

# Initial Environmental Examination

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Construction of New 132kV Double Circuit Underground Cable Sunny View – Mcleod Rod – Qurtaba

February 2017

**PAK: MFF – Power Distribution Enhancement  
Investment Program (Tranche 4)**

## NOTES

- (i) The fiscal year (FY) of the Government of the Islamic Republic of Pakistan and its agencies ends on 30 June.
- (ii) In this report "\$" refer to US dollars.

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Re: Fw: IEE Report of Sunny View - McLeod Road - Qurtaba U/G Transmission Line

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to:

Liaqat Ali

08/02/2017 04:23 AM

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Safia Shafiq, Ehtesham Z. Khattak, Zhang Lei

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2 Attachments



Revised IEE of sunny -Macleod-Qurtab.docx comments of sunny q.docx

Dear Liaqat,

I am OK with the revised IEE. Please disclose it on the ADB's website.

Thanks,

Nurlan

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Subject: Fw: IEE Report of Sunny View - McLeod Road - Qurtaba U/G Transmission Line

Dear Nurlan:

The revised IEE after incorporating your comments by LESCO is attached below for your further review and clearance.

Regards,

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Respected Madam

Assalam o Alaikum

Updated IEE Report of Sunny View - McLeod Road - Qurtaba Underground Transmission Line has been attached after incorporating necessary amendments as indicated in your comments on the report.

With best regards

Muhammad Usman

Deputy Manager (E&S) PMU LESCO (*See attached file: Revised IEE of sunny -Macleod-Qurtab.docx*)  
(*See attached file: comments of sunny q.docx*)



## **Draft Initial Environmental Examination (IEE) Report**

Project Number: 3096PAK  
{February 2017}

**Islamic Republic of Pakistan:  
Power Distribution Enhancement  
Investment Program  
(Multi-Tranche Financing Facility)**

**Tranche-IV: Construction of New 132kV Double Circuit Underground Cable**

**(Sunny View – McLeod Road - Qurtaba)**

Prepared by:

**Lahore Electric Supply Company (LESCO)  
Government of Pakistan**

The Initial Environmental Evaluation Report is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

## **EXECUTIVE SUMMARY**

### **INTRODUCTION**

Lahore Electric Supply Company Limited (LESCO) is a public limited utility company responsible for distribution of electric power. In order to improve its transmission system and its expansion within its area of jurisdiction, LESCO decided to construct new *132kV Double circuit underground cable from **Sunny view –Macleod Road – Qurtaba** grid station. Sunny view and McLeod Road Grid Stations are running on single circuit and in case of any emergency, the area cannot be fed from other sources. The project is financed by Asian Development Bank. The Projects which are financed by the Asian Development Bank have to comply with Bank's guidelines relevant to environmental and social safeguard policies as well as applicable laws and regulations. The Initial Environmental Examination (IEE) Study of the Project was conducted by LESCO Environmental & Social Cell.*

Proposed Route of 132 kV Transmission Line is thickly populated and RoW does not allow the erect overhead transmission line. Therefore, to avoid RoW 132 kV underground Double Circuit Transmission Line is proposed.

### **THE PROJECT OVERVIEW**

The objectives of the Project are to help increase the efficiency, reliability, and quality of electricity supply in terms of the overall technical and commercial losses reduction, continuous availability and the improved voltage profile of electricity. The Project shall also facilitate electricity sector reforms, investment planning, financing and technical assistance.

### **POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORKS**

The National Environmental Policy had been announced by Government of Pakistan in the year 2005. Pakistan Environmental Protection Council is the apex decision making body of the country. Submission of the Initial Environmental Examination report to the concerned Environmental Protection Agency is mandatory under the Pakistan Environmental Protection Act, 1997. Similarly the global financial institution and donor agencies also demand for the undertaking the IEE studies respecting the developmental projects.

### **PROJECT ENVIRONMENT**

The project area occupies almost level alluvial plain. The soils are free from physical and chemical hazards and do not present any problem for foundation construction. The area is not prone to earthquakes. The climate of the area is sub-humid, sub-tropical and continental and has no negative impact on the performance of electrical insulations. The wildlife does not exist in the congested project area. Similarly, no forest is found. Total 79 persons were consulted along the Route of Sunny view-Macleod Road-Qurtaba cable and noted their concerns about the construction of underground cable.

## **ENVIRONMENTAL IMPACT ASSESSMENT**

As a first step, the screening of the Project was done considering The ADB guidelines. The project falls in Environmental Category B for which limited scale initial environmental examination(IEE) is required.

To ensure participation of local communities and Project stakeholders, consultative meetings, scoping sessions and group discussions were held in which 79 participated. The participants were of the view that Project should be implemented as early as possible. The main concerns of the participants were that local people should be provided jobs during construction and work should be completed before summer, load shedding should be minimized, electricity /voltage should be stabilized, load shedding causes disruption in water supply and burning of electronic appliances. Considering these difficulties, the participants were of the view that improvement of electricity supply through construction of underground cable is the need of the day.

### **Major Negative Impacts**

There are only one major negative impacts i.e. disruption of traffic.

### **Major Positive Impacts**

The major positive impacts include improvement in power supply in old areas and improved reliability and stability of electricity, improvement in voltage profile, control existing load shedding and creation of jobs during construction.

### **MITIGATION MEASURES**

Mitigation measures for amelioration of negative impacts include in EMMP. The noise can be mitigated by using silencers and earmuffs. The dust pollution can be mitigated by sprinkling water 2 to 3 times a day and controlling of speed of moving vehicles. For controlling the traffic, traffic management plan has been proposed in Environmental Management and Monitoring Plan (EMMP).

The other mitigation measures include periodic cleaning and de-silting of sewerage drains, careful driving in work areas, avoidance of vehicle and machinery movements during peak hours, transportation of equipment and machinery at night and careful collection and disposal of oils and lubricants.

### **ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (EMMP)**

EMMP has been prepared. It includes actions proposed for mitigation of negative impacts and effective monitoring of the implementation of proposed mitigation measures during pre-construction, construction and operation phases. This will form part of contract. LESCO is responsible for its implementation.

### **ENVIRONMENTAL AND SOCIAL COSTS**

Environmental Cost is estimated as Rs. 15.75million

## **CONCLUSIONS**

### **Environmental Aspects**

The construction stage will face negative impacts in form of dust, smoke and noise on account of employment of vehicles, machinery and equipment. The generation of construction waste, solid waste and oil spills/seepage will have negative impacts on land and air resources. Further, will involve traffic congestion in commercial areas. All such impacts are temporary and are of minor nature. The mitigation measures have been suggested in the EMMP.

### **Major Positive Impacts**

Significant improvement in reliability and stability of electric supply system.

Improvement in voltage profile.

Control of existing load shedding.

There is insignificant environmental damage to local land, water and biological resources.

## **RECOMMENDATIONS**

### **Environmental Aspects**

In view of the above mentioned conclusions of the IEE study following recommendations for implementation by the LESCO.

Being a responsible customer oriented corporate body the LESCO should devise the Health, Safety and Environmental (HSE) Policy, Quality Policy and Social Policy on priority basis.

The LESCO should work towards obtaining quality, environmental and social certifications for the international standards. This will improve their public image also.

capacity should be strengthened the earliest in order to meet the environmental challenges of the modern and environment friendly electric supply system.

Adoption of SOP on Environmental and safeguards from BOD and its implementation



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**Units of Measurements**

- 1 inch = 2.54cm
- 1Foot = 12inches = 0.3048m
- 1yard= 3feet =0.9144m
- 1Kilometre = 1000m

**ABBREVIATIONS**

ADB	Asian Development Bank
DGS	Distribution Grid Substation
DISCO	Distribution Companies
DHA	Defence Housing Authority
DSC	Design and Supervision Consultant
EA	Executing Agency
EARF	Environment Assessment Review Framework
ECR	Environmental Complaints Register
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
ESC	Environmental & Social Cells
ESIC	Environmental and Social Implementation Cell
FEA	Framework of Environment Assessment
FEPA	Federal Environmental Protection Agency
GFPs	Grievance Focal Points
GoP	Government of Pakistan
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
GSC	Grid System Construction
GSO	Grid System Operation
IA	Implementation Agency
IEE	Initial Environment Examination
ITC	Increase transformer capacity
km	Kilometer
Kv	Kilo Volts
LARP	Land Acquisition & Resettlement Plan
LAR	Land Acquisition & Resettlement
LESCO	Lahore Electricity Supply Company
MVA	Mega Volt Ampere

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MW	Mega Watt
MFF	Multi-Tranche Finance Facility
NEQS	National Environmental Quality Standards
NGO	Non-Governmental Organization
NTDC	National Transmission and Despatch Company
Pak-EPA	Pakistan Environmental Protection Agency
PA Systems	Public Announcement System
PC	Public Consultation / Planning Commission
PCB	Polychlorinated Biphenyl
PFR	Project Financing Requests
PDE	Power Distribution Enhancement
PDEMFF	Power Distribution and Enhancement Multi-tranche Finance Facility
PEPCO	Pakistan Electric Power Company Private Limited
PEPA	Pakistan Environmental Protection Act
PMU	Project Management Unit
PIU	Project Implementation Unit
PIC	Project Implementation Consultants
REA	Rapid Environmental Assessment
RP	Resettlement Plan
ROW	Right of Way
S-P	Sub-Project
SR	Sensitive Receivers / Receptors
SPS	Safeguard Policy Statement
SF6	Sulphur hexafluoride
TSP	Total Suspended particles
TSG	Technical Services Group
TOR	Terms of Reference
WHO	World Health Organization

## INTRODUCTION

### 1.1 Overview

This document is the Initial Environmental Examination (IEE) for the *Construction of New 132kV Double Circuit underground cable from Sunny View-Macleod Road-Qurtaba* subproject (1.65+3.19=4.84Km) being proposed by Lahore Electricity Supply Company (LESCO). This IEE was prepared under **Tranche-IV (saving)** of the Asian Development Bank (ADB) loan for Power Distribution and Enhancement Multi-tranche Finance Facility (PDEMFF).

Government of the Islamic Republic of Pakistan (GoP) has requested ADB to provide the PDEMFF to facilitate investments in power distribution and development of networks of eight independent distribution companies (DISCOs) that distribute power to end user consumers. The funding from ADB is expected to be released in stages (tranches). The Power Distribution Enhancement (PDE) Investment Program is part of the GoP long term energy security strategy. The proposed ADB intervention will finance new investments in PDE and assist capacity building of sector related agencies. The investment program will cover necessary PDE development activities in secondary transmission/distribution networks of eight DISCOs. The PDEMFF activities include extension (additional transformers), augmentation (replacement of transformers with higher capacity) distribution line extensions, new and replacement of distribution lines, additional sub-stations, transformer protection and other non-network activities such as automatic meter reading, construction equipment and computerized accounting. New distribution lines to and from various network facilities and some of the above activities will also be included in the later tranches.

This IEE presents the results and conclusions of environmental assessment for Construction of New 132kV Double Circuit underground cable subproject proposed by LESCO and submitted by Pakistan Electric Power Company (PEPCO) to Ministry of Water and Power on behalf of LESCO. PEPCO has been nominated by Ministry of Water and Power to act as the Executing Agency (EA) with each LESCO being the Implementing Agency (IA) for work in its own area. PEPCO's role in the processing and implementation of the investment program is that of a coordinator of such activities as preparation of PC-1s and Project Financing Requests (PFRs), monitoring implementation activities; that includes submission of environmental assessments for all subprojects in all tranches of the PDEMFF under ADB operating procedures. An IEE has been carried out to fulfil the requirements of ADB Safeguards Policy Statement, 2009.

## 1.2 Requirements for Environmental Assessment

A scoping and field reconnaissance was conducted on the subproject site, during which a Rapid Environmental Assessment (REA) was carried out to establish the potential environmental and social impacts and for categorization of subproject activities. Most of the construction impacts will take place locally and there are no potential significant environmental and social impacts associated with the Tranche-IV(saving) subproject construction. Initial environmental reconnaissance and Rapid Environmental Assessment (REA) carried out by consultants under ADB requirements indicated that the Construction of New 132kV Double Circuit underground cable from Sunny View-Macleod Road-Qurtaba subproject (1.65+3.19=4.84Km) is a Category B subproject, as the Underground Cable has minor environmentally sensitive receptors like shops, School, Hospitals offices, hotels etc.

The environmental assessment requirements of the GOP for grid stations and power distribution subprojects are different to those of ADB. Under GOP regulations, the Pakistan Environmental Protection Agency (Pak-EPA) Review of Initial Environmental Examination and Environmental Impact Assessment Regulations (2000) categorize development projects into two schedules according to their potential environmental impacts. The proponents of projects that have reasonably foreseeable impacts are required to submit an IEE for their respective projects (Schedule I). Projects that have more adverse environmental impact (Schedule II) are required to submit an environmental impact assessment (EIA) to the respective provincial Environmental Protection Agency (EPA). Distribution lines and sub-stations are included under energy projects and IEE is required for Transmission lines less than 11kV, and large distribution projects (Schedule I). EIA is required by GOP for all projects involving Transmission Lines (11kV and above) and grid stations (Schedule II). EIA is required as per PEPA1997, but IEE report has been prepared as per Asian Development Bank requirement.

Refer to the Figure 1.1 Pakistan EIA Approval Process.



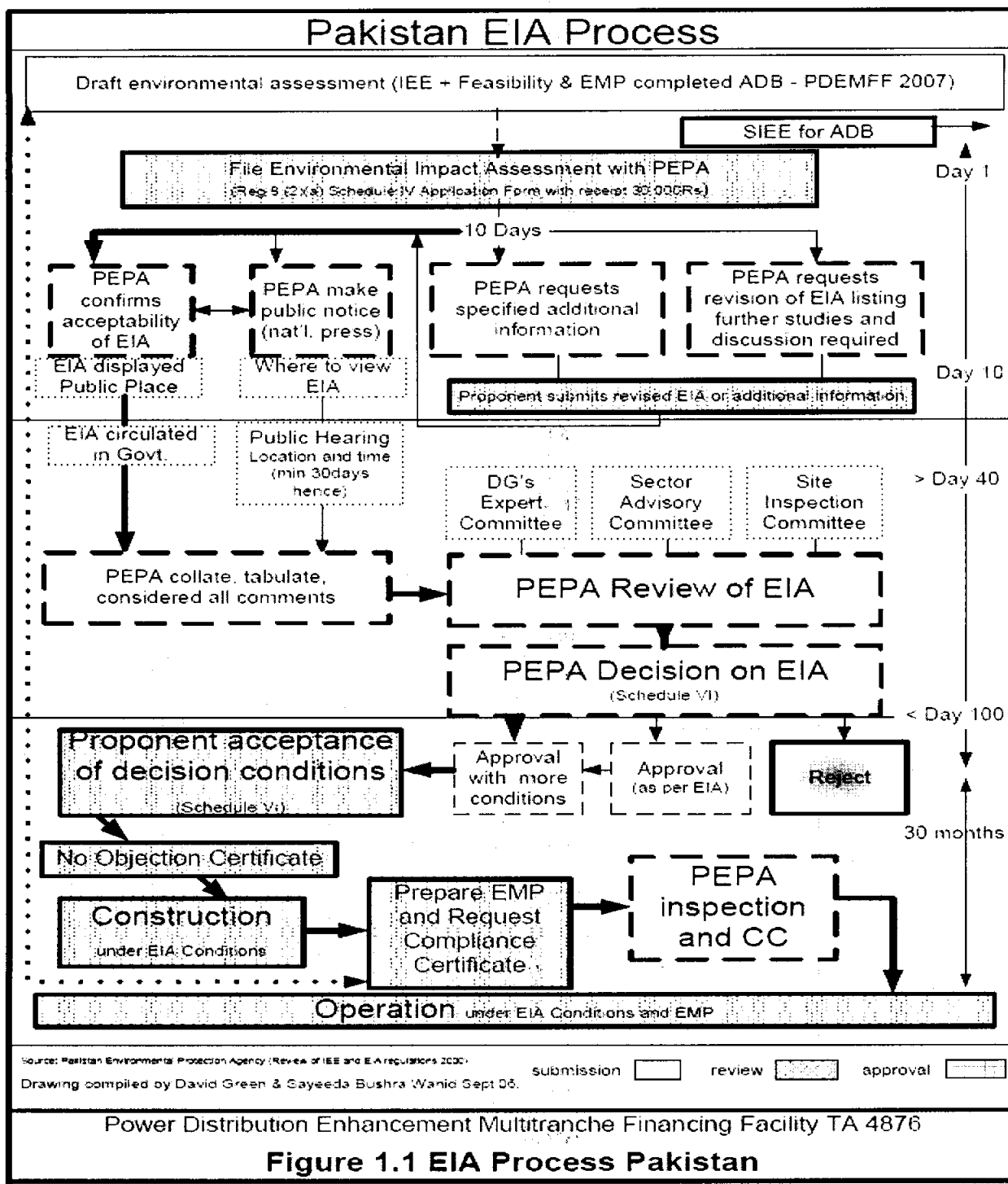


Figure 1.1 Pakistan EIA Approval Process

### **1.3 Scope of the IEE Study and Personnel**

This IEE study has included field reconnaissance for proposed subproject in August 2016. 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 100m of the proposed underground cable. The works are generally envisaged to involve construction of the (4.84 Km) 132 kV double circuit underground cable subproject by LESCO and supervised by the LESCO management.

The field studies were undertaken by a core study team with experience of environmental assessment for power projects. Mr. Muhammad Usman, Mr. Tahseen Yousaf and Ms. Zartashia Mazhar conducted preliminary scoping, surveys and assessment activities, coordinated field surveys and analysis, and were responsible to supervise collection of information and coordinate with public consultation activities. The environmental team also benefited from technical support and other important information on the impacts of the proposed power works provided in feasibility reports prepared for LESCO, by consultant experts dealing with engineering, power transmission, socio-economic, re-settlement and institutional aspects.

The study process began with scoping and field reconnaissance during which REA was carried out to establish the potential impacts and categorization of network enhancement activities. The environmental impacts and concerns requiring further study in the environmental assessment were then identified. The methodology of the IEE study was then elaborated in order to address all interests. Subsequently secondary baseline environmental data was collected and the intensity and likely location of impacts were identified with relation to the sensitive receivers (SRs); based on the work expected to be carried out at subproject site. The significance of impacts from the construction and operation of the proposed subproject was then assessed and, for those impacts requiring mitigation, measures were proposed to reduce impacts to within acceptable limits.

Public Consultation was carried out in August & September 2016, in line with ADB's Safeguard Policy Statement (SPS), 2009. According to the ADB requirements, the environmental assessment process must also include meaningful public consultation during the completion of the draft IEE. In this IEE the Public Consultation process included verbal disclosure regarding the subproject works as a vehicle for further discussion. Consultations were conducted with local families and communities around and proposed subproject site.

## **1.4 Structure of Report**

This report reviews information on existing environmental attributes of the areas around the Study Area. Geological, hydrological and ecological features, air quality, noise, water quality, soils, social and economic aspects and cultural resources are included. The report predicts the probable impacts on the environment due to the proposed subproject enhancement and expansion. This IEE also proposes various environmental management measures. Details of all background environmental quality, environmental impact/pollutant generating activities, pollution sources, pollution control equipment, predicted environmental quality and related aspects have been provided in this report. Following this introduction the report follows ADB guidelines and includes:

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

## **2. POLICY FRAMEWORK**

### **2.1 Policy Framework**

The Ministry of Environment is the authority responsible for policy making for environmental protection in Pakistan.

### **2.2 National Environment Policy, 2005**

In March 2005, Government of Pakistan (GOP) launched its National Environmental Policy, which provides an overarching framework for addressing environmental issues. Section 5 of the policy commits for integration of environment into development planning as instrument for achieving the objectives of National Environmental Policy. It further states in clause (b) of sub section 5.1 that EIA related provisions of Environmental Protection Act, 1997, would be diligently enforced for all development projects. It also provides broad guidelines to the federal government, provincial governments, federally administered territories and local governments to address their environmental concerns and to ensure effective management of their environmental resources.

### **2.3 National Resettlement Policy, 2002**

In March – 2002, Pakistan Environmental Protection Agency (Pak-EPA), GOP issued its National Resettlement Policy which explains the basis for compensation, rehabilitation and relocation of project affected persons. It also explains the requirements and implementation of Resettlement Action Plan (RAP).

### **2.4 Legal Framework**

GOP has promulgated laws, acts, regulations and standards for the protection, conservation, rehabilitation and improvement of the environment. In addition to this, they have also developed environmental assessment procedures governing developmental projects. The relevant excerpts of these laws and procedures are attached below.

### **2.5 Pakistan Environmental Protection Act, 1997**

The Act enacted on December 06, 1997 by repealing the Pakistan Environmental Protection Ordinance - 1983. It provides the framework for implementation of the PNCS - 1992, establishment of provincial sustainable development funds, protection and Conservation of species, conservation of renewable resources, establishment of Environmental Tribunals, appointment of Environmental Magistrates, Initial Environmental Examinations (IEE), and Environmental Impact Assessments (EIA). Section 12 of the Acts stresses the need to carry out EIA/IEE studies prior to construction or operation of a project. PEPA, 1997 is available at official website of EPD, Punjab.

After the passing of the 18<sup>th</sup> Amendment to the Constitution of Pakistan, Pakistan's Federal Ministry of Environment devolved to the provincial level on June 30, 2011. Thus, an amendment in Pakistan Environmental Protection Act - 1997 was presented and published in Punjab Gazette on April 18, 2012 as an Act of Provincial Assembly of Punjab. Twenty-three amendments were incorporated in **Punjab Environmental Protection (Amendment) Act, 2012**. The amendments are categorized as follows:

Amendments in "Short Title" and commencement as Punjab Environmental Protection Act (PEPA) and it extends to the province of Punjab only;

Amendments in administrative jurisdiction (Transfer of powers and control from Federal to Provincial Government);

Definitions and reference to the territorial waters, exclusive economic zone and historic waters shall be omitted based on the devolution of powers from Federal to provincial levels ;and

Amendments in penalties

## **2.6 Pakistan Environmental Protection Agency (Review of IEE/EIA) Regulations, 2000**

These regulations provide criteria for projects requiring IEE and EIA. They also briefly describe the preparation and review of environmental reports. These Regulations are also available at official website of EPD, Punjab.

## **2.7 Pakistan Environmental Assessment Procedures, 1997**

Protection of the environment with regards to toxic and hazardous waste is covered by the Pakistan Penal Code (PPC), 1860. Environment Protection Department (EPD), Punjab is mandated to monitor the transportation of hazardous materials within the provincial limits. Pakistan Environmental Assessment Procedures (1997) contains the following sets of information relevant to the proposed project.

### **2.7.1 Policy and Procedures for Filing, Review and Approval of Environmental Assessment Reports**

It describes environmental policy and administrative procedures to be followed for filing of environmental examination/assessment reports by the proponents and their review and approval by the concerned environmental protection agencies.

### **2.7.2 Guidelines for the Preparation and Review of Environmental Reports**

These guidelines are developed to facilitate both the proponents and decision makers to prepare reports (inclusive of all the information contained therein) and carry out their review so as to take informed decisions.

### **2.7.3 National Environmental Quality Standards (NEQS), 2010**

Pakistan Environmental Protection Council (PEPC) first approved these standards in 1993 subsequently revised in 1995, 2000 and 2010. They furnish information on the permissible limits for discharges of municipal and industrial effluent parameters and industrial gaseous emissions in order to control environmental pollution. The National Environmental Quality Standards (NEQS), 2010 are available at official website of EPD, Punjab. Local NEQS are compatible with international standards and where the local NEQS are silent, international standards for the same are observed.

### **2.7.4 Comparison of International and Local Environmental Legislations**

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

A comparison of applicable local and international guidelines for air quality has been provided in Annexure 3, Table 1. In general, the NEQS standards for air quality are most stringent in comparison to USEPA, WHO and the World Bank standards. The only exception is the TSP parameter for the annual mean where the World Bank standard (100  $\mu\text{g}/\text{m}^3$ ) is more stringent than the NEQS standard (360  $\mu\text{g}/\text{m}^3$ ). Apart from this one exception, the NEQS standards have been used for the proposed project.

Similar to the standards for air quality, the comparison of noise standards provided in Annexure 3, Table 2 clearly shows that NEQS standards for noise are more stringent in comparison to the World Bank/IFC standards. The only exception is the daytime noise level standard for Industrial areas where the World Bank/IFC standard is more stringent (70 dB(A)) in comparison to NEQS (75 dB(A)) and so for this particular parameter, the World Bank/IFC standard will be used. Apart from this one exception, the NEQS standards have been used for the proposed project.

Moreover the standards for water quality clearly shows that NEQS for water are same as WHO standards as shown in the Table

In Pakistan LESCO is legally bound to comply with NEQS as per requirement of EPD Punjab for obtaining NOC. Moreover as per comparison, it is clear that NEQS are more stringent.

## **2.8 Other Relevant Laws**

There are a number of other federal and provincial laws that are important in the context of environmental management. The main laws potentially affecting subprojects in this MFF are listed below:

- I. **The Punjab Wildlife Protection Ordinance, 1972** empowers the government to declare certain areas reserved for the protection of wildlife and control activities within in these areas. It also provides protection to endangered species of wildlife. As no activities are planned in these areas, no provision of this law is applicable to the proposed subproject.
- II. **The Forestry Act, 1927** empowers the government to declare certain areas as reserved forest. As no reserved forest exists in the vicinity of the proposed subproject, this law will not affect to the proposed subproject.
- III. **The Antiquities Act of 1975** ensures the protection of Pakistan's cultural resources. The Act defines "antiquities" as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the GoP to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the subproject proponents are obligated to ensure that no activity is undertaken in the proximity of a protected antiquity, report to the *Department of Archaeology, GoP*, if any archaeological discovery made during the course of the subproject. This law will not affect the proposed subproject as no historical sites are located nearby.

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

The Safeguard Policy Statement (SPS) was approved by the Board of Directors of ADB on 9 June 2009. The SPS took effect on 20 January 2010.

The Board of Directors' approved the Environment Policy R-Paper on 8 November 2002. The Environment Policy represents the culmination of two years of extensive consultations with internal and external stakeholders, including a Board seminar, country workshops, and several rounds of inter-departmental review. It also incorporates comments and

suggestions made by Board members during the Board discussion of the Environment Policy working paper in April 2002.

The Environment Policy has been prepared to address five main challenges:

- the need for environmental interventions to reduce poverty
- the need to mainstream environmental considerations into economic growth and development planning
- the need to maintain regional and global life support systems
- the need to work in partnership with others
- the need to further strengthen the processes and procedures for addressing environmental concerns in ADB's own operations

The Policy highlights a number of areas that require attention in ADB's environmental assessment process. It addresses the need for more upstream environmental assessment at the level of country programming, the need for more structured consultation in the conduct of environmental assessments, the need for greater emphasis on monitoring and compliance with environmental requirements during project implementation, and finally the need to view environmental assessment as an ongoing process rather than a one-time event.

## **2.10 OSHA Standards Health Safety**

The Occupational Safety and Health Administration (OSHA) are issuing safety and health program management guidelines for use by employers to prevent occupational injuries and illnesses. The Occupational Safety and Health Act of 1970 (OSHA) representatives have noted a strong correlation between the application of sound management practices in the operation of safety and health programs and a low incidence of occupational injuries and illnesses. Where effective safety and health management is practiced, injury and illness rates are significantly less than rates at comparable worksites where safety and health management is weak or non-existent. The Occupational Safety and Health Administration (OSHA) have concluded that effective management of worker safety and health protection is a decisive factor in reducing the extent and the severity of work-related injuries and illnesses. Effective management addresses all work-related hazards, including those potential hazards, which could result from a change in worksite conditions or practices. It addresses hazards whether or not they are regulated by government standards.



### **3. DESCRIPTION OF THE PROJECT**

#### **3.1 Type of Project**

This IEE has been conducted for the construction of 132kV Double Circuit underground cable from Sunny View-Macleod Road-Qurtaba subproject (1.65+3.19=4.84Km) prioritized by LESCO and selected to be included in the PDEMFF Tranche-IV(saving). The environmental assessments have been carried out to follow the ADB *Safeguards Policy Statement, 2009* and GOP's environmental assessment regulations and guidelines.

#### **3.2 Categorization of the Project**

Categorization is based on the most environmentally sensitive component of a subproject. The aspects of the subproject with potential for significant environmental impacts need to be assessed in detail and this environmental assessment has therefore focused on the significant impacts possible from the construction activities of the subproject.

The Construction of 132kV Double Circuit underground cable from Sunny View-Macleod Road-Qurtaba subproject is categorized as a Category 'B' sub-project under ADB requirements, as the route of the underground cable has contains environmentally sensitive receptors like Govt. offices, hotels, schools, Hospital shops, college etc

#### **3.3 Need for the Project**

The conditions of the power transmission system in Pakistan are inadequate to meet the rapidly growing demand for electrical power. This situation limits national development and economic growth. To cope with the constraints, the existing power transmission infrastructure has to be improved, expanded and upgraded. The overall contribution of power infrastructure also requires institutional arrangements and capacity that support strategic management of the sector, as well as planning and management of investments. Overall the proposed PDEMFF facility has been designed to address both investment and institutional aspects in the electrical power sector.

The city of Lahore has been expanding in all possible directions. In the south and west of the city there is an expansion and development of housing schemes. Currently a dozen of housing societies are being developed in this area such as Press Club, Bahria Town, Sukhchain, Green Fort, NESPAK, Eden Lands, Valancia, DHA Rahbar, Jubilee Town, Orange Train and Central Park etc. therefore the domestic, commercial and industrial power demand in and around the Lahore City (Refer to the Jurisdiction of LESCO, Figure 3.1) has increased rapidly, especially in summer months, so that the existing DGS are unable to cope up with the increasing demands of the domestic, commercial and industrial sectors. Due to the increased power demand of the area the existing grid stations have become overloaded and insufficient to meet the increased demand. There is need to improve the power supply of the area. For this purpose LESCO is planning to construct a new 132 kV underground cable to cope with the increasing load demand.

The Tranche-IV(saving)sub-project will contribute to the improvement of the overall performance of the power distribution sector, improving distribution efficiency, broadly widening access to power to drive economic opportunities. The beneficiaries of the

subprojects will be the people, companies, and government and non-government agencies in Pakistan that use power distribution services directly and indirectly. Communities indirectly served by the sub-projects will benefit from improved, secure faster distribution services. Power users will benefit in terms of secure power and improved power safety and potentially increased productivity.

### **3.4 Location and Scale of Project**

This IEE has included field reconnaissance of site and surroundings of proposed underground Cable .The proposed cable is located within LESCO jurisdiction.

Site location is determined by a committee comprising of professionals from planning, design, construction, operation and Grid Station Operation (GSO) formations of the DISCO. The committee selects the best site from a number of alternatives, based on the following considerations: Least cost; 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 .line's RoW.

The subproject will involve the construction of one *132kV Double Circuit underground cable from SunnyView-McLeodRoad-Qurtaba* subproject (1.65+3.19=4.84Km) The proposed route 132kV cable appears to be environmentally feasible and technically appropriate and will join DGS.

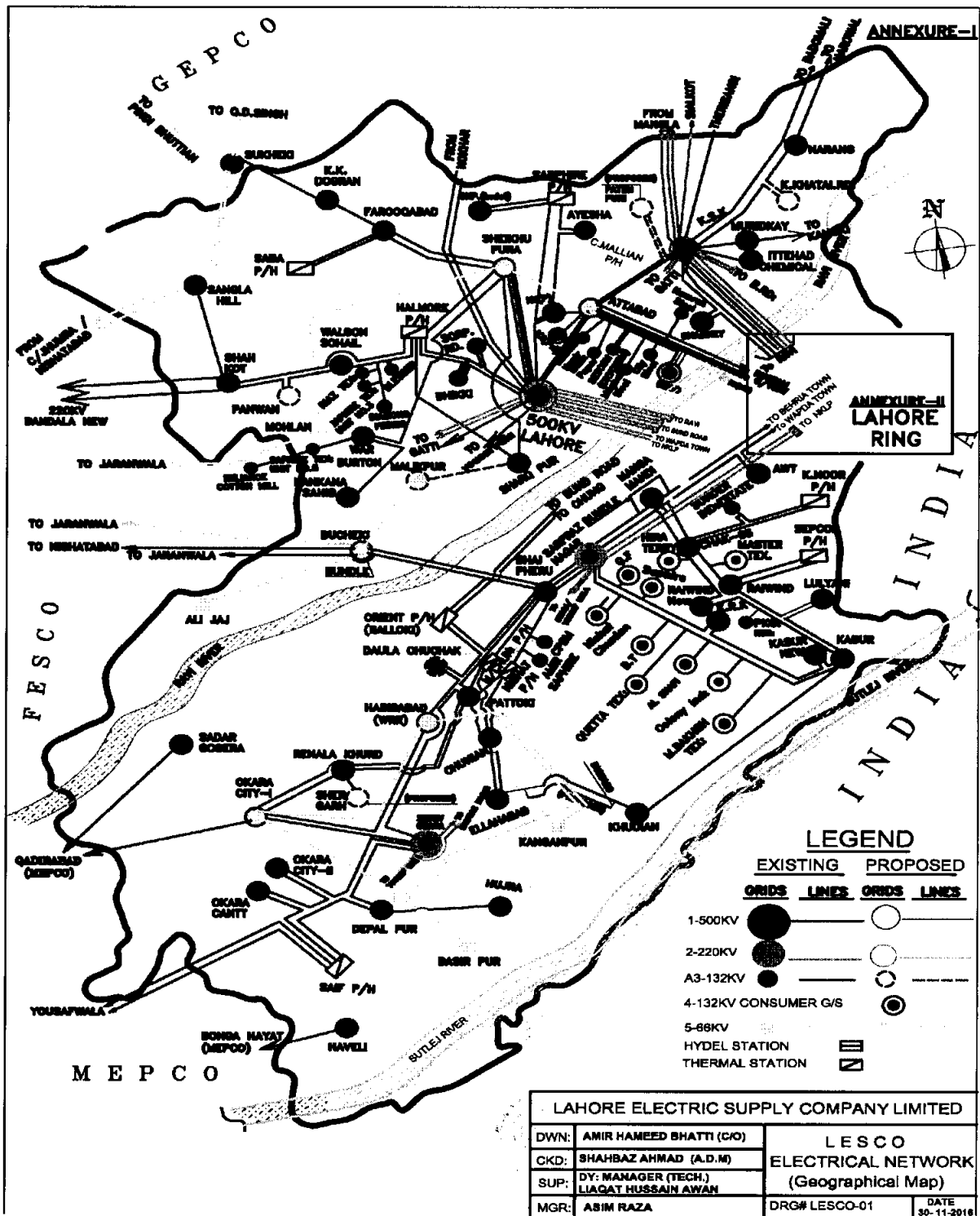


Fig 3.1-1 Jurisdiction of LESCO

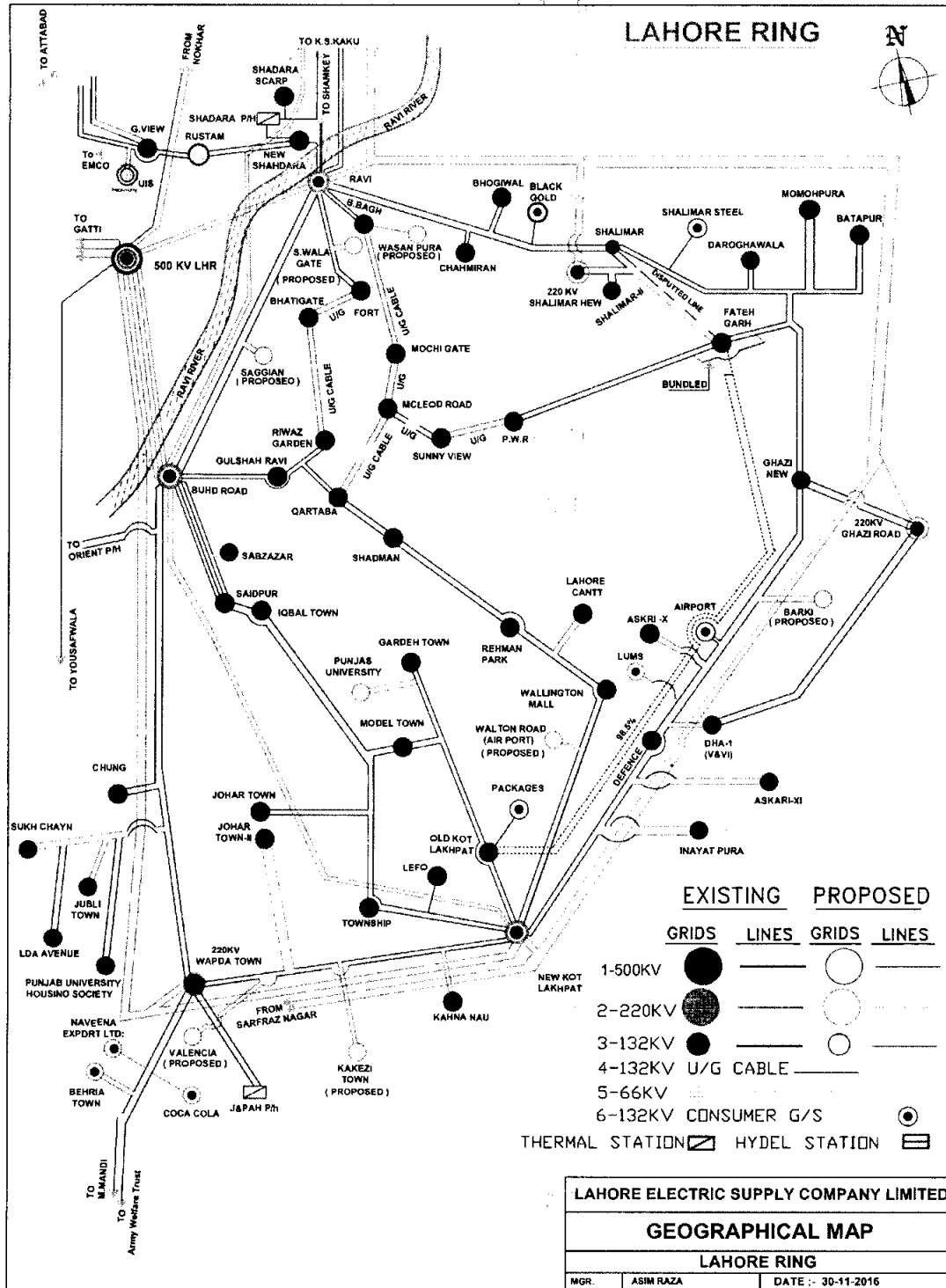


Fig 3.1-2 Jurisdiction of LESCO (Lahore Ring)



Fig: 3.1a Route Plan

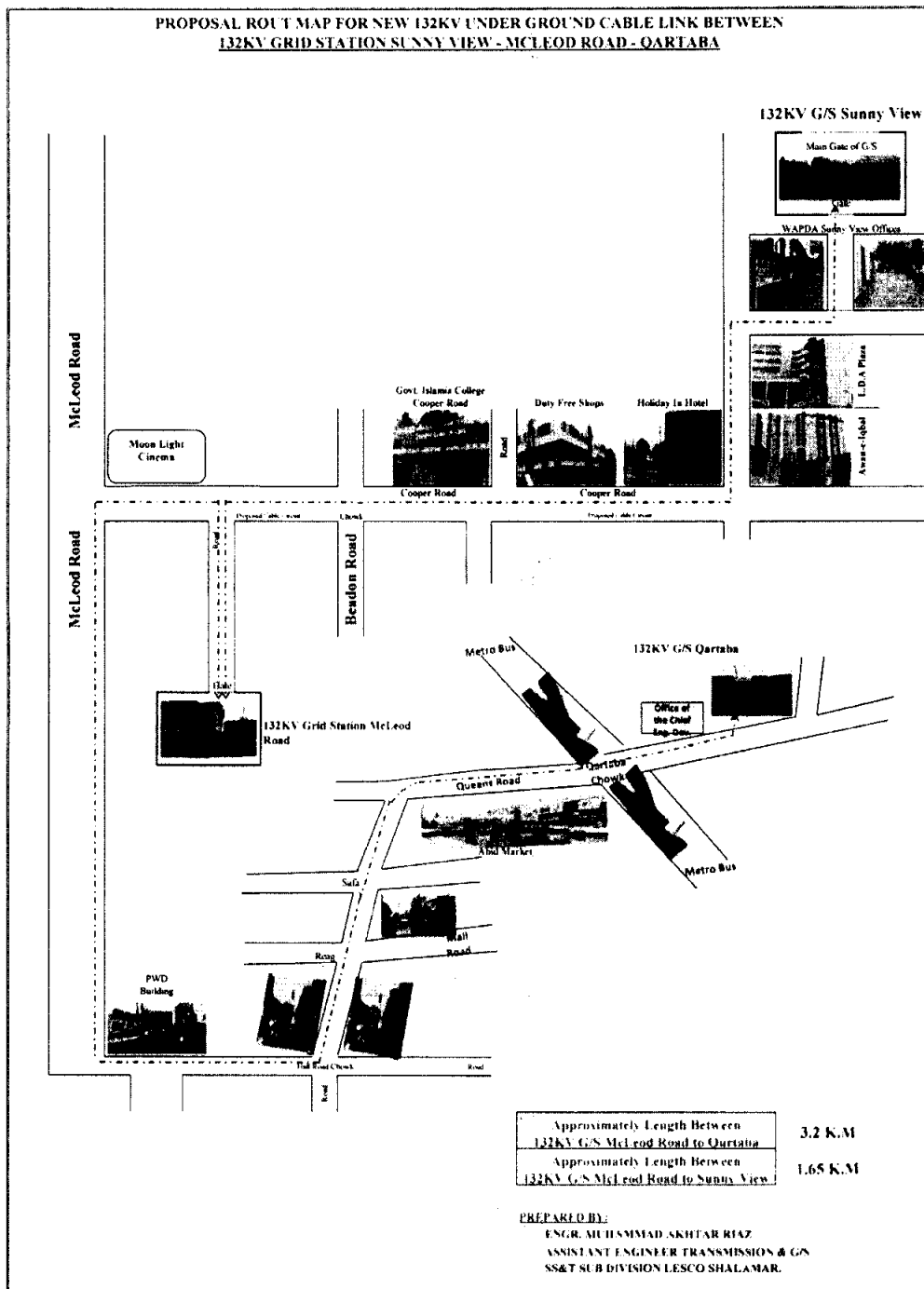


Fig: 3.1b SRs Route Map



Fig:3.1c Alternate Route of cable

This IEE has been conducted based on the assumptions available in August 2016 when the preliminary designs for the TL were completed and the overall requirement for installation of the equipment has been identified. The detailed designs are currently being progressed by LESCO. At this stage, the construction activities under the subproject are expected to include the usual localized civil works, including excavation, Trenching, Replacing the soil and closing the trench and splicing or joint the cables. After following, the mentioned steps testing and evaluating will be done throughout the process. The underground cable line would normally buried 1.42m beneath the surface. Impacts from construction are envisaged to be minor; the work is mostly on the road or along the road.

The designs for the subprojects will be developed under the subproject support component of the MFF. This IEE, however, is based on preliminary line route surveys (which includes alternative routes and the route which minimizes the social impacts is chosen). The line route is then submitted to the design formation which determines the line profiles and location. The IEE is therefore based on preliminary line design which is in initial stage (barring any unforeseen occurrence) and will subject to change at detailed design stage if so warranted by new developments.

### **3.5 Affected Administrative Units**

This subproject will pass through different roads. The area to be affected by the new works falls between *Sunny view-Macleod road-Qurtaba*. Interviews were conducted with public near the proposed cable corridor to obtain their views on the subproject and any perceived impacts.

### **3.6 Proposed Schedule for Implementation**

Designs of power transmission arrangements, access, review of environmental management and construction processes could take several months. When the detailed designs are completed, tendering and award of contract will take place over about three to six months. The tentative construction period will follow and best estimates indicate about nine months.



## 4. PROJECT ALTERNATIVES

Analysis of alternatives is part of the IEE process to select the best among all possible project options. The assessment and recommendations made by the IEE team are presented below:

### 4.1 No Project Alternative

The rationale for not considering the proposed project alternatives in terms of transmission line route is presented as follows:

- The proposed transmission line route is overlapping of new transmission line over the existing transmission line's route with little modifications; therefore, no other utility is expected to be damaged during the installation phase.
- TEPA intends to allocate a designated corridor at the proposed route, therefore no other utilities are expected to get damaged in operational and maintenance stages as well.
- The proposed transmission line route is expected to exhibit minor adverse impacts in terms of traffic congestion as the proposed route passes through busy road, networks and commercial markets.

More over it is important to note that the proposed transmission line may avert few negative impacts commonly associated with power lines such as trenching and underground cable laying works especially in commercial areas, impact on road, street infrastructure, utilities services, and land take. It will not balance the overall need of development in the city for fulfilling the electricity demands. Since there is increasing demand of electricity at local and national scale, the

- "No-Development" Alternative is not considered as a feasible option

***Note\* proposed project route has been discussed earlier in chapter 3 "Project Description"***

### 4.2 Alternative Routes

The proposed transmission line's alternative routes have been presented as **figure3.1a&b**. Detailed analysis and description of those alternative options are described afterwards.

### 4.3 Analysis of Alternatives

#### Route A

The proposed alternative routes i.e. alternative route one marked with yellow line as mentioned in **figure 3.1a&b** is recommended as a feasible option as it passes through Sunny view Grid station to Macleod Road Grid station via Egerton Road near LDA plaza and turns to cooper road near hospitality inn hotel then passes through cooper road market enters in to Macleod Road Grid station and Macleod Road Grid station to Qurtaba Grid Station via passing through Macleod road, Cooper Road, Hall road, Temple road, Qartaba Chowk, Bhawalpur road and will then enter into Qartaba Grid Station. Total length is 4.84km

#### Route B

This route starts from Sunny View Grid Station passes through US consulate, Simla Hill and enters to Montgomery Road to Macleod Road Grid Station via Lakshmi Chowk. And Macleod road, Mall road, Jain Mander Road, Chuburgi, Bahawalpur Road and enter in Qurtaba Grid Station. **Fig 3.1c**. It is envisaged that if these alternative routes are considered for laying of underground transmission line, Commercial area may face prolonged social issues in terms of traffic congestions, utility damage and disturbance in daily market routines. Total length is 6.4Km.

### 4.4 Conclusion:

The proposed project route marked with yellow line was finalized out of two alternate routes. The shortest possible final route was planned after considering following primary factors:

- Clustered settlements
- Common access routes and pathways
- Markets
- Community structures
- Private land (by avoiding it to extent possible)
- While selecting the route, due weight age was given to the accessibility of the line for construction as well as for maintenance for its total life span;
- In most part of the route it is possible to transport materials and tools quickly in case of breakdowns;
- It would be possible for the personnel patrolling the line to be able to reach every location, careful inspection of the accessories without any obstruction from the land owners;
- Prior consultations were held with the concerned public
- Minimizing the transmission line exposure over residents/Offices

The route A does not involve any ROW and security issues as compared to Route B where serious issues will be raised during construction. In nutshell **Route A** is recommended

#### **4.5 Alternatives for Transmission Lines**

##### **Overhead Transmission Lines**

This alternative includes construction of traditional overhead transmission lines. Its characteristics are:

- Technically, this option is simple as compared to underground cable system as trained manpower is available.
- Economically construction and operation & maintenance costs of overhead transmission line are lower.
- Socially, this system is problem free as it poses no threat to existing utilities (water supply, telephone lines, gas lines etc) as no large scale digging / excavation is involved.
- This system is not very safe / public friendly as the poles and conductors are susceptible to fall during bad weather conditions (high wind speed and heavy rains) causing damage to life and property.
- Purchase of land is required for Pole/Tower that is an expensive option in populated commercial area. Cost of land is much higher than in Rural/less populated area.
  
- Although overhead power lines are typically more economical, they are susceptible to damage from wind-borne tree branches, debris, and high wind conditions from extreme weather. The damages can cause extended power outages that in extreme cases cannot be restored for days or even weeks.

##### **Underground Cable**

The option includes construction of underground cable system instead of over-head transmission line.

- Technically, its maintenance is costly and difficult and trained manpower to undertake the system is available with LESCO.
- Economically, this is costlier as compared with the overhead option. Roughly, it costs 3 times more the overhead option, as expressed by the LESCO engineers.
- The adoption of this option may cause greater number of social problems as compared with the overhead option in terms of threat to the existing utilities (water supply, telephone lines, gas lines). During digging/excavation process, traffic disturbance and environmental degradation due to dust and smoke, loss of access or difficult access of the residents to their residences and business dwellings at the busy and populated routes of project area.

Conclusively, the overhead transmission line represents a better technical option than the underground counterpart but under the current technical and socio-economic conditions the underground option is adopted due to the highly populated commercial areas and construction of overhead transmission line is not possible

due to the non availability of land for towers/Poles. The proposed route passes from highly populated area and cost of land is very high so the Construction of overhead Transmission line is very expensive option as compared with underground cable in this case.

#### **4.6 Alternative Technologies**

The alternative technology, which can be adopted for the proposed project, may include horizontal directional drilling commonly referred to as thrust boring. This technology can be used in non-disruptive road crossings since it eliminates the need to cut roads as well as minimizes the probable traffic disturbances. However, the proposed project area is less developed therefore provision of this technology is not mandatory.

## 5. DESCRIPTION OF THE ENVIRONMENT

### 5.1 Subproject Areas

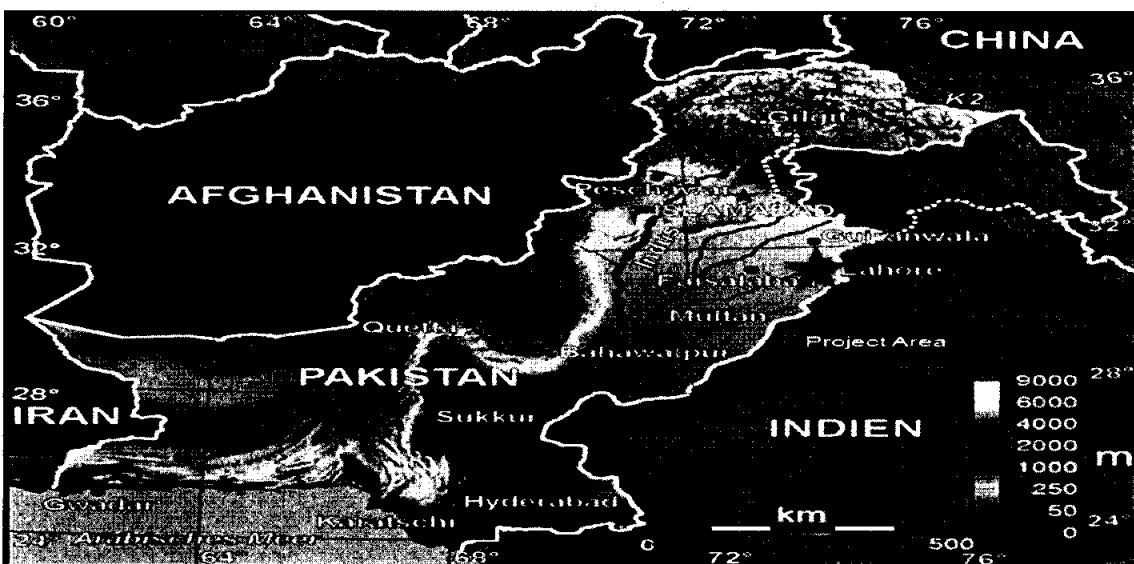
### 5.2 General Characteristics of Subproject Area

The route of cable will following for lying of new underground cable starting from Macleod Road Grid Station passing through Cooper Road Egerton Road LDA Plaza and will end at Sunny View Grid Station. This route is tentative and will be finalized once the contractor mobilizes to conduct survey and finalize the design.

### 5.3 Physical Resources Topography, Geography, Geology, and Soils

According to the district census report, Lahore District derives itself naturally between the central up-lands and alluvial lands of Ravi, having no hills or mountains of any kind. The alluvial land of Lahore can be sub-divided into a. Uttar Land & b. Hither land. Uttar lies in the North and forms about 2/3rd of the entire land. The low lands are known as Hither, which are generally inundated by the water of the Ravi River during Monsoon floods. Ravi flows in the west of District along its boundary with Sheikhpura District. The general height of the area is 150-200 meters above sea level. The only mineral worth of any value is Kallar and Kankar used to manufacture crude saltpetre, which is used as manure for top dressing of young cotton and tobacco plants. The soil is very different in character and generally inclined to be dry. However, it is rich in plant nutrients. No impact is expected on local soils and topography. Electrical conductors produce heat, especially XLPE conductors operate at about 176°C. In order to conductors operate efficiently; heat must be carried away from the conductor which is performed by soils in and around the trench. All of the heat generated from the direct buried cables must be dissipated through the soil, if could not, the selective back fill makes a strong difference on the capacity rating. Different soils have different abilities to transfer heat; saturated soils conduct heat more easily than soils with air pockets or dry places. For this reason, the soil nearest the line must not be allowed to dry out.

In proposed underground transmission lines trench, special back fill material or soft soil will be used to ensure a good heat transfer to surroundings oil or groundwater. This backfill material specifically designed to move heat away from the trenches.



## **5.4 Climate and Hydrology**

There is negligible variation of altitude above sea level in the area over which the selected DGS is situated, which means no variation between the climates of the various subproject area. The climate in general is typical of that of the central Punjab.

According to the district census report, the maximum temperature in summer reaches 45°C. In winter the minimum is 1°C. The mean maximum and minimum temperatures in summer are 41°C and 27°C; and in winter 19°C and 4°C respectively. The summer season starts from April and continues till October. May, June and July are the hottest months. The winter season on the other hand starts from November and continues till March, December, January and February are the coldest months.

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

## **5.5 Groundwater and Water Supply Resources**

Irrigation is largely dependent on the canals, but tube wells have also been sunk in the areas where water is fit for irrigation. The chemical quality of ground water in the district varies area wise and depth wise. The sweet potable water is available in a belt five to twenty miles wide paralleling the river Ravi. In hither irrigation supplies are perennial and tube wells have been installed to make up the deficiencies. The strata near the DGS are water bearing and alluvial deposits, giving groundwater potential throughout the project area and the water table is fairly near the surface. The water table is not seasonal and dug wells do not generally run dry. In proposed subproject area water table is below **100 feet**. Groundwater sources exist in the area and there are tube wells within 500m of the proposed underground cable but the wells are generally well away from the proposed transmission lines. Elsewhere the local population is generally reliant on supply from tube wells. There should be no impact on these sources of water during the construction. Moreover, contractor is bound to conduct water analysis before the start of construction activities for baseline data.

## **5.6 Surface Water Resources**

### **Rivers and Tributaries**

The Ravi is the only river, which flows through the district. It enters the district from Amritsar, by the village of Ichogil, after a course of 55km, leaves it on the borders of Kasur district. The Ravi is the smallest of the five rivers of the Punjab. Just above Lahore city the course of the stream is carefully directed by the Mahmud Booti Bund, which keeps it to one channel and protects the city from floods. In rainy season its floods are heavy and of a very strong current. Alterations in its course are frequent and extensive. After construction of the Bari Doab Canal, most of its flow is diverted. There are ferry services at Khudpur, Chung and Kariolwar.

### **Lakes and Wetlands**

There are no lakes or marshes in the district. The only permanent body of water is the Hudyara Rohi (Nullah-Drain) which enters the district from Amritsar District near the villages of Moujoki and Padhana (Badhana) and runs parallel to Ravi and falls into the

same near village Khudpur in Lahore district. At places, its channel is two to three hundred yards wide. During the monsoon season, huge volume of water comes down this Rohi Nullah and very often spills over its banks, causing loss to crops and other properties. In the year 1962 and 1976 because of the floods in the Nullah, many neighbouring villages were inundated and extensive damage was done to the crops and houses etc. Since it has a gentle slope, sand was not deposited on its banks.

### **Surface Drains**

In addition there are 76 minor drains (collecting drains) which connect eight major drains namely Satto Kattla drain, Mian Mir drain, Lakshami drain, Sukh Nehar drain, Upper Chotta Ravi drain, Lower Chotta Ravi drain, Siddique Pura drain and Shahdara drain which ultimately connect into the river Ravi.

### **5.7 Air Quality**

Air quality in most of the subproject area appears good based on observation during the study period. Emissions should be controlled at source under the EMP. There will be a few items of powered mechanical equipment to be used in the construction of the transmission line works that may give rise to many complaints about dust and other emissions, however there should be well dissipated. The major sources of complaint will likely be any necessary earthworks and local soil compaction. In comparison domestic sources of air pollution, such as emissions from wood and kerosene burning stoves as well as small diesel standby generators in some households are minor.

Industrial pollution sources are not present in the vicinity of subproject. The project area is distant from major sources of air pollution like industries or urban type traffic, domestic sources such as burning of wood and kerosene stoves, etc. or fugitive sources such as burning of solid wastes. Air quality in the project area appeared very good during the study period. Air quality measurements in major urban centres, carried out by Pak-EPA, in 2004-2005 financed by JICA revealed that CO, SO<sub>2</sub> and NO levels were in excess of the acceptable levels in some areas but the average levels were found below NEQS. No such studies further conducted by Pak EPA. Air quality testing by DISCOs (average values are: TSP 1.09mg/m<sup>3</sup>, CO 634ppb, SO<sub>2</sub> 24.34ppb, NO<sub>2</sub> 23.73ppb) through various consultants has revealed that most sub-stations have NO<sub>2</sub>, CO<sub>2</sub> and CO values below international standards although TSP levels at some locations was higher than international standards. Moreover, contractor is bound to conduct air analysis before the start of construction activities for baseline data.

There should be no source of atmospheric pollution from the subproject. In the operational phase the industrial facilities with fuel powered mechanical equipment will be the main polluters. All such emissions will be very well dissipated in the open terrain and there will be no cumulative effect from the subproject.

The other major source of air pollution is dust arising from construction and other ground or soil disturbance. Near the access roads, when vehicles pass, dust levels will increase. Dust levels are elevated when vehicles pass intermittently over the roads based on field observations and may be high enough to obscure vision.

## 5.8 Noise and Vibration

Noise from vehicles and other powered mechanical equipment is intermittent. There are also the occasional calls to prayer from the PA systems at the local mosques but there are no significant disturbances. However the construction from the proposed power expansion will use powered mechanical equipment. Subjective observations were made of background noise and also of individual vehicle pass by events. The average minimum distance of the structures is 30feet along the cable route.

Based on professional experience background daytime noise levels are probably well below 45 dB(A)Leq. DISCOs have carried out noise level measurements at various substations and transmission line locations within the system. These analyzed to calculate Leq values and have resulted in Leq values much below the 85dBA limit prescribed under the NEQS established by the EPA or the 75dBA used by DISCOs/NTDC/PEPCO in the equipment specifications. Typical values were: average 46.21dBA; high 63.14dBA; and low 34.35dBA. Moreover contractor is bound to conduct noise analysis before the start of construction activities for baseline data.

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

## 5.9 Ecological Resource

### Wildlife, Fisheries and Aquatic Biology

There is no wildlife in this district except jackals, dogs, and snakes, etc. Common species of birds found in the district are the common house sparrow, crow, pigeon, dove, tiliar (starling), lal mena, bia (weaver bird), parrot, quail, pintail, mallard, teal, and humming bird, etc. Some commercial fisheries operate in the area. There are no reservoirs and other water bodies except Ravi River.

## 5.10 Terrestrial Habitats, Forests and Protected Species

### Vegetation Cover and Trees

Lahore District is dominated by urban suburbs and with various productive fields of monocultures that now dominate the agro-ecosystems. Common floral species with rooted vegetation are also present in most of the water bodies of the area. Only River Ravi and BRB canal in Lahore.

There is no vegetation at the route of underground cable and in the Right of Way (RoW) is provided by city district government. Amongst trees, the most important are Kikar (*Acacia Arabica*) Shisham or Tahli (*Delbergia sissoo*), Beri (*Zizyphus jujube*), Toot (*Morus alba*), Sharin (*Albizzia lebbek*), Dherek (*Melia azeharach*), Phulai (*Acacia modesta*), Pipal (*Ficus religiosa*) and Bohr (*Ficus bengalansis*) are planted for shade. The growth in Rakhs is composed mainly of three kind of trees, Jand (*Prosopis spicigera*), Karir (*Capparis aphylla*), and Wan (*Salvadora oleoides*). Occasionally Rero (*Acacia ieucophhloea*) and Farash (*Tamarix articulata*) are also found. Pilchhi (*Tamarix dioica*) is found on moist sandy soil along the river and is used for wicker work, basket making etc.



There is no wild growth of any bush near the area of works but natural forest cover in the district has been significantly reduced in the past but some of the older stands of trees are well established could be considered as semi-naturalized to some extent.

The route of underground cable is along the road, which is adjacent to the populated urban area.

### **5.11 Protected and Religious Trees**

There is no tree within the two proposed DGS boundary and along the ROW. In general permission should be sought from the local tree owners for the cutting of any trees. The Land Acquisition and Resettlement Plan (LARP) may make provision for compensation of local people for the loss of trees, if needed after detailed study. The works must deal with trees that need to be lopped or removed for safety reasons with the necessary permissions.

### **5.12 Protected Areas/National sanctuaries**

In Pakistan there are several areas of land devoted to the preservation of biodiversity through the dedication of national parks and wildlife sanctuaries. There are no protected areas near the proposed subproject site.

### **5.13 Economic Development**

#### **5.13.1 Agriculture, Industries, and Tourism**

The sub project is located in the urban area and no agriculture site is located there. The proposed sub project is very small so the overall data of Lahore city is given. The main crops in the District Lahore area during winter are tobacco, mutter (peas) wheat and sesamum comprise 531, 489, 51 and 32 thousand hectares respectively. Mung, barley, masoor and rape-seed seem to be less cultivated as compared to the other crops.

Vegetables are grown in abundance as the water and soils are suitable for cultivation. Potato, carrot, lady finger, chillies, onion and cauliflowers are grown on 4131, 601, 259, 250 and 220 hectares respectively as per 2008 data. The production of coriander is very prominent in Lahore. Bitter gourd, turmeric and garlic are grown to meet the public demand. Other vegetables i.e. Radish, Tinda, Bringal is also grown. Major fruits grown are; citrus, guava, mango watermelons, banana and peach.

Lahore is the biggest trade centre in Punjab which exports and imports a sizable quantity of different types of goods. Its major industrial items of trade include electrical fans, motors, transformers and electrical goods, rubber and its products, bicycles and auto cycles, food products, beverages, body building, handicrafts, leather shoes, printing and publishing chemicals, photo goods and cinema films. Besides, it trades in agriculture production and dry fruits.

After Karachi, Lahore is the biggest industrial area in Pakistan. There has been a steady expansion of industries in and around Lahore since independence. Industrial consumers are causing the greatest demand for electricity, and are also worst affected by power shut downs.

There are few industrial and commercial businesses in the vicinity of the subproject reliant on the efficient distribution of electrical power. There are also agricultural businesses on the fringes of the urban areas and tourism is also an important business in Lahore.

There are many places of interest that attract tourists and promote tourism e.g. Royal Fort Lahore, Shalimar Garden, Minar-e-Pakistan, Lahore Zoo, Badshahi Mosque, Wazeer Khan Mosque, Golden Mosque, Shrine of Data Hazrat Data Ali Hajvery, Shrine of Miran Shah, Anarkali Bazar, Walled city, Jallo Park, Alhamra Art Centre, Shakir Ali Museum, Tomb of Allama Iqbal, Town Hall, Chouburji and the Zamzama, etc.

### **5.13.2 Transportation**

Lahore is linked with the rest of the country by air, rail and road. It lies on the Grand Trunk (GT) Road or the Shahrah-e-Azam. It has linked the eastern and western regions of the Indian subcontinent, running from Chittagong, Bangladesh through to Howrah, West Bengal in India, across north India into Peshawar in Pakistan, up to Kabul, Afghanistan. The modern road was built by Sher Shah Suri, who renovated and extended the ancient route in the 16th century.

There is a complete network of roads in the district. All major villages are connected with the district headquarters through highways. The first four lanes Motorway was constructed from Lahore to Islamabad. It also provides modern facilities to the passengers at international standards.

The main Karachi-Peshawar railway line passes through the district. It enters Lahore from the south near Raiwind and passes through Shahdara in the north and leaves for Gujranwala. From Lahore Railway Station, a railway line goes up to Wahga at Pakistan-India border and then across the border to Amritsar in India.

For air traffic, there is a modern International airport in Lahore. PIA and other air companies operate regular flights from Lahore to other parts of the country as well as on international routes.

The number of vehicles, notably private cars, has increased dramatically over the last few years, resulting in all kinds of environmental problems. Traffic load has far exceeded the carrying capacity of roads in Lahore city, as well as in adjoining smaller towns. Valiant efforts are being made to cope with the situation by widening existing roads, and constructing new roads.

### **5.13.3 Energy Sources**

The transmission lines for electrical power in the LESCO run in a complex grid with numerous local substations.

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

## **5.14 Social and Cultural Resources**

### **5.14.1 Population Communities and Employment**

The total population of Lahore was 6,318,745 persons respectively, as enumerated in March, 1998. According to the 1998 Census, the population is predominantly Muslim, i.e. 93.9, 98.0 and 95.0%. The next higher percentage is of Christians with 5.8, 1.9 and 4%, followed by Ahmadis 0.2, 0.1 and 0.1%. While other minorities like Hindu (Jati), Scheduled Castes etc. are very small in number. Punjabi is the predominant language being spoken in the districts, representing 86.2 and 88% of the population, followed by Urdu, Pushto and Siraiki spoken by 10.2, 1.9, 7 and 0.4 %. Sindhi is spoken by 0.1%.

Of the total economically active population 98.9% were registered as employed in 1998. Nearly 52.6% were self-employed, 27.1% private employees and 14.4% government employees. Un-paid family helpers were recorded as 1.1%. In 1998 of the total employed persons, 44.7% had elementary occupations, followed by service workers and shop and market sales workers, 17.5% and professional, 9.2%. In rural areas people having elementary occupations were again in majority, followed by skilled agricultural and fishery works and service workers and shop and market sales workers, represented 52.5, 23.7 and 8.4% respectively.

The main occupation of women in rural areas of subproject is house-keeping which includes attending to the cattle, extracting butter and ghee from milk, weaving and sewing of family clothes. In addition they generally help their men-folk on farms with the lighter duties like transplanting of seedlings, threshing and winnowing of grains and sometimes they also help in harvesting. In city women are house-wives or work as professional's doctors, nurses, teachers and also in offices.

### **5.14.2 Education and Literacy**

The current literacy ratio in the Lahore district is 74%. The enrolment of the students in various level of education is given in Table 4.1.

Lahore is a first class seat of learning in Pakistan. The world famous and the oldest university of Pakistan i.e. University of the Punjab is located in this city. The pioneering University of Engineering and Technology is also in Lahore. There has been a significant development in the educational sector of this district. University of the Punjab has been extended and its new campus is constructed along the Upper Bari Doab canal. There are also a number of government and private schools, colleges and technical institutes. Main medical colleges in Lahore include the King Edward Medical College, the Allama Iqbal Medical College and the Fatima Jinnah Medical College, as well as several private and chartered medical universities and colleges.

Table 4.1: Educational Institutions by Level of Education, 1997-98 (Lahore)

Type of Institute	Institute		Enrolment		Teaching Staff	
	Male	Female	Male	Female	Male	Female
Primary	447	496	56,103	59,417	2,422	2,422
Middle	54	91	15,639	25,729	798	1,262
Secondary	119	114	82,521	90,551	3,194	3,363
Higher Secondary (Class I-XII)	20	9	2,676	2,101	378	164
Intermediate and Degree colleges	18	27	32,563	43,275	1,634	1,798
Mosque schools	447	496	56,103	59,417	2,422	2,422
<b>Total</b>	<b>662</b>	<b>742</b>	<b>158002</b>	<b>223083</b>	<b>5319</b>	<b>9102</b>

Source: Punjab Development Statistics, Bureau of Statistics, Punjab(1999).

### 5.14.3 Health Facilities

Good medical and health facilities are available in the Lahore Metropolitan Corporation area and its suburbs. Shaukat Khanum Hospital is a medical care facility in Lahore for the most dangerous disease i.e. cancer. There are also other hospitals of voluntary organizations, which provide health cover to the public. King Zaid Bin Sultan Hospital is also a very advanced addition in the medical care for Lahore. Among the prominent hospitals are General Hospital, Lady Aitchison Hospital, Lady Wellington Hospital, Mayo Hospital, Fatima Jinnah Hospital, Services Hospital, Gulab Devi Hospital, Ganga Ram Hospital, Shalimar Hospital, Combined Military Hospital and Ittefaq Hospital. Besides, a number of private medical practitioners, hakims and homeopathic doctors are also practicing in the city.

Table 4.2 Number of Health Institutions with Bed Capacity, 1998 (Lahore)

Medical facilities	Number	Beds
Hospital	42	11,529
Dispensary	140	68
Rural Health Centre	6	120
Basic Health Centre	37	74
T.B. Clinic	6	-
Sub-Health Centres	11	-
M.C.H. Centres	117	-
<b>Total</b>	<b>359</b>	<b>11,791</b>

### 5.14.4 Cultural Heritage and Community Structure

There are no official heritage sites or historic, religious, or archeologically important sites located in the subproject works area. There is no major historic or archaeological feature of note but there are a few places of worship e.g. Churches and Mosques within 500m radius of proposed sites of subprojects. Pakistan Radio, Agriculture department, Punjab Public Service Commission are the historical buildings near the project site. Minimum safe clearance i.e 20 feet will be maintained and NOC from concerned departments will be obtain before the start of work.

**5.14.5 Aesthetic Values:**

Post construction issue as aesthetic value is less issue for underground cable as they are not visible after construction and has no impact on aesthetics. In case of proposed subproject, this aspect would not consider as significantly as the current land uses do not rely on the visual and aesthetics environment area.

## **6. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

### **6.1 Project Location Impact Assessment and Mitigation**

This Tranche-IV(saving) subproject will involve the construction of 132kV Double circuit underground cabling, implying an expansion of both outside and within the proposed subproject boundary. There are few SRs including shops, college, and WAPDA Offices, Government department, hotels, school close to the cable, which could be possibly affected by certain activities of the subproject works as shown in **figure 3.1c**. The cable will crossroads, and could require the removal of trees but there is no other sensitive receiver on its routes, which could be affected by the works.

The location and scale of the works are very important in predicting the environmental impacts. This process of impact prediction is the core of the IEE process and it is critical that the recommendations and mitigation measures are carried out according to with reference to the conditions on the ground in the affected areas in the spirit of the environmental assessments process. In this section the potential environmental impacts are reviewed. Where impacts are significant enough to exceed acceptable environmental standards, mitigation is proposed in order to reduce residual impact to acceptable levels and achieve the expected outcomes of the subproject being implemented. Therefore, it is essential that a proper analysis is carried out during the project planning period. In this regard, the impact prediction plays a vital role as these predictions are used for developing mitigation measures and any alternative options, if appropriate. When the detailed designs are completed the impacts and mitigation measures will need to be further reviewed to take account of how the contracts are set up and in the light of any fine tuning of the subproject proposals.

The environmental management plan has been reviewed based on the assessment and shall be reviewed in due course at subproject inception and through construction in order to provide a feedback on any significant unpredicted impacts. It is based on the analysis of impacts, primarily to document key environmental issues likely to arise from subproject implementation, to prescribe mitigation measures to be integrated in the subproject design, to design monitoring and evaluation schedules to be implemented during subproject construction and operation, and to estimate costs required for implementing subproject mitigation measures. The EMP must be reviewed in the subproject inception by the subproject management and approved before any construction activity is initiated, to take account of any subsequent changes and fine tuning of the proposals

### **6.2 General Approach to Mitigation**

Based on experience on some projects contractors have put emphasis on the financial compensation for environmental nuisances. This may be acceptable for some social impacts where evacuation is necessary or where houses have been accidentally damaged, however it is not best international practice to accept payment for environmental impacts. An approach whereby the subproject contractor pays money for nuisances rather than control impacts at source will not be acceptable. This practice should not be allowed and financial compensation shall not be allowed as mitigation for negative environmental impacts or environmental nuisance.

During the preparation for the subproject construction phase the future contractors must be notified and prepared to cooperate with the executing agency, project management, supervising consultants and local population, in the mitigation of impacts. Furthermore the contractor must be primed through bidding stages and the contract documentation to implement the EMP in full and be ready to engage trained environmental management staff to audit the effectiveness and review mitigation measures as the project proceeds. The effective implementation of the EMP will be audited as part of the loan conditions and the executing agency (PEPCO) must be prepared for this. In this regard the LESCO must fulfil the requirements of the law and guidance prepared by Pak-EPA on the environmental aspects of power projects and the recommendations already made for subproject in this IEE and under PEPA, 1997.

The location of the residences, shops colleges and civic cultural and other heritage sites has been reviewed in Section 4. Few SRs close enough to subproject were identified that there will face potential impacts in the construction stage due to disturbance, and significant noise and dust. This is because the TL is very short 1.65 Km and the alignment is along with roads and has no human settlements and structures as the development of the colony is under progress.

Work site could cause some generation of air borne dust, but any nuisance from this is likely to be very localized and temporary. Other project activities, e.g. movement of heavy vehicles on unpaved tracks during the works, could generate considerable dust. Water is available in the study area, although surplus water may not always be available to suppress dust at vulnerable locations in the dry season. Therefore as a general approach it is recommended that where works are within 15m of any residential sensitive receivers, the contractor should install segregation between the works and the edge of the sensitive receivers. The segregation should be easily erectable 2.5m high tarpaulin sheet and designed to retain dust and provide a temporary visual barrier to the works. Where dust is the major consideration the barrier can take the form of tarpaulins strung between two poles mounted on a concrete base.

Noise from the construction should not be a major consideration unless very close to schools or hospitals where construction should be avoided at sensitive times. In addition to the physical effect of mitigating dust and noise with barriers installation of such measures should be discussed with the local population and serve as a vehicle for further public consultation at the implementation stage to assist in public relations.

### **6.3 Cultural Heritage, Temples, Religious Sites, Social Infrastructure**

The location of mosques and other cultural and heritage SR sites have been reviewed and there are no mosques or other religious sites close to the site. The new line will also not affect or disturb any such site.

The nearest clinic/hospital is more than 500m from the edge of the subproject location, and the nearest houses at about 100m from the route. The cable will cross some roads. Apart from these features, there will be sufficient buffer distance between the works and any other SRs, so that no significant impacts should be expected. Public consultation should be undertaken at the implementation stage to ensure nuisances are not allowed to escalate for the SRs close to the TL Site.

## **6.4 Potential Environmental Impacts & Mitigation Measures in Construction Stage**

### **6.4.1 Traffic & Transport**

#### **Effect on Local Road Network**

Iron bars, concrete materials, equipment etc. will be transported through the provincial and local road network to the project site. Heavy transportation vehicles might disturb the local traffic especially at peak working hours. Visibility is usually minimum during nighttime where there are less streetlights, this will pose a hazard for the local traffic travelling in night time. Additionally it is important to note that the transmission line routes are allocated in low population areas, hence traffic and transport systems will have less significant impact.

#### **Mitigation Measures:**

- Diversion routes must be allocated for normal and construction vehicular traffic to maintain normal traffic flow
- The site that has to be excavated must be barricaded by means of safety signs and symbols, such as using reflectors, danger signs, direction signs, red lights and safe drive directions to improve indication of excavated sites in night time
- The construction vehicles must not be parked on roads. A proper parking area should be assigned to work safely and to prevent road accidents and road traffic congestion.
- Emergency routes must be kept clear and accessible.

A comprehensive Traffic Management Plan is provided in **Annexure-I**.

### **6.4.2 Encroachment, Landscape and Physical Disfiguration**

The extent of the proposed subproject for power expansion is moderate and should not extend beyond the power corridor (ROW) created by the subproject. No significant landscape impacts are expected from construction of this subproject.

### **6.4.3 Cut and Fill and Waste Disposal**

Disposal of surplus materials must also be negotiated through local authority approvals prior to the commencement of construction. The Subproject work should not involve any significant cutting and filling but minor excavations (down to 4m).

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



Mitigation measures must focus on the minimization of impacts. In order to allow the proper functioning of the settlement sites during construction it is recommended that consideration be given to erect temporary hoardings immediately adjacent to the nearest houses and shops if they are within 15m of the power distribution line tower construction.

If surplus materials arise from the removal of the existing surfaces from specific areas, these should be used elsewhere on the subproject before additional soil, rock, gravel or sand is brought in. The use of immediately available material will generally minimize the need for additional rock based materials extraction from outside.

The subproject detailed designers have so far estimated that no substantial additional materials will be required subject to confirmation at the detailed design stage.

At this stage no areas require any removal of tree. However if specimen trees are affected the owners should be given the resources and opportunity to reinstate the woodland long term and a plantation compensation plan should be drawn up to replant the woodland/trees. In the event that the land is not suitable for plantation then other areas should be identified to replace the cut trees and sufficient areas should be identified to allow plantation of trees at a rate of say 3:1. The replacement ratio should allow for a high mortality rate among the newly planted trees in the dry environment or otherwise as based on advice from the forest authority.

Contractual clauses should be included to require each contractor to produce a materials management plan (one month before construction commences) to identify all sources of cement and aggregates and to balance cut and fill. The plan should clearly state the methods to be employed prior to and during the extraction of materials and all the mitigation measures to be employed to mitigate nuisances to local residents. Financial compensation shall not be allowed as mitigation for environmental impacts or environmental nuisance. Mitigation measures shall seek to control the impacts at source in the first place. The construction supervising consultant (engineer) shall be responsible to update the cut and fill estimates and create Materials Master Plan to facilitate materials exchange between the different contracts areas along the power line and sub-contractors to provide an overall balance for materials and minimize impacts on local resources.

#### **6.4.4 Trees, Ecology and Protected Areas**

There are no Reserved or Protected Forests or trees near the TL alignment. The proposed line will require the laying of underground cable. All work will be done on government land. This TL route disclosed by LESCO will not affect trees

A requirement shall be inserted in the contracts that no trees are to be cut on the TL site or outside, without the written permission from the supervising consultant who may permit the removal of trees if unavoidable on safety/technical/ engineering grounds after written justification by LESCO and to the satisfaction of the forest authority and the owner.

#### **6.4.5 Hydrology, Sedimentation, Soil Erosion**

The proposed subproject is on flat site and should only require minor excavations and piling. Therefore there is little potential for the works to have impact on local water resources. There should be no need for erosion control and there should not be any significant runoff from stockpiles.

#### **6.4.6 Air Pollution from Crushing, Cut, Fill, & Asphalt**

The material (cement, sand and aggregate) requirement of a typical 132kV underground transmission line (4.8m<sup>3</sup>, or 40 bags of cement per tower) is not large. In transmission line construction sand and aggregate are delivered directly to the location from the quarry/source, there is no intermediate or bulk storage of these materials. Similarly construction materials stored at the site are scheduled as per the work progress, which means that at any given point in time the amount of construction material stored is not significant. The quantities of construction material required for a cable are not so large that they potentially represent a traffic hazard, these requirements are time dispersed. The contractor will be, however, required to provide a traffic management plan before commencement of work at site. Field observations indicate that ambient air quality is generally acceptable and that emissions from traffic and other powered mechanical equipment in the area are rapidly dispersed. There will be a few items of powered mechanical equipment to be used in the construction of the distribution line works that may give rise to gaseous emissions. However these should be well dissipated.

Work will contribute to increasing dust, and the following mitigation measures are needed:

- (i) Dust suppression facilities (back pack water sprayer) shall be available where earth and cement works are required.
- (ii) Areas of construction (especially where the works are within 20m of the SRs) shall be maintained damp by watering the construction area.
- (iii) Construction materials (sand, gravel, and rocks) and spoil materials will be transported trucks covered with tarpaulins.
- (iv) Storage piles will be at least 30m downwind of the nearest human settlements.
- (v) All vehicles (e.g., trucks, equipment, and other vehicles that support construction works) shall be well maintained and not emit dark or smoky emissions in excess of the limits described in the NEQS.

#### **6.4.7 Noise and Vibration**

It is anticipated that powered mechanical equipment and some local labour with hand tool methods will be used in construction of the subproject works. No blasting is anticipated. Powered mechanical equipment can generate minor noise and vibration. The cumulative effects from several machines can be significant. To minimize such impacts, the contractor for subproject should be requested by the construction supervision consultants (engineer) to provide evidence and certification that all equipment to be used for construction is fitted with the necessary air pollution and noise dampening devices to meet NEQS requirements.

Table 6.1: National Environmental Quality Standards for Noise

S No.	Category Area/Zone	of Effective from 1st July, 2010			
		Effective from 1st July, 2010		Effective from 1st July, 2012	
Limit in dB(A) Leq*					
		Day time	Night time	Day time	Night time
1.	Residential are (A)	65	50	55	45
2.	Commercial area (B)	70	60	65	55
3.	Industrial area (C)	80	75	75	65
4.	Silence zone (D)	55	45	50	45

Note:

- i. Day time hours: 6 .00 am to 10.00 pm
- ii. Night Time hours: 10.00 pm to 6.00 am
- iii. Silence zone: Zones which are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts and courts.
- iv. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.
- v. dB (A) Leq: time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

Noise from construction of the power distribution lines and improvements to substations is not covered under any regulations however in order to keep in line with best international practice, it is recommended that no construction should be allowed during nighttime (9 PM to 6 AM) and less than 70dB(A)Leq should be the criterion at other times during the day measured from the boundary of land from which construction noise is emitted. A criterion of 70dB(A)Leq (exterior, boundary of DGS) has been used for assessment in previous IEE studies. Any noisy equipment should be located within DGS or as far from SRs as possible to prevent nuisances to dwellings and other structures from operation.

Vibration from construction may be a significant impact but this should be for a short duration. Where vibration could become a major consideration (within say 100m of schools, religious premises, hospitals or residences) a building condition survey should take place prior to construction. The physical effect of construction should be assessed prior to construction and measures should be discussed with the local population as well as timing of the works to serve as a vehicle for further public consultation at the implementation stage and to assist in public relations. At nearby schools, the contractor shall discuss with the school principals the agreed time for operating these machines and completely avoid machine use near schools during examination times, if such a need arises.

#### **6.4.8 Sanitation, Solid Waste Disposal, Communicable Diseases**

Almost all the activities from excavation to laying of underground transmission line will generate waste, however the waste will be of inert nature. The waste will mainly comprise of cement and concrete waste, the concrete material resulting from batching and mixing will harden the ground surface resulting in growth inhibition of plant growth. This would also result in unaesthetic environment of the site.

Furthermore, solid wastes will be generated and will be categorized according to their nature. For instance, packaging materials, wood, leftovers, plastics of various categories etc.

The works will be under close supervision of the LESCO authority, these issues can be controlled at source.

In order to maintain proper sanitation around construction sites, the provision of temporary toilets (if required) should be made for workers at the proposed subproject site.

Wherever water is allowed to accumulate, in temporary drainage facilities, due to improper storm water management, or improper disposal of wastewater generated from the site, it can offer a breeding site for mosquitoes and other insects. Vectors such as mosquitoes may be encountered if open water is allowed to accumulate at the sites. Temporary and permanent drainage facilities should therefore be designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water ponds.

#### **6.5 Potential Environmental Impacts & Mitigation Measures in Operational Stage**

##### **6.5.1 Air Pollution and Noise from the Enhanced Operations**

The subproject works will extend the power distribution lines but no houses, mosques or schools will be close to the new TL in the operational phase. Nevertheless some houses, a school, a hospital and a hostel are close to the proposed subproject site. The proposed subproject will not extend level of operation to increase the air and noise pollution level due to the other point and non-point sources of pollution. However, it is recommended that an acoustical check be made on the detailed design to determine if any noise barriers are required. There should be no source of atmospheric pollution from the subproject. In the operational phase any nearby industrial facilities in the city with fuel powered mechanical equipment will be the main polluters. All such emissions will be very well dissipated in the open terrain and there will be no cumulative effect from the subproject.

Noise impacts from the operation of the equipment should be reviewed at the detailed design stage. There are no national noise standards in Pakistan for power distribution noise emissions that would apply in the operational stages. A criterion of 70db(A) Leq (exterior, boundary of DGS) has been used for assessment in previous environmental studies. It is recommended that a check be made on the likely acoustical performance based on maker's specifications of the installed equipment at the detailed design stage.

### **6.5.2 Pollution from oily run-off, fuel spills and dangerous goods**

No significant impacts from oily residues such as transformer oil and lubricants are expected to arise in this subproject. However control measures will be needed for oily residues such as transformer oil and lubricants in the case of accidental or unexpected release. Transformer oil is supplied in drums from an imported source and tap tanks are topped up as necessary on site. There are facilities in some subproject maintenance yards for recycling (dehydrating) oil from breakers. However the areas upon which these recycling facilities are located have no dedicated drainage, which can capture run-off. Oily residues and fuel and any contaminated soil residues should be captured at source and refuelling and maintenance should take place in dedicated areas away from surface water resources. Contaminated residues and waste oily residues should be disposed at a site agreed with the local authority. Control measures will be needed for oily residues such as transformer oil and lubricants in the case of accidental or unexpected release. Transformer oil is supplied in drums from an imported source and tap tanks are topped up as necessary on site. There are facilities in some subproject DGS maintenance yards for recycling (dehydrating) oil from breakers. However the areas upon which these recycling facilities are located have no dedicated drainage, which can capture run-off. Contaminated residues and waste oily residues should be disposed at a site agreed with the local authority. No significant impacts from oily residues such as transformer oil and lubricants are expected to arise in this subproject. DISCOs are served by the Technical Services Group (TSG) TSG prepare a detailed routine maintenance schedule for each piece of hardware and TSG also supervises and monitors the implementation of this schedule by Grid System Operation (GSO). Transformer oil has a long life (typically over 15 years, which depends upon the level of load the transformer serves). Oil spills are very rare and are pre-empted by routine maintenance. TSG and GSO have a written down procedure to deal with oil spills. TSG ensure that the maintenance schedule of each piece of hardware is adhered to. DISCOs have also established a safety unit, which among other tasks, investigates all accidents. Frequency of accidents, on average is about 1 per DISCO per year (based on last 4 years record, about 60 % of these are non-fatal. Most accidents occur due to staff and supervision negligence. Detailed report of each accident is prepared.

### **6.5.3 Enhancement**

Environmental enhancements are not a major consideration within the subproject site. However it is noted that it is common practice at many such sites to create some local hard and soft landscaping and successful planting of fruit trees and shrubs has been accomplished at many sites. This practice should be encouraged as far as practicable. Other opportunities for enhancements can be assessed prior to construction and proposed enhancements should be discussed with the local population to serve as a vehicle for further public consultation at the implementation stage and to assist in public relations. Trees removed for construction purposes should be replaced as compensation in line with best practice at ratio of three replaced for one removed however additional trees should be planted as enhancements where there is space in the DGS and along the cable.

## **7. INSTITUTIONAL REQUIREMENTS & ENVIRONMENTAL MANAGEMENT PLAN**

In this section, the mitigation measures that are required, for Tranche-IV proposed subproject, to reduce residual impact to acceptable levels and achieve the expected outcomes of the project, are discussed. The Environmental Management Plan (EMP) is based on the type, extent and duration of the identified environmental impacts for the proposed subproject. The EMP has been prepared following best practice and by reference to the ADB guidelines.

It is important that the recommendations and mitigation measures are carried out according to the spirit of the environmental assessment process and in line with the guidelines. The impact prediction has played a vital role in reconfirming that typical mitigation measures and approaches to achieve the necessary environmental controls based on the feasibility and detailed design assumptions and available alternatives at this stage.

The EMP has been compiled based on the available information and shall be reviewed in due course at project inception and through construction in order to feedback and provide updated mitigation requirements for any significant unpredicted impacts. The analysis primarily focuses the key environmental issues likely to arise from subproject implementation, to prescribe mitigation measures to be integrated in the project design, to design monitoring and evaluation schedules to be implemented during subproject construction and operation and to estimate costs required for implementing subproject mitigation measures. The details of EMP are given in the Table 6.1 for the Construction of *New 132kV Double Circuit underground cable Sunny View-Macleod Road – Qurtaba* subproject. The EMP plan must be reviewed when the subproject reaches detailed design stage by the project management and be approved before any construction activity is initiated, to take account of any subsequent changes and fine tuning of the proposals.

Prior to implementation and construction of the subproject the EMP shall be reviewed by the LESCO and amended after detailed designs are complete. Such a review shall be based on reconfirmation and additional information on the assumptions made at the feasibility stage on positioning, alignment, location scale and expected operating conditions of the subproject. For example, in this case if there are any additional transmission lines or extension of the sub-station boundaries to be included, the designs may be amended and then the performance and evaluation schedules to be implemented during project construction and operation can be updated, and costs estimates can be revised.

The IEE and EMP plan must be reviewed by the project management and approved by the Pak-EPA before any construction activity is initiated. This is also an ADB requirement in order to take account of any subsequent changes and fine tuning of the proposals. It is recommended that before the works contract is worked out in detail and before pre-qualification of contractors, full extent of the environmental requirements for the subproject and the IEE and EMP are included in the bidding documents. Professional experience indicates that past environmental performance of contractors and their awareness of environmentally responsible procurement should also be used as indicator criteria for the prequalification of contractors.

LESCO as the implementing agency (IA) bears the overall responsibility for the preparation, implementation, and financing of all tasks set out in this IEE, as well as inter-agency coordination required for the implementation of the Subprojects. As such, it takes care of the preparation/updating and implementation of the IEEs, short RPs and DDRs, and internal monitoring and evaluation activities. Institutionally, LESCO has two functional directorates, namely, Project Management Unit (PMU) and Grid System Construction (GSC).

The PMU contains a specially created cell to take care of the safeguards related activities, namely, the Environment and Social Safeguard Section (E&SS), headed by a Deputy Manager (E&SS), and assisted by two Assistant Managers, Environment, and Social Impact, respectively. The Assistant Manager (Environment) is responsible for the preparation/updating, implementation and internal monitoring of the subproject IEE.

To support the E&SS, to carry out its responsibilities, Project Implementation Consultant (IC) are hired by PEPCO who also have environmental and social experts to assist LESCO in revising and updating the IEE as and when required, and then in implementation of the EMP and IEE

The implementation of EMP will be subjected to both internal and external monitoring. Internal monitoring will be conducted by the environmental expert of E&SS unit PMU, assisted by GSC's field team. The external monitoring responsibilities will be carried out by External Monitoring Consultant (FMC, SMEC) engaged by PMU, PEPCO.

Table 7.1: Environmental Management Plan – Matrix

Environmental Concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Responsibility to implement MM	Monitoring
<b>DESIGN STAGE</b>						
1. Flora and Fauna	To minimize damage to flora and fauna	1. Ensure that minimal flora is damaged 2. Ensure that fauna especially bird nesting's are not damaged	Before the commencement of construction activities/during design stage	Flora and Fauna sensitive locations	ES SMEC	ES LESCO
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 substation are relocated near water courses, culverts or bridges in the design stage reports	ES LESCO with the ES SMEC (Design Consultant)	ES LESCO
3. Noise	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 DGS 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 IEE/EIA/EMP or as required / approved by PEPA.	ES LESCO with the ES SMEC (Design Consultant)	ES LESCO and ES SMEC
4. Waste disposal	Ensure adequate disposal options for all waste including transformer oil, residually contaminated soils, scrap metal.	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, 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.	1. Prior to detailed design stage no later than pre-qualification or tender negotiations 2. Include in contract.	LESCO ESU. Locations approved by EPA and LESCO and local waste disposal authorities.	ES LESCO with the ES SMEC (Design Consultant)	ES LESCO with the ES SMEC
5. Temporary drainage and	include mitigation in preliminary designs	1. Identify locations where drainage or irrigation crossing RoW may be affected by	During designing stage no later than	Locations based on drainage or	ES LESCO with the ES	ES LESCO with the ES



Environmental Concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Responsibility to implement MM	Monitoring
erosion control	for erosion control and temporary drainage.	works. 2. Include protection works in contract as a payment milestone(s).	pre-qualification or tender negotiations.	irrigation crossing RoW near DGS.	SMEC	SMEC
6. Contract clauses	Ensure requirements and recommendations of environmental assessment are included in the contracts.	Include EMP Matrix in tender documentation and make contractors responsible to implement mitigation measures by reference to EIA/IEE in contract. Include preparation of EMP review and method statement WM plan, TD and EC Plan in contract as a payment milestone(s). Require environmental accident checklist and a list of controlled chemicals / substances to be included in the contractor's work method statement and tender documentation.	During tender preparation. No later than pre-qualification or tender negotiations In bidding documents as evaluation criteria.	Noise sensitive locations identified in the IEE/EIA/EMP or as required / approved by PEPA.	ES LESCO with the ES SMEC	ES LESCO with the ES SMEC

**Construction Phase**

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Frequency of Monitoring	Responsibility
Air	Chronic health effects Reduced visibility on roads	Sprinkling of water Tuning of construction vehicles & machines Dust masks for laborers Monitoring of vehicular emission Monitoring of Ambient Air	ParticulateM after Smoke CO SOx NOx	All project locations	Monthly	ContractorL ESCO

<p><b>Noise</b></p>	<p>Stress Hypertension Hearing loss Headache</p>	<p>Avoid working at night Lubrication of construction vehicles Earplugs Monitoring of Ambient Noise Monitoring of noise (near construction machinery)</p>	<p>Noise levels</p>	<p>Project location Close to residential areas</p>	<p>Monthly</p>	<p>Contractor LESCO</p>
<p><b>Land and soil</b></p>	<p>Erosion due to excavation Formation of pits due to improper backfilling</p>	<p>Proper backfilling and stone pitching around the excavated site if required</p>	<p>Surface topography</p>	<p>All project locations</p>	<p>Continuous</p>	<p>Contractor LESCO</p>
<p><b>Solid Waste</b></p>	<p>Land contamination unpleasant aesthetic view</p>	<p>Raw material inventory should be maintained to avoid stockpiles</p>	<p>Raw material inventory</p>	<p>All project locations</p>	<p>Continuous</p>	<p>Contractor LESCO</p>
<p><b>Vegetation</b></p>	<p>No cutting of trees is involved</p>	<p>-</p>	<p>-</p>	<p>-</p>	<p>-</p>	<p>-</p>
<p><b>Water</b></p>	<p>Wastage and misuse of water</p>	<p>Avoid unnecessary use of water Prevent leakages</p>	<p>Record log of water usage</p>	<p>All project locations</p>	<p>Continuous</p>	<p>Contractor</p>
<p><b>Social Environment</b></p>	<p>Disturbance to routine activities Conflicts between laborers and local communities</p>	<p>Specify time scale for construction activities Discussion with local people regarding conflicts if any</p>	<p>Review of complaint register Local Consultations</p>	<p>All project locations</p>	<p>Monthly</p>	<p>LESCO</p>

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Frequency of Monitoring	Responsibility
Road and networks	Traffic congestion leading to accidents	<p>Diversion routes must be notified to maintain traffic flow</p> <p>Signs and reflectors must be boarded for driver visibility at night</p>	Signs and detectors are being followed	Intersection of divisions	Monthly	Contractor
Health and Safety	<p>Lack of awareness among general public about safety may lead to accidents</p> <p>Incompetent and untrained workers might cause harm to themselves and others</p> <p>Construction works may include many risks and hazards that may lead to injuries or even death</p>	<p>Safety symbols and instructions will be boarded at work sites</p> <p>Trained personnel will be appointed for the specific work</p> <p>Appropriate PPEs must be used for technical work</p>	<p>Record of Safety Talks</p> <p>Record of safety incidents (Major &amp; Minor)</p> <p>Record of PPEs Visual Assessments</p>	On project sites	Monthly	Contractor LESCO

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Frequency of Monitoring	Responsibility
<b>Operational Phase</b>						
<b>Electric Magnetic Field (EMF)</b>	Human health impact such as, neuro-psychological disorders or cardiovascular diseases	Increase depth of cable to suppress the EMF levels Appropriate cabling with protective shields to suppress electric field strength	EMF Intensity	Neighboring communities near the corridor	Biannually	LESCO
<b>Health and Safety</b>	Incompetent and untrained workers might cause harm to themselves and others Maintenance works may include many risks and hazards that may lead to injuries or even death	Trained personnel will be appointed for this specific work Appropriate PPEs must be used for technical work	Records of safety incidents (Major & Minor) Records of PPEs Visual Assessments	On all project sites	During maintenance works	LESCO

Note: DDS=Detailed design stage. Based on IEE report to be revised at DDS, RAP, SIA and other engineering considerations may change. IEE= Initial Environmental Examination. EMP= Environmental Management Action Plan = Environmental Management Plan, EPA= Environmental Protection Agency, ESIC=Environmental and Social Implementation Cell DGS= Distribution Grid Station.

In order to facilitate the implementation of the EMP, during the planning for the construction phase the LESCO must prepare the future contractors to cooperate with all stakeholders in the mitigation of impacts. Furthermore the contractor must be primed through the contract documentation and ready to implement all the mitigation measures. LESCO will need to engage at least one trained environmental management staff and the staff should audit the effectiveness and review mitigation measures as the subprojects are rolled out. The effective implementation of the EMP will be audited as part of the midterm review of loan conditions and the executing agency must prepare for this at the inception stage.

The impacts have been classified into those relevant to the design/preparation stage, construction stage and operation and maintenance stage. The matrix provides details of the mitigation measures recommended for each of the identified impacts, time span of the implementation of mitigation measures, an analysis of the associated costs and the responsibility of the institution. The institutional responsibility has been specified for the purpose of the implementation and the supervision. The matrix is supplemented with a monitoring plan for the performance indicators. A tentative estimation of the associated costs for the monitoring is given with the plan. The EMP has been prepared following best practice and the ADB guidelines.

The EMP was prepared taking into account the limited capacity of LESCO to conduct environmental assessment of the subproject, LESCO'S Organizational Set-up for EMP Planning, Implementation and Monitoring is shown in Figure 7.1. LESCO has appointed one (1) Deputy Manager Environment, one (1) assistant environmental manager and one (1) assistant social impact manager with support staff. LESCO, Environmental and Social Unit (ESU) are fully functional. However, an environmental manager will be required. Proposed Structure of ESU is shown in Figure 6.1a. It is envisaged that experience in this field should therefore develop in the near future. It is envisaged that experience in this field should therefore develop in the near future. However it is also strongly recommended that for subprojects in future Tranches that the LESCO should be prepared to engage more support where necessary (e.g. senior environmental specialist with at least 3 years' experience in environmental management 1 year site experience in environmental monitoring and auditing) to guide the subsequent formal assessment and submission process under the PEPA, 1997 and monitor compliance with the EMP. As of August 2007, the LESCO has established Environment & social cell to developed in-house environmental and social capability. The cell is work under Chief engineer Development PMU. One Deputy Manager and Two Assistant Managers are working in the cell.

The environmental staff members has a good level of awareness and will be responsible for addressing environmental concerns for sub-projects potentially involving of distribution lines and DGS. Whereas some of their work may in future be delegated to consultants they will need more training and resources if they are to effectively provide quality control and oversight for the EMP implementation. They require robust support from senior management staff members if they are to address all environmental concerns for the subprojects effectively. Specific areas for immediate attention are to create post of Manager (Environment) experienced or trained in EMP auditing, environmentally responsible procurement, air, water and noise pollution management and ecological impact mitigation. It is recommended that an environmental specialist consultant with 07 years' experience be made available to all the DISCOS to cover these aspects full time for at least the first six months of the

PDEMFF project and that on a call off basis with local support those services are retained for the life of the PDEMFF loan. The newly appointed environmental manager can then shadow the environmental specialist to improve awareness and hopefully provide independent quality control and oversight for the EMP implementation for the first 12 months.

Figure 7.1: LESCO'S Organizational Set-up for EMP Planning, Implementation and Monitoring

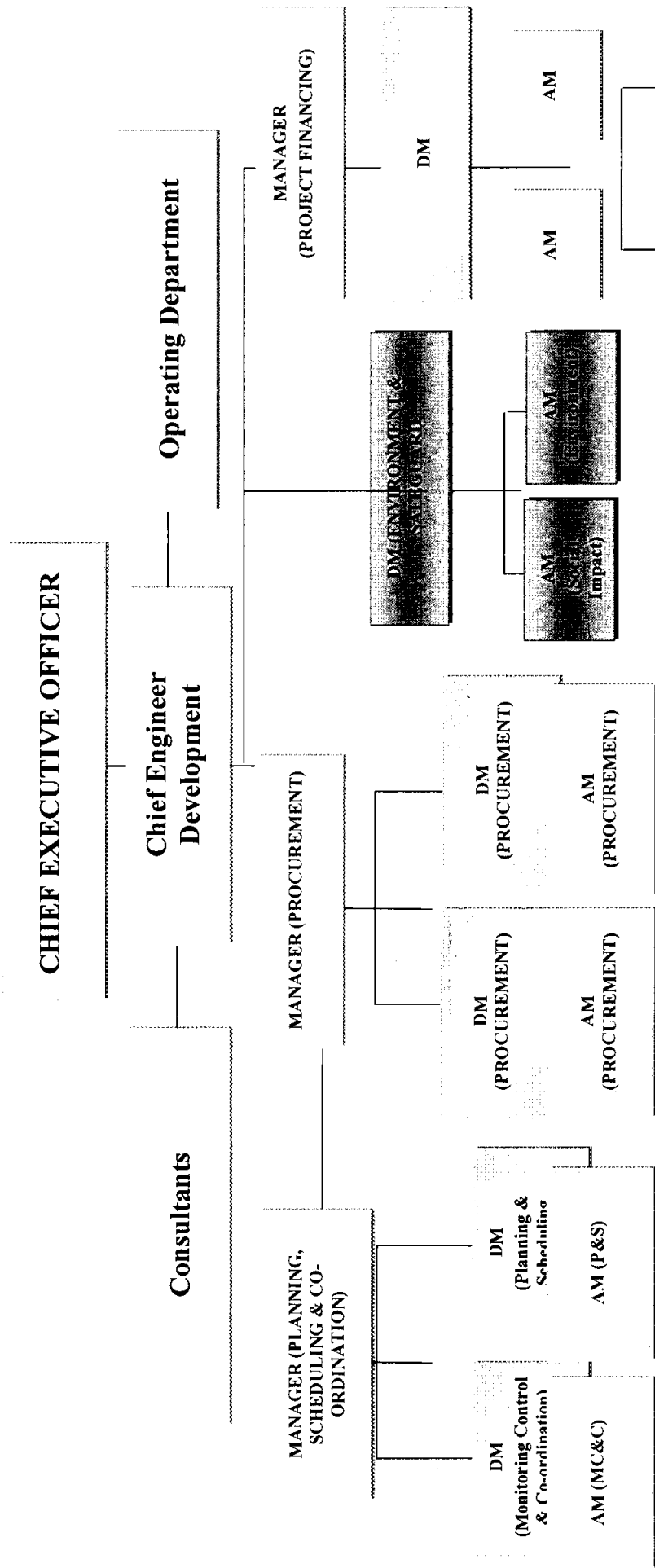
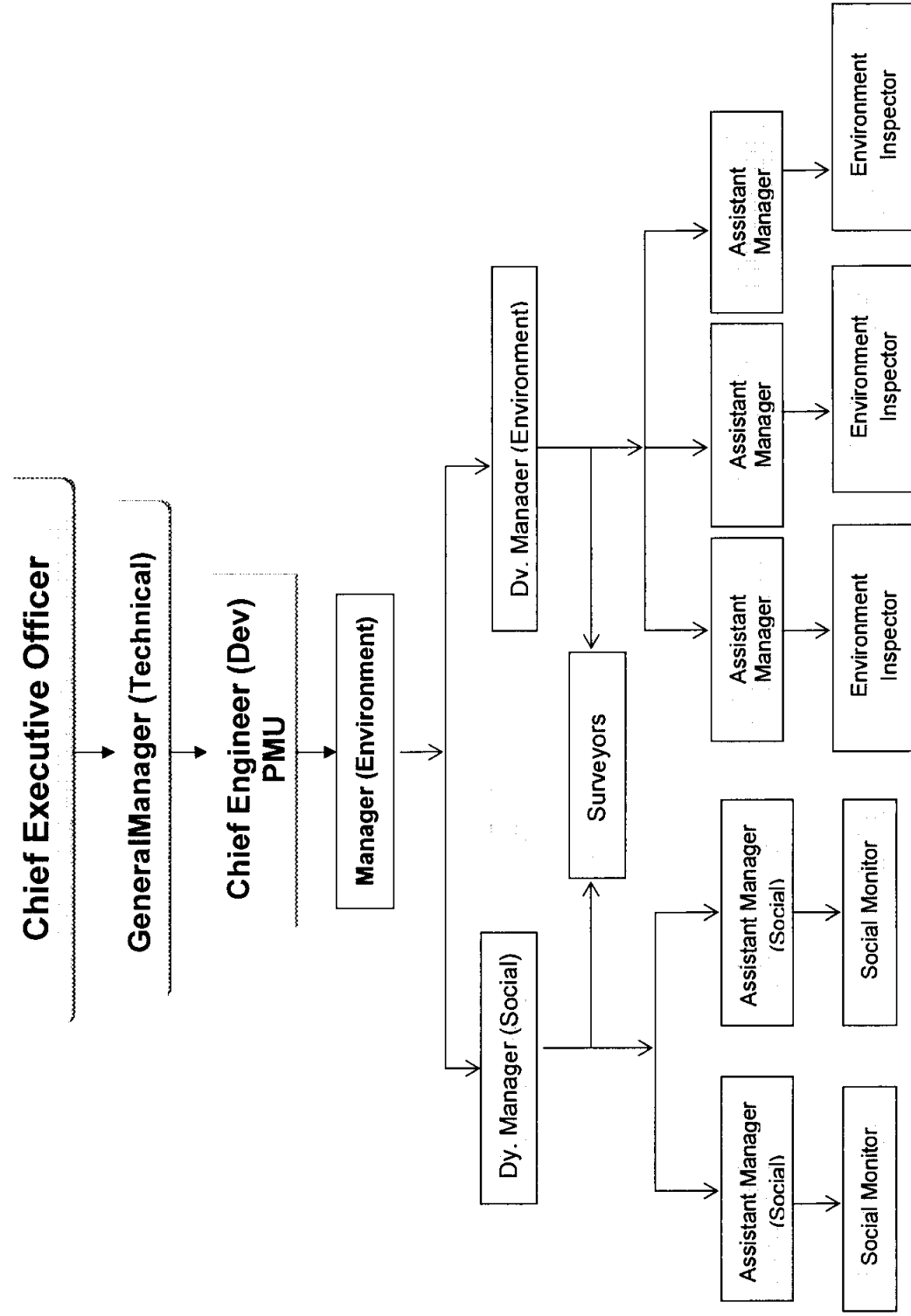


Figure 7.1a: Proposed Organizational Set-up of ESU for EMP Planning, Implementation and Monitoring





In order to achieve good compliance with environmental assessment principles the environmental staff for the project implementation team must be actively involved, prior to the outset of the implementation design stage, to ensure compliance with the statutory obligations under the PEPA, 1997. It is also recommended that LESCO Board allow direct reporting to Board level from the in-house ESU. If ESU requires resources for LESCO own sub-projects then LESCO should hire Manager for environment & safeguard through the relevant project implementation unit to address all environmental aspects in the detailed design. It is recommended that the Project Management Unit (PMU) should liaise directly with the ESU to address all environmental aspects in the detailed design and contracting stages.

Overall implementation of the EMP will become LESCO's responsibility. LESCO Board of Directors will be responsible to ensure that sufficient timely resources are allocated to process the environmental assessments and to monitor implementation of all construction and operational mitigation measures required to mitigate environmental impacts. Other parties to be involved in implementing the EMP are as follows:

- **Contractors:** Responsible for carrying out the contractual obligations, implementing all EMP measures required to mitigate environmental impacts during construction; and
- **Other government agencies:** Such as regional EPA and state pollution authorities, Department of Forests, Department of Wildlife Services, who will be responsible for monitoring the implementation of environmental conditions and compliance with statutory requirements in their respective areas and local land use groups.

Considering that other government agencies that need to be involved in implementing the EMP, training or harmonization workshops should be conducted for all ESUs in LESCO every six months or twice each year, for the first 2 years (and annually thereafter) to share the monitoring report on the implementation of the EMP in LESCO and to share lessons learned in the implementation and to achieve a consistent approach to decide on remedial actions, if unexpected environmental impacts occur.

The monitoring plan (**Table 7.2**) is designed and based on the project cycle. During the design stage, the monitoring activities will focus on (i) checking the contractor's bidding documents, particularly to ensure that all necessary environmental requirements have been included; and (ii) checking that the contract documents' references to environmental mitigation measures requirements have been incorporated as part of contractor's assignment and making sure that any advance works are carried out in good time. Where detailed design is required (e.g. for power distribution lines and avoidance of other resources) the inclusion and checking of designs must be carried out. During the construction period, the monitoring activities will focus on ensuring that environmental mitigation measures are implemented, and some performance indicators will be monitored to record the subprojects environmental performance and to guide any remedial action to address unexpected

impacts. Monitoring activities during project operation will focus on recording environmental performance and proposing remedial actions to address unexpected impacts.

At this stage, due to the modest scale of the new power distribution projects and by generally keeping to non-sensitive and non-critical areas the construction and operational impacts will be manageable. No insurmountable impacts are predicted providing that the EMP is implemented to its full extent and become part of the contract documents. However experience suggests that some contractors may not be familiar with this approach or may be reluctant to carry out some measures. In order that the contractors are fully aware of the implications of the EMP and to ensure compliance, it is recommended that environmental measures be cost separately in the tender documentation and that payment milestones are linked to environmental performance, *Vis a Vis* carrying out the EMP.

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

Table 7.2: 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	Responsibility PI Supervision	Cost of Supervision
<b>DESIGN / PRE - CONSTRUCTION STAGE</b>								
1. Review of Environmental Monitoring Action Plan (EMAP).	Environmental Management Action Plan is reviewed	During design monthly Contractor cover any unidentified impacts)	By completion of detailed design.	All project alignment	Contractor	Initially DISCO's Cell / later Contractor cost	E&SS, LESCO / ADB*	E&SS staff cost.
	Inventory of losses, Property acquisition, compensation & resettlement completed to RP requirements	Completed prior to commencement of construction	Before removal of houses and structures.	APs according to RP & LAFC.	DISCO'S Cell	DISCO'S Cell staff cost	E&SS, LESCO / ADB*	E&SS staff cost.
3. Project Disclosure.	Design changes notified	During design Contractor to cover any access roads alignment changes, additional Villages.	Completion of detailed design.	All project alignment.	Contractor	Contractor cost	E&SS, LESCO / ADB*	E&SS staff cost.
	Contract follows ADB Guidelines on ERP.	Once, before Contract is signed.	Before Contract is signed.	Method Statements include resources for mitigation measures.	DISCO'S Project Cell.	Contractor cost	E&SS, LESCO / ADB*	DISCO'S Cell staff cost.
4. Environmentally Responsible Procurement (ERP).	Contractual clauses include implementation of environmental mitigation							

Environmental Concern	Performance Indicator (PI)	Frequency to Monitor	Timing to Check PI	Locations to Implement PI	Responsible to Implement PI	Cost of Implementation	Responsibility PI Supervision	Cost of Supervision
	measures tied with contract agreement.	Monthly or as required in waste management plan to identify sufficient locations for, storage and reuse of transformers and recycling of breaker oils and disposal of transformer oil, residually contaminated soils and scrap metal "cradle to grave".	Prior to detailed design stage no later than pre-qualification or tender negotiations Include in contract.	Locations approved by local waste disposal authorities.	DISCO'S cell with the design consultant.	E&SS	E&SS, LESCO / ADB*	DISCO'S Cell staff cost.
<b>5. Waste Disposal</b>	Disposal options for all waste transformer oil, residual contaminated soils, scrap metal agreed with DISCO'S and local authority.	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.						
<b>6. Noise and Air Quality Mitigation in design</b>	Design changes included in approved EMP & EMAP	During detailed design by Contractor.	Completion of detailed design.	As defined in EMP (supplementary) & EMAP.	DISCO'S Cell / Contractor	Contractor cost	E&SS, LESCO / ADB*	DISCO'S Cell staff cost.

<b>7. Hydrological Impacts.</b>	Temporary Drainage Management plan.	During design by Contractor and monthly to cover any unidentified impacts	One month before commencement of construction	Considered locations to be as identified in the Detailed Drainage Report.	Contractor	Contractor cost	E&SS, LESCO / ADB*	DISCO'S Cell staff cost.
<b>8. Temporary drainage and erosion control.</b>	Erosion Control and Temporary Drainage completed.	During 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 cost	E&SS, LESCO / ADB*	DISCO'S Cell staff cost.
<b>9. Planning construction camps.</b>	Use of land agreed with LESCO Authority	During design updated by Contractor monthly to cover any unidentified impacts.	One month before construction commences.	Locations agreed LESCO ESU in consultation with community and the Contractor.	Contractor ESU facilitates.	Contractor cost	E&SS, LESCO / ADB*	DISCO'S Cell staff cost.
<b>10. Traffic Condition.</b>	Temporary Pedestrian and Traffic Management Plan agreed.	During design updated by Contractor monthly to cover any unidentified impacts.	One month before construction commences.	Locations agreed with DISCO'S cell in consultation with community and the Contractor.	Contractor	Contractor cost	E&SS, LESCO / ADB*	DISCO'S Cell staff cost.
<b>11. Institutional strengthening and capacity building.</b>	Train DISCO'S Cell officials.	Once ongoing	As soon as practicable No later than one month before Contract award.	Throughout the project	DISCO'S Project Cell.	DISCO'S Cell staff cost	E&SS, LESCO / ADB*	ADB cost of IES support for 1 month <b>US\$25,000</b>

**CONSTRUCTION STAGE**

<b>1. Orientation for Contractor, and Workers.</b>	Contractor agreed to provide training to professional staff and workers.	Once	Before contract is signed	All BOT staff members in all categories. monthly induction and six month refresher course	Contractor with E&SS assistance and record details.	Contractor cost	GSC / E&SS, LESCO.	DISCO'S Cell staff cost.
	Special briefing and training for Contractor completed. Periodic progress review sessions. Drainage Management plan. Erosion Control & Temp. Drainage plan Temp. Pedestrian & Traffic Management plan. Emergency Response Plan Materials Management plan. Waste Management plan. Noise and Dust Control plan. Safety Plan. Agreed schedule of costs for environmental mitigation. (N.B. Forest Clearance	Ongoing  Ongoing	Before construction areas are opened up  Every six months	Deliverable in final form to DISCO'S cell one month before construction commences for any given stretch.	All of DISCO'S alignment.	Contractor	Contractor cost	GSC / E&SS, LESCO.
<b>2. Plans to control environmental impacts.</b>								

	and Compensatory Planting plan is prepared by DISCO'S cell).									
<b>3. Water quality</b>	Meaningful water quality monitoring and up downstream during construction within 100m of rivers. Rapid reporting and feedback by DISCO'S.	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 designs including all bridges during construction within 100m of rivers	Independent experienced laboratory.	Contractor cost	GSC / E&SS, LESCO.	DISCO'S Cell staff cost.		
<b>4. Water Resources</b>	Availability of water acceptable to community and no complaints.	Monthly	Prior to submission of progress reports.	All local water supply resources and rivers.	Contractor	Contractor cost	GSC / E&SS, LESCO.	DISCO'S Cell staff cost.		
<b>5. Spoil disposal and construction waste disposal</b>	Use of land agreed with LESCO Authority.	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All DISCO'S alignment.	Contractor	Contractor cost	GSC / E&SS, LESCO.	DISCO'S Cell staff cost.		
	Waste Management Plan implemented. No open burning.									
<b>6. Noise</b>	Noise mitigation measures implemented in line with guidelines for noise reduction from ISO/TR11688-	Monthly (line item when opening up construction).	Maximum allowable noise levels are 70dB (A) <sub>Leq</sub> at sensitive receptors	All DISCO'S alignment.	Contractor should maintain the accepted standards	Contractor cost	GSC / E&SS, LESCO.	DISCO'S Cell staff cost.		

7. Air quality	1:1995(E) Dust control plan implemented.	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All DISCO'S alignment.	Contractor	Contractor cost	GSC / E&SS, LESCO.	DISCO'S Cell staff cost.
8. Soil Contamination	Contractor's workforce to be instructed and trained in handling of chemicals. Use of land agreed with LESCO Authority. Waste Management Plan implemented. No open burning.	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All DISCO'S alignment.	Contractor	Contractor cost	GSC / E&SS, LESCO.	DISCO'S Cell staff cost.
9. Work Camp Location and Operation	Emergency Response Plan / Safety Plan implemented.	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All DISCO'S alignment.	Contractor	Contractor cost	GSC / E&SS, LESCO.	DISCO'S Cell staff cost.
10. Safety Precautions for Workers	Local labor is used as workforce. Local educated people for office work.	Once monthly (update as necessary)	One month before construction and update quarterly.	All DISCO'S alignment.	Contractor.	Contractor cost	GSC / E&SS, LESCO.	DISCO'S Cell staff cost.
11. Social Impacts	Complaints on construction nuisance damages close to ROW are responded to promptly by the Contractor. Close liaison	Monthly (line item when opening up construction).	During construction. Update monthly.	All DISCO'S alignment.	Contractor	Contractor cost	GSC / E&SS, LESCO.	DISCO'S Cell staff cost.



	established with locals for the purposes to monitor complaints.	Once monthly (update as necessary)	One month before construction and update quarterly.	All DISCO'S alignment.	Contractor.	Contractor cost	DISCO'S / (DISCO'S Cell to actively supervise and enforce.	DISCO'S Cell staff cost
<b>12. Enhancements</b>								
Contractor has included for some enhancements in detailed designs including planting of trees in addition to bioengineering such as in median								
<b>OPERATIONAL STAGE</b>								
<b>1. Air Quality.</b>	Roadworthiness of vehicles	Roadworthiness of vehicles on DISCO'S daily use during operations	During operation.	All DISCO'S alignment.	Contractor	Contractor cost	GSC, GSO / E&SS, LESCO.	DISCO'S Cell staff cost.
	Monitor NO <sub>2</sub> and PM10 as indicators.	Yearly intervals for opening for reinsurance.						

**Summary of Estimated Costs for EMP Implementation**

<b>Activities</b>	<b>Description</b>	<b>Estimated Cost</b>	
		<b>Pak Rs</b>	<b>US \$</b>
<b>Monitoring activities</b>	As detailed under EMP	63,00000	60,000
<b>Mitigation measures</b>	As prescribed under EMP and IEE	525,0000	50,000
<b>Capacity building Program</b>	Training for Staff & Management	315,0000	30,000
<b>Contingency</b>	contingency	105,000	10,000
<b>Total</b>		<b>1,575,0000</b>	<b>1,50,000</b>

1US\$=105RS

## **8. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE**

### **8.1 Approach to Public Consultation**

The public consultation process with various stakeholders has been approached so as to involve public and other stakeholders from 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 its equipment.

### **8.2 Public Consultation Process**

The public consultation process has commenced in the initial feasibility stages (prior to construction) in order to disclose the project information to the stakeholders and record feedback regarding the proposed project and preferences. The stakeholders involved in the process were the population likely to be impacted along the route of the proposed power lines; the hotels, college, schools, , shopkeepers etc.

Prior to the implementation of the consultation, feedback, etc. has been carried out to support this IEE and recorded. The focus of attention has been the population near the proposed TL that may be affected by the proposed subproject. The level of engagement varied from stakeholder to stakeholder with some registering no major comment but it is noted that none registered any outright opposition to subproject.

The disclosure of the enhancement project in advance and subsequent consultation with stakeholders has advantages in the environmental assessment and mitigation of impacts. Public consultation can also provide a conduit for the improvement of the project implementation to better serve the stakeholders.

The environmental assessment process under the PEPA, 1997 only requires the disclosure to the public after the statutory IEE/EIA has been accepted by the relevant EPA to be in strict adherence to the rules. In this IEE the consultation process was performed to satisfy the ADB requirements. The summary of consultation and people consulted are listed in the table of public consultation.

### **8.3 Results of Public Consultation**

The consultations identified some potential environmental and social impacts and perceptions of the affected communities. The community generally supports the construction of the cable. The local poor people predominantly requested for unskilled and semi-skilled jobs on priority basis with the contractors during implementation of the project. No land acquisition and resettlement is involved in this subproject.

On the basis of the consultations so far, it appears that the project will have no insurmountable environmental and social impacts but LESCO will have to make sure that compensation and assistance amounts are assessed justly and that skilled and unskilled employment should be preferentially given to the affected persons (if any) as far as is reasonably practicable.

Table 8.1: Summary of Public Consultation (August, 2016)

Sr. No.	Participant Name	Participant Profession	Issues raised / Concerns expressed / Suggestions & Requests	Proposed Measure	Action Taken / Proposed	Contact #
1	Waheed Ahmad	Waheed Traders Cooper Road	All the stakeholders expressed their concern regarding traffic disruption during construction work	Construction work should be completed in time. At the earliest	LESCO should complete all work timely.	03212563975
2	Gulam Hussain	Tea Shop Cooper Road	-	-	-	03334303346
3	Abdul Razaq	Electrical Shop Cooper Road	-	-	-	03225990984
4	Kabeer Ahmad	Cooper Road	-	-	-	
5	Zuhaib Ahmad	Click One printing Cooper Road	-	-	-	
6	Mr. Idrees	Idrees Traders Cooper Road	-	-	-	
7	Mr. Ibrahim	Yaqoob Plastic Cooper Road	-	-	-	
8	Iftikhar Ahmad	Cooper Road	-	-	-	
9	Gafoor Ahmad Niazi	Sun & Star Cooperation Cooper Road	-	-	-	

10	<b>Sh. Javed Iqbal</b>	New Lucky Traders Cooper Road	-	-	-	
11	<b>Sh. Majeed Uddin Sabir</b>	Sabri Plastic Cooper Road	-	-	-	
12	<b>Faizan</b>	Goga Naqibia restaurant Cooper Road	-	-	-	
13	<b>Mian manzoor</b>	Akbari Group of Companies beaden Road	-	-	-	
14	<b>Mr. Sabir</b>	Cooper Road	-	-	-	
15	<b>M Kashif kamal</b>	Data Cooperation Cooper Road	-	-	-	
16	<b>M. Illyas baig</b>	EPS Industries Cooper Road	-	-	-	
17	<b>M. Suffayan</b>	49-B Place Market Cooper Road	-	-	-	
18	<b>M. Azam Khan</b>	Ooper Road	-	-	-	
19	<b>M. Arif Iqbal</b>	Hussain Glass Cooper Road	-	-	-	
20	<b>M. Arif Iqbal</b>	Hussain Glass Cooper Road	-	-	-	
21	<b>Ifitikhar Ahmad</b>	36- Cooper Road	-	-	-	

22	<b>Anjum Butt</b>	Wall Street Exchange Cooper Road	-	-	-	
23	<b>Farooq Butt</b>	Japan Center Cooper Road	-	-	-	
24	<b>Mr. Adnan</b>	Bhai Bhai Gift Center 17 Cooper Road	-	-	-	
25	<b>Mr. Mukhtar Mirza</b>	23/2 Cooper Road	-	-	-	
26	<b>Madam Farzana Shaheen</b>	Govt. Islamia College For Women Cooper Road	-	-	-	04299200776
27	<b>Mr. Ali Akber</b>	Superintendent health Department Punjab Cooper Road	-	-	-	04299200980
28	<b>Sheikh Muhammad Azam</b>	Chief Conservator Punjab forest Department Punjab Cooper Road	-	-	-	04299200781
29	<b>Mr. Saleem</b>	Divisional Forest Officer Punjab Forest Cooper Road	-	-	-	04299200796
30	<b>Asad Abas</b>	Production Incharge duty free shop Cooper Road	-	-	-	03154508401
31	<b>Mr. Zahid</b>	Duty Free Shop Cooper Road	-	-	-	04236283972
32	<b>Tayyab Mehmood</b>	Zee Avenue Cooper Road	-	-	-	03214400444 04236300220-1

33	<b>Muhammad Adrees Sr. Personal Officer</b>	Hospitality Inn Egerton Road	-	-	-	03214494611
34	<b>Capt (R) Ijaz Ibrahim</b>	Manager HR Hospitality Inn Egerton Road	-	-	-	04236310077
35	<b>Mudassar Ishaq</b>	Malindo Air Egerton Road	-	-	-	
36	<b>Danish Hameed Khan</b>	Travel Channel National Tower Egerton Road	-	-	-	
37	<b>Ch. Abdul Ghafoor</b>	Iqbal Electronics	All the stack holder s expressed their concern regarding traffic disruption during construction work	Construction work should be completed in time. At the earliest	LESCO should complete all work timely.	03219468274
38	<b>Ahmed Javaid Ch.</b>	Iqbal Electronics	-	-	-	03339468274
39	<b>Zubair Ahmed Hashmi</b>	Hussain Electronics	-	-	-	03249446524
40	<b>Naeem Iqbal</b>	Lahore Center 21-Abid Market	-	-	-	03218409049
41	<b>Hafiz Adman</b>	New Rafi Electronics	-	-	-	

42	<b>Muhammad Tahir</b>	New Rafi Electronics	-	-	-	03230433664
43	<b>Muhammad Kashif</b>	Ckka Electronics Abid Market	-	-	-	03234160908
44	<b>Hafiz Waqar</b>	Cikka Electronics	-	-	-	03234399229
45	<b>Yousin Butt</b>	Younis Electronics	-	-	-	04236374900 03334341744
46	<b>Haji Tariq Farooz Chairman</b>	Haji Tariq Electronics Abid Market	-	-	-	03008404070 04236313160
47	<b>Maqood Ahmen</b>	Tariq Electronics Abid Market	-	-	-	03356404070
48	<b>Mian Raique</b>	Taj Mahal Sweet	-	-	-	03324450233
49	<b>Mian Zarar</b>	Mian auto	-	-	-	03004432547
50	<b>Junaid Ejaz</b>	Kings Tikoom Temple Road	-	-	-	03247777786
51	<b>Hussain Ahmed Shahzad</b>	Ahmed Mobile	-	-	-	
52	<b>Khiizar Hayyat</b>	Ahmed Mobile	-	-	-	



53	<b>Dildar Hussain</b>	Rigal Chowk Quzi Haleem	-	-	-	
54	<b>Gulam Mustafa Yaseen</b>	Tepal Road Kareem Dahi Bhale	-	-	-	
55	<b>Muhammad Ilyas</b>	Bilal Milk Shop temple Road	-	-	-	
56	<b>Muhammad Yaqoob</b>	Shahid Briyani Temple Road	-	-	-	
57	<b>Muhammad Azeem</b>	Alsdaa Store	-	-	-	
58	<b>Mr. Ayyaz James Principle</b>	Sacred heart School Temple Road	-	-	-	03325896003
59	<b>S.R Rose Yaqoob</b>	Cathedral Girls school Temple Road	-	-	-	04236360987
60	<b>Abdul Gafaar</b>	Admen K.E Hostel Boys	-	-	-	03364051716
61	<b>Mirza Gulam Hussain</b>	DEO- Education Officer	-	-	-	
62	<b>Sarwar Anwar</b>	Principle Cathedral school Mall	-	-	-	04237243525
63	<b>Nasir Admen</b>	Admen Officer School Mall Road	-	-	-	
64	<b>Qazi Muhammad Syed</b>	Qazi Hospital	-	-	-	03334334546

65	<b>Gulam Rasool</b>	Admen Ali Eye Hospital	-	-	-	
66	<b>Sheikh Tahir</b>	Joint Secretly Abid Market Temple Road	-	-	-	
67	<b>Sheikh Hader Ali</b>	Queens Road White House	-	-	-	03008441933
68	<b>Kashif Maqsood</b>	Secretly Abid Market	-	-	-	
69	<b>Abdul Kaleem Tahir</b>	Principle SCAS School Bahawal pur Road	-	-	-	03219481014
70	<b>Baber Mehmood</b>	President Alkhidmat Group Hall Road Market	-	-	-	03008477785
71	<b>Ijaz Ahmad Butt</b>	Abdulah Center Hall Road	-	-	-	
72	<b>M. Rafique</b>	S. Vice Chairman Zone no. 3 16 Hall Road	-	-	-	03334322405
73	<b>M. Ijaz Mugal</b>	Vice Chairman Zone no. 3 16 Hall Road	-	-	-	03218419723
74	<b>Aftab Ahmad</b>	Hajimaan & Co	-	-	-	
75	<b>M.Asiam</b>	Aslam Dar ul Mahi	-	-	-	
76	<b>Syed Awais</b>	Muhammad Niahri	-	-	-	

77	<b>Afzal</b>	Rashid Battery	-	-	-	
78	<b>M. Arshad</b>	Arshad Dar ul Mahai	-	-	-	
79	<b>Faisal bashir</b>	Manager PSO Pump Bhawalpur Road	-	-	-	

#### 8.4 Grievance Redressal Mechanism

In order to receive and facilitate the resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance an Environmental Grievance Redress Mechanism (GRM) will be established for the project. The mechanism will be used for addressing any complaints that arise during the implementation of projects. In addition, the GRM will include a proactive component whereby at the commencement of construction of each project (prior to mobilization) the community will be formally advised of project implementation details by Environment Specialist of DISCO, Environment Specialist of SMEC, the Design and Supervision Consultant (DSC) and Environmental Specialist of the contractor (designs, scheduled activities, access constraints etc.) so that all necessary project information is communicated effectively to the community and their immediate concerns can be addressed. This proactive approach with communities will be pursued throughout the implementation of each project.

The GRM will address affected people's concerns and complaints proactively and promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people at no costs and without retribution. The mechanism will not impede access to the Country's judicial or administrative remedies.

#### 8.5 Redress Committee, Focal Points, Complaints Reporting, Recording and Monitoring

The Grievance Redress Mechanism (GRM), which will be established at each project level is described below:

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

The GRC will comprise representatives from local authorities, affected parties, and other well-reputed persons as mutually agreed with the local authorities and affected persons. It will also comprise the Contractor's Environmental Specialist, SMEC's Environmental Specialist and PIU Safeguards/Environmental Specialist. The role of the GRC is to address the Project related grievances of the affected parties that are unable to be resolved satisfactorily through the initial stages of the GRM.

EA will assist affected communities/villages identify local representatives to act as Grievance Focal Points (GFP) for each community/village.

GFPs are designated personnel from within the community who will be responsible for i) acting as community representatives in formal meetings between the project team (contractor, DSC, PIU) and the local community he/she represents and ii) communicating community members' grievances and concerns to the contractor during project implementation. The number of GFPs to be identified for each project will depend on the number and distribution of affected communities.

A pre-mobilization public consultation meeting will be convened by the EA Environment Specialist and attended by GFPs, contractor, Disco, PIU representative and other interested parties (e.g. District level representatives, NGOs). The objectives of the meeting will be as follows:

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

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

- (i) Individuals will lodge their environmental complaint/grievance with their respective community's nominated GFP.
- (ii) The GFP will bring the individual's complaint to the attention of the Contractor.
- (iii) The Contractor will record the complaint in the onsite Environmental Complaints Register (ECR) in the presence of the GFP.
- (iv) The GFP will discuss the complaint with the Contractor and have it resolved;
- (v) If the Contractor does not resolve the complaint within one week, then the GFP will bring the complaint to the attention of the DSC's Environmental Specialist. The DSC's Environment Specialist will then be responsible for coordinating with the Contractor in solving the issue.
- (vi) If the Complaint is not resolved within 2 weeks the GFP will present the complaint to the GRC.
- (vii) The GRC will have to resolve the complaint within a period of 2 weeks and the resolved complaint will have to be communicated back to the community. The Contractor will then record the complaint as resolved and closed in the Environmental Complaints Register.
- (viii) Should the complaint not be resolved through the GRC, the issue will be adjudicated through local legal processes.
- (ix) In parallel to the ECR placed with the Contractor, each GFP will maintain a record of the complaints received and will follow up on their rapid resolution.
- (x) EA will also keep track of the status of all complaints through the Monthly Environmental Monitoring Report submitted by the Contractor to the DSC and will ensure that they are resolved in a timely manner.

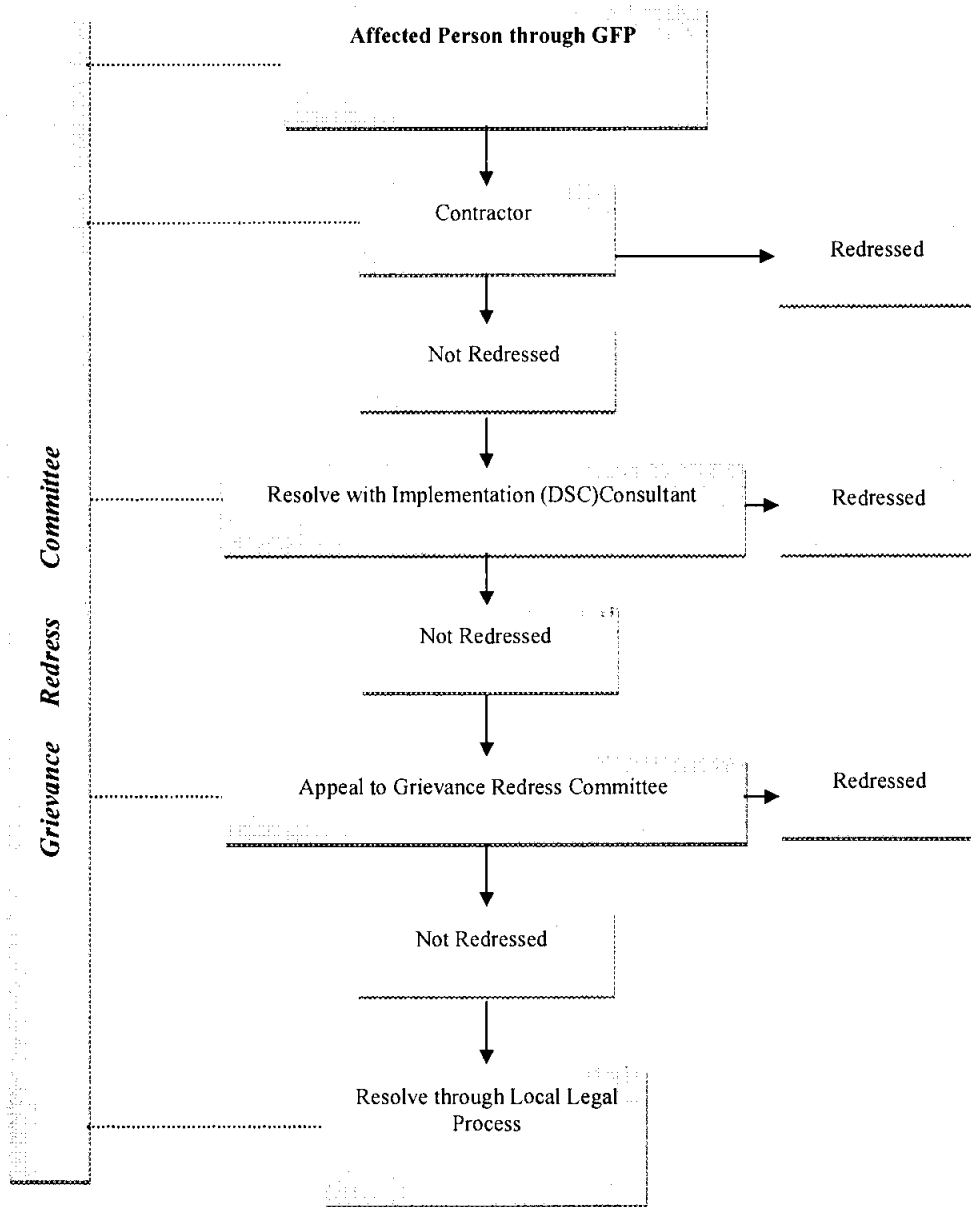


Figure 8.1 Grievance Redress Mechanism

## 9. FINDINGS RECOMMENDATIONS AND CONCLUSIONS

### 9.1 Findings and Recommendations

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 subproject, and recommended suitable mitigation measures. This study recommends that some further follow up studies be undertaken during project processing in order to meet the ADB requirements.

There are some further considerations for the planning stages such as obtaining clearance for the project under the PEPA, 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 IEE report.

There are a number of key actions required in the detailed design phase. Prior to construction the LESCO must receive clearance certification from the provincial EPD and LESCO must complete an EMP that will be accepted by the provincial EPD 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 provincial EPD as required in future.

No land acquisition, compensation and resettlement are involved. However, some trees will be compensated to the concerned parties, if needed. However, provisions may be made in DDR, based on the proposed alignments these should not be difficult tasks and can be conducted as the detailed designs are worked out and to dovetail with the proposed subproject and minimize adverse impacts and maximize benefits. A social impact assessment and Due Diligence Reports (DDR) has been completed in tandem with this IEE for the whole subproject. The study has:

- (i) *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 subproject districts.*
- (ii) *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.*
- (iii) *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.*

- (iv) *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 recommends monitoring on two occasions at the site location. The results should be integrated with the contract documentation to establish performance action thresholds, pollution limits and contingency plans for the contractor's performance.

During the commissioning phase noise monitoring should ensure that statutory requirements have been achieved. Monitoring activities during project operation will focus on periodic recording environmental performance and proposing remedial actions to address any unexpected impacts

## **9.2 Conclusion**

The construction of new double circuit underground cable from *Sunny View-Macleod Road - Qurtaba* the sub project Tranche-IV(saving) is a feasible and sustainable option from the power transmission, engineering, environmental, and socioeconomic points of view. Implementation of the EMP is required and the environmental impacts associated with the subproject need to be properly mitigated, and the existing institutional arrangements are available. Additional human and financial resources will be required by LESCO to complete the designs and incorporate the recommendations effectively and efficiently in the contract documents, linked to payment milestones. The proposed mitigation and management plans are practicable but require additional resources.

This IEE, including the EMP, should be used as a basis for an environmental compliance program and be included as an Appendix to the contract. The EMP shall be reviewed at the detailed design stage. In addition, any subsequent conditions issued by provincial EPA 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 and 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.



# **Annexure**

**ANNEXURE-I**  
**Traffic Management Plan**

## TRAFFIC MANAGEMENT PLAN

Aspect	Measures to be taken	Implementation	Responsibility
Route Diversions	Plan and designate entry and exit points for the project sites which will be required by heavy vehicles during construction phase.	Work planning phase	LESCO
	Allocate temporary alternative route considering usual traffic volumes and road carrying capacities and feasibility of general public with consultation and approval of City Traffic Police LAHORE	Work planning phase	LESCO
	Conditions of roads are to be checked prior to selecting routes for both general public and construction vehicles.	Work planning phase	Contractor
	Provide a separate clear path for emergency care vehicles like ambulances and fire brigades	Work planning phase	Contractor
Work zone demarcation	Ensure proper fencing where storage, campsites and other facilities are located to avoid unauthorized access.	Throughout project	Contractor
	Cordon of the work zone by reflector cones at least 50m before the actual working site to alert all people passing by.	Throughout project	Contractor
	Allocate appropriate parking areas for the use of employees including contractors and for heavy machineries.	Throughout project	Contractor
	Number of vehicles will be checked that enter and leave the area and unauthorized vehicles will not be allowed to enter in work zone.	Throughout project	Contractor
Signage	Display sign boards and banners about traffic diversions at places on detour routes.	Initiating phase	LESCO/Contractor
	Ensure use of Traffic Control Devices (TCDs) like reflectors, hazard cones and sign boards as required at main roads.	Throughout project	LESCO/Contractor

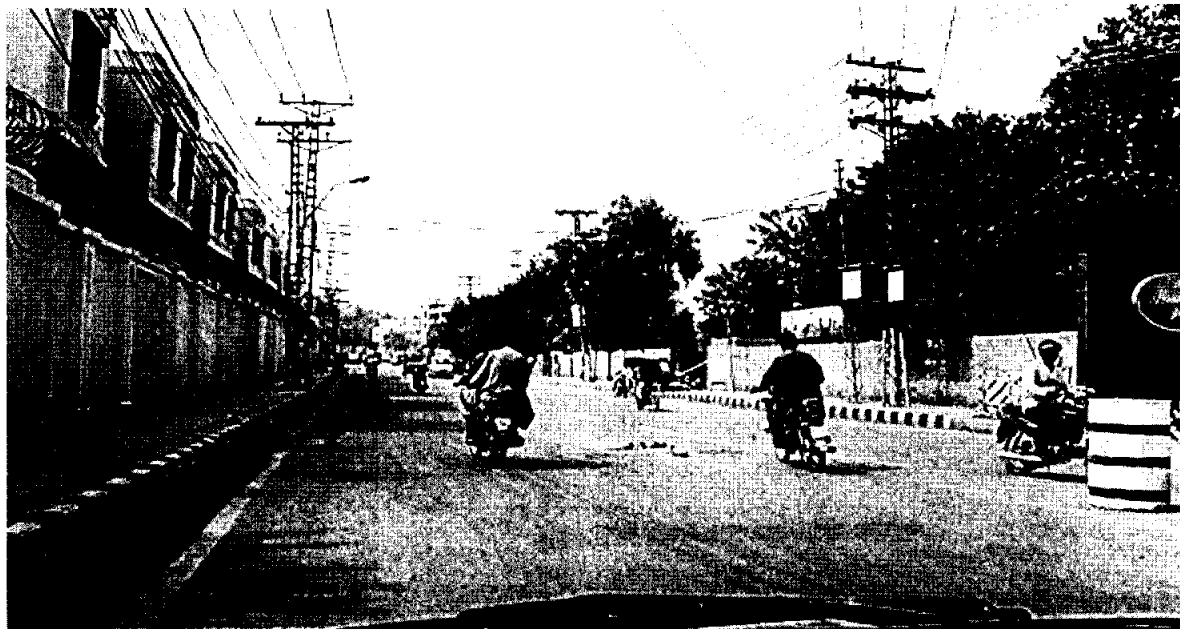
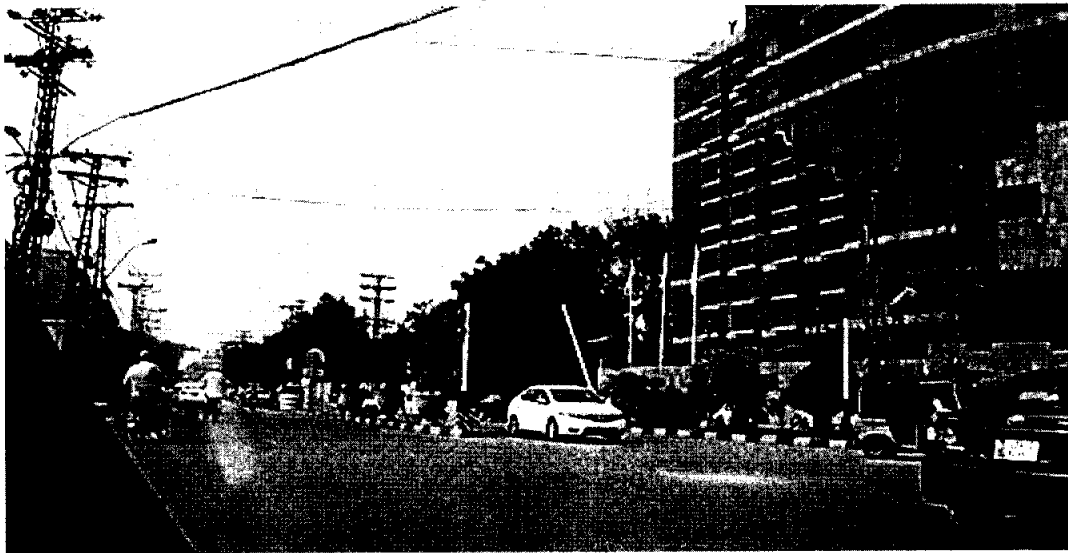
Aspect	Measures to be taken	Implementation	Responsibility
	Construction Vehicles will be installed with revolving hazard lights and hooters for signaling operation when in use	Throughout project	
Speed	<p>Install temporary speed bumps / humps near work zone Areas and specially near residential/ commercial areas with consultation and approval of City Traffic Police Lahore .</p> <p>Ensure all vehicles in the area maintain speeds up to 30km/hr</p>	<p>Initiating phase</p> <p>Throughout project</p>	
Timings	<p>Undertake construction activities that are audible at any residential/commercial receptor, between the following hours:</p> <p>7:00am to 6:00pm, Mondays to Fridays. 8:00am to 1:00pm on Saturdays. No time on Sundays or public holidays. Entry of heavy machineries or vehicles and delivery timings on work site will be adjusted such that vehicles do not queue</p> <p>Temporarily stop work or access in work zone during school and office hours between 8:30am to 9:30am and 2:00pm from Monday to Friday</p> <p style="text-align: center;">↓ ↓ ↓</p>	<p>Throughout project</p> <p>Throughout project</p> <p>Throughout project</p>	
Foremen / Signaling	<p>Special foremen will be employed to control vehicular movement in and outside the work zone.</p> <p>Foremen will wear appropriate PPEs and use TCDs to guarantee efficient work zone management.</p> <p>Two-way radios and color flags will be provided to all foremen.</p>	<p>Work planning phase</p> <p>Throughout project</p> <p>Throughout project</p>	

## Annex-II

### Photographs of the Construction of New 132kV Double Circuit Underground Cable (Macleod Road – Sunny View)

Photographs of key sections of the route proposed for laying of  
underground cable b/w Sunny view-Mcleod Road

Cooper Road



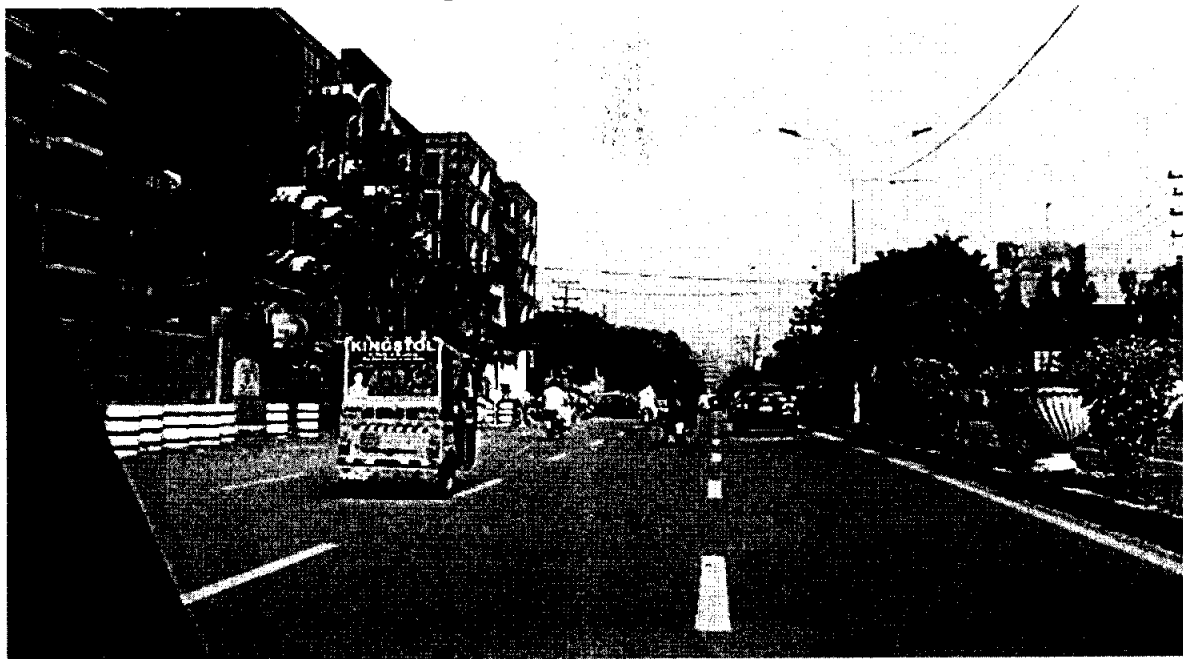
Cooper Road







Egerton Road



Egerton Road

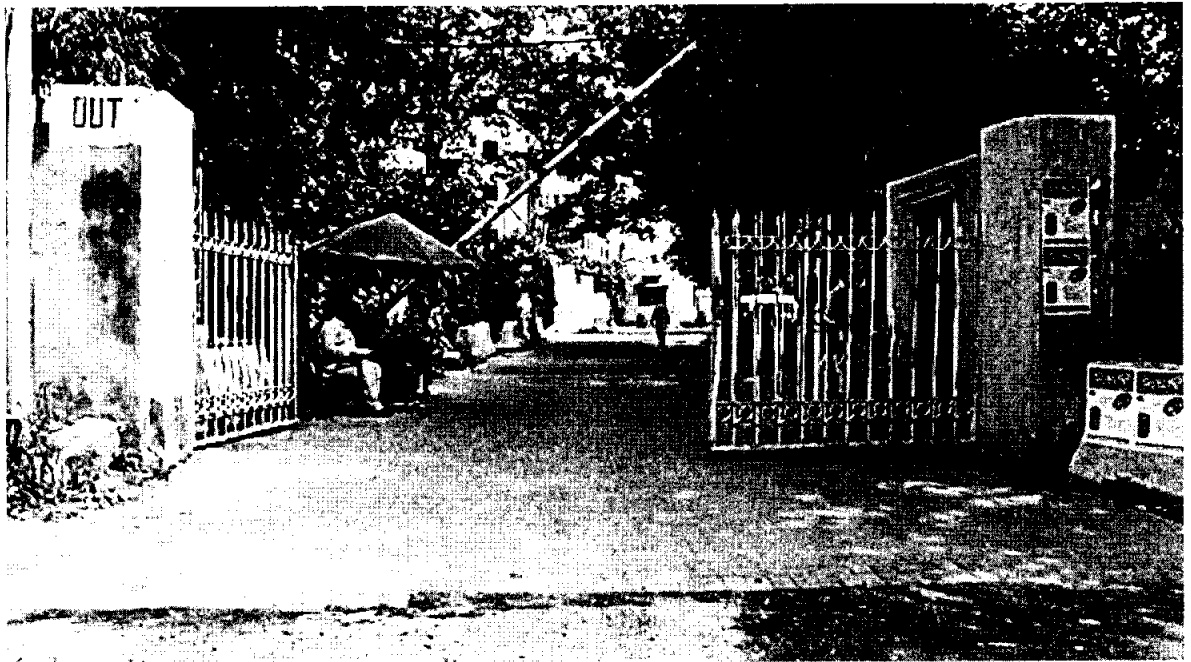




**Towards Sunny View Complex near LDA PLAZA**



**Exit Gate of Sunny View Complex WAPDA whers route for underground cable will enter into Complex premises and will end into Sunny View Grid Station**



# Annex-III

Pollutants	USEPA		WHO		World Bank		Pak NEQS	
	Avg. Time	Standard	Avg. Time	Standard	Avg. Time	Standard	Avg. Time	Standard
SO <sub>2</sub>	24 hrs	365 ug/m <sup>3</sup> (140 ppb)	24 hrs	90 ug/m <sup>3</sup> (34 ppb)	Annual Mean	100 ug/m <sup>3</sup> (38 ppb)	Annual Mean	80 ug/m <sup>3</sup>
	1 hr	40 mg/m <sup>3</sup>	1 hr	350 ug/m <sup>3</sup>	24 hrs	500 ug/m <sup>3</sup>	24 hrs	120 ug/m <sup>3</sup>
CO	8 hrs	35 mg/m <sup>3</sup> (10 ppm)	8 hrs	10 mg/m <sup>3</sup> (8.7 ppm)	-	-	8 hrs	5 mg/m <sup>3</sup>
	1 hr	40 mg/m <sup>3</sup>	1 hr	190-320 ug/m <sup>3</sup>	Annual Mean	100 ug/m <sup>3</sup> (50 ppb)	1 hr	10 mg/m <sup>3</sup>
NO <sub>2</sub>	Annual Mean	100 ug/m <sup>3</sup> (53 ppb)	1 hr	120 ug/m <sup>3</sup>	Annual Mean	-	Annual Mean	40 ug/m <sup>3</sup>
O <sub>3</sub>	1 hr	235 ug/m <sup>3</sup>	8 hrs	200 ug/m <sup>3</sup>	-	-	24 hrs	80 ug/m <sup>3</sup>
	24 hrs	260 ug/m <sup>3</sup>	1 hr	150-230 ug/m <sup>3</sup>	Annual Mean	100 ug/m <sup>3</sup>	1 hr	120 ug/m <sup>3</sup>
TSP	24 hrs	150 ug/m <sup>3</sup>	24 hrs	150-230 ug/m <sup>3</sup>	Annual Mean	100 ug/m <sup>3</sup>	Annual Mean	360 ug/m <sup>3</sup>
PM <sub>10</sub>	24 hrs	150 ug/m <sup>3</sup>	-	-	24 hrs	500 ug/m <sup>3</sup>	24 hrs	500 ug/m <sup>3</sup>
	-	-	-	-	-	-	Annual Mean	120 ug/m <sup>3</sup>
PM <sub>2.5</sub>	-	-	-	-	-	-	Annual Average	15 ug/m <sup>3</sup>
	-	-	-	-	-	-	24 hrs	35 ug/m <sup>3</sup>
-	-	-	-	-	-	-	1 hr	15 ug/m <sup>3</sup>

**Table1: Comparison of International and Local Noise Standards**

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