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1 EXECUTIVE SUMMARY

This executive summary presents the main findings of Environmental Impact Assessment (EIA) of Installation/ Construction of 132 KV Grid Station at Lahore Motorway City (Ex-Green View Cooperative Housing Society) by M/S Renaissance International Pvt. Ltd located at 14-Km, Lahore-Sheikhupura Road, Tehsil Ferozwala, District Sheikhupura. The main objective of this proposed project is to provide an electricity of 132 KV for consumers of Lahore Motorway City.

1.1 Title & location of project

Installation/ Construction of 132 KV Grid Station at Lahore Motorway City (Ex-Green View Cooperative Housing Society) by M/S Renaissance International Pvt. Ltd at 14-Km, Lahore-Sheikhupura Road, Tehsil Ferozwala, District Sheikhupura.

1.2 Name of proponent

Ejaz Mahmood S/o Mushtaq Ahmad

R/O House no. 179-A, Street no. 6, DHA Phase-I, Lahore Cantt, District Lahore

CNIC No: 37405-3108165-3

1.3 Name of organization preparing the report

M/s Renaissance International (Pvt.) Ltd has engaged Environtech Consultants (Private) Limited at office no. 11, Second Floor, Centre Point Plaza, Main Boulevard, Gulberg-III, Lahore. Contact: 0303-4342302.

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Table 1: Salient features of project

Salient features of project		
1.	Total Area	16 Kanals
2.	Cost of the project	Pkr/- 2000 million approx.
3.	Location of project	31°39'01.2"N 74°13'51.8"E
4.	Capacity of the project	30.726 MW
5.	Surroundings of area	North Road + open plot South Road + open plot East open plot West Road

6.	Details of equipment	Power Transformer, GIS Switchgear (comprising of Air Bushings, 145 KV Voltage Transformer, Isolator, earthing switch, circuit breaker, current transformer), surge arresters, Power cables (15kV, with Copper conductor), Earth fault relay, Distance Relay, Differential Relay, Ammeter, Volt meter, Power factor meter and DPM, 11 KV Switchgear Panels
7.	Description of proposed project	The proposed project is the establishment / installation of 132 KV GIS Consumer Grid Station over an area of 16 Kanals. The proposed installation of grid station will take load from transmission line of 132 KV through power transformer for consumers of Lahore Motorway City. The energy will be supplied through transmission line already passing besides the proposed project site.

1.4 A brief outline of proposal (type, process, technology and land requirements)

As per Punjab Environmental Protection Act 1997 (amended 2012) and Initial Environmental Examination (IEE) & Environmental Impact Assessment (EIA) Regulations, 2022 proposed project falls under ***Category A (2) "Transmission lines and grid stations"*** mentioned in Schedule-II. Thus, requires an EIA.

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The current project is about installation of grid station. Site selected for proposed project is under the ownership of applicant which has been transferred to LESCO. It is an environmentally friendly project to supply electricity for residents of Lahore Motorway City. The estimated project cost is **PKR 2000 million approx.** The project under consideration of this EIA is the Installation/ Construction of 132 KV Grid Station at Lahore Motorway City (Ex-Green View Cooperative Housing Society) by M/S Renaissance International Pvt. Ltd at 14-Km, Lahore-Sheikhupura Road,

Tehsil Ferozwala, District Sheikhupura. Beyond this scope no other development activities have been covered in this EIA study.

1.5 The major impacts & recommendations for mitigation measures

The potential impacts associated with the proposed project construction and operation activities Included: increase in water consumption; air pollution from vehicle; vehicle movement, noise and disturbance, soil contamination and waste generation. Proposed installation of grid station to be laid on concrete foundations, control house building and GIS Hall. The machinery installation does not require water while only water use will be during civil works and domestic activities. Water conservation practices will be utilized to reduce the overall water consumption during proposed project activities.

The ambient air quality of the area can be affected by exhaust emissions of vehicles. The emissions include sulphur dioxide, oxides of nitrogen, carbon monoxide, carbon dioxide, and particulates. Emission levels depend on the type and size of activity, the type and quality of fuel and the manner in which it is burned. A significant impact will be interpreted if the concentration of pollutants in the ambient air exceeds the PEQS or recognized international guidelines for ambient air quality.

The sources of emissions during construction activities will not be significantly enough to alter the ambient air quality at regional level. Cleaner fuels if required (less 1% Sulphur content) will be preferred to procure. Monitoring of Ambient air parameters and emissions should be carried out on to ensure compliance with the PEQS.

Noise has the potential to cause an impact to nearby communities and working personnel. To avoid the impact of noise, it will be ensured that, vehicles and other potentially noisy equipment used are in good condition. The noise level monitoring results would be compared with Punjab Environmental Quality Standards (PEQS) for Noise to meet the permissible limits. All on-site personnel will use required personal protective equipment (PPE) in high noise areas that will be clearly marked.

All the waste generated during construction & installation activities will be disposed-off through implementation of an effective waste management plan to ensure that any impact resulting from

waste generation shall be minimal. The recyclable waste will be sold to waste contractors, as per waste management plan. No hazardous chemical will be uncontrollably discharged into the Environment.

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Table 2: Impacts and mitigation measures

Aspect	Impact	Mitigation	Monitoring parameters	Location	Monitoring	Frequency monitoring	Responsibility
Construction phase							
Air	Health affects Reduced visibility on roads	Sprinkling of water Tuning of construction vehicles & machines Dust masks for laborers	Particulate Matter Smoke	All Project locations	Vehicular emissions Dust Ambient air quality	Daily for dust	HSE Manager/ Proponent
Noise	Hearing Loss headache	Avoid working at night Lubrication of construction vehicles Provision of Ear Plugs	Noise levels	All Project locations	Noise monitoring device	As required	HSE Manager/ Proponent
Land & Soil	Erosion Formation of pits due to improper backfilling	Proper backfilling and stone pitching around the excavated site if required	Tree Plantation, surface topography	All Project locations	Visual assessment Photographic evidences	From beginning till completion of project	HSE Manager/ Proponent
Vegetation	Cutting of trees	Avoid unnecessary cutting of trees In case of cutting of trees, one plant should be replaced by 6 plants	No trees will be cut down	All Project locations	Visual assessment Photographic evidences	From beginning till operational phase	HSE Manager/ Proponent

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Water	Wastage and misuse of water	Avoid un necessary use of water Prevent leakages	Water Supply and Use	All Project locations	All Project locations	From beginning till the end of project	HSE Manager/ Proponent
Construction debris	Formation of heaps Remaining concrete material results in hardening of ground surface	Avoid wastage of concrete material Reuse remaining construction material	Quantity and quality of construction material	All Project locations	Visual assessment Photographic evidence	Weekly	HSE Manager/ Proponent
Social Environment	Disturbance to routine market and local business	Specify time scale for construction activities Discussion with local people regarding conflicts if any	Maintenance of complaint register	All Project locations	Review of complaint registration Local consultations	Monthly	HSE Manager/ Proponent
Health and safety	Lack of awareness to general public about safety may lead to accidents	Safety symbols and instructions will be boarded at work sites Trained personnel will be appointed for the specific work	Safety precautions Use of PPE's	All Project locations	Tool box talk Visual assessments Record of PPEs	Daily	HSE Manager/ Proponent

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Proposed monitoring

To monitor actual impacts of the project on selected sensitive receptors so that impacts not anticipated in the EIA or impacts which exceed the levels anticipated in the EIA can be identified and appropriate mitigation measures can be adopted in time. This objective will be achieved through effects monitoring.

Considering the environmental conditions of the project area and the assessment of potential impacts of the project made in the EIA, the following environmental parameters will be monitored at identified locations.

Air Quality Monitoring – Air quality monitoring will be done during the construction and operation phase of the project at the representative locations. Ambient air quality parameters will include NO_X, SO_X, CO and PM_{10},

Water Quality Monitoring – Ground water quality monitoring will be done during the construction and operation phase of the project at the representative locations.

Groundwater Quality Parameters: Total Coliforms, Total Colonial Count, E-Coli, pH, TDS, Total Hardness, Nitrate, Chloride, Fluoride, Colour, Manganese, Aluminium, Chromium, Cadmium, Boron, Barium, Antimony, Arsenic, Mercury, Nickel.

Wastewater Quality Parameters: pH, DO, TSS, Alkalinity, BOD_5, COD, Turbidity.

Noise Monitoring - The monitoring will be carried out at key locations covering all receptors

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2 SCREENING

According to the Section 12 of Punjab Environmental Protection Act, 1997 (amended 2012) which states;

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

As per Punjab Environmental Protection Act 1997 (amended 2012) and Initial Environmental Examination (IEE) & Environmental Impact Assessment (EIA) Regulations, 2022 proposed project falls under ***Category A (2) "Transmission lines and grid stations"*** mentioned in Schedule-II. Thus, requires an EIA Report is being prepared for duly submission in EPA, Punjab.

2.1 EIA process

2.1.1 Overview of EIA

EIA is a systematic process to identify, predict and evaluate the environmental impacts of proposed actions and projects. The process is applied prior to major decisions and commitments being made. Wherever appropriate, social, cultural and health effects are considered as an integral part of EIA. Particular attention is given to practical implementation of EIA to prevent and mitigate significant adverse effects of proposed undertakings.

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2.1.2 Objectives of EIA

The overall objective of the EIA is as follows:

- Description of the proposed project, including an estimate of emissions, effluent and waste and consideration of the project alternatives;
- Identify and investigate all impacts of the proposed project on the physical, biological, and socio- economic environment;
- Evaluation of the baseline environmental conditions in the impact zone to provide a basis for assessing the incremental impacts of the proposed project, including existing pollution levels

and nuisance conditions;

- Identification and assessment of the potential impacts on the environment during each of the project phases;
- To propose mitigation measures that would help the Project Proponent in conducting the operation in an environmental sustainable manner; and
- To develop an Environmental Management Plan that would assist the Project Proponent in the effective implementation of the recommendations of the EIA.

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3 SCOPING

Project land is owned by LESCO. Impacts have been assessed for the immediate and direct area of influence of the project defined as:

- Immediate Area of Influence: Within the proposed project site boundary.
- Direct Area of Influence: Within 5 Km from the proposed project site boundary.

Effects on socioeconomic receptors and resources have been assessed for the construction and operational phases of the proposed project. The proposed project activities are predicted to last for a period of 12 months within which the potential impacts have been assessed. The operational impacts have been assessed for the entire lifespan of the facility. The impacts related to the decommissioning of the proposed project will be assessed at the time of decommissioning which will involve carrying out site assessment study at the proposed project location.

Project location is given in below figure:

3.1 Scope of EIA

This consolidated EIA report covers the examination of physical, biological, environmental and socioeconomic impacts of the proposed project

The spatial and temporal scope of the project is described below:

3.1.1 Spatial scope

Impacts have been assessed for the immediate and direct area of influence of the project defined as:

- Immediate Area of Influence: Within the proposed project site boundary.
- Direct Area of Influence: Within 5 Km from the proposed project site boundary.

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3.1.2 Temporal scope

Effects on socioeconomic receptors and resources have been assessed for the construction and operational phases of the proposed project. The proposed project activities are predicted to last for a period of 12 months within which the potential impacts have been assessed. The operational impacts have been assessed for the entire lifespan of the facility. The impacts related to the decommissioning of the proposed project will be assessed at the time of decommissioning which will involve carrying out site assessment study at the proposed project location.

3.1.3 EIA methodology

The EIA project passes through series of stages prior to attaining approval from relevant environmental protection agency. The EIA process and the approach followed for the proposed project is defined below:

3.1.4 Scoping

Scoping is an early stage in the process and is designed to ensure that the environmental studies provide all the relevant information on:

- The impacts of the project, in particular focusing on the most important impacts;
- The alternatives to the project;
- Other environmental sensitivities to be addressed at early stage.

The EIA process started with the scoping study. The purpose of scoping was to identify:

- Important issues to be considered in an EIA;
- Appropriate time and space boundaries of the EIA study;
- Information necessary for decision-making;
- Significant effects and factors to be studied in detail.

The scoping was followed by data collection describes in subsequent section.

3.1.5 Data collection

Following literature reviews and data collection was carried out for EIA:

- A generic description of the proposed project and its related activities was collected from the proponent.
- Legislative review of the applicable laws, regulations, guidelines and standards from literature search.
- Baseline of the area's environmental and socio-economic settings was collected through literature search and field surveys.

3.1.6 Baseline

The environmental impact is measured through a change in the environment, resulting from a designated action or activity. In order to identify such a change, it is essential to have as complete as practicable understanding of the nature of the existing environment, prior to its interaction with the proposed activity. This translates into the need to characterize the existing baseline

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environmental conditions, including establishing prevailing conditions for a range of environmental media, particularly air, water, soil and groundwater, flora and fauna and the human environment. This was achieved through a detailed review of all secondary resources (i.e. existing documentation and literature); and the undertaking of project specific baseline studies and surveys to collect supplementary data in the following areas:

- Geology;
- Flora and fauna;
- Water quality characteristics;
- Traffic;
- Ambient air quality;
- Noise conditions;
- Socio-economic conditions;
- Archaeology.

Both the existing secondary sources and literature studies were conducted and integrated into one coherent description of baseline characteristics.

3.1.7 Evaluation of alternatives

To establish an environmentally sound preferred option for achieving the objectives of the proposed project, different alternatives including site selection, and technology alternatives were studied in collaboration with the project proponent. Technology selection was made taking in to consideration environmentally, economically and socially suitable as well as technically feasible options.

3.1.8 Stakeholder consultation

Stakeholder consultation was carried out for the proposed project with primary and secondary stakeholders of the project. Following steps were involved to attain stakeholder consent:

- Providing information on the proposed project activities;
- Identifying the stakeholders concerns, expectations and apprehensions about the proposed project;
- Summarizing the process outcome.

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3.1.9 Impact assessment and mitigation

The information collected in the previous phases was used to assess the potential environmental impacts of the proposed project activities. The impact assessment approach is provided in below table**.** Impacts of project activities on environment. The issues studied during impact assessment include potential impacts on:

- Physical environment of the area
- Biological environment of the area
- Socio-economic environment of the area

Impact Characteristics	Categorise
Nature of the Impact	**Direct:** The environmental parameter is directly changed by the project. **Indirect:** the environmental parameter changes as a result of change in another parameter.
Duration of the impact	**Short term:** Lasting only till the duration of the project such as noise from the construction activities. **Medium term**: Lasting for a period of few months to a year after the project before naturally reverting to the original condition. **Long term:** Lasting for a period much greater than medium term impacts before naturally reverting to the original condition.
Geographical Location of the impact	**Local:** Within the area of project i.e. operation site and access road. Regional: Within the boundaries of the project area. **National:** Within the boundaries of the country. **Global:** Trans-boundary impacts
Timing	Construction Operation
Likelihood of the impact	**High:** High likelihood of occurrence during lifetime of operation, Regular/continuous part of operations. **Moderate:** Moderate possibility of occurrence during lifetime of operation, Periodic/occasional part of operations. **Low:** Unlikely to occur during lifetime of operation.

Impact Characteristics	Categorise
	Reversible: When a receptor resumes its pre-project condition.

Reversibility of the impact	**Irreversible**: When a receptor does not or cannot resume its pre-project condition.
Significance of the impact	**Major, Moderate, Minor, Negligible and Beneficial** Based on the consequence, likelihood, reversibility, geographical extent, duration, level of public concern and conformance with legislative or statutory requirements.
Consequence severity of impact	**High:** ▪ Serious/catastrophic damage to environment ▪ Direct legislative requirement ▪ Corporate requirement ▪ Serious threat to corporate reputation/profitability/ability to do business. **Medium:** ▪ Measurable damage to the environment ▪ Subject to potential future legislation ▪ Potential to affect reputation/cost ▪ Implication/reduced efficiency **Low:** ▪ Negligible damage to the environment No risk to business

3.2 Important issues and concerns raised during consultation

During consultation it was observed that maximum of people was in favor of project and following issues and concerns were raised. Stakeholder Consultation it is mentioned in detail in **Chapter 10**.

- During survey following concerns of the local community, Government Departments and Environmental Practitioners and experts were noted:
- Nuisance must be controlled.
- Latest/State of the art technology must be adopted.
- Locals should be preferred for the job opportunities.
- Monitoring should be done regularly to comply with PEQS.
- Solid waste should be managed effectively by adopting the standard practices of the area.
- Cleanliness of the area should be ensured.

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- An effective EMMP should be designed and enforced with true spirit.
- Health of the workers should be ensured.

3.3 Significant impacts and factors to be determined

Main impacts and factors to be determined are:

- Occupational Health and safety
- Site Security
- Traffic Management
- Hygiene management
- Job opportunities for locals
- Resource conservation
- Avoid excessive water consumption
- Energy efficient techniques must be adopted
- Proper site restoration after construction
- Tree plantation at designated green areas
- Emergency preparedness

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4 CONSIDERATION OF ALTERNATIVES

This chapter will discuss alterative and their selection and rejection criteria.

4.1 Site alternatives (selection and rejection criteria)

For installation of Grid Station it is important that site must be selected at suitable location where residential area is present and there is requirement of electricity.

- Transportation infrastructure (road network) is available.
- Transmission Line is passing besides the project site.
- The selected site is under the ownership of the LESCO.

4.2 Design/technology alternatives (selection and rejection criteria)

The project technology will be up to date and will also environment and eco-friendly. So, no other technology will be taken under consideration.

4.3 Environmental alternatives (selection and rejection criteria)

Environmental considerations are of utmost importance in selecting site. The project land is owned by LESCO and it is not situated and environmental sensitive area. Thus, there is no ecologically sensitive or declared protected.

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5 DESCRIPTION OF PROJECT

This chapter provides the description of "Installation/ Construction of 132 KV Grid Station at Lahore Motorway City (Ex-Green View Cooperative Housing Society) by M/S Renaissance International Pvt. Ltd" type and category of project, location and layout, vegetation features of site, project schedule of implementation and complete description of proposed project related to its process and steps.

5.1 Type & category of project

As per Punjab Environmental Protection Act 1997 (amended 2012) and Initial Environmental Examination (IEE) & Environmental Impact Assessment (EIA) Regulations, 2022 proposed project falls under ***Category A (2) "Transmission lines) and grid stations"*** mentioned in Schedule-II. Thus, requires an EIA Report is being prepared for duly submission in EPA, Punjab.

5.2 Objectives of project

The objective of this project is to provide Lahore motorway city residents with electricity supply.

- 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 Environmental Protection Agency (EPA), Punjab.

5.3 Location and site layout of project

The project site is at 14-Km, Lahore-Sheikhupura Road, Tehsil Ferozwala, District Sheikhupura. Google Earth map of site is given in **Fig-1** and layout map of the project is given in **Fig-2.**

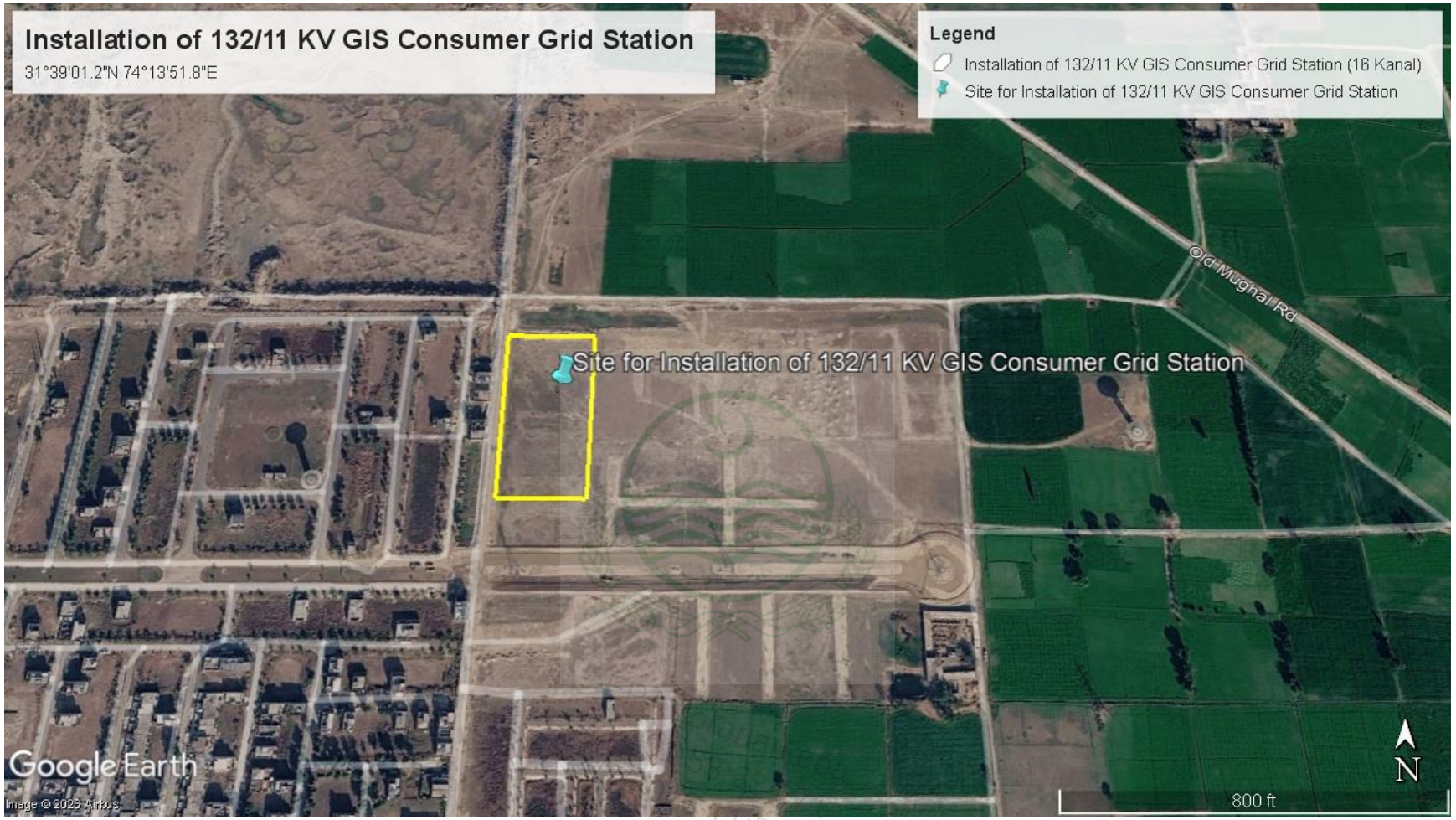

Figure 1: Location map of site

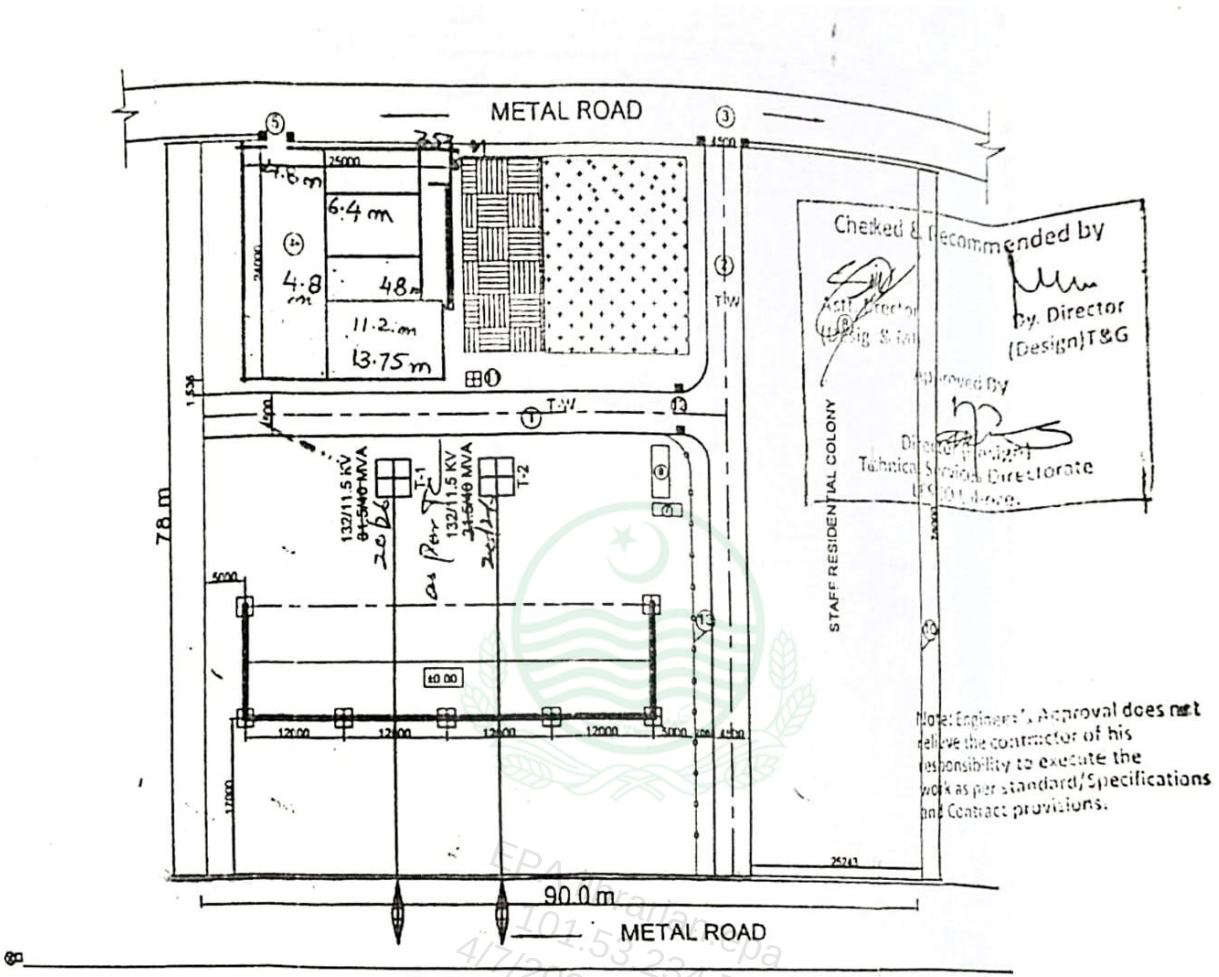

Figure 2: Layout map of project

5.4 Land use on the site

The site is duly approved by LESCO and land is transferred to LESCO. Layout map is attached with report.

5.5 Road access

The site is accessible through the housing society and Old Mughal Road

Figure 3: Road access map

5.6 Vegetation features of the site

There is no vegetation, as the current project site is a vacant plot. However, proponent will make arrangements to plant trees, building green belts, and garden and plant ornamental plants.

5.7 Cost and magnitude of operation

Total cost of the proposed project is estimated to be around **2000 million PKR** which includes the provision of installation, associated amenities and cost for utilities and equipment/machinery. Thus, falls under Schedule II for which Environmental Impact Assessment (EIA) report is required.

5.8 Schedule of implementation

It is projected that the construction phase of entire project will be started after getting environmental approval from EPA Punjab and complete in the period of 12 months. Activities involved are:

- Assessment of environmental impacts and its mitigation measures
- EIA approval, other local issues
- Implementation of recommended alteration in system, if required
- Commencement of operation

5.9 Description of the project (process flow chart/steps, technology, raw material and products, by-products)

5.9.1 Project Scope

Project scope includes to take the power (47 MW) from 132 KV Transmission Line for the purpose of load distribution to Lahore Motorway City.

Line Bays = 3 No. (In and out arrangement from 132 KV Transmission Line)

Power Transformers = 2 x 40 MVA

11 KV Feeders = 20 No.

5.9.2 The Grid Station

A Grid station is an important element of the electricity generation, transmission and distribution system. Its function is to transform voltages from high to low or the reverse, using transformers and other heavy duty electrical switchgear. GIS (Gas Insulated Switchgear) Grid Station consists of bays and it is pre-fabricated stations and require very small space and GIS is installed in GIS Hall, while commissioning and installation of compact machinery would be time efficient

Figure 4: The Grid Station

5.9.3 Technical Specifications of Project

Details about grid station to be installed

S/No.	Characteristics	Type 'C'
	General	
1.	Operating voltage, kV U_o	132
2.	Rated voltage, kV U_r	145
3.	Rated voltage of switchgear, kV U_r	145
4.	Rated frequency, Hz	50
5.	Number of phases	3
6.	Switching arrangement	Double bus bar
7.	Rated normal current for main circuits, A a) busbars b) feeder circuits	 3150 2000
8.	Rated short time withstand current for main and earthing circuits, kA (rms value)	40
9.	Rated peak withstand current for main and earthing circuits, kA (peak value)	100
10.	Rated duration of short-circuits	3
11.	Rated insulation levels at minimum operation Sr6 gas pressure: a) lightning impulse withstand voltage, kV (peak value) b) Power-frequency (one-min) withstand	 650 275
	voltage, kV (rills value)	
12.	Circuit breakers	
13.	Rated short circuit breaking current (symmetrical value) r.m.s value	31.5
14.	Rated short-circuit making current, KA (peak value)	80

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15.	Rated transient recovery voltage related to the rated short-circuit breaking current, (TRY peak value U_C) -Terminal Fault	249
16.	First pole-to·dear factor 16Rated operating sequence	1.5
17.	Rated breaking time, ms	100
18.	Disconnections (Isolators) and Earthing Switches	
19.	Rated lightning impulse withstand voltage at minimum operating SF6 gas pressure, kY (peak value) a) to earth and between poles b) across isolating distance	650 750
20.	Rated power-frequency (one min.) withstand voltage at minimum operating SF6 gas pressure, kY (r.m.s. value) a) to earth and between poles b) across isolating distance	 275 315

Specifications of current transformer

S/No.	Characteristics	Type 'C'	
	Current transformers	Line Bay	Trans Bay
1.	Rated primary current, A	1200-600-300	200-100
2.	Rated secondary current A	5	5
3.	No. of secondary cores	4	3

4.	R/secondary output, VA (at lowest tap) a) Measuring core 1 b) Protective core 2 c) Protective core 3 d) Protective core 4 e) Protective core 5	 15 30 30 60	 15 30 60 -
5.	Accuracy class(for all specified ratios) a) Measuring b) Protective	 0.5 10P	 0.5 10P
6.	Accuracy limit factor (for protective cores)	20	20
7.	Instrument security factor (for measuring core)	5	5
8.	Power frequency (one min) withstand voltage for secondary circuits, kV	3	3

Technical Specification of Voltage Transformers

S/No.	Characteristics	Type 'C'
	Voltage transformers	
1.	Rated primary voltage (phase-to-neutral,kV)	220/1.732
2.	Rated secondary voltage (phase-to-neutral,kV)	0.110/1.732
3.	Number of secondary windings	1
4.	Rated output per phase, VA a) For measuring b) For protection	 75 100
5.	Accuracy class : a) For measuring b) For protection	 0.5 6P

6.	Rated voltage factor a) For continuous duty b) For 30 seconds	 1.2 1.5
7.	Rated thermal burden, VA	1000
8.	Maximum short - circuit impedance referred to secondary, ohm	-
9.	Power frequency (one min) withstand voltage for secondary circuits, kV	2

5.9.4 Requirements

The metal-enclosed gas-insulated switchgear (GIS) shall be supplied complete in all respects to make complete assembled unit ready for installation and operation. All components, accessories, control, monitoring and other auxiliary devices and systems including interconnections and interfaces, mechanical linkages, couplings, cabling and wiring, earthing materials etc. required for proper and satisfactory operation of the GIS and associated equipment. The GIS may be installed outdoor or housed in a separate switchgear building and the required type will be specified in the tender documents. The GIS shall be installed on suitable supporting frames or pads which shall be included in the scope of supply.

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The supports shall have provision for leveling adjustments. All the equipment including auxiliaries described in this specification shall be designed and dimensioned to operate continuously at the specified ratings under the specified service conditions without requiring roofing or forced ventilation in case of outdoor installation and air conditioning, external heating, de-humidification or pressurization in the switchgear building except normal ventilation in case of indoor installation. The manufacturer may however, propose appropriate ventilation requirements to be met by the switchgear building in the case of indoor installation.

5.9.5 Materials

a) All parts of the switchgear including mechanism, devices and other accessories shall be constructed from materials having composition and properties best suited for the intended service under climatic and operating conditions specified in clause 3. The moving parts shall be of such materials as would prevent sticking of parts due to rust or corrosion. In case of outdoor installation, all parts of the switchgear including enclosures, operating mechanisms, linkages, joints, gaskets, local control cubicles, instrument list shall be weather proof and given special treatment to prevent ageing, rusting and corrosion due to the climatic conditions. Joints and coupling between different metals shall be avoided to prevent electrolytic action. The bearings and other such parts, which require lubrication for proper operation, shall be applied with permanent type lubricant to eliminate the need for greasing during the service life. All supporting steel work shall be hot-dip galvanized and all exposed metal surfaces of frames, tanks, enclosures, operating mechanisms, control cubicles etc. which would normally be rust-proof painted, shall be applied one additional coat of the suitable primer with rust inhibiting properties prior to normal painting.

b) All the materials used in the construction of the GIS shall be brand new and of good quality free from all defects and imperfections. The manufacturer shall, if requested, furnish necessary test certificates for the materials used in the construction of the GIS. The design and workmanship shall throughout be of best quality and conform to the best modern engineering and trade practices.

c) All current carrying parts shall be made of electrolytic copper or aluminium. All interconnecting sections of current transferring parts shall be silver plated.

5.9.6 Layout

a) The design and layout of the GIS shall be such that installation, replacement, maintenance and future alterations and extension can be undertaken easily and conveniently with a minimum of time and expense. Also, the arrangement shall be such as to offer maximum flexibility to facilitate realization of all configuration of a substation as well as complete freedom to arrange the equipment to suit any particular configuration of a given substation.

b) The arrangement of equipment shall provide adequate access for operation and maintenance. The parts which are subject to wear and tear in service shall in particular, be arranged for easy access. Necessary means for access such as stair, gateways etc. shall be provided.

c) The GIS and its associated devices and equipment including accessories. Interconnections, earthing switches, enclosure, piping. Wiring. Supporting structures and frames etc. shall be so constructed and arranged that no structural failure occurs under transport, storage. Erection and service conditions. The factors of safety throughout shall be chosen liberally so as to provide ample design margins for the thermal and mechanical stresses that may be encountered in service.

d) GIS shall be fully gas-tight, pressure-resistant and safe-to-touch. Provision shall be made in the design of accessories, local control cubicles etc. to ensure that proper operation is not impaired by dust, vermin, insects, reptiles, rodents and birds. The degree of protection for the auxiliary and control circuits and control cabinets shall be at least IP32 and IP54 according to IEC for indoor and outdoor installations respectively.

e) The GIS shall be designed so as to ensure high reliability. Operational security and personnel safety under all normal operating and fault conditions. No part of the equipment shall fail to respond or shall result in false operation or give unsatisfactory performance under normal service conditions.

5.9.7 Maintenance

The switchgear and all its components and accessories, both internal and external to the switchgear, shall be designed for long maintenance-free operation. The minimum internal between major inspection/overhaul including refilling and replenishment of gas, shall be 10 years or 5000 operations

Which ever is earlier, while minor inspections (which will be restricted to visual checking and adjustments of external parts only) shall have minimum 5 years interval between them.

5.9.7.1 Design and Construction

5.9.7.2 Switchgear

a) The single line diagrams of a typical elementary transformer bay and a typical elementary line bay are given in drawings No. PDW/TE-I069, 1070, 1071 and 1072. The gas-insulated switchgear shall be generally formed and arranged in accordance with these drawings unless indicated otherwise in the single line diagram or the substation concerned.

b) The type' A' switchgear will be of double busbar configuration or one-and-a half breaker array as indicated in the single line diagram of the relevant substation. The types B&C switch gears will generally employ double busbar and single bus bar scheme respectively. Provision shall, however, be made in case of type 'C' switchgear for conversion from single busbar to double busbar scheme at a later stage.

c) The switchgear shall be self-.supporting and designed and arranged in a manner that installation, normal service, inspection and maintenance operations, earthing of connected cables or other apparatus and the elimination of dangerous electrostatic charges can be carried out safely and conveniently including the checking of phase sequence after erection and extension. Means shall be provided for easy to each section and all internal components to allow physical and electrical inspection and testing. By-pass or non-return valves shall be provided, where required, to permit such operations. Also to ensure safety during maintenance work, all parts of the main circuit shall be capable of being earthed in a manner that there is no possibility of personnel or equipment being endangered under any circumstances.

d) Switchgear shall be of compact and modular design. It shall he of multi-enclosure (phase segregated) or single enclosure (phase combined) configuration in case of type' A' switchgear and single enclosure (phase combined) arrangement in case of type B&C switchgears. However, switchgears with configuration/arrangement differing from these can also be offered as alternatives for consideration by NTDC.

e) Each module of switchgear, consisting of individual elements intended to be directly connected together, shall be constructed as a transportable assembly \suitable for shipping and

transportation without being dismantled. All sub-assemblies shall be pre-assembled into the bay and shipped as completely assembled units fully tested in the factory so as to simplify and minimize assembly work during erection at site and shorten commissioning time.

f) It shall be capable of extension in the future by addition of extra line bays. Transformer bays, bus coupler and associated bus bar sections ' and without complete shut-down of the substation. Similarly, replacement of any part or sub-assembly, for any reason, should cause minimum of disruption to the remaining equipment. Maintenance of any equipment in a bay shall be possible without having to drain gas from other parts of the bay or switch off or disturb and other bays of the installation. The bidders shall furnish with the bid sufficient information and details so as to clearly demonstrate the suitability of offered switchgear design in these respects. The design and the characteristics of the GIS shall be well coordinated with those of the system in which it is intended to be used so as to ensure that faults of any kind in the network will not lead to the faults in or damage to GIS installation as a whole or any part thereof or endanger the safety of operation personnel.

g) The control and supervision of the GIS shall be accomplished through control and relay panels in the central control room in the substation as well as from the individual local control cubicles to be supplied by the manufacturer of GIS. The local control cubicles shall be provided with all equipment, control and measuring devices as well as necessary auxiliary contacts etc. for remote control and monitoring.

h) All components of same rating and construction which may need to be replaced shall be interchangeable. Similarly, all identical modules of the switchgear shall be easily interchangeable.

5.9.8 Enclosures

a) In order to prevent hazards approach to live or moving parts, all such parts of switchgear shall be contained in hermetically sealed, cylindrical, permanently earthed metal enclosure which shall be firmly bonded together to ensure electrical continuity and filled with dry SF6 gas at appropriate pressure to ensure complete safety to human life. The various components of the switchgear which are at ground potential shall be bonded together and connected to a continuous copper ground bus extending to entire length of switchgear and of adequate to the

rated short circuit current. Necessary terminal pads and connectors suitable for 95-120mmsq. Stranded copper conductor shall be provided to connect switchgear ground bus to substation earthing mesh at a number of points.

b) The enclosure shall be made of approved steel or aluminium alloy and the thickness shall be so selected as to withstand the normal and transient pressures to which it may be subjected in service including the effects of possible transmitted vibrations and internal arc. Depending upon the material used for the enclosures consistent with the requirements of corrosion resistance and thermal and mechanical strength, necessary measures shall be taken to minimize eddy currents and allow passage to fault-currents without exceeding the permissible temperature and voltage limits. The enclosures shall meet the requirements of appropriate ASME code or equivalent pressure vessel standard

5.9.9 Compartments and Partitions

Depending upon the switchgear configuration, the enclosures shalt be suitably divided into separate modular compartments e.g. circuit breakers compartment, busbar compartment etc. filled with pressurized SF6 gas and separated by suitable long-life gas tight partitions (gas barriers) so as to minimize risk to human life, allow ease of maintenance and limit the effects of as leaks, failures and internal arcs etc. The partitions shall have adequate mechanical strength to withstand the possible pressure differentials existing between adjoining compartments when one compartment is at a zero-pressure relative they shall be able to withstand twice rated gas pressure on one side and full vacuum on the other side. In addition, they shall not be damaged or go loose on an internal arc of rated short-circuit current. Temperature compensated pressure switches shall be installed to monitor density of SF6 gas of each compartment.

5.9.10 Internal Fault and Pressure Limiting Devices

All measures shall be taken to conform disturbance occurring in case of an internal fault. However, an internal fault at all lead to arcing inside a compartment, the same shall not be allowed to spread out to adjacent compartments or other parts of the switchgear. The over-pressure created by arcing faults shall be relieved automatically and instantly through reliable pressure relief devices in such a way as to eliminate hazard and risk to personnel and equipment. The pressure relief devices shall be fitted in each compartment and so designed and located that over pressure due to

internal arcing is in no case allowed to exceed the withstand capability of the enclosure nor the over-pressure in one module can travel to the adjacent modules. It shall also be ensured that no puncturing or burn through of the metal enclosure occurs under any circumstances due to arc formed inside. All earthing connections shall remain intact during and after an arc fault. The manufacturer shall furnish with the bid details of pressure limiting devices and also state measures for internal fault location. Drawings required showing the directions of gas/plasma output of pressure limiting devices. They shall be directed away from aisles and operator places.

5.9.11 Isolation and Earthing

The various compartments of the switchgear shall incorporate appropriate dis-connectors. Ordinary (slow-speed) and high-speed types earthing switches. Earthing electrodes and other protective features as required for proper operation and maintenance. Each separately insulated compartment of the switchgear shall be earthed separately. The dis-connectors shall be motor as well as manual operated and necessary electrical and electro-mechanical interlocking with associated circuit breakers and other dis-connectors and earthing switches in the circuit shall be provided to ensure see and correct operation of the devices. These shall include interlock to prevent dis-connectors operation when open or closed. Necessary interlocks shall also be provided between manual and motor operating mechanisms.

The ordinary earthing switches shall also be provided with motor and manual operating mechanisms. Electromechanical interlocking with associated dis-connectors and electrical interlocking with other dis- connectors in the circuit shall be provided to ensure again incorrect operation. Necessary interlocks shall also be provided between manual and motor operating mechanisms. High speed closing earthing switches capable of making full rated peak short-circuit current and interrupting possible capacitive and inductive currents shall be provided where required. These shall be provided with motor charged spring operating mechanism and shall be full y interlocked electrically and electromechanically with associated equipment as necessary to prevent mal-operation. It shall be possible to close the switch even when auxiliary supply has failed. All motor operated dis connectors and earthing switches shall be operable locally as well as remotely

5.9.12 Busbars and Conductors

The busbars/conductors shall be supported on molded epoxy resin, gas-tight, are-proof ribbed insulators having adequate strength to withstand electrical and mechanical stresses that may be encountered in service. The support insulators shall be free from all void and be of such design as to reduce electrical stresses in the insulators to a minimum. The busbars and all other conductors shall be able to carry normal and short-circuit currents without dangerous temperature-rise or other damage. Suitable plug- in or sliding (tulip) contacts made of silver-plated cooper shall be used for interconnecting individual sections of the busbars and other parts or the switchgear.

5.9.13 SF6 Gas Tightness

The enclosure s shall employ high-grade effective sealing system throughout to ensure minimal gas leakage under all extreme temperature and pressure conditions. All coupling flanges including those of valves shall be provided with grooves fitted with suitable weather resistant lifelong gaskets coping with the specified service conditions. The sealing system shall be such that gas leak in any compartment shall neither affect the pressure nor require emptying of the other compal1ments. The sealing system shall also effectively ensure against the ingress of moisture, dust and other contaminants into gas compartments. All gas compartments shall contain suitable agent to absorb moisture and any decomposition products of SF6 gas. The manufacturer shall guarantee a leakage rate of less than 0.5 percent per year according to IEC- 62271-203 for the whole installation over the life time of the switchgear. The maximum yearly leakage across each partition shall not exceed two percent.

5.9.14 Partial Discharge Intensity

All equipment's and components of the switchgear including epoxy insulators shall be free of partial discharges. The partial discharge intensity shall not exceed 5 pC in the decreased phase with a test voltage according to IEC 602271-203 Table 106.

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5.9.15 Circuit Breakers

The switchgear shall incorporate single pressure single break puffer type SF6 gas-insulated circuit breakers suitable for single pole rapid auto-reclosing in case of type A switchgear and single shot triple pole rapid auto-reclosing in case of types B&C switchgears. They shall generally comply with the requirements of respective NTDC specifications for 132 kY & 220 kY power circuit breakers as far as applicable and except to the extent modified herein. The interrupting chambers of the circuit breakers shall be equipped with separate over-pressure relief and gas density monitoring devices. The gas in the interrupting chambers shall not be allowed to mix with gas in the breaker compartments or other adjacent modules. All rated parameters of the circuit breakers including the breaking time shall be complied with at minimum permissible gas density and minimum specified DC control voltage. The operating mechanism shall only be spring or hydraulic/spring type and shall also enable emergency manual operation of the breaker. Facilities shall also be provided for manual slow closing of circuit breaker for maintenance purposes. The circuit breakers shall be provided with operation counters may be located in the local control cubicle

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a) The disconnectors and earthing switches including their operating mechanisms shall be so constructed that they cannot inadvertently come out of their higher open or closed position by forces due to short-circuit, gravity, gas pressure, vibrations, reasonable shocks, accidental touching of the connection of their operating mechanisms by other forces which may occur in service. The disconnectors of earthing switches shall be provided with locking facilities to permit locking both in open or close positions and in these positions only.

b) All connectors and earthing switches shall be equipped with mechanical position indicators directly coupled to the driving shaft and clearly visible from the operating position on the floor. It will be preferred if an accessible inspection window is also provided in the housing of each disconnector and earthing switch to ensure isolating distance or gap by observing the position of each movable contact.

c) All effective and reliable interlocking system compnsll1g electrical and electromechanical interlocking arranged in an approved manner shall be employed to ensure safe and correct operation of the switchgear. The interlocks shall be effective and reliable under all service conditions including local manual and electrical and remote electrical operation. All manual operating mechanisms shall incorporate electro-mechanical interlocking consisting of an electromagnetic coil and its armature and shall be such that the operating rod can only be moved when the coils energized to release its armature. The manufacturer shall furnish with bid all information on the purpose and function of the interlocks.

d) Each disconnected and earthing switch shall be provided with mechanically coupled auxiliary switches rated for l0A (class I IEC-62271-1) each comprising 8 Nos. & 8 Nos. contacts for signaling of their respective positions and to facilitate interlocking with the associated equipment.

5.9.16 Current & Voltage Transformers

a) The current and voltage transformers shall be SF6 gas-insulated and shall be suitable for their intended service. They shall comply with requirements of relevant lEC Standards.

b) They shall be located in separate compartments as for as possible. The voltage transformers shall be capable of mounting directly on the switchgear.

c) They shall be designed for satisfactory and reliable operation in conjunction with the gas-insulated switchgear under all rated and fault conditions in the given networks with solidly

grounded neutral. The cores shall be made of high-grade silicon steel stampings having high permeability and shall he so designed as to assure and maintain specified accuracy throughout service life.

d) The current transformers shall be of toroidal design and shall be mounted within the switchgear enclosure. Alternative designs can be offered subject to approval of NTOC. The secondary terminals of the CTs shall be brought out of the switchgear enclosure and housed in suitable accessible terminal boxes. All secondary leads shall be wired to shorting-type terminals.

e) The voltage transformers shall be of the inductive type, metal-enclosed, mounted directly on the switchgear enclosure with plug-in contacts that allows easy removal. Alternative mounting arrangement may be offered subject to approval of NTOC. The core and coil assembly shall be rigidity braced and fastened to prevent moving or shifting due to electro-dynamic stresses. The secondary terminals shall be housed in accessible grounded terminal boxes located on the VTs. Provision shall be made after earthing of the secondary windings inside the terminal box.

The required grounding pads and earthing connectors suitable for 95- 120mmsq. Stranded copper conductor shall be provided for necessary ground connections to substation earthing system.

5.9.17 Accessories for Grid Station

The transformers shall be provided with the following accessories mounted generally in accordance with drawing No. EW/TS-193.

a) Oil level indicators magnetic type, (One each for main and OLTC conservators)
b) Oil and temperature indicators.
c) Winding temperature indicator(s),
   (Two for 31.5/40MVA transformers and one for others)
d) Thermometer pockets
e) Buchholz (with valves on both sides)
f) Fans and controls
g) Auxiliary panel
h) Control cabinet
i) Lifting eyes for cover only

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(Optional for transformers others than 10/13MVA)

j) Facilities for lifting the core and coil assembly

k) Lugs for lifting complete transformer

l) Moving facilities/flanged roller wheels

m) Jacking facilities

n) Oil conservator with silica gel breather

o) Drain and filter valves comprising

i. One drain valve

ii. Two filter valves of about 30mm dia

iii. Two sampling valves of about 20mm dia

iv. Air release plug

v. Oil filling plug

p) Pressure relief devices

q) Earthing terminals for tank

r) Inspection facilities

s) Rating plate

t) Terminal marking plate

a) Accessories not indicated in drawing No. EW/TS-193 shall be located at suitable places by the manufacturer with specific approval of the purchaser prior to manufacture.

Accessories with markings or dials shall be mounted at a height of approximately 1.5 meter from the base of transformer in such positions as to be easily readable by a person standing on the ground. It necessary, dial faces shall be mounted at an inclined angle for easy visibility/readability.

5.9.18 Life Cycle Assessment and maintenance of Grid station

1. Long maintenance intervals. Insulation arc-quenching properties reduce contact wear. Technological advancements over the years have seen GIS continues to grow smaller and lighter.
2. Low Maintenance Cost: GIS are highly reliable and maintenance free. No inspection is required before ten years.
3. Long Life: The operating life of GIS is 40 to 50 years compared to 25 to 30 years of conventional outdoor grid stations.

4. Personnel Safety: GIS causes no risk of injury to operating personnel.
5. Unaffected by Environmental Conditions: GIS is unaffected by environmental factors. It is most suitable for harsh environmental conditions i.e. where humid, saline, polluted atmosphere laden with industrial exhausts prevails.

5.9.19 Solid Waste and Management

Approx. 600-800 kg/day constructional and domestic waste will be produced during the constructional phase of the project. Constructional waste will be reused for road filling and maintenance purposes. According to an estimate, approx. 9-10 kg/day domestic (based on solid waste generation rates of 0.45 kg/capita/day urban waste generation) which will be handed over to the certified contractors. Project related waste will not be generated as the subject project is Grid station.

The Solid waste will be managed in proper way by following operations:

1. Placement of separate waste bins for domestic and project related waste in all designated points.
2. Collection of waste from all the offices at one designated point by the sanitary workers on daily basis.
3. Careful collection of sludge on regular basis and temporary storage at designated point.
4. Collection of waste from designated area and handling to the solid waste contractors for its final disposal.

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5.10 Amenities

The following social amenities are present at site and the management of the waste (solid waste and effluents) is explained in sub-sections below:

a) Ground Water Resource

During constructional and operational phase ground water will be consumed which will be supplied by the Industrial Estate. For construction purposes water will be pumped from ground from the depth of 250ft. and 200-300 liters/day will be used for the overall consumption.

b) Emergency Preparedness

Emergency response preparedness committee will be formulated consisted of heads of all departments and nominated members. Project Manager will be the head of the team who will chair the Committee.

In the case of emergency, he will immediately inform the concerned authorities. HSE Manager will be responsible for on-site HSE management.

First aid facilities will be available at facility which will include; blankets, hot water bottles, sterilized dressing, snake bite kit, cotton and iodine (2% alcohol).

5.11 Safety Trainings

Skilled, semi-skilled and un-skilled staff will be provided with proper training about the work and safety practices that need to adopt during the process activities.

Use of Drugs and Narcotics

Drugs and narcotics are strictly prohibited during working hours in working area. Smoking will be only allowed during rest timings at properly isolated places.

Personal Protective Equipment's

Following Personal Protective Equipment (PPEs) will be provided to the workers:

- ✓ **Safety Helmet**
- ✓ **Safety Shoes/Dry Shoes**
- ✓ **Dust Mask**
- ✓ **Safety Gloves**
- ✓ **Safety Jackets**
- ✓ **Earmuffs**
- ✓ **Insulating Gloves and Suits**

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5.12 Operational hours of facility

During operational phase of the proposed project about 24 Hours/day will be engaged for the operation of the project.

5.13 Restoration and rehabilitation plans

There will be no any matter of rehabilitation as the site is already owned by the project proponent. However, at the end of the life of the unit, it will be duly dismantled with special precautions to avoid/minimize pollution and at the same time taking all safety precautions to protect human life and property around the project site. Debris or any other wastes resulting from demolishing will be disposed-off in environmentally sustainable fashion. The materials capable of recycling/reuse will be either sold in the market or to be reused for other suitable purposes. While dismantling, Government rules and regulations as applicable to such activities will be strictly adhered. Safety measures as desired under the

code of demolition will be adopted to avoid any harm to humans, property around, or the environment in the project area. Dust to be generated will be minimized by constant sprinkling of water. After completion; all demolishing matrix, debris and garbage will be removed off immediately from the site within the minimum possible time under safe conditions. Any minor spillover of these materials will be cleared adequately. The land, if and where pitted will be adequately levelled. On the whole, the project site and the area in its near vicinity will be made neat and clean.

5.14 Green Features

a) Renewable Energy Production

At present, no solar system has been proposed as the project is still at its proposed stage. However, the proponent might intends to explore the feasibility of incorporating a solar power system in the future to partially meet the facility's electricity demand and promote the use of renewable energy for sustainable operations.

b) Tree Plantation Plan

A tree plantation plan has been integrated into the project, under which 0% of the total project area will be reserved for plantation and landscaping. In accordance with EPA guidelines, trees will be planted within the boundary walls of the project site. Native and pollution-tolerant species such as Neem (Azadirachta indica), Kikar (Vachellia nilotica), and Eucalyptus (Eucalyptus globulus) will be planted along the boundary walls, internal roads, and open areas within the premises.

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6 DESCRIPTION OF ENVIRONMENT

This section covenants with the prevailing environmental conditions of the project area. Information that has been collected from different sources, including public literature, reports of other studies conducted in this area, knowledge with the proponent and the concerned government departments and the first-hand surveys and field measurements has been presented in this section. This encompasses all the important aspects of local environment; such as biological resources, socioeconomic development and quality of living values.

6.1 Baseline physical environment

Pakistan Can be divided into five broad physiographical regions. These are the mountainous regions of the north, the western highlands and plateaus, the sub-mountains Indus region, the Potohar Plateau, Salt Range, and the Indus Plain. Brief description of these regions are given below:

Region	Characteristics	Location	Height
Northern Mountainous	Hindu Kush Karakoram and Himalayan Mountain Ranges	Northern Part of KPK, Gilgit Agency, Northern Areas and Kashmir.	Rises above 8,000m
Western Highlands and Plateaus	Toba Kakar, Sulaiman, Central Baruhi, Saihan, Central Makran, Makran Coastal and Kirthar Ranges	Mainly in Baluchistan, also parts of Sindh and KPK	Between 1,200 to 3,000 m
Sub-Mountains Indus	Alluvial filled Basins	Plains of Peshawar Kohat and Bannu	Less than 1,000 m
Potohar Plateau and Salt Range	Flat to gently undulating surface, broken by gullies,	Mainly northern parts of Punjab, some parts of KPK	Less than 1,000 m
Indus Plain	Flood plains of the Indus, Jhelum, Chenab Ravi and Sutlej Rivers	Punjab and Sindh	Less than 1,000 m

6.1.1 Topography and Soil

Sheikhupura the city of Punjab province, eastern Pakistan. In the town center stands a fort of the Mughal emperor Jahangir (completed 1619) that also served as the 19th-century residence of one of Ranjit

Singh's queens; outside the city, the massive Hiran Minar tower overlooks the countryside. Sheikhupura is connected by road and rail with Lahore (25 miles [40 km] southeast) and various other cities. It is an industrial center that makes food products and textiles. The city is in a section of alluvial plain known as the Bar tract, which is irrigated by the Chenab Canal system.

Sheikhupura is an industrial city in the northwest of Punjab province, Pakistan. The city is also the administrative headquarter of the Sheikhupura district and is approximately 38 km from Punjab's provincial capital, Lahore. District Sheikhupura is bounded on the North by Gujranwala and Hafizabad districts, on the North-East by Narowal district, on the West and South-West by Nankana Sahib District, on the East by Lahore district. The proposed project site is located in Quid-e-Azam Buisness Park, District Sheikhupura

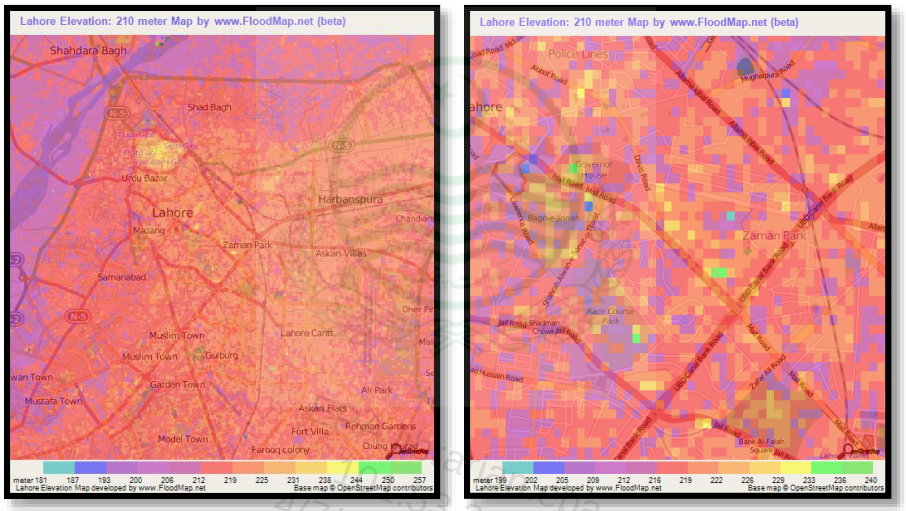

Figure 5: Topography of District Sheikhupura

6.1.2 Climate and Rainfall

Due to its high evaporation rate, Sheikhupura features hot desert-like climatic conditions according to Koppen-Geiger classification. The climate of the district can see extremes, with a summer maximum temperature 44°C and a winter temperature of 4.0°C The mean maximum and minimum temperature in summer are 43.5°C and 18.0°C respectively. In winter it peaks at around 19.4°C and 4.1°C respectively. The summer season starts from April and continues till October. May, June and July are the hottest months. The winter season starts from November and continues till March. December, January and February are the coldest months. "The bulk of monsoon precipitation occurs in July and August, with

monthly averages of 115.0 mm and 89.8 mm respectively. Minimum rainfall occurs in the month of November which is 3.0 mm" (PMD).

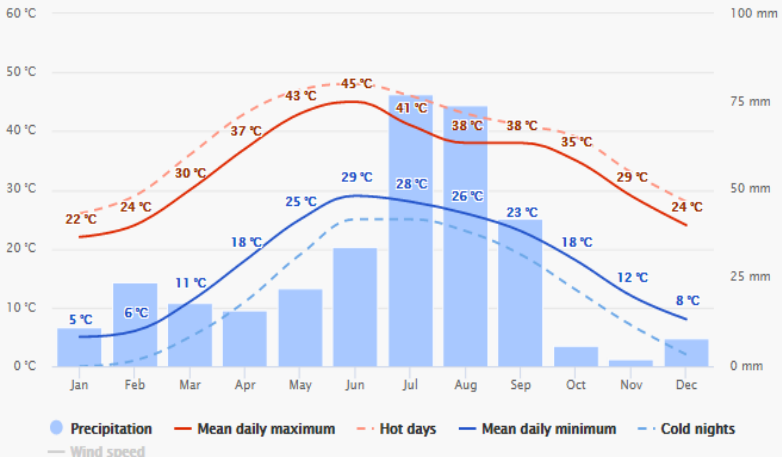

Figure 6: Average Annual Temperatures and precipitation in Sheikhupura

The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Sheikhupura. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Weather in Sheikhupura is influenced by Subtropical Dry Semiarid Steppe climate. Low-latitude dry climate. Evaporation exceeds precipitation on average but is less than potential evaporation

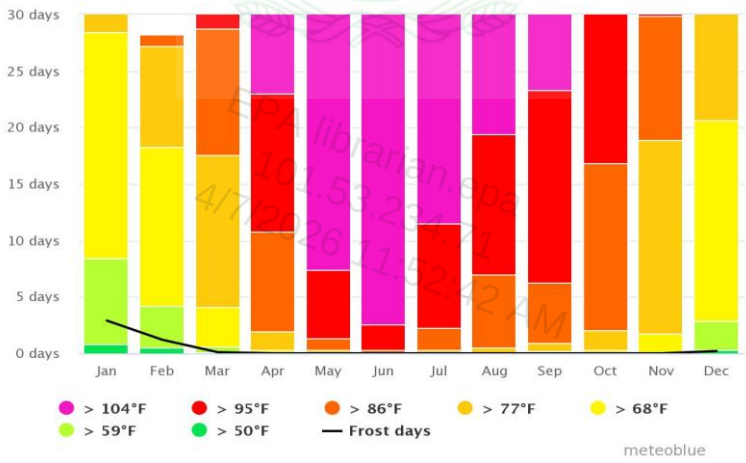

Figure 7: Maximum temperature ranges in Sheikhupura

The graph shows the monthly number of sunny, partly cloudy, overcast and precipitation days. Days with less than 20% cloud cover are considered as sunny, with 20-80% cloud cover as partly cloudy and with more than 80% as overcast.

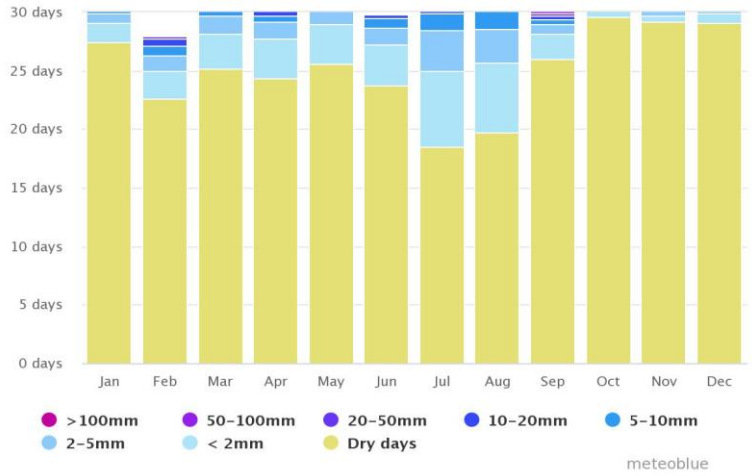

Figure 8: Annual Precipitation amounts in Sheikhupura

6.1.3 Wind

The diagram for Sheikhupura shows the Max and Average Wind speed and Wind Gust.

6.1.4 Seismology

According to Seismic Zoning of Pakistan, the project area lies in Zone 2A and represents minor to moderate damage due to earthquakes.

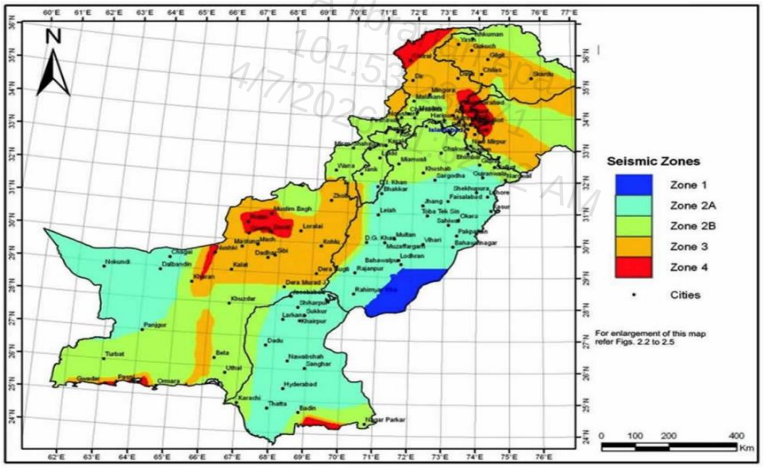

Figure 9: Seismic Zone of Pakistan (Geological Survey of Pakistan)

6.1.5 Ambient air quality

At present, major sources of air pollution are mobile sources and generators in commercial areas. Ambient air quality was monitored at the location the monitored parameters included Carbon mono-oxide (CO), Nitrogen oxides (NOx), Sulphur oxides (SOx), Particulate Matter (PM10).

6.1.6 Water resources

6.1.6.1 Ground water

Groundwater from depth of 100 ft can be used for drinking and other purpose. Groundwater is the major source of water in the study area, which is extracted with the help of pumps and motors. The groundwater extracted is used to fulfill various domestic, irrigation and industrial needs. Ground water quality report of area is annexed. No surface water body is present within 5 km radius of the project site.

6.1.6.2 Surface Water

No Surface Water near the proposed project site.

6.1.7 Noise level

Major source of noise generation is vehicular traffic.

6.2 Baseline ecological environment

The project area neither contain any forest nor falls in protected area or archaeological site and so no jurisdiction on the proposed sire area of the relevant legislations.

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6.2.1 Flora

The proposed project is present on the agriculture land and there was no tree present on the site.

6.2.2 Fauna

For study of fauna in the project area, field guides and books were consulted. On the other hand field observations were conducted along with the interviews of local community members about the fauna of the area. The equipment used in field included cameras, binoculars and GPS device (wherever required). It is important to note that there is a number of factors which can change the findings of such survey. It may be pointed out that the pattern of seasonal migration of small birds varies depending

upon each specie. During the construction activity in project area, no important biological feature will be damaged or disturbed as the project falls in industrial area.

The fauna commonly found in District Sheikhupura includes; Hares, Falcon, Eagle, Quail, Starling, Jungle Pigeon, Russian Sparrow, Doves, King Fisher, Parrot, Crow and Local Sparrow.

Commonly found mammals in the area include; dogs, cats, horses, house-rats, squirrels, porcupines and bats. However, Small Indian Mongoose and Indian Palm Squirrel are also found in the District Sheikhupura

6.3 Baseline socio-economic environment

This section describes the key socioeconomic features of the study area like administrative setup, population and communities, education, health, transportation, infrastructure and archaeological sites etc.

6.3.1 Population & Community

Demographic Studies are the major source of any city's Socio-Economic profile. Demographic Studies relate to population. Population studies are extremely important from Town Planning point of view. Until and unless we know about population in detail, we cannot do successful planning. All aspects of population, such as sex-age composition, trend of migration, social, cultural, political, economic and administrative works, values and facilities have to be related to planning considerations and decisions. Individuals are the raw material of society; therefore, society is directly affected by size, growth, composition and distribution of its individuals. The term population refers to the number of individuals living within a geographical area at a given time.

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Different community individuals in the vicinity of the project area have different family sizes depending upon their living setups. Average family size is however 5-7 individuals per family with 1-2 earning hands per family.

6.3.2 Infrastructure

No cultural, religious and other structures are present in the close proximity of the project area that needs to be relocated. Villages present around the project site have mosques and imam bargah.

6.3.3 Educational facilities

Government primary school for girls and boys are present near site some private school are present.

6.3.4 Sites of historical significance

No archaeological sites are observed in the vicinity of proposed project during the field survey.

6.4 LAB REPORTS

Lab Reports are attached with and submitted to EPA.

To assess the environmental conditions of the project area, following environmental parameters were monitored;

- Ambient air quality monitoring
- Noise monitoring
- Water sampling and analysis

6.4.1 Ambient air monitoring

Major air pollutants including CO, NO, NO_2, NO_X, SO_2 and Particulate Matter (PM_{10}) were monitored during field visit near the proposed project site. The ambient air samples were taken 50-100meter distance from roadside. The results of all ambient air quality monitoring were observed below the standards because there are some air pollution sources were found in the study area. Methodology adopted for the air monitoring is given in **Table-3** while the results of ambient air monitoring are presented in **Table-4.**

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Table 3: Ambient air quality monitoring methodology

Parameter	Methodology	LDL
Nitrogen Oxide (NO)	US EPA Designated Method RFNA-1289-074	0.75
Nitrogen Dioxide (NO_2)	US EPA Designated Method RFNA-1289-074	0.75
Sulfur Dioxide (SO_2)	US EPA Designated Method ESQA-0486-060	1.3
Carbon Monoxide (CO)	US EPA Designated Method RFCA-0981-054	0.1
Particulate Matter ($PM_{2.5}$)	ISO 21501-4:2007	1.00
Particulate Matter (PM_{10})	ISO 21501-4:2007	1.00

Table 4: Result of ambient air quality monitoring at proposed project site

Parameter	Unit	Monitoring Duration	Average Obtained	Limits as per PEQs
Nitrogen Oxide (NOx)	µg/m^3	24 Hours	45.3	120 µg/m^3
Sulfur Dioxide (SOx)	µg/m^3	24 Hours	47.1	120 µg/m^3
Carbon Monoxide (CO)	µg/m^3	24 Hours	2.56	10 µg/m^3
Particulate Matter (PM_{10})	µg/m^3	24 Hours	136.9	150 µg/m^3

Table 5: Noise Level Results

Location	Min	Max	Average	PEQs Industrial Area
North Side of site	65.41	69.5	69.4	75
West Side of site	68.6	72.4	65.2	75
East Side of site	71.2	75.7	71.9	75
South Side of site	67.4	71.4	70.1	75
Centre of site	64.6	68.2	68.4	75

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6.5 Suitability of the site

The consultations demonstrated that goodwill towards the project proponents indeed exists; approval for project activities by the communities was evident. The consultations were considered a good gesture and appreciated. Proposed project will help in improving the health conditions of the area so the respondents were positive about the proposed development. Proponent recognizes that benefits from the project should be distributed judiciously and equitably especially among primary stakeholders in the project area, and will continue to ensure that this principle is followed in its projects and community development program.

7 IMPACT ASSESSMENT

This section discusses the potential environmental impact of proposed project, methodologies for impact identifications and characteristics of impacts including nature, magnitude, extent and location, timing, duration, reversibility, risk The assessment carried out in this Section is based on potential impacts on overall environmental receptors within the project area.

7.1.1 Methodologies for impact identification

The potential impacts due to installation of grid station are mostly beneficial. During construction phase, adverse environmental & social impacts are depending on the resources and receptors involved along with other parameters such as; geographical scope (magnitude and extent), temporal scope (duration) and reversibility. It is anticipated that this project will have maximum positive impacts as it is environmentally friendly project to reduce pollution load.

Moreover, the project is expected to result in negative impacts of short-term duration and transient in nature. Having identified and characterized the potential significant impacts during design, construction and operation phase of project an Environmental Impact Severity Matrix & checklist to summarize all the identified impacts as mentioned below in tables.

Table 6: Impact significance criteria

Impact	Criteria
No Impact	When the proposed activity will have no impact
Long Term	When the impact is of high intensity with high spread and high duration or of high intensity with medium spread and medium duration
Moderate Term	When the impact is of moderate intensity with high spread and high duration or of high intensity with low/ moderate spread and low duration
Short Term	When the impact is of low intensity but with moderate spread and moderate duration or of moderate intensity
Insignificant	When the impact is of low intensity, low spread and low duration
Adverse	When the impact is of large intensity, spread easily and long-term
Beneficial	When the impacts are positive and improve the environmental conditions

7.1.2 Checklist

Table 7: Impact matrix checklist for construction phase

Environmental Sensitivities	Intensity of Impact						Impact Nature		Impact Significance				
	Low Intensity	Medium	High Intensity	Local	Moderate	Regional	Beneficial	Adverse	Insignificant	No Impact	Short Term	Moderate	Long Term
Physical Parameters													
Air Quality		•		•									
Noise		•			•								
Water Quality		•			•								
Biological Parameters													
Land Environment													
Flora													
Fauna													
Physical Parameters													
Local Economy	•												
Social Impacts	•												
Health & Safety	•												

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Table 8: Impact assessment checklist for operational phase

Environmental Sensitivities	Intensity of Impact						Impact Nature		Impact Significance				
	Low Intensity	Moderate Intensity	High Intensity	Local	Moderate	Regional	Beneficial	Adverse	Insignificant	No Impact	Short Term	Moderate	Long Term
Physical Parameters													
Noise		?											
Water Quality													
Odor	?												
Biological Parameters													
Land Environment													
Flora													
Fauna													
Physical Parameters													
Local Economy													
Social Impacts													
Health & Safety													

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7.2 Characteristics of impacts (nature, magnitude, extent and location, timing, duration, reversibility and risk)

The impact characteristics are identified to screen out potentially insignificant environmental and social impacts from potentially significant adverse environmental and social impacts during planning & designing, construction and operational phases of the project. The objective of impact screening process is to assess the significance of issues related to the air, water, noise, soil, transportation, civil work, communication, the hazards and external constraints. The beneficial and adverse impacts of project during planning & designing, construction and operational phases are identified based on their duration, location, frequency, extent, significance and reversibility. The impact of each activity on various environmental parameters is given below:

Table 9: Impact assessment characteristics

Sr#	Environmental Component	Impact Characteristics												
		Duration		Location		Frequency		Extent		Significance			Reversibility	
		Long	Short	Direct	Indirect	Cont.	Intermittent	Wide	Local	Large	Moderate	Minor	Rev.	Irrev.
Beneficial Impacts														
1	Employment Opportunity	◙		◙		◙			◙		◙		◙	
2	Solid Waste Management	◙		◙		◙			◙		◙		◙	
3	Land Value	◙			◙	◙			◙			◙		◙
4	Tree Plantation	◙		◙		◙			◙		◙			◙
5	Wastewater		◙	◙		◙		◙			◙		◙	
Adverse Impacts														

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1	Solid Waste	•		•		•			•		•		•	
2	Health and Safety		•		•		•		•			•		•
3	Physical Hazards		•	•			•		•			•		•
4	Security Risks		•		•		•		•		•		•	

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8 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This Chapter identifies the potential impacts (positive and adverse) on the physical, biological and socio-economic environment of project area due to proposed project. It also identifies measures that will help to mitigate the adverse environmental and social impacts (if any) and it will enhance positive impacts of the project. Impacts are assessed by analyzing their magnitude and sensitivity, which is a legal requirement.

8.1 Impacts associated with project activities

- Environmental Impact - Construction and Operation Activity
- Socioeconomic Impact - Construction and Operation Activity

8.2 Project location

There will be no impacts due to project location as the land is owned by project proponent. For the installation of grid station an open plot has been selected. In the project area or its vicinity no ecologically important area is present. However, no human settlement or infra-structure will be dislocated due to the establishment of project. So, no adverse impact is being envisaged. Hence, there is no need to change the design of project is required.

8.2.1 Compensation in money terms

There is no damage envisaged to fauna, flora or any other biological source due to the establishment proposed project. However, agricultural land is being converted to the built-up area. So, no compensation in monetary terms will be needed as the land is owned by the project proponent.

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8.2.2 Replacement/relocation/rehabilitation

The proposed project is located in open land where there is no sensitive area, population or natural resource is present which could be impacted due to the establishment of project. No replacement, relocation and rehabilitation is requiring for the proposed project establishment. However, at the end of the life of the unit, it will be duly dismantled with special precautions to avoid/minimize pollution and at the same time taking all safety precautions to protect human life and property around the project site. Debris or any other wastes resulting from demolishing

will be disposed-off in environmentally sustainable fashion. The materials capable of recycling/reuse will be either sold in the market or to be reused for other suitable purposes.

8.3 Project design

The proponent has planned to construct the grid station on modern lines, meeting international standards, with incorporation of imported technology. The design, if maintained and operated in an environment-friendly manner, is expected to cast positive impact on the environment and will not pose any adverse impact or threat on any component of the environment.

The design of the proposed project will be sustainable and will follow the principles of energy conservation. The design of the main public buildings will follow the green building designs such as; maximum utilization of the sunlight, high roofs to keep the building cool, etc. Moreover, the building will be designed by keeping in consideration all the technical standards to avoid adverse impacts on the environment and society.

8.4 Construction phase

Following impacts could arise during constructional phase of project. The proposed project area is located in well-developed area. The roads of the area are metaled. During the transportation of the raw-material such as cement, bricks, sand, gravels, etc. The dust clouds may be generated which could impact the local climatic conditions on temporary basis. This impact is considered in-significant because of the metaled road structure.

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8.4.1 Mitigation measures

Impacts of raw materials transportation can be reduced significantly by adopting better management and monitoring practices. Following management and monitoring practices will be adopted to reduce the impacts:

- Proper tuning of vehicles should be done on the regular basis in order to control the air pollution generated by the burning of the fossil fuels in the vehicles
- Restrict excessive transportation of the vehicles as well as the speed of the haulage trucks that shall not exceed the speed limit of 40km/hour
- Careful site planning and managing the transportation routes for the vehicles carrying raw-materials

- Cover the vehicles with tarpaulin carrying sand and loose material
- The wind prone loose material should be covered and sprinkled with water on the regular basis.

8.4.2 Impacts on vegetation

There are no vegetation present on site so no mitigation measures are required.

8.4.3 Impacts on water sources

During construction phase, water will be used for the preparation of the raw material, for watering under-construction buildings and consumption by the workers in various domestic activities. It will cause negative impact on underground water resource. The consumption of the water will be high causing minor negative impact on the water resource of the area.

8.4.4 Mitigation measures for water

Following mitigation measures will be required for water sources:

- Avoid un-necessary consumption of the water and close the tap when water isn't in use
- Proper knowledge regarding the watering of the under-construction building should be given to the workers in order to conserve water
- Water efficient equipment and process will be used
- Awareness regarding the water conservation techniques should be carried out
- The wastewater that is being consumed from the use of the labour on-site will be disposed off in the wastewater drains.

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8.4.5 Impacts on air quality

During construction phase, the machinery working on project site may cause air pollution due to release of the pollutants such as; carbon dioxide, methane, NOx and SOx from the burning of the fossil fuels in the vehicles. Dust may be generated due to the excavation activity and filling activities. No other impact is envisaged that may deteriorate the ambient air quality of the area.

8.4.6 Mitigation measures for ambient air quality

Following mitigation measures will be adopted to reduce the impact on the air quality:

- Proper tuning of vehicles should be done on the regular basis in order to control the air pollution
- It should be ensured that the high quality fuel is being used in the vehicles that are working on-site
- The material prone to wind should be covered with tarpaulin
- Avoid unnecessary movement of the trucks carrying raw-materials to avoid unnecessary air emissions
- Avoid excavation and filling activity on the windy days
- Impact can be minimized through a management programs which ensure dust will be controlled by regular watering the dusty and wind areas
- Abandoned excess laterite and stone aggregate littered around stock pile areas after construction completed changes the soil structure
- Regular water sprinkling may be done to control the dust generation

8.4.7 Impacts due to noise

During construction phase, heavy construction machinery will be use. The machines are noisy and can cause a certain degree of nuisance to the nearby residents. The noise levels of machines and vehicles vary widely depending on the type of noise generated and level of activity. Some common impacts of noise nuisance include annoyance, sleep disturbance and interference with communication. Acceptable levels of noise are regarded to be 40 dB(A) during the night and 50 dB(A) during the day. Since construction will take place during the day only the 50 dB(A) level is of importance. As the proposed project is not located in the residential zone so the noise related impacts will cause insignificant impact on the nearby community

8.4.8 Mitigation for noise

Following mitigation measure will be adopted to reduce the noise;

- The noise related activities should be done during the day time to ensure minimum disturbance to the local community
- Proper tuning of the vehicles should be done on the regular basis, so that the noise level will be reduce up to the acceptable limits

- Noise related activities should be done speedily and completed as soon as practically possible
- Construction activity will be confined to the small reserved area

8.4.9 Impacts on socio-economic environment

During this phase, skilled and unskilled labor will be required. Employment opportunities for the un-skilled workers will therefore increase which will enhance the positive benefits for the local people who are in dire need of income for sustenance. Furthermore, indirect opportunities for employment will arise from the provision of services to the construction teams; sale of raw-material such as cement, bricks, sand etc., as well as food and beverages for the labor. After completion of construction phase serve as a permanent business opportunity.

8.4.10 Mitigation measures

No mitigation is required.

8.5 Operational phase

The environmental and socio-economic impacts associated with the operation phase are had been studied in detail. Following is the detailed description:

8.5.1 Water consumption

A significant impact will be interpreted, if water extracted for the project directly affects the ability of the community and other users to meet their water needs. The water usage will be the water required for domestic use of workers, for floor cleaning.

8.5.2 Mitigation measures

Following mitigation measures will be adopted:

- Water conservation program will be initiated to prevent wastage of water
- The management will ensure maximum recycling of washing water, so that overall consumption could be reduced
- Reusing the water for sprinkling purpose after floor cleaning

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8.5.3 Wastewater

The building operations will generate wastewater in the form of domestic wastewater. The wastewater can be a potential source of pollution groundwater resources of the area. Domestic wastewater generated during building operation is estimated to be approximately 1.4m^3/day. Implementation of the proposed mitigation measures and regular monitoring is not likely to leave any significant impact of the wastewater from the proposed facility.

8.5.4 Mitigation measures

Following mitigation measures will be adopted for effective management of wastewater:

- The grey water will be treated through settling tank which will be recycled to be re-used in irrigation purposes
- Waste segregation measures would be employed to minimize entry of solid waste into the wastewater stream
- Water conservation strategies will be employed to avoid wastage of water
- Periodic sampling and monitoring of key parameters for wastewater effluent into the receiving body (drain or sewerage system) and for this purpose samples will be collected at the discharge point to ensure effective treatment

8.5.5 Noise

Noise cause stressful effect on the ears, nervous system and heart; especially to people exposed to noise above 85 dB (A) for long period of time. Due to the operation of the proposed project heavy machines can serve as the potential noise sources. This noise will depend upon the machine efficiency, their maintenance level and the nature of room housing it, and the atmospheric conditions. No significant increase in noise level in the community is envisaged under normal operation. Moreover, implementation of the below-stated mitigation techniques will also keep the noise impacts at minimum to the workers as well as to the community.

8.5.6 Mitigation measures

Noise management and mitigation plan should follow the underlying strategy:

For people working in noisy installations, ear-protection aids like ear-plugs, ear-muffs, noise helmets, headphones etc. must be provided to reduce occupational exposure. This is possible if working methods are improved by:

- Proper designing and fabrication
- Proper lubrication and better maintenance of machines
- Covering noise-producing machine parts with sound-absorbing materials to check noise production
- Reducing the noise produced from a vibrating machine by vibration damping i.e. making a layer of damping material (rubber, neoprene, cork or plastic) beneath the machine
- Using silencers to control noise from automobiles, ducts, exhausts etc. and convey systems with ends opening into the atmosphere
- Using glass wool or mineral wool covered with a sheet of perforated metal for the purpose of mechanical protection

Noise can also be controlled with barriers by enclosing the source of the noise, by placing sound-reducing barriers between the worker and the source, or by increasing the distance between the worker and the source

- Tree plantation helps to block the propagation of sound. Proponent has planned tree plantation in and around the unit premises
- Sound-proof materials will also be used for construction
- During the project operation, it should be ensured that the noise level does not exceed prescribed limits as set by WHO or Pak-EPA; for which regular monitoring must be carried out.

8.5.7 Waste management

Improper disposal off the solid waste generated during the operational phase of proposed project can pose a health hazard; pollute soil, surface and ground water. Proper implementation of the mitigation measures will ensure that the residual impact from improper management and

disposal of the waste is minimal. Monitoring and inspection will be undertaken to ensure compliance and minimize any residual impact.

Following mitigation measures will be adopted:

- Waste generation will be minimized by adopting waste management strategy of reduce, reuses and recycle
- A waste management plan will be prepared, implemented and monitored for the safe collection, storage and treatment/disposal of the building waste
- Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register
- Records of all waste generated will be maintained
- Training will be provided to personnel for identification, segregation, and management of waste
- Various waste containers for waste collection should be placed at appropriate locations in the building
- Waste management inspections will be undertaken on a regular basis of onsite waste management and of waste disposal contractors to ensure that the waste management procedures are being followed

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Monitoring measures will include:

- Record of all waste generated
- Quantities of waste disposed, reused at site or sold should be logged on the waste tracking register
- Audit of waste management on annual basis
- The areas around the project boundary and access roads should be periodically inspected to verify that no project related waste is scattered in these areas

8.5.8 Air emissions

No air emissions are likely to generate during operational phase of project as the no combustion activities will be involved during operational phase of project.

8.5.9 Mitigation measures

No mitigation measures are required.

8.5.10 Emergency response

Incidents and accidents may take place unexpectedly during project operations no matter how effective, strong and efficient the mitigation measures for all adverse impacts; especially the safety issues may be adopted. These may include; fire hazard which may poses a serious threat.

8.5.11 Mitigation measures

Following mitigation measures will be adopted:

- Fire extinguishers should be properly maintained and checked periodically
- Adequate fire hydrant system should be installed
- Flammable materials should be prohibited in the premises
- Fire alarm systems should be maintained for detection and warning of fire
- Adequate training of workers on use of fire-fighting system to deal with the situation.
- Administration of the unit will make a proper evacuation plans for emergency escape from all halls
- Emergency call service must be made available
- Fire-fighting team must remain ready at all times

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8.5.12 Occupational hazards

It includes occupational hazards like physical injuries arising from accidents such as being hit by falling weak structures, being overrun by heavy equipment. The major safety issues in operational phase are:

- Electrical Hazards
- Machine Guarding
- Eye, Head and Foot Protection
- Fire and Explosion Hazards
- House-Keeping Issues

8.5.13 Mitigation measures

Following mitigation measures will be suitable:

- Care will be taken to properly ground and insulate all equipment
- Head, arms and foot PPE's will be provided
- Fire-fighting equipment will be available and their locations will be clearly marked
- Exits from work places will be well marked and visible in dim light
- Housekeeping will be frequent and thorough to prevent slips, trips, and falls
- Workers will be told and encouraged to use PPEs as may be standardized
- Workers' awareness and safety wall chart showing safety symbols will be displayed.
- First Aid Box will be kept in easy approach of all in case of any injury or mishap.
- Basic medical and health facilities will be provided to all employees
- Safety and warning devices such as reflectors, lights, etc. shall be installed at designated spots
- Visual monitoring of hazards and accidents will be done in order to control the potential hazard

8.6 Potential environmental enhancement measures

Tree plantation within and outside the premises is a potential environmental enhancement measure. A large area will be reserved for tree plantation and among plants native flora like Peepal, Kikar and Amaltas will be planted in the specified green zone which will have the maximum capacity to reduce noise pollution and tolerance index of these species are more than 10. Some floral species like roses and other ornamental evergreen plants will also be introduced in the lawn which will enhance aesthetic beauty. In addition, trees like Amaltas will be planted as boundary wall inside the lawn which will look like green wall. The proponent will also make arrangements for protection and maintenance of trees

8.7 Building enhancement

The introduction of an ecologically effective and efficient design of a building is the environmental enhancement measures planned by the proponent to be incorporated into the design of the intended project.

8.7.1 Social enhancement measures

Following measures will be adopted to improve the socio-economic condition of the area:

8.7.2 Employment/poverty alleviation

The employment opportunities in the project area will be increased due to the establishment of project at the proposed location. During establishment un-skilled workers will be required as labors, sanitary workers and sweepers as well as for the skilled workers such as; accounts and managers to run the administration office local community will be considered on the priority basis. In totality, the overall economic conditions of the area will be improved due to the establishment of the proposed project.

8.7.3 Local economy

The employment opportunities and/or income sources generated by the project construction and operation will be long term in nature. These will be enhanced once the construction phase is completed. The local economy will experience a slight boom during development and operational period.

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9 ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM

The potential environmental impacts are identified from the planning stage of proposed project through the Environmental Impact Assessment (EIA) process. The EIA has identified potential impacts that are likely to arise during the project. The EIA has examined in detail both negative and positive impacts at each stage of the project covering both construction and operations phase. To minimize the effects of adverse impacts the EIA has recommended mitigation measures. The proposed mitigation measures have been based on the understanding of the sensitivity and behavior of environmental receptors in the project area, the legislative controls that apply to the project and a review of good industrial practices while operating in similar environments.

For effective implementation and management of the mitigation measures an Environmental Management Plan (EMP) has been prepared. The EMP satisfies the requirement of the Punjab Environmental Protection Department Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2022.

The EMP is a tool that serves as to manage environmental impacts and specifically focuses on implementation of mitigation measures in its true sense against likely environmental impacts.

9.1 Purpose and objective of the EMP

The primary objectives of the EMP are to:

- Facilitate the implementation of the mitigation measures identified in the EIA.
- Define legislative requirements, guidelines and best practices that apply to the project.
- Define the responsibilities of the project proponent.
- Define a monitoring mechanism and identify monitoring parameters in order to:
    - Ensure the complete implementation of all mitigation measures.
    - Ensure the effectiveness of the mitigation measures.
- Define requirements for environmental monitoring and auditing.
- Provide a mechanism for taking timely action in the face of unanticipated environmental situations.
- Identify training requirements at various levels.

9.2 Components of the EMP

The EMP consists of the following:

- Legislation and guidelines
- Organizational structure; roles and responsibilities
- Monitoring/Management plan
- Environmental monitoring
- Communication and documentation
- Change management Plan
- Training program/schedule

9.3 Legislation and guidelines

The EIA has discussed national and international legislation and guidelines that are relevant to the project; proponent will ensure that the project is conducted in conformance to the project proponent corporate environmental policy, national legislation and relevant international conventions and that guidance is sought from national and international guidelines. Project proponent will also ensure that its key project management staff and all its assigned contractors are aware of these legislation and guidelines prior to the start of project activities

9.4 Description of proposed mitigation actions

It lists all the mitigation measures identified in the EIA and the associated environmental or social aspect in line during construction and operational phase with the administrative framework involving all the responsible implementing authorities who are required to take the planned actions/measures and monitor it accordingly. It enhances project benefits by reducing its impacts and making it environmental friendly. The environmental management and monitoring plan is given below in table.

Table 10: Description of proposed mitigation actions

Sr. No.	Project Activity	Impacts	Mitigation Measures	Responsibility
1	Water Resources	▪ Depletion in groundwater aquifer ▪ Water contamination	▪ Water extraction will be kept at minimum and waste management plan will be developed. ▪ Wastewater from construction & installation site will be directed to settling tanks. ▪ Spill prevention plan shall be followed to mitigate any kind of spill.	Proponent & Contractor
2	Air Quality	▪ Dust emissions during construction activities. ▪ Combustion products from vehicles used for project-related activities.	▪ Water will be sprinkled daily on all exposed surfaces to suppress emission of dust. ▪ All construction equipment used during the project will be properly tuned and maintained in good working condition. ▪ Regular maintenance of project vehicles to ensure that engines are in sound working condition and are not emitting smoke;	Proponent & Contractor
3	Noise	▪ Noise Pollution ▪ Disturbance to the site workers	▪ Proper maintenance of vehicles and potentially noisy equipment. ▪ Minimize/avoid unnecessary use of noisy machinery. ▪ Blowing of horn will be prohibited. ▪ Provision of Personal Protective Equipment (PPE) to the on-site personnel in high noise areas.	Proponent & Contractor
4	Solid Waste	▪ Surface and groundwater pollution ▪ Soil contamination	▪ Recyclable material will be separated at source and will be sold to waste contractor. ▪ Hazardous waste will be segregated and stored in closed	Proponent & Contractor

Sr. No.	Project Activity	Impacts	Mitigation Measures	Responsibility
		▪ Air pollution, odor ▪ Health hazards ▪ Aesthetic issues	containers in a fenced storage area with paved floor; ▪ On-site audits of the waste management will be undertaken on a regular basis during the period of project activity. ▪ Records of all waste generated during the project activity period will be maintained. Quantities of waste disposed, recycled, or reused will be logged on a waste tracking register. ▪ Training will be provided to personnel for identification, segregation, and management of waste. ▪ No waste will be dumped at any location.	
5	Traffic Control	▪ Disturbance to local community	▪ Movement of vehicles (trucks) will remain confined to defined access and limited to a specific duration. ▪ Regular maintenance of vehicles to reduce exhaust emissions. ▪ Parking at NO PARKING areas shall not be allowed.	Proponent & Contractor
6	Worker's Health and Safety	▪ Health problems or immediate risk may take place. ▪ Occupational health of workers and community may be affected.	▪ Compliance to emergency response plan for emergencies and accidents will be ensured to avoid health safety risks. ▪ Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for laborers. ▪ Protection devices (earmuffs) will be provided to the workers operating in the vicinity of high noise generating machines. ▪ Proper maintenance of facilities for workers will be monitored. ▪ Provision of protective clothing for labors e.g.	Proponent & Contractor

			helmet, adequate footwear, protective goggles, gloves ▪ Ensure strict use of wearing PPE during work activities. ▪ Provision of proper safety signage at sensitive/accident prone spots.	
7	Socio-Economic / Local community	▪ Community disturbance ▪ Community awareness ▪ Skilled and un-skilled jobs for local community	▪ All community grievances will be recorded and maintained in a Community Complaint's Register. ▪ Maximum number of unskilled and semi-skilled jobs will be reserved for the local communities. ▪ An increase in the income of locals may occur due to employment during project activities. ▪ Communities will be informed about the project activities and possible disturbance in advance.	Proponent & Contractor

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Table 11: Management and Monitoring Plan – Operation

Sr. No.	Project Activity	Impacts	Mitigation Measures	Responsibility
1	Water Use / Wastewater	▪ Surface water contamination ▪ Pollution risk from accidental spillage	▪ Wastewater from the proposed activities will be contained in settling tanks and will be reused. ▪ Compliance of effluent with PEQS will be ensured prior to discharge in water body. ▪ Water conservation practices will be followed to minimize the water usage. ▪ Water use will be monitored periodically to ensure that water is not wasted. ▪ In case of any accidental spillage, emergency plan should be implemented.	Proponent & Contractor
2	Air Emissions	▪ Compliance with prescribed PEQS for ambient air	▪ Proper ventilation and exhaust system for air passages; ▪ Daily maintenance of transport vehicles is required to control air emissions.	Proponent & Contractor
3	Noise	▪ Noise Pollution ▪ Disturbance to the personnel handling the installations	N/a The proposed project will be placed such that the cumulative noise levels at walkways and worker locations will not exceed PEQS for noise.	Proponent & Contractor
4	Waste Management	If not managed properly; ▪ Groundwater pollution ▪ Soil contamination ▪ Air pollution, odor ▪ Health hazards ▪ Aesthetic issues	Solid waste management plan will be implemented and following mitigation measures will be taken: ▪ Only municipal solid waste will be produced which will be segregated and disposed off using environment friendly techniques ▪ Area supervisor will mark the quantity/weight and nature of the material on the drums and logbook. ▪ Training will be provided to personnel for	Proponent & Contractor

			identification, segregation, and management of waste.	
5	Occupational Health and Safety	▪ Health problems or immediate risk may take place. ▪ Occupational health of workers and community may be affected.	▪ Providing basic medical training, safety training to work staff and basic medical service during operations. ▪ Firefighting equipment, first aid, security, fencing, and contingency measures in case of accidents. ▪ Provision of adequate sanitation, washing, cooking and dormitory facilities including light up to satisfaction; ▪ Adequate signage, safety cones, lightning devices, barriers, yellow tape and persons with flags. ▪ Adequate signage, safety cones, lightning devices, barriers, yellow tape and persons with flags during operations.	Proponent & Contractor

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9.5 Schedule of implementation and environmental budget

9.5.1 Schedule of implementation

This project will be completed in 12 months after getting Environmental Approval. The total cost of the project is **PKR 2000 million approx**. which includes; the cost of civil work, purchase of machinery and its installation, implementation of mitigation measures, site rehabilitation, etc.

9.5.2 Environmental budget

Environmental budget will be allocated for protection of environment. PKR 1.0 million will be allocated as environmental budget in both constructional and operational phase of project.

Table 12: Cost breakup of environmental budget

Constructional Phase		
Serial No.	**Activity**	**Environmental Budget**
1.	Air Quality Monitoring/Emission monitoring	Pkr/- 200,000
2.	Noise Monitoring	Pkr/- 50,000
3.	Waste Water Monitoring	Pkr/- 200,000
4.	Fire Safety	Pkr/- 200,000
5.	PPE's	Pkr/- 50,000
6.	Potential Environment Enhancement Measures	Pkr/- 200,000
Total		**Pkr/- 100,000,0**
Operational Phase		
Serial No.	**Activity**	**Environmental Budget**
1.	Air Quality Monitoring/Emission monitoring	Pkr/- 200,000
2.	Noise Monitoring	Pkr/- 50,000
3.	Waste Water Monitoring	Pkr/- 200,000
4.	Fire Safety	Pkr/- 200,000
5.	PPE's	Pkr/- 50,000
6.	Potential Environment Enhancement Measures	Pkr/- 200,000
Total		**Pkr/- 100,000,0**

9.6 Environmental management team along with their roles and responsibilities

Proponent shall hire environmental management team in operational phase of project. The roles and responsibilities of environmental management team are given below in table.

Table 13: Roles & responsibilities of environmental management team

Roles and Responsibilities		
Sr#	Concerned Persons	Duties
1	The Project Manager	Following will be the responsibilities of the Project Proponent: ▪ Ensure that the contractor is aware of all specifications, legal constraints, standards and procedures pertaining to the project specifically with regards to environment. ▪ Ensure that all stipulations within the EMMP are communicated and adhered to by contractor(s) ▪ Monitor the implementation of the EMMP throughout the project by means of site inspections and meetings. This will be documented as part of the minutes of the site meeting documents ▪ Ensuring project execution within defined budget and timelines ▪ Conducting regular check of the project status and meetings with project team ▪ Provide support and guidance to project team as and when needed ▪ Project proponent is expected to continually monitor and improve the overall performance of their operation
4	HSE Manager	In addition to the health and safety responsibilities held by staff, managers and supervisors must do whatever is reasonably practical to ensure that both the workplace and the work itself are safe. This includes: ▪ Ensuring that staff are appropriately trained and supervised ▪ Identifying, assessing and managing health and safety risks ▪ Consulting with workers (including staff, affiliates and contractors ▪ Health and safety risk assessments ▪ Decisions are made about the measures to be taken to eliminate or control these risks ▪ Health and safety risk assessments ▪ Implementing health and safety risk management programs relevant to their operations, teaching, research and consulting functions and work environment ▪ Reporting investigating and responding to all hazards, accidents, incidents and taking action to control the risk ▪ Assisting with the development, implementation and maintenance of a return to work program for injured staff. ▪ Be fully conversant with the EIA and conditions of its approval

		▪ Be fully conversant with the EMMP ▪ Be fully conversant with all relevant environmental legislation, policies and procedures, and ensure compliance ▪ Convey the contents of this document to the contractor site staff and discuss the contents in detail with the Project Manager and Contractor ▪ Undertake regular and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EMMP ▪ Take appropriate action if the specifications contained in the EMMP are not followed ▪ Monitor and verify that environmental impacts are kept to a minimum, as far as possible ▪ Review and approve construction methods, with input from the Site Manager, where necessary ▪ Ensure that activities on site comply with all relevant environmental legislation ▪ Compile progress reports on regular basis, with input from the Site Manager, for submission to the Project Manager, including a final post excavation audit ▪ Liaise with the Site Manager regarding the monitoring of the site ▪ Report any non-compliance or remedial measures that need to be applied ▪ All environmental problems arising on the construction area will be reported to the Site Manager by the Environmental Manager. Reports on such problems will be submitted to the Project Manager by the Site Manager

9.7 Proposed monitoring program to assess performance or output of EMP

For effective monitoring, management and documentation of the environmental performance during the construction and operational phase of the project, environmental matters will be discussed during meetings held on-site. Environmental concerns raised during the meetings will be mitigated after discussions between project proponent and the contractors. Any issues that require attention of project proponent higher management will communicate to them for action. Project proponent and its contractors will ensure that the communication and documentation requirements specified in the EMP arefulfilled during the project.

Environmental monitoring can be categorized into two types; 1) compliance monitoring and 2) effects monitoring. The environmental monitoring program is summarized in **Table-14** which identify the roles and responsibilities of project monitoring, further described in detail in following section

9.8 Compliance monitoring

Compliance monitoring will be carried out to ensure compliance with the requirements of the EIA. The objectives of the EIA compliance monitoring will be to:

- Systematically observe the activities undertaken by the contractors or any other person associated with the project.
- Verify that the activities are undertaken in compliance with the EIA and other conditions identified by project proponent.
- Document and communicate the observations to the concerned person(s) of project proponent so that any corrective measures, if required, can be taken timely.
- Maintain a record of all incidents of environmental significance and related actions and corrective measures.

Compliance monitoring will be the responsibility of all teams involved in the project activities i.e. project proponent and the contractors. Project proponent staff and contractors will carry out the inspections on a set frequency.

9.9 Effects monitoring

To monitor actual impacts of the project on selected sensitive receptors so that impacts not anticipated in the EIA or impacts which exceed the levels anticipated in the EIA can be identified and appropriate mitigation measures can be adopted in time. This objective will be achieved through effects monitoring.

Considering the environmental conditions of the project area and the assessment of potential impacts of the project made in the EIA, the following environmental parameters will be monitored at identified locations.

Air Quality Monitoring – Air quality monitoring will be done during the construction and operation phase of the project at the representative locations. Ambient air quality parameters

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will include NOX, SOX, CO, PM10, and Smoke.

Water Quality Monitoring – Ground water quality monitoring will be done during the construction and operation phase of the project at the representative locations.

Groundwater Quality Parameters: Total Coliforms, Total Colonial Count, E-Coli, pH, TDS, Total Hardness, Nitrate, Chloride, Fluoride, Colour, Manganese, Aluminium, Chromium, Cadmium, Boron, Barium, Antimony, Arsenic, Cyanide, Mercury, Nickel.

Wastewater Quality Parameters: pH, DO, TSS, Alkalinity, BOD5, COD, Turbidity.

Noise Monitoring - The monitoring will be carried out at key locations covering all receptors

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Table 14: Environmental monitoring plan

Component	Parameters	Monitoring Frequency		Responsibility	
		Construction	Operation	Construction	Operation
Ambient Air Quality	SOx , NOx, CO, PM_{10}, Smoke	Quarterly	As per EPA, Punjab Guidelines	Contractor	Proponent
Ground Water Monitoring	pH, TDS, Chloride, Fluoride, Colour, $NO3^-$, Selenium, Residual chlorine, Lead, Total hardness, Turbidity, Zinc, Manganese, Aluminium, Chromium, Cadmium, Boron, Barium, Antimony, Aresenic, Cyanide, Mercury, Nickel, Total Coliform, E.Coli, Total count.	Monthly	As per EPA, Punjab Guidelines	Contractor	Proponent
Surface & Waste Water Quality	pH, DO, TSS, Alkalinity, BOD5, COD, Turbidity.	Quarterly	As per EPA, Punjab Guidelines	Contractor	Proponent
Noise Level	Using noise level meter (minimum dB and maximum dB)	Quarterly	As per EPA, Punjab Guidelines	Contractor	Proponent
Occupational Health & Safety	Proper provision of PPEs to workers	Daily	Daily	Contractor	Proponent

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9.10 Proposed EMP reporting and reviewing procedures

During construction, EMP reporting and reviewing will be done by the contractor/HSE department. Regular monitoring will be done and reports will be submitted in EPA as per condition of Environmental Approval of construction phase.

- Monitoring reports will be reviewed by EMP team and HSE department
- Photographic records will also be maintained
- Recorded data will be reviewed by supervisory contractor/proponent so that it can be further improved if required.

9.11 Training needs

Environmental training will help to ensure that the requirements of the EIA and EMP are clearly understood and followed by all project personnel throughout the project period. Environmental training will form part of the environmental management system. The training will be directed towards all personnel for general environmental awareness

9.12 Objectives of the training program

The key objective of training program is to ensure that the requirements of the EMP are clearly understood and followed throughout the project. The trainings to the staff will help in communicating environmental related controls specified in the EIA and EMP.

9.13 Objectives of the training program

The key objective of training program is to ensure that the requirements of the EMP are clearly understood and followed throughout the project. The trainings to the staff will help in communicating environmental related controls specified in the EIA and EMP.

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9.14 Training schedule

The training modules will include air, noise and water pollution monitoring, social awareness, Environmental Laws, Environmental Quality Standards usage of personal protection equipment, and health and safety related issues on the construction site.

The contractor will train all construction workers in basic sanitation and health care issues and in general health and safety matters, and on the specific hazards of their work. Training should also consist of basic hazard awareness, site specific hazards, safe work practices, and emergency

procedures for fire, evacuation. A generic scope of the training which covers the requirements of the EIA and the EMP is discussed in **Table-14** while site contractor will prepare site specific training plan considering these training contents.

Table 15: Training needs

Target Audience	Contents	Schedule
Selected management staff of contractor and selected staff	▪ Introduction to project EIA and EMP. Key findings of EIA ▪ Mitigation measures ▪ EMP ▪ Social and cultural values of the area.	Prior to the start of project activities
All site personnel (including locally hired staff)	▪ Environmental sensitivity of the project area ▪ Waste disposal ▪ Community issues/ Social and cultural ▪ values	Prior to the start of project activities
Construction supervisor/ Installation crew	▪ EMP communication, documentation and monitoring requirements. ▪ Good construction & installation practices. ▪ Dust emissions control	Prior to the start of construction & installation activities
Drivers	▪ Safety provision ▪ Road access restrictions ▪ Dust reduction ▪ Waste disposal ▪ Emergency response preparedness	Before and during field operations
Selected staff	Safety provision Hazardous waste disposal Emergency response preparedness	Prior to start of project operations

10 STAKEHOLDER'S CONSULTATION

Public consultation refers to the process by which the concerns of local affected persons and others who have plausible stake in impacts assessment of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. According to the IEE and EIA Review Regulations, 2000 public consultation is mandatory for any socio-environmental study. For this purpose, assessment survey and public consultation sessions held with different stakeholder groups that may be impacted. The consultation process was carried out in accordance with the guidelines laid by EPA, Punjab. The objectives of this process were to:

- Share information with stakeholders on proposed project installation and operation.
- To access the impacts on the physical, biological, and socio-economic environment.
- Understand stakeholder concerns regarding various aspects of the project.
- Understand the perceptions, assessment of social impacts and concerns of the communities of the project area.
- Find out the awareness level and situation of acceptability to identify any issues for the implementation of said project.
- To invite people to express their views about the positive/negative impacts on their life styles and environment.

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This report includes all the comments, which were taken into account in preparing the definitive development concept for the installation of the proposed unit.

10.1.1 Consultation mechanism

Primary stakeholders were consulted during informal and formal meetings. The consultation process was carried out in the Urdu language. During these meetings a simple, non-technical, description of the project was given, with an overview of the project's likely human and environmental impact. This was followed by an open discussion allowing participants to voice their concerns and opinions. In addition to providing communities with information on the proposed project, their feedback was documented during the primary stakeholder consultation.

The issues and suggestions raised were recorded in field notes for analysis, and interpretation.

By reaching out to a wider segment of the population and using various communication tools such as participatory needs assessment, community consultation meetings, focus group discussions, in-depth interviews, and participatory rural appraisal EIA involved the community in active decision-making. This process will continue even after this EIA has been submitted, as well as during future EIA in which similar tools will be used to create consensus among stakeholders on specific environmental and social issues.

Secondary stakeholder consultations were more formal as they involved government representatives and local organizations, consulted during face-to-face meetings. They were briefed on the EIA process, the project design, and the potential negative and positive impact of the project on the area's environment and communities. It was important not to raise community expectations unnecessarily or unrealistically during the stakeholder consultation meetings in order to avoid undue conflict with community's leaders or local administrators. The issues recorded in the consultation process were examined, validated, and addressed in the EIA report. This section involves communication of possible impacts and concerns with

- Proponents Environmental Management Team
- The responsible authority
- Other departments and agencies
- Environmental Practitioners and experts
- Affected and wider community

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10.2 Proponent's environmental management team

Consultation regarding establishment of Installation of 132 KV GIS Consumer Grid Station was done with stakeholders and anticipated impacts were discussed. Concerns of locals, Environmental Practitioners & experts and Government departments were discussed and asked to consider them while construction of above-said project. Locals will be preferred for employment after providing proper training. Mitigations measures mentioned in EMP will be truly implemented

10.3 The responsible authority

Overall responsibility for implementation of EMP will be that of project proponent. He will appoint an HSE/Project Manager of relevant qualification. HSE/Project Manager will act as Environmental Manager and will manage the all HSE condition at the PEQS.

10.4 The other departments and agencies

Different Government departments were consulted regarding establishment of proposed project. Government officer were consulted by the socio-environmental team of the consultants and concerned details about the project were noted down through personal interviews, group meetings, etc., in their offices.

10.5 Environmental practitioners and exerts

Consultation with Environmental Practitioners and experts was done and following comments and suggestions were observed.

Table 16: Consultation with environmental practitioners and experts

Name	Qualification	Comments/suggestions
Dr. Sabiha Khurram	Ph.D. Environmental Sciences	Following comments are summarized: ▪ Latest technology must be preferred ▪ Regular monitoring should be conducted
Ms. Maham Ayesha	Ph.D. (scholar) Environmental Sciences	She said that current project must be installed as : ▪ Residents will be able to use electricity at low cost. ▪ GIS grid station are widely preferred over the world because of their benefits ▪ But, mitigatory measures and environmental conservation must be preferred.
Mr. Danial Zaib	BS Environmental Sciences	He said that: ▪ Locals should be preferred for employment. ▪ In case of outsider's residence must be provided ▪ Proper mitigation measures must be adopted while construction and operation of this project

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10.6 Affected and wider community

Social survey was conducted to consult with local community. Their concerns were noticed and discussed with proponent and their team. There is no affected community present in the radius of our study area. Environtech Consultants team has consulted with the inhabitants of the different villages. They provided positive remarks regarding the subject project and in the favor of the subject activity for the proposed plant.

10.7 Key findings of stakeholder's consultation

The key points of stakeholder's consultation are given below:

- It will enhance the socio-economic conditions/values of the area.
- Project will increase revenue generation for the Government.
- It will create employment opportunities.
- Local people will be given preference for employment in the proposed project.
- Construction of the proposed project will be completed in the designated timeframe to limit adverse impacts of construction.
- There will be no significant additional load on the existing infrastructure i.e. utilities of water, telephone, electricity etc. due to the development of the proposed project.

Majority of people favored the proposed project in a sense that the construction of the said project generate employment opportunities for local people and revenue for the government, will enhance the socioeconomic conditions of the area and automatically will contribute to the national economy of the country.

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11 CONCLUSION AND RECOMMENDATION

M/s Renaissance International (Pvt.) Ltd respects the environment, supports sustainable development and is committed to environmentally sound business practices. The proposed project will provide electricity to consumers. This study was carried out to assess the environmental and socioeconomic impacts of the proposed project. The assessment was carried out in keeping with the legislation of Pakistan, as well as national and international guidelines.

Baseline environmental and socioeconomic information was collected from a variety of sources, including reports of previous studies, published literature, and field surveys. The information collected was used to compose profiles of the natural, socioeconomic, and cultural environment likely to be affected by the project.

The proposed activities were reviewed, and an assessment was made of the potential impacts of these activities on the area's natural and socioeconomic environments, using both qualitative and quantitative assessment methods. Where appropriate, mitigation measures were recommended tokeep the environmental impacts within acceptable limits.

It was analyzed that most of the aspects related with the proposed project have very minor impacts. It is therefore concluded that if the implementation of all mitigation measures is carried out as described in this report, the anticipated impact of the project on the area's natural and socioeconomic environment will be well within acceptable limits.

Proponent of subject project has expressed strong commitment to protection of the social and natural environment from any potential adverse impact of the project. A preventive maintenance philosophy supported by robust inspection plans and sound operational practices will be adopted to ensure sustainable and sound functioning of the proposed project. Therefore, it is recommended that the competent authority may please be issues Environmental Approval for the operation of this project.

12 APPENDICES

12.1 LIST OF ABBREVIATIONS

EIA	Environmental Impact Assessment
EMMP	Environment Mitigation and Monitoring Plan
EMP	Environmental Management Plan
EPAs	Environmental Protection Agencies
IEE	Initial Environmental Examination
NGO's	Non–Government Organizations
NOC	No Objection Certificate
O&M	Operation and Maintenance
PEPA	Pakistan Environmental Protection Act 1997
PEQS	Punjab Environmental Quality Standards
DO	District Officer
PKR	Pak Rupees
hr	Hour
mg/l	Milligram per Liter
mg/m^3	Milligram per Cubic Meter
PPE	Personal Protective Equipment
QC	Quality Control
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
WWTP	Wastewater Treatment Plant
NO_X	Oxides of Nitrogen
SO_X	Oxides of Sulphur
PM	Particulate Matter

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12.2 SOURCES OF DATA AND FULL LIST OF ALL REFERENCE MATERIAL USED

Data was collected by:

- Field visits
- Published articles
- Stakeholder's consultation
- Client meetings'

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12.3 TERMS OF REFERENCES

The consultants is required to carry out an environmental impact assessment study of the project under Section-12 of Pakistan Environmental Protection Act 1997/ Punjab Environmental Protection (Amendment) Act 2012.

The Study should be comprehensive and should cover all aspects which are envisaged under the relevant national and provincial laws & regulations including but not limited to:

- Identification and recommendation for suitable solution/treatment/mitigation measures for emissions and effluents such as wastewater and sludge etc. in accordance with Punjab Environmental Quality Standards (PEQS).
- Identification and recommendation for suitable solution/treatment/mitigation measures of solvents, oils (tar), hazardous waste, organic compounds, steam, flue gases, particulate matter and chemical compounds harmful for the environment and other substances leading to air, noise, water and soil pollution in accordance with PEQS.

The Study should be acceptable to the relevant national and/or provincial authorities (relevant authorities) in Punjab.

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12.4 LIST OF NAME, QUALIFICATION AND ROLES OF TEAM MEMBERS CARRYING OUT IN IEE/EIA STUDY

Sr. No.	Name	Designations	Qualifications	Roles & Responsibility
1.	Dr. Mateen Shafqat	Peer Advisor	PhD Environmental Sciences PMAS, Arid Agriculture University M. Phil Environmental Sciences PMAS, Arid Agriculture University M.Sc. Environmental Sciences PMAS, Arid Agriculture University	Technical Peer Review
2.	Mr. Kamal Ahmed Cheema	Lead Environmentalist	M. Phil. Environmental Economics PIDE, Islamabad Diploma in Environmental Law Punjab University, Lahore BS Environmental Sciences University of Gujrat	Technical Peer review
3.	Ms. Maham Ayesha	Manager Operations	PHD, Environmental Sciences, GCU, LHR MS Environmental Sciences, NUST BS Environmental Sciences, University of Gujrat (UOG)	Legal framework review and Stakeholder consultation IEE/EIA Expert, Environmental & Social Baseline, Report Writing.
4.	Arslan Iqbal	Environmentalist	MS Environmental Sciences, The University of Lahore BS Environmental Sciences University of Lahore	Project Coordination and management, Impact Assessment and Mitigation Measures, Environmental Management Plan, Technical Report Writing.
5.	Ms. Amna Hafeez	Environmentalist & GIS Expert	M.Sc. Mountain conservation and Water management	Legal framework review and Stakeholder

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			Punjab University, Lahore	consultation, IEE/EIA Expert, Environmental & Social Baseline, Report Writing.
6.	Ms. Huda Ashfaq	Environmentalist	M. Phil. Environmental Sciences, UVAS. Lahore	Legal framework review and Stakeholder consultation, IEE/EIA Expert, Environmental & Social Baseline, Report Writing.
7.	Mr. Zargham Arshad	Environmentalist	MS. Environmental Sciences FCCU, Lahore	Legal framework review and Stakeholder consultation, IEE/EIA Expert, Environmental & Social Baseline, Report Writing.

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EPA PUNJAB EIA CHECKLIST FOR PREPARATION AND REVIEW OF ENVIRONMENTAL REPORTS

Required Content	EIA Report		
	PAGE NO.	REMARKS (If Any)	LACKING
Executive summary: 1. Title and location of project with GPS Co-ordinates	1		
2. Name of the proponent along with contact number and email	1		
3. Name and details of the organization preparing the report	1		
4. A brief outline of the proposal (type, production capacity, process, technology and land requirement)	2		
5. The major impacts	3		
6. Recommendations for mitigation measures	4		
7. Proposed monitoring	4		
Screening: Whether the Project requires IEE or EIA as per Regulations	13		
Scoping	13		
1. Spatial and Temporal Boundaries of Environmental Assessment	13		
2. Important issues and concerns raised during consultation	13		
3. Significant impacts and factors to be determined	14		
Consideration of Alternatives	14		
1. Site alternatives, their selection and rejection criteria	14		
2. Design/Technology alternatives, their selection and rejection criteria	15		

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3. Environmental Alternatives, their selection and rejection criteria	15		
4. Economic Alternatives, their selection and rejection criteria	15		
Description of the project:	16		
1. Type and Category of project	16		
2. Objectives of Project	16		
3. Location and Site Layout of the project	16		
4. Site alternatives, their selection and rejection criteria	17		
5. Design/Technology alternatives, their selection and rejection criteria	17		
6. Process, Raw material and product alternatives			
7. Pictures of project site and Surroundings (East, west, north, south.)	18		
8. Google earth map with coordinates	17		
9. Land use on the site	18		
10. Road access	18		
11. Vegetation / tree plantation features of the site	18		
12. Cost and Magnitude of operation	18		
13. Schedule of implementation	19		
14. Description of the project (Process flow chart/steps, Technology, Raw material and products, by-products):	19		
a) Detail of process/operations involved	19		
b) Source and quantity of raw materials	19		
c) Source and quantity of raw materials	19		
d) Collection, storage and transport of raw material	19		
e) Operational equipment and machinery to be used		Attached as Annexure.	
f) Production capacity of the unit for each product	19		
15. Water usage (also mention quantity) and source	28		

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16. Wastewater generation (Quantity and quality) and disposal method	28		
17. Air emissions and control measures	26		
18. Solid waste generation and disposal method	28		
19. Operational hours of the facility	29		
20. Energy requirements and sources (e.g., `electricity, LPG)	29		
21. Fuel storage and handling (if applicable)		Not applicable	
22. Emergency response and safety features	29		
23. Restoration and rehabilitation plans	30		
24. Any green or sustainable features planned a. Rainwater Harvesting system b. Renewable Energy Production (Solar System) c. Tree plantation Plan	30		
Description of Environment: Clear-cut picture of existing environmental resources:			
1. Baseline Physical Environment (Land use, physical structures, human settlements etc.)	31		
2. Baseline Ecological Environment (Flora and Fauna etc.)	34		
3. Baseline Socioeconomic Environment (Gender, populations, income levels etc.)	35		
4. Lab reports of environmental analyses (Ambient air, water quality and quality of surface water body receiving the discharge of project) along with soil tests, geo-investigation in case of building projects and industries)	37		
5. Suitability of the site (not prohibited, environmentally sensitive, incompatible to surroundings and unsuitable)	37		
Impact Assessment 1. Methodologies for impact identifications (One/more)	39		
✓ Checklists	41		
✓ Matrices	42		

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✓ Networks		N/A	
✓ Overlays		N/A	
✓ GIS and Computer expert systems		Google earth map is attached as Annexure.	
2. Characteristics of impacts (nature, magnitude, extent and location, timing, duration, reversibility, risk)	38		
Screening of potential Environmental Impacts and mitigation measures on/during:	42		
1. Project location	42		
2. Design	43		
3. Construction phase	43		
4. Operational phase	45		
5. Potential Environmental Enhancement Measures	48		
Environmental management and monitoring program	50		
1. Description of proposed mitigation actions along with:	50		
2. Schedule for implementation and Environmental budget	52		
3. Environmental Management Team along with their Roles and responsibilities	58		
(by name or position)			
4. Proposed monitoring program to assess performance or output of EMP	60		
5. Proposed EMP reporting and reviewing procedures	71		
6. Any training needs required to ensure implementation of EMP and Monitoring plans	72		
Stakeholders Consultation: Communicate the possible impacts and concerns to the following to assist further analysis and decision making:	74		
1. Proponent's Environment Management Team	74		
2. The responsible authority	75		
3. Other departments and agencies	77		
4. Environmental practitioners and experts	79		

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5. Affected and wider community	79		
Appendices			
i. List of abbreviations	83		
ii. Lists of individuals and organizations consulted along with their written feedback	85		
iii. Sources of data and a full list of all reference material used	86		
iv. Terms of references of environmental reports and those given to individual specialists	87		
v. List of names, qualifications and roles of team members carrying out the EIA study	88		
vi. Approvals from other concerned departments		Will be provided during obtained Operational Phase NOC.	
vii. Approved Building layout map/ planning Permission		Attached as Annexure	
viii. KML file of project site		Emailed	

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