K-ELECTRIC

Environmental Impact Assessment
for
132kV Gadap Grid Station
and 132kV Transmission Line Maymar to
Gadap Grid Station

GEMS

Environmental Impact Assessment
of
132kV Gadap Grid Station
and 132kV Transmission Line Maymar to Gadap Grid Station

Final Report

July, 2014

global environmental management services

2nd Floor, Aiwan-e-Sanat, ST-4/2, Sector 23, Korangi Industrial Area, Karachi

Ph: (92-21) 35113804-5; Fax: (92-21) 35113806; Email: info@gems-intl.com

EXECUTIVE SUMMARY

This report discusses the Environmental and Socio-economic impact assessment of the proposed linked projects for electricity power supply infrastructure. The project consists of addition of 132 kV Grid having capacity of 40MVA at existing 66kV Gadap Grid Station. This power will be served from Maymar Grid Station through Single Circuit Overhead and Underground transmission line.

Underground cable will loop out from Maymar Grid Station along the main road till Northern By-Pass Road at an approximate length of 1 km. That point forward, through PLDP, Overhead transmission network will begin and end at the Gadap Grid Station which is about 20 km in length.

The project is proposed to fulfill the electricity requirements of the city by improvement of transmission networks.

PROPONENT INTRODUCTION

K-Electric Limited formerly known as Karachi Electric Supply Company Limited (KESC) is at present the only vertically-integrated power utility in Pakistan that manages the generation, transmission and distribution of electricity to the city of Karachi. The Company covers a vast area of over 6,500 square kilometers and supplies electricity to all the industrial, commercial, agricultural and residential areas that come under its network, comprising over 2.2 million customers in Karachi and in the nearby towns of Dhabeji and Gharo in Sindh and Hub, Uthal, Vindar and Bela in Balochistan.

K-Electric is also one of the city's largest employers with nearly 11,000 people currently working for it. It was established one hundred years ago on September 13, 1913 and is one of the oldest companies operational in Karachi. It was set up under the Indian Companies Act of 1882 as the Karachi Electric Supply Corporation–KESC. The entity was nationalized in 1952 but re-privatized on November 29, 2005. KESC came under new management in September, 2008 and was renamed as the Karachi Electric Supply Company. At this point, it was transformed into a profitable entity and is today a globally recognized example of an unprecedented turnaround.

Over the last few years, KE has demonstrated a strong ability to bring about a sustainable change. It has pursued a path of visible growth and transformation which has placed it amongst the most dynamic institutions in Pakistan and in the region.

The indicators of KE's operational and financial turnaround have been clearly noticed by its stakeholders, who have reason to believe that the Company is now a renewed entity with a brand new vision and a progressive outlook. Therefore, there is a strong case for its repositioning and rebranding with a refreshing new identity as a manifestation of its aspirations and its current stance as a leader in the energy sector in Pakistan. It is for this reason that KESC has now been rebranded as K-Electric, complete with the renewed hope that it will serve Karachi with more vigour, more energy and a fresh purpose.

NEED OF THE PROJECT

The purpose of this transmission network from Maymar Grid Station to Gadap Grid Station is to increase the power supply capacity to 132kV from the existing 66kV supply to cater the needs of electricity of the utility consumers of the Gadap Grid Station.

PROJECT AREA

Maymar Grid Station in Gulshan-e-Maymar transacting the Northern By-Pass and leading into the Gadap Town, whereas the Grid is also being added at the Gadap Grid Station.

PROJECT DESCRIPTION

The project consists of addition of 132 kV Grid having capacity of 40MVA at existing 66kV Gadap Grid Station. The type proposed for grid is the Air Insulated Grid Station.

This power will be served from Maymar Grid Station through Single Circuit Overhead and Underground transmission line. Underground cable will loop out from Maymar Grid Station along the main road till Northern By-Pass Road at an approximate length of 1 km. That point forward, through PLDP, Overhead transmission network will begin and end at the Gadap Grid Station which is about 20 km in length. The RoW required for Overhead will be 15 m while for underground it will be 1 m. The clearance required for Overhead will be 10.5 m and the depth of trench for underground cable laying will be 1.5 m.

The Proposed Transmission line routes are shown in **Exhibit: 2.1**

ADDITION OF GRID

A Grid station (substation) is a part of an electrical generation, transmission, and distribution system. Grid stations transform voltage from high to low, or the reverse, or perform any of several other important functions. Electric power may flow through several grid stations between generating plant and consumer, and its

voltage may change in several steps. A substation may include transformers to change voltage levels between high transmission voltages and lower distribution voltages, or at the interconnection of two different transmission voltages.

Grid stations depend upon its switchgear which can be of two types Gas Insulated or Air Insulated. For this project Air Insulated Substation is proposed to be installed.

LEGISLATIVE REQUIREMENT

The EIA of the proposed K-Electric Project activity will be subjected to the pertinent legislative and regulatory requirements of the Government of Pakistan including State laws. Legislation presents a synopsis of environmental policies, legislation and other guidelines that have relevance to the proposed project.

The proposed project falls under the project category of SCHEDULE II "*Transmission lines (11kV and above) and Grid Stations*" as per the guidelines issued by the Environmental Protection Agency (EPA) under the Pakistan Environmental Protection Act 1997 (PEPA 1997). According to these guidelines, projects under this category require an EIA to be conducted.

The Pakistan Environmental Protection Act, 1997 (PEPA 1997) is the basic legislative tool empowering the government to frame regulations for the protection of the environment. The PEPA 1997 is broadly applicable to air, water, soil, marine and noise pollution. Penalties have been prescribed for those contravening the provisions of the Act. Under the provisions of the Act, federal and provincial EPAs have been formed which ensure enforcement of the Act in their respective areas of power.

The two primary deliberations of the Act are the conduct of projects only after approval of environmental assessments from the relevant EPA and adherence with National Environmental Quality Standards (NEQS).

Under section 12 of PEPA, no project involving construction activities or any change in the physical environment can be taken unless an IEE or EIA as required is conducted and a report submitted to the federal or provincial EPA.

PHYSICAL ENVIRONMENT

The appraised land cover of Karachi city indicated that the major share by area is comprised of mountains/barren land and seawater (79.9%); urban land use (15%) and vegetation canopy (4.9%). However, urban land cover is growing day by day.

The exposed geological material in the area is generally silty sand, sandy gravel and silty clay which is either product of in-situ weathering or deposited by the action of gravity and water. Below this over burden of silty sandy gravel soil, alternating

layer of sedimentary rock comprising of sandstone, shell mudstone, siltstone and limestone are present. Preliminary soil investigation will be carried out by the contractor after award of contract at design stage.

The area's climate is broadly classed as hot and arid. The yearly (1992-2012) maximum average temperature in the area remains approximately 32.3°C. Hottest months of the year are May, June and July; coldest, are December, January and February. Humidity levels in the project area are high in the mornings as compared to the evenings Maximum humidity occurs in the month of August whereas minimum occurs in the month of April.

Average annual rainfall in the district is about 166mm. The rain fall is scanty and is un- predictable. The rainy season stretches between July, August & September.

There is no significant ***natural freshwater*** source in the project area. The Indus River about 120km to the east of Karachi city and the Hub River, a perennial stream that originates in Balochistan and marks the boundary between Karachi Division and Balochistan are the sources of fresh water in Karachi.

Groundwater resources in Karachi Division are limited. The aquifers close to the coastal belt are mostly saline and unusable for domestic purposes. The proposed areas didn't have any ground water sources nearby, while it was estimated through local interactions that the depth to access water might go upto 20 to 25ft which is not feasible as the water will be restricted for use in respect of health and accessibility.

BIOLOGICAL ENVIRONMENT

Data for the EIA was gathered from both primary and secondary sources. Baseline field survey was conducted in May 2014. Sampling locations for the identification of floral and faunal assemblages has carefully been selected so that maximum number of species that could be observed within the project area.

No Endangered or threatened species were found to be existent within project areas. Since the area represent urban structure, there is minimal floral habitat found which shall need special attention, the project will be carefully executed to eliminate unnecessary damage to vegetation.

SOCIO ECONOMIC ENVIRONMENT

The proposed project spreads over one town of Karachi that is Gadap Town. Gadap Town is a town in the northwestern part of Karachi with the Hub River on its western limits also forming the provincial border between Sindh and Balochistan, while to the north and east are Dadu District and the Kirthar Mountains. There are 8 union councils in the town. There are over 400 rural villages in Gadap Town. Some of the rural villages of Gadap Town are Old Thana Village, Mula Essa Goth, Jam Goth,

Memon Goth, Haji Miandad Goth, Samoon Goth, Haji Murad Jaffar Goth, Darsano Chhano, Kathore, Saleh Mohammad Goth, Kohi Goth, etc.

The main places at the vicinity of this underground and overhead transmission line are Jamia Tur Rasheed, Central Park, Gulshan e Maymar, Abdullah Gabol Goth, Garden City, Dream World, Mokhi Nala, Kherthar Park Road, Northern Bypass, Kozi Water Park, Samzu Water Park.

Gadap Town is the largest town of Karachi in terms of area but is very less populated and providing a large area for future development of Karachi city. This town is serving as extension of Karachi city. The people are migrating from the dense populated areas of Karachi and building new houses and residential flats in the calm and clear atmosphere of Gulshan e Maymar. Baldia Town is purely residential area with a few industries and markets. This town is providing a large area for recreational facilities for the citizens of Karachi and Hyderabad in the form of water Parks and has a popular resort named as “Dream World Resort”.

Gadap Town is the least developed area of the city and represents a rural environment, except that urbanization has taken pace in this area as Gulshane Maymar is developing further. The people of Gulshan e Maymar are generally associated with private and government jobs mainly in the central Karachi city. While a small portion of people are involved in different businesses. The other undeveloped sectors of the town have no proper developments and there are small village like structures. The people of these areas prefer agriculture as their sole business activity and home based economic activities.

New and strong network of roads is developed in this area for the development of proposed residential colonies and other associated infrastructure.

Public transport is almost not available in this area because of less population and the people rely on their own vehicles and private transport like taxi and rickshaws.

PUBLIC CONSULTATION

The consultants organized meetings with primary and secondary stakeholders of targeted areas including local residents, business community and civil servants. The team visited various prominent places in the project area to meet with the targeted audience.

The public consultation meetings were arranged at shops, outside house / flat or on roads. In a metropolitan city like Karachi and due to current law and order situation none of the residents allowed the team to enter inside their house, neither it was possible to arrange a Focus Group Discussion at some central place with a group of 6-8 people together. Individual meetings were arranged at shops, tea hotels, outside the house or on the street / market, or in the office / working premises individually or in small groups of 3-4 persons.

Participants generally acknowledged K-Electric's initiative for meeting the demands of electric supply in the city. However, some villagers demanded immediate supply of electricity to their areas whereas they will cooperate when needed. Since mostly areas are under agricultural use, villagers have requested to ensure no land is disturbed permanently and vegetation must not be removed unnecessarily.

IMPACTS AND MITIGATIONS

The transmission line and grid station project is not an air, water polluting and resource intensive sector. However, there can be considerable environmental impacts during the initial construction phase mainly due to civil works such as site preparation, construction of access roads, vehicle movement, RCC foundation, erection of tower etc. Construction phase impacts are usually temporary and localized phenomenon, except the permanent changes they may occur in the local landscape and land use patterns along the Right-of–Way. However, these impacts are given due consideration, wherever applicable.

The operational phase has minor environmental and health impacts. This may include electrical hazards due to meteorological conditions and generation of EMF. These can be mitigated by or minimized by proper vigilance. The mitigations for these impacts are summarized in the Environmental Management Plan as shown below.

CONCLUSION

The EIA of the proposed electricity transmission project has achieved the following goals:

- Identification of national environmental regulatory requirements that apply to the proposed project activities;
- Identification of the environmental features of the project area including the physical biological and social disturbance and likely impact of the project on the environment;
- Recommendation of appropriate mitigation measures that K-Electric will incorporate and ensure as per this EIA into the project to minimize the adverse environmental impacts.

"If the activities are undertaken as proposed and described in this report, and the recommended mitigation measures and environmental management plan is adopted, the project will not result in any long-term or significant impacts on the local community or the physical and biological environment of the project area rather it will prove to benefit in many ways and bring development in Karachi"

Environmental Management Plan

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Monitoring	Frequency of Monitoring	Responsibility
Construction Phase							
Air	Chronic health affects Reduced visibility on roads	Sprinkling of water Tuning of construction vehicles & machines Dust masks for laborers	Particulate Matter Smoke CO SOx	All project locations	Vehicular emissions Dust Ambient air quality	Monthly for emissions and daily for dust	Contractor K-Electric
Noise	Stress Hypertension Hearing loss Headache	Avoid working at night Lubrication of construction vehicles Ear plugs	Noise levels	Project location close to residential areas	Noise monitoring device	Monthly	Contractor K-Electric
Land and soil	Erosion due to excavation Formation of pits due to improper backfilling	Proper backfilling and stone pitching around the excavated site if required	Surface topography	All project locations	Visual assessment Photographic evidences	From beginning till completion of project	Contractor K-Electric

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Monitoring	Frequency of Monitoring	Responsibility
Vegetation	Cutting of trees	Avoid unnecessary cutting of trees In case of cutting of trees, one plant should be replaced by 6 plants	No of trees cleared or cut Disposal of chopped trees Ensure re-plantation by 1:6 ratio of same species	All project locations	Visual assessment Photographic evidences	From beginning till operational phase	K-Electric
Water	Wastage and misuse of water	Avoid un necessary use of water Prevent leakages	Water supply and use	All project locations	Visual assessment Record log of water usage	From beginning till the end of project	Contractor
Construction debris	Formation of heaps Remaining concrete material results in hardening of ground surface	Avoid wastage of concrete material Reuse remaining construction material	Quantity & quality of construction material	All trenching areas	Visual assessment Photographic evidence	Weekly	Contractor
Social Environment	Disturbance to routine market and local business activities Conflicts between laborers and local communities	Specify time scale for construction activities Discussion with local people regarding conflicts if any	Maintenance of complaint register	All project locations	Review of complaint register Local consultations	Monthly	K-Electric

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Monitoring	Frequency of Monitoring	Responsibility
Roads and networks	Traffic congestion Night time visibility of drivers is reduced	Diversion routes must be allocated to maintain traffic flow Signs and reflectors must be boarded for driver's visibility	Signs and detours are being followed	Intersections of diversions	Observations Local residents consultations and log book	Weekly	Contractor
Health and safety	Lack of awareness to general public about safety may lead to accidents Incompetent and untrained workers might cause harm to themselves and others Construction works may include many risks and hazards that may lead to injuries or even death	Safety symbols and instructions will be boarded at work sites Trained personnel will be appointed for the specific work Appropriate PPEs must be used for technical work	Safety precautions Use of PPEs	On all project sites	Tool box talk Visual assessments Record of PPEs	Daily	Contractor K-Electric

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Monitoring	Frequency of Monitoring	Responsibility
Operational Phase							
Meteorological conditions	Heavy rainfalls may break damaged overhead transmission line which may lead to electrical shock hazards	Ensure good quality of all products used in transmission lines In case of breakage, ensure emergency shutdown of transmission line Immediately repair the damage and ensure Log-Off-Tag-Off (LOTO)	Quality assurance Grid stations loads	All project components Grids	As per technical knowledge	Regularly	K-Electric
Electric Magnetic Field (EMF)	Human health impacts such as, neuropsychological disorders or cardiovascular diseases	Increase depth in case of underground cables to suppress the EMF levels Appropriate cabling with protective shields to suppress electron flux	EMF Intensity	Residency units near the corridor and grids	Electromagnetic meter	Biannually	K-Electric

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Monitoring	Frequency of Monitoring	Responsibility
Transformer oil spillage	Contamination of soil and water bodies	Regular checking of storage tanks and machines	Soil sampling for oil and grease	Grid station	Visual assessment Soil analysis Equipment maintance record	Bi annually	K-Electric

LIST OF CONTENTS

ANNEXURE

1- Installation of Panels
2- SOP for the Installation of Power Transformers
3- Stringing of OPGW
4- Stringing of Conductor
5- Right of Way
6- Erection of Poles
7- To Supervise Casting of foundations
8- Sagging of Conductor
9- Installation of AFOC
10- To Supervise Casting of Basement
11- Laying Methodology
12- To Supervise Concreting at Site
13- To Supervise Excavation at Construction Site
14- Installation of Fire Alarm System
15- To Supervise Backfilling at Construction Site
16- Health, Safety and Quality Policy

LIST OF EXHIBIT

Chapter:1 INTRODUCTION

1.1 BACKGROUND

This report discusses the Environmental and Socio-economic impact assessment of the proposed linked projects for electricity power supply infrastructure. The project consists of addition of 132 kV Grid having capacity of 40MVA at existing 66kV Gadap Grid Station. This power will be served from Maymar Grid Station through Single Circuit Overhead and Underground transmission line.

Underground cable will loop out from Maymar Grid Station along the main road till Northern By-Pass Road at an approximate length of 1 km. That point forward, through PLDP, Overhead transmission network will begin and end at the Gadap Grid Station which is about 20 km in length.

The proposed project falls under the project category of SCHEDULE II "*Transmission lines (11kV and above) and Grid Stations*" as per the guidelines issued by the Environmental Protection Agency (EPA) under the Pakistan Environmental Protection Act 1997 (PEPA 1997). According to these guidelines, projects under this category require an EIA to be conducted.

1.1.1 Proponent Introduction

K-Electric Limited formerly known as Karachi Electric Supply Company Limited (KESC) is at present the only vertically-integrated power utility in Pakistan that manages the generation, transmission and distribution of electricity to the city of Karachi. The Company covers a vast area of over 6,500 square kilometers and supplies electricity to all the industrial, commercial, agricultural and residential areas that come under its network, comprising over 2.2 million customers in Karachi and in the nearby towns of Dhabeji and Gharo in Sindh and Hub, Uthal, Vindar and Bela in Balochistan.

K-Electric is also one of the city's largest employers with nearly 11,000 people currently working for it. It was established one hundred years ago on September 13, 1913 and is one of the oldest companies operational in Karachi. It was set up under the Indian Companies Act of 1882 as the Karachi Electric Supply Corporation – KESC. The entity was nationalized in 1952 but re-privatized on November 29, 2005. KESC came under new management in September, 2008 and was renamed as the Karachi Electric Supply Company. At this point, it was transformed into a profitable entity and is today a globally recognized example of an unprecedented turnaround.

Over the last few years, KE has demonstrated a strong ability to bring about a sustainable change. It has pursued a path of visible growth and transformation

which has placed it amongst the most dynamic institutions in Pakistan and in the region.

The indicators of KE's operational and financial turnaround have been clearly noticed by its stakeholders, who have reason to believe that the Company is now a renewed entity with a brand new vision and a progressive outlook. Therefore, there is a strong case for its repositioning and rebranding with a refreshing new identity as a manifestation of its aspirations and its current stance as a leader in the energy sector in Pakistan. It is for this reason that KESC has now been rebranded as K-Electric, complete with the renewed hope that it will serve Karachi with more vigour, more energy and a fresh purpose.

1.2 NEED OF THE PROJECT

The purpose of this transmission network from Maymar Grid Station to Gadap Grid Station is to increase the power supply capacity to 132kV from the existing 66kV supply to cater the needs of electricity of the utility consumers of the Gadap Grid Station.

1.3 PURPOSE OF STUDY

Purpose of this EIA study is to evaluate the proposed extension project activities against Pakistan Environmental Protection Agency (Pak-EPA) standards, and against international environmental guidelines, such as those of the World Bank.

The specific objectives of this EIA are to:

- Assess the existing environmental conditions in the project area, including the identification of environmentally sensitive areas and receptors;
- Assess the various activities (such as construction, process, operational etc) to identify their potential impacts on environment, evaluate these impacts, and determine their significance;
- Propose appropriate mitigation measures that can be incorporated into the design of the proposed activities to minimize damaging effects or lasting negative consequences identified by the environmental assessment;
- Assess the proposed activities and determine whether they comply with the relevant environmental regulations in Pakistan;
- Prepare an EIA report for submittal to the Sindh Environmental Protection Agency (SEPA).

1.4 PROJECT AREA

Maymar Grid Station in Gulshan-e-Maymar transacting the Northern By-Pass and leading into the Gadap Town, whereas the Grid is also being added at the Gadap Grid Station.

1.5 SCOPE OF THE EIA

For the EIA study, the scope of work is as under:

- Description of physical, environmental, socio-economical and cultural conditions in the project area;
- Project impact identification, prediction, and significance based on project activities.
- Identification and assessment of the workability of mitigation measures to offset or minimize negative project impacts on environment.

1.6 APPROACH AND METHODOLOGY

The EIA was performed in five main phases, which are described below.

1.6.1 Scoping

The key activities of this phase included:

Project Data Compilation: A generic description of the proposed activities, within the project area relevant to environmental assessment, was compiled with the help of EPA Guidelines.

Literature Review: Secondary data on weather, soil, water resources, and wildlife vegetation was reviewed and compiled.

Legislative Review: Information on relevant legislation, regulations, guidelines, and standards was reviewed and compiled.

Identification of Potential Impacts: The information collected in the previous steps was reviewed, and potential environmental issues identified.

1.6.2 Baseline Studies

Following the scoping exercise, the project area was surveyed to collect primary data. During the field visits, information was collected on ecologically important areas, ambient air quality, surface and groundwater resources, existing infrastructure, local communities, public services, and sites of archaeological or cultural importance. The following specific studies were conducted as part of the EIA.

Vegetation: A botanist conducted vegetation study, which consisted of a thorough literature review and field data collection. As part of the vegetation study, random sampling was conducted and the area's floral species were documented.

Vegetation communities were identified and vegetation cover determined.

Wildlife Study: A wildlife expert has conducted wildlife study, which consist of a thorough literature review and field data collection. During the fieldwork, the faunal species of the area were documented. The diversity of avian, large and small mammals, and reptile species was determined. Information was collected on the species found in the area.

Physical Environment: Environmental Assessment Specialist conducted physical environmental study including, ambient air, noise, water sampling, surface water resources and the groundwater resources of the areas. It also carried out the impact of project on soil and water resources

Socioeconomic Study: Team of experts including Social Assessment and gender specialist conducted socioeconomic and cultural study in the project area.

The study team through participatory technique collected data from men and women of the project area, consulted communities and local leadership about the project. The profile included livelihood, culture, leadership, gender issues, spiritual and temporal leadership, demographic information based on field data and published sources, the existing use of land resources, community structure, employment, distribution of income, goods and services, public health, local religious and cultural values, and local customs, aspirations, and attitudes.

1.6.3 Public Consultation

The socioeconomic and gender team also conducted a public consultation at various locations of the project areas. Data was collected by conducting of unstructured meetings and interviews with the stakeholders. The scope of work included:

- Provision of basic information on the project to stakeholders;
- Identification of stakeholders' concerns and apprehensions regarding the project;
- Identification of stakeholders' expectations of the project;
- Summarizing the process and the outcome.

1.6.4 Impact Assessment

The environmental, socioeconomic and cultural, gender and project information collected in previous phases was used to assess the potential impacts of the proposed activities. The issues studied included potential project impacts on:

- Geomorphology;
- Groundwater and surface water quality;
- Ambient air quality;
- Ecology of the area, including flora and fauna;
- Local communities.
- Wherever possible and applicable, the discussion covers the following aspects:
  - The present baseline conditions;
  - The change in environmental parameters likely to be effected by project related activities;
  - Identification of potential impacts;
  - Likelihood and significance of potential impacts;
  - Mitigation measures to reduce impacts to as low as possible;
  - Prediction of impacts, including all long-term and short-term, direct and indirect, and beneficial and adverse impacts;
  - Evaluation of the importance or significance of impacts (The significance of each impact has been judged on the basis of available local, national, and international standards. Where such standards were not available, the best practice elsewhere has been referred to);
    - Implementation of mitigation measures (i.e., environmental management);
    - Determination of residual impacts;
    - Identification of controls and monitoring of residual impacts.

1.6.5 Documentation

At the end of the assessment, a report is prepared according to the relevant guidelines of the Pakistan Environmental Protection Agency. This report includes the findings of the assessment, project impacts, and mitigation measures to be implemented during the execution of the proposed activities.

- Components of this Report will be:

  Chapter: 1 Introduction

  Chapter: 2 Project Description

  Chapter: 3 Institutional, Legislation and policy framework

  Chapter: 4 Physical Environment

  Chapter: 5 Biological Environment

Chapter: 6 Socio-Economic and Cultural Environment

Chapter: 7 Alternatives

Chapter: 8 Public Consultation

Chapter: 9 Environmental Impacts Assessment & Environmental Management Plan

Chapter: 10 Conclusion

Chapter: 2 PROJECT DESCRIPTION

Electric power transmission is the bulk transfer of electrical energy between the point of generation and multiple substations near a populated area or load center. Electric power transmission allows distant energy sources to be connected to consumers in population centers. Transmission may be via overhead or underground lines, however, most transmission is done with overhead lines because they are less costly to construct and easier to maintain. Underground lines are generally restricted to urban areas.

A power transmission network is referred to as a "grid." Multiple redundant lines between points on the grid are provided so that there are a variety of routes from any power plant to any load center. The specific routing of electricity on the grid at any time is based on the economics of the transmission path and the cost of power.

The EIA study includes two components of the transmission Project which are described as follows.

The project consists of addition of 132 kV Grid having capacity of 40MVA at existing 66kV Gadap Grid Station. The type proposed for grid is the Air Insulated Grid Station.

This power will be served from Maymar Grid Station through Single Circuit Overhead and Underground transmission line. Underground cable will loop out from Maymar Grid Station along the main road till Northern By-Pass Road at an approximate length of 1 km. That point forward, through PLDP, Overhead transmission network will begin and end at the Gadap Grid Station which is about 20 km in length. The RoW required for Overhead will be 15 m while for underground it will be 1 m. The clearance required for Overhead will be 10.5 m and the depth of trench for underground cable laying will be 1.5 m.

Exhibit 2.1: Transmission Line Network Map

Green: Overhead Transmission Line **Red:** Grid Station

2.1 PROJECT SITE LOCATIONS

Component	Subject	Description	Coordinates	View of Location
A-I	Maymar Grid Station	Located in Gulshan-e-Maymar a few metres inwards from main Super Highway	N 24°58'36" E 67°04'35"	
A-II	Gadap Grid Station	Located in main Gadap Town	N 24°51'55.3" E 67°12'13.8"	

2.2 PROJECT SCHEDULE

The Project will be finalized after Award of Contract; the tentative schedule is to be in Construction phase by mid of May 2015 and in testing and commissioning phase by End of the year of 2016.

2.3 GRID STATION

A Grid station (substation) is part of an electrical generation, transmission, and distribution system. Grid stations transform voltage from high to low, or the reverse, or perform as a buffer to provide continuous power to the consumers even if there is a shortfall of power from the source. Electric power may flow through several grid stations between generating plant and consumer, and its voltage may change in several steps. A substation may include transformers to change voltage levels between high transmission voltages and lower distribution voltages, or at the interconnection of two different transmission voltages.

Grid stations depend upon its switchgear which can be of two types Gas Insulated or Air Insulated. For this project Air Insulated Substation is proposed to be installed.

2.3.1 Air Insulated Substation (AIS)

It is also called conventional substation/ grid station. There are two types of AIS, Indoor and Outdoor. In indoor type of AIS, all the bays (Line and trafo) are installed inside a building while in outdoor type all the bays are installed in open air. The indoor type substation is more reliable than outdoor type where equipment is safe and faults are less as compare to outdoor type.

The type to be installed for this project will be finalized after award of contract.

Following are the key factors for AIS

1- Less Reliability
2- More area required to install separate large components
3- Ease-of-Access for Maintenance as components are individually set up
4- Voltage limitations up to 132 kV
5- Economically more feasible

Technical Provisions for installation of Grid are shown in **Annexures 1** and **2**.

2.4 OVERHEAD TRANSMISSION LINE

2.4.1 Towers

2.4.1.1 Types

The transmission line tubular poles / towers will consist of a galvanized steel pole with six cross-arms and will be bolted on an anchor bolt system embedded in foundation.

The poles / towers are of following types:

- Type T/PT 0^{O}- 5^{O} Angle
- Type TS/PS 0^{O}- 30^{O} Angle
- Type LA/PLA 0^{O}- 60^{O} Angle
- Type LB/PLB 0^{O}- 90^{O} Angle
- Type PLT Terminal 0^{O} Angle
- Type PLDP Dead end with platform

P stands for tubular steel poles whereas subscripts T, S, LA, LB, LT & LDP etc. have been adopted from existing nomenclature used by K-Electric to indicate function, angle for which pole is designated.

2.4.1.2 Material

Poles / Towers will be made of low alloy high tensile steel sheet or plate having the tensile properties as specified. The steel will be made by open hearth or basic oxygen processes.

2.4.1.3 Conductors

Before stranding, wire will be tested in accordance with ASTM B1 for copper wires.

300 mm² Copper Conductor:

- Cross section 300 mm²
- Stranding (No. of Copper wires) 61
- Diameter of copper wires 2.5 mm
- Diameter of complete conductor 22.5 mm
- Direction of lay of outermost layer Right hand lay
- Mass of conductor 2700 kg/km
- Ultimate strength (according to VDE 0210) 115.7 kN
- Modulus of elasticity (final) 117.3 kN/mm²
- Coefficient of linear expansion 1.764 x 10-5
- DC resistance at 20O C 0.0595 ohms/km
- Standard un-jointed length on drum 1500 meters

All Technical Provisions for installation of Overhead Transmission Lines are provided in **Annexures-3** to **9**

2.5 UNDERGROUND CABLE

2.5.1 Types

XLPE is the abbreviated designation of "Cross Linked Polyethylene". Cross linked polyethylene is produced from polyethylene under high pressure with organic peroxides as additives.

Following are the types which will be selected for the transmission Underground Route:

132kV, 500 sq mm Aluminium Sheathed Single Core Copper Conductor XLPE Insulated Cable

132kV, 800 sq mm Aluminium Sheathed Single Core Copper Conductor XLPE Insulated Cable

Following are some features of XLPE cables:

1. Capability of carrying large currents: The excellent resistance to thermal deformation and the excellent ageing property permit to carry large current under normal (90°C), emergency (130°C) or short circuit (250°C) conditions.

2. Ease of Installation: Lighter in weight and smaller radius allows ease of installation at quicker pace.

3. Free from Limitation and Maintenance: Ease of access allows no special consideration for route profile even, no height specific problems and no maintenance works are required as compared to oil filled cables.

4. No metallic sheath required: Generally no metallic sheath is required therefore no specific potential for corrosion or breakage.

All Technical Provisions for Laying of underground cables is shown in **Annexures 10** and **11**

2.6 SAFETY MEASURE DURING GROUND WORK

SOP for implementation of corporate HSEQ Plan during civil activities for Grid Station and transmission line with or without shutdown and Health Safety and Environment Policy are given in **Annexure-12** to **16.**

Chapter: 3 INSTITUTIONAL, LEGISLATION AND POLICY FRAMEWORK

The EIA of the proposed K-Electric Project activity will be subjected to the pertinent legislative and regulatory requirements of the Government of Pakistan including State laws. This chapter presents a synopsis of environmental policies, legislation and other guidelines that have relevance to the proposed project.

3.1 NATIONAL ENVIRONMENTAL POLICY, LEGISLATION AND GUIDELINES

The enactment of comprehensive legislation on the environment, covering multiple areas of concern, is a relatively new and ongoing phenomenon in Pakistan. Whereas, a basic policy and legislative framework for the protection of the environment and overall biodiversity in the country is now in place, detailed rules, regulations and guidelines required for the implementation of the policies and enforcement of legislation are still in various stages of formulation and discussion. The following section presents a brief overview of the existing national policies, legislation and guidelines.

3.1.1 National Conservation Strategy (NCS)

The National Conservation Strategy (NCS) is the primary Policy document of the Government of Pakistan on national environmental issues. The Policy was approved by the Federal Cabinet in March 1992. The Strategy also attained recognition by international donor agencies, principally the World Bank. The NCS identifies 14 core areas including conservation of biodiversity, pollution prevention and abatement, soil and water conservation and preservation of cultural heritage and recommends immediate attention to these core areas in order to preserve the country's environment.

A midterm review of the achievements of the NCS in 2000 concluded that achievements under the NCS have been primarily awareness raising and institutional building rather than actual improvement to environment and natural resources and that the NCS was not designed and is not adequately focused as a national sustainable development strategy (GoP, November 2000). The need therefore arose for a more focused National Environmental Action Plan (NEAP) required to bring about actual improvements in the state of the national environment with greater emphasis on poverty reduction and economic development in addition to environmental sustainability.

The National Environmental Action Plan was approved by the Pakistan Environmental Protection Council under the chairmanship of the President/Chief

Executive of Pakistan in February 2001. NEAP now constitutes the national environmental agenda and its core objective is to initiate actions that safeguard public health, promote sustainable livelihoods, and enhance the quality of life of the people of Pakistan.

A National Environmental Policy has been approved by the Federal Cabinet in its meeting held during June 2005. This policy has already been endorsed by the Pakistan Environmental Protection Council during 2004. The new policy has total 171 guidelines on sectoral and cross-sectoral issues. The objectives of new policy include assurance of sustainable development and safeguard of the natural wealth of country. The following are the approved Sectoral Guidelines;

- Water Supply and Management;
- Air Quality and Noise;
- Waste Management;
- Forestry;
- Biodiversity and Protected Areas;
- Climate Change and Ozone Depletion;
- Energy Efficiency and Renewable;
- Agriculture and Livestock;
- Multilateral Environmental Agreements.

3.1.2 National Environmental Action Plan-Support Programme (NEAP-SP)

The Government of Pakistan and United Nations Development Program (UNDP) have jointly initiated an umbrella support program called the National Environmental Action Plan-Support Program (NEAP-SP) signed in October 2001 and implemented in 2002. The development objective supported by NEAP-SP is environmental sustainability and poverty reduction in the context of economic growth.

3.1.3 Pakistan Environmental Protection Act 1997

The Pakistan Environmental Protection Act, 1997 (PEPA 1997) is the basic legislative tool empowering the government to frame regulations for the protection of the environment. The PEPA 1997 is broadly applicable to air, water, soil, marine and noise pollution. Penalties have been prescribed for those contravening the provisions of the Act. Under the provisions of the Act, federal and provincial EPAs have been formed which ensure enforcement of the Act in their respective areas of power.

The two primary deliberations of the Act are the conduct of projects only after approval of environmental assessments from the relevant EPA and adherence with National Environmental Quality Standards (NEQS).

Under section 12 of PEPA, no project involving construction activities or any change in the physical environment can be taken unless an IEE or EIA as required is conducted and a report submitted to the federal or provincial EPA.

3.1.4 Approval from Sindh Environment Protection Agency

As per the Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000, K-Electric will submit an EIA report for their project activities to EPA Sindh (Environment Protection Agency Sindh), and seek approval on the same from the agency. 10hard copies and 2 soft copies of the EIA report will be submitted to Sindh Environmental Protection Agency. It will then grant its decision on the EIA as per the rules and procedures set out in the Pakistan Environmental Protection Agency review of IEE and EIA Regulation, 2000 Regulations; the following rules will apply:

- A fee is payable to SEPA for review of the EIA;
- The EIA submittal is to be accompanied by an application in the format prescribed in Schedule IV of the Pakistan Environmental Protection Agency review of IEE and EIA Regulation, 2000 Regulations;
- SEPA is bound to conduct a preliminary scrutiny and reply within 10 days of the submittal of the report a) confirming completeness, or b) asking for additional information, if needed;
- K-Electric will publish a public notice in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project. The public notice will mention the following:
  - The type of project;
  - The location of the project;
  - The name and address of the proponent;
  - The places at which the EIA can be accessed;
  - The date, time and place for public hearing of any comments on the project or its EIA;
- The date set for public hearing will not be earlier than 30 days from the date of publication of the public notice;
- In the review process, SEPA may consult a Committee of Experts, which maybe constituted on the request of the DG SEPA;

- On completion of the review process and the public hearing, the decision of SEPA will be communicated to the proponent in the form prescribed in Schedule VI;

- Where an EIA is approved, SEPA can impose additional controls as part of the conditions of approval;

- SEPA is required to make every effort to complete the EIA review process within 90 days of the issue of confirmation of completeness. However, SEPA can take up to 4 months for communication of final decision;

- The approval will remain valid for the project duration mentioned in the EIA but on the condition that the project commences within a period of three years from the date of approval. If the project is initiated after three years from approval date, the proponent will have to apply for an extension in the validity period. The SEPA on receiving such request grant extension (not exceeding 3 years at a time) or require the proponent to submit a fresh EIA if in the opinion of SEPA changes in baseline conditions or the project so warrant;

- After receiving approval from SEPA the proponent will acknowledge acceptance of the conditions of approval by executing an undertaking in the form prescribed in Schedule VII of the Pakistan Environmental Protection Agency review of IEE and EIA Regulation, 2000;

- The Pakistan Environmental Protection Agency review of IEE and EIA Regulation, 2000;also require proponents to obtain from SEPA, after completion of the project, a confirmation that the requirements of the EIA and the conditions of approval have been duly complied with;

- The SEPA in granting the confirmation of compliance may impose any additional control regarding the environmental management of the project or the operation, as it deems necessary.

3.1.5 Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000

The Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000 (The 2000 Regulations) promulgated under PEPA 1997 was enforced on 15 June, 2000. The 2000 Regulations define the applicability and procedures for preparation, submission and review of IEEs and EIAs. These Regulations also give legal status to the Pakistan Environmental Assessment Procedures prepared by the Federal EPA in 1997.

The Regulation classifies projects on the basis of expected degree of adverse environmental impacts and lists them in two separate schedules. Schedule I lists projects that may not have significant environmental impacts and therefore require

an IEE. Schedule II lists projects of potentially significant environmental impacts requiring preparation of an EIA. The Regulations also require that all projects located in environmentally sensitive areas require preparation of an EIA.

The relevant categories are as follows:

Schedule II (EIA)

1. Transmission lines (11kV and above) and grid station

The proposed project is classified under this category as it involves transmission network improvement by upgrading supply from 132kV to 220kV. Therefore, it requires an EIA to be conducted.

3.1.6 The National Environmental Quality Standards

The NEQS promulgated under the PEPA 1997 and last revised in 2000 specify standards for industrial and municipal effluents, gaseous emissions, vehicular emissions, and noise levels. The PEPA 1997 empowers the EPAs to impose pollution charges in case of non-compliance to the NEQS.

During the construction and post development phase of the project, NEQS will apply to all effluents and emissions. NEQS for municipal and industrial effluents, selected gaseous pollutants from industrial sources and motor vehicle exhaust and noise are provided in **Exhibit 3.1**, **Exhibit 3.2**, **Exhibit 3.3 & Exhibit 3.4**. NEQS Standards for disposal of solid waste have as yet not been promulgated.

3.1.7 Land Acquisition Act, 1894

The Land Acquisition Act (LAA) of 1894 amended from time to time has been the defacto policy governing land acquisition, resettlement and compensation in the country. The LAA is the most commonly used law for acquisition of land and other properties for development projects. It comprises of 55 sections pertaining to area notifications and surveys, acquisition, compensation and apportionment awards and disputes resolution, penalties and exemptions.

3.1.8 Pakistan Penal Code (1860)

The Pakistan Penal Code (1860) authorizes fines, imprisonment or both for voluntary corruption or fouling of public springs or reservoirs so as to make them less fit for ordinary use.

3.1.9 The Antiquities Act, 1975

The Antiquities Act of 1975 ensures the protection of cultural resources of Pakistan. The Act is designed to protect 'antiquities' from destruction, theft, negligence, unlawful excavation, trade, and export. Antiquities have been defined

in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area that may contain articles of archaeological significance.

Under the Act, the project proponents are obligated to:

- Ensure that no activity is undertaken in the proximity of a protected antiquity;
- Report to the Department of Archeology, Government of Pakistan, any archeological discovery made during the course of a project.

3.1.10 The Factories Act, 1934

The clauses relevant to the project are those that concern to health, safety and welfare of workers, disposal of solid waste and effluent and damage to private and public property. The Factories Act also provides regulation for handling and disposal of toxic and hazardous materials.

3.1.11 Electricity Act, 1910

The Act provides a legal base for power distribution. A licensee under this Act is enabled to operate supply of electricity. This Act obligate licensee to pay compensation for any damages caused during the constructions and maintenance of any power distribution facilities

3.2 NATIONAL AND INTERNATIONAL GUIDELINES OR STANDARDS

3.2.1 The Pakistan Environmental Assessment Procedures, 1997

The Pakistan Environmental Protection Agency prepared the Pakistan Environmental Assessment Procedures in 1997. They are based on much of the existing work done by international donor agencies and Non Governmental Organizations (NGO's). The package of regulations prepared by PEPA includes:

- Policy and Procedures for Filing, Review and Approval of Environmental Assessments;
- Guidelines for the Preparation and Review of Environmental Reports;
- Guidelines for Public Consultation;
- Guidelines for Sensitive and Critical Areas; and
- Sectoral Guidelines for various types of projects.

3.2.2 World Bank Guidelines on Environment

The principal World Bank publications that contain environmental guidelines are listed below.

- Environmental Assessment-Operational Policy 4.01. Washington, DC, USA. World Bank 1999.
- Environmental Assessment Sourcebook, Volume I: Policies, Procedures, and Cross-Sectoral Issues. World Bank Technical Paper Number 139, Environment Department, the World Bank, 1991,

The first two publications provide general guidelines for the conduct of EIAs, and address the EIA practitioners themselves as well as project designers. While the Sourcebook in particular has been designed with Bank projects in mind, and is especially relevant for the impact assessment of large-scale infrastructure projects, it contains a wealth of useful information, for environmentalists and project proponents.

The Sourcebook identifies a number of areas of concern, which should be addressed during impact assessment. It sets out guidelines for the determination of impacts, provides a checklist of tools to identify possible biodiversity issues and suggests possible mitigation measures. Possible development project impacts on wild lands, wetlands, forests etc. are also identified and mitigation measures suggested.

The World Bank Guidelines for noise are provided in **Exhibit 3.5**. The indicative IFC guideline values applicable to sanitary wastewater discharges are shown in **Exhibit 3.6**.

3.2.3 IFC Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution

The following guidelines are applicable to electric power transmission systems and wire line installations, including receiving and transmitting stations, switches, related equipment:

- The sponsors must provide information regarding rights-of-way, their lengths, general locations and the sponsor's policies regarding alignment of these rights of way.
- Noise abatement measures should achieve the following level or a maximum increase of background levels of 3 dB (A).
- Feasible administrative and engineering controls, including sound-insulated equipments and PPEs.

- Periodic monitoring of workplace air quality should be conducted for air contaminants and masks should be used.

- Project sponsors should recycle or reclaim materials where possible, otherwise disposed off in environmentally acceptable manner

- All hazardous (reactive, flammable, radioactive, corrosive and toxic) materials must be stored in clearly labeled containers or vessels.

- Strict procedures for de energizing and checking of electrical equipment must be in place before any maintenance work is conducted.

- Shield guards or guard railings should be installed at all belts, pulleys, gears and other moving parts. Personnel should use special footwear, masks and clothing.

- Employees should be trained on the hazards, precautions and procedures for the safe storage, handling and use of all potentially harmful materials relevant to each employee's task and work area.

Exhibit 3.1: NEQS for Municipal and Industrial Effluents[a]

Parameters	***Into Inland Water(mg/l)***	***Into Sewage Treatment(mg/l)***
Temperature or temperature increase[c]	≤3°C	≤3°C
pH	6-9	6-9
Biochemical Oxygen Demand (BOD5) at 20°C[d]	80	250
Chemical Oxygen Demand (COD)[d]	150	400
Total Suspended Solids (TSS)	200	400
Total Dissolved Solids (TDS)	3,500	3,500
Grease and oil	10	10
Phenolic compounds (as phenol)	0.1	0.3
Chloride (as Cl^-)	1,000	1,000
Fluoride (as F)	10	10
Total cyanide (as CN-)	1.0	1.0
An-ionic detergents (as MBAS)[e]	20	20
Sulphate (SO_4)	600	1000
Sulphide (S-)	1.0	1.0
Ammonia (NH_3)	40	40
Pesticides[f]	0.15	0.15
Cadmium[g]	0.1	0.1
Chromium (trivalent & hexavalent)[g]	1.0	1.0
Copper[g]	1.0	1.0
Lead[g]	0.5	0.5
Mercury[g]	0.01	0.01
Selenium[g]	0.5	0.5

Parameters	*Into Inland Water(mg/l)*	*Into Sewage Treatment(mg/l)*
Nickel[g]	1.0	1.0
Silver[g]	1.0	1.0
Total Toxic metals	2.0	2.0
Zinc	5.0	5.0
Arsenic[g]	1.0	1.0
Barium[g]	1.5	1.5
Iron	8.0	8.0
Manganese	1.5	1.5
Boron[g]	6.0	6.0
Chlorine	1.0	1.0

Notes

a. All values are in mg/l, unless otherwise defined

b. Applicable only when and where sewage treatment is operational and BOD5=80 mg/L is achieved by the sewage treatment system

c. The effluent should not result in temperature increase of more than 3°C at the edge of zone where initial mixing and dilution take place in the receiving body. In case zone is defined, use 100 meters from the point of discharge

d. Assuming minimum dilution 1:10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency. By 1:10 dilution means, for example that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meter of water for dilution of this effluent

e. Modified Benzene Alkyl Sulphate; assuming surfactant as biodegradable

f. Pesticides include herbicide, fungicides and insecticides

g. Subject to the total toxic metals discharge should not exceed level of total toxic metals

Exhibit 3.2: NEQS for Selected Gaseous Pollutants from Industrial Sources [a]

Parameter	***Source of emission***	***Standard(mg/Nm³)***
Smoke	Any	40% or 2 Ringlemann scale or equivalent smoke number
Particulate matter[b]	Boilers and furnaces:	
	Oil fired	300
	Coal fired	500
	Cement kilns	300
	Grinding, crushing, clinker coolers and related processes, metallurgical processes, converter blast furnaces and cupolas	500
Hydrogen chloride	Any	400
Chlorine	Any	150
Hydrogen fluoride	Any	150
Hydrogen sulfide	Any	10
Sulfur oxides[c]	Sulfuric acid/Sulfonic acid plants	5,000
	Other plants except power plants operating on oil and coal	1,700
Carbon monoxide	Any	800
Lead	Any	50
Mercury	Any	10
Cadmium	Any	20
Arsenic	Any	20
Copper	Any	50

Parameter	*Source of emission*	*Standard(mg/Nm³)*
Antimony	Any	20
Zinc	Any	200
Oxides of nitrogen[d]	Nitric acid manufacturing unit	3,000
	Other plants except power plants operating on oil or coal:	
	Oil Fired	400
	Coal fired	600
	Cement kilns	1,200

Notes:

a. All values are in mg/Nm3, unless otherwise defined

b. Based on the assumption that the size of the particulates is 10 micron or more

c. Based on 1% sulphur content in fuel oil. Higher content of sulphur will cause standards to be pro-rated

d. In respect of the emissions of the sulfur dioxide and nitrogen oxides, the power plants operating on oil or coal as fuel shall, in addition to NEQS specified above, comply with the following standards

Exhibit 3.3: NEQS for Motor Vehicle Exhaust and Noise

Parameter	*Standard*	*Measuring Method*
Smoke	40% or 2 on the Ringlemann scale during engine acceleration mode	To be compared with Ringlemann Chart at a distance of 6 meters or more
Carbon Monoxide	New vehicles: 4.5% Used vehicles: 6%	Under idling conditions, non-dispersive infrared detection through gas analyzer
Noise	85 dB (A)	Sound-meter at 7.5 meters from the source

Exhibit 3.4: NEQS for Noise

S. no	Category of Area/Zone	Effective from 1st July, 2012	
		Limits in dB	
		Day Time	Night Time
1	Residential Area	55	45
2	Commercial Area	65	55
3	Industrial Area	75	65
4	Silence Area	50	45

Note:

1. Day Time hours: 6.00am to 10.00pm
2. Night Time hours: 10.00pm to 6.00am
3. 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.
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

dB: Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

Exhibit 3.5: World Bank Guidelines for Noise Levels [a]

No	*Receptor*	*Day (07:00-22:00)*	*Night (22:00-07:00)*
1.	Residential, institutional educational	55	45
2.	Industrial,commercial	70	70

Source: Pollution Prevention and Abatement Handbook World Bank Group (1998).

Notes:

a. Maximum allowable log equivalent (hourly measurements,) in dB (A)

Exhibit 3.6: Indicative IFC Values of Treated Sanitary Sewage Discharges [a]

Pollutants	***Units***	***Guideline Value***
pH	*pH*	*6-9*
Biochemical oxygen demand (BOD)	*mg/L*	*30*
Chemical oxygen demand (COD)	*mg/L*	*125*
Total nitrogen	*mg/L*	*10*
Total phosphorus	*mg/L*	*2*
Oil and grease	*mg/L*	*10*
Total suspended solid (TSS)	*mg/L*	*50*
Total coliform bacteria	*MPN[b]/100ml*	*400*

Notes

a. Not applicable to centralized, municipal, wastewater treatment systems which are included in EHS Guidelines for Water and Sanitation.

b. MPN= Most Probable Number

Chapter: 4 ENVIRONMENTAL BASELINE: PHYSICAL ENVIRONMENT

The existing physical environmental conditions of the project area are described in this section. Information for this section was collected from a variety of sources, including published literature, surveys conducted for other studies in the area, and those that were conducted specifically for this study.

Much of the information on topography and land use, geophysical, climate and water resources were collected from published literature and previously conducted studies. The information given in the sections on air, sound and water quality is the result of detailed field surveys conducted specifically for this EIA.

4.1 TOPOGRAPHY AND LAND USE

Karachi city may be classified in to 11 land masses/covers. The appraised land cover of Karachi city indicated that the major share by area is comprised of mountains/barren land and seawater (79.9%); urban land use (15%) and vegetation canopy (4.9%). However, urban land cover is growing day by day. Spread of land cover clusters of Karachi division is shown in **Exhibit 4.1.**

Exhibit 4.1: Spread of Land Cover Clusters of Karachi Division

Sr. No	Area (Sq. Km)	Cluster	Cumulative Land Cover	Share of AggregateLand Cover	
				(Sq. Km)	Percentage
1	80.3	Dense Vegetation	Vegetation Cover	166	4.9
2	22.3	Sparse Vegetation			
3	63.4	Mangrove			
4	144.2	Urban Vegetation	Built up Land	5	15.0
5	112.9	Dense Urban Built up			
6	86.2	Medium Urban Built up			
7	156.9	Sparse Urban Built up			
8	1,500.6	OpenLand	Unused Land	2,663.9	79.9

Source: hec.gov.pk

4.2 GEOLOGY

Geology of Karachi is underlain in lower Indus Basin which is described as Indus river alluvial zone of early Eoicene age. Early deposition of sediments includes silt, sand stone, conglomerate and limestone with low compact and cementing materials. Surface feature describe as syncline delta and valley region and anticline ridges exposed. As stratigraphic description there are two formations Gazij and Manchar formation dip gently northeast to southeast in offshore.

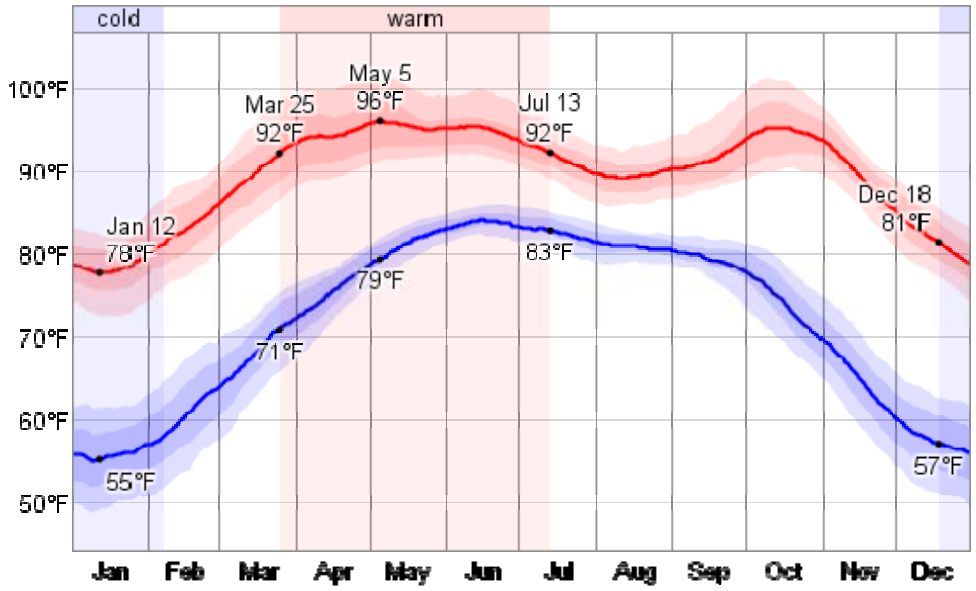
The exposed geological material in the area is generally silty sand, sandy gravel and silty clay which is either product of in-situ weathering or deposited by the action of gravity and water. Below this over burden of silty sandy gravel soil, alternating layer of sedimentary rock comprising of sandstone, shell mudstone, siltstone and limestone are present. The rock formation of this area is from Nari Formation of Oligocene age and partially from Gaj Formation of Miocene age. The Nari Formation consists mainly of sandstone, siltstone and shale with subordinate limestone while the Gaj Formation consists of shale with subordinate limestone.

4.3 CLIMATE

The climate of the country is characterized by extreme variations of temperature, both daily as well as seasonally; the data regarding weather was obtained from the Jinnah International Airport weather station over the course of an average year. All of the meteorological data presented below has been obtained from the same source. It is based on the historical records from 1992 to 2012. Earlier records are either unavailable or unreliable. Karachi has a mild hot dry climate. Yearly mean maximum and minimum temperatures are provided in **Exhibit 4.2**.

Exhibit 4.2: Yearly mean and minimum temperature

Over the course of a year, the temperature typically varies from 55°F to 96°F and is rarely below 49°for above 102°F, the data obtained is average from 1992 to 2012



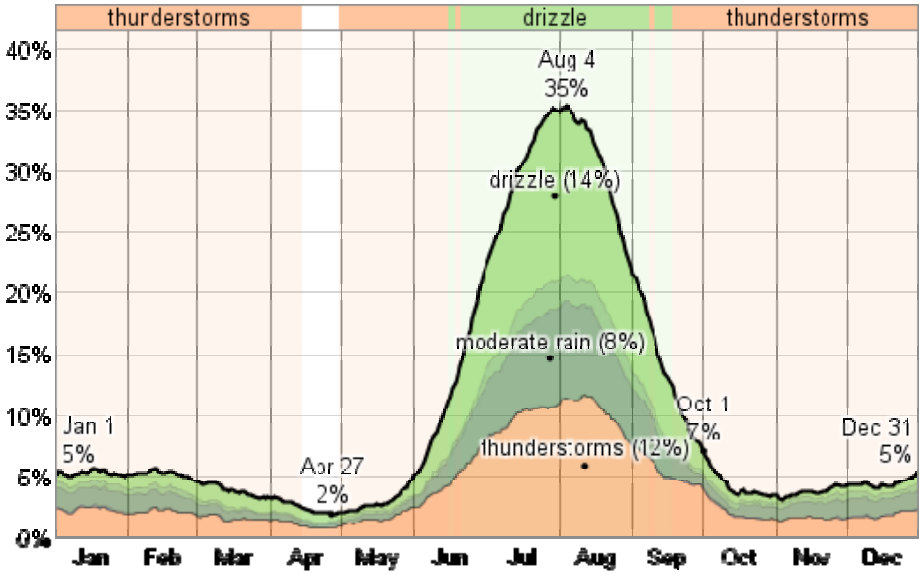
Source; Jinnah International Airport meteorological station

4.4 RAINFALL

There is a variation in the probability of rain throughout the year; however it has been observed that there is probability of precipitation between the month of July and August according to statistical data, it has been estimated that specifically during the month of August precipitation is more likely occurring in 35% of the days. On the other hand Precipitation is least likely around April 27, occurring in 2% of days. Over the entire year, the most common forms of precipitation are thunderstorms, drizzle, and moderate rain. Thunderstorms are the most severe precipitation observed during 38% of those days with precipitation. They are most likely around August 12, when it is observed during 12% of all days.

The mean monthly precipitation average value of the year 1992 to 2012 for Karachi South District is shown graphically in **Exhibit 4.3**.

Exhibit 4.3: Mean monthly precipitation for Karachi south District

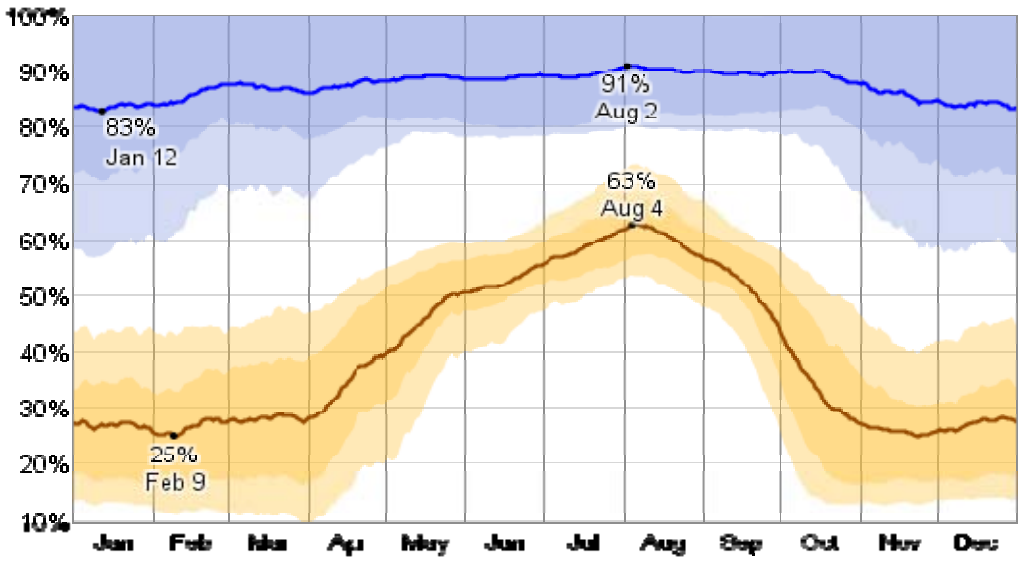


4.5 RELATIVE HUMIDITY

The relative humidity typically ranges from 25% (dry) to 91% (very humid) over the course of the year, rarely dropping below 10% (very dry) and reaching as high as 100% (very humid).

The air is *driest* around February 9, at which time the relative humidity drops below 33% (comfortable) three days out of four; it is *most humid* around August 2, exceeding 83% (humid) three days out of four. The mean monthly relative humidity average value of the year 1992 to 2012 Karachi South district is shown graphically in **Exhibit 4.4**.

Exhibit 4.4: Relative humidity for Karachi south district



Source; Jinnah International Airport meteorological station

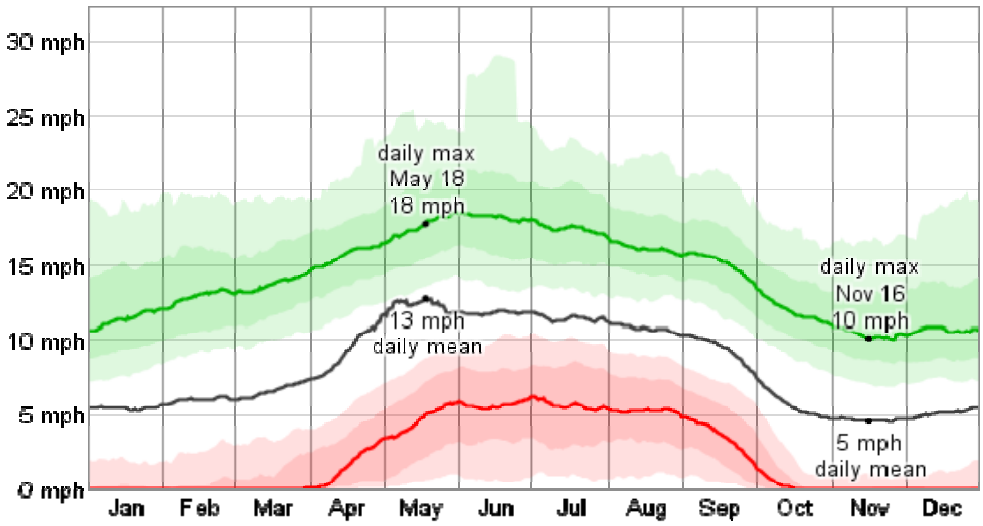
4.6 WIND SPEED AND DIRECTION

The project area lies in region where wind blows throughout the year with highest velocities during the summer months, when the direction is south-west to west. During winter the wind blows from north to northeast, shifting southwest to west in the evening hours. The wind usually carries sand and salt resulting in severe corrosion and erosion. The wind direction and speed between the two monsoon seasons viz. summer and winter are rather unsettled and large variations are noted both with respect to speed and direction. Winds too, are dry and have a desiccating effect during May & June. In July and August winds contain moisture and have a beneficial effect on the plant life.

Over the course of the year typical wind speeds vary from 0 mph to 19 mph (calm to fresh breeze), rarely exceeding 29 mph (strong breeze).The *highest* average wind speed of 13 mph (moderate breeze) occurs around May 18, at which time the average daily maximum wind speed is 18 mph (fresh breeze).The *lowest* average wind speed of 5 mph (light breeze) occurs around November 16, at which time the average daily maximum wind speed is 10 mph (gentle breeze).

The wind is most often out of the *west* (31% of the time) and *south west* (23% of the time). The wind is least often out of the south east (1% of the time), south (2% of the time), east (3% of the time), north west (5% of the time), and north (5% of the time). Exhibit 4.5 shows the wind speed and direction of the project area. The data obtained is average from 1992 to 2012.

Exhibit 4.5: Wind speed and direction of the project area



Source; Jinnah International Airport Meteorological Station

4.7 WATER RESOURCES

This section covers the information of both surface and ground water resources identified within the project areas.

4.7.1 Surface Water Resources

There is no significant natural freshwater source in the project area. The Indus River about 120 km to the east of Karachi city and the Hub River, a perennial stream that originates in Balochistan and marks the boundary between Karachi Division and Balochistan are the sources of fresh water in Karachi.

The Lyari and Malir Rivers that passes through the city do not have any natural flow, except during the monsoons. The Lyari River falls in Kemari and Malir River falls in Gizri Creek. Malir River is ephemeral and is constituted from two major tributaries, i.e. Mol and Khadeji as well as some minor tributaries. Khadeji is a perennial stream that originates at Khadeji falls and gains flow as it travels across the Malir Basin.

The Malir and Khadeji River basins include dry hill torrents and flow depends upon precipitation during rains.

According to Karachi water and sewerage board, the total estimated water supply of Karachi is 500 MGD. Approximately 445 MGD, amounting to 89% of the total supply to Karachi, is transported to the city from the Kotri Barrage on the Indus River through a system of canals and conduits. The second source of surface water to Karachi is the dam on the Hub River located north of Karachi, which supplies about 29 MGD of water to the city. Except for a few Karachi Water and Sewerage Board's (KWSB) wells, all of which are connected to the piped supply system, the water from the groundwater wells is distributed through water tankers to various parts of the city.

4.7.2 Groundwater Resources

Groundwater resources in Karachi Division are limited. The aquifers close to the coastal belt are mostly saline and unusable for domestic purposes. The aquifers near the Hub River bed are well developed and are source of water for agriculture and other domestic purposes. Generally the aquifers in Karachi are estimated to lie at depths of 50 m to 100 m. However, there is no groundwater source found at any site of the transmission line route and grid stations area.

4.8 AMBIENT AIR QUALITY

The town represented half urban development and half rural environment. It was least expected to be polluted by any anthropogenic factors.

The data on the ambient air quality in Pakistan is scarce in general. Very few studies have been conducted that bring into light the air quality in major cities of Pakistan. An ambient air quality survey was conducted, the results are shown in **Exhibit 4.6**

Exhibit 4.6: Ambient Air Quality

S. No	LOCATION	CO_2 ppm	PM_{10} (ug/m^3)	PM_{10} NEQS
1	Maymar Grid Station	386	161	150
2	Baloch Khan Goth	391	142	150
3	Gadap Grid Station	402	184	150

The ambient air quality of the area has been degraded in terms of particulate matters, as the results are showing higher concentration of PM_{10} at all prominent areas of the proposed transmission line. The reasons for such higher concentrations are heavy traffic, rough roads and use of Sulphur containing fuels in vehicles.

4.9 NOISE LEVELS

Along the route initiating from Maymar Grid Station till the Gadap Grid Station, Noise was monitored at different stations. The activity for monitoring of noise was carried out by Environmental monitoring specialists; results of noise monitoring can be seen in **Exhibit 4.7**

Exhibit 4.7: Noise Monitoring Results

S. No	Project Location	Noise Level (dB)	NEQS
1	Maymar Grid Station	62	85
2	Baloch Khan Goth	56	85
3	Gadap Grid Station	63	85

4.10 EARTHQUAKES

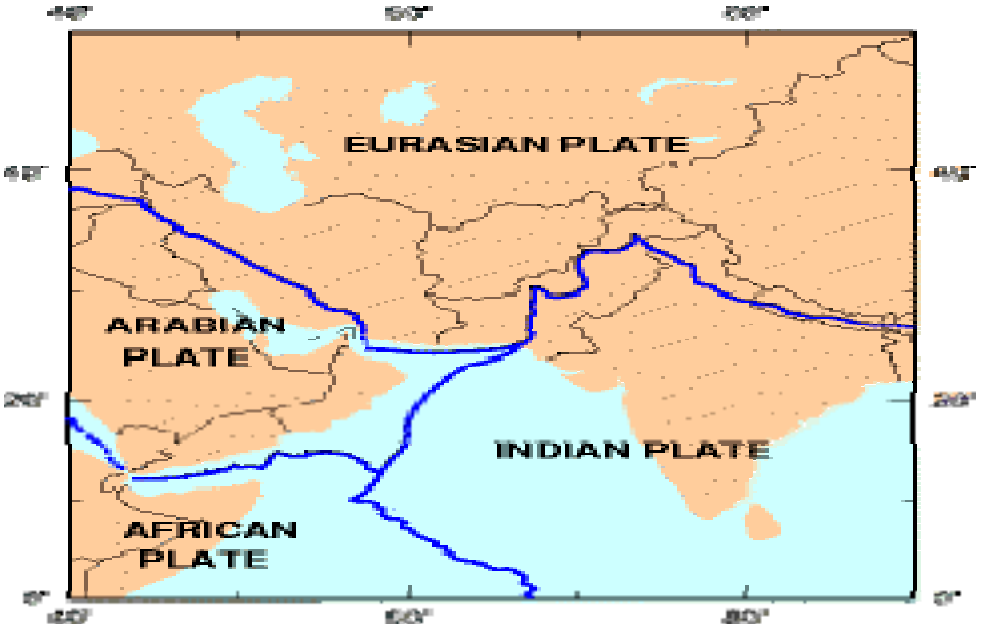
The Indo-Australian plate upon which Pakistan, India and Nepal lie, is continuously moving northward, colliding with and sub-ducting under the Eurasian plate, thus forming the Himalayan mountains, and triggering earthquakes in the process. The city of Karachi is located on the edge of the high hazard zone2B. **Exhibits 4.8** shows seismic zoning map of Pakistan. The history reveals that:

- The areas comprising Pakistan have suffered four major earthquakes in the 20th century including the great Quetta earthquake of 1935, the 1945

earthquake off the coast of Makran, the 1976 earthquake in the Northern areas, and the October 2005 Kashmir earthquake. In between these major events, the Northern areas and Kashmir have experienced many small quakes with localized impact. No appreciable earthquakes have been recorded in Karachi during the recent past.

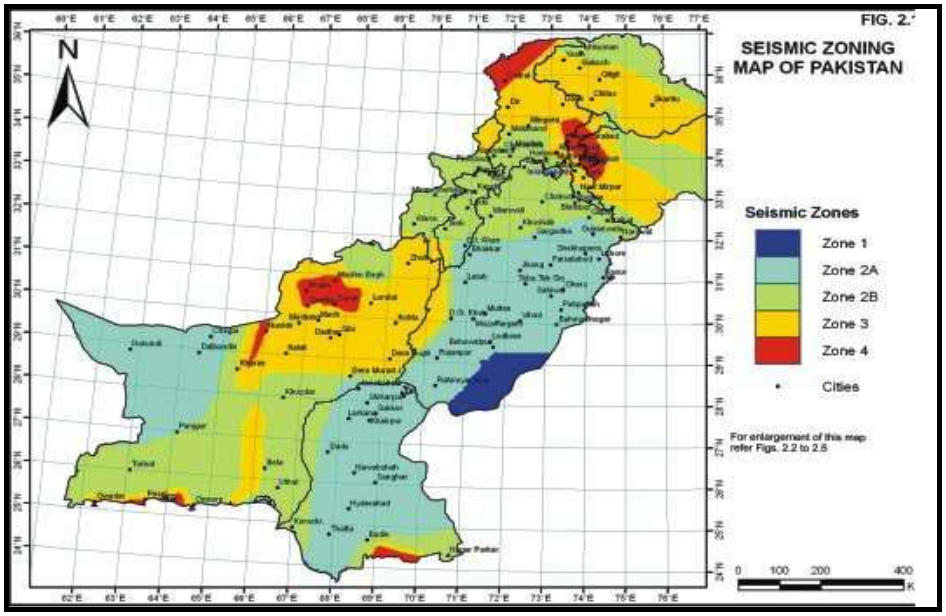
- The recently developed (after the October 2005 earthquake) seismic zone map of Pakistan has divided the country into four seismic zones ranging in term of major, moderate, minor and negligible zones with respect to ground acceleration values. Under this zoning Karachi Division has been identified on the edge of moderate to high hazard zone. This zone has minor to moderate damaging affect.

Exhibit 4.8: Tectonics Plates/Seismic Zoning Map of Pakistan



- The proposed project is located in the seismic tectonic region of the Kirthar Ranges, where a moderate level of seismic activity is believed to exist, but large magnitude earthquakes are rare. Tectonic Plates/Seismic Zoning Map of Pakistan can be seen in **Exhibit 4.9**.

Exhibit 4.9: Karachi lies on 2B Seismic Zone



4.10.1 Tsunamis

The coastal areas of Karachi might experience the affect of Tsunamis as the coast line of Pakistan has had this natural hazard in the recent past. An earthquake of magnitude 8.3 generated a destructive tsunami wave in the Northern Arabian Sea and the Indian Ocean on 28th November 1945, producing 12 m to15 m high sea waves that killed at least 4,000 people in Pasni and adjoining areas. The tsunami hit as far as Mumbai in India. Karachi, about 450 km from the epicenter, experienced 2 m high sea waves which affected harbor facilities. Hence, the occurrence of another tsunami in the future cannot be ruled out.

4.10.2 Tropical Storms and Cyclones

Tropical cyclones also occur periodically in the coastal areas. Seldom, these cyclones have high intensities. A total of 14 cyclones approached the coastal areas of Pakistan from 1971 to 2001. More recently the cyclone of 1999 hit the Sindh coast near Coastal Gharo with wind speeds in excess of 170 miles/hour, generating tidal waves and caused serious damage in terms of lives and property in Thatta and Badin districts. This particular cyclone wiped out 73 settlements, killed 11,000 cattle and affected nearly 0.6 million people. The losses to infrastructure were estimated at US$20 million.

However, except for the above mentioned cyclone, severe storms and cyclones seldom cross the coast of Pakistan. The main cyclonic activity generally takes place in the month of June. All the cyclonic storms that emerge in the Arabian Sea either curve sharply into the Gulf of Kutch or cross the Arabian Sea from east to west and end up at the coast of the Arabian Peninsula. When the cyclones cross the coast they are accompanied by storm surges, generally known as storm tides. The

cyclones that cross the coast in the month of June generate winds of approximately 15 m/s to 18 m/s.

Hence the possible occurrence of a future cyclone with severe consequences is quite rare but cannot be ruled out.

Chapter: 5 ENVIRONMENTAL BASELINE: BIOLOGICAL ENVIRONMENT

Data for the EIA was gathered from both primary and secondary sources. Baseline field survey was conducted in May 2014. Sampling locations for the identification of floral and faunal assemblages has carefully been selected so that maximum number of species could be observed within the project area.

The faunal field data through direct counts, incidental sightings and visual searches for:

- Birds
- Mammals
- Reptiles

To record the occurrence and individuals of various species present there, observations were made from vantage points suitable for viewing the habitat. For the confirmation of various species, field guides and checklists were used such as Akhtar (2006), Ghalib et al. (2002, 2004), Grimmett et al. (2008), Khan (2007) and Roberts (2005).

5.1 FLORA

The flora of Karachi is typical of an arid area and depends upon the summer, and winter rainfall. The vegetation on mountains, dry streambeds, and stony and sandy plains vary is terms of species, habitat diversities and community structures. The harsh climate, minimal rainfall, and poor soil condition do not allow for dense vegetation and over grazing is also a major issue of the project area. Livestock totally depend on natural vegetation as a fodder.

Due to the developmental activities, the natural flora of the city is replaced by the planted flora. Most of the species that had been reported earlier by ecologists are now extinct from the urban settlements however, in rural areas they are found in their natural habitats.

5.1.1 Natural vegetation of Project Site:

The ecological characteristic of project site and surrounding area is xerophytic due to low availability of water. Project area is barren and bears arid characteristics. Mostly plants species have economical benefits like medicinal plant species. Most common species, present in project site include *Aerva javanica, Suaeda fruiticosa, Tribulus terrestris, Prosopis juliflora, Parkinsonia aceulata, and Calotropis procera.*

Most of the area near and along the project site is covered with wild vegetation.

The level of anthropogenic activity is medium-high; specifically communities used the place to cut the woods (*Prosopis juliflora)* for their livelihood and fuel. This has resulted in loss of natural habitat into barren land with native vegetation. The quality of soil is also poor with little organic matter, sandy loam and poor texture to support large-scale vegetation.

Sampling was carried out at the at plant location, along the earthen access track towards plant site and the surroundings of the plant site.

A total of 11 species of plants were observed within the vicinity of the proposed plant site. Most of the species are of minor ecological importance and only four of them are dominant and wide spread. The plant species dominating the plant location include *Prosopis juliflora, Capparis decidua, Euphorbia hirta* and *Calotropis procera.* The plant species within the vicinity of the plant location is mainly dominated with *Acacia nilotica* and *Salvadora persic*. The vegetation cover is less than 12% at the plant site. The area falls in zone, with common, less important species.

5.2 FAUNA

A limited number of birds, mammals and reptiles were recorded from the project site during the field visit for EIA study.

3 species of Mammals, 5 species of Birds 5 species of Reptiles and 11 species of plants have been recorded from the area. Details are provided in **Exhibit 5.1 to 5.4**.

Because of absence of favorable habitat, the floral and faunal species are low in the project area.

5.2.1 Birds

Eates, in Soreley's Gazetteer of Sindh lists 426 bird species, out of which about 60 species was observed in the project area and its surroundings. Of these, 51 are resident species and the rest are winter visitors and summer breeders. Resident bird species that are commonly found in the area include Bank Myna, Blue Rock Pigeon, House Crow, House Sparrow, and White Eared Bulbul. The project area also hosts many species of migratory birds. .

Figure: 1 View of vegetation in Gadap Town

5.2.2 Mammals

Active burrows in windrows within the plant location indicate a sizable population of small mammals in the area. Other common mammals found here include the Asiatic jackal, the Indian wild boar, the Indian hear, the five-striped palm squirrel, the Indian gerbil, the desert cat, the Long-eared Desert Hedgehog, and the Indian Porcupine. No mammalian species are listed under any category of the IUCN Red List (2000) was found during the field survey. However Asiatic jackal in the project area has been included in **Appendix III** of CITES.

5.2.3 Reptile

The project area provides a good habitat for a variety of reptiles. Monitor lizards *(Varanus bengalensis* and *Varanus griseus)* were observed in the project area, the largest lizards in the area, are included in the list provided by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The preferred habitat of the desert monitor *(Varanus griseus)* is sandy, while the Indian monitor *(Varanus bengalensis)* prefers water bodies. This rare species of lizard has been included in **Appendix III** of the CITES, but its population was found satisfactory in the project area.

The aforementioned lizard species have some economic importance for their valuable skin and their fat, which is used for medicinal purposes. Hunters sell their skins and fat, as a result of which the population is decreasing day by day. However at the particular site it was not reported that people hunt these animals.

The population of the Indian sandy boa *(Eryx johni)* is very low. Black Cobra presence is also reported in the project area, which has also been included in **Appendix II** of CITES. The most prominent snake in the area is the saw-scaled viper *(Echis carinatus)*. This is a highly poisonous snake and is distributed throughout Pakistan. The size reached by this species in the project area is larger than in other parts of Pakistan.

The populations of other species of snakes and lizards found in the project area are satisfactory and no other species thereof is included in Cites.

Exhibit 5.1: Mammals Recorded in the Project Area

S. No	Common Name	Scientific Name	Occurrence				Listing		
			Common	Abundant	L. Common	Rare	SWPO	Red list	Appendix /CITES
1	Asiatic Jackal	Canis aureus			√				III
2	Desert Cat	Felis silverstris ornata			√				
3	Five striped palm squirrel	Funambulus pennantii	√						
4	Indian Gerbil	Tatera indica	√						
5	Indian hare	Lepus nigricollis	√						
6	Indian Porcupine	Hystrix indica	√						
7	Indian Wild boar	Sus scrofa			√				
8	Long-eared Desert Hedgehog	Hemiechinus collaris	√						

Exhibit 5.2: Reptiles Recorded in the Project Area

S. No	Common Name	Scientific Name	Occurrence				Listing		
			Common	Abundant	L. Common	Rare	*SWPO	Red list	Appendix /CITES
1	Black cobra	Naja naja			√				II
2	Indian Monitor lizard	Varanus bengalensis			√		√		I
3	Indian Fringed- toed Lizard	Acanthodactylus cantoris cantoris	√						
4	Indian sand boa	Eryx johni	√						
5	Saw scaled viper	Echis carinatus	√		√				

*SWPO = Sindh Wildlife Protection Ordinance

Exhibit 5.3: Birds recorded in the project area

S#	English Name	Scientific Name
1	Grey Partridge	Pondicerianus mecranesis
2	Grey Quail	Coturnix coturnix
3	Redwattled Lapwing	Vanellus indicus
4	Painted Sandgrouse	Pterocles indicus
5	Indian Ring dove	Streptopelia decaocto
6	Blue Rock Pigeon	Columbia livia
7	Indian red turtle dove	Streptopelia tranquebarica
8	Rose ringed parakeet	Psittacula krameri
9	Cuckoo	Cuculus canorus
10	Sind-tailed Bee-eater	Merops orientalis
11	Hoopoe	Upupa epops
12	Indian crested Lark	Galerida cristata
13	Indian grey Shrike	Lanius excubator
14	Indian Golden Oriole	Oriolus oriolus
15	Rosy Starling	Sturnus roseus
16	Indian Myna	Acridotheres tristis
17	Sindh House Crow	Corvus splendens
18	White eared Bulbul	Pycnonotus leucogenys
19	Red vented Bulbul	Pycnonotus cafer
20	Common babbler	Turdoides caudatus
21	Sindh Jungle babbler	Turdoides striatus
22	Pied chat	Oenanthe picata

Exhibit 5.4: Flora of the Project Area

S. No	Plant Species	Local Name	Life Form			
			Herb	Shrub	Grass	Tree
1	Acacia jacquemontii	Banwar		√		
2	Acacia nilotica	Sindhi Babur				√
3	Avicena merina	Mangrove				√
4	Calotropis procera	Ak		√		
5	Capparis decidua	Kirar				√
6	Euphorbia hirta	Kheer wal				√
7	Prosopis juliflora	Devi		√		
8	Salsola imbricate	Lano		√		
9	Salvadora persica	Khabbar		√		
10	Saveda fruticosa	Lani		√		
11	Zizyphus nummularia	Ber		√		

Chapter: 6 SOCIO-ECONOMIC & CULTURAL ENVIRONMENT

6.1 STUDY METHODOLOGY

A team of experts comprising a social analyst carried out the study of socio economic and cultural environment of the project area. The approach and methodology was a combination of qualitative and quantitative data gathering techniques. The data collection addresses the primary requirements of an Environmental Impact Assessment (EIA), incorporating the Pakistan Environmental Assessment Procedures 2000.

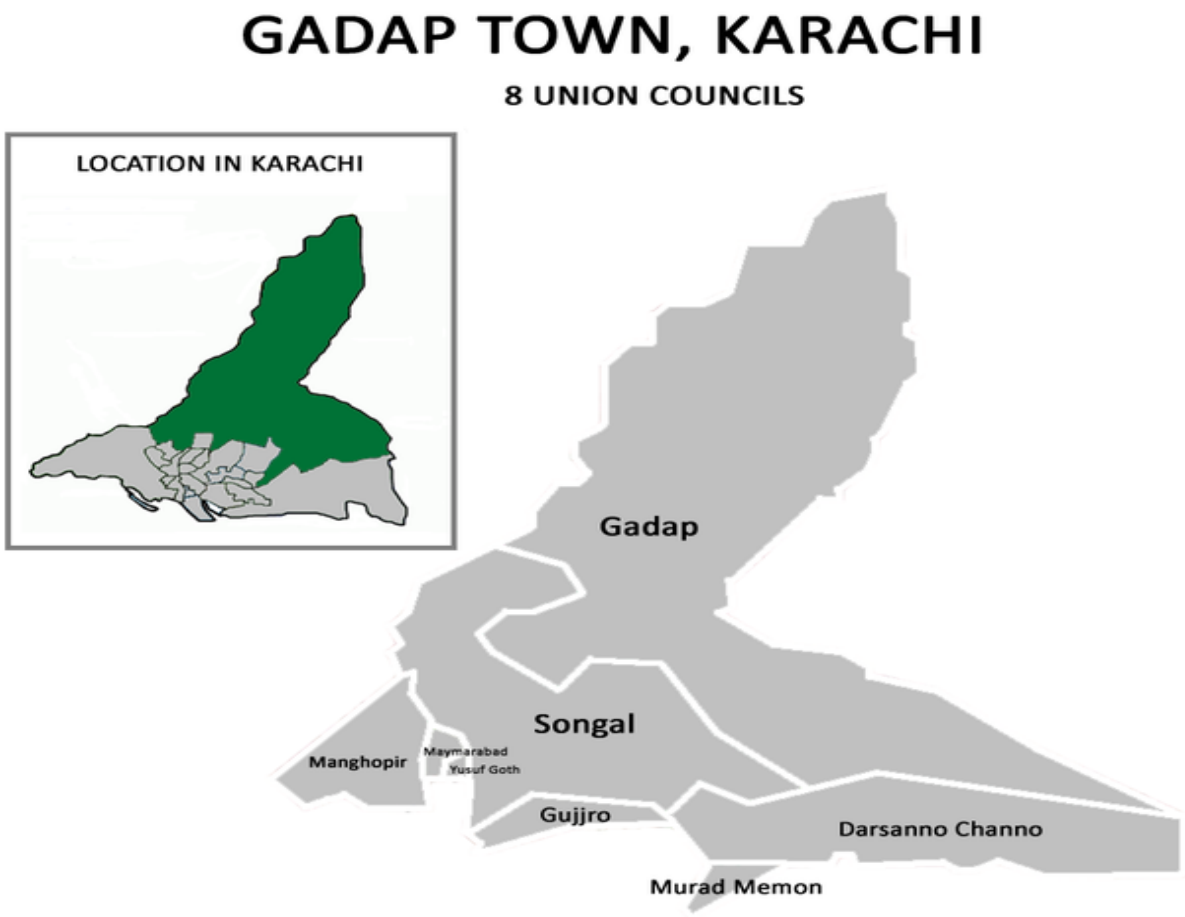
A Participatory Urban Assessment was combined with the extensive qualitative data collection of socio-economic and cultural data through short structured questionnaires and focus group interviews with communities including key informants of the key places of the project area. The specific tools used for collection of data includes, direct observation, short questionnaire, focuses groups and semi-structured interviews.

6.2 PROJECT LOCATION AND ADMINISTRATIVE SETUP

The proposed project spreads over one town of Karachi that is Gadap Town. Gadap Town is a town in the northwestern part of Karachi with the Hub River on its western limits also forming the provincial border between Sindh and Balochistan, while to the north and east are Dadu District and the Kirthar Mountains. There are 8 union councils in the town. There are over 400 rural villages in Gadap Town. Some of the rural villages of Gadap Town are Old Thana Village, Mula Essa Goth, Jam Goth, Memon Goth, Haji Miandad Goth, Samoon Goth, Haji Murad Jaffar Goth, Darsano Chhano, Kathore, Saleh Mohammad Goth, Kohi Goth, etc.

Underground and overhead transmission line will be constructed to connect Gulshan-e – Maymar Grid Station to Gadap Grid Station.

The main places at the vicinity of this underground and overhead transmission line are Jamia Tur Rasheed, Central Park , Gulshan e Maymar, Abdullah Gabol Goth, Garden City, Dream World, Mokhi Nala, Kherthar Park Road, Northern Bypass, Kozi Water Park, Samzu Water Park.



6.3 ENTRY AND EXIT POINT

The main entry and exit points of the proposed transmission line are Karachi Hyderabad Motorway and Karachi Northern Bypass. The Underground portion is situated in the east of Karachi-Hyderabad Motorway and in the south of Karachi Northern Bypass. The overhead transmission line will run parallel to Karachi Hyderabad motorway in the east.

6.4 DEMOGRAPHICS

Karachi is one of the world's largest populated cities, spread over 3,530 square kilometers. The city credits its growth to the mixed populations of economic and political migrants and refugees from different national, provincial, linguistic and religious origins largely come to settle here permanently.

According to the census of 1998, the population of Gadap Town is approximately 289,564. Although this is the largest town of Karachi in terms of area but least populated and developed town.

The Average household size is 5-7 members per family. Almost medium and lower class families are living in these areas.

6.5 NETWORKING AND BUSINESS ACTIVITIES

Gadap Town is the largest town of Karachi in terms of area but is very less populated and providing a large area for future development of Karachi city. This town is serving as extension of Karachi city. The people are migrating from the dense populated areas of Karachi and building new houses and residential flats in the calm and clear atmosphere of Gulshane Maymar. Baldia Town is purely residential area with a few industries and markets. This town is providing a large area for recreational facilities for the citizens of Karachi and Hyderabad in the form of water Parks and has a popular resort named as “Dream World Resort”.

Gadap Town is the least developed area of the city and represents a rural environment, except that urbanization has taken pace in this area as Gulshane Maymar is developing further. The people of Gulshan e Maymar are genrally associated with private and government jobs mainly in the central Karachi city. While a small portion of people are involved in different businesses. The other undeveloped sectors of the town have no proper developments and there are small village like structures. The people of these areas prefer agriculture as their sole business activity and home based economic activities.

New and strong network of roads is developed in this area for the development of proposed residential colonies and other associated infrastructure.

Public transport is almost not available in this area because of less population and the people rely on their own vehicles and private transport like taxi and rickshaws.

Rural environment of the Town

Weekly markets in the Town

6.6 LEADERSHIP DYNAMICS

There is no strong system of leadership observed in the project areas. People living in this area are independent and follow solitary lives without any leader. There is a system of forming committees of people living in a block of flats/ Residential Project

/ colonies. They normally meet and discuss the issues of their respective flat / colony. However people living in bungalows are totally disconnected from the joint social activities and they only have limited circle of their personal contacts.

In the village areas of the project area the villagers have a community head in each area in the form of Wadera and Sardar and the villagers believe them as their political leaders and head of the village.

6.7 LIVELIHOOD

The livelihood of the people in the project area is mixture of upper, middle and lower class population, hence very diverse. The livelihood of upper class people mainly depends on business, private and Government jobs, however medium and lower class people depend on shops, jobs and labor. Liberalization and the communications revolution have brought the corporate culture to Karachi. Around 40% people of the project area are affiliated with jobs, 10% with small business, 35% with labor and 5% with large business. The people working in low profile jobs and labor mostly belong to slum areas and colonies. For residents of this area who belong to lower and middle class, the family system mainly consists of joint family system with large families.

A donkey cart on the road of Goth.

View of a market in the area.

6.8 DRINKING WATER

The major source of providing drinking water in the project area is KWSB. People of this area also use water of supply line and underground water for drinking purpose but mostly for gardening, sanitary or cleaning purposes. According to the people of this area, there is shortage of water. The water through KWSB in most of the areas comes daily or on alternative days for around one hour. If there is load shedding at that time, people cannot store the water. In this case people have to purchase water through tankers. The underground water of the area is brackish and hard in nature.

The villagers of the project area near Baloch Khan Goth and its vicinity rely on well water and tube wells and since there is no sufficient water available so the consumption of water is also low in the villages.

6.9 EDUCATION

There are over 360 primary schools besides 37 girls' primary schools. A majority of these are one-room, one-teacher schools where students from classes I to V sit together and are taught by one teacher.

There are a few high schools and two degree colleges at Memon Goth and Gadap village.

On the other hand Maymar Town has numerous private schools, coaching centers and colleges as well. But no prominent large institution likes universities. So the people go to the central Karachi for universities and for government colleges. The only popular big institution is Baqai Medical University which is near to the project area.

Primary school in Noor Muhammad Goth

Baqai Medical University

6.10 HEALTH

Government Health facilities are also minimal in the Town, with just two maternity homes, at Memon Goth and Manghopir.

The people of Gulshane Maymar and Taiser Town rely on private hospitals of the area. The major private hospitals and clinics in the area include Afsar memorial Hospital, Aga Hospital, Sepo Hospital, Al shifa Medical centre and Fatima Hospital Baqai University.

In case of critical and severe health problem or accident, the patients are sent to big hospitals of Karachi city like Jinnah Hospital, Civil Hospital and Aga khan etc.

Fatima hospital Baqai Medical University

6.11 CULTURE

The people of project area adopt mixture or rural and urban culture. The undeveloped area and Goths of Gadap Town has rural culture. Karachi is home to many cultural sects such as Sindhi, Punjabi, Saraiki, Pathan, Baloch, Urdu-speaking, Gilgiti etc. People of the project area have however established small communities according to their livelihood. The people of Maymar and Taiser Town represent urban living style and their way of life reflects the developed environment while on the other side the inhabitants of Baloch Khan Goth are pure villagers and their daily routine practices are realated with typical Sindhi rural environment.

The Gadap Town is also providing canopy to Afghan migrants and there are so many Afghan colonies and Goths which are providing residency to the Afghan migrants who are permanently set in Pakistan now. These people have their own Pashtun culture and specific life style. There source of earning is small businesses and daily wages works in the central Karachi city.

Masjid in the route of transmission line.

Dargah in the Baloch Khan Goth.

6.12 DAILY ROUTINE OF WOMEN

Life in Gulshan e Maymar area is a blend of busy working style. Women of this area are professional, mostly related to the professions of teaching, medical officers, lawyer, private jobs and government often, etc and other fields of life. Some women look after household task e.g. washing clothes, cooking, and also pick and drop their children from school. Females of this area regularly go out of their homes mainly for shopping. As males leave early for the work and return late, so females are responsible for purchasing daily use stuff. There are few small shops of vegetable, fruits and other kitchen items in this area otherwise every necessary item can be purchased from Super Markets. Women of this area visit the different shopping malls for shopping which area situated in the area. e.g. Pick and pay market, weekly bazaars like Sunday bazaar.

On the other side the women in the undeveloped part of Gadap Town are purely house wives and involved in home economics and some are engaged in agricultural activities. These women are less educated and hardly crossed primary education due to non availability of good schools and also the trend of low education in the society.

Most of women wear simple shalwar kamiz and dupatta, some also opt western wears like jeans, T-shirts etc in the developed part of the town like Gulshan e Maymar. Most women are active in Gulshan e Maymar Town for shopping activities and are independent of any restrictions to move about according to their will. There are few small shops of vegetable, fruits and other kitchen items in these areas. The women in the rural part and Goths are not allowed to go for shopping independently and their necessities are fulfilled by men.

Chapter: 7 ALTERNATIVES

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

7.1 "NO-DEVELOPMENT" ALTERNATIVE

While not developing the power line would avert negative impacts commonly associated with power lines such as visual intrusion especially in residential areas, impact on road, street infrastructure, utilities services and land take. It will not balance the 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.

7.2 ALTERNATIVE ROUTES

The proposed project route was finalized from many alternate routes. The final route was planned considering primary factors:

The key considerations in selecting the corridor route included clustered settlements, common access routes and pathways, markets, community structures, private land (by avoiding it to extent possible). The shortest possible route was identified after considering all above factors.

Technically the route identified for transmission line is as follows:

- While selecting the route, due weightage was given to the accessibility of the line for construction as well as for maintenance for its total life span;
- The line is sited in areas which are accessible by slight deviations and marginal increase in the route length;
- In most part of the route it is possible to transport materials and tools quickly in case of breakdowns;
- Wherever roads are existing the line and stations are approachable from such roads; where there are some illegal settlements and outgrowth of local plant species, proper planned system is designed
- Minimizing the transmission line exposure over residents/houses.
- Proper compensation to the affected people would be given.

7.3 ALTERNATIVE TECHNOLOGIES

Trenching is carried out generally with machinery like excavator and jack hammer for rocky soil but in streets/narrow paths where machineries are unable to reach the project area trench is made manually by using a spade or shovel and not a fork or pick-axe, in areas where utility services exist.

Chapter: 8 PUBLIC CONSULTATION

8.1 OBJECTIVES OF PUBLIC CONSULTATION

The main objective of the public consultation process was to disseminate information on the project and its expected impact among primary and secondary stakeholders. Another important objective was to determine the extent of the impact of different project activities and suggest appropriate mitigation measures. The overall objectives of the process were as follows:

- To inform and acquire feedback from primary and secondary stakeholders on project activities;
- To gain the consent of all the primary and secondary stakeholders for carrying out project activities;
- To identify potential issues and mitigation measures;
- To incorporate stakeholders concerns in the project documents.

8.2 PROCESS

A team of environmental consultants organized meetings with the primary and secondary stakeholders of the proposed transmission line area, including local residents, and representatives of other institutions. The team visited various prominent places in the project area to meet the targeted audience. During these meetings a simple, non-technical description of the project was given, along with an overview of the project's likely human and environmental impact. Following the project description, a discussion was held so that the participants could voice their concerns and opinions. These concerns and suggestions were recorded in field notes. Participants were also asked to suggest alternatives in case of their particular concerns.

Public consultation meetings were held at prominent locations, with major stakeholders engaged in various activities e.g. jobs, business, labor, households. The meetings with local businessmen, shopkeepers, local residents, civil servants, representatives of civil society and senior citizens in the project area were arranged.

Project description was explained in simple language. All the stakeholders were encouraged to ask questions and share their concerns related to the project.

The views of the participants of the meeting are summarized below:

- The participants of Gulshan e Maymar and the villagers of Gadap Town appreciated the developmental steps taken by K-Electric to facilitate the people of this backward town with more electricity, specially the villagers.

- The villagers of Gadap complained that the span of load shedding in the area is too long and yet many small villages have no facility of electricity.

- Villagers of Boloch Khan Goth near to the Gadap grid station demanded that after the completion of the new transmission line and the extension of the grid station, this big village should be considered on priority bases and proper and immediate provision of electricity should be ensured.

- Villagers also demanded that skilled villagers should be employed in the grid station and labor of the villages should be considered in the construction of transmission line.

- Some of the local farmers shared their concerns about transmission line and said that their farmland should not be degraded during construction as it is the source of economy for some of the villagers and unnecessary removal of trees and other vegetation should be avoided.

- The construction vehicles and other material transportation vehicles should not be parked on road to avoid accidents and to ensure the flow of traffic on the road.

- All the participants wished that the project will be completed on time and the operational phase will start as soon as possible to overcome the energy shortages of the area.

- The participants also emphasized on the point that during operation, the transmission line should be monitored and complains of consumers should be entertained and the problems should be withdrawn immediately by K-electric.

Exhibit 8.1: Consultation with the residents of Different Goths

Consultation with shop keepers

General view of a Goth

Consultation with residents of a Goth

Farming activity in the area

Chapter: 9 ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PLAN

After a thorough assessment of the existing environmental and socio-economic conditions and review of technical data, a team of environmental professionals analyzed the impacts and how to mitigate if these are significant. This Chapter presents the impact assessment of the proposed project as a whole including all the components.

The transmission line and grid stations project is not an air, water polluting and resource intensive sector. However, there can be considerable environmental impacts during the initial construction phase mainly due to civil works such as site preparation, construction of access roads, vehicle movement, RCC foundation, erection of tower etc. Construction phase impacts are usually temporary and localized phenomenon, except the permanent changes they may occur in the local landscape and land use patterns along the Right-of–Way. However, these impacts are given due consideration, wherever applicable.

The transmission line and grid stations projects may also cause significant impacts on socio-economic environment, if the project is passing through the populated area. The activities such as clearing of land for transmission line RoW and associated facilities can result in the displacement of local people. Moreover, if the route is selected through forest area, concerns such as impacts on biodiversity or changes in land use patterns also become significant. The impacts of transmission line projects on a hilly terrain vary as compared to a plain area. Therefore, magnitude of impact on forest, wildlife and water resources in a hilly area is much higher as compared to plain areas. The auxiliary activities such as construction of approach roads, cutting, filling etc. may lead to slope destabilization and thus causes landslides.

Sometimes, the transmission line and grid stations projects can also affect the sensitive sites such as areas of archeological, historical or religious significance, if these sites fall along the RoW. The overall aesthetic effect of a transmission line is likely to be negative to most people, especially when proposed lines would cross natural landscapes and private properties.

9.1 ENVIRONMENTAL IMPACTS ASSESSMENT

The project activities during construction phase will involve clearing of trees along the route alignment wherever required, excavation for installation of towers, erection of towers, civil works related to transmission line and line stringing. For Grid station, it will involve excavation for building and equipment foundations, civil works and

erection of equipment. During the operation phase, most of the construction phase impacts will get stabilized and the impacts will be restricted only to the operation and maintenance of the project.

The impacts on the environment from various activities of the project can be categorised as follows:

- Impact on Physical Resources
    - Impact on Topography
- Impact on Environmental Resources
    - Impact on Air Quality
    - Impact on Noise Levels
    - Impact on Surface Water Quality
    - Impact on Ground Water Quality
    - Impact on Soils and Geology
- Impact on Ecological Resources
    - Terrestrial Ecology
    - Wild Life
    - Aquatic Ecology
- Impact on Human Environment
    - Health and Safety
    - Agriculture
    - Socio-economics
    - Resettlement and Rehabilitation
    - Cultural sites
    - Traffic and Transport
    - Interference with other utilizes and traffic
- Waste Disposal
    - Solid waste disposal
    - Liquid waste disposal

9.1.1 Impact On Physical Resources

Impact on Topography

During the construction of the transmission line and substation, the topography will change due to excavation and erection of tower, fill and cut for leveling the tower erection place. The most prominent impact on the surface topography will be due to the removing of the trees at the tower erection site and all along the Right of Way for construction facilitation which are estimated to be about 100 species. This will lead to change in the surface features only. The impact will be irreversible as the present features along the 15 m RoW will be changed due to presence of the transmission line.

No topographical changes are envisaged during the operation phase of the transmission line and the substation. The existing access routes will be utilized during the operation and maintenance of the transmission lines.

9.1.2 Impact on Environmental Resources

Impact on Air Quality

During the construction phase, the activity would involve excavation for the tower erection, movement of transporting vehicles carrying the construction materials etc. along the haul road (through un-built roads, but are not maintained). At majority of locations, movement of heavy vehicles may not be possible; from approach road to construction site material will be head loaded. All these activities would give rise to emission of dust particles thereby affecting air quality marginally at the site which will be transitory in nature.

Mitigation Measures

Sprinkling of water during excavation will reduce the dust emission to a great extent.

The operation of transmission line and the Grid station will not have any negative impact on the air quality of the region.

Impact on Noise Levels

During the construction phase, the major sources of noise pollution are movement of vehicles transporting the construction material and equipment to the site. Most of the access roads along the alignment are feasible for motor vehicles. The major work of the construction is expected to be carried out during the day time.

Mitigation Measures:

Following measures will help to keep noise and vibration in acceptable level during construction phase:

- Contractor shall equip their heavy construction equipment and plants with exhaust silencers to limit the engine noise so as not to exceed 75 dB (compacters, loaders, vibrators and cranes) and regularly maintain all construction vehicles and machinery that should meet the National Environmental Quality Standards.

- Contractor shall limit working time for activities that create noise only from 7.00 am to 8.00 pm except for construction site near public sensitive receptors. Construction related activities closer to sensitive receptors have to be scheduled in coordination with the relevant authorities.

During the operation phase of the project, there will be corona noise from the conductors which will be felt only up to 15 to 30 m area; hence the ambient noise level shall meet the 85dB limit of NEQS.

Impact on Surface Water Quality

The construction and operation of the transmission lines will not have any significant impact on the surface water quality in the area since no surface water body was found. Proposed activities will create temporary impacts to the existing drainage system in the area. Stagnation of water will also create temporary breeding sites to mosquitoes, which will have direct impact on public health.

Mitigation Measures:

Ensure that minimum water is lost during construction activities and no water remains stagnant at any place.

Impact on Ground Water Quality

Ground water contamination might take place during construction activities. In case of an accidental spill or maintenance works of vehicles, machineries and different components of the transmission line and grid station; chemical substances and oily wastes, which are often used in the construction vehicles and machineries, may leach into the soil and percolate to the ground water. In rainy seasons, the quality of soil is vulnerable since the porosity increase and leachate formation is escalated which may eventually bring an impact on the ground water resources.

Mitigation Measures:

Thus following measures will be required in order to prevent deterioration of water from the construction and construction related activities:

- All construction vehicles and equipment should be maintained in proper conditions to avoid any leakage
- Contractors shall use silt traps and erosion control measures where the construction is carried out in close proximity to the water bodies to avoid cement particles, rock, rubbles and waste water entering the surrounding water bodies
- Construction activities should be restricted to dry season
- All liquid raw materials and semi-liquid components must be kept at impermeable floorings and covered properly with appropriate labeling which shall avoid any leakage that might occur due to accidental spill or rain water runoff

Impact on Soil and Geology

Project activities including excavation, cut and fill operations, removal of trees and green cover vegetation etc., will enhance the soil erosion during the rainy season. Removal of trees and green cover vegetation will reduce infiltration rate of rainwater. The impact on soils will be due to the soil erosion at the tower construction site and along the access routes. Excavation activity and land clearance in the erosion prone areas have to be minimised while conducting site selection for towers. Leveling and stabilisation of tower construction sites will be done after completion of construction activity which will avoid surface runoff and damage to the topsoil.

Mitigation Measures:

The impact associated with landslides due to excessive erosion and other civil works can be avoided or minimised by following mitigation measures:

- Maximum effort should be taken to minimise removal of trees and green cover vegetation
- Minimise obstruction or destruction to natural drainage pattern of the surrounding area
- Proper treatment of clearing and filling areas against flow acceleration
- Turfing work should be taken prior to rainy season around the Grid station
- Contractors shall restrict cut and fill operation around sharp/deep slope areas

- Piling activities will be restricted to non-rainy season, unless piled materials will spread all over the area and contaminate close by water bodies

- Top soil (2-3 cm from the top of the soil), which is removed during construction from the cultivated lands must be stored separately for future utilisation of cultivated lands near tower leg locations

9.1.3 Impact on Ecological Resources

There is no national wildlife park, bird sanctuary, wetland in the route alignment of the proposed transmission line. The study area for route alignment has sparse plantations area. The ecological impacts are briefly described in the following sections

Effect on Flora and Fauna

An estimated number of 100 species of trees will be removed from the project area for RoW. None of the declared environmentally sensitive areas is located within the project-affected area since it is an urban settlement. Migratory paths of small mammals and reptiles may be affected due to construction activities. However, noise, vibration and emission from construction vehicles, equipment will occur during construction and pre-construction stages in temporary manner.

Mitigation Measures:

The impacts related to above activities are temporary and can be mitigated through following measures:

- Strict attention on worker force regarding disturbance to surrounding habitats, flora and fauna including hunting of animals and unnecessary cutting of plants

- Construction activities must begin with low intensity which may serve as an early warning system for the fauna to leave the area and go to safer areas

- Ensure habitat conservation by avoiding dumping of construction and sanitary waste like debris, bricks, gravel, litter, food leftovers in open areas and seek a place with the municipal office to extricate a place to release them

Impact on Terrestrial Ecology

There is no sensitive ecological area / protected forest area such as national wildlife park, or bird sanctuary crossing the proposed route alignment. The removal of herbaceous vegetation from the soil and loosening of the top soil generally causes

soil erosion. However, such impacts would be primarily confined to the project site during initial periods of the construction phase.

Mitigation Measures:

These would be minimised through adoption of mitigation measures like paving and surface treatment and water sprinkling.

Removal of Trees

Approximately 100 plant species will be removed from the RoW of the transmission line. The initial construction works along the alignment involving land clearance, cutting, filling, and leveling may cause loss of vegetation. This will be irreversible impact.

Mitigation Measures:

Care has been taken to avoid the thick plantations/vegetation as far as possible and tower locations are selected at plain paddy fields where the vegetation is thin. This will minimise the tree loss

Replanting of similar species with the ratio of 6 against 1 will be implemented

Effect on Local Road Network

Transformers, tower material, substation equipment, 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 specially at peak working hours. Excavation at roads will bring impact on traffic flow and also lead to traffic jams. Visibility is usually minimum during night time where there are less street lights, this will pose as a hazard for the local traffic travelling in night time.

Mitigation Measures:

- Contractor should properly maintain all road sections, which will be utilised for the construction related activities
- Construction vehicles will only be allowed to operate at times when there is minimum traffic load
- The site that has to be excavated will be barricaded by means of safety signs and symbols, such as using reflectors to improve indication of excavated sites in night time
- Diversion routes must be allocated for normal and construction vehicular traffic to maintain normal traffic flow
- Emergency routes must be kept clear and ensure that they are easily accessible.

9.1.4 Impact on Human Environment

Health and Safety

Health and safety is one of the major concerns during the construction and operational phase, almost all activities are having potential to cause harm, this includes; Manual lifting of construction material resulting in severe body pains as well as work related stress. The activities like manual lifting, lifter operation as well as operations of other construction vehicles and other activities associated with construction and operation phase will enhance the work related stress. The accidents may be caused due to electrocution, lightening, fires and explosions. The local people living nearby the site where excavation and erection has to be done are more susceptible to road side accidents and noise. Improper lifting of extra tools and storage, while erecting towers is a potential hazard. The accidents may be caused due to electrocution, lightening, fires and explosions.

Mitigation Measures:

- Organise awareness programmes relevant to personal safety of the workers and public in the area
- Installation of warning signs to particular locations such as transverse points of local road network by transmission lines, additional workers and general people specifically children will not be entertained for accessing the work place especially during erection
- Necessary training regarding safety aspects to the personnel working at the line will be provided by the contractor
- Ensure that hazards associated with manual lifting are controlled by proper lifting techniques, work rotation system will reduce the chances of being exposed to work related stress associated with construction activities
- All the workers involved in construction, operational and maintenance activities will be provided with proper PPEs including; safety belts, footwear, helmets, goggles, eye-shields, and clothes to workers depending on their nature of work
- During operational phase it will be ensured that the site having high electrical voltage will be barricaded by means of impermeable walls, this would reduce the probability of being exposed to severe electrical shocks
- Only trained operators will be allowed to access high voltage area

Socio-Economics

Social services like road, traffic, utility lines as well as routine market activities and general business may be affected, however the impact is only limited to the constructional phase. The positive impact during construction of transmission line will generate local employment, as number of unskilled labors (men/women) will be required at the time of construction activities, in summary there is no major impact on social environment, rather it is a developmental activity for the benefit of community.

Mitigation Measures:

The following measures will have to be taken:

- Advance notice to the public as well as major utility providers like, KWSB, SSGS, and PTCL about the time and the duration of the utility disruption, and restore the utilities immediately to overcome public inconvenience
- Alternate routes should be planned and will be kept clear to keep the traffic and general public services in flow and momentum

9.1.5 Electro Magnetic Fields (EMF)

EMFs are generated only at the operational phase when the current is passed from the lines. There are no significant impacts on the environment but there are some aspects of minor concerns. EMF causes changes in flight directions of migratory birds. Moreover, referenced from WHO research archives, it is found that EMF has some effects on human health, such as neuropsychological disorders or cardiovascular diseases, but the data is not sufficient to confirm the risks, however more research is being done in this regard.

Mitigation Measures:

There are no mitigations to consider, however the following steps can be taken to minimize any possible risks:

- Appropriate cabling with protective shields to suppress electron flux
- Health-based exposure limits must be mandated to protect public health
- A labeled zone shall be highlighted to indicate EMF in the area
- Telecommunication service providers must be alerted about the activities and the level of EMF in the corridors and around stations to minimize exceeding levels in other communication devices
- ICNIRP guidelines will be taken into consideration from commissioning to corridor ranges

9.1.6 Construction Waste

Construction waste management

Almost all the activities from excavation to erection will generate waste, however the waste will be of inert nature, in addition 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

Mitigation Measures:

Thus following measures are needed to protect and enhance the quality of environment during the construction stage:

- It is strongly recommended that waste should be reduced at source and by reusing the residual waste
- It will be ensured that waste will be segregated and collected, however recyclable waste will be sent to the recycling industry to generate revenue
- The waste which cannot be reused or recycled will be dumped to the proper and allocated containment facility

9.1.7 Other Environmental Impacts

Electric shock

This may lead to death or injury to the workers and public in the area.

Mitigation Measures:

This can be minimized or avoided by:

- Security fences around Grid station and looping areas
- Display of warning signs

Noise Generation

Nuisance to the community around the site can occur during the project implementation stage.

Mitigation Measures:

Provision of appropriate noise barriers will be essential in this regard

Workers and operators, working in close proximity to the grid station will be provided with adequate PPEs

General public will be restricted to stay away from those areas to a safe zone

Construction activities must be limited to day time and avoided at night

Oil Spillage

Contamination of water on land/nearby water bodies by the transformer oil can occur during operation due to leakage or accident.

Mitigation Measures:

Substation transformers will be located within secure and impervious areas with a storage capacity of 100% spare oil. Also proper drainage facilities will be constructed to avoid overflow or contamination with natural flow paths.

9.2 ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan (EMP) is a framework for the implementation and execution of mitigation measures and alternatives. It usually covers all phases of the project, right from pre-construction to the operation and maintenance phases of the transmission line project. The plan outlines mitigation measures that will be undertaken to ensure compliance with environmental laws and regulations and to eliminate adverse impacts. The objectives of an EMP, thus, are:

- To ensure that mitigation measures are implemented;
- To establish systems and procedures for this purpose;
- To monitor the effectiveness of mitigation measures;
- To ensure compliance with environmental laws and regulations;
- To take any necessary action when unforeseen impacts occur;

Exhibit 9.1: Environmental Impact Mitigation Plan

S/No	Aspect	Impacts
Construction phase		
1	**Land Disturbance**	
	Underground Transmission Line The potential problems that can arise from the installation of underground cable is the land disturbance. Overhead Transmission Line The potential problems that can arise from the installation of Overhead Transmission are the excavation for foundation construction activities.	There is possibility of land disturbance at project area. It is expected that there are small chances of change in land at project area. The only change in land use for overhead transmission towers installation will be due to earth works and excavation activities which may damage paved road and foot path
	Mitigation Measure	• Earth work should be technically designed according to geological feature of project site. • Obtain all the exact approved routes and locations which have been selected for tower foundation and shall issue "Notices of intent" to all concerned authorities at least four weeks prior to commencement of the work, such as the employer, Municipality, Telecommunication Department, Traffic police, etc. Also excavate the material with care to avoid damaging the existing services and electric cables.

S/No	Aspect	Impacts
		• Excavation operations shall be confined to a minimum working area consistent with efficient operations • Damage to road, footpaths, ditches, etc caused by the project activities should be repaired during completion of earth work on immediate bases. • The trenches (excavated area) shall be located exactly within the approved reservation and no more than two adjacent sections of excavated trench shall be open at a time. • If the transmission line is constructed within roadways, lane closures will be required and traffic control signs be installed. • Restore the paved and unpaved roads. Road need to be paved and backfilled rapidly and properly where cable transmission line is installed. At some sites cable diversion place is at the one side of roadway, lane closures will be required and traffic control signs be installed.
2	**Ambient air quality**	
	Underground & Overhead Transmission Line The potential problems that can arise from the dust emissions from the excavated material and Gaseous emissions from the construction equipments/vehicles.	Fugitive dust emission from construction activities like excavation, trench foundations, backfilling or road leveling. Gaseous emission from the construction and erection machinery.

S/No	Aspect	Impacts
	Mitigation Measure	• Use dust abatement. techniques on unpaved, un vegetated surfaces to minimize airborne dust and during earthmoving activities, prior to clearing, excavating, backfilling, compacting and grading. • Excavated material need to be disposed off away (which is not in use) from the construction area to prevent dust emission. • Sprinkling of water frequently in the area where earth filling and excavation is being carried out. • Post and enforce speed limits to reduce airborne fugitive dust caused by vehicular traffic. • Cover construction materials and stockpiled soils if they are a source of fugitive dust.
3	**Noise Pollution**	
	Underground & Overhead Transmission Line The potential problems that can arise from the noise from the construction equipments/vehicles. Noise produces by transportation and erection of material as well as during construction and installation of cable or overhead transmission line.	While construction noise can be unwelcome during night time in residential areas when people are trying to sleep, sometimes it may be too loud, be impulsive, and interrupt people's activities. Contain annoying pure tones; occur unexpectedly and at undesirable times of day In Overhead Transmission line noise in the form of buzzing or humming can often be heard around transformers or high voltage power lines producing corona.

S/No	Aspect	Impacts
	Mitigation Measure	• If the right-of-way is in a residential area, construction hours and the amount of equipment operating simultaneously may need to be limited to reduce noise levels. • Noise pollution due to construction works should be controlled by completing this task in a short period of time and also be confining it to day time hours. • Use of noise barriers or noise canceling acoustic devices should be considered as necessary.
4	**Ground Water contamination**	
	Underground & Overhead Transmission Line Sewage water line leakages/damage, grey water (used in construction) by project activities.	Sewage water leakages or sewage pipe damages during excavation work of trenches which can contaminate ground water quality
	Mitigation Measure	• In case of incidental leakages from sewage line, it is recommended that leakage line should be replaced to reduce the ground water contamination and leachate formation. Also use municipal tankers to collect water filled in excavated/trench area. • Before any earth work consult with cornered department

S/No	Aspect	Impacts
5	**Water Supply line**	
	Underground & Overhead Transmission Line Sewage water line leakages/damage, grey water (used in construction) by project activities.	Sewage water leakages or sewage pipe damages during foundation excavation and grey water may contaminate water supply from KWSB. Improper excavation may cause deteriorate water quality.
	Mitigation Measure	• Before any excavation work take inform the concerned Departments. • Excavation techniques should be efficient to avoid water utility damage Avoid any damage of sewage and other utilities which may cause water contamination
6	**Soil and land contamination**	
	Underground & Overhead Transmission Line Oil, lubricant chemical spillage, construction debris and damages of sewage line may cause land contamination.	Spillage of Oil, lubricant and spillage may cause soil contamination, slippery surface and Soil contaminated with over spill of sewage water by damaging sewage line. At some sites soil may contaminated by leakage of dielectric oil from oil filled cable
	Mitigation Measure	• The secondary containment facility should be available to avoid any spillage or fire hazard and material should be stock according to the inventory requirement.

S/No	Aspect	Impacts
		• Oil filled single core lines must have a spill control plan • Construction debris should be collected and dispose off properly • Avoid any damage to sewage and other utilities which may cause land and soil contamination • Vegetation and debris removed from the tower side shall not be disposed off with in 15m of the centre of the tower.
7	**Solid Waste**	
	Underground & Overhead Transmission Line lubricants and chemicals, construction debris and other waste installation material (metal, wooden, plastic & cable pieces or tower assembling defect or useless pieces), excavated (dredging) material and packaging material	Waste may cause land contamination, slippery site surface and harm natural environment, Excavated material with trench may slide on workers, choking of drains, etc.
	Mitigation Measure	• Use waste minimization techniques to reduce, reuse & recycle waste material. • Excavated materials should be segregated from other wastes to avoid contamination thereby ensuring acceptability at KACHRA KUNDI areas and avoiding the need for disposal at landfill. • Arrival of materials and products should be planned, according to designated place on site and to production requirement • Raw material inventory records should be maintain and avoid excessive stocks.

S/No	Aspect	Impacts
		• Stockpiles of sand, gravel, soil and other similar material should be managed properly so that they do not spread and cannot be washed in the adjacent drain/street • Integrated waste management plan should be prepared to minimize a waste generation • Hazardous waste should be stored in identified mark with air tight lid container. • Waste disposal should be according to nature of the waste with approved EPA certified contractor.
8	**Ecological Impact**	
	Underground & Overhead Transmission Line Ecological disturbance from project activities.	No major vegetation clearing will be carried out during the excavation, however, some areas have patches of thick vegetation but are of common nature. The plants species within the vicinity of the proposed site are of minor ecological importance.
	Mitigation Measure	• Construction techniques should be environment friendly to minimized local vegetation clearance of the project site. • Clearance of vegetation to be kept minimum. • In case of cutting each tree will be planted with the ratio of 1:6. • Grow invasive species of trees but height of trees in right of area should not be exceeding more than 10 to 15m.

S/No	Aspect	Impacts
		• Avoiding night construction whenever possible to minimize fauna disturbance. • The trenches should be properly covered to avoid any incidents of live stock and other animals. • Bird nest should not be disturbed from project activities. Wild life should not be harmed from project activities
9	**Health and Safety**	
	Underground & Overhead Transmission Line Incident may occur in case of improper management and work practices	Overhead transmission excavation way may interfere by numerous public utilities and service systems including water, sewer, electric, Sui gas and telecommunication lines which may cause incidents and fire hazard by electrocution, fractures gas and dust emissions may harm far community, Structure collapse, accidents during transportation, handling, installation of high transmission line (falling from high altitude) and land (excavated material sliding may cause serious injury).
	Mitigation Measure	• Establish and maintain a safety and health program for the worksite • Provide adequate systematic policies, procedures, practices • Health and safety Impact assessment should be prepared before starting project activity to prevent hazards to workers or nearby community. • Contractor should be aware of health hazards from project activities. • Contact with concerned department before starting excavation

S/No	Aspect	Impacts
		• Surface encumbrances that create hazards must be removed/supported • Employees must be trained to operate heavy equipment • Use barricades, hand or mechanical signals, stop logs to keep operators safe • Barricades should be used at excavated site • Appropriate PPE's should be providing to workers. • Safety sign boards should be placed for construction work and traffic safety purpose at project site. • Preliminary safety precautions should be taken before earth work • Workers are prohibited from entering excavation sites with accumulated water unless adequate protection has been provided • Keep surface materials at least 2 feet away from the edge of excavation sites. • Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers, among others. • Understand the minimum approach distances outlined for specific live line voltages • Ensure proper use of special safety equipment and procedures when working near or on exposed energized parts of an electrical system

S/No	Aspect	Impacts
		• Retrofitting existing transmission or distribution systems by installing elevated perches, insulating jumper loops, placing obstructive perch deterrents, changing the location of conductors, and / or using raptor hoods The worker is properly isolated and insulated from any other conductive object (live-line work).
10	**Traffic**	
	Underground & Overhead Transmission Line Vehicle movement disturbance on main road of project site	Construction proposed activities would temporarily affect transportation facilities within the project area. Construction is likely to cause temporary traffic delays.
	Mitigation Measure	• During construction stage, the contractors/K-Electric should organize detailed temporary traffic management schemes using updated traffic counts and on-site trial runs for the works. Use temporary traffic management schemes to be approved by the relevant authorities prior to its implementation. • Minimize disruptions to traffic patterns while maximizing the directness of detoured routes, thereby minimizing short-term impacts on emergency services (police, fire, rescue, and hospital access) and transit services throughout the project area. Wide and oversized loads would be restricted to barges, where possible.

S/No	Aspect	Impacts
11	**Social Impacts**	
	Underground & Overhead Transmission Line Blocking of Right of ways in streets, property damage (shops & houses) Incidents by opening the trenches or by the construction vehicular movements	Visual and auditory disturbance due to the presence of machinery, construction workers, transmission towers, and associated equipment
	Mitigation Measure	• People to be informed about the construction activities and surveys. • Impacted people to be given Preference for local employment as labor. • Compensation to be paid on time and based on the prevailing market rates. • Community should involve during all project activities. • Contractor should inform before any earth work to residents of project sites. • Incidents should be avoided and construction vehicles should be placed at designated areas to avoid any incident.
12	**Geo hazards –Earthquake**	
	Overhead Transmission Line Could cause towers to fall.	Limited potential for harm unless people were very close to tower or line.

S/No	Aspect	Impacts
	Mitigation Measure	• Maintenance of 30-meter buffer zone for houses. • Foundation/maintenance should be inspected periodically. • SCADA emergency system should be efficient in working condition
13	**Meteorological impacts**	
	Underground & Overhead Transmission Line Damages of towers, equipments and construction structure caused by heavy rainfall, flooding & wind storms.	Damage lines may fall on the residents which may cause any serious conditions. Excavated material in wind storms may harm the environment. Improper back filling may cause serious incidents in rainy season Rainfall may affect the construction work. Heavy rain have tendency to collapse foundation or trench structure.
	Mitigation Measure	• Safety measures should be efficient incase of any natural hazards. • Clear right of way area of 30 by 30m around a tower. • Prohibit the construction work during heavy rainfall, flooding and windstorms. • Tower holding capacity should be according to the wind speed of the project area

S/No	Aspect	Impacts
Post Development Phase		
1	**Meteorological impacts**	
	Underground & Overhead Transmission Line Damages of towers, equipments and construction structure caused by heavy rainfall, flooding & wind storms.	Damage lines may fall on the residents which may cause any serious conditions. Improper back filling may cause serious incidents in rainy season Heavy rain have tendency to collapse foundation or trench structure. These hazards may work as a medium between ground objects and energized conductors. This may cause any serious incident. Dust or water drops can affect a conductor's electrical surface gradient and its corona & induced current performance (Corona is the physical manifestation of energy loss, and can transform discharge energy into very small amounts of sound, radio noise, heat, and chemical reactions of the air components)
	Mitigation Measure	• Safety measures should be efficient incase of any natural hazards. • Clear right of way area of 30 by 30m around a tower. • Prohibit the maintenance work during heavy rainfall, flooding and windstorms. • Tower holding capacity should be according to the wind speed of the project area

S/No	Aspect	Impacts
2	**Electric and Magnetic field**	
	Overhead Transmission Line there is public and scientific concern over the potential health effects associated with exposure to EMF	There is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmissions lines and equipment. However, while the evidence of adverse health risks is weak, it is still sufficient to warrant limited concern
	Mitigation Measure	• Identification of potential exposure levels in the workplace, including surveys of exposure levels in new projects and the use of personal monitors during working activities. • Training of workers in the identification of occupational EMF levels and hazards. • Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, limiting access to properly trained workers. • Considering sitting new facilities so as to avoid or minimize exposure to the public. Installation of transmission lines or other high voltage equipment above or adjacent to residential properties or other locations intended for highly frequent human occupancy, (e.g. schools or offices), should be avoided. • EMF can be reduced by Shielding with specific metal alloys, Increasing height of transmission towers and modifications to size, spacing, and configuration of conductors

S/No	Aspect	Impacts
		• Since Pakistan does not have NEQS for EMF levels, it is suggested to follow international standards of WHO, IFC etc.
3	**Oil Spillage**	
	Transformer oil spillage can occur during operation due to leakage or accident.	Contamination of land and soil of the facility Leaching into water bodies located nearby grid station
	Mitigation Measure	• Substation transformers will be located within secure and impervious areas with a storage capacity of 100% spare oil. • Proper drainage facilities will be constructed to avoid overflow or contamination with natural flow paths.
4	**Health and Safety**	
	Underground & Overhead Transmission Line Incident may occur in case of improper management and work practices	• Overhead transmission may interfere by numerous public utilities, fire hazard by electrocution and Structure collapse maintenance of high transmission line.
	Mitigation Measure	• Establish and maintain a safety and health program for the worksite • Provide adequate systematic policies, procedures, practices • Health and safety Impact assessment should be prepared before starting project activity to prevent any incident hazards to workers or nearby community.

S/No	Aspect	Impacts
		• Contractor should be aware of health hazards from project activities. • Employees must be trained before working with heavy voltage lines during maintenance. • Use barricades, hand or mechanical signals, illuminants painted towers for traffic safety in night hours, stop logs to keep operators safe • Appropriate PPE's should be providing to workers during maintenance work. • Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers, among others. • Understand the minimum approach distances outlined for specific live line voltages • Ensure proper use of special safety equipment and procedures when working near or on exposed energized parts of an electrical system • Retrofitting existing transmission or distribution systems by installing elevated perches, insulating jumper loops, placing obstructive perch deterrents, changing the location of conductors, and / or using raptor hoods • The worker is properly isolated and insulated from any other conductive object (live-line work).

Exhibit 9.2: Environmental Management Plan

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Monitoring	Frequency of Monitoring	Responsibility
Construction Phase							
Air	Chronic health affects Reduced visibility on roads	Sprinkling of water Tuning of construction vehicles & machines Dust masks for laborers	Particulate Matter Smoke CO SOx	All project locations	Vehicular emissions Dust Ambient air quality	Monthly for emissions and daily for dust	Contractor K-Electric
Noise	Stress Hypertension Hearing loss Headache	Avoid working at night Lubrication of construction vehicles Ear plugs	Noise levels	Project location close to residential areas	Noise monitoring device	Monthly	Contractor K-Electric
Land and soil	Erosion due to excavation Formation of pits due to improper backfilling	Proper backfilling and stone pitching around the excavated site if required	Surface topography	All project locations	Visual assessment Photographic evidences	From beginning till completion of project	Contractor K-Electric

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Monitoring	Frequency of Monitoring	Responsibility
Vegetation	Cutting of trees	Avoid unnecessary cutting of trees In case of cutting of trees, one plant should be replaced by 6 plants	No of trees cleared or cut Disposal of chopped trees Ensure re-plantation by 1:6 ratio of same species	All project locations	Visual assessment Photographic evidences	From beginning till operational phase	K-Electric
Water	Wastage and misuse of water	Avoid un necessary use of water Prevent leakages	Water supply and use	All project locations	Visual assessment Record log of water usage	From beginning till the end of project	Contractor
Construction debris	Formation of heaps Remaining concrete material results in hardening of ground surface	Avoid wastage of concrete material Reuse remaining construction material	Quantity & quality of construction material	All trenching areas	Visual assessment Photographic evidence	Weekly	Contractor
Social Environment	Disturbance to routine market and local business activities Conflicts between laborers and local communities	Specify time scale for construction activities Discussion with local people regarding conflicts if any	Maintenance of complaint register	All project locations	Review of complaint register Local consultations	Monthly	K-Electric

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Monitoring	Frequency of Monitoring	Responsibility
Roads and networks	Traffic congestion Night time visibility of drivers is reduced	Diversion routes must be allocated to maintain traffic flow Signs and reflectors must be boarded for driver's visibility	Signs and detours are being followed	Intersections of diversions	Observations Local residents consultations and log book	Weekly	Contractor
Health and safety	Lack of awareness to general public about safety may lead to accidents Incompetent and untrained workers might cause harm to themselves and others Construction works may include many risks and hazards that may lead to injuries or even death	Safety symbols and instructions will be boarded at work sites Trained personnel will be appointed for the specific work Appropriate PPEs must be used for technical work	Safety precautions Use of PPEs	On all project sites	Tool box talk Visual assessments Record of PPEs	Daily	Contractor K-Electric

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Monitoring	Frequency of Monitoring	Responsibility
Operational Phase							
Meteorological conditions	Heavy rainfalls may break damaged overhead transmission line which may lead to electrical shock hazards	Ensure good quality of all products used in transmission lines In case of breakage, ensure emergency shutdown of transmission line Immediately repair the damage and ensure Log-Off-Tag-Off (LOTO)	Quality assurance Grid stations loads	All project components Grids	As per technical knowledge	Regularly	K-Electric
Electric Magnetic Field (EMF)	Human health impacts such as, neuropsychological disorders or cardiovascular diseases	Increase depth in case of underground cables to suppress the EMF levels Appropriate cabling with protective shields to suppress electron flux	EMF Intensity	Residency units near the corridor and grids	Electromagnetic meter	Biannually	K-Electric

Aspect	Impact	Mitigation	Monitoring Parameter	Location	Monitoring	Frequency of Monitoring	Responsibility
Transformer oil spillage	Contamination of soil and water bodies	Regular checking of storage tanks and machines	Soil sampling for oil and grease	Grid station	Visual assessment Soil analysis Equipment maintance record	Bi annually	K-Electric

*Chapter:*10 CONCLUSION

The EIA of the proposed transmission network project has achieved the following goals:

- Identification of national environmental regulatory requirements that apply to the proposed project activities;
- Identification of the environmental features of the project area including the physical ,biological and social disturbance and likely impact of the project on the environment;
- Recommendation of appropriate mitigation measures that K-Electric will incorporate and ensure as per this EIA into the project to minimize the adverse environmental impacts.

Baseline physical, biological and socio-economic and cultural data and information was collected from a variety of primary and secondary sources, including field surveys, review of relevant literature and online publications. The collected data was used to organize profiles of the physical, biological and socio-economic environments, likely to be affected by the project. Communities were consulted as per public consultation processes including women, men and institutional stakeholders. The aim of public consultation was to assure the quality, comprehensiveness and effectiveness of the EIA; as well as to ensure that the views and opinions of the local people were adequately taken into account in the decision making process.

Further an Environmental Impact Assessment Report was made to highlight the potential impacts of the described project on the area's physical, biological and socio-economic, gender and cultural environments.

It is concluded that the potential impacts of the proposed K-Electric Project (Transmission line and Grid addition) will be insignificant on most of the environmental receptors, provided that the EMP and its mitigation measures proposed in this report are implemented in true spirit. However, some area will need special care with regards to the disturbance to the community of the area. K-Electric must be constituted to ensure minimum impacts.

After assessing the proposed project activities and investigating the project area, the environmental consultants, GEMS have concluded that:

"If the activities are undertaken as proposed and described in this report, and the recommended mitigation measures and environmental management plan is adopted, the project will not result in any long-term or significant impacts on the local community or the physical and biological environment of the project area rather it will prove to benefit in many ways and bring development in electrical supply of Karachi."

ANNEXURE - 1

Installation of Panels

CONTENTS

1.0 PURPOSE

This procedure outlines the requirement for safe and efficient installation of panels pertaining to SCADA/Telecom equipment.

2.0 SCOPE

This procedure applies to the supervisory engineer(s) and staff involved in the installation of SCADA/Telecom Panels and sub-system whether K-Electric, contractor or third party employee.

3.0 DEFINITION

N/A

4.0 RESPONSIBILITIES

The concerned engineers and associated staff are responsible for the following;

- All installations are performed in accordance to the HSEQ and EIA guidelines for indoor works.
- All installations are performed in accordance to the best practices underlined herein.

PID engineer(s) shall be responsible to ensure compliance to the above mentioned guidelines.

5.0 PROCEDURE

5.1 Necessary entry permit shall be available with the contractor. Permission to start works shall be arranged by the contractor well in advance.

5.2 PID engineer shall perform a formal headcount before the start of works as per the company's HSEQ guideline. Emergency Exit Plan must be discussed (daily before start of works).

5.3 PID engineer shall ensure that all the engineers and associated staff present at the site shall be equipped with healthy PPE/SPE (e.g. safety shoes, safety helmets with chin straps, safety harness for working at height, safety goggles for drilling works, cotton gloves, etc).

5.4 Before the start of installation, all tools and equipment to be used shall be inspected by the PID engineer for any physical damage. In case of such an item, the start of works shall be delayed until replacements are arranged by the contractor.

5.5 A Tool Box Talk shall be performed by the PID engineer, highlighting the probable hazards that can occur during the course of work and their mitigation plan.

5.6 Approved room layout and other supporting documents shall be present with the contractor.

5.7 Wall mounted panel such as MDF, ODF, etc must be installed so that the top is at a height of 5 ft from the ground level. PID engineer shall ensure the panel orientation is at 90 degree vertical.

5.8 The contractor shall arrange a push cart type hydraulic/pneumatic trolley for the movement of panel to the marked location. Any other means for panel movement which violate the HSEQ guidelines shall be avoided.

5.9 PID engineer shall ensure that the Rowel bolts are firmly fixed in the floor. After the installation and tightening of Rowel bolts, PID engineer must check the panels for firmness.

5.10 The contractor shall ensure that the cable for grounding of the panel is taken from the main station grounding busbar. Inter-panel looping should be avoided due to future shifting/dismantling of panels.

5.11 PID engineer shall verify that the diameter of the earthing cable being installed is as per the contractual obligation.

5.12 PID engineer shall ensure that all packaging material, debris and other wastages are removed from site after the completion of works.

6.0 RELATED DOCUMENTS

- Tool Box Talk (TBT).

S. No.		Name	Designation	Date	Signature
1	Prepared By	Mohib Ur Rehman	Asst. Manager	20/03/2014	
2	Checked By	Faraz Ali	Dy. General Manager	20.3.2014	
3	Witnessed by GM	Omeal Ahmed	General Manager	28/3/14	
4	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	28/3/14	
5	Head of Department	Bilal Ahmed Mirza	Deputy Director	26/3/14	
6	HSEQ / CHEQ Approved	Abdul Faheem	Deputy General Manager		
7	DCTO	Muhammad Adil	DCTO	1/4/14	

MUHAMMAD ADIL
Dy. Chief Transmission Officer
Transmission Network
K-ELECTRIC LIMITED

783
28 MAR 2014

ANNEXURE - 2

SOP for the Installation of Power Transformers

	SOP for the Installation of POWER TRANSFORMERS			
	Title			
QMS-SOP-024	IR	April 30, 2014	Page 1 of 4	PID
Document No.	Revision	Date of Issuance	Page	Issuing Department

1. CONTENTS

	SOP for the Installation of POWER TRANSFORMERS			
	Title			
QMS-SOP-024	IR	April 30, 2014	Page 2 of 4	PID
Document No.	Revision	Date of Issuance	Page	Issuing Department

1.0 PURPOSE

1.1 To supervise installation of Power Transformer.
1.2 To ensure safety at site.

2.0 SCOPE

2.1 This procedure applies to PID supervisory Staff/Engineers on Site.

3.0 DEFINITION

3.1 Power transformer is an equipment to step up or step down voltage levels.

4.0 RESPONSIBILITIES

4.1 The concerned engineers and associated staff are responsible for the following;
4.1.1 All installation processes are performed in accordance to the HSEQ and EIA guidelines.
4.1.2 All installations are performed in accordance to the best practices and as per manufacturer guide lines.
4.2 PID engineer(s) shall be responsible to ensure compliance to the above mentioned guidelines.

5.0 PROCEDURE

5.1 Necessary entry permit (from K-Electric Security Department) shall be available with the contractor. Permission to start works shall be arranged by the contractor well in advance.

5.2 PID engineer shall perform a formal headcount before the start of works as per the company's HSEQ guideline.

5.3 Emergency Exit Plan must be discussed (daily before start of works).

5.4 PID engineer shall ensure that all the engineers and associated staff present at the site shall be equipped with healthy PPEs (e.g. safety shoes, safety helmets with chin strips, safety mask, safety goggles, cotton gloves, etc).

5.5 Before the start of installation, all tools and equipment to be used shall be inspected by the PID engineer for any physical damage. In case of such an item, the start of works shall be delayed until a replacement is arranged by the contractor.

5.6 A Tool box Talk (TBT) shall be performed by the PID engineer as per the HSEQ requirements, highlighting the probable hazards that can occur during the course of work and their mitigation plan.

5.7 Approved drawings, wiring diagrams, layouts and other supporting documentations shall be available with the contractor.

5.8 When a transformer is reached at site, a thorough external inspection should be made. Inspect carefully for any apparent damage if available during transit. Shock recorder should be checked carefully and if there is evidence of damage or rough handling in transit, an inspector representing the carrier and the manufacturer should be notified.

5.9 If the transformer shall be unloaded by means of a crane, lashing calculations must be submitted for this activity before undertaking the work. The crane must have valid calibration certificate and operator should have a valid crane operating license.

5.10 At the installation site, all reasonable precautions should be exercised to avoid exposure of the staff to hazards. Prior to starting installation of the transformer, a detailed procedure for handling, inspecting, assembling, vacuum treating, oil filling, and testing of the transformer should be developed.

5.11 Adequate fire extinguishing means must be provided at site before start of work.

5.12 Excessive and prolonged skin contact with transformer oil (mineral oil) should be avoided.

6 RELATED DOCUMENTS

6.1 Tool Box Talk (TBT)

	SOP for the Installation of POWER TRANSFORMERS			
	Title			
QMS-SOP-024	IR	April 30, 2014	Page 4 of 4	PID
Document No.	Revision	Date of Issuance	Page	Issuing Department

S. No.		Name	Designation	Date	Signature
1	Prepared By	Hunain	Assistant Manager	30/4/14	
2	Checked By	Bilal Ahmed	Deputy General Manager	30.04.14	
3	Witnessed By	Wiqar Ahmed	General Manager	30.4.14	
4	Agreed By	Khalid Iqbal	Advisor E&P	30/4/14.	
5	Head of Department	Bilal Ahmed Mirza	Deputy Director	30.4.14	
6	HSEQ / CHEQ Approved	Abdul Faheem	Deputy General Manager	5/4/14	
7	DCTO	Muhammad Adil	DCTO		15/5/14

MUHAMMAD ADIL
Dy Chief Transmission Officer
Transmission Network
K-ELECTRIC LIMITED

1088
06 MAY 2014

ANNEXURE - 3

Stringing of OPGW

	Stringing of OPGW			
	Title			
QMS-SOP-001	IR	8th January, 2014	Page 1 of 5	Transmission Section (PID)
Document No.	Revision	Date of Issuance	Page	Issuing Section / Department

CONTENTS

1.0 PURPOSE:

This procedure outlines the requirement for safe and efficient stringing of OPGW.

2.0 SCOPE:

This procedure applies to the supervisory engineer(s) and staff involved in the stringing of OPGW whether K-Electric, contractor or third party employee.

3.0 DEFINITION:

OPGW: Optical Power Ground Wire is an Earthing wire having fiber optic cable inside it. It is used in overhead transmission line for protection against lightning and for communication purpose.

4.0 RESPONSIBILITY:

The concerned engineers and associated staff are responsible for the following;

- All installation processes are performed in accordance to the HSEQ and EIA guidelines for outdoor works and working at height.
- All installations are performed in accordance to the best practices underlined herein.

Following responsibility matrix shows the responsibilities:

S. No.	Designation	Responsibility Percentage
1	Site Supervisor (AM/AE)	80 %
2	Project Engineer (DM/Manager)	100%

5.0 PROCEDURES

(5.1) Necessary entry permit shall be available with the contractor. Permission to start works shall be arranged by the contractor well in advance.

(5.2) Before starting the work, make sure that the tower and phase conductors are ready and no work is in progress on any of these.

(5.3) PID engineer shall perform a formal headcount before the start of works as per the company's HSEQ guideline.

(5.4) PID engineer shall ensure that all the engineers and associated staff present at the site shall be equipped with healthy PPEs (e.g. safety shoes, safety helmets with chin straps, safety harness for working at height, safety goggles for drilling works, cotton gloves, etc).

(5.5) Make sure that the area is cordon off using warning tapes and safety signs.

(5.6) Make sure that OPGW Drum of calculated length, its hardware and installing machines are available on site.

(5.7) Before the start of installation, all tools and equipments to be used shall be inspected by the PID engineer for any physical damage. In case of such an item, the start of works shall be delayed until a replacement is arranged by the contractor.

(5.8) A Tool box Talk shall be performed by the PID engineer, highlighting the probable hazards that can occur during the course of work and their mitigation plan.

(5.9) Approved drawings, wiring diagrams, layouts and other supporting documentations shall be present with the contractor.

(5.10) If required, take LDC approval for complete isolation of the circuit.

(5.11) Place the rollers and pulleys at their suitable position.

(5.12) The tensioner and the puller should be placed at a distance from the first tower pulley which is equivalent to at least twice the height of the pulley at the working tower/pole.

(5.13) The stringing of OPGW is done through pilot wire or rope.

(5.14) Make sure that during stringing of the OPGW, it should not strike nor gaze any objects other than the pulley.

(5.15) Make sure that the metal part of the pulleys do not make contact with the OPGW.

(5.16) Make sure that pulling tension shall be lower than 1.5 times the weight (kg) of 1 km OPGW cable length.

(5.17) Make sure that the stringing speed should be lower than 40 meters per minute.

(5.18) Make sure that the bending radius should be greater than 400mm during stringing/installation.

(5.19) After stringing of OPGW, place suspension clamps and tension clamps at the particular location on each tower/pole.

(5.20) Place shield wire at both ends of angle tower/pole and on the middle of straight tower/pole.

(5.21) Vibration dampers of OPGW should be placed on the shield wire.

(5.22) Jointing of OPGW is done through proper splicing equipment and place them in a joint box.

(5.23) After jointing, supervise the testing of OPGW through OTDR.

6.0 RELATED DOCUMENTS

- Tool Box Talk (TBT).

	Stringing of OPGW			
	Title			
QMS-SOP-000	IR	8th January, 2014	Page 5 of 5	Transmission Section (PID)
Document No.	Revision	Date of Issuance	Page	Issuing Section / Department

S. No.		Name	Designation	Date	Sign
1	Prepared By	Abid Khokhar	Manager	13.03.2014	
2	Checked By	Aurangzeb Zainulabdin	Deputy General Manager	13.03.14	
3	Witnessed by GM	Omeal Ahmed	General Manager	13/3/14	
4	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	14/3/14	
5	Head of Department	Bilal Ahmed Mirza	Deputy Director	14/3/14	
6	HSEQ / CHEQ Approved	Abdul Faheem	Deputy General Manager		
7	DCTO	Muhammad Adil	DCTO	20/3/14	

OFFICE OF THE TRANSMISSION & GRID NETWORK RESOURCES
743
20 MAR 2014

GENERAL MANAGER PROJECT IMPLEMENTATION K-ELECTRIC LIMITED
Diary No. 217
21 MAR 2014

ANNEXURE - 4

Stringing of Conductor

	Stringing of Conductor			
	Title			
QMS-SOP-009	IR	25th March, 2014	Page 1 of 5	Transmission Section (PID)
Document No.	Revision	Date of Issuance	Page	Issuing Section / Department

CONTENTS

1.0 PURPOSE:

This procedure outlines the requirement for safe and efficient stringing of conductor.

2.0 SCOPE:

This procedure applies to the supervisory engineer(s) and staff involved in the stringing of conductor whether K-Electric, contractor or third party employee.

3.0 RESPONSIBILITY:

The concerned engineers and associated staff are responsible for the following;

- All installation processes are performed in accordance to the HSEQ and EIA guidelines for outdoor works and working at height.
- All installations are performed in accordance to the best practices underlined herein.

Following responsibility matrix shows the responsibilities:

S. No.	Designation	Responsibility Percentage
1	Site Supervisor	100 %

4.0 PROCEDURES

(4.1) Necessary entry permit shall be available with the contractor. Permission to start works shall be arranged by the contractor well in advance.

(4.2) Before starting conductor stringing, make sure that the tower and insulator strings are ready and no work is in progress on any of these.

(4.3) PID engineer shall perform a formal headcount before the start of works as per the company's HSEQ guideline.

(4.4) PID engineer shall ensure that all the engineers and associated staff present at the site shall be equipped with healthy PPEs (e.g. safety shoes, safety helmets with chin straps, safety harness for working at height, safety goggles for drilling works, cotton gloves, etc).

(4.5) Make sure that the area is cordon off using warning tapes and safety signs.

(4.6) Make sure that Conductor reels of calculated length, its hardware and installation machineries are available on site.

(4.7) Before the start of installation, all tools, bolts and nuts should be in bags and equipments to be used shall be inspected by the PID engineer for any physical damage and check the license and vehicle fitness certificate etc with valid dates. In case of such an item, the start of works shall be delayed until a replacement is arranged by the contractor.

(4.8) A Tool box Talk shall be performed by the PID engineer, highlighting the probable hazards that can occur during the course of work and their mitigation plan.

(4.9) Approved drawings, layouts, sag calculation charts and other supporting documentations shall be present with the contractor's Engineer/site supervisor at site.

(4.10) If stringing work is to be performed on the same tower/poles where other circuit is alive then take shutdown from LDC. Inform LDC daily at the start and end of the activity till completion of stringing works.

(4.11) If required, take LDC approval for complete isolation of the circuit daily until conductor pulling and sagging is completed.

(4.12) For entering in the grid premises PID Engineer will inform to Grid personal present there about it and add entry for both start and end of the activity.

(4.13) The tensioner and the puller should be placed at a distance from the first tower pulley which is equivalent to at least 2-3 times height of the nearest tower to avoid possible overcoming of the tower.

(4.14) The stringing of conductor is done through steel wire. The puller and tensioner are positioned towards the direction of phase to be pulled and both are coneected to anchors by means of chain block or turn buckle.

(4.15) Make sure that during stringing of the conductor, it should not strike nor gaze any objects other than the pulley.

(4.16) Make sure that the metal part of the pulleys do not make contact with the conductor.

(4.17) During stringing connect the temporary earth wire on all conductors to reduce the induction hazard.

(4.18) A low tension is maintained between conductor reel stands and tensioner through hand brake.

(4.19) The joints are pressed with compression tool. After completion of all joints, the elongation of joints is compared the recommended values given by the manufacturer. A complete record of joint is kept. After compression joint are straightened and surface smoothened with file or emery paper.

(4.20) When all phases of conductor have been pulled and permanent compression joints are pressed between pulls and back anchors, preparations are made for the commencement of the sagging operation.

(4.21) Proper sag targets are set according to sag calculation and proper record is kept.

(4.22) After sag has been completed, the conductors are placed into suspension clamps. Suitable capacity chain block is attached with cross arm for lifting of conductors. The roller is then detached from the insulator string.

(4.23) The torque of the bolts is checked by means of a torque wrench.

(4.24) The conductor is cut according to the string length and dead end body is pressed using compression tool. After completion of all dead end work, the unclipped towers are clipped and rollers removed as per procedure.

(4.25) When dead end process on both sides of a tension tower is completed, the jumpers are installed on all conductor phases.

(4.26) Vibration/spacer dampers should be placed on the conductor.

(4.27) After stringing anchors and temporary guard structures are removed and site is cleared and restored. All temporary earths are removed. Site is then patrolled and each tower is again checked with user representative/engineer and any discrepancy found is rectified on the spot.

5.0 RELATED DOCUMENTS

- Tool Box Talk (TBT).

KE	Stringing of Conductor			
	Title			
QMS-SOP-009	IR	25th March, 2014	Page 5 of 5	Transmission Section (PID)
Document No.	Revision	Date of Issuance	Page	Issuing Section / Department

S. No.		Name	Designation	Date	Signature
1	Prepared By	Abid Khokhar	Manager	26.03.2014	
2	Checked By	Aurangzeb Zain	Deputy General Manager	26/3/14	
3	Witnessed by GM	Omeal Ahmed	General Manager	26/3/14	
4	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	25/3/14	
5	Head of Department	Bilal Ahmed Mirza	Deputy Director	27/3/14	
6	HSEQ / CHEQ Approved	Abdul Faheem	Deputy General Manager		
7	DCTO	Muhammad Adil	DCTO	14/4/14	

ANNEXURE - 5

Right of Way

	Right of Way			
	Title			
QMS-SOP-010	IR	26th March, 2014	Page 1 of 3	Transmission Section (PID)
Document No.	Revision	Date of Issuance	Page	Issuing Section / Department

CONTENTS

1.0 PURPOSE:

This procedure outlines the requirement for safe and efficient acquiring of ROW.

2.0 SCOPE:

This procedure applies to PID or contractor's staff involved in the process of acquiring of ROW.

3.0 RESPONSIBILITY:

The concerned engineers and associated staff are responsible for acquiring ROW.

4.0 PROCEDURES

(4.1) Concerned agencies shall be identified for approval of route profile of proposed transmission line.

(4.2) In this connection route profile and drawings are submitted to civic agencies along with covering letter from K-Electric (PID) or contractor.

(4.3) Joint route survey is conducted with representative of concerned agencies of the proposed location. During survey PPEs (i.e. safety helmet and safety shoes) are used to avoid any accident.

(4.4) After joint survey the route is marked where work is to be conducted.

(4.5) After marking the concerned agencies formulate an estimate involving financial charges to K-Electric (PID) or contractor in form of challans.

(4.6) After payment of challans from PID or contractor NOC is issued for the marked route by the civic agencies accordingly as required for commencement of work.

(4.7) After NOC is issued by civic agencies K-Electric (PID) or contractor commence works at proposed location accordingly.

(4.7) Complete coordination with concerned agencies regarding ROW issues with beginning till completion of all works will be required.

(4.8) For entering in the grid premises PID Engineer will inform to Grid personal present there about it and add entry for both start and end of the activity.

5.0 RELATED DOCUMENTS

N/A

S. No.		Name	Designation	Date	Signature
1	Prepared By	Abid Khokhar	Manager	26.03.2014	
2	Checked By	Aurangzeb Zain	Deputy General Manager	26/03/14	
3	Witnessed by GM	Omeal Ahmed	General Manager	26/3/14	
4	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	28/3/14	
5	Head of Department	Bilal Ahmed Mirza	Deputy Director	26/3/14	
6	HSEQ / CHEQ Approved	Abdul Faheem	Deputy General Manager		
7	DCTO	Muhammad Adil	DCTO		9/4/14

TRANSMISSION & GRID OF TRUNK RESCLTD
Diary No. 790
28 MAR 2014

ANNEXURE - 6

Erection of Poles

	Erection of Poles			
	Title			
QMS-SOP-018	IR	17th April, 2014	Page 1 of 4	Transmission Section (PID)
Document No.	Revision	Date of Issuance	Page	Issuing Section / Department

CONTENTS

KE	Erection of Poles Title			
QMS-SOP-018	IR	17th April, 2014	Page 2 of 4	Transmission Section (PID)
Document No.	Revision	Date of Issuance	Page	Issuing Section / Department

1.0 PURPOSE:

This procedure outlines the requirement for safe and efficient method for erection of Poles.

2.0 SCOPE:

This procedure applies to the supervisory engineer(s) and staff involved in erection of Poles whether K-Electric, contractor or third party employee.

3.0 RESPONSIBILITY:

The concerned engineers and associated staff are responsible for the following;

- All installation processes are performed in accordance to the HSEQ and EIA guidelines for outdoor works and working at height.
- All installations are performed in accordance to the best practices underlined herein.

Following responsibility matrix shows the responsibilities:

S. No.	Designation	Responsibility Percentage
1	Site Supervisor	100 %

4.0 PROCEDURES

(4.1) Necessary entry permit shall be available with the contractor. Permission to start works shall be arranged by the contractor well in advance.

(4.2) Before starting erection, make sure that the foundation of poles are ready and no work is in progress.

(4.3) PID engineer shall perform a formal headcount before the start of works as per the company's HSEQ guideline.

(4.4) PID engineer shall ensure that all the engineers and associated staff present at the site shall be equipped with healthy PPEs (e.g. safety shoes, safety helmets with chin straps, safety harness for working at height, safety goggles for drilling works, cotton gloves, etc).

(4.5) Make sure that the area is cordon off using warning tapes and safety signs.

(4.6) Make sure that all parts of pole and installation machineries (Crane, lifter etc) are available on site.

(4.7) Before the start of erection, all tools, bolts and nuts should be in bags and equipments to be used shall be inspected by the PID engineer for any physical damage and check the

license and vehicle fitness certificate etc with valid dates. In case of such an item, the start of works shall be delayed until a replacement is arranged by the contractor.

(4.8) A Tool box Talk shall be performed by the PID engineer, highlighting the probable hazards that can occur during the course of work and their mitigation plan.

(4.9) Approved erection drawings and other supporting documentations shall be present with the contractor's Engineer/site supervisor at site.

(4.10) If erection work is to be performed parallel or under the live circuit then take shutdown from LDC

(4.11) If required, take LDC approval for complete isolation of the circuit daily until erection work is completed.

(4.12) For entering in the grid premises PID Engineer will inform to Grid personal present there about it and add entry for both start and end of the activity.

(4.13) At site, the pole material is stacked on the wooden logs/battens before erection work.

(4.14) During assembly, by the help of chain pulley blocks (10 tons capacity), pole sections are slide as per approved drawings. During the assembly work all the bolts used to fix by cross arms section are tightened upto specified torque values.

(4.15) Assembled Pole are lifted by crane and mounted on the foundation bolts. In order to control the movement of pole, 3-4 supporting ropes are tied to manually control the movement. After placing at the desired location the nuts are tightened.

(4.16) The earth wire is connected to the poles after erection is completed.

(4.17) After erection work warning tapes and signs are removed and site is cleared and restored.

5.0 RELATED DOCUMENTS

- Tool Box Talk (TBT).

	Erection of Poles		
	Title		
QMS-SOP-018	IR	17th April, 2014	Page 4 of 4	Transmission Section (PID)
Document No.	Revision	Date of Issuance	Page	Issuing Section / Department

S. No.		Name	Designation	Date	Signature
1	Prepared By	Abid Khokhar	Manager	23/4/2014	
2	Checked By	Aurangzeb Zain	Deputy General Manager	29/4/14	
3	Witnessed by GM	Omeal Ahmed	General Manager	30/4/14	
4	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	30/4/14	
5	Head of Department	Bilal Ahmed Mirza	Deputy Director	30/4	
6	HSEQ / CHEQ Approved	Abdul Faheem	Deputy General Manager		
7	DCTO	Muhammad Adil	DCTO		15/5/14 MUHAMMAD ADIL Dy. Chief Transmission Officer Transmission Network K-ELECTRIC LIMITED

ANNEXURE - 7

To Supervise Casting of foundations

	To Supervise Casting of foundations			
	Title			
QMS-SOP-015	IR	22nd April, 2014	Page 1 of 5	PID Dept.
Document No.	Revision	Date of Issuance	Page	Issuing Department

CONTENTS

KE	To Supervise Casting of foundations			
	Title			
QMS-SOP-015	IR	22nd April, 2014	Page 2 of 5	PID Dept.
Document No.	Revision	Date of Issuance	Page	Issuing Department

1.0 **PURPOSE:**

(1.1) To supervise casting of foundations at construction site.

(1.2) To make sure safety at site.

2.0 **SCOPE:**

This procedure applies to the supervisory Engineer(s) and staff involved in the casting of Basement activity whether K-Electric, contractor or third party employee.

3.0 **DEFINITION:**

Concreting: It is a process in which concrete is poured at required place by manual or mechanical means.

Foundation: It is part of a structural system that supports and anchors the superstructure of a building and transmits its load directly to the earth.

4.0 **RESPONSIBILITY:**

The concerned engineers and associated staff are responsible for the following;

- Whole activity must be performed in accordance to the HSEQ and EIA guidelines for outdoor works and working at height.
- Whole activity must be performed in accordance to the best engineering practices underlined herein.

Following responsibility matrix shows the responsibilities:

S. No.	Designation	Responsibility Percentage
1	Site In charge	100 %

	To Supervise Casting of foundations			
	Title			
QMS-SOP-015	IR	22nd April, 2014	Page 3 of 5	PID Dept.
Document No.	Revision	Date of Issuance	Page	Issuing Department

5.0 **PROCEDURE:**

5.1 Contractor must get Security permission first from K-Electric office prior to start work.

5.2 Inform Switch Board Officer (SBO) (or equivalent position) about arrival and log in the register (only applicable if working inside a live grid station).

5.3 Fill out Tool Box Talk (TBT) form as per the guidelines of HSEQ and conduct TBT.

5.4 Make sure that following Personal Protective Equipment (PPEs) are available on site and are used where required;

a) Safety Uniform/ Full body Harness

b) Hard Hats

c) Safety shoes

d) Safety Glasses

e) Safety gloves (cotton & rubber)

f) Gum boots

5.5 Proper access should be maintained during concreting of foundations, shoring must be adequate to avoid any collapse of surrounding soil during concreting.

5.6 Concrete should be mixed either in a concrete mixer or in a batching/mixing plant, as per standards and specifications.

5.7 Hand mix concrete should not be permitted for any structural member.

5.8 Ingredients of concrete being mixed at site should be proportioned carefully as per design and specifications.

5.9 Temperature of mixed concrete should not exceed 32^{0} C.

5.10 Slump value should be in accordance to the mix design depending upon structural member and desired workability of concrete.

5.11 Specimens should be made at site for each concreting activity for testing at 28 days. Additional cubes/cylinders may be made to determine strength at 7/14/21 days or as required by Engineer In charge.

5.12 Equipment for transporting and placing of concrete should have means for discharging concrete without segregation i.e. chutes, hose pipe, tremie pipe, etc. Concrete pump must be thoroughly examined before use. Concrete should be pumped slowly. In case of Transit Mixer, location of TM should be dressed and leveled.

5.13 Concrete should not be freely dropped from height exceeding 2 m.

5.14 Freshly poured concrete must be compacted by means of mechanical vibrator in order to remove air bubbles from concrete mass. Try to avoid use of electrical vibrator.

5.15 Over compaction should be avoided as it may result in segregation of ingredients and bleeding of cement slurry.

5.16 Concrete must be properly finished and leveled as per specified levels/slopes mentioned in drawings.

5.17 Concrete should be kept constantly wet by ponding or covering with a layer of hessian cloth or similar absorbent material for a minimum period of 07 days after concreting. Curing compounds can also be used to achieve this purpose.

5.18 Irrelevant people must be kept away from the concreting area. Only skilled masons should work in that area during concrete.

5.19 Ensure that formwork scaffolding complies with best practices for scaffolding. Formwork should be regularly inspected before, during and after concreting.

5.20 Ensure that eye protection is worn in situations where concrete splashes may occur. Also ensure that gloves and other protective clothing are worn.

5.21 Avoid getting feet caught in reinforcement during concreting.

5.22 Do not smoke when refueling vibrators.

5.23 K-Electric staff, contractors and visitors must know the emergency exit route location and trained in evacuations drills before start of work.

5.24 In case of incident or accident call Ambulance with medical facilities and medical staff if possible.

5.25 Only Site in charge will be authorized to give instructions for any change of status.

5.26 Use PPEs and SPEs as per job requirement.

6.0 RELATED DOCUMENTS:

Tool Box Talk Form (TBT Form)

S. No.		Name	Designation	Date	Sign
1	Prepared By	Kamran M. Khalil	Manager	25/04/14	
2	Checked By	Ghayoor Ahmed Qureshi	Deputy General Manager	25/04/14	
3	Witnessed by	Omeal Ahmed	General Manager	25/4/14	
4	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	25/4/14	
5	Head of Department	Bilal Ahmed Mirza	Deputy Director	30/4/14	
6	HSEQ / CHEQ Approved	Abdul Fahim	Deputy General Manager		
7	DCTO	Muhammad Adil	DCTO		15/5/14

MUHAMMAD ADIL
Dy. Chief Transmission Officer
Transmission Network
K-ELECTRIC LIMITED

1097
06 MAY 2014

ANNEXURE - 8

Sagging of Conductor

	Sagging of Conductor Title			
QMS-SOP-019	IR	17th April, 2014	Page 1 of 4	Transmission Section (PID)
Document No.	Revision	Date of Issuance	Page	Issuing Section / Department

CONTENTS

KE	Sagging of Conductor Title			
QMS-SOP-019	IR	17th April, 2014	Page 2 of 4	Transmission Section (PID)
Document No.	Revision	Date of Issuance	Page	Issuing Section / Department

1.0 PURPOSE:

This procedure outlines the requirement for safe and efficient sagging of conductor.

2.0 SCOPE:

This procedure applies to the supervisory engineer(s) and staff involved in sagging of conductor whether K-Electric, contractor or third party employee.

3.0 RESPONSIBILITY:

The concerned engineers and associated staff are responsible for the following;

- All installation processes are performed in accordance to the HSEQ and EIA guidelines for outdoor works and working at height.
- All installations are performed in accordance to the best practices underlined herein.

Following responsibility matrix shows the responsibilities:

S. No.	Designation	Responsibility Percentage
1	Site Supervisor	100 %

4.0 PROCEDURES

(4.1) Necessary entry permit shall be available with the contractor. Permission to start works shall be arranged by the contractor well in advance.

(4.2) Before starting, make sure that the line is ready for sagging and no work is in progress.

(4.3) PID engineer shall perform a formal headcount before the start of works as per the company's HSEQ guideline.

(4.4) PID engineer shall ensure that all the engineers and associated staff present at the site shall be equipped with healthy PPEs (e.g. safety shoes, safety helmets with chin straps, safety harness for working at height, safety goggles for drilling works, cotton gloves, etc).

(4.5) Make sure that the area is cordon off using warning tapes and safety signs.

(4.6) Make sure that sagging machineries (Theodolite etc) are available on site.

(4.7) Before the start of work, all tools should be in bags and equipments to be used shall be inspected by the PID engineer for any physical damage and check the license and vehicle fitness certificate etc with valid dates. In case of such an item, the start of works shall be delayed until a replacement is arranged by the contractor.

	Sagging of Conductor			
	Title			
QMS-SOP-029	IR	17th April, 2014	Page 3 of 4	Transmission Section (PID)
Document No.	Revision	Date of Issuance	Page	Issuing Section / Department

(4.8) A Tool box Talk shall be performed by the PID engineer, highlighting the probable hazards that can occur during the course of work and their mitigation plan.

(4.9) Approved sag charts, tension tables and other supporting documentations shall be present with the contractor's Engineer/site supervisor at site.

(4.10) If sagging is to be performed parallel or under the live circuit then take shutdown from LDC

(4.11) As per requirement, take LDC approval for complete isolation of the circuit daily until sagging is completed.

(4.12) For entering in the grid premises PID Engineer will inform to Grid personal present there about it and add entry for both start and end of the activity.

(4.13) After completion of pulling the conductor are pulled into rough sag and gripped with the help of grips and suitable slings to the tower cross arms to avoid any damage to the conductor during the pulling of next phase. After rough sag the conductor are usually checked that they are clear from all obstruction

(4.14) When all phases of conductor have been pulled and permanent compression joints are pressed between pulls and back anchor, preparations are made for the commencement of the sagging operation

(4.15) Before starting the actual operation sagging spans are selected. Generally for the section of 4-5 towers sag is checked in middle of the sag section.

(4.16) After assuming working temperature proper sag targets are set according to the sag chart at one tower and instrument on the other tower.

(4.17) Hook the conductors on the dead end towers wherever so required. When the arrangements as mentioned above are completed the conductor is pulled with puller and tensioner using steel rope. Tension is increased gradually up to required sagging limits as mentioned in sag calculation chart.

(4.18) The final sag is checked by sag engineer on each check point as per temperature/tension mentioned in approved sag charts.

(4.19) The same procedure is used for remaining conductor.

(4.20) After erection work warning tapes and signs are removed and site is cleared and restored.

5.0 RELATED DOCUMENTS

- Tool Box Talk (TBT).

19

KE	Sagging of Conductor Title			
QMS-SOP-019	IR	17th April, 2014	Page 4 of 4	Transmission Section (PID)
Document No.	Revision	Date of Issuance	Page	Issuing Section / Department

S. No.		Name	Designation	Date	Signature
1	Prepared By	Abid Khokhar	Manager	23/4/2014	
2	Checked By	Aurangzeb Zain	Deputy General Manager	29/4/14	
3	Witnessed by GM	Omeal Ahmed	General Manager	30/4/14	
4	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	30/4/14	
5	Head of Department	Bilal Ahmed Mirza	Deputy Director	30/4	
6	HSEQ / CHEQ Approved	Abdul Faheem	Deputy General Manager		
7	DCTO	Muhammad Adil	DCTO		15/5/14

MUHAMMAD ADIL
Dy. Chief Transmission Officer
Transmission Network
K-ELECTRIC LIMITED

1093
06 MAY 2014

ANNEXURE - 9

Installation of AFOC

	Installation of AFOC			
	Title			
QMS-SOP-020	IR	April 24, 2014	1 of 3	PID
Document No.	Revision	Date of Issuance	Page	Issuing Department

CONTENTS

KE	Installation of AFOC			
	Title			
QMS-SOP- 030	IR	April 24, 2014	2 of 3	PID
Document No.	Revision	Date of Issuance	Page	Issuing Department

1.0 PURPOSE

This procedure outlines the requirement for safe and efficient installation of Approach Fiber Optic Cable (AFOC) from Optical Power Ground Wire (OPGW) joint box till Optical Distribution Frame (ODF).

2.0 SCOPE

This procedure applies to the supervisory engineer(s) and staff involved in the installation of AFOC whether K-Electric, contractor or third party employee.

3.0 DEFINITION

AFOC: Approach Fiber Optic Cable (AFOC) is a rugged to cable comprising of multiple fibers optics with shielding and protection to sustain insensitive environments.

ODF: Optical Distribution Frame or ODF is referred to a passive distribution frame used in telecom networks for interconnection between a single source fiber and multiple equipment utilizing it.

4.0 RESPONSIBILITIES

The concerned engineers and associated staff are responsible for the following;

- All installation processes are performed in accordance to the HSEQ and EIA guidelines for indoor, outdoor works and working at height.
- All installations are performed in accordance to the best practices underlined herein.

PID engineer(s) shall be responsible to ensure compliance to the above mentioned guidelines.

5.0 PROCEDURE

5.1 Necessary entry permit (from K-Electric Security Department) shall be available with the contractor. Permission to start works shall be arranged by the contractor well in advance.

5.2 PID Engineer shall inform to Grid In-charge/ Grid personal present on site about the subject activity and add entry to Grid Log book for both start of activity and also finish of activity.

5.3 PID engineer shall perform a formal headcount before the start of works as per the company's HSEQ guideline.

5.4 Emergency Exit Plan must be discussed (daily before start of works).

5.5 PID engineer shall ensure that all the engineers and associated staff present at the site shall be equipped with healthy PPE/SPE (e.g. safety shoes, safety helmets with chin straps, safety harness for working at height, safety goggles for drilling works, cotton gloves, etc).

5.6 Before the start of installation, all tools and equipment to be used shall be inspected by the PID engineer for any physical damage. In case of such an item, the start of works shall be delayed until replacements are arranged by the contractor.

5.7 A Tool Box Talk (TBT) shall be performed by the PID engineer, highlighting the probable hazards that can occur during the course of work and their mitigation plan.

5.8 Approved drawings, wiring diagrams, layouts and other supporting documentations shall be present with the contractor.

5.9 PID engineer shall ensure that before the AFOC is laid, appropriate length is available at site and is in healthy condition.

5.10 The contractor shall be responsible to setup warning tapes and safety signs before the start of works. In case of inadequate lightening conditions, proper lightening system shall be arranged the by contractor.

5.11 The AFOC shall be preferably laid from the OPGW joint box towards the ODF (to be installed inside the telecom room). Fiber drums or rolls shall be laid by utilizing the trenches available in HV/EHV yard or by laying it within UPVC/GI pipes where trenches are unavailable.

5.12 PID engineer shall ensure that the cable is laid with consideration of the soil surface. For paving way on concrete, proper drilling tools should be used. For sand or gravel, after laying of cable, red colored bricks may be used to demarcate cable underneath the surface for future maintenance.

5.13 PID engineer shall ensure the area to be worked upon has no other ongoing activity. In such a case, coordination shall be maintained throughout the activity with the other team members.

	Installation of AFOC			
	Title			
QMS-SOP- 020	IR	April 24, 2014	4 of 3	PID
Document No.	Revision	Date of Issuance	Page	Issuing Department

5.14 In case of wall mounted ODF, the installation shall be made at an appropriate location. PID engineer shall ensure that the location is accessible for maintenance and housekeeping purposes.

5.15 All wastages before and after the cable laying need to be cleared before exiting the site.

6.0 RELATED DOCUMENTS

- Tool Box Talk (TBT).

	Installation of AFOC			
	Title			
QMS-SOP-020	IR	April 24, 2014	5 of 3	PID
Document No.	Revision	Date of Issuance	Page	Issuing Department

S. No.		Name	Designation	Date	Signature
1	Prepared By	Saad ul Haq	Asst. Manager	30/4/14	
2	Checked By	Faraz Ali	Deputy General Manager	30/4/2014	
3	Witnessed by GM	Omeal Ahmed	General Manager	30/4/14	
4	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	30/4/14	
5	Head of Department	Bilal Ahmed Mirza	Deputy Director	30/4/14	
6	HSEQ / CHEQ Approved	Abdul Faheem	Deputy General Manager		
7	DCTO	Muhammad Adil	DCTO		15/5/14

MUHAMMAD ADIL
Dy. Chief Transmission Officer
Transmission Network
K-ELECTRIC LIMITED

1092
06 MAY 2014

ANNEXURE - 10

To Supervise Casting of Basement

	To Supervise Casting of Basement			
	Title			
QMS-SOP-016	IR	22nd April, 2014	Page 1 of 5	PID Dept.
Document No.	Revision	Date of Issuance	Page	Issuing Department

CONTENTS

KE	To Supervise Casting of Basement			
	Title			
QMS-SOP-016	IR	22nd April, 2014	Page 2 of 5	PID Dept.
Document No.	Revision	Date of Issuance	Page	Issuing Department

1.0 **PURPOSE:**

(1.1) To supervise casting of basement at construction site.

(1.2) To make sure safety at site.

2.0 **SCOPE:**

This procedure applies to the supervisory Engineer(s) and staff involved in the casting of Basement activity whether K-Electric, contractor or third party employee.

3.0 **DEFINITION:**

Concreting: It is a process in which concrete is poured at required place by manual or mechanical means.

Basement: RCC basement is a low height building provided for cables (220/132/11 kV) termination into EHT, HT & MV equipment as per their cable bending radii.

4.0 **RESPONSIBILITY:**

The concerned engineers and associated staff are responsible for the following;

- Whole activity must be performed in accordance to the HSEQ and EIA guidelines for outdoor works and working at height.
- Whole activity must be performed in accordance to the best engineering practices underlined herein.

Following responsibility matrix shows the responsibilities:

S. No.	Designation	Responsibility Percentage
1	Site In charge	100 %

KE	To Supervise Casting of Basement Title			
QMS-SOP-016	IR	22nd April, 2014	Page 3 of 5	PID Dept.
Document No.	Revision	Date of Issuance	Page	Issuing Department

5.0 **PROCEDURE:**

5.1 Contractor must get Security permission first from K-Electric office prior to start work.

5.2 Inform Switch Board Officer (SBO) (or equivalent position) about arrival and log in the register (only applicable if working inside a live grid station).

5.3 Fill out Tool Box Talk (TBT) form as per the guidelines of HSEQ and conduct TBT.

5.4 Make sure that following Personal Protective Equipment (PPEs) are available on site and are used where required;

a) Safety Uniform/ Full body Harness

b) Hard Hats

c) Safety shoes

d) Safety Glasses

e) Safety gloves (cotton & rubber)

f) Gum boots

5.5 Proper access should be maintained during concreting of Slab on grade, RCC walls, and RCC slab, shoring must be adequate to avoid any collapse of surrounding soil during concreting.

5.6 Concrete should be mixed either in a concrete mixer or in a batching/mixing plant, as per standards and specifications.

5.7 Hand mix concrete should not be permitted for any structural member.

5.8 Ingredients of concrete being mixed at site should be proportioned carefully as per design and specifications.

5.9 Temperature of mixed concrete should not exceed 32° C.

5.10 Slump value should be in accordance to the mix design depending upon structural member and desired workability of concrete.

KE	To Supervise Casting of Basement			
	Title			
QMS-SOP-016	IR	22nd April, 2014	Page 4 of 5	PID Dept.
Document No.	Revision	Date of Issuance	Page	Issuing Department

5.11 Specimens should be made at site for each concreting activity for testing at 28 days. Additional cubes/cylinders may be made to determine strength at 7/14/21 days or as required by Engineer In charge.

5.12 Equipment for transporting and placing of concrete should have means for discharging concrete without segregation i.e. chutes, hose pipe, tremie pipe, etc. The concrete pump must be thoroughly examined before use. Concrete should be pumped gently. In case of Transit Mixer, location of TM should be dressed and leveled.

5.13 Concrete should not be freely dropped from height exceeding 2 m.

5.14 Freshly poured concrete must be compacted by means of mechanical vibrator in order to remove air bubbles from concrete mass. Try to avoid use of electrical vibrator.

5.15 Over compaction should be avoided as it may result in segregation of ingredients and bleeding of cement slurry.

5.16 Concrete must be properly finished and leveled as per specified levels/slopes mentioned in drawings.

5.17 Concrete should be kept constantly wet (for curing) by ponding or covering with a layer of hessian cloth or similar absorbent material for a minimum period of 07 days after concreting. Curing compounds can also be used to achieve this purpose.

5.18 Irrelevant people must be kept away from the concreting area. Only skilled masons should work in that area during concrete.

5.19 Ensure that formwork scaffolding complies with best practices for scaffolding. Formwork should be regularly inspected before, during and after concreting.

5.20 Ensure that eye protection is worn in situations where concrete splashes may occur. Also ensure that gloves and other protective clothing are worn.

5.21 Avoid getting feet caught in reinforcement during concreting.

	To Supervise Casting of Basement			
	Title			
QMS-SOP-016	IR	22nd April, 2014	Page 5 of 5	PID Dept.
Document No.	Revision	Date of Issuance	Page	Issuing Department

5.22 Do not smoke when refueling vibrators.

5.23 K-Electric staff, contractors and visitors must know the emergency exit route location and trained in evacuations drills before start of work.

5.24 In case of incident or accident call Ambulance with medical facilities and medical staff if possible.

5.25 Only Site in charge will be authorized to give instructions for any change of status.

5.26 Use PPEs and SPEs as per job requirement.

6.0 **RELATED DOCUMENTS:**

Tool Box Talk Form (TBT Form)

S. No.		Name	Designation	Date	Sign
1	Prepared By	Kamran M. Khalil	Manager	25/04/14	
2	Checked By	Ghayoor Ahmed Qureshi	Deputy General Manager	25/04/14	
3	Witnessed By	Omeal Ahmed	General Manager	25/4/14	
4	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	25/4/14	
5	Head of Department	Bilal Ahmed Mirza	Deputy Director	30/4/14	
6	HSEQ / CHEQ Approved	Abdul Fahim	Deputy General Manager		
7	DCTO	Muhammad Adil	DCTO		

1/5/14

MUHAMMAD ADIL
Dy. Chief Transmission Officer
Transmission Network
K-ELECTRIC LIMITED

1096
06 MAY 2014

ANNEXURE - 11

Laying Methodology

Laying Methodology:

Cables shall be laid directly in the ground, protected with protection covers or protective layer, drawn-in to pipes and ducts, laid directly in troughs or in concrete trenches, as may be required by the Employer.

All power cables of each circuit shall be laid in flat formation with a minimum axial space of 3 times the outer diameter of power cable, and a space of minimum 9 times the outer diameter of power cables for double circuit.

Cable should be laid in trenches inside the premises of the grid stations subject to Employer's approval.

Excavation in paved sidewalks shall be carried out with special care and with the granted permission of the concerned authority. When removing paving slabs, the Contractor shall take the necessary precautions to avoid breakage. All slabs removed during the performance of the work shall be re-established or replaced.

Whenever trenches run in parallel to existing services, cables, etc. the Contractor shall maintain a distance of at least 0.5 m between the existing services, cables, etc. and the edge of the new trench. The Contractor shall cross existing services with the utmost care and shall ensure that the cables are adequately protected. At least 0.5 m distance shall be maintained. He should obtain the written approval of the Employer with regard to the method of crossing existing services in advance.

Where the existing ground level is much higher than the future final ground level, cables shall be laid to a depth measured from the final future ground level.

A minimum depth of:

- 140 cm for power cables
- 140 cm for fiber optic & sensor cables

From the road level or the level given by the Employer, whichever is the deepest shall be maintained underneath the cables.

As stipulated above, a minimum trench depth of:

- 140 cm for power cables
- 140 cm for fiber optic & sensor cables

is required, but in some areas the existing levels may be more or less than the required levels below the road levels or the levels given by the Employer. In such cases, the Contractor shall backfill 130/55 cm soil upon the bottom of the cable covers or protective layers as a minimum in any case, subject to the Employer's approval.

After the trench has been excavated to the necessary depth, a minimum layer of 20 cm of approved sand bedding material shall be placed to form smooth bedding for the cables. The bedding material shall have a maximum thermal resistivity of 120K-cm/W under

operation conditions and shall be chemically neutral. In case a maximum thermal resistivity of 120 K-cm/W is not obtainable under completely dried out conditions, the Contractor shall submit an alternative proposal (e.g. weak mix concrete 1:20 for 20 cm below the power cables and 20 cm above the top of the uppermost cable) to cope with specified thermal resistivity. The contractor's proposal will be subject to the approval of the Employer.

Pulling-in of cables shall not commence until the Employer has inspected and approved the trench.

After the cables have been laid, and provided that their spacing has been approved by the Employer, they shall be covered with an additional layer of the approved bedding material and well compacted over and around the cables to a level of 20 cm above the top of the power cable.

Cable covers of concrete shall then be carefully placed over the cables. The concrete covers having concrete compressive strength of 3000 psi at 28 days with sulphate resistant cement (Type-V) of aggregate conforming to ASTM C-33 shall have a size (in centimetres) of 50x30x6 and attention shall be paid that they are laid adjacent to each other without leaving spaces in between. The concrete covers shall be supplied and installed by the Contractor.

If required and subject to the Employer's approval, the protective layer shall be alternatively made of a concrete layer of a thickness of minimum of 15 cm. Cables shall be laid directly from the drums into the trenches and special rollers placed at intervals of maximum 2 m shall be employed for supporting the cables during pulling and laying. Rollers used during the laying of cables shall have no sharp projecting parts likely to damage the cables. Before leaving the factory, suitable pulling eyes shall be fitted to the power cables.

After the cables have been laid and until all the cables in the trench have been covered with the concrete covers or protective concrete layer, no sharp tools such as spades, pickaxes or fencing stakes shall be used in the trench or shall be placed in such a position that they may fall into the trench.

The sand bedding over the cables and laying of the concrete covers shall follow immediately after the cable pulling in order to avoid exposure and damage of the cables.

Each single-core cable joint shall be so marked that the phase identity of each joint may be easily ascertained.

After placing of the cables' protective covers or the protective concrete layer, the Contractor shall backfill the trench with selected and approved material in 20 cm layers, each layer being well compacted, watered if necessary, and consolidated. In case the excavated material does not meet the requirements for backfilling, the Contractor shall use the same material for backfilling as applied for bedding of the cables, without extra charge. He shall then carefully reinstate the paving slabs, all to the satisfaction of the Employer.

At a level given by the Employer a 40 cm wide plastic warning tape shall be installed.

Warning tape to be marked "CAUTION! CAUTION! HIGH VOLTAGE CABLE BELOW" in English and Urdu. Each refilled trench shall be maintained in a thoroughly safe condition by the Contractor at his expense until such time as he can carry out permanent reinstatement of the upper levels and surface so as to restore these to their original condition or to the level of the surrounding curb stones, respectively, whichever is higher. All excess excavation material has to be removed without extra charge.

Cable for certain circuits is to be laid in ventilated trenches instead of direct burial in ground unless specified otherwise.

Such Concrete trenches shall be made below ground level with dimension as 2.0 m x 2.0 m (width x height). These trenches shall have adequate openings with louvered top covers for natural ventilation. Internal light and fire detection system shall also be provided in these trenches. The Bidder shall satisfy himself with regard to the type of construction based on nature of soil in that area, where required, special measure may have to be taken against seepage of water inside these trenches.

Where trenches pass from a footway to a roadway or at other positions where a change of level is necessary, the bottom of the trench shall rise or fall gradually. The Contractor shall take all precautions necessary to prevent damage to the road or ground surface due to a slip or breaking-away from the side walls of the trench.

Cable shall be laid inside these trenches in flat formation with a bonding system to be designed and proved by the contractor for maximum current carrying capacity.

All concrete trenches and covers shall be provided and shall be subject to the approval of the Employer. All cables installed in concrete trenches shall be supported by means of suitable spacers. For cable movements the laying of snaked cables is requested. The cables should be laid in a regular snaked form in the horizontal plane and they should be secured at regular intervals by clamps or straps. The distance between the fixing points and the straps must take electrodynamics stresses under short circuit conditions into account. They shall run in a neat and orderly manner and the crossing of cables within the trench shall be kept separate. On completion of the cable lying, all concrete trenches supplied under this Contract shall be inspected, and the Contractor shall be responsible for the replacement of any broken parts at no additional cost.

In Road Crossing the Contractor shall provide the plastic pipes for each phase separately including one spare phase per circuit in the required positions. Except where the Contractor considers that a larger size is necessary, plastic pipes shall consist of a minimum internal diameter of 2.0 times the outer diameter of the pertaining cable in a surrounding of 20 cm thick reinforced concrete. The ducts shall be laid on level concrete foundations previously prepared by him, then carefully connected and aligned, and consolidated with concrete. The ends of the ducts shall protrude to a distance of 1.0 m beyond the curb stones. Contract prices for cable laying and installation shall include all necessary road crossing ducts including one spare, i.e. 4 pipes. The Contractor shall be responsible for all work involved, including the breaking-up of the road surface and subsequent reinstatement of the same in accordance with the requirements of the Municipality Department.

After pulling-in the cables, the pipes shall be filled with a low thermal resistivity mixture, if necessary, and sealed by an approved method. Cement may not be used.

Any pipes or ducts not used shall be sealed by an approved method before backfilling. All sealing material shall be supplied by the Contractor.

Excavation for road crossings shall be carried out on only half of the carriageway at a time. Where asphalt surfaces have been broken, the Contractor shall be responsible for topping and reinstatement of the surfaces.

Cable markers and danger plates of an approved type shall be provided and mounted on metallic; hot-dip galvanized and suitably painted posts of 0.1 m diameter along each route of buried cables and shall be erected as reinstatement is being carried out. The markers and danger plates shall be supplied and installed by the Contractor and shall be made of permanent material. The markers shall indicate the cable voltage, the KE's name, the name of the circuit, depth of the buried cable and the distance of trench and joints from the markers, as well as the joint numbers.

The types and details of the markers and danger plates proposed to be used shall be submitted by the Contractor for the Employer's approval before cable installation work commences.

Markers shall be installed at all joint positions, all places where the route changes direction, and on straight routes at distances not exceeding 50 m, and shall be approved by the Employer. Similarly joint marker plates should be installed where the route changes direction. Different colour route markers shall be installed at all joint positions.

Each end of the cable run shall be provided with markers for identification which shall be fitted in a suitable position under the cable terminal. Where cables enter or leave ducts or pipes, suitable identification markers shall be fitted.

The material of all markers, danger plates, labels and clamps shall be such as to avoid corrosion due to the incompatibility of materials, and to ensure permanent legibility.

Cable markers should be of anti theft design & should be painted with reflecting paint or built in concrete reflectors. They should be erected at least 12// above the ground.

Cable markers should also be installed at places where the depth of the cables is not standard due to some unavoidable reasons

ANNEXURE - 12

To Supervise Concreting at Site

CONTENTS

1.0 PURPOSE:

(1.1) To supervise concreting activity at a construction site.

(1.2) To make sure safety at site.

2.0 SCOPE:

This procedure applies to the supervisory engineer(s) and staff involved in the excavation activity whether K-Electric, contractor or third party employee.

3.0 DEFINITION:

Concreting: It is a process in which concrete is poured at required place by manual or mechanical means.

4.0 RESPONSIBILITY:

The concerned engineers and associated staff are responsible for the following;

- Whole activity must be performed in accordance to the HSEQ and EIA guidelines for outdoor works and working at height.
- Whole activity must be performed in accordance to the best engineering practices underlined herein.

Following responsibility matrix shows the implementation of this SOP:

S. No.	Designation	Responsibility Percentage
1	Site In-charge	100 %

5.0 PROCEDURE:

5.1 Fill out Tool Box Talk (TBT) form as per the HSEQ requirements and conduct TBT.

5.2 Make sure that following Personal Protective Equipment (PPEs) are available on site and are used where required;

a) Safety Uniform/ Full body Harness

b) Helmet

c) Safety shoes

d) Safety Glasses

e) Dust Masks

f) Safety gloves (cotton & rubber)

g) Gum boots

h) Full body Harness

5.3 Inform Switch Board Officer (SBO) (or equivalent position) about arrival and log in the register. (Applicable if working inside a live grid station).

5.4 Concrete should be mixed either in a concrete mixer or in a batching/mixing plant, as per standards and specifications.

5.5 Hand mix concrete should not be permitted for any structural member.

5.6 Ingredients of concrete being mixed at site should be proportioned carefully as per design and specifications.

5.7 Temperature of mixed concrete should not exceed 32° C.

5.8 Slump value should be in accordance to the mix design depending upon structural member and desired workability of concrete.

5.9 Specimens should be made at site for each concreting activity for testing at 28 days. Additional cubes/cylinders may be made to determine strength at 7 days.

5.10 Equipment for transporting and placing of concrete should have means for discharging concrete without segregation i.e. chute, hose pipe, tremie pipe, etc.

5.11 Concrete should not be freely dropped from height exceeding 2 m.

5.12 Freshly poured concrete must be compacted by means of mechanical vibrator in order to remove air bubbles from concrete mass.

5.13 Over compaction should be avoided as it may result in segregation of ingredients and bleeding of cement slurry.

5.14 Concrete must be properly finished and leveled as per specified levels/slopes mentioned in drawings.

5.15 Concrete should be kept constantly wet (curing) by ponding or covering with a layer of hessian cloth or similar absorbent material for a minimum period of 07 days after concreting. Curing compounds can also be used to achieve this purpose.

5.16 Irrelevant people must be kept away from the concreting area.

5.17 Ensure that formwork scaffolding complies with best practices for scaffolding and strong enough to bear the wet concrete load. Formwork should be regularly inspected during, before and after concreting.

5.18 Ensure that eye protection is worn in situations where concrete splashes may occur. Also ensure that gloves and other protective clothing are worn.

5.19 Avoid getting feet caught in reinforcement during concreting.

5.20 Do not smoke when refueling vibrators or when the vibrator is hot.

5.21 KE staff, contractors and visitors must know the emergency exit route location and trained in evacuations drills before start of work.

5.22 In case of incident or accident call Ambulance with medical facilities and medical staff if possible.

5.23 Only Site in-charge will be authorized to give instructions for any change of status.

5.24 Use PPEs and SPEs as per job requirement.

6.0 RELATED DOCUMENTS:

Tool Box Talk Form (TBT Form)

KE	To Supervise Concreting at Site			
	Title			
QMS-SOP-005	IR	14th Mar, 2014	Page 5 of 5	PID Dept.
Document No.	Revision	Date of Issuance	Page	Issuing Department

S. No.		Name	Designation	Date	Sign
1	Prepared By	Kamran M. Khalil	Manager	24/03/14.	
2	Checked By	Ghayoor Ahmed Qureshi	Deputy General Manager	24/03/14.	
3	Witnessed by GM	Omeal Ahmed	General Manager	24/3/14	
4	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	24/3/14.	
5	Head of Department	Bilal Ahmed Mirza	Deputy Director	25/3/14	
6	HSEQ / CHEQ Approved	Abdul Faheem	Deputy General Manager		
7	DCTO	Muhammad Adil	DCTO		2/4/14

OFFICE OF THE TRANSMISSION & GRID NETWORK MGT. LTD.
Copy No 785
28 MAR 2014

ANNEXURE - 13

To Supervise Excavation at Construction Site

CONTENTS

1.0 **PURPOSE:**

(1.1) To supervise excavation activity at construction site.

(1.2) To make sure safety at site.

2.0 **SCOPE:**

This procedure applies to the supervisory engineer(s) and staff involved in the excavation activity whether K-Electric, contractor or third party employee.

3.0 **DEFINITION:**

Excavation: It is a process in which natural earth (sand, stone, clay, etc.) is dig manually or mechanically to attain required ground level.

4.0 **RESPONSIBILITY:**

The concerned engineers and associated staff are responsible for the following;

- All processes are performed in accordance to the HSEQ and EIA guidelines for outdoor works and working at height.
- All installations are performed in accordance to the best practices underlined herein.

Following responsibility matrix shows the responsibilities:

S. No.	Designation	Responsibility Percentage
1	Site In charge	100 %

5.0 **PROCEDURE:**

5.1 Fill out Tool Box Talk (TBT) form as per the HSEQ requirements and conduct TBT.

5.2 Make sure that following Personal Protective Equipment's (PPEs) are available on site and are used where required;

a. Safety Uniform/ Full body Harness

b. Helmet

c. Safety shoes

d. Safety Glasses

e. Safety gloves

f. Dust Mask (in case of loose soil)

g. Long boot (to avoid insect bite or mud)

5.3 Inform the Switch Board Officer (SBO) (or equivalent position) about arrival and log in the register (only applicable if working inside a live grid station).

5.4 Check for signs of buried power and utility services lines passing through the area of excavation.

5.5 Barricade the area by hard barricade if the excavation is deep, for smaller area, warning tape should be tied in surrounding.

5.6 In manual excavation, special care should be taken as cables may be just below the surface.

5.7 Use a spade or shovel and not a fork or pick-axe, and do not spear the tools into the ground.

5.8 In mechanical excavation, fill the check list of excavator before use. Also verify the valid fitness certificate of the excavator and driving license of the driver.

5.9 If you find a cable embedded in concrete do not break it out but seek advice.

5.10 If a cable is damaged, even slightly, keep well clear.

5.11 Do not work with bare chest. Normal work clothing can provide some protection from flash burns.

5.12 Never work ahead of the side supports in a trench even when you are erecting shoring.

5.13 Appearances can be deceptive. Neither, shallowness of an excavation, nor the solid appearance of the ground, is necessarily an indication of safety.

5.14 Deep trenches look dangerous, but most fatal accidents occur in trenches less than 3.0 m deep.

5.15 Always wear a safety helmet when you work in an excavation.

5.16 Sides of excavation should have a safe inclination, less than the angle of repose of the excavated material, to avoid collapse. Or shoring must be provided.

5.17 Proper means of access and egress, such as secured ladder should be installed in the excavated area.

5.18 Inform the SBO before leaving the site if working in an energized grid station.

5.19 KESC staff, contractors and visitors must know the emergency exit route location and trained in evacuations drills before start of work.

5.20 In case of incident or accident call Ambulance with medical facilities and medical staff if possible.

5.21 Only Site in charge will be authorized to give instructions for any change of status

5.22 Use PPEs and SPEs as per job requirement.

6.0 RELATED DOCUMENTS:

Toolbox Talk Form (TBT Form)

S.No.		Name	Designation	Date	Sign.
1.	Prepared by:	Kamran M. Khalil	Manager	24/03/14	
2.	Checked by:	Ghayoor Ahmed Qureshi	DGM	24/03/14	
3.	Witnessed by GM	Omeal Ahmed	General Manager	24/3/14	
4.	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	24/3/14	
5.	Head of Department	Bilal Ahmed Mirza	Deputy Director	25/3/14	
6.	HSEQ/CHEQ Approved	Abdul Faheem	Deputy General Manager		
7.	DCTO	Muhammad Adil	DCTO		9/4/14

ANNEXURE - 14

Installation of Fire Alarm System

	Installation of Fire Alarm System			
	Title			
QMS-SOP-007	IR	March 25, 2014	1 of 5	PID
Document No.	Revision	Date of Issuance	Page	Issuing Department

CONTENTS

1.0 PURPOSE

This procedure outlines the requirement for safe and efficient installation of Fire Alarm System (FAS).

2.0 SCOPE

This procedure applies to the supervisory engineer(s) and staff involved in the installation of FAS system whether K-Electric, contractor or third party employee.

3.0 DEFINITION

Fire Alarm System: is a combination of an alarm panel along with sensors, call points and hooter / sounder for hazard identification and successful evacuation of personals.

4.0 RESPONSIBILITIES

The concerned engineers and associated staff are responsible for the following;

- All installation processes are performed in accordance to the HSEQ and EIA guidelines for indoor, outdoor works and working at height.
- All installations are performed in accordance to the best practices underlined herein.

PID engineer(s) shall be responsible to ensure compliance to the above mentioned guidelines.

5.0 PROCEDURE

5.1 Necessary entry permit (from K-Electric Security Department) shall be available with the contractor. Permission to start works shall be arranged by the contractor well in advance.

5.2 PID Engineer shall inform to Grid In-charge/ Grid personal present on site about the subject activity and add entry to Grid Log book for both start of activity and also finish of activity.

5.3 PID engineer shall perform a formal headcount before the start of works as per the company's HSEQ guideline.

5.4 Emergency Exit Plan must be discussed (daily before start of works).

5.5 PID engineer shall ensure that all the engineers and associated staff present at the site shall be equipped with healthy PPE/SPE (e.g. safety shoes, safety helmets with chin straps, safety harness for working at height, safety goggles for drilling works, cotton gloves, etc).

5.6 Before the start of installation, all tools and equipment to be used shall be inspected by the PID engineer for any physical damage. In case of such an item, the start of works shall be delayed until replacements are arranged by the contractor.

5.7 A Tool Box Talk (TBT) shall be performed by the PID engineer, highlighting the probable hazards that can occur during the course of work and their mitigation plan.

5.8 Approved drawings, wiring diagrams, layouts and other supporting documentations shall be present with the contractor.

5.9 The Fire Alarm Panel shall be installed at a convenient location, accessible and visible to the station staff at all times.

5.10 Separate two-pole miniature circuit breaker (MCB) shall be installed in the existing AC or DC distribution panel. PID engineer shall ensure that the MCB is clearly marked with a red tape/sticker for easy identification.

5.11 Wiring shall be done in conduits or as per the contractual obligation. In case of PVC pipes being used as conduit, a saddle to saddle distance of 2 ft (max.) shall be maintained. All conduit joints shall be sealed in such a way that water/moisture ingress is impossible.

5.12 PID engineer shall ensure the appropriate route is selected from fire alarm panel to devices or associated equipment so that the building structure is not affected.

5.13 PID engineer shall ensure that the excavation/drilling area is properly barricaded by the contractor before start of any activity. All excavations shall be back filled by the contractor (and refinished as per existing) before the removal of warning sign / barricade

5.14 Manual Call Points (MCP) shall be at a minimum height of 4 ft from ground level. PID engineer shall ensure the locations of all MCPs are accessible in the event of emergency.

5.15 PID engineer shall ensure that sensors are installed at a position covering maximum area of probable hazard and are accessible for maintenance/testing purpose.

5.16 PID engineer shall ensure the audible sounder / hooter is installed in such a way that the alarm is heard over a maximum area possible.

5.17 PID engineer shall ensure all unused openings created as a result of drilling / excavation of the installation process are re-finished as per contractual obligation.

6.0 RELATED DOCUMENTS

- Tool Box Talk (TBT).

	Installation of Fire Alarm System			
	Title			
QMS-SOP-007	IR	March 25, 2014	5 of 5	PID
Document No.	Revision	Date of Issuance	Page	Issuing Department

S. No.		Name	Designation	Date	Signature
1	Prepared By	Ahsan Fawad	Manager	25.03.2014	
2	Checked By	Bilal Ahmad Khan	Dy. General Manager	25-03-14	
3	Witnessed by GM	Syed Niaz Hayder	General Manager	25/03/2014	
4	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	27/3/204	
5	Head of Department	Bilal Ahmed Mirza	Deputy Director	26/3/14	
6	HSEQ / CHEQ Approved	Abdul Faheem	Deputy General Manager		
7	DCTO	Muhammad Adil	DCTO		14/4/14

ANNEXURE - 15

To Supervise Backfilling at Construction Site

CONTENTS

1.0 **PURPOSE:**

(1.1) To supervise backfilling activity at construction site.

(1.2) To make sure safety at site.

2.0 **SCOPE:**

This procedure applies to the supervisory engineer(s) and staff involved in the excavation activity whether K-Electric, contractor or third party employee.

3.0 **DEFINITION:**

Backfilling:

It is a process in which excavated pits, trenches or natural land is filled with local/imported backfill material, manually or mechanically to attain required ground level.

4.0 **RESPONSIBILITY:**

The concerned engineers and associated staff are responsible for the following;

- All processes are performed in accordance to the HSEQ and EIA guidelines for outdoor works and working at height.
- All installations are performed in accordance to the best practices underlined herein.

Following responsibility matrix shows the responsibilities:

S. No.	Designation	Responsibility Percentage
1	Site In-charge	100 %

5.0 **PROCEDURE:**

5.1 Fill out Tool Box Talk (TBT) form as per the HSEQ requirements and conduct TBT.

5.2 Make sure that following Personal Protective Equipment's (PPEs) are available on site and are used where required;

a. Safety Uniform

b. Helmet

c. Safety shoes

d. Safety Glasses

e. Safety gloves

f. Dust Mask (in case of loose soil)

g. Long boot (to avoid insect bite or mud)

5.3 Inform and take approval of Switch Board Officer (SBO) (or equivalent position) about arrival and log in the register (only applicable if working inside a live grid station).

5.4 Check for signs of buried power and utility services lines passing through the excavated area, to avoid any unwanted incident.

5.5 Barricade the area by hard barricade if the excavation is deep, for smaller area, warning tape should be tied in surrounding.

5.6 For deep excavated area, backfilling should be carried out by means of chute or directly, provided a safe distance is maintained between the workers and backfill location.

5.7 Backfilling should be carried out with material approved by KE representative.

5.8 In case of rainfall or high ground water table in the excavated area, proper method of dewatering should be used.

5.9 In mechanical backfilling, fill the check list of excavator before use. Also verify the valid fitness certificate of the excavator and driving license of the driver.

5.10 After backfilling, proper compaction of backfilled material with approved method should be performed as per KE standards.

5.11 In case of petrol compactor, refueling should be done only in OFF and cooled down condition.

5.12 A fire extinguisher should be present at the work location if compaction is being done with petrol compactor.

5.13 Shoring should be dismantled only by a competent worker operating under supervision.

5.14 Appearances can be deceptive. Neither, shallowness of an excavation, nor the solid appearance of the ground, is necessarily an indication of safety.

5.15 Deep trenches look dangerous, but most fatal accidents occur in trenches less than 3.0 m deep.

5.16 Always wear a safety helmet when you work in an excavation.

5.17 For movement of dumpers and other heavy vehicles, take on the help of another worker or signalman before you reverse and keep him in view at all times.

5.18 Proper means of access and egress, such as secured ladder should be installed in deep excavated area.

5.19 Inform and cancel permit from SBO before leaving the site, if working in an energized grid station.

5.20 KE staff, contractors and visitors must know the emergency exit route location and trained in evacuations drills before start of work.

5.21 In case of incident or accident call Ambulance with medical facilities and medical staff if possible.

5.22 Only Site in charge will be authorized to give instructions for any change of status.

5.23 Use PPEs and SPEs as per job requirement.

6.0 RELATED DOCUMENTS:

Toolbox Talk Form (TBT Form)

KE	To Supervise Backfilling at Construction Site Title			
QMS-SOP-008	IR	25th Mar, 2014	Page 5 of 5	PID Dept.
Document No.	Revision	Date of Issuance	Page	Issuing Department

S.No.		Name	Designation	Date	Sign.
1.	Prepared by:	Muhammad Bilal	Asst. Manager	25-3-2014	
2.	Checked by:	Ghayoor Ahmed Qureshi	DGM	25-3-2014	
3.	Witnessed by GM	Omeal Ahmed	General Manager	25/3/14	
4.	Agreed By (Advisor E&P)	Khalid Iqbal	Advisor E&P	25/3/14	
5.	Head of Department	Bilal Ahmed Mirza	Deputy Director	25/3/14	
6.	HSEQ/CHEQ Approved	Abdul Faheem	Deputy General Manager		
7.	DCTO	Muhammad Adil	DCTO		9/4/14

ANNEXURE - 16

Health, Safety and Quality Policy

1.0 Purpose:

The purpose of this procedure is to describe the process required to be adopted with respect to Health, Safety, Environment and Quality (HSEQ) management during implementation of Contracts and Procurement process for acquisition of goods and/or services. The main objectives are to;

- Define the minimum HSEQ objectives to be met at each stage of a contract.
- Develop a strategy for proactive management of Contractor & Supplier HSEQ.
- Highlight the benefit of effective proactive approaches, particularly prior to tendering and mobilization.
- Describe a planned approach to Management of Contractor and Supplier HSEQ that will ensure a continuing improvement in HSEQ performance for all contractor activities.
- Describe the role and responsibilities of key personnel in contractor and supplier HSEQ management.

2.0 Scope:

This procedure applies to KESC employees, contractors and suppliers.

3.0 Distribution:

All employees at KESC, Contractors and Suppliers.

4.0 Definitions:

Company: Karachi Electric Supply Company.

Contract: A formal business agreement detailing the terms and conditions for the supply of products or the provision of services.

HSEQ Plan: A formal document showing how it is intended to manage the hazards determined. It should be recognized that in many situations, particularly for larger contracts, this HSEQ Plan will effectively form a significant part of the contract.

Contractor: A Supplier holding a Contract with Company for the supply of goods or services.

Contract Sponsor: The department, BU or function that has budget and management authority to execute the Contract.

Contract Manager: The person named in the contract to represent the Contractor in respect of the contract and to be responsible for the management of the contract or supplies.

Contractor Representative: The person appointed in writing by the Contract Manager to supervise the execution of the contract activities or supplies.

Scope of Work: The objective and extent of work to be accomplished by a Contractor or Supplier.

Services: Reflect work done in which people play a prominent role in delivery. A service is an intangible product. Work performed for pay.

5.0 HSEQ Requirements:

5.1 Corporate HSEQ Policy:

- Embedding the Health, Safety, Environment and Quality requirements in our routine and non-routine activities.
- Preventing injuries and ill health to personnel affected by our activities through a proactive system of risk management.
- Improving competence and skill through training and awareness.
- Ensuring continual improvement through a system of performance planning, measurement and reviews.

5.2 ISO 14001:2004 Specifications (Section 4.4.2) - Training Awareness and Competence:

The organization shall ensure that any person(s) performing tasks for it or on its behalf that have the potential to cause a significant environmental impact(s) identified by the organization is (are) competent on the basis of appropriate education, training or experience, and shall retain associated records.

5.3 OHSAS 18001 Specifications (Section 4.4.2) - Training Awareness and Competence:

Personnel shall be competent to perform task that may impact on OH & S in the work place. Competence shall be defined in terms of appropriate education, training and or experience.

6.0 Objectives:

The overall objectives of this procedure are:

- Ensure that contractors / supplier meet or exceed KESC HSEQ standards.

6.1 Adherence to Hazards and Effects Management Process:

All hazards to contractor's personnel, KESC staff, public and to the environment shall be:

- Identified, assessed systematically and eliminated where possible
- Controlled through formal procedures and planning methods
- Covered by contingency plans in place to deal with identified consequences of potential loss of control.

6.2 Mutual HSEQ awareness:

The contractor / supplier and the Contract Sponsor shall be mutually aware of both parties' minimum obligations to manage HSEQ and these obligations shall be within mutually agreed contractual terms.

6.3 Means to monitor the contract HSEQ management:

The means to monitor the contract HSEQ management system (HSEQMS) shall be mutually defined, understood, accepted and agreed by both parties as contractually binding.

6.4 Equal attention to Health, Safety, Environment and Quality:

6.5 Controls in place for hazards and effects management

The controls necessary for the management of hazards and effects shall be in place and working. Where they are not, this shall be speedily remedied or in extreme cases, work should be stopped.

6.6 Ensure clarity between Contract Sponsor and Contractor regarding responsibilities:

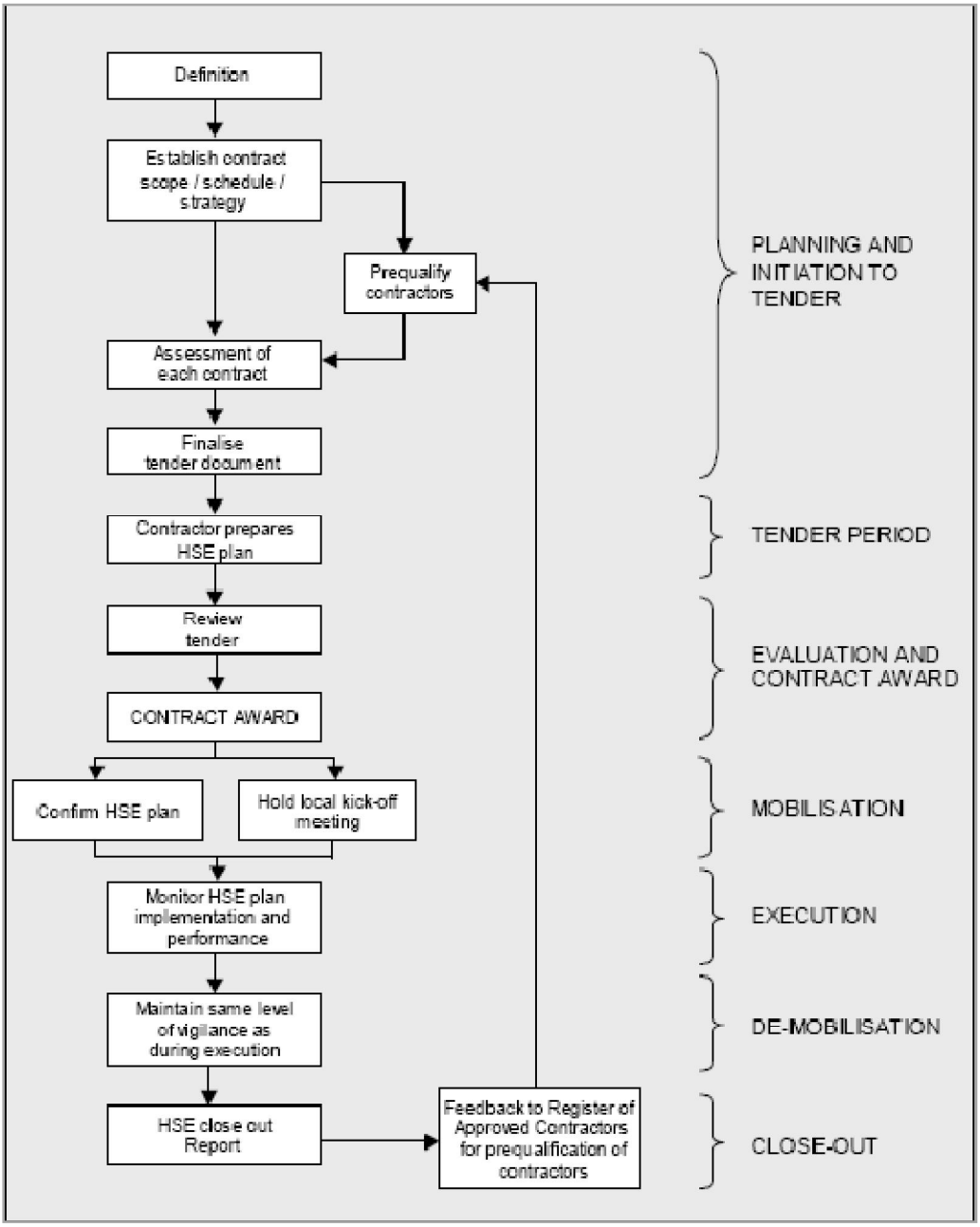
7.0 Procedure:

7.1 Contract Phases and HSEQ Planning:

The influence and inclusion of HSEQ issues in the preparation of tender and contract documents and the subsequent HSEQ management of a contractor shall be described within the context of an identifiable series of phases:

- Planning and invitation to tender.
- Tender period.
- Bid evaluation and contract award.
- Mobilization.
- Execution
- Demobilization
- Close-out.

More details are in the below table



7.2 Pre-Qualification and Tender Process:

Pre-Qualification is a process that shall be conducted preferably in advance of, but may be in parallel with, Tendering, to determine if a Contractor has the capacity to deliver a specific service. In all cases, pre-qualification shall include an HSEQ assessment component.

HSEQ prequalification pack shall include but not be limited to the requirement for potential Tenderers to submit the following:

- Contractor Self Evaluation Form (KESC-SP-022-F01).
- HSEQ policy.
- Contractor HSEQ Management plan.
- HSEQ Organizational structure.
- Details of Contractor HSEQ training and audit systems.
- Overview of the Contractor's recent HSEQ performance.

In addition, any specific HSEQ requirements of the Contractor/Supplier should be defined based on the control measure outcomes of identified in the Risk Evaluation process and included in the Pre-Qualification package.

7.3 HSEQ Tender Package:

The Tender package shall clearly present all HSEQ requirements applicable to the Scope of Work. HSEQ documentation to be included in the HSEQ Tender package and must include but not be limited to the following HSEQ documentation:

- KESC Corporate HSEQ Policy.
- KESC Corporate HSEQ Manual.
- KESC-SP-022 – Contractor / Supplier HSEQ Management Procedure.
- All relevant KESC Corporate HSEQ Procedures (If required by the contractor).

These requirements are mandatory for all Contracts with the Company – irrespective of their jurisdiction. The applicability of all Company HSEQ requirements must be assessed on a case by case basis for each contract.

7.4 Tender Schedule:

A specific HSEQ Tender Schedule shall be prepared that lists all HSEQ related information to be provided by the Tenderer in their submission. It is used as a formal basis for evaluation of the Tender.

The Tender Schedule should require a response to be submitted by the Tenderer for all key HSEQ issues that must be addressed by the Contractor in performing the Scope of Work.

For simple procurement contracts, the HSEQ Tender Schedule may be limited to a request for basic information repeating to the Tenderers internal HSEQ policies and systems. However, for controlled Site based activities, more detailed information shall be requested of the Tenderer including specific responses to HSEQ related issues pertinent to the Scope of Work (e.g. outline of method statements, etc.).

7.5 HSEQ Evaluation of Tender Submissions:

A weighted evaluation of Tenderers final submissions shall be prepared as a basis determining a preferred Tenderer from an HSEQ perspective. The relative weighting assigned to each component of the Tender Schedule shall be based on the risk exposure associated with each aspect of the Scope of Work.

8.0 Contract Award:

8.1 Pre-award HSEQ alignment meeting:

A Pre-Award HSEQ alignment meeting is mandatory for all high risk contracts. The Contract Sponsor shall arrange a pre-award HSEQ alignment meeting with the preferred Tenderer to ensure that the Tenderer is fully cognizant and aligned with all HSEQ requirements applicable to the Scope of Work. Any discrepancies shall be identified at this meeting, if possible resolved, and outcomes minuted by the Contract Sponsor.

8.2 Finalize HSEQ Contract Documentation:

Should any HSEQ amendments to the Tender documentation be necessary as identified in the Pre-Award HSEQ alignment process, these amendments shall be translated into a revision of Contract documentation prior to Contract award.

Any additions, changes or deletions to the standard HSEQ pro-forma clauses shall be approved by the HSEQ and/or Legal functions.

9.0 Contract Pre-Execution:

9.1 Contractor / Supplier HSEQ Plan:

The purpose of the Contractor/Suppliers HSEQ Plan is to define how the Scope of Work shall be implemented by the Contractor/Supplier in accordance with Company (Contractual) HSEQ requirements.

Although a specific Contractors/Suppliers HSEQ Plan shall be required for all Contracts, the content and format of the plan shall be commensurate with the risk associated with executing each aspect of the Scope of Work as determined by risk assessment as well as the necessary control measures.

The Contractors HSEQ Plan shall address any bridging or interfacing requirements necessary to ensure the effective management of HSEQ related issues.

The Plan shall be approved by the Company prior to commencing execution of the Scope of Work.

9.2 Establish Specific HSEQ Systems and Processes:

Specific HSEQ systems and processes shall be established prior to commencing the Scope of Work shall be defined in the HSEQ Plan for the activity and/or the Contractors HSEQ Plan. Following presents a guide to Company expectations regarding HSEQ processes and systems to be established across a range of activities.

The level of inspection and assessment required will be a function of the Scope of Work, work environment and jurisdiction classification of planned activities.

Process	Controlled site activities	Supply/Procurement contract only
Plan	Equipment (Inspections, Checklists, Certifications, Tagging) as per KESC-SP-022-F02	Inspections
	Procedures (Permit systems and certificates)	
	Personnel (Induction, training, certifications)	
Do	Maintain hazard register	
	Inspections	
	Actions register maintenance	
	Contractor coordination meetings	Contractor coordination meetings
	Workforce communications meetings Tool Box Talk	
	Behavioral observation systems	
	Incentive scheme implementation	
	Knowledge sharing initiatives	Knowledge sharing initiatives
Check	Compliance auditing	Compliance auditing
Act	Monthly HSE Reporting	
	Incident and event	

9.3 Complete Pre-Start HSEQ Inspections and Review:

Assessment of key plant, equipment and personnel should be undertaken prior to site mobilization. For example, equipment to be evaluated may include the following:

Fixed and mobile plant (cranes, elevated work platforms, generators, air compressors, etc.). Other specific equipment (scaffolding, ladders, harnesses, rigging, tools, PPE, etc.)

Inspections, audits and third party compliances are mandatory for all activities.

All Personnel working in activities shall have the minimum training, competency and qualifications:

Certificates verifying competency, training and qualifications shall be up to date and made available to upon request.

In addition, short service personnel shall complete a minimum of:

- Site specific HSEQ Induction.

All other personnel shall complete;

- Site specific HSEQ Induction.
- Specific training and competency topics as identified by the site.

10.0 Contract Execution:

10.1 Implement HSEQ Systems and Processes:

The Contract Sponsor and HSEQ Support shall be responsible for monitoring and review of Contractor compliance with all HSEQ requirements defined in the Contract.

A process of continuous review shall be maintained to track HSEQ performance throughout Contract execution. Opportunities for improvement and enhancement of HSEQ systems and processes shall also be identified and implemented. Tools to assist in this process include the following:

- Regular reviews and inspections
- Audit compliance with the HSEQ Plan
- Audit HSEQ performance against the KESC requirements
- Contractor coordination meetings.
- Other feedback mechanisms.

HSEQ performance reviews shall be conducted on a quarterly basis for all high risk contracts.

An HSEQ Action Register shall be established to ensure HSEQ issues are followed up in a timely manner.

10.2 Reporting and Auditing:

Reporting: The Contractor shall be responsible for providing monthly HSEQ performance data to the Company as defined in the Contract and aligned with Company reporting requirements.

Reporting shall be done of the following as minimum;

- HSEQ Incidents / Accidents

- Near-misses
- Tool Box Talk
- Manning Statistics

Auditing: Auditing shall be undertaken by the Contractor, Contract Sponsor and HSEQ as defined in the Contract and the Contractors HSEQ Plan.

A process of corrective action tracking shall be in place in the event that areas of non-compliance are identified. Depending on the Scope of Work, formal audits and audit reporting may also be required.

10.3 Contract Closeout:

After completion, a Contract HSEQ review shall be prepared that provides a formal record and a concise history of the contractor's HSEQ performance and capture learning's that can be applied to future contracts. The review should derive the majority of its content from factual documentation collected during the duration of the contract and lodged with Supply and Chain for future reference.

11.0 Responsibilities:

11.1 Contract Sponsor:

- Shall be responsible for ensuring that this Procedure is implemented for their assigned contract.
- Shall be responsible to conduct regular audit, inspections in conjunction with Corporate HSEQ Department.
- Shall gather the relevant HSEQ documents from the contractor as mentioned in the procedure or as and when required basis.

11.2 Corporate HSEQ Department:

- Shall assist the contract sponsor to conduct the inspections, audits.
- Shall analyze the HSEQ Data received from the contract sponsor for the continuous improvement in the HSEQ System.
- Shall analyze the contracts / tenders with respect to HSEQ Management System prior to the award of contracts.

11.3 Contractor:

- Shall be responsible to conduct regular internal audit, inspections, tool box talks, etc as per company policy.
- Shall provide the HSEQ Data on regular basis as mentioned in the procedure.
- Shall be responsible to provide the HSEQ Resources (PPEs, SPEs, training) to all staff involved in the activity.

12.0 APPLICABILITY

- All Management and non-management staff – KESC.
- 3rd Party contractual.

13.0 FORMS / DOCUMENTS

KESC-SP-022-F01 ---------- Contractor Self Evaluation Form.

KESC-SP-022-F02 ---------- Equipment Inspection Checklist.

10.8.18
AMIR ZAFAR
Director-Corporate HSEQ
KESC Ltd.

Prepared By;

HSEQ Department

Tabish Gauhar
Chief Executive Officer
KESC Ltd.

Approved By;

CEO

Contract Sponsor TO FILL THIS SECTION OUT

Name of Contracting Organization:

Contract Sponsor:

Contractor Scope of Work:

(Provide a brief description of the work the contractor is to undertake, including any specific HSEQ critical tasks).

_____

_____

_____

KESC Contact: _____ _____ Date Issued: _____/_____/_____

CONTRACTOR INSTRUCTIONS:

Review each of the items below and circle the option which best represents your Company's performance. Where appropriate attach examples to demonstrate that choice such as a policy document or a procedure. You can add qualifying comments in the box provided beneath each item.

1. Health, Safety, Environmental and Quality (HSEQ) Policy Statement:

A: No written policy exists

B: A policy statement exists but it has no specific commitments and is not issued for all employees to see.

C: A policy exists and is distributed but there is no definitive commitment to performance targets.

D: Policy clearly establishes commitment to specific performance targets, is signed by a responsible company officer and is issued for all employees to see.

COMMENTS:

2. Health, Safety, Environmental & Quality (HSEQ) Management Manual:

A: Doesn't exist

B: A few basic HSEQ procedures exist but they are not controlled or collated in a manual.

C: A manual exists with some procedures that may or may not be controlled but are not widely available.

D: A comprehensive manual exists with controlled procedures that are available for employees to use.

COMMENTS:

3. Health, Safety, Environmental and Quality Rules:

A. No written rules.

B. Some HSEQ rules have been developed in memo/document form but have not been widely distributed.

C. HSEQ rules developed and issued but no follow up for enforcement.

D. Comprehensive HSEQ rules developed and issued to employees. Disciplinary action established for infraction of HSEQ rules.

COMMENTS:

4. Organisational Roles and Responsibilities for HSEQ:

A. No assignment to any specific person. No responsibility devolved to front line supervisors.

B. Responsibility is assigned to a specific person (non HSEQ specialist). Front line supervisors not responsible for HSEQ

C. Professional(s) on staff or responsibility is part of another position. Responsibilities not well defined. Front line supervisors are responsible for HSEQ.

D. Professional(s) on staff with well defined role and responsibilities. Front line supervisors exercise responsibilities for HSEQ.

COMMENTS:

5. Personnel Sourcing:

A. Basic labour hire service, adhoc hire.

B. Few core staff, with adhoc labour hire as required. Less than 50% of staff are permanent.

C. Core staff with peaks covered by sub contractor hire.

D. Majority core staff or long-term contractors. Low staff turnover.

COMMENTS:

6. Recruitment and Personnel Records:

A. None.

B. Basic details only including name and addresses.

C. Basic personnel details plus employment health testing in accordance with legal requirements of permanent staff; qualifications of all staff on record.

D. For all staff there exists employment health checks, in accordance with legal requirements; record of training, reference checks, drivers licence, next of kin personal details, etc.

COMMENTS:

7. New Employee Orientation Program

A. No formal program.

B. Verbal instructions on Company procedures only.

C. Orientation booklet provided for new employee, but no on-the-job orientation by the Supervisor.

D. Employee handbook provided and Supervisor outlines, explains and demonstrates new employee's job Follow up.

COMMENTS:

8. Health, Safety and Environmental Training Program:

A. No HSEQ training established.

B. On site basic training conducted occasionally.

C. Training is given for specialised operations but no routine training conducted.

D. Formal training programs have been developed and are conducted on a regular basis. Retraining periods are established. Records maintained.

COMMENTS:

9. Personal Protective Equipment:

A. Not used unless prompted.

B. Staff use some PPE some of the time.

C. Staff use appropriate PPE most of the time.

D. Correct PPE is always available and used.

COMMENTS:

10. HSEQ Meeting Program:

A. None, or on rare occasions.

B. Periodic HSEQ meetings for special operations only.

C. HSEQ meetings held on a routine basis but are mainly attended by supervisors with little employee involvement or insufficient records exist.

D. HSEQ meetings performed on regularly scheduled basis by Supervisor or HSEQ rep and include employee representatives. Records kept & actions followed up.

COMMENTS:

11. HSEQ Inspection Program (relevant to Contractors premises only):

A. No program to identify and evaluate workplace hazardous practices and/or conditions.

B. Ad hoc, informal inspections take place from time to time. No records kept.

C. Periodic inspections are conducted but mainly by management with insufficient recording and follow up.

D. Periodic inspections are conducted by management and employees with records kept and hazards eliminated.

COMMENTS:

12. Inspection of Equipment:

A. None or informal.

B. Basic inspection, electrical equipment in date and tagged. Hand tools in good condition.

C. As for previous plus an inspection procedure is in place for hire equipment.

D. Routine inspections done, records available and corrective actions closed out.

COMMENTS:

13. Hazard Identification Systems:

A. Not used.

B. Basic hazard identification systems exist but not documented or formalised.

C. Hazard identification systems such as job HSEQ analysis, task analysis, tool box meetings exist and are sometimes used and not well documented.

D. Hazard identification systems such as job HSEQ analysis, task analysis exist in documented form and are regularly used. Tool box meetings are held on contract sites.

COMMENTS:

14. Accident/Incident Reporting Procedure:

A. No procedure exists.

B. Written procedure requiring basic reporting of personal injuries only.

C. Written procedure requiring reports on all accidents/incidents but no database to track actions and insufficient root cause analysis.

D. Procedure exists with database to track outstanding actions. Copies of reports sent to relevant companies (eg. KESC). Supervisory investigation required to determine and correct root causes of all incidents and near misses.

COMMENTS:

15. HSEQ Performance and Records:

A. No records.

B. A basic understanding of injury reporting is evident and some records kept.

C. Some statistics are recorded and tracked but not made available to employees.

D. Statistics such as Incident frequency rates and injuries are recorded and performance is graphed for employees to see.

COMMENTS:

16. International Certification **Yes** **No**

A. Is your company certified against?

B. ISO 14001 specifications?

C. OHSAS 18001 specifications?

D. SA 8000 specifications?

COMMENTS:

Date completed: _____/_____/_____

Name of Contractor's Representative: _____

Please return this form with all relevant information and evidence documents to the KESC contact Office. That person will arrange with you a suitable date to have an evaluation meeting.

CRANE CHECKLIST

Equipment / Tag No. _____ Capacity / Rating : _____

	ACCEPTABLE		REMARKS
	YES	NO	
1. CERTIFICATES			
VALIDITY / TRACEABILITY OF EQUIPMENT / THIRD PARTY CERTIFICATION			
OPERATOR / DRIVER CERTIFICATION *(Validity of card / License / Competency with regards to load chart, operating procedures, safety devices)*			
2. STATIC			
HOOKS *(No deformation / cracks & safety latch / catch is must, swivel moves freely)*			
WIRE ROPE *(See for kinks, corrosion, broken strands, lubrication)*			
PHYSICAL LOCKING SYSTEM *(Disables and isolate free fall)*			
POWER SUPPLY ISOLATION POINT *(In case of electrical crane)*			
FALL PROTECTION SYSTEM *(Ergonomically acceptable)*			
PULLEYS *(Sheave deformation, any visible cracks, deformation)*			
SLINGS, SHACKLES, TACKLES *(SWL Marked, condition)*			
LIMIT SWITCHES *(Also called Anti Two block device & is a must item)*			
DUTY CHART *(Load / Radius Chart / Crane Manual)*			
TYRE CONDITION *(Condition and inflation, 1/6" Tread @ least)*			

	ACCEPTABLE		REMARKS
	YES	NO	
BOOM *(Structure, straightness, any local welding, repair evidence)*			
BOOM ANGEL INDICATOR *(Accuracy / Condition)*			
BOOM LIMIT SWITCH ALARM			
SWING ALARM *(Must for the counter weight those protrude crane's body)*			
REVERSING ALARM *(Horn should be working)*			
SPARK FLAME ARRESTOR*			
SEAT BELTS *(Mandatory while driving and not while load lifting)*			
OUT RIGGERS ***(Any leakage, damage, cylinders, rod seals or bolting valves, valves for proper operation, feet, hydraulic hoses condition)***			
BASE PLATE FOR OUT RIGGER *(Size and outlook)*			
BATTERY *(Installation fixing)*			
WARNING SIGN AGAINST INTERRUPTION OF THE OPERATOR.			
SWL SAFE WORKING LOAD (Clearly marked and visible)			
ENGINE / DIFFERENTIAL (Leakages)			
Fire Extinguisher *(Seal, marking, gauge, body, fixing)*			
RUNNING			
ABNORMAL SOUND			
VIBRATION			
EXHAUST PIPE *(Engine smoke)*			
BRAKES			
VISIBLE HYDRAULIC HOSES			
EXTERNAL LIHTING *(Load cells, load moment indicator, External rated capacity lighting, brake, reverse and side indicators)*			

	ACCEPTABLE		REMARKS
	YES	NO	
LEVERS *(Operational, function tested)*			
BOOM HYDRAULIC JACK *(Seepage, fully open and close)*			
OBSERVATIONS (IF ENTRY REFUSED)			

CHECKED BY (Contractor Representative) Name / Sign:_____	**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

LEGEND

* FOR HAZARDEOUS AREA

** NECESSARY FOR DRIVERS CABIN

TRUCK / FLAT BED TRUCK / LOW BED TRAILER / DUMPER / VEHICLE CHECKLIST

Equipment / Tag No. _____

	ACCEPTABLE		REMARKS
	YES	NO	
1. STATIC			
LIGHTS			
HOOKS FOR SECURING LOAD / SIDE SUPPORTS / CARGO BARRIERS**			
REAR VIEW MIRROR			
REVERSE LIGHT INDICATOR / ALARM (AUTO WORKING)			
BRAKE LIGHTS			
DIESEL DRIVEN			
TYRE CONDITION			
TOW HOOKS & CHOKE BLOCKS			
LOOSE PARTS (SECURE)			
INDICATORS			
FLAME ARRESTOR*			
VALIDITY OF LICENSE			
SEAT BELTS *(for all passengers)*			
FIRE EXTINGUISHER			
FIRST AID KIT			
COMMUNICATION *(Radio / Mobile phone)*			
TOOL BOX KIT			
TOP PLATE (FIFTH WHEEL / KING PIN) **			
LEAF SPRING			
EXHAUST EMISSION MONITORING			
2. RUNNING			
EXHAUST PIPE WITH SPARK ARRESTOR*			
BRAKES			
ABNORMAL SOUNDS			
OIL & WATER LEAKS			
HYDRAULIC SYSTEM CONDITIONS			
BATTERY *(Installation fixing, damaged or corrosive terminals, terminal covers)*			

	ACCEPTABLE		REMARKS
	YES	NO	
OBSERVATIONS (IF ENTRY REFUSED)			

CHECKED BY (Contractor Representative) Name / Sign:_____	**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

LEGEND

* REQUIRED FOR HAZARDEOUS AREA

** NOT APPLICABLE FOR TOYATA PICK UP & DUMPER

WELDING MACHINE CHECKLIST

Equipment / Tag No. _____ Capacity / Rating: _____

	ACCEPTABLE		REMARKS
	YES	NO	
1. STATIC			
POLARITY MARKED			
AMMETER			
VOLT METER			
WELDING CABLE CONDITION			
HOLDER			
EARTH CLAMP			
EARTH CABLE CONDITION			
SAFETY GAURDS ON ROTARY PARTS / BELTS / PULLEYS			
WIRING			
BATTERY WITH TERMINAL COVERS			
FLAME ARRESTOR*			
TYRES CONDITION			
TOW HOOKS CONDITION			
GROUNDING RODS			
VRD (Voltage Reducing Device)			
OVERALL CONDITION			
ANY OTHER HAZARD IDENTIFIED			
2. RUNNING			
LEAKS OIL / WATER			
ABNORMAL SOUND			
VIBRATION			
ON / OFF SWITCH			
SAFET STARTING SYSTEM			
OBSERVATIONS (IF ENTRY REFUSED)			

	ACCEPTABLE		REMARKS
	YES	**NO**	
CHECKED BY (Contractor Representative) Name / Sign:_____			**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

LEGEND

* REQUIRED FOR HAZARDEOUS AREA

CUTTING TORCH CHECKLIST

Equipment / Tag No. _____

	ACCEPTABLE		REMARKS
	YES	NO	
1. STATIC			
PRESSURE GAUGE AND REGULATOR ON CYLINDER			
CUTTING TORCH CONDITION			
HOSE CONDITION			
CYLINDER TROLLEY AND CHAIN			
HOSE CLAMPING (JUBILEE CLAMPING NOT ACCEPTABLE) – HYDRAULIC PUNCHING			
CUTTING TORCH TIPS			
FLASH BACK ARRESTOR (OXYGEN / ACCETELENE) BOTH ENDS			
CYLINDER KEY / FIXED SPANNER / LIGHTER & TIP CLEANER			
CONDITION OF CYLINDER			
CONDITION OF CYLINDER THREADS / LEAKAGE			
SPARK LIGHTER FOR IGNITION.			
OBSERVATIONS (IF ENTRY REFUSED)			

	ACCEPTABLE		REMARKS
	YES	NO	
CHECKED BY (Contractor Representative) Name / Sign:_____			**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

POWER GENERATORS CHECKLIST

Equipment / Tag No. _____

	ACCEPTABLE		REMARKS
	YES	NO	
1. STATIC MECHANICAL			
DIESEL DRIVEN			
BATTERY TERMINAL WITH COVER			
GUARDS ON MOVING PARTS			
FLAME ARRESTOR / EXHAUST SILENSOR PERSONAL PROTECTED			
TYRE-TROLLEY CONDITION			
2. ELECTRICAL			
ELECTRIC WIRING CONDITION			
AMMETER			
VOLT METER			
BREAKER *(Required Amperage)*			
BATTERY TERMINAL WITH COVER			
PROTECTION *(Overload / short-circuit)*			
PROTECTION *(Reverse power / earth fault for heavy duty only)*			
WEATHER PROTECTED TERMINAL BOX & ELECTRICAL PANEL			
CABLE GLANDS FOR CABLE ENTRY			
ANY OTHER HAZARD IDENTIFIED & EVALUTED			

	ACCEPTABLE		REMARKS
	YES	NO	
3. RUNNING			
ABNORMAL SOUND			
VIBRATION			
OIL AND WATER LEAKS			
EXHAUST EMISSION MONITORING			
OBSERVATIONS (IF ENTRY REFUSED)			

CHECKED BY (Contractor Representative) Name / Sign:_____	**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

GRINDERS / DRILL MACHINE CHECKLIST

Equipment / Tag No. _____

	ACCEPTABLE		REMARKS
	YES	NO	
GENERAL			
CABLE CONDITION			
NO JOINT / PROPER INSULATED LEAK PROOF			
SOCKETS (THREE PIN RECEPTACLE TYPE)			
PLUGS (THREE PIN RECEPTACLE TYPE)			
SPANNER KEYS			
FAIL TO SAFET MODE			
GRINDING DISC FIT FOR PUPOSE AND COMPATABLE WITH MACHINE SPEED			
GUARDS IN GOOD CONDITION AND IN PLACE			
EARTHING ARRANGEMENT			
CARBON BUSHES (SPARK GENERATION NOT ALLOWED)			
ANY OTHER HAZARD IDENTIFIED & EVALUATED			
OBSERVATIONS (IF ENTRY REFUSED)			

	ACCEPTABLE		REMARKS
	YES	NO	
CHECKED BY (Contractor Representative) Name / Sign:_____			**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

HYDRO TEST PRESSURE PUMP CHECKLIST

Equipment / Tag No. _____

	ACCEPTABLE		REMARKS
	YES	NO	
1. STATIC			
DIESEL DRIVEN / MOTOR			
ELECTRIC WIRING CONDITION (NO JOINS / INSULATED / LEAK PROOF)			
BATTERY TERMINALS WITH COVERS			
GAURDS ON MOVING PARTS			
CALIBRATED PSV INSTALLED ON DISCHARGE LINE *(Certificates for PSV)*			
FLAME ARRESTOR*			
ELCB (EARTH LEAKAGE CIRCUIT BREAKER)			
RATED FITTINGS & HOSE CONDITION			
EARTHING ARRANGEMENTS			
MOTOR / ENGINE (WEATHER PROOF / CABLE GLAND)			
TYRES TROLLEY CONDITION			
ANY OTHER HAZARD IDENTIFIED & EVALUATED			
2. RUNNING			
VIBRATION			
PLUNGER BOX (STUFFING BOX) LEAKS			
ABNORMAL SOUND			

	ACCEPTABLE		REMARKS
	YES	NO	
OIL LEAKAGE			
OBSERVATIONS (IF ENTRY REFUSED)			

CHECKED BY (Contractor Representative) Name / Sign:_____	**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

LEGEND

* REQUIRED FOR HAZARDEOUS AREA

FIRE EXTINGUISHER CHECKLIST

Equipment / Tag No. _____ **Type:** CO_2 DRY POWDERE OTHER

	ACCEPTABLE		REMARKS
	YES	NO	
GENERAL			
GENERAL CONDITION (DENTS / COOROSION OR PITTING)			
GAUGE PRESSURE			
OPERATING INSTRUCTION LABEL			
HOSE CONDITION			
DISCHARGE NOZZEL CONTROLLER			
SEAL ON LOCKING PIN			
LOCKING PIN			
FOR C02 FIRE EXTINGUISHER, CHECK WEIGHT			
THE WEIGHT SHOULD BE MARKED ON THE FIRE EXTINGUISHER BY THE MANUFACTURER			
ANY OTHER HAZARD IDENTIFIED & EVALUATED			
OBSERVATIONS (IF ENTRY REFUSED)			

	ACCEPTABLE		REMARKS
	YES	NO	
CHECKED BY (Contractor Representative) Name / Sign:_____			**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

MIXER MACHINE CHECKLIST

Equipment / Tag No. _____

	ACCEPTABLE		REMARKS
	YES	NO	
1. STATIC			
DIESEL DRIVEN / MOTOR			
BUCKET & SLING CONDITION			
CHAIN TIGHTNESS			
TOW HOOKS			
TYRE CONDITION			
LOOSE PARTS			
FLAME ARRESTOR*			
GUARDS ON MOVING PARTS			
GEAR SHAFT CONDITION			
ELECTRICAL WIRING CONDITION			
ANY OTHER HAZARD IDENTIFIED & EVALUATED			
2. RUNNING			
ABNORMAL SOUND			
VIBRATION			
EXHAUST PIPE CONDITION			
OIL & WATER LEAKS			
BATTERY TERMINAL COVER			
OBSERVATIONS (IF ENTRY REFUSED)			

	ACCEPTABLE		REMARKS
	YES	NO	
CHECKED BY (Contractor Representative) Name / Sign:_____			**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

LEGEND

* REQUIRED FOR HAZARDEOUS AREA

LOADER / DOZER / GRADER / BACKHOE CHECKLIST

Equipment / Tag No. _____

	ACCEPTABLE		REMARKS
	YES	NO	
1. STATIC			
CHAIN TRACK TIGHTNESS & CONDITION			
TOW HOOKS			
REVERSING ALARM (AUTO) / INDICATION LIGHTS			
REAR VIEW MIRROR			
TYRE CONDITION			
TIE ROD			
LOOSE PARTS (SECURE)			
FLAME ARRESTOR			
VALIDITY OF LICENSE			
SEAT BELTS			
BUCKET / BLADE & PLOUGH CONDITION			
FIRE EXTINGUISHER			
BATTERY CONDITION			
ELECTRICAL WIRING			
ANY OTHER HAZARDS IDENTIFIED & EVALUATED			
2. RUNNING			
ABNORMAL SOUND			
LIGHTS / INDICATORS			
HYDRAULIC SYTEM CONDITION			
BRAKES			
EXHAUST PIPE			
OIL AND WATER LEAKS			
VIBRATION			

	ACCEPTABLE		REMARKS
	YES	NO	
OBSERVATIONS (IF ENTRY REFUSED)			

CHECKED BY (Contractor Representative) Name / Sign:_____	**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

COMPRESSOR CHECKLIST

Equipment / Tag No. _____ Capacity / Rating: _____

	ACCEPTABLE		REMARKS
	YES	NO	
1. STATIC MECHANICAL			
PRESSURE GAUGE			
PSV ON DISCHARGE LINE			
HOSE CONDITION			
EXTERNAL CONDITION FOR PRESSURE TANK CORROSION / DENTS			
TYRE CONDITION			
DRAIN VALVE ON PRESSURE TANK			
FLAME ARRESTOR (VISIBLE)			
GUARDS ON MOVING PARTS			
QUICK OPEN & CLOSE HOSE CLAMP WITH LOCK PIN / WHIP CHICK			
TOW HOOKS			
OVERALL CONDITION			
2. ELECTRICAL			
BATTERY WITH TERMINAL COVER			
CABLE CONDITION			
TERMINATION (LOOSE PARTS)			
PRESSURE SWITCH / UNLOADER			
MOTOR WITH OVERLOAD PROTECTION (IN CASE OF ELECTRICAL DRIVEN)			
MOTOR (WEATHER PROOF / CABLE GLAND)			

	ACCEPTABLE		REMARKS
	YES	NO	
3. RUNNING			
ABNORMAL SOUND			
VIBRATION			
OIL AND WATER LEAKS			
EXHAUST PIPE			
VERIFY LOADING & UNLOADING OF COMPRESSOR			
EMERGENCY SHUTDOWN SWITCHES			
OBSERVATIONS (IF ENTRY REFUSED)			

CHECKED BY (Contractor Representative) Name / Sign:_____	**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

TRACTOR / TROLLEY CHECKLIST

Equipment / Tag No. _____

	ACCEPTABLE		REMARKS
	YES	NO	
1. STATIC			
TROLLEY / BLADE / PLOUGH CONDITION			
LINKS WITH TRACTOR ATTACHEMENTS (LOCK PIN)			
REAR VIEW MIRRIOR			
INDICATORS & LIGHTS			

	ACCEPTABLE		REMARKS
	YES	NO	
REVERSING ALARM (AUTO WORKING)			
TIE ROD (TOW) / AXLES			
TYRE CONDITION			
WIRING			
LOOSE PARTS (SECURED)			
HOOKS FOR SECURING LOAD			
BRAKES AND LIGHTS			
FLAME ARRESTOR			
VALIDITY OF LICENSE			
BATTERY TERMINAL WITH COVERS			
ANY OTHER HAZARD IDENTIFIED & EVALUATED			
2. RUNNING			
ABNORMAL SOUND			
STARTING SYSTEM			
OIL AND WATER LEAKS			
BRAKES			
HYDRAULIC SYSTEM			

OBSERVATIONS (IF ENTRY REFUSED)

CHECKED BY (Contractor Representative)

Name / Sign:_____

Approved By (KESC Representative)

Name / Sign:
_____

Approval Date:
_____

Valid up to:
_____

ELECTRICAL CONNECTION BOARDS / PANELS

Equipment / Tag No. _____

	ACCEPTABLE		REMARKS
	YES	NO	
GENERAL			
ELECTRIC BOARD CLOSABLE			
CABLE CONDITION (CABLE GLAND FOR CABLE ENTRY)			
NO JOINT / PROPER INSULATED LEAK PROOF			
SOCKET (THREE PIN / RECEPTACLE TYPE)			
LIGHTS FIXTURE (SHOULD BE ENCLOSED)			
EQUIPMENT GROUNDING			
BREAKER (REQUIRED AMPERAGE)			
ELCB (EARTH LEAKAGE CIRCUIT BREAKER)			
DOUBLE INSULATED			
COVERED WITH WOODEN BOX			
ANY OTHER HAZARD IDENTIFIED & EVALUATED			
OBSERVATIONS (IF ENTRY REFUSED)			

	ACCEPTABLE		REMARKS
	YES	NO	
CHECKED BY (Contractor Representative) Name / Sign:_____			**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

SIDE BOOM CHECKLIST

Equipment / Tag No. _____

	ACCEPTABLE		REMARKS
	YES	NO	
1. STATIC			
THIRD PARTY CERTIFICATION OF EQUIPMENT / LOAD CHARTS			
HOOKS WITH SAFETY LATCH			
WIRE ROPE			
PULLEYS AND DRUMS			
AXLES			
TOW HOOKS			
SLING / SHACKLE & BELTS CONDITION / CERTIFICATION			
CHAIN TRACK CONDITION			
FLAME ARRESTOR			
COUNTER WEIGHT (DEAD WEIGHT)			
BOOM CONDITION			
BOOM LIMIT SWITH (ALARM)			
ROLLER (PIPE CRADLE)			
HYDRAULIC LEVER (FUNCTION & TESTING)ROLLER (PIPE CRADLE)			
BATTERY TERMINAL WITH COVERS			
LIGHTS & INDICATORS			
2. RUNNING			
ABNORMAL SOUND			
STARTING SYSTEM			
OIL AND WATER LEAKS			
EXHAUST PIPE			
HYDRAULIC SYSTEM / BRAKES / HOSE CONDITION			

	ACCEPTABLE		REMARKS
	YES	NO	
OBSERVATIONS (IF ENTRY REFUSED)			

CHECKED BY (Contractor Representative) Name / Sign:_____	**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____

FORKLIFT CHECKLIST

Equipment / Tag No. _____

	ACCEPTABLE		REMARKS
	YES	NO	
1. STATIC			
THIRD PARTY CERTIFICATION OF EQUIPMENT / LOAD CHARTS			
SWL or WLL *(Clearly Marked and Visible)*			
FORK *(Condition, wear tear, deformation, cracks)*			
FORK SLIDING *(Condition)*			
CHAIN *(Condition of links)*			
FLAME ARRESTOR			
HYDRAULIC SYSTEM / JACK *(Condition, leakage, seepage)*			
LEVER *(Function testing)*			
TOW HOOKS / HITCH			
SEAT BELTS			
BRAKE SYSTEM			
TYRE CONDITION			
BATTERY TERMINAL WITH COVERS			
LIGHTS & INDICATORS			
2. RUNNING			
ABNORMAL SOUND			
STARTING SYSTEM			
OIL AND WATER LEAKS			
EXHAUST PIPE			
HYDRAULIC SYSTEM / BRAKES / HOSE CONDITION			

	ACCEPTABLE		REMARKS
	YES	NO	
OBSERVATIONS (IF ENTRY REFUSED)			

CHECKED BY (Contractor Representative) Name / Sign:_____	**Approved By** (KESC Representative) Name / Sign: _____ Approval Date: _____ Valid up to: _____