23.1 (73.6)	26.9 (80.4)	26.7 (80.1)	25.9 (78.6)	24.0 (75.2)	17.8 (64.0)	10.3 (50.5)	5.1 (41.2)
Average precipitation mm (inches)	31 (1.2)	30 (1.2)	29 (1.1)	18 (0.7)	19 (0.7)	46 (1.8)	147 (5.8)	168 (6.6)	63 (2.5)	9 (0.4)	5 (0.2)	16 (0.6)

7.4.3 Groundwater and Water Supply

The chemical quality of ground water in the district varies in different areas and at different depths. Potable water is available in the district. Irrigation supplies are perennial and tube wells have been installed to make up the deficiencies. The stratum near the grid station is bearing and alluvial deposits, giving groundwater potential throughout the subproject area. The water table is about ten to twelve meters below the surface. The water table is not seasonally fluctuating and dug wells do not generally run dry. Groundwater sources exist in the area and there are wells within 500 meters of the proposed grid station.

7.5 Air Quality

Air quality in most of the project area appears good based on observation during the study period. There will be a few items of powered mechanical equipment to be used in the construction of the grid station works that may give rise to complaints of dust and noise emissions; however these should be minor and easily dissipated. There are no other industrial pollution sources in the vicinity of the Garden Town subproject. There should be no source of atmospheric pollution from the project. The other major source of air pollution is dust and noise from construction and other ground or soil disturbance, during dry weather, and from movement of vehicles on poorly surfaced or damaged access roads. It has been observed that dust from vehicles may even be high enough to obscure vision significantly temporarily.

7.6 Noise

Noise from vehicles and other powered mechanical equipment is intermittent. However, construction from the proposed power expansion will use powered mechanical equipment. Subjective observations were made of background noise and also of individual vehicle pass events. Environmental Baseline Data Collection/ Lab Tests Reports attached at Annexure A

7.7 Seismology

On the basis of Peak Ground Acceleration (PGA) values obtained through Probabilistic Seismic Hazard Assessment (PSHA), Pakistan is divided into five (05) seismic zones in line with UBC (1997) as below: -

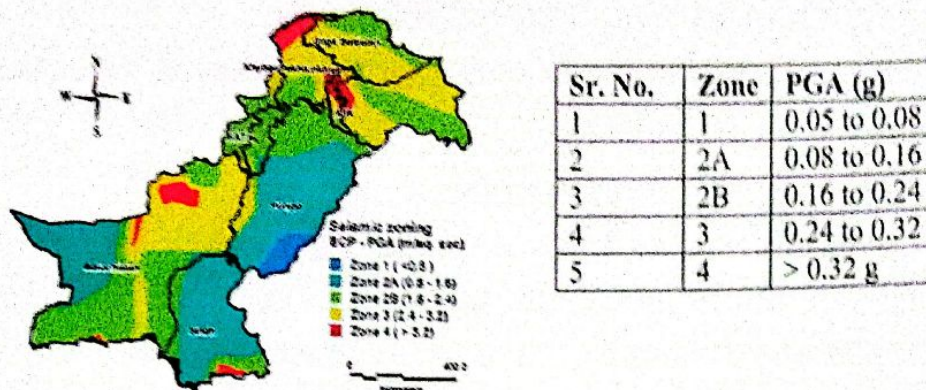


Figure 4: Seismic zoning map of Pakistan according to Building Code of Pakistan

Seismic zones

Sr. No.	Tehsil	Seismic Zones
1	Gujranwala City	2A
	Wazirabad	2A
	Gujranwala Sadar	2A
	Nowshera Virkan	2A
	Kamoki	2A
2	Hafizabad	2A
	Pindi Bhattian	2A
3	Gujrat	2B
	Kharian	2B
4	Mandi Bahauddin	2B
	Malikwal	2B
	Phalia	2A
5	Sialkot	2B
	Daska	2B
	Pasrur	2B
6	Narowal	2B
	Shakargarh	2B

The proposed route as per Building Code of Pakistan (BCP), 2007 (Seismic Provisions) falls entirely in the zone 2A, which is the regions of low seismic risk. Hence all the applicable provisions of BCP, stated in the report related to, Mechanical and Electrical System should be met during the design and construction for safety against seismic hazards.

7.8 Biological Resources

Wildlife, Fisheries and Aquatic Biology:-No wildlife and fisheries and aquatic life exist in the area.

7.9 Protected Areas/ Trees

There is no protected and religious tree. There are 10-15 trees shall be cut down inside boundary wall of Garden Town Grid Station which will be compensated with plantation least 100 trees inside AIS grid station.

7.10 Protected Areas / National Sanctuaries

There is no wetland, protected area or national sanctuary near the area of works and subarea.

7.11 Socio-Economic Environment

Gujranwala also known as "City of Wrestlers" and is quite famous for its food. The city is Pakistan's 5th most-populous metropolitan area, as well as 5th most populous city in Pakistan by population. Since the 2000s the population growth rate of Gujranwala has averaged at 3.0%. The population growth rate is projected to slow down to 2.51% by 2035.

7.11.1 Economic Development

Gujranwala is home to a wide variety of industries. Gujranwala is the Pakistan's third largest center of industrial production, after Karachi and Faisalabad. Gujranwala, along with the other industrial cities of Sialkot and Gujarat City, form what is sometimes referred to as the Gujranwala Triangle in reference to their relative prosperity and export-oriented industrial base. The city's industries employ up to 500,000 people, while the city's GDP makes up 5% of Pakistan's economy along with an estimated 6,500 small and medium enterprises 25,000 cottage units. The city is the center for manufacture and export of sanitary fittings and wares in Pakistan, with 200 producers based in Gujranwala.

The city is Pakistan's third largest center for iron and steel manufacturing - reflecting Gujranwala's historic association with metalworking since the migration of the Lohar clan blacksmiths to the city during the colonial era. Textiles, apparel, yarn, and other textile goods are also produced in Gujranwala. Other manufacturing based in the city include rice, plastic cutlery, coolers and heaters, agricultural tools and equipment, carpets, glass goods, sugar equipment, leather products, and machinery for military uses, domestic appliances, motor vehicles and food products. The rural regions surrounding Gujranwala are heavily engaged in production of wheat, and are yield more wheat per acre than the national average. Gujranwala District is also the most productive region for rice-growing in Punjab.

7.12 Transportation

Gujranwala is situated along the historic grand truck road that connects Peshawar to Islamabad and Lahore. The grand trunk road also provides access to the Afghan border via the Khyber Pass, with onwards connections to Kabul and Central Asia via the Solangi Pass. Gujranwala

connected to Lahore by way of the Sialkot-Lahore Motorway, opened in 02-2022. The motorway is passing east of the Grand Trunk Road, and will terminate near the Sialkot International Airport. Plans for the motorway's extension further north to Kharian near Gujarat City were announced in early 2022 and is under execution.

7.12.1 Rail

Gujranwala Railway Station serves as a stop along Pakistan's 1,687 kilometers (1,048 mi)-long Main Line-1 railway that connects the city to the port city of Karachi to Peshawar.

7.12.2 Air

Gujranwala has no airport of its own. The city is instead served by airports in nearby cities, including the Allama Iqbal International Airport in Lahore that offers non-stop flights to Europe, Canada, Central Asia, East Asia, and Southeast Asia. Gujranwala is also serviced by the nearby Sialkot International Airport Pakistan's first privately owned commercial airport. Built in 2015, the airport offers non-stop service to the Middle East, as well as domestic locations.

7.12.3 Public Transportation

Gujranwala lacks a centrally managed public transportation system. Uber car-hire services became available in Gujranwala in early 2020 and were soon followed by Careem.

7.13 Education and Literacy

Gujranwala is the city located under the Gujranwala District in Punjab, the overall literacy rate in this region is not bad because various educational institutes are offering their best educational services to support the education sector in Gujranwala. Colleges/ Universities in Gujranwala are providing different courses for the students. Numerous other educational government and private institutions are also contributing their role in education area to develop the healthy nation.

Literacy: All the respondents of the Project Area were literate having good educational background. Educational status of the respondents shown in the Table;

Sr. #	Respondent	Intermediate	Graduate	Post graduate
1.	Male	4	8	12
2.	Female	1	2	3
	Total	5	10	15

7.14 Health Facilities

The project abounds with medical health facilities such as DHQ Hospitals, Private Hospital, private clinics, dispensaries etc. Medical health facilities available in the project area include private clinics and govt. Hospital.

7.15 Energy Sources

Electricity:-GEPCO (Gujranwala electric power company) declared as Distribution Company "GEPCO" after dis-bundling of WAPDA. GEPCO is providing a public utility service of

distribution/ supply of electricity within the territories (07 districts Gujranwala, Hafiz Wazirabad, Sialkot, Gujrat, Narowal and Mandi-Baha-ud-din).

Water:-WASA Gujranwala is responsible for the planning, design and construction of water supply, sewerage and drainage facilities; rehabilitation and augmentation of the existing system; and operation and maintenance of the entire system in Gujranwala District. Presently, WASA Gujranwala is providing water and sewerage services to 73 urban union councils (73 Km). Water Supply system coverage is 37% whereas the coverage of Sewerage/Drainage System is 65%.

Gas:-More than 80% percent housing units are using gas as cooking fuel in their houses, 16% percent are using wood for this purpose. About 4 percent are using kerosene oil and other sources of cooking fuel in their houses.

7.16 Cropping Pattern

The cropping pattern refers to the allocation of cultivated area under different crops during a year. There are different Rabi and Kharif crops which are being grown along the Project alignment. The main crops grown during Rabi season are wheat, gram, peas, carrot, onion, potato. In case of Kharif season, the main crops are rice, maize, corn, jowar, soya bean, sugarcane, etc. The Rabi crops are sown in mid-November and harvest in April/ May while the Kharif crops are sown in June/ July and harvest in November/ December. The major crops in this area are wheat and rice.

7.17 Professional Status of Sample Households

The respondents of the Project Area were economically active. Out of thirty (30) respondents, fifty per cent (50%) were in service having Government and private jobs, ten per cent (10%) were businessmen, twenty per cent were house wife, and nine of them were unemployed. Following presents the professional status of the respondent.

Sr. #	Profession	Number	Percentage (%)
1.	Business	11	30
2.	Service (Govt./Public/Private)	15	50
3.	Housewives	6	20
4.	Unemployed	0	0
Total		30	100%

7.18 Cultural, Archaeological and Other Structures

There are no religious sites, tombs around the project area.

7.19 Public Utilities

All the public utilities such as water supply, sewerage system, electricity, Sui gas and telephone lines are available near the Project Area. Petrol Pumps, Mosques are available near the Project Area.

7.20 Resettlement Issues

The land of construction is in GEPCO possession and there is no structure or settlement on the land, therefore, there is no issue of resettlement involved.

8. MITIGATION & IMPACT ASSESSMENT

8.1 Identification of Project Affected Persons (PAPs)

As referred earlier, the project is at the feasibility stage and detailed survey along with the spotting of the T/L Tower. The GS will be energized with the nearby existing Pasroor Road Grw. to Lahore Road Grw. transmission line. Only one tower will be installed within the boundary of grid station, therefore no ROW and affected persons involved in T/Line factor.

8.2 Mitigation Measure (Construction Stage)

Pre-Construction and Construction Stages

Pre-construction:-About 32 Kanals of land has been acquired to construct the 132 kV Garden Town grid station. All the land is owned by GEPCO. The area of influence is 100% rural.

Construction: During this stage, impacts on environment are expected to be encountered due to the following major factors:

- i. **Air:** Some particulate matters may get into the air due to excavation and movement of heavy construction machinery. However, the large particles of the dust will redeposit in the adjoining areas of the site. In addition the dust particles will also disperse into the air as a result of wave action, wind speed and air temperature.
- ii. **Noise:** Construction/ erection activities at site would cause substantial increase in the noise level due to excessive use of different construction and erection machines. However, the high level of noise and vibration are only site specific and short term and would not be significant. Further, high sound level would have no detrimental effects as most of the transportation activities shall take place during night hours.
- iii. **Soil Removal:** No major digging activities of soil are foreseen except the excavation of land for the construction of foundation. The excavation material for the foundations and Transmission lines would be backfilled in the project area.
- iv. **Soil Erosion:** The site area is flat having mild slope just sufficient for irrigating the land and is vegetated. The wind velocity ranges from 3 to 6 KMs@ hour during most of the year. It is therefore anticipated that soil erosion would not take place during construction phase.
- v. **Drainage and Surface Water Changes:** The drainage would be done through city district government sewerage system which has been approved by concerned Tehsil

Municipal Authority (TMA office). As such no inflow of waste water or sewerage envisaged during implementation of the project.

- vi. **Wildlife:** During the site survey, it revealed that no habitation of significant wild exists near the project site.
- vii. **Secondary Development:** This would help in improving the socio-economic aspect of the area through decrease in fluctuation in voltage and inflow of employees being in during operation of the project.

Operational Stage: The effects of the proposed plant pollutants on the environment are not on air and nor on water and land. As no large sources of combustion derived air pollution emissions within 50 km of proposed site of plant exists, background concentrations of SO_2 and particulates matters were assumed to be essentially zero.

- i. **Air Pollution:** The proper HSE program shall be implemented as described in the emergency plan during the operation phase of the project.
- ii. **Air Quality:** The results of existing air quality are given in Annexure A. Since the values are typical of clean air, the above assumption regarding zero background concentration appears valid.
- iii. **Gaseous Emissions:** No high concentration of gases is envisaged by the unit.
- iv. **Water Pollution, Surface and Ground water:** No surface water pollution shall be envisaged due to dry process and no natural surface water course passes through the area.
- v. **Waste water Disposal:** No waste water shall be produced during the operation phase except toilet waste water which will be within the NEQs.
- vi. **Solid and oil waste:** No solid waste shall be produced during operation of the plant; however, during construction stage solid waste produced shall be debris and excavated material which may be dumped into low lying area of project site or nearby areas.
- viii. **Noise:** The design noise level for the plant will be 45 dBA at 01 m distance from the equipment. Noise levels "design noise generators may produce the high noise than the ambient noise level. Protective devices, like ear muffs, would be provided to the workers to minimize the high noise level effects if any.

8.3 HSE Arrangements for Environmental Management

The detailed health and safety plan is responsibility of GEPCO environmental manager and usually are site specific, but must contain the following minimum:

- Information concerning the Construction site and, if appropriate, information complementing the preliminary statement;
- General measures for site organization;

- Reference to possible risks and description of works that may affect health and safety of workers;
- Specific safety measures for jobs which carry risks, collective and individual protection measures;
- Organization of the construction site, including methods for the storage of materials, placement of the equipments pertaining to contractors and subcontractors;
- coordination measures set out by the coordinators of health and safety matters and obligations which derive from such measures;
- General measures to ensure maintenance and cleaning of the site;
- Practical tips on first aid, people evacuation and organizational measures taken with this regard;
- Cooperation rules between contractors, subcontractors and independent workers regarding the safety and health measures.

8.4 Identification of Critical Environmental Impacts & Remedial Measures

The quality of ground water is suitable for human use and no hazard is expected for potable water quality. Proper safety measures for handling the hazardous chemicals required for the operation of plant, as discussed in Health and Safety Manual would be taken by the operation staff. The storage for these chemicals would be provided with all safety equipment as required by International safety rules and standards. Plant operation and shut down is not expected to cause any hazard to the environment.

Impacts of 132kV Transmission Line: The spacing of conductors is determined by considerations, which are partly electrical and partly mechanical. Tower top clearance is the vertical clearance between earth wire and top conductor, which is governed by the angle of shielding. The shield angle varies from about 250 to 300, depending on the configuration of conductors. Tower top clearance shall be taken 1.5 and 2.25 meters for 132kV and 220kV respectively. It could be clearly noted that safety of margin is at least 3 times to cater for any negative impacts of magnetic field generated due to transmission lines.

8.5 Short Resettlement Plan

A Resettlement Plan to identify project related social aspects, associated impacts and to minimize these impacts is provided at *Annexure-B*.

8.6 Strategy for Compensation of Land Affected by Towers

The GS will be energized with the nearby existing 132kV Gakhar-Aroop Transmission line. 20 No. of Poles will be installed.

8.7 Assessment of Compensation Unit Values

The damages caused to the existing crops during the detailed survey and soil investigation for the Tower foundations will be recorded and estimates of compensation will be prepared accordingly by the concerned revenue staff i.e. Patwari. The estimates will be prepared in accordance with the approved rates of the concerned District Government. The record of Patwari will be verified by the Assistant Land Acquisition Officer (ALAO) and GEPCO's divisional officer (SDO), who will be the in-charge of the work. After verification, the record will be submitted to the Chief Engineer (Dev.), GEPCO through the project Director, GEPCO and the competent authority for approval. Accordingly, funds will be released for payment to the affected persons.

The proposed methodology to be adopted during the RP for assessing unit compensation value of different items is illustrated as follows:

- Land shall be valued at replacement cost based on actual land sale price survey in the year before the impact survey. No deductions for taxes/transaction costs will be applied.
- Houses/buildings will be valued at replacement value based on cost of materials, type of construction, labor, transport and other construction costs. No deductions will be applied for depreciation, salvaged materials and transaction costs;
- Annual crops will be valued at net market rates at the farm gate for the first year crop. In the eventuality that more than one-year compensation is due to the AHs the crops, at the first will be compensated at gross market value; and
- Fruit trees will be valued based on age category (a. seedling; b. not yet productive; c. productive). Productive trees will be valued at gross market value of 1 year income multiplied by the number of years needed to grow a new tree with the productive potential of the lost tree.

9. REPORTING

This study was carried out at the planning stage of the project. Primary and secondary data were used to assess the environmental impacts. The potential environmental impacts were assessed in a comprehensive manner. The report has provided a picture of all potential environmental impacts associated with the Project, and recommended suitable mitigation measures. This study recommends that some further follow up studies are undertaken during project processing in order to meet the EPA requirements. There are some further considerations for the planning stages such as obtaining clearance for the project under the Pakistan Environmental Protection Act (1997) but environmental impacts from the power enhancements will mostly take place during the construction stage. There are also some noise impacts and waste management issues for the operational stage that must be addressed in the detailed design and through environmentally responsible procurement. At the detailed design stage the number of and exact locations for transmission tower enhancements may change subject to detailed surveys but the impacts are likely to be broadly similar at most locations and impacts have been reviewed in the environmental impact section of this ESIA report.

There are a number of key actions required in the detailed design phase. Prior to construction the GEPCO must receive clearance certification from the PEPA and GEPCO must complete an EMP that will be accepted by the PEPA and agreed by the contractor prior to signing the contract. The information provided in this report can form the basis of any further submission to PEPA as required in future. No land acquisition, compensation and resettlement is involved. A social impact assessment and resettlement action plan (RP) has been completed in connection with this ESIA for the whole subproject. The study has:

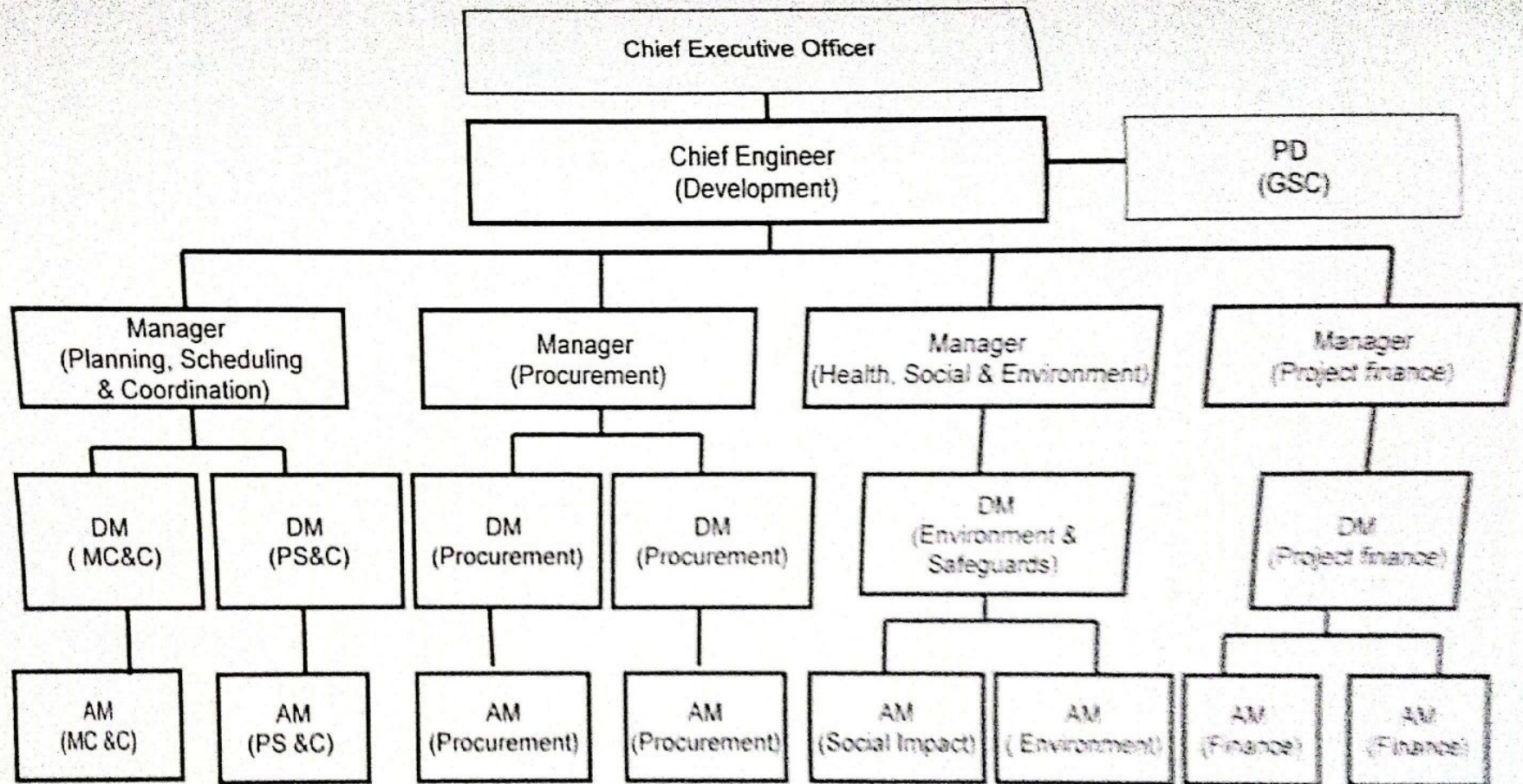
- Examined and assess the overall social and poverty profile of the project area on the basis of the primary and secondary data sources and preparation of a socio-economic profile of the project districts.
- Prepared a social and poverty analysis, taking into account socio-economic and poverty status of the project area of influence, including the nature, extent and determinants of poverty in the project area including assessment. In addition, estimation of the likely socioeconomic and poverty reduction impacts of the project should be included.
- Held consultations with relevant officials from the government and other relevant officials, including consultation with affected communities to assess responses to the project and ascertain the nature and scope of local participation in project planning and implementation.
- Identified, analyzed and, where appropriate, quantified the potential resettlement impacts (minimal) of the proposed Project on the area and the population.

Baseline monitoring activities should be carried out during project detailed design stage to establish the baseline of parameters for checking during the construction stage. The monitoring schedule (Attachment 4) recommends monitoring on two occasions at the site location. Monitoring results should be integrated with the contract documentation to establish performance as thresholds, pollution limits and contingency plans for the contractor's performance. During commissioning phase noise monitoring should ensure that statutory requirements have been achieved. Monitoring activities during project operation will focus on periodic record of environmental performance and proposing remedial actions to address any unexpected impacts.

9.1 Summary and Conclusion

The construction of the Garden Town 132 KV AIS is a feasible and sustainable option from the power transmission, engineering, environmental, and socioeconomic points of view. Implementation of the EMMP is required and environmental impacts associated with the project need to be properly mitigated, and the existing institutional arrangements are available. Additional human and financial resources will be required by GEPCO to complete the design and incorporate the recommendations effectively and efficiently in the contract documents linked to payment milestones. The proposed mitigation and management plans are practical but require additional resources. This EIA, including the EMMP, should be used as a basis for an environmental compliance program and be included as an Attachment to the contract. The EMMP shall be reviewed at the detailed design stage. In addition, any subsequent conditions issued by PEPA as part of the environmental clearance should also be included in the environmental compliance program. Therefore, continued monitoring of the implementation of mitigation measures, the implementation of the environmental conditions for work as part of environmental clearance, and monitoring of the environmental impact related to the operation of the subproject should be properly carried out and reported at least twice per year as part of the project performance report.

EMU ORGANIZATION





SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



AMBIENT AIR MONITORING REPORT

Client Name: Gujranwala Electric Power Company Limited (GEPCO)
Monitoring Point: Mid of Project
Monitoring Date: 04-01-2023
Monitoring By: Solution Environmental & Analytical Laboratory

Site Location: 131 KV Grid Station, Garden Town, Gujranwala
Time Duration of Monitoring: 24 Hours
Reporting Date: 09-01-2023
Sample ID: SEAL/LAB/2023/AA/002

Results:

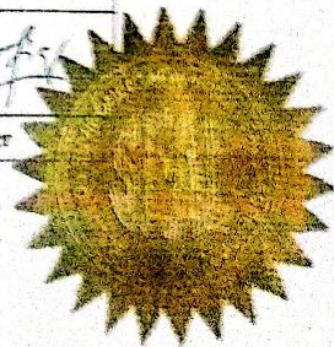
No.	Parameter	Method	Unit	Results	PEQS
1	Particulate Matter (PM ₁₀)	40 CFR Part 50, App J (US-EPA)	µg/m ³	122.4	150
2	Carbon monoxide (CO)	40 CFR Part 50, App. C (US-EPA)	mg/m ³	3.18	10
3	Oxides of Nitrogen NOx (NO & NO ₂)	40 CFR Part 50, App F (US-EPA)	µg/m ³	40.5	120
4	Sulphur dioxide SOx(SO ₂)	EQSA-0197-114 (US-EPA)	µg/m ³	51.8	120
5	Particulate Matter (PM _{2.5})	40 CFR Part 50, App J (US-EPA)	µg/m ³	28.1	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.
- The report is not valid for any negotiations

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



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Email: karachi@seal.com.pk

SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



NOISE LEVEL MONITORING REPORT

Client Name:

Gujranwala Electric
Power Company Limited
(GEPCO)

Site Location:

132 KV Grid Station, Garden
Town, Gujranwala

Monitoring Point:
Monitoring Date

Mid of Project
04-01-2023

Instrument Used:

Digital Sound Level Meter
BSWA-308

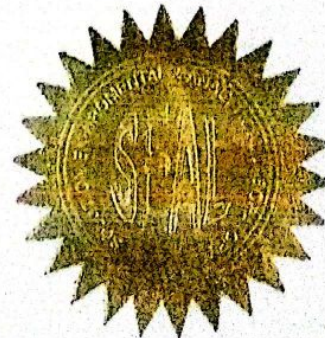
Reporting Date:
Monitoring By:

09-01-2023
SEAL

Time of Monitoring:
Reference No.:

24 Hours
SEAL/LAB/2023/NM/001

Sr. No.	Time	Noise dB(A)		PEQS
1	11:00 AM	62.5	Day Time	65
2	12:00 PM	64.9		
3	01:00 PM	60.8		
4	02:00 PM	58.9		
5	03:00 PM	54.5		
6	04:00 PM	62.4		
7	05:00 PM	63.5		
8	06:00 PM	61.4		
9	07:00 PM	57.6	Night Time	55
10	08:00 PM	50.2		
11	09:00 PM	52.4		
12	10:00 PM	54.2		
13	11:00 PM	51.2		



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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



Client Name:

Gujranwala Electric Power
Company Limited
(GEPCO)

Site Location:

132 KV Grid Station, Garden
Town, Gujranwala

Sampling Point:

Tap Water

Sampling Date:

04-01-2023

Sampling By:

Solution Environmental &
Analytical Laboratory

Nature of Sample:

Ground Water

Date of Completion:

12-01-2023

Reference No.:

SEAL/LAB/2023/GW/007

Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
20	Antimony	APHA 3114 C			
21	Arsenic	APHA 3114 C	mg/l	BDL	0.020
22	Cyanide	APHA 4500-CN ⁻ D	mg/l	0.002	0.050
23	Mercury	APHA 3112	mg/l	0.01	0.05
24	Nickel	APHA 3111 B	mg/l	BDL	0.001
25	Residual Chlorine	APHA 4500-Cl ₂	mg/l	0.008	0.020
26	Total Coliform	APHA 9222 B	mg/l	0.32	0.2 - 0.5
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:

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- 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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Validation for Wastewater & Drinking Water

Gujranwala Electric Power Company Ltd. (GEPCO), 132 KV Grid Station, Wapda Town, Gujranwala.				Sampling Point TAP			
Waste Water (WW) Treatment Facility Primary Secondary Tertiary NA							
Drinking Water (W) Treatment Facility							
Total WW collected Sample							
Total Collected Drinking water samples.....							
Sample Tag for testing parameter is assigned on sample container							
Sample is preserved properly for each testing parameter							
Sample size is adequate for testing the target parameters							
Wastewater Flow Measurement performed to ensure sample representativeness							
Waste Water Flow m ³ /hr from each outlet (Optional)		Water Intake m ³ /hr (Optional)		Water Mass balance complied during sampling (Optional)		Sample Type Ground water	
				Yes No		Grab Composite	
Matrix W WW		Container		Sample Size		Preservation	
✓		Sterile Container		100 mL		Refrigerate 6 C	
✓		Sterile Container		100 mL		0.008% Thiosulphate & cooled 6 C	
✓		P,G		500 mL		Cool 6 C	
✓		P,G		500ml		HNO ₃ to pH < 2	
		P,G		2000 mL		H ₂ SO ₄ to pH < 2, Cool 6C	
		P,G Rinsed I.I HNO ₃		500 mL		HNO ₃ to pH < 2	
		P,G		500 mL		NaOH to pH > 12, Cool 6C	
		Glass		1 Liter		Cool 6 C	
Parameters*							
parameter		pH meter, Model Make		Measurement Method		Calibrated in Field	
				APHA		Yes NO	
				APHA		6.92	
				APHA		22.2°C	
						6.32	

Testing parameters only be validated by RAs, ROs, DD (Labs)

Remarks for Sample Quality (if Any):-

Signature of EPA Officer with office Address
RAs / ROs or ADs / DDs

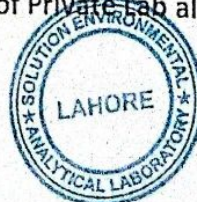
Dated

04-01-2023

Saad Malik
Quaeth

Signature

Name of Assistant /Deputy Analyst, Analytician with Name of Private Lab along with Address:



Deputy Director (Lab),
Environmental Protection Agency,
Duniah Gujranwala



Validation for Stack & Ambient Monitoring / Sampling

Emission Monitoring under CTM-34 or OTM-39			
Facility Name & Address	Gujranwala Electric Power Company Ltd.		
Phone	CGTEPCO, 132KV Grid Station, Wapda Town, Gujranwala.		
Industry Category			
Analyzer Model & Make			
Average stack emission Values of CO, NOx (in mg/m ³)			
Excess Air / Excess Oxygen (%age):-			
Analyzer exposed for Ramp-Up phase to the sample gas for 5 minutes	Yes	No	NA
Analyzer flow rate and EC temperature monitored during calibration and testing	Yes	No	NA
Test Data Phase of sample gas recorded with 15 second interval	Yes	No	NA
All key requirements to ensure QA/QC complied for said EPA approved Method	Yes	No	NA
Particulate Matter (PM) Monitoring / Sampling under USEPA Method 5 / 17			
Model & Make of Iso-kinetic PM Assembly			
The PM sampling train is complete as per Method 5 & 17	Yes	No	NA
Leak Test performed prior to sampling	Yes	No	NA
Field data Sheet for PM Sampling filled during PM sampling	Yes	No	NA
Data for determining of "K" factor & DGM "Y" Factor filled during sampling	Yes	No	NA
All method key requirements during sampling were compiled to ensure QA/QC	Yes	No	NA
Filter of Particulate matter is suitable for metal Testing	Yes	No	NA
SOx sampling as per Method 8 (Thorin Indicator Method)	Yes	No	NA
The right absorbent solution are available for SOx Sampling	Yes	No	NA
The equipment is capable to maintain flow rate @ 2.0LPM or as per method 8 requirement	Yes	No	NA
Sampling for SOx is performed as per method	Yes	No	NA
Ambient Air Quality Monitoring by Automatic Monitors for CO, O ₃ , SO ₂ , NOx, PM _{2.5} & PM ₁₀			
In case of continuous monitoring at a site, One Point QC Check Single analyzer & Zero/span check is performed every 14 days.	Yes	No	NA
The CE of NOx analyzer is ensured to be maintained within 96% - 104.1%	Yes	No	NA
Zero/span check is performed prior to starting ambient monitoring	Yes	No	NA
All key requirements for Critical & Operational Criteria for ambient air monitoring by automatic monitors were compiled during monitoring	Yes	No	NA
The measuring techniques of monitors comply PEQS	Yes	No	NA
Ambient Air Sampling of SPM, PM ₁₀ , Pb by High Volume Sampler	Yes	No	NA
In case of Sampling for SPM through samplers, the flow rate of sampler comply PEQS (1.1m ³ /min).	Yes	No	NA
Calibration of Sampler performed prior to sampling	Yes	No	NA
Vehicular Emissions & Noise Measurement			
Sampling of Vehicle emissions and noise measurement have been performed as per method and SOPs	Yes	No	NA

Remarks (if Any):-

Signature

Name of EPA Officer with office Address

Dated

04-01-2023

Name of Assistant / Deputy Analyst, Analyst

Signature





SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



GROUND WATER ANALYSIS REPORT

Client Name: Gujranwala Electric Power Company Limited (GEPCO) Site Location: 132 K.V Grid Station, Wapda Town, Gujranwala

Sampling Point: Tap Water Nature of Sample: Ground Water

Sampling Date: 04-01-2023 Date of Completion: 12-01-2023

Sampling By: Solution Environmental & Analytical Laboratory Reference No.: SEAL/LAB/2023/GW/907

Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
1	pH	APHA 4500-H ⁺ B	--	6.92	6.5-8.5
2	Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	240.0	1000
3	Chloride	4500- APHA Cl ⁻ B	mg/l	31.99	250
4	Fluoride	APHA 4500-F ⁻ D	mg/l	0.40	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	0.0	15
8	Nitrate (as NO ₃ ⁻)	APHA 4500-NO ₃ ⁻ E	mg/l	0.4	50
9	Nitrite (as NO ₂ ⁻)	APHA 4500-NO ₂ ⁻ B	mg/l	BDL	3
10	Lead	APHA-Pb B	mg/l	BDL	0.05
11	Total Hardness as CaCO ₃	APHA 2340 C	mg/l	189.28	500
12	Turbidity	APHA 2130 B	NTU	4.0	5
13	Zinc	APHA 3500-Zn B	mg/l	0.055	3
14	Aluminum	APHA 3111 D	mg/l	BDL	0.2
15	Chromium	APHA 3500-Cr B	mg/l	0.0	0.050
16	Cadmium	APHA 3500-Cd D	mg/l	0.0	0.01
17	Copper	APHA 3500-Cu C	mg/l	0.13	2
18	Boron	APHA 4500-B C	mg/l	0.020	0.300
19	Barium	APHA 3111 B	mg/l	0.027	0.700





SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



Client Name: Gujranwala Electric Power Company Limited (GEPSCO) Site Location: 132 KV Grid Station, Wapda Town, Gujranwala

Sampling Point: Tap Water Nature of Sample: Ground Water

Sampling Date: 04-01-2023 Date of Completion: 12-01-2023

Sampling By: Solution Environmental & Analytical Laboratory Reference No.: SEAL/LAB/2023/GW/007

Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
20	Antimony	APHA 3114 C	mg/l	BDL	0.020
21	Arsenic	APHA 3114 C	mg/l	0.002	0.050
22	Cyanide	APHA 4500-CN D	mg/l	0.01	0.05
23	Mercury	APHA 3112	mg/l	BDL	0.001
24	Nickel	APHA 3111 B	mg/l	0.008	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)

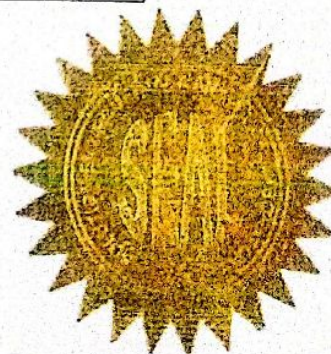
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ANALYZED BY	REVIEWED BY	APPROVED BY
Lab Analyst	Assistant Lab Manager	Lab Manager

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AMBIENT AIR MONITORING REPORT

Client Name: Gujranwala Electric Power Company Limited (GEPCO) Site Location: 132 KV Grid Station, Wapda Town, Gujranwala

Monitoring Point: Mid of Project Time Duration of Monitoring: 24 Hours

Monitoring Date: 04-01-2023 Reporting Date: 09-01-2023

Monitoring By: Solution Environmental & Analytical Laboratory Sample ID: SEAL/LAB/2023/AA/002

Results:

Sr. No.	Parameter	Method	Unit	Results	PEQS
1	Particulate Matter (PM ₁₀)	40 CFR Part 50, App J (US-EPA)	µg/m ³	122.4	150
2	Carbon monoxide (CO)	40 CFR Part 50, App. C (US-EPA)	mg/m ³	3.18	10
3	Oxides of Nitrogen NOx (NO & NO ₂)	40 CFR Part 50, App F (US-EPA)	ppb/m ³	40.5	120
4	Sulphur dioxide SOx(SO ₂)	EQSA-0197-114 (US-EPA)	µg/m ³	51.8	120
5	Particulate Matter (PM _{2.5})	40 CFR Part 50, App J (US-EPA)	µg/m ³	28.1	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.
- The report is not valid for any negotiations

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



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Email: karachi@seal.com.pk



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



NOISE LEVEL MONITORING REPORT

Client Name: Gujranwala Electric Power Company Limited (GEPCO)
Monitoring Point: Mid of Project
Monitoring Date: 04-01-2023
Reporting Date: 09-01-2023
Monitoring By: SEAL
Results: -
Site Location: 132 KV Grid Station, Wapda Town, Gujranwala
Instrument Used: Digital Sound Level Meter BSWA-308
Time of Monitoring: 24 Hours
Reference No.: SEAL/LAB/2023/NM/001

Sr. No.	Time	Noise dB(A)		PEQS
1	11:00 AM	62.5	Day Time	65
2	12:00 PM	64.9		
3	01:00 PM	60.8		
4	02:00 PM	58.9		
5	03:00 PM	54.5		
6	04:00 PM	62.4		
7	05:00 PM	63.5		
8	06:00 PM	61.4	Night Time	55
9	07:00 PM	57.6		
10	08:00 PM	50.2		
11	09:00 PM	52.4		
12	10:00 PM	54.2		
13	11:00 PM	51.2		



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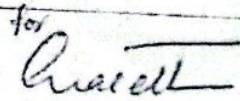
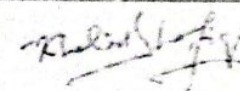


14	12:00 AM	47.8	Night Time	55
15	01:00 AM	49.4		
16	02:00 AM	46.1		
17	03:00 AM	54.5		
18	04:00 AM	52.6		
19	05:00 AM	50.9		
20	06:00 AM	54.7		
21	07:00 AM	60.7	Day Time	65
22	08:00 AM	61.8		
23	09:00 AM	62.6		
24	10:00 AM	61.7		
Average Noise Level		56.84dB(A)		

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 is not valid for any negotiation.

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



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Annexure-B**Short Resettlement Plan (RP)****132kV Garden Town Grid Station and Associated T/Line**
(As associated activity)**A. Background**

1. This document is the Short Resettlement Plan (RP) for 132kV Garden Town Grid Station and Associated Transmission Line Project. This document has been prepared to comply with all National legislation relating to environmental safeguards in Pakistan and best international practices adopted by donor agencies.
2. The project is being executed by GEPCO, which is responsible for the design and construction of the required improvements of grid station. GEPCO has surveyed and marked the line routes and also prepared and drafted the bidding documents. Most of the contracts have been evaluated and awarded by GEPCO. The load flow studies were conducted on the proposed interconnection scheme of the project.
3. This Resettlement Plan (RP) report presents the screening of potential environmental impacts of the proposed project and contains the mitigation measures in order to eliminate or reduce the negative/ adverse impacts to an acceptable level, describes the institutional requirements and provides an environmental and social management plan. There is neither any land acquisition involved nor is resettlement required of the project.
4. The city of Gujranwala has been expanding all around and there has been rapid industrialization and urbanization during the last two to three decades. Currently, GEPCO is supplying electric power to Gujranwala city and its suburbs from four 132kV Grid Stations. Due to rapidly increasing power demands for domestic, industrial needs of the city, and its surrounding rural areas with additional needs for the tube-well for irrigated agriculture, these grid stations have become overloaded and insufficient to meet the power demands of the area. Thus, there is a dire need to improve the power supply system in Gujranwala.

B. The Sub-Project

5. This subproject comprises the construction of a 132kV Air Insulated Substation (AIS), namely the Garden Town 132kV Grid Station, through GEPCO own resources. The proposed grid station will be energized and linked to existing Gakhar-Aroop Transmission Line. About 03 KMs length of 132kV transmission line will be constructed by GEPCO under own resources, and therefore, it is part of this subproject. However, a brief social assessment of the transmission line component has also been included in this Report (RP) as it is an "associated activity" of this sub-project.

Environmental & Social Impact Assessment, 12/2019

C. Land Acquisition and Resettlement Impacts

Grid Station

6. The new grid station will be constructed on a piece of the 32 Kanals land already possessed by the GEPCO. The land was subsequently transferred to GEPCO as a result of the "Transfer Deed" between GEPCO authority and M/s Garden Town Housing Scheme Authority Gujranwala. This land is currently agricultural land and cultivated by the land owners.
7. This piece of land (32 Kanals) is owned and possessed by the GEPCO, and there are no encroachers occupying or using this land. The construction of the new grid station will not affect any private assets or anybody's livelihood directly or indirectly. As such, the Subproject will have no affected persons or households (APs/AHs). Moreover, consultations with the residents (men and women) of Garden Town revealed outstanding grievances from the original acquisitions of site. Thus, it can safely be concluded that the construction of Garden Town 132kV AIS grid station will cause no land acquisition and resettlement impacts to the families and villages around.

132kV Transmission Line

8. The new proposed substation will be linked to the existing Gakhar-Arrop Transmission Line (Gujranwala), through construction of about 03 KMs long transmission line. The new transmission line will involve construction of 18 No. of Poles for proposed grid station. No private lands, built-up structures or other assets, nor livelihoods of any people will be affected by the construction of this 132KV transmission line. Only 20 No. of small trees will need to be removed. These trees are Shisham, Kikar and Eucalyptus.
9. After energization of this grid station about 100 No. of trees along with proper landscaping and plantation will be carried out at subproject site.
10. As there is no land acquisition and resettlement involved in this subproject, the preparation of a LARP is not required. Therefore, this Resettlement Plan (RP) has been prepared for the documentary requirements.
11. Two community consultation meetings were held at the subproject site. Two meetings (one male group and one female group) were held at grid station site. People are pleased by the project and they supported the subproject. None of the community members opposed the subproject.
12. The local communities' response (awareness, perceptions and preferences) for the Garden Town Sub-project and resettlement related matters are summarized as follows:
 - This subproject is necessary under the current local conditions;

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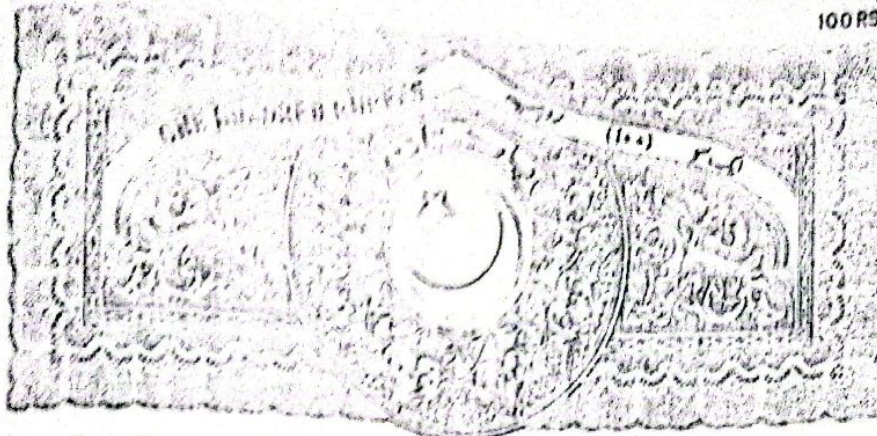
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 - This subproject is necessary under the current local conditions;

- There exist no outstanding grievances pertaining to the original possession of lands, the site selected for the new GIS,
- Local skilled and unskilled labor should be used wherever possible; and
- Construction work should be completed in time.

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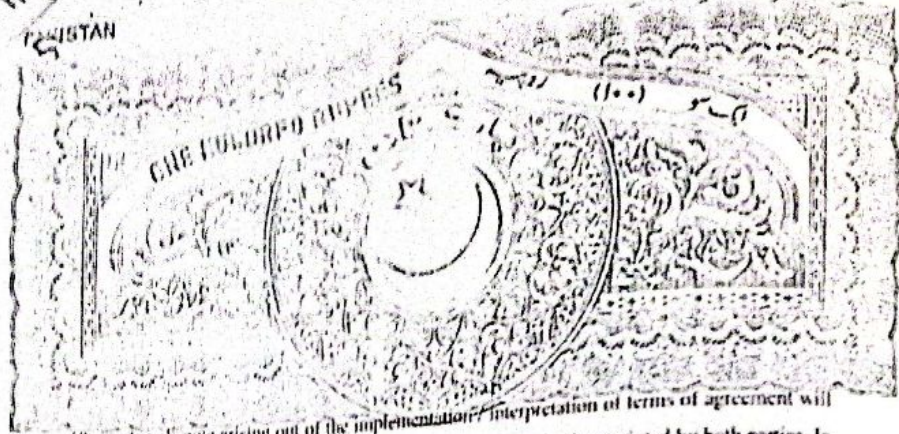
9. The sponsor shall build dedicated distribution system himself at his own cost according to the procedure laid down by GEPCO / WAPDA regarding self electrification circulated vide letter No. 4467-20/GM/PE&S/1(F(DP) dated 21-05-1998 (copy enclosed). Ultimately the complete system shall be handed over by the sponsor to GEPCO for energization. GEPCO will be responsible for maintenance & operation of the newly constructed electric works.
10. Connections to the individual consumers/plot owners shall only be given by the Deputy Manager / Assistant Manager (Operation) concerned after final approval of the layout plan by the District Scrutiny committee / TMA, energization of newly constructed electrification work/11 kv feeder and observing all the above Terms & Conditions.
11. Supply of power to Garden Town Phase-2 (extension) Housing Scheme shall be given through 1 No 11 KV independent feeder to be emanated from existing 132 KV Aroop Grid Station of GEPCO which shall be constructed by the sponsor at his own cost. He will provide one 11 KV panel and cables to connect the feeder with the said Grid Station. GEPCO shall not be responsible for any right of way problem and any expenses occurring as a consequence of construction of 11 KV feeder shall be borne by the sponsor.
12. The source feeder and external electrification work inside the housing society shall be built by the Sponsor (at his own cost) through GEPCO/WAPDA approved contractor according to the design approved and as per guidelines noted below:
 - a) The Sponsor will be fully responsible for the procurement & installation of quality material according to WAPDA's approved specifications from the manufacturers approved by WAPDA. The colour code of such material shall be different from that of WAPDA (e.g. transformer to be of blue colour).
 - b) The Sponsor will not purchase/use any material bearing WAPDA/GEPCO monogram or WAPDA's / GEPCO's colour scheme or identification. In case WAPDA's/GEPCO's material is found installed, GEPCO will reserve the right to lodge FIR.
 - c) Procurement of material will be done by the sponsor from WAPDA's approved manufacturers. Alternatively, contractors appointed by the Sponsor may also purchase the material after getting the purchase order endorsed by the sponsors and vetted by GEPCO. However, responsibility for purchase made by the contractor will rest with the sponsor.
 - d) Sponsor will keep and pass on the following record to GEPCO while procuring the material:
 - (i) Purchase order showing clearly the name of the manufacturer, quantity, type and make, cost and equipment identification.
 - (ii) Invoice bearing the name of project, with cost of material and sales tax etc.
 - (iii) Delivery order.
 - (iv) Gate Pass

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19. Any dispute arising out of the implementation/ interpretation of terms of agreement will be referred to Arbitration consisting of two Arbitrators, each appointed by both parties. In case of inability to come to a constructive conclusion between the Arbitrators, the matter will be referred to Chief Executive Officer GEPCO and his decision would be final.
20. If the sponsor is found acting in contravention of Agreement, or any of his acts adjudged or liable to be adjudged prejudicial to any of the clauses contained herein or any other instructions issued from time to time, GEPCO reserves the right to revoke this Agreement unilaterally and is also authorized to cancel the approval regarding electrification of the said Housing Scheme..

[Signature]
Sponsor of HS Scheme

[Signature]
Witness

03/07/09

[Signature]
C.E.O GEPCO
31/07

[Signature]
Witness

03/07/2009

ANNEXURE-D

SUMMARY OF PUBLIC CONSULTATION

Sr. No.	Participant Name	Participant Profession	Address	Date	Issues Raised/ Concerns expressed/ Suggestions & Requests	Proposed Measures	Action Taken / Proposed
1.	Mr. Javed Wattu	Rent	Garden Town Housing Scheme	January 2023	Government should do its work and facilitate us	No objection	Issues of facility to local people should prevail through action of GEPCO
2.	Mr. Ikram	Resident	Garden Town Housing Scheme	January 2023	Project should be completed as early as possible to reduce the botheration for locals	Time limit check	GEPCO implement the schedule of the project in letter and spirit.
3.	Mr. Arshad Aslam	Landowner	Garden Town Housing Scheme	January 2023	Local cultural norms should be adhered	Local norms be communicated to laborers	GEPCO to ensure the compliance
4.	Muhammad Riaz	Landowner	Garden Town Housing Scheme	January 2023	Trees should not be cut	Minimum to no tree cutting	GEPCO to ensure the compliance
5.	Mr. Azhar Lodhee	Landowner	Garden Town Housing Scheme	January 2023	Tree should be preserved	Avoid unnecessary cutting of trees	GEPCO to ensure the compliance
6.	Mr. Naveed Akhtar	Landowner	Nawan Pend	January 2023	Noise pollution should be remain within permissible limits	Transportation of raw material be done at night	GEPCO to ensure the compliance
7.	Mr. Shabbir Ahmed	Landowner	Nawan Pend	January 2023	Safety precautions should be taken during construction.	Contractor should take safety precautions.	GEPCO should bound the contractor.-to take safety measures.
8.	Muhammad Nabil	Teacher	Nawan Pend	January 2023	Load shedding in the summer is disturbing our study; she hoped the construction of subproject will improve the situation	Contractor should take safety precautions.	GEPCO should bound the contractor.-to take safety measures
9.	Mr. Asad Mehmood	Landowner	Kot-Shahaan	January 2023	Safety precautions should be taken during construction.	Contractor should take safety precautions.	GEPCO should bound the contractor.-to take safety measures
10.	Mr. Nasir Mehmood	Landowner	Kot-Shahaan	January 2023	No comment	-	-
11.	Mr. Kashif Aslam	Landowner	Kot-Shahaan	January 2023	.	-	-
12.	Ms. Sadia Rana	Student	Trigree	January 2023	Load shedding in the summer is disturbing our study; she hoped the construction of subproject will improve the situation.	-	-

13.	Mr. Hammad Ayub	Landowner	Trigree	January 2023	He expects stable supply in the region with lesser complaints.	Line should not pass over the houses	GEPCO avoid distribution lines to pass over the houses
14.	Mr. Faheem Aslam	Landowner	Trigree	January 2023	He expects stable supply in the region with lesser complaints.	Line should not pass over the houses	GEPCO avoid distribution lines to pass over the houses
15.	Mr. Umair Raza	Landowner	Trigree	January 2023	He expects stable supply in the region with lesser complaints.	Line should not pass over the houses	GEPCO avoid distribution lines to pass over the houses
16.	Ms. Sheeza Nawaz	House wife	Aroop Town Grw.	January 2023	She expects stable supply in the region with lesser complaints.	Line should not pass over the houses	GEPCO avoid distribution lines to pass over the houses
17.	Mr. Tahir Malik	Business	Aroop Town Grw.	January 2023	He expects stable supply in the region with lesser complaints.	-	-
18.	Mr. Nasir Azam	Shopkeeper	Aroop Town Grw.	January 2023	He expects stable supply in the region with lesser complaints.	-	-
19.	Mr. Muazzam Ali	Shop keeper	Aroop Town Grw.	January 2023	He expects stable supply in the region with lesser complaints.	Line should not pass over the houses.	GEPCO avoid distribution lines to pass over the houses
20.	Mr. Muzamil Faiz	Landowner	Aroop Town Grw.	January 2023	He expects stable supply in the region with lesser complaints.	Line should not pass over the houses.	GEPCO avoid distribution lines to pass over the houses

Trees Affected by Construction of 132kV Garden Town G.S

132 KV Garden Town Grid Station Land	Affected Wood Trees (No.)				Total Affected Trees (No.)
	Shisham (Sisso)	Arjan (Acasia)	Eucalyptus/ Poplar	Others	
	5	7	8	-	20
Sub-total	5	7	8	-	20

Public Consultation with Local Affected Community at Nawan Pend, Trigree
Kot-Shahan & Aroop Town Villages Gujranwala

