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### Project Summary Table

Section	Parameter	Details
<b>1. Project Identification</b>	Name of Project / M/S	Pak Elektron Limited
	Project Location	34-Km Ferozepur Road, Lahore, Punjab
	Geographical Coordinates	Latitude: 31°17'21.8"N Longitude: 74°24'45.4"E
<b>2. Proponent Information</b>	Proponent Name	Arif Rashid Mir
	CNIC	35202-9879208-3
	Proponent Address	House No. 16-C, phase 1 defence housing society, Lahore Cant, District Lahore
<b>3. Project Overview</b>	Total Project Cost	PKR 06 billion
	Project type	Extension, capacity enhancement, and technological change
	Process Description	Capacity Enhancement and Technological Change of Power Products Unit for the Manufacturing of Distribution Transformers, Switchgears, Power Transformers, Instrument Transformers and Energy Meters along with installation of 2MW renewable energy. The estimated cost of the project is 06 billion PKR.
	Project Capacity	Capacity of the project product wise Distribution Transformers = 2200 Unit/Month, Power Transformers = 9 Unit/Month, Switchgears = 575 Unit/Month, Instrument Transformers = 3500 Unit/Month and Energy Meters = 130,000 Unit/Month
	Land Area and Ownership	Over an area of 190.25 kanal. The land is owned by Pak Elektron Limited.

	Allied Facilities	Warehouse, Admin Block, Utilities, Generators,
<b>4. Waste Management</b>	Types of Waste	The majority of the waste will be non-hazardous industrial waste, including metal scraps such as copper, aluminium, and mild steel generated during sheet cutting, punching, and busbar fabrication processes.
	Estimated Waste Generation	Total Estimated Solid Waste is ~60 tons/year tonnes/year depending on production cycles and product m
	Waste Handling Measures	Source segregation, appropriate interim storage, and final disposal
	Final Disposal Plan	The waste management strategy emphasizes source segregation, appropriate interim storage, and final disposal or recycling through authorized and certified vendors.
<b>5. Wastewater Management (Proposed)</b>	Coordinates of Septic Tank	Latitude: 31°17'19.7"N Longitude: 74°24'43.6"E
	Proposed Treatment Method	Sewerage waste water treatment will be done on site. As their will be only domestic waste water. No process related waste water will be generated.
	Disposal Method & Location	Discharging waste water into Kot mela ram drain at RD. 0+500 L/S
	NOC from Authority	Irrigation department (Attached)
<b>6. Rainwater Harvesting</b>	Harvesting Infrastructure	Pits & Storage Tanks
	Collection Source	Rooftop and Surface Runoff
	Implementation Status	Planned
	Proposed Green Area	65,532.72 SFT



<b>7. Plantation &amp; Green Development</b>	Tree Types and Numbers	Azadirachta indica (Neem) – Medicinal, shade-providing, pest-repellent, Dalbergia sissoo (Sheesham) – Fast-growing, strong timber, excellent for shade, Morus alba (Mulberry / Shahtoot) – Fruit-bearing, supports biodiversity, Acacia nilotica (Kikar / Babul) – Hardy, nitrogen-fixing, good windbreak, and Ficus religiosa (Peepal) – Sacred, oxygen-producing, long-living
<b>8. CSR &amp; Community Welfare</b>	CSR Budget	3-5% of total Budget
	Activities	Health & Safety Water, Sanitation & Hygiene (WASH) Livelihood & Skill Development



## Executive Summary

### 1. Title and Location of the Project

**Project Title:** Expansion, Technological Enhancement, and Capacity Upgrade of Power Products Unit

**Location:** 34-Kilometer, Ferozpur Road, Lahore, Punjab, Pakistan

**Coordinates:** Latitude 31°17'21.8"N, Longitude 74°24'45.4"E

### 2. Name of the Proponent

**M/s Pak Elektron Ltd.**

**Proponent:** Mr. Arif Rashid Mir

**Address:** House No. 116, Block C, Tech Society, Lahore

### 3. Name of the Organization Preparing the Report

**Pak Green Enviro-Engineering (Pvt.) Ltd.**

**Address:** 46-M, Gulberg III, Lahore

**Contact:** 042-35441444, 0303-4442335

### 4. Brief Outline of the Proposal

The project involves the **expansion and upgradation** of an existing power products manufacturing unit operated by M/s Pak Elektron Ltd., which currently holds environmental clearance. The expansion focuses on:

- **Product Types:** Distribution Transformers, Power Transformers, Instrument Transformers, Switchgears, and Energy Meters
- **Manufacturing Process:** Mechanical assembly, oil processing, electrical testing, and calibration using upgraded machinery and advanced automation
- **Technology Upgrade:** Modern testing bays, CNC-controlled winding machines, quality management software, and energy-efficient systems
- **Land Requirement:** Total area covered for expansion is approximately **190.25 Kanal**
- **Energy Integration:** A 2 MW **solar photovoltaic system** will be installed to reduce grid dependency
- **Water Management:** Installation of a **Septic Treatment Plant (STP)** and a **rainwater harvesting system**



The project falls under **Category B, Schedule II** of the Punjab EPA Regulations 2022 due to its industrial nature and expansion scope.

## 5. Major Environmental Impacts Identified

### Construction Phase:

- Air pollution (dust, PM) and noise from machinery
- Generation of construction waste and minor soil contamination
- Safety risks to labor and temporary traffic congestion

### Operational Phase:

- Stack emissions from diesel generators
- Wastewater discharge from industrial and sanitary sources
- Solid waste from packaging, scrap, and electronic components
- Occupational health risks due to high-voltage equipment
- Increased traffic from logistics and product delivery

All identified impacts are **localized, moderate in magnitude**, and **reversible** with appropriate mitigation.

## 6. Recommendations for Mitigation Measures

A comprehensive **Environmental Management and Monitoring Plan (EMMP)** has been proposed to manage environmental risks effectively. Key mitigation measures include:

- Dust suppression through **water sprinkling**, covered transport, and site management
- Enclosure of **high-noise testing units** and provision of **PPE** for workers
- Segregation and proper disposal of solid waste through **licensed recyclers**
- Continuous operation and maintenance of **2MW solar PV** system to reduce emissions
- Deployment of **bunded storage tanks** and spill kits for chemical safety
- Comprehensive **occupational health and safety (OHS)** program for all operational staff
- Development of a **green buffer zone** to reduce noise, improve aesthetics, and support local biodiversity

## 7. Proposed Monitoring Program

To ensure environmental compliance, a **multi-tier monitoring plan** has been devised, which includes:

Parameter	Frequency	Responsible Entity
Ambient air and stack emissions (PM, NOx, SOx, CO)	Quarterly	Environmental Consultant / Lab



Noise levels	Monthly / on complaint	HSE Department
Treated wastewater (BOD, COD, TSS, pH)	Monthly	External Lab
Solid waste handling	Weekly	Waste Management Officer
Solar energy performance	Quarterly	Facility Engineer
Worker safety and PPE compliance	Weekly	HSE Coordinator
Community grievance tracking	Monthly / on complaint	Admin / Liaison Officer

All results will be documented and compiled into **quarterly Environmental Monitoring Reports** and shared with **EPA Punjab**.

### Conclusion

The proposed expansion project of Pak Elektron Ltd. is **environmentally feasible, socially beneficial, and economically significant**. It is recommended that the **Punjab EPA grant environmental approval**, subject to strict implementation of the EMP and continuous monitoring as outlined in this EIA.



## Chapter 1

### Introduction

#### 1.1 Purpose of the Report

This Environmental Impact Assessment (EIA) Report has been prepared to evaluate and document the potential environmental and socio-economic impacts associated with the proposed **Extension, Capacity Enhancement, and Technological Change** project of **M/s Pak Elektron Limited (PEL)** at their existing manufacturing facility located at **34-Km Ferozpur Road, Lahore, Punjab**.

The primary objective of this report is to ensure that all potential environmental aspects are thoroughly assessed in line with the regulatory requirements outlined in the **Pakistan Environmental Protection Act (PEPA), 1997** and the **Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000, amended in 2022**. The project falls under **Schedule II, Category B (Manufacturing and Processing)**, thereby necessitating a full EIA study and subsequent environmental approval from the competent authority, **Punjab Environmental Protection Agency (Punjab EPA)**.

This report will serve to:

- Identify potential environmental and social impacts of the proposed extension project,
- Propose viable mitigation and enhancement measures,
- Recommend an Environmental Management Plan (EMP) and monitoring framework to ensure regulatory compliance and environmental protection during construction and operational phases.

#### 1.2 Identification of Project and Proponent

**Project Title:**

Extension, Capacity Enhancement, and Technological Change of Power Products Manufacturing Unit

**Name of Project Proponent:**

**Mr. Arif Rashid Mir**

Pak Elektron Limited (PEL)

**Proponent Address:**

House No. 16-C, Phase 1, Defence Housing Society, Lahore Cantt, District Lahore



### **Project Location:**

PEL Manufacturing Facility, 34-Km Ferozepur Road, Lahore, Punjab

### **Geographical Coordinates:**

Latitude: 31°17'21.8"N

Longitude: 74°24'45.4"E

### **Nature of Project:**

The project involves the technological upgrade and expansion of the existing transformer manufacturing unit, including the production of **distribution transformers, power transformers, instrument transformers, switchgears, and energy meters**, along with the installation of a **2MW solar energy system** to support internal energy demands.

## **1.3 Details of Consultant**

The Environmental Impact Assessment (EIA) study for the proposed project is being conducted by:

### **Consultant Firm:**

#### **Pak Green Enviro-Engineering (Pvt.) Ltd.**

Environmental Consultants & Engineers

**Office Address:** 46-M, Gulberg III, Lahore

**Contact:** 042-35441444, 0303-4442335

**Scope of Services:** Independent environmental consultancy for the preparation of EIA including baseline assessment, stakeholder consultations, impact analysis, mitigation planning, and formulation of the Environmental Management Plan (EMP).

Pak Green Enviro-Engineering (Pvt.) Ltd. is a registered and experienced firm specializing in environmental assessments for industrial, infrastructural, and development projects across Pakistan. The firm has multidisciplinary expertise in environmental sciences, engineering, pollution control, and regulatory compliance.

## **1.4 Brief Description of Nature, Size, and Location of Project**

### **Nature of the Project:**

The proposed project by **M/s Pak Elektron Limited (PEL)** is an **industrial extension and capacity enhancement initiative**, aimed at upgrading their existing manufacturing facility. The project involves modernization of equipment, process expansion, and the integration of advanced technologies for the production of:

- Distribution Transformers
- Power Transformers
- Instrument Transformers
- Switchgears
- Energy Meters



Additionally, a **2MW solar energy system** will be installed to supplement the facility’s energy demand, contributing to sustainable power consumption and reducing reliance on conventional energy sources.

**Project Size:**

- **Total Land Area for Enhancement:** 190.25 Kanal
- **Total Project Cost:** PKR 6 billion
- **Production Capacity:**
  - Distribution Transformers: 2,200 units/month
  - Power Transformers: 9 units/month
  - Instrument Transformers: 3,500 units/month
  - Switchgears: 575 units/month
  - Energy Meters: 130,000 units/month

The site is located within an established industrial zone with proper access to utilities, road infrastructure, and workforce. The land is fully owned by Pak Elektron Ltd. and includes existing facilities that will be utilized and expanded as part of the project. No relocation or resettlement is required.

**Table 1-1: Production capacity**

Product	Enhanced Capacity (Units/Month)
Distribution Transformers	2,200 Units
Power Transformers	9 Units
Switchgears	575 Units
Instrument Transformers	3,500 Units
Energy Meters	130,000 Units

**By-products:**

There are no hazardous by-products. All solid waste will be non-hazardous and managed appropriately.

**Source of Raw Materials:**

Raw materials will be sourced from both **local markets and international suppliers** to maintain quality and supply chain efficiency.

**Project Area:**

The total land area allocated for this extension and enhancement project is **190.25 Kanal**, which provides adequate space for expanded production, storage, internal road access, solar panel installation, and environmental management systems.

### Estimated Project Cost:

The total estimated cost of the proposed project is **PKR 06 Billion**, which includes civil construction, machinery, utilities, environmental management systems, and renewable energy infrastructure.

### Project Location:

- **Address:** 34-Km Ferozepur Road, Lahore, Punjab
- **Geographic Coordinates:**
  - Latitude: 31°17'19.7"N
  - Longitude: 74°24'43.6"E

This location is part of a well-established industrial corridor and is well connected to urban infrastructure, utilities, and logistics networks. It is conducive for industrial development and minimizes environmental conflicts due to its existing industrial land use.

### Map 1.1: Location of the Project Site



### Power Supply:

- **Primary Source:** WAPDA
- **Supplementary Source:** 2MW Solar Energy System (On-site generation)

### Water Requirements:

- **Consumption:** Less than 0.5 cusec



- **Source:** WASA (Water and Sanitation Agency) via motor pump system
- **Use:** Primarily for domestic use, cooling, and general process support

**Solid and Liquid Waste Management:**

**Table 1-2: Solid and Liquid Waste Management**

Type	Source	Disposal Method
<b>Solid Waste (Non-Hazardous)</b>	Manufacturing, Domestic	Contracted to local waste handlers
<b>Wastewater</b>	Domestic & construction	Drained into WASA sewerage network

**Labor Force:**

*Table 0-3: Labor Force*

Phase	Estimated Workforce
<b>Construction</b>	30-40 Persons
<b>Operational</b>	300-500 Persons

This expansion is anticipated to significantly contribute to **employment generation, technological advancement, and sustainable industrial development** in the energy sector.



## Screening

### Regulatory Basis for Screening

Environmental Screening is a preliminary assessment step used to determine the level of environmental review a proposed project must undergo, as per the provisions of the **Pakistan Environmental Protection Act (PEPA), 1997 (Amended 2022)**, and the **Pakistan Environmental Protection Agency (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2000 (Amended 2022)**. The main objective of screening is to classify the project into one of two categories:

- **Schedule I** projects, which require an **Initial Environmental Examination (IEE)**.
- **Schedule II** projects, which require a more comprehensive **Environmental Impact Assessment (EIA)**.

The classification is based on the **nature, size, and location** of the project and its potential environmental impacts.

### Screening Determination for the Proposed Project

After a detailed review of the proposed project characteristics, it is determined that the **Extension, Capacity Enhancement, and Technological Change** of the **Power Products Unit** of **M/s Pak Elektron Ltd. (PEL)** falls under **Schedule II**, specifically under the following clause:

**Schedule II, Category F (Manufacturing/Processing), Clause 5: "Expansion, modernization, or conversion of existing industrial units."**

The project's scope involves:

- Substantial increase in production capacity.
- Introduction of new machinery and manufacturing processes.
- Construction activities expanding the facility footprint.
- Installation of a 2 MW solar system.

These components collectively pose **moderate to significant potential impacts** on environmental parameters such as air quality, noise levels, resource consumption, waste generation, and energy use. Therefore, the project **requires a full-scale Environmental Impact Assessment (EIA)**, not just an IEE.



## Justification for EIA Requirement

The following points justify the classification of the project as requiring an EIA:

### 1. Scale of Operations

The project covers a total area of 190.25 Kanal, with significant expansion in built-up area, production capacity, and employee numbers. Such a scale inherently increases pressure on local environmental infrastructure.

### 2. Introduction of New Technologies

The technological upgrade includes new production lines and automation systems that may introduce new emissions, noise, or solid waste streams. An EIA is essential to assess and mitigate any such risks.

### 3. Resource Utilization

Although the project proposes efficient resource use (including solar energy), the overall **water, power, and raw material** requirements will increase. An EIA helps in understanding the cumulative environmental load and devising sustainable use strategies.

### 4. Waste and Emissions Management

Increased industrial activity typically results in increased volumes of **non-hazardous solid waste**, packaging material, and possibly chemical residue. The EIA ensures proper waste management practices are integrated.

### 5. Sensitive Receptors and Urban Proximity

The project is located along **Ferozpur Road**, an urban-industrial corridor of Lahore. Although the area is designated for industrial use, its proximity to urban settlements and mixed-use developments necessitates careful analysis of **cumulative impacts**, especially air and noise pollution.

### 6. Solar Energy Integration

The inclusion of a **2 MW solar power plant** within the facility, while environmentally beneficial, also requires environmental scrutiny for land use compatibility, e-waste management, and safety planning.

### 7. Public and Occupational Health Considerations

The employment of 300–500 operational staff members and the expected movement of goods and materials demands careful consideration of **occupational health and safety, traffic management, and community exposure to emissions**.

## Regulatory Consultation and Confirmation

The need for conducting a full EIA for this project was **confirmed through a formal screening process** in consultation with the **Punjab Environmental Protection Agency (Punjab-EPA)**. The regulatory authority confirmed that the project falls under **Schedule II** and must follow the complete procedure under the **EIA Regulations 2000 (Amended 2022)**.



Accordingly, this EIA report has been prepared in compliance with:

- **Section 12 of the PEPA 1997 (Amended 2022)**
- **Rule 4 and Rule 5 of the EIA/IEE Regulations 2000 (Amended 2022)**
- **Terms of Reference (ToRs)** provided or accepted by the Punjab-EPA for projects of this type and scale.

## Summary of Screening Outcome

Table 2-1: Summary of Screening Outcome

Parameter	Description
Project Type	Expansion and Technological Change of Existing Unit
Activity Nature	Manufacturing (Electrical/Power Products)
Schedule Classification	Schedule II
Regulatory Clause	Category F, Clause 5 (Modernization/Expansion of Industry)
Screening Decision	Requires Full Environmental Impact Assessment (EIA)
Confirmation Source	Punjab Environmental Protection Agency (Punjab-EPA)

This screening outcome has guided the preparation of the full Environmental Impact Assessment report that follows, including baseline studies, impact analysis, mitigation planning, and stakeholder engagement strategies.



## Scoping

### Spatial and Temporal Boundaries of Environmental Assessment

The scoping process for this Environmental Impact Assessment (EIA) of the proposed project by M/s Pak Elektron Ltd. (PEL) defines the spatial and temporal boundaries within which the environmental assessment has been conducted.

#### Spatial Boundaries:

- **Core Project Area:** The 190.25 kanal industrial site located at 34-Km Ferozpur Road, Lahore, comprising existing manufacturing units and proposed expansions.
- **Zone of Influence:** A buffer zone of 1 km radius around the project site has been considered to assess potential off-site impacts on air quality, noise, soil, surface water, groundwater, traffic, and nearby communities.
- **Broader Context:** Consideration of impacts beyond the immediate surroundings including downstream water users, regional electricity grid contributions, and supply chain inputs.

#### Temporal Boundaries:

- **Pre-Construction Phase:** Includes site clearing, construction mobilization, and material transport.
- **Construction Phase:** Expected to span over 12–18 months, covering all civil, mechanical, and electrical works.
- **Operational Phase:** Long-term impacts from routine operations, energy consumption, emissions, and workforce dynamics.
- **Decommissioning Phase:** Although not immediate, potential impacts related to plant closure, if applicable in the future, have been briefly identified.

### Important Issues and Concerns Raised During Consultation

Stakeholder consultations were carried out with local communities, industrial neighbors, labor representatives, and relevant government authorities. Key concerns raised included:

- **Air Quality and Noise:** Community members expressed concerns about dust and noise during construction and increased vehicular movement.
- **Traffic Congestion:** Anticipated increase in transport of raw materials and finished goods may affect local road networks.
- **Employment Opportunities:** Local community members were eager for job openings and skill development initiatives.



- **Water Use and Quality:** Stakeholders emphasized the importance of ensuring responsible water consumption and disposal practices.
- **Environmental Compliance:** Local EPA officials stressed adherence to emission standards, solid waste management protocols, and use of renewable energy.

These concerns have been incorporated into the assessment, and relevant mitigation measures have been proposed in the Environmental Management Plan (EMP).

### Significant Impacts and Factors to be Determined

Based on the scoping exercise and preliminary understanding of project activities, the following key environmental and social factors have been identified for detailed assessment:

- **Air Quality:** Assessment of emissions from construction equipment, increased vehicular traffic, and potential fugitive dust.
- **Noise Pollution:** From machinery, transportation, and manufacturing operations.
- **Water Resource Use and Wastewater Disposal:** Impact on local water supply and adequacy of WASA drainage network.
- **Solid Waste Management:** Generation and disposal of non-hazardous waste from production processes.
- **Energy Consumption and Renewable Integration:** Impact of conventional power use versus benefits of 2 MW solar integration.
- **Occupational Health and Safety:** Impacts on worker health due to industrial processes, chemical use, and operational hazards.
- **Socioeconomic Impacts:** Including employment, infrastructure development, and contributions to the local economy.

Each of these factors will be evaluated in the subsequent chapters to determine the nature, magnitude, and significance of the impacts and propose feasible mitigation strategies.



## Consideration of Alternatives

### Site Alternatives, Their Selection and Rejection Criteria

Several potential sites were evaluated before finalizing the proposed location at 34-Km Ferozpur Road, Lahore. The key considerations for site selection included proximity to suppliers and markets, availability of infrastructure, existing land ownership, and minimal environmental and social conflicts.

**Selected Site:** 34-Km Ferozpur Road, Lahore

#### Rejection Criteria for Alternative Sites:

- Lack of adequate space for expansion
- Distance from raw material sources and transportation links
- Higher likelihood of impacting residential or environmentally sensitive areas
- Additional infrastructure development requirements

The selected site was preferred due to existing ownership, industrial land use classification, connectivity to the road network, and minimal displacement or disruption to surrounding communities.

### Design/Technology Alternatives, Their Selection and Rejection Criteria

The project evaluated several design and technological options before selecting the most efficient and sustainable solutions for production processes and energy consumption.

#### Selected Technologies:

- Use of state-of-the-art automated machinery for transformer and switchgear production
- Incorporation of clean energy through a 2MW on-site solar system

#### Rejection Criteria for Alternatives:

- Outdated manual machinery with lower energy efficiency and higher emissions
- Exclusive reliance on conventional fossil fuel-based power sources
- Technologies not compliant with environmental standards or lacking local technical support

The chosen technologies ensure product quality, operational efficiency, worker safety, and environmental sustainability.



## Environmental Alternatives, Their Selection and Rejection Criteria

Environmental design alternatives were considered to mitigate negative impacts and enhance the ecological compatibility of the project.

### Adopted Environmental Measures:

- On-site solar energy system to reduce carbon emissions
- Proper drainage connectivity with WASA sewerage system
- Green belt development and plantation within the facility

### Rejected Environmental Practices:

- Diesel generators as the primary energy source
- Open dumping or burning of solid waste
- Discharge of untreated effluents into open land or water bodies

The selected environmental alternatives help minimize pollution and contribute to a cleaner, safer work environment.

## Economic Alternatives, Their Selection and Rejection Criteria

From an economic perspective, the project considered cost-effective and sustainable options to ensure long-term viability.

### Selected Economic Options:

- Integrated manufacturing setup to reduce operational costs and logistics delays
- Renewable energy component to reduce long-term energy expenses
- Phased investment approach to manage capital flow efficiently

### Rejected Options:

- Outsourcing production processes with higher recurring costs
- Full dependency on national grid with variable energy tariffs
- Use of low-cost, low-quality materials affecting product lifecycle

The adopted economic strategy supports profitability, energy independence, and market competitiveness.

## Chapter 2

### Description of the Project

#### 2.1 Objectives of the Project

The proposed project by **M/s Pak Elektron Ltd. (PEL)** aims to significantly enhance the technological capacity, production volume, and operational efficiency of its Power Products Manufacturing Unit. The objectives of this extension and technological upgrade are both strategic and practical, aligning with national energy goals, industrial growth, and sustainability targets.

#### Key Objectives Include:

1. **Expansion of Production Capacity:**

The primary goal is to increase the manufacturing capacity of various power products such as distribution transformers, power transformers, switchgears, instrument transformers, and energy meters to meet the growing national and regional demand. The new capacity will include:

- 2,200 units/month of Distribution Transformers
- 900 units/month of Power Transformers
- 575 units/month of Switchgears
- 3,500 units/month of Instrument Transformers
- 130,000 units/month of Energy Meters

2. **Integration of Advanced and Automated Technology:**

The extension project includes the installation of advanced machinery such as CNC-based equipment, automated winding machines, robotic assembly stations, and computer-based testing units to enhance quality, reduce production time, and improve worker safety.

3. **Support for the National Energy Infrastructure:**

By improving the availability of high-quality power equipment, PEL aims to strengthen Pakistan's domestic energy infrastructure, reduce reliance on imports, and ensure the timely availability of grid-compatible power equipment.

4. **Environmental Sustainability through Renewable Energy:**

The installation of a **2MW Solar Power System** on-site aims to reduce dependence on fossil fuel-based grid electricity, thereby lowering greenhouse gas emissions and operational carbon footprint.

5. **Boost to Local Economy and Employment:**

The expansion will create direct and indirect employment opportunities for skilled and semi-skilled labor, engineers, and administrative staff, while also stimulating local businesses involved in supply chain and services.



## 6. Quality Enhancement and Export Competitiveness:

Adoption of modern standards and ISO-compliant production processes will enhance the competitiveness of PEL products in the international market, supporting export growth.

## 7. Safety and Compliance:

Upgrades will ensure adherence to environmental regulations, fire and electrical safety codes, and occupational health standards as prescribed by PEPA 2022 and other regulatory frameworks.

## 2.2 Location and Site Layout of the Project

The project is situated at a strategically advantageous location at:

### Address:

34-Kilometer Ferozepur Road, Lahore, Punjab, Pakistan

### GPS Coordinates:

31°17'19.7"N, 74°24'43.6"E

### Site Selection Justification:

- The site lies within a designated **industrial zone**, minimizing land-use conflicts.
- Availability of utility services such as electricity, water, and gas.
- Proximity to skilled labor, industrial suppliers, and transport networks.
- No significant ecological or residential zones nearby, reducing risks of adverse environmental impact.

### Total Area:

The total area allocated for this project is **190.25 Kanal**, currently owned and operated by PEL. The site has previously been used for similar industrial operations, and thus, the project qualifies as an **expansion of existing industrial facilities**, rather than a greenfield development.

### Site Layout Description:

The project layout has been strategically designed to optimize land use, enhance workflow, and ensure compliance with health and environmental safety guidelines. The layout comprises:

- **Production Units:** Dedicated buildings for the manufacturing of each product type — transformers, switchgears, and energy meters.
- **Material Storage Zones:** Clearly segregated areas for raw material and finished goods.
- **Testing and R&D Labs:** Facilities for quality control, product testing, and research.
- **Renewable Energy Area:** Approximately **20,000 sq. ft.** (rooftop) is designated for a **2MW solar panel installation**.
- **Waste Management Area:** Includes temporary solid waste storage, sorting, and disposal zones.
- **Administrative Buildings:** Office complexes, security checkpoints, and meeting spaces.



- **Utility Services:** Backup generators, water supply units, fire safety installations.
- **Parking and Internal Roads:** Separate lanes for heavy vehicles, staff vehicles, and emergency vehicles.
- **Green Areas:** Approximately **10% of the site** is landscaped as green belts, buffer zones, and tree plantations.

**Future Expansion Compatibility:**

The design allows for future vertical or horizontal expansion, with clear zoning to prevent congestion and ensure smooth industrial operations.

**2.3 Land Use on the Site**

The proposed project site is located within the premises of **M/s Pak Elektron Ltd. (PEL)**, occupying a total area of **190.25 Kanal**. The land has been historically used for industrial manufacturing and is officially designated for **industrial use** as per the zoning regulations of the **Lahore Development Authority (LDA)**. This ensures the project’s compliance with regional planning and environmental requirements.

**Current Land Utilization:**

The existing industrial estate hosts various functional units involved in the manufacturing of power products. The land is currently utilized as follows:

**Table 4-1: Land Utilization**

Zone	Purpose
<b>Production Workshops</b>	Manufacturing transformers, meters, switchgears
<b>Raw Material Storage</b>	Receiving and storing metals, electrical parts
<b>Finished Goods Warehousing</b>	Secure storage of completed units
<b>Testing and Quality Control Labs</b>	Inspection, calibration, and load testing
<b>Administration and Offices</b>	Engineering, HR, finance, and logistics departments
<b>Utilities and Backup Systems</b>	DG sets, compressor house
<b>Internal Roads &amp; Circulation</b>	Material and personnel transport lanes
<b>Solar Power Plant Zone (New)</b>	2 MW solar installation (planned)
<b>Green Areas and Plantation</b>	Landscaping, buffer zones

These zones are carefully delineated to prevent cross-contamination, enable efficient workflow, and adhere to occupational safety standards.

**Proposed Enhancements and Land Optimization:**

As part of the extension project, the following improvements are planned:



- **Technology Upgrade Zones:** Installation of new, automated production equipment in dedicated process lines.
- **Solar Power Integration:** Land allocated for the solar panel plant will include battery rooms and monitoring systems.
- **Environmental Infrastructure:** Establishment of a solid and hazardous waste management area, compliant with EPA guidelines.
- **Noise and Dust Buffers:** Green belts along the perimeter will function as both environmental buffers and aesthetic enhancements.

The land use strategy aligns with **PEL's Integrated Management System (IMS)**, encompassing ISO 14001 (Environment), ISO 45001 (Occupational Health), and ISO 9001 (Quality Management) frameworks.

## 2.4 Road Access

Efficient transportation and logistics access are crucial to the success of the industrial operations at PEL. The site enjoys excellent connectivity via road networks and supporting infrastructure, making it ideal for large-scale manufacturing and distribution.

### Primary Access Route:

- The main access to the site is via **Ferozpur Road (N-5)**, a national highway of strategic importance that connects Lahore with Kasur, Okara, and Multan.
- This road supports **heavy-duty vehicular traffic**, enabling the seamless movement of raw materials, components, and finished products.

### Internal Circulation Network:

The project site is designed with a robust internal transportation system, including:

- **Asphalt-paved roads** (20–30 feet wide), supporting two-way movement of container trucks, forklifts, and cargo vans.
- **Loading/Unloading Bays** adjacent to warehouses and production halls to prevent traffic bottlenecks.
- **Pedestrian Lanes and Safety Markings** to segregate worker movement from vehicular zones.
- **Fire and Emergency Lanes** providing unobstructed access to all buildings.

### Secondary Entry/Exit Points:

To facilitate security and operational efficiency:

- Separate gates are provided for **commercial logistics** and **employee entry**, with surveillance and automated access control.



- **Emergency exits** are clearly marked and maintained in compliance with **Building Code of Pakistan – Fire Safety Provisions**.

**Connectivity to External Infrastructure:**

**Table 4-2: Connectivity to External Infrastructure**

Mode	Facility Name	Distance from Site	Use
Rail	Kot Lakhpat Railway Station	~15 km	Heavy and bulk freight transport
Air	Allama Iqbal International Airport	~35 km	Urgent shipments, overseas visitors
Dry Port	Lahore Dry Port (Prem Nagar)	~25 km	Containerized goods, customs clearance
Bus Terminal	Kalma Chowk Bus Station	~18 km	Worker and visitor transport

**Traffic and Environmental Considerations:**

- The project is expected to **increase traffic by less than 10%** over current volumes, which is manageable within the current road capacity.
- **Vehicle emissions** will be mitigated through route optimization, fuel-efficient fleets, and **on-site solar power generation** to offset carbon impact.
- **No significant traffic congestion** is expected, as logistic operations are scheduled during off-peak hours and coordinated through digital tracking systems.

**2.5 Vegetation Features of the Site**

The project site, located within the industrial premises of M/s Pak Elektron Ltd. (PEL) at 34-KM Ferozepur Road, Lahore, lies in an urban-industrial zone with minimal natural vegetation. The land has been utilized for industrial purposes for several decades, and as such, the **natural vegetation cover is significantly limited**.

**Existing Vegetation Profile:**

The existing vegetation at the site is primarily ornamental and functional in nature, serving purposes such as dust control, temperature regulation, and aesthetic improvement. It includes:

- **Lawn Grass and Ground Cover:** Maintained in administrative areas and along pedestrian paths.
- **Shade Trees:** Species such as *Dalbergia sissoo* (Sheesham), *Azadirachta indica* (Neem), and *Ficus religiosa* (Peepal) are planted along the internal roads and near boundary walls.
- **Shrubs and Hedges:** Decorative hedging using *Bougainvillea*, *Lantana*, and *Duranta* is found at the front of administrative buildings.



- **Potted Plants:** Various indoor and outdoor potted plants are maintained in office and reception zones.

A recent internal audit estimated that green areas and landscaping features cover approximately **10% of the total site area**, equivalent to around **190.25 Kanal**.

### **Proposed Vegetative Enhancements:**

In line with the environmental goals of the expansion project, the following additions and improvements are planned:

- **Green Buffer Zones:** Along the site boundary to mitigate dust and noise pollution.
- **Vertical Green Walls:** On selected external facades for aesthetic and thermal benefits.
- **Native Plantation Drives:** Use of drought-resistant, native plant species to promote biodiversity and minimize water usage.
- **Rainwater Harvesting Beds:** Landscaping design will include permeable surfaces and bioswales for rainwater recharge.

These initiatives are aligned with the company's environmental commitment under ISO 14001 and local Environmental Protection Department (EPD) requirements.

## **2.6 Cost and Magnitude of Operation**

The proposed project represents a major capital investment in industrial modernization, capacity enhancement, and sustainability. The overall cost and operational scope of the project are summarized below:

### **Total Project Cost:**

The total estimated cost of the proposed extension and technological enhancement project by M/s Pak Elektron Limited is approximately PKR 6 billion. This investment encompasses the procurement and installation of advanced machinery, upgradation of existing production infrastructure, civil works, integration of modern energy-efficient technologies, installation of a 2MW solar power generation system, and implementation of environmental management and safety measures. The substantial financial commitment reflects the proponent's strategic focus on enhancing production capacity, improving product quality, meeting growing market demand, and aligning operations with sustainable industrial practices.

### **Magnitude of Operation:**

- **Product Categories:**  
The facility will produce:
  - Power Transformers
  - Distribution Transformers
  - Switchgears



- Instrument Transformers
- Energy Meters
- **Production Capacity (Post-Expansion):**
  - Power Transformers: Up to 9 units/month
  - Distribution Transformers: Up to 2200 units/ month
  - Switchgears: Up to 575 units/ month
  - Instrument Transformers: Up to 3500 units/ month
  - Energy Meters: Up to 130,000 units/ month
- **Workforce:**
  - Current Staff: ~1200 employees
  - Post-Expansion Staff: Expected to increase to ~1500
- **Operating Hours:**
  - 2–3 production shifts/day depending on product line demand.
  - Facility will run 6 days a week, with Sunday allocated for maintenance and utility checks.
- **Energy Consumption:**
  - Estimated demand: ~3.5–4 MW
  - Contribution from Solar: ~2 MW (57% of peak demand)
- **Water Requirement:**
  - Estimated at 50,000–60,000 liters/day, primarily for cooling, cleaning, and sanitation.
  - Sourced through LDA-approved bore wells and water conservation measures.

The scale and scope of operations ensure that the project remains economically viable, environmentally sound, and technically advanced. With a strong market demand, especially in power distribution infrastructure, the project is expected to achieve break-even within 4–5 years post commissioning.

## 2.7 Schedule of Implementation

The implementation schedule for the proposed expansion and technological upgradation project at PEL’s Power Products Unit has been carefully developed to ensure timely completion, resource optimization, and minimal disruption to ongoing operations. The execution strategy will follow a **phased approach**, integrating civil work, machinery installation, utility upgrades, and workforce training in sequential milestones.

### Project Implementation Phases:

**Table 4-3: Implementation Phases**

Phase	Key Activities	Timeline
<b>Phase 1: Planning &amp; Approvals</b>	Finalization of design, procurement planning, environmental approvals	Month 1 – 2
<b>Phase 2: Civil Works</b>	Construction and modification of factory floors, utility corridors, solar platform	Month 3 – 5



<b>Phase 3: Machinery Procurement</b>	Import and local sourcing of new machinery, pre-installation logistics	Month 4 – 6
<b>Phase 4: Installation &amp; Setup</b>	Machinery installation, calibration, testing, electrical and utility connections	Month 6 – 8
<b>Phase 5: Workforce Training</b>	Training of operators and maintenance personnel on new technologies	Month 7 – 8
<b>Phase 6: Commissioning &amp; Trial</b>	System trials, dry runs, initial production and quality assurance	Month 9
<b>Phase 7: Full-Scale Operation</b>	Commercial production initiation, performance monitoring	Month 10 onward

### Total Project Duration:

- **Estimated completion time:** 10–11 months from the date of formal initiation.
- **Critical Path Activities:** Include timely delivery of imported equipment, successful integration of the solar energy system, and regulatory inspections.

A dedicated project management team under PEL’s Engineering Division will monitor progress against key performance indicators (KPIs), ensuring adherence to cost, time, and quality benchmarks.

## 2.8 Description of the Project

The proposed project involves **expansion, modernization, and sustainability integration** within PEL’s existing manufacturing facility for power and electrical products. The project encompasses the following dimensions:

### 1. Process Overview & Technological Scope

PEL manufactures five primary categories of power products:

- Distribution Transformers
- Power Transformers
- Switchgears
- Instrument Transformers
- Energy Meters

Each product line will be supported by dedicated production zones equipped with **automated, CNC-based, and high-efficiency machinery**. Technological upgrades aim to reduce manual error, improve consistency, and meet international standards (e.g., IEC, ISO, WAPDA).

A **2 MW on-site solar power system** will support green energy generation, feeding directly into the plant’s internal grid and reducing dependence on fossil fuels.



## 2. Production Process Flow (Generalized)

The manufacturing of all five product lines broadly follows these steps:

1. **Raw Material Reception and Inspection**
2. **Cutting, Punching, and Shaping (using CNC and hydraulic presses)**
3. **Core Assembly and Coil Winding**
4. **Insulation, Drying, and Tanking**
5. **Final Assembly and Enclosure Sealing**
6. **Vacuum Drying and Oil Filling (for transformers)**
7. **Testing and Quality Assurance**
8. **Painting and Surface Finishing**
9. **Packaging and Dispatch**

The exact sequence and technologies vary by product type. Specific **process flow diagrams for each product line** are appended in separate sections of this report.

## 3. Machinery and Equipment

The plant will house over **150 modern machines and systems**, including:

- CNC punching and shearing machines
- Coil winding machines (vertical/horizontal)
- High-voltage test equipment
- Paint booths and curing ovens
- Robotic arms for repetitive assembly
- Solar inverters and controllers for the renewable section

Details of machinery for each product line are provided under individual sections with specifications and layout plans.

## 4. Raw Materials

Key raw materials used across the facility include:

- CRGO (Cold Rolled Grain Oriented) Steel
- Copper and Aluminium Conductors
- Transformer Oil
- Sheet Metal and Epoxy Moulding Compounds
- Resins, Insulation Paper, and Fiberboards
- Electronic components and smart meters (for digital meters)

Each product category utilizes a tailored mix of these inputs, ensuring material optimization and compliance with electrical safety codes.



## 5. Products and By-Products

### Final Products:

- Distribution and Power Transformers
- Medium and Low Voltage Switchgears
- Current and Potential Transformers (CTs & PTs)
- Smart and Analog Energy Meters

### By-Products/Wastes:

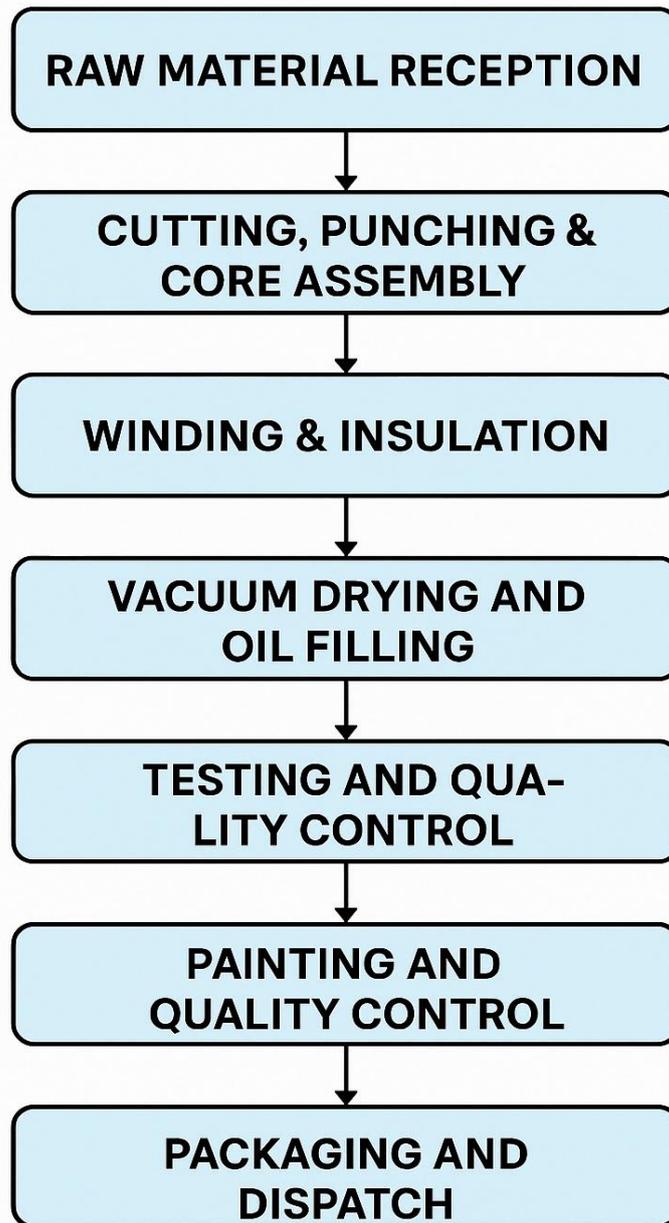
- Metal scraps (copper/aluminium) – recycled internally or sold to certified vendors
- Waste oil and resins – disposed of via licensed hazardous waste handlers
- Packaging waste – sorted for reuse or recycling

## 6. Restoration and Rehabilitation Plans

The project includes proactive planning for post-installation environmental and aesthetic restoration:

- **Construction debris and excess materials** will be properly disposed of using EPA-compliant contractors.
- **Landscaped green zones** will be restored or expanded.
- **Noise control measures** (acoustic insulation, barriers) will be added near high-noise machinery.
- In case of future decommissioning of any production line, **land reclamation, soil remediation**, and material decontamination protocols will be implemented.

These efforts reflect PEL's commitment to responsible industrial development, in alignment with national environmental policies and international best practices.



### GENERAL PROCESS FLOW

## 2.9 Restoration and Rehabilitation Plans

Although the site is already developed for industrial use, PEL aims to incorporate the following restoration and rehabilitation measures as part of sustainable project development:

- **Green Belt Development:** A dedicated plantation plan around the facility boundary and internal pathways using native species.



- **Soil Stabilization:** Paved pathways and vegetative cover to prevent erosion and dust.
- **Noise and Dust Control:** Installation of acoustic barriers and sprinkling systems during construction and operational phases.
- **Post-Project Decommissioning Plan:** If at any point the plant is shut down or relocated, proper dismantling, removal of hazardous material, and site reclamation will be carried out in line with PEPA regulations.

PEL is committed to maintaining environmental quality and workplace safety throughout the life cycle of the project by incorporating these restoration strategies and environmental best practices.

## Rainwater Harvesting System Design and Integration

### 1. Introduction

Rainwater harvesting (RWH) has been integrated into the Pak Elektron Ltd. Expansion Project as a **sustainable water management practice** to reduce dependency on municipal water, manage stormwater runoff, and recharge groundwater reserves. This initiative aligns with both **corporate environmental responsibility** and **Punjab Sustainable Development Goals** related to water conservation.

Given the project's location at **34-Km Ferozpur Road, Lahore**, which receives an average annual rainfall of approximately **600 mm**, the site offers favorable conditions for **rainwater collection and reuse**, especially for **non-potable applications** such as:

- Green belt irrigation
- Floor cleaning and equipment washing
- Sanitary flushing systems
- Emergency fire reserve storage

### 2. System Components and Technical Design

The RWH system is designed based on roof area calculations, rainfall data, and projected non-potable demand. The key components include:

**Table 0-1: Rain Water harvesting System Overview**

Component	Description
<b>Catchment Area</b>	5,000 m <sup>2</sup> rooftop area (main production halls and offices)
<b>Average Annual Rainfall</b>	~600 mm/year
<b>Estimated Harvestable Volume</b>	~3,000,000 liters/year
<b>Gutters &amp; Downpipes</b>	Installed on all roof edges, fitted with leaf guards and anti-clog screens
<b>First Flush Diverters</b>	Directs initial runoff to separate chamber to remove contaminants
<b>Pump System</b>	Submersible pump (0.5 HP) for internal distribution to utility and green areas
<b>Distribution Lines</b>	Separate pipeline network for non-potable applications
<b>Overflow Management</b>	Connected to stormwater drains or percolation pits for safe discharge

### 3. Usage and Environmental Benefits

#### Utilization Plan

**Table 5-2: Assumed water Utilization Plan**

Use	Volume Allocated (Approx.)	Frequency
Green Belt Irrigation	40,000 liters/month	Daily, seasonal
Floor Washing & Cleaning	20,000 liters/month	Weekly
Toilet Flushing (select areas)	30,000 liters/month	Daily
Emergency Fire Reserve	50,000 liters (static storage)	As needed

## Environmental Impact

- **Reduced surface runoff** leading to **lower soil erosion and urban flooding**
- **Less reliance on WASA supply** or groundwater withdrawal
- **Improved groundwater recharge** through controlled percolation of overflow
- Helps maintain **cooler microclimate** in landscaped zones

## 4. Maintenance and Monitoring

- **Monthly inspection** of filters, diverters, and pumps by maintenance team
- **Bi-annual cleaning** of tanks and sediment traps
- Record-keeping of **rainfall, tank levels, and usage volumes**
- **Signage and SOPs** installed for staff handling RWH system

## 5. Compliance and Best Practice Alignment

- Aligned with **Pakistan Building Code 2021 (Section 7: Water Efficiency)**
- Promotes **UN SDG 6 – Clean Water and Sanitation**
- Reinforces the proponent’s commitment to **industrial water conservation**

## Conclusion

The integration of a **Rainwater Harvesting System** in the Pak Elektron Ltd. Expansion Project is a **forward-looking environmental intervention**. It not only supports resource efficiency but also strengthens climate resilience and regulatory compliance. As urban water stress increases, such systems are vital to achieving **industrial sustainability** without compromising operational reliability.

## Chapter 3

### Description of Environment

This chapter provides a comprehensive description of the existing environmental baseline conditions in and around the project area, which serves as a reference to identify, predict, and assess the potential impacts of the proposed industrial extension. The assessment covers the **physical**, **ecological**, and **socioeconomic** environments based on secondary data, site-specific observations, and public consultations.

#### 3.1 Baseline Physical Environment

##### 3.1.1 Topography and Land Use

The project site is located at **34-Km Ferozpur Road, Lahore**, within an established industrial zone. The terrain is flat and suitable for industrial development. Land use around the site is predominantly industrial with a mix of residential and commercial zones along the Ferozpur Road corridor. There are no sensitive ecological zones, forests, or wetlands in the immediate vicinity.

##### 3.1.2 Climate and Meteorology

The climate of Lahore is classified as **semi-arid (BSh)** under the Köppen climate classification. It is characterized by hot summers, a monsoon season, and mild winters.

Table 6-1: Climate and Meteorology

Parameter	Value/Range
Average Annual Rainfall	650 mm
Temperature (Summer)	30°C – 48°C
Temperature (Winter)	5°C – 20°C
Predominant Wind Direction	NW to SE
Monsoon Season	July – September
Humidity	30% – 80% (seasonal variation)

##### 3.1.3 Soil Characteristics

The soil in the project area is predominantly **sandy loam**, suitable for construction. Soil sampling in the vicinity indicates a pH range of 7.0 to 8.0, with no significant contamination from heavy metals or hydrocarbons in the upper soil strata. Load-bearing capacity is adequate for industrial structures.

### 3.1.4 Water Resources and Quality

Water for the proposed project is sourced from **WASA (Water and Sanitation Agency)** and supplemented by **motor pumps**. Surface water bodies in the vicinity include minor seasonal drains, but no perennial rivers or major canals are within a 2 km radius.

**Table 6-2: Water and Quality**

Parameter	Source/Reading
<b>Water Source</b>	WASA + Groundwater
<b>Water Consumption</b>	< 0.5 cusec
<b>Groundwater Depth</b>	90–110 feet
<b>Groundwater Quality</b>	Acceptable for industrial use (TDS < 500 ppm)

### 3.1.5 Air Quality

The ambient air quality near the site is moderately affected by vehicular emissions from Ferozpur Road and adjacent industrial activities. However, pollutant levels are generally within **NEQS limits**.

**Table 6-3: Air Quality**

Pollutant	Observed Range	NEQS Limit
<b>PM<sub>2.5</sub></b>	35–70 µg/m <sup>3</sup>	35 µg/m <sup>3</sup> (24-hr avg)
<b>NO<sub>x</sub></b>	40–60 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>
<b>SO<sub>2</sub></b>	20–40 µg/m <sup>3</sup>	120 µg/m <sup>3</sup>
<b>CO</b>	1–3 ppm	5 ppm

## 3.2 Baseline Ecological Environment

### 3.2.1 Flora

The project area lies in an urban-industrial setting with limited natural vegetation. The existing flora is mostly **introduced or ornamental species** found along roadsides or in small green belts.

**Table 6-4: Floral Information**

Common Plant Species	Type
<b>Dalbergia sissoo (Shisham)</b>	Native Tree
<b>Eucalyptus spp.</b>	Fast-growing, non-native
<b>Nerium oleander</b>	Shrub

**Grass cover**

Sparse and mixed

### 3.2.2 Fauna

The project area does not fall within any **wildlife sanctuary or protected area**. Faunal presence is limited to urban-adapted species.

**Table 6-5: fauna**

Species	Type	Status
House crow ( <i>Corvus spp.</i> )	Bird	Common
Common myna ( <i>Acridotheres tristis</i> )	Bird	Common
Rodents (mice, rats)	Mammal	Abundant (urban)
Stray dogs and cats	Mammal	Common

There is **no evidence of endangered or protected species** in the immediate or surrounding project area.

## 3.3 Baseline Socioeconomic Environment

### 3.3.1 Demographics and Settlements

The project is located in an industrial stretch of **Lahore District**, with nearby communities including factory workers, small businesses, and residential settlements.

**Table 6-6: Demographic Data**

Parameter	Description
District	Lahore
Nearby Communities	Kahna Nau, Gajju Matta, Youhanabad
Estimated Population (5-km radius)	150,000–200,000
Literacy Rate	Approximately 65%
Major Languages	Urdu, Punjabi

### 3.3.2 Livelihood and Employment

The local economy is largely supported by **industrial employment**, small-scale trading, and services. The proposed expansion will directly and indirectly contribute to employment generation.

**Table 6-7: Livelihood and Employment**

Employment Sector	Contribution
-------------------	--------------

<b>Industrial/Factory Work</b>	High
<b>Construction</b>	Moderate (temporary)
<b>Retail and Services</b>	Medium

### 3.3.3 Education and Health Facilities

The area is served by a mix of public and private educational institutions and healthcare units. Tertiary care is available in Lahore city.

*Table 6-8: Educational availability*

Facility Type	Availability Within 5 km
<b>Schools (Govt./Private)</b>	Available
<b>Basic Health Units</b>	Available
<b>Hospitals</b>	Located within Lahore city (10–15 km)

### 3.3.4 Infrastructure and Utilities

The project area is well-connected via **Ferozpur Road** and has access to **electricity (WAPDA)**, **natural gas**, **telecommunication**, and **public transport**. The location is suitable for industrial operations without creating undue pressure on public infrastructure.

## 3.4 Lab Reports of Environmental Analyses

To establish the environmental baseline and assess potential impacts, environmental sampling and laboratory analyses were conducted for air, water, and soil quality in and around the project site. These tests were carried out by certified environmental laboratories in accordance with **NEQS (National Environmental Quality Standards)** and relevant protocols.

### 3.4.1 Air Quality Analysis

Ambient air sampling was conducted at multiple locations around the project site. Results show that while **PM<sub>2.5</sub> levels** slightly exceed NEQS during peak traffic hours, all other parameters remain within permissible limits.

*Table 6-9: Air Quality Analysis*

Parameter	Unit	Observed Range	NEQS Limit	Remarks
<b>PM<sub>2.5</sub></b>	µg/m <sup>3</sup>	35–70	35 (24-hr avg)	Slight exceedance
<b>NO<sub>x</sub></b>	µg/m <sup>3</sup>	40–60	80	Within limit
<b>SO<sub>2</sub></b>	µg/m <sup>3</sup>	20–40	120	Within limit
<b>CO</b>	ppm	1–3	5	Within limit

### 3.4.2 Water Quality Analysis

Samples from the **WASA supply and groundwater bore** were analysed. The water was found to be **suitable for industrial use**.

Table 6-10: Water Quality Analysis

Parameter	Unit	Observed Value	NEQS (Drinking)	Remarks
pH	-	7.3 – 7.6	6.5 – 8.5	Within limit
TDS	mg/L	380 – 420	< 1000	Acceptable
Hardness	mg/L	180 – 210	< 500	Moderate
Nitrate	mg/L	2.5 – 4.0	< 50	Within limit
Fecal Coliform	CFU/100ml	Not Detected	0	Safe

### 3.4.3 Soil Quality and Geotechnical Investigation

Soil samples from the site were analyzed for fertility, pH, organic matter, and heavy metals. A **geotechnical investigation** confirmed that the **soil has suitable load-bearing capacity** for industrial infrastructure.

Table 6-11: Soil Quality and Geotechnical Investigation

Parameter	Value/Range	Remarks
Soil Texture	Sandy loam	Good for construction
pH	7.1 – 7.8	Neutral to mildly alkaline
Organic Matter	0.5% – 1.2%	Low, typical for industrial area
Heavy Metals	Not detected	Safe levels
Load Bearing Capacity	> 1.5 kg/cm <sup>2</sup>	Suitable for industrial buildings

*Lab reports and certificates from the accredited testing agency are attached in Annexure-III.*

### 3.5 Suitability of the Site

The site has been evaluated for its **legal, environmental, and infrastructural suitability**. Based on field assessments, documentation, and regulatory checks, the site is deemed appropriate for industrial expansion.



### 3.5.1 Regulatory Compliance and Zoning

- The site is located in an **industrial zone** recognized by local planning authorities.
- It does **not fall within any prohibited or environmentally protected area** under the Punjab Environmental Protection (Amendment) Act, 2012 or PEPA 1997.
- The project has an existing **NOC for industrial operations** and is seeking environmental approval solely for the extension and technological enhancement component.

### 3.5.2 Environmental Sensitivity

- No **forests, wetlands, wildlife habitats, or archaeological sites** exist within a 5 km radius.
- The **nearest residential zone** is at a reasonable distance and separated by a buffer of roads and industrial premises.
- Air and noise emissions will be managed within NEQS through use of cleaner technologies and control measures.

### 3.5.3 Compatibility with Surroundings

- The surrounding area already hosts **similar manufacturing industries**, warehouses, and commercial operations.
- The infrastructure (roads, utilities, drainage) is well-developed to support expansion.
- **No relocation or resettlement** is required.

### 3.5.4 Accessibility and Infrastructure

- The site lies adjacent to **Ferozpur Road**, offering excellent road connectivity.
- **Power supply is available** via WAPDA, supplemented by planned solar power.
- **WASA water and drainage systems** are present and operational.

The site is environmentally and technically suitable for the proposed industrial expansion and does not conflict with regulatory restrictions, sensitive land use, or local planning objectives.

## Chapter 4

### Impact Assessment

The objective of this chapter is to identify, predict, and evaluate potential environmental and social impacts that may arise during the **construction**, **operation**, and **post-operation** phases of the proposed extension project by M/s Pak Elektron Ltd. This assessment serves as the foundation for proposing appropriate mitigation strategies in the next chapter.

#### 4.1 Methodologies for Impact Identification

To ensure a comprehensive and systematic assessment of potential impacts, the following standard **methodologies** were adopted, individually and in combination:

##### 1. Checklist Method

A **simple interaction matrix** (activity vs. environmental component) was developed to preliminarily identify the sources of impacts. This method is useful for screening and ensures that no potential issue is overlooked.

**Example:**

Project Activity	Air Quality	Water Quality	Soil	Noise	Ecology	Socioeconomic
Site Preparation	✓	✓	✓	✓	X	✓
Construction Activities	✓	✓	✓	✓	X	✓
Operation of Manufacturing Units	✓✓	✓	✓	✓✓	X	✓✓
Solar Energy Installation	✓	X	X	✓	X	✓

✓ indicates impact; ✓✓ indicates significant impact; X indicates no or negligible impact.

##### 2. Leopold Matrix

A modified version of the **Leopold Matrix** was used to quantify the significance of interactions between project actions and environmental attributes. Each interaction was scored based on:

- **Magnitude** (scale of impact)
- **Importance** (sensitivity of the receptor)

This method helps in distinguishing **major** from **minor** impacts.



### 3. Expert Judgment and Stakeholder Consultation

Experts from **Pak Green Enviro-Engineering (Pvt.) Ltd.**, in consultation with the project proponents and relevant stakeholders (e.g., WASA, EPA Punjab), provided professional judgment in predicting long-term, cumulative, or indirect impacts that are not easily quantifiable.

### 4. Baseline Comparison Approach

Changes to baseline environmental parameters (air, water, soil, noise, traffic, etc.) were assessed by **comparing predicted conditions** under project scenarios to **measured baseline conditions** (Chapter 3). This helped in identifying both **adverse** and **beneficial** effects.

### 5. Regulatory Review Method

Environmental impacts were cross-checked with the requirements of the **Pakistan Environmental Protection Act 1997, PEPA Regulations 2022**, and **NEQS** standards to ensure full compliance with legal and policy frameworks.

### 6. Public Concern Mapping (if applicable)

Where applicable, the concerns raised during stakeholder meetings or public consultation were **mapped to specific project activities** and environmental components, ensuring that perceived social impacts were considered in the impact matrix.

**Environmental Impact Identification Checklist****Project Title:** Extension and Capacity Enhancement of Transformer Manufacturing Facility by M/s Pak Elektron Ltd.**Location:** 34-Km Ferozpur Road, Lahore**Prepared by:** Pak Green Enviro-Engineering (Pvt.) Ltd.

Project Activities / Environmental Components	Air Quality	Water Quality	Soil Quality	Noise	Solid Waste	Ecology	Socio-Economy	Land Use	Health & Safety
<b>A. Construction Phase</b>									
Site clearing and leveling	✓	✓	✓✓	✓	✓	X	✓	✓	✓✓
Civil construction and structure works	✓✓	✓	✓	✓✓	✓✓	X	✓	✓	✓✓
Transportation of materials & machinery	✓✓	X	✓	✓✓	✓	X	✓	X	✓
Storage of construction materials	✓	✓	✓✓	✓	✓	X	X	X	✓
Labor camp & utilities	✓	✓✓	✓	✓	✓✓	X	✓✓	X	✓✓
Excavation / Earthwork	✓	✓	✓✓	✓	✓	X	✓	✓	✓
Use of DG sets for power	✓✓	X	X	✓✓	✓	X	X	X	✓
<b>B. Operation Phase</b>									



<b>Transformer manufacturing (core assembly, oil filling, etc.)</b>	✓✓	✓✓	✓	✓✓	✓✓	X	✓✓	X	✓✓
<b>Testing of transformers and switchgear</b>	✓✓	✓	X	✓✓	✓	X	✓	X	✓✓
<b>Cooling and insulation processes</b>	✓	✓	X	✓	✓	X	X	X	✓
<b>Installation of solar panels (2 MW)</b>	✓	X	✓	✓	✓	X	✓	X	✓
<b>Domestic and process wastewater generation</b>	X	✓✓	X	X	X	X	✓	X	✓✓
<b>Solid waste from process and packaging</b>	X	X	✓	X	✓✓	X	✓	X	✓
<b>Storage of oil, chemicals, and metals</b>	✓✓	✓✓	✓✓	✓	✓	X	✓	X	✓✓
<b>Workforce commuting &amp; activities</b>	✓	X	X	✓	✓	X	✓✓	X	✓✓
<b>C. Post-Operation / Maintenance Phase</b>									
<b>Decommissioning or facility upgrades</b>	✓✓	✓	✓✓	✓	✓✓	✓	✓	✓	✓✓
<b>Maintenance of solar panels and equipment</b>	✓	X	X	✓	✓	X	✓	X	✓

**Legend for Impact Indicators**

- ✓✓ = Significant potential impact
- ✓ = Moderate or possible impact



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- X = Negligible or no expected impact



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## Key Observations

- Major impacts are expected during **construction** in terms of **air pollution, noise, waste generation, and worker health/safety**.
- In the **operation phase**, significant impacts relate to **air emissions, wastewater, and occupational hazards** due to manufacturing and chemical usage.
- The project has **low ecological risk**, as the site is industrial with no sensitive habitats nearby.
- Positive socio-economic impacts are expected through **job creation, technological enhancement, and local economic development**.

**Environmental Impact Matrix (Modified Leopold Format)****Project Title: Extension and Capacity Enhancement of Transformer Manufacturing Facility****Proponent:** M/s Pak Elektron Ltd.**Location:** 34-Km Ferozpur Road, Lahore**Prepared by:** Pak Green Enviro-Engineering (Pvt.) Ltd.

Project Activities / Environmental Components	Air Quality	Water Quality	Soil Quality	Noise/Vibration	Ecology / Flora Fauna	Socio- & Economics	Occupational Health & Safety	Solid Waste	Land Use / Aesthetics
<b>A. Construction Phase</b>									
Site clearing and land preparation	-3 / 2	-2 / 2	-3 / 3	-2 / 2	-1 / 1	+2 / 2	-2 / 3	-2 / 2	-2 / 2
Excavation & civil works	-3 / 3	-2 / 2	-4 / 3	-3 / 3	-1 / 1	+2 / 2	-3 / 3	-2 / 2	-1 / 1
Material transport and machinery operation	-4 / 3	-1 / 1	-2 / 2	-4 / 3	-1 / 1	+2 / 2	-2 / 2	-1 / 1	-1 / 1



DG set use & temporary facilities (camps, storage)	-3 / 2	-2 / 2	-2 / 2	-3 / 3	-1 / 1	+2 / 3	-2 / 3	-2 / 2	-1 / 1
<b>B. Operation Phase</b>									
Transformer & switchgear manufacturing	-4 / 4	-4 / 3	-2 / 2	-4 / 4	-1 / 1	+4 / 4	-4 / 4	-3 / 3	0 / 0
Energy meter production	-3 / 2	-2 / 2	-1 / 1	-2 / 2	-1 / 1	+4 / 4	-2 / 2	-2 / 2	0 / 0
Chemical/oil handling & storage	-3 / 3	-4 / 4	-3 / 3	-2 / 2	-1 / 1	+2 / 2	-4 / 4	-2 / 2	0 / 0
Solar panel installation (2 MW)	-1 / 1	0 / 0	-1 / 1	-1 / 1	0 / 0	+2 / 2	-1 / 1	-1 / 1	0 / 0
Wastewater and solid waste generation	0 / 0	-4 / 4	-1 / 1	0 / 0	-1 / 1	+2 / 2	-3 / 3	-3 / 3	-1 / 1
Employment & production output	+1 / 1	0 / 0	0 / 0	0 / 0	0 / 0	+5 / 5	+2 / 2	0 / 0	+1 / 1
<b>C. Post Operation / Maintenance</b>									



Equipment maintenance & upgrades

-2 / 1    -1 / 1    -1 / 1    -2 / 1                    -1 / 1                    +2 / 2                    -2 / 2                    -1 / 1    0 / 0

Legend:

- Values are shown as **Impact Magnitude / Importance** (e.g., -3 / 2)
- **Magnitude Scale:**
  - +5 = Very High Positive
  - +1 = Minor Positive
  - 0 = No impact
  - -1 to -5 = Minor to Major Negative
- **Importance Scale** (Sensitivity of receptor or significance):
  - 1 = Low
  - 2 = Moderate
  - 3 = High
  - 4 = Very High
  - 5 = Critical

Key Takeaways:

- **Air and noise impacts** are significant during both construction and operation phases.



- **Water quality degradation** from oil handling and wastewater generation needs careful mitigation.
- **Socio-economic benefits** (employment, industrial growth) are strong positive impacts.
- **Ecological impacts** are minimal due to the existing industrial nature of the site.
- **Occupational health and safety** requires strict controls, especially in handling transformers, chemicals, and energy systems.

### Environmental Impact Network

**Project:** Technological Enhancement & Capacity Expansion of Transformer Manufacturing Unit

**Prepared by:** Pak Green Enviro-Engineering (Pvt.) Ltd.

#### ◆ 1. Project Activities

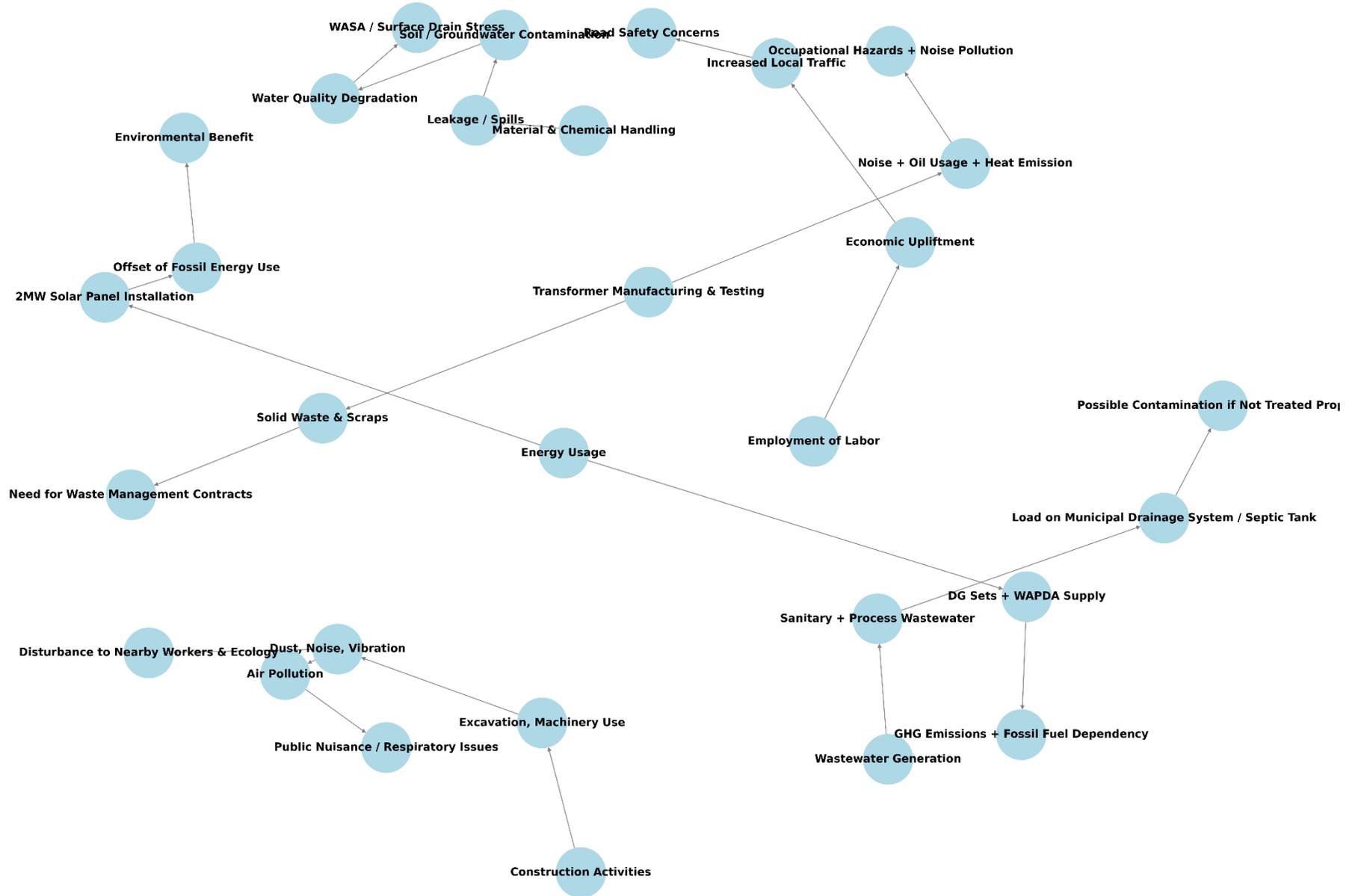
- Site preparation and civil works
- Transformer & switchgear manufacturing
- Chemical & oil storage and handling
- DG set usage (during construction)
- Solar panel installation
- Domestic and process wastewater generation
- Transportation of materials and goods



- Packaging and solid waste generation



Environmental Impact Network for Pak Elektron Ltd. Extension Project





### Key Observations from the Network:

- **Indirect impacts** such as **GHG emissions**, **road safety**, and **public nuisance** are linked to direct construction and operational activities.
- **Chemical handling and transformer testing** can lead to **soil, air, and water pollution** unless mitigated.
- The **installation of solar panels** has a **positive cascading impact** by reducing fossil energy reliance.
- **Solid waste management and wastewater treatment** are central nodes—requiring special focus in mitigation planning.

### 4.2 Characteristics of Impacts

The proposed extension and technological upgrade project of M/s Pak Elektron Ltd. will cause a range of environmental and social impacts during both construction and operational phases. The key characteristics of these impacts are outlined below.



**Impact Characterization Table**

Impact	Nature	Magnitude	Extent & Location	Timing	Duration	Reversibility	Risk Level
Dust and Noise from construction machinery	Negative	Medium	Localized (on-site and adjacent areas)	Construction	Short-term	Reversible with control	Moderate
Air emissions from DG sets and machinery	Negative	Medium	Site-specific and immediate vicinity	Construction	Short-term	Reversible	Low
Soil contamination from spills and waste storage	Negative	Low to Medium	On-site	Both Phases	Medium-term	Partially reversible	Moderate
Water quality degradation due to wastewater	Negative	Medium	Local sewerage and soil	Operational	Continuous	Reversible with treatment	High
Solid waste from production and packaging	Negative	Medium	On-site and through disposal channels	Operational	Continuous	Reversible	Moderate
Noise and heat from transformer testing units	Negative	Low to Medium	Localized within plant boundaries	Operational	Continuous	Reversible	Low
Visual impact and land use change	Neutral to Minor	Low	Project site	Construction	Long-term	Irreversible	Low
Energy demand from grid (WAPDA)	Neutral	Medium	Regional (grid-based impact)	Operational	Continuous	Reversible (solar offset)	Low
Installation of solar panels	Positive	High	On-site	Operational	Long-term	Permanent improvement	None



<b>Employment generation</b>	Positive	Medium	Local community	Both Phases	Long-term	Irreversible (benefit)	None
<b>Traffic increase due to goods movement</b>	Negative	Medium	Site access roads and surrounding routes	Operational	Long-term	Reversible	Moderate

**Summary of Key Impact Characteristics:**

- **Nature:** Impacts are both negative (e.g., emissions, waste, noise) and positive (e.g., employment, renewable energy).
- **Magnitude:** Ranges from low to high depending on activity.
- **Extent:** Primarily localized to the project site and immediate surroundings.
- **Timing and Duration:**
  - Construction-related impacts are short- to medium-term.
  - Operational impacts are long-term and continuous.
- **Reversibility:**
  - Most impacts are **reversible** with proper environmental management.
  - Some positive impacts (like economic uplift) are **irreversible benefits**.
- **Risk:**
  - Moderate risks exist if waste and wastewater are not properly handled.
  - Risks can be minimized through planned mitigation and monitoring.



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## Chapter 5

### Screening of Potential Environmental Impacts and Mitigation Measures

#### 5.1 Project Location

The proposed extension and technological upgrade of M/s Pak Elektron Ltd. is located at **34-Km Ferozepur Road, Lahore, Punjab**, an area already established as an industrial and semi-urban zone. The project site lies within an approved industrial use zone, away from ecologically sensitive areas, forest reserves, or protected wetlands.

#### Site Context and Surroundings

Table 0-1: Site Context and Surroundings

Parameter	Details
Land Use Category	Industrial / Semi-Urban
Nearest Residential Area	Approximately 800 meters from the site
Nearest Sensitive Receptor	No schools or hospitals within 500 meters radius
Access Route	Direct access from Ferozepur Road
Topography	Generally flat terrain
Flood Risk	Located outside of flood-prone areas
Soil Type	Loamy soil with moderate infiltration rate
Groundwater Table	Approximately 60–70 feet below surface
Zoning Compliance	Fully compliant with industrial zoning regulations
Prohibited Area Status	Not located in any prohibited or environmentally restricted area

#### Environmental Impacts Associated with Project Location

Table 8-2: Environmental Impacts Associated with Project Location

Potential Impact	Nature	Magnitude	Mitigation Measure
Encroachment on sensitive habitats	Negative	Low	Site selected within approved industrial zone; no sensitive ecological receptors nearby
Public nuisance from traffic or noise	Negative	Medium	Install green buffer zones and noise barriers along periphery



<b>Overload on local infrastructure</b>	Negative	Low	Coordinate with local authorities and WASA for utilities and drainage planning
<b>Change in natural drainage pattern</b>	Negative	Low	Ensure surface runoff is managed through planned drainage infrastructure
<b>Visual intrusion or land use conflict</b>	Neutral	Low	Maintain site aesthetics; use landscape elements at boundary

### Suitability Justification

- **Land Use Compatibility:** The location is already established for industrial use and does not conflict with adjacent land uses.
- **Environmental Compatibility:** No known endangered species, protected habitats, or culturally significant sites are located within the project’s influence area.
- **Infrastructure Availability:** The area is served by road, grid electricity, WASA water, and local labor, which supports the project's operational viability.

### Conclusion:

The selected project location is **suitable and environmentally viable** for the proposed extension. With the implementation of **planned mitigation measures** and site-level **environmental management**, the location does **not pose significant adverse environmental risks**.

## 5.2 Design Phase

The design phase is critical in preemptively minimizing potential environmental impacts. The project incorporates sustainability, efficiency, and compliance into its architectural and engineering design.

### Potential Environmental Impacts During Design Phase

**Table 8-3: Potential Environmental Impacts During Design Phase**

<b>Design Element</b>	<b>Potential Impact</b>	<b>Mitigation/Enhancement Measures</b>
<b>Inadequate drainage design</b>	Surface runoff and localized flooding	Integrate proper stormwater drainage with permeable surfaces
<b>Insufficient air flow in building layout</b>	Poor indoor air quality	Design with cross-ventilation, air filtration, and natural lighting
<b>Material inefficiency</b>	Excessive resource use	Use recyclable and certified construction materials

<b>Poor layout planning</b>	Increased energy and water consumption	Optimize layout for energy efficiency, passive solar gain, and shading
<b>Lack of provision for renewable energy</b>	Continued reliance on fossil fuel sources	Include 2 MW rooftop solar PV system in base design
<b>Safety hazards (electrical, mechanical)</b>	Occupational and fire hazards	Integrate safety protocols and emergency response in design
<b>Improper waste handling infrastructure</b>	Inefficient solid/liquid waste management	Include segregated waste storage and effluent treatment facilities

### 5.3 Construction Phase

During the construction phase, short-term environmental disturbances may occur. These must be addressed through a site-specific **Environmental Management Plan (EMP)** to ensure mitigation of dust, noise, waste, and resource use impacts.

#### Potential Impacts and Mitigation Measures During Construction

**Table 8-4: Potential Impacts and Mitigation Measures During Construction**

Activity	Potential Impact	Mitigation Measures
<b>Site clearance and land preparation</b>	Soil erosion, loss of vegetation	Minimize area of disturbance; use sediment controls and turfing
<b>Use of heavy machinery</b>	Air pollution, GHG emissions, and noise	Use well-maintained low-emission machinery; schedule noisy operations during daytime
<b>Construction material handling</b>	Dust generation, spillage	Store materials in covered areas; wet unpaved roads and open stockpiles
<b>Waste generation (construction debris)</b>	Visual pollution, injury risk, land contamination	Segregate waste, reuse where possible, and contract certified waste handlers
<b>Labor movement and temporary settlements</b>	Pressure on water and sanitation infrastructure	Provide clean drinking water, sanitation, and solid waste bins on-site
<b>Fuel and chemical storage</b>	Fire hazard, soil and water contamination	Use bunded storage tanks, safety signage, and spill kits
<b>Excavation and foundation work</b>	Noise, dust, and vibration impacts	Water spraying, vibration monitoring, and proper PPE for workers



## Health & Safety Considerations

- Mandatory use of PPE (helmets, masks, gloves, safety boots)
- First-aid facilities and on-site safety officer
- Fire extinguishers and spill containment kits at designated locations
- Safety drills and training sessions for labor

### Conclusion:

The **design and construction phases** carry short- to medium-term environmental and occupational risks that can be **effectively mitigated** through proper planning, design interventions, and on-site controls. The proposed mitigation measures are **practical, cost-effective, and enforceable** through the implementation of an Environmental Management Plan (EMP).

### 5.4 Operational Phase

During the operational phase, the project will involve the regular production of transformers, switchgears, and energy meters. While designed to be environmentally compliant, the scale of operations can still generate air emissions, wastewater, solid waste, and occupational health risks.

#### Potential Environmental Impacts and Mitigation Measures

Operational Activity	Potential Impact	Mitigation Measures
Use of transformers and electrical testing	Noise and electromagnetic exposure	Enclosure of testing bays; limit testing hours; shielding where required
Operation of diesel generators (backup)	Air emissions (PM, NOx, CO2)	Use of low-sulfur fuel, periodic maintenance, emission monitoring, stack height design
Solid waste from production (metal, insulation)	Non-hazardous industrial waste accumulation	Separate collection, storage, and contracted recycling/disposal through licensed vendors
Energy consumption from grid	Increased load on national grid	Utilize 2 MW solar power to offset grid demand
Worker activity in plant environment	Health & safety concerns	Implement OHS protocols (PPE, signage, emergency plans); regular health check-ups
Vehicular traffic for goods movement	Road congestion, emissions	Schedule movement during off-peak hours; use fuel-efficient transport fleet

## Environmental Monitoring in Operation

- **Air quality:** Periodic stack and ambient monitoring
- **Effluent quality:** Monitoring per NEQS before disposal
- **Noise:** Testing bays to comply with permissible dB limits
- **Solid waste:** Inventory and audit of waste generation and disposal routes
- **Energy use:** Track and optimize solar/grid power ratio

## 5.5 Potential Environmental Enhancement Measures

Environmental enhancement refers to actions that go **beyond regulatory compliance** to generate **positive environmental and social outcomes**. The proponent has considered several strategies for this project:

### Recommended Enhancement Measures

**Table 8-5: Recommended Enhancement Measures**

Area	Enhancement Action
<b>Renewable Energy</b>	Increase solar capacity in future (target 3–5 MW) to further reduce carbon footprint
<b>Landscaping</b>	Develop green belt around the site with native tree species to reduce dust and noise
<b>Water Conservation</b>	Install rainwater harvesting system for non-process use (toilet flushing, gardening)
<b>Community Engagement</b>	Organize technical skill-building workshops and internships for local youth
<b>Occupational Wellbeing</b>	Develop green rest zones and indoor air quality improvement systems for workers
<b>Circular Economy Practices</b>	Implement resource recovery (e.g., reuse of packaging, metal scrap recovery contracts)
<b>Environmental Reporting</b>	Voluntary annual environmental performance disclosure or ESG report

### Conclusion:



While the operational phase poses continuous environmental risks, these can be **mitigated through robust systems and best practices**. Moreover, the adoption of **enhancement measures** can position the project as an **environmentally responsible and community-conscious industrial operation**.

## Chapter 6

### Environmental Management and Monitoring Program

#### 6.1 Description of Proposed Mitigation Actions

The Environmental Management and Monitoring Program (EMMP) is designed to ensure that the environmental impacts identified in the EIA are effectively mitigated, monitored, and managed throughout the project lifecycle. This includes measures for the **design, construction, and operational phases**, with emphasis on compliance with applicable environmental regulations (such as PEPA 1997, NEQS, and Punjab EPA guidelines), and integration of best environmental practices.

The EMMP specifies mitigation actions, the responsibilities of various stakeholders (proponent, contractors, consultants), and indicators for monitoring performance. A dedicated Environmental Health and Safety (EHS) team will oversee implementation, documentation, and continuous improvement.

#### Mitigation during Design Phase

In the design phase, preventive actions are embedded to avoid or reduce environmental risks. Key actions include the integration of a **2 MW solar energy system** to reduce reliance on grid electricity, incorporation of **stormwater drainage** structures to manage runoff, and **acoustic planning** to buffer noise during transformer testing. The layout design includes **green buffers**, waste segregation zones.

#### Mitigation during Construction Phase

Construction activities will temporarily impact air quality, noise levels, and soil integrity. To minimize these, the contractor will conduct **regular water sprinkling**, cover material transport vehicles, and maintain equipment. Noise from machinery will be managed by **restricting activities to daytime hours** and using **low-noise machinery**. Temporary sanitation facilities and solid waste collection mechanisms will be implemented, with waste handed over to approved municipal or private contractors. Safety protocols will be enforced for laborers, including PPE use, first-aid access, and safety drills.

#### Mitigation during Operational Phase

The operational phase poses potential long-term environmental concerns such as **effluent discharge, air emissions from backup generators**, and **solid waste generation**. These are addressed by operationalizing septic tanks, maintaining **emission control systems**, segregating and **recycling solid waste**, and monitoring ambient conditions. OHS (Occupational Health and Safety) measures will be institutionalized, and periodic **training sessions** will be held for employees. The proponent also plans to **monitor solar vs. grid energy use**, aiming to improve sustainability.



**Environmental Mitigation Plan**

Phase	Impact/Activity	Mitigation Measures	Responsibility	Monitoring Indicators
<b>Design</b>	Energy demand and carbon emissions	Integrate 2 MW solar power into design layout	Design Team & Consultant	Solar system installed, verified BOQ
	Flooding & waterlogging	Design stormwater drains, use permeable surfaces in utility zones	Civil Engineers	Drainage plan approved and implemented
	Environmental zoning	Reserve green buffer zones and utility areas for waste and water treatment	Project Architect	Site zoning plan approved
<b>Construction</b>	Dust from excavation, roads	Sprinkling, covered material transport, stabilization of stockpiles	Contractor / Site Manager	Visual inspections; complaint log
	Noise from construction equipment	Use of silenced generators, daytime operation only	Contractor / HSE Officer	Noise levels < 85 dB; dB meter readings
	Waste from construction activities	Separate collection and disposal through authorized contractors	Contractor & Waste Coordinator	Daily waste logs, third-party receipts
	Worker health and safety	Provision of PPE, on-site first-aid, safety training	Contractor / HSE Officer	Training logs; accident reports
<b>Operation</b>	Industrial effluent generation	Operate and maintain septic tanks in compliance with NEQS	Facility Manager & Lab Technician	Monthly effluent test results; maintenance logs



Emissions from generator & operations	Stack height compliance, generator maintenance, use of low-sulfur fuel	Maintenance Department	Stack emissions monitoring; fuel quality logs
Waste from transformer & meter production	Segregation, safe storage, contracts with recycling vendors	Plant Admin & Waste Officer	Waste inventory, monthly disposal summary
Occupational safety risks	Enforce safety SOPs, emergency response plans, regular drills	HR & HSE Officer	PPE compliance; emergency drill records
Energy performance	Monitor energy load, optimize solar utilization	Electrical Engineer	Monthly solar-grid consumption ratio

## 6.2 Schedule for Implementation and Environmental Budget

### Implementation Schedule

A well-defined implementation schedule ensures that mitigation measures are not delayed and become part of the regular project management system. The schedule aligns with the major project phases and monitoring frequency.

**Table 0-1: Implementation Schedule for EMMP**

Activity	Timeline	Phase	Monitoring Frequency
<b>Inclusion of EMP in construction contracts</b>	Prior to mobilization	Design	One-time
<b>Worker training and HSE setup</b>	First month of work	Construction	Monthly updates
<b>Installation of drainage and septic tank systems</b>	Mid construction	Construction	Completion and testing phases
<b>Operational monitoring of emissions &amp; water</b>	After commissioning	Operational	Monthly



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**Annual environmental performance review**

Start of second year

Operational

Annually



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## Environmental Budget Estimate

An environmental budget ensures that adequate resources are allocated for all planned mitigation and monitoring measures. The total 3-5 % of the total budget of the project is reserved for environmental budget.

### 6.3 Environmental Management Team and Their Roles & Responsibilities

To ensure effective implementation of the Environmental Management and Monitoring Plan (EMMP), a dedicated Environmental Management Team (EMT) will be constituted by **Pak Elektron Ltd.** The team will function under the overall supervision of the project management and will coordinate environmental, health, and safety activities throughout the project lifecycle

**Table 9-2: Environmental Management Team (EMT) Structure**

Position	Designation	Responsibilities
<b>Project Director</b>	Mr. Arif Rashid Mir	<ul style="list-style-type: none"> <li>- Overall responsibility for compliance and implementation of EMP</li> <li>- Resource allocation</li> </ul>
<b>Environment &amp; HSE Manager</b>	Ali Mehmood	<ul style="list-style-type: none"> <li>- Supervise environmental compliance</li> <li>- Liaise with EPA</li> <li>- Oversee monitoring activities</li> </ul>
<b>Site Environmental Officer</b>	Mubeen Ali	<ul style="list-style-type: none"> <li>- Daily monitoring of EMP actions</li> <li>- Maintain environmental records</li> <li>- On-ground inspections</li> </ul>
<b>HSE Coordinator (Construction)</b>	Nominated contractor staff	<ul style="list-style-type: none"> <li>- Implement health &amp; safety practices at construction sites</li> <li>- Conduct tool-box talks</li> </ul>
<b>Monitoring Analyst</b>	Lab/Consultant-based	<ul style="list-style-type: none"> <li>- Conduct sampling and lab tests (air, water, soil)</li> <li>- Report findings to HSE Manager</li> </ul>
<b>Waste Management Officer</b>	Internal / Outsourced	<ul style="list-style-type: none"> <li>- Ensure safe segregation, handling and disposal of waste</li> <li>- Maintain inventory</li> </ul>
<b>Training &amp; Documentation Officer</b>	HR Department	<ul style="list-style-type: none"> <li>- Conduct employee environmental awareness sessions</li> <li>- Maintain training and audit logs</li> </ul>



#### 6.4 Proposed Monitoring Program to Assess EMP Performance

The monitoring program aims to evaluate the **effectiveness of mitigation measures, detect environmental deviations,** and **ensure compliance** with relevant national and international standards (e.g., NEQS, PEQS, ISO 14001). The program includes air, water, noise, waste, and occupational safety monitoring.

**Environmental Monitoring Plan**

Parameter	Indicator / Method	Frequency	Responsible	Standard / Reference
<b>Air Quality</b>	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>x</sub> , CO, VOCs (Ambient & stack)	Quarterly	Monitoring Analyst / EPA Lab	NEQS / PEQS
<b>Noise Levels</b>	dB(A) levels at boundary and sensitive receptors	Monthly (or on complaint)	Site Environmental Officer	PEQS – <85 dB(A)
<b>Wastewater Quality</b>	BOD, COD, TSS, pH, Oil & Grease, Heavy Metals	Monthly	Lab	NEQS for Industrial Discharges
<b>Drinking Water</b>	pH, TDS, Coliform, Turbidity	Quarterly	Monitoring Analyst	WHO Guidelines / NEQS
<b>Solid Waste</b>	Volume/type, disposal records, segregation quality	Monthly	Waste Management Officer	Internal SOPs
<b>Occupational Safety</b>	PPE usage, incident records, safety drills	Weekly inspections	HSE Coordinator	OSHA / Company Policy
<b>Energy Use</b>	Solar vs Grid consumption ratio	Monthly	Facility Engineer	Internal Benchmark
<b>Flue Gas Emissions</b>	CO <sub>2</sub> , SO <sub>x</sub> , NO <sub>x</sub> (from backup generators)	Semi-annually	Generator Maintenance Team	NEQS for Gaseous Emissions
<b>Soil Condition</b>	Heavy metals, pH, organic content	Annually	External Consultant	Baseline Comparison



## Reporting and Documentation

- **Monthly Environmental Monitoring Report (MEMR)** will be prepared by the HSE Manager and submitted to senior management.
- Non-compliance events will trigger **Corrective Action Reports (CARs)** and immediate mitigation.

### 6.5. Proposed EMP Reporting and Reviewing Procedures

To ensure accountability and transparency in the implementation of the Environmental Management Plan (EMP), a structured **reporting and review mechanism** will be established. This will allow for periodic assessment of environmental performance and timely corrective actions.

#### Reporting Procedure

The following reporting structure will be implemented:

**Table 0-3: Reporting Procedure**

Report Type	Prepared By	Submitted To	Frequency
<b>Daily Site Inspection Log</b>	Site Environmental Officer	HSE Manager	Daily
<b>Monthly Environmental Monitoring Report (MEMR)</b>	HSE Manager	Project Director / Corporate Management	Monthly
<b>Incident / Non-compliance Report</b>	HSE Coordinator / Officer	HSE Manager & Project Director	As needed
<b>Quarterly Environmental Review Report</b>	Consultant / Internal Audit Team	Senior Management & EPA (if needed)	Quarterly
<b>Annual Environmental Performance Report (AEPR)</b>	HSE Manager in collaboration with Consultant	Punjab EPA	Annually

These reports will include data trends, summaries of environmental incidents (if any), lab test results, corrective actions taken, and recommended improvements.

#### Reviewing Mechanism

- **Quarterly EMP Review Meetings** will be held with the project team to review monitoring results, compliance status, and upcoming activities.
- **Annual Review** will be conducted with senior management and external consultants to assess overall EMP effectiveness and suggest upgrades.



- **Third-party environmental audits** may be carried out annually or as required by the regulatory authorities.

All reports and review records will be **archived and made available** during EPA inspections or audits.

## 6.6. Training Needs to Ensure Implementation of EMP and Monitoring Plans

The effectiveness of the EMP depends heavily on the capacity and awareness of the personnel involved. Hence, **targeted training programs** will be essential to build competency among staff, workers, and subcontractors.

### Training Objectives

- Ensure that all personnel understand the environmental obligations of the project.
- Provide hands-on training for specific roles in environmental monitoring and reporting.
- Improve emergency response, pollution prevention, and safety compliance.

### Proposed Training Plan

**Table 9-4: Proposed Training Plan**

Training Module	Target Audience	Trainer	Frequency
<b>EMP Orientation and Overview</b>	Project staff, site engineers	Environmental Consultant / HSE Manager	At project start
<b>Waste Handling &amp; Disposal Procedures</b>	Factory and construction workers	Waste Mgmt. Officer	Bi-annual
<b>Air, Noise, and Water Monitoring Techniques</b>	Monitoring Analysts / Technicians	Lab Experts / Consultant	Quarterly
<b>Emergency Response and Spill Management</b>	All staff and subcontractors	HSE Coordinator	Quarterly
<b>Occupational Health and Safety (OHS) Procedures</b>	Site workers, contractors	HSE Officer	Monthly toolbox talks
<b>Environmental Reporting and Documentation Procedures</b>	Site Environmental Officer, Admins	HSE Manager / Consultant	Quarterly
<b>Solar Energy Monitoring and Maintenance</b>	Technical staff	Renewable Energy Vendor	Bi-annually

Training sessions will be documented, and a **Training Logbook** will be maintained, including participants' attendance, topics covered, and assessment results.



### Environmental Management and Monitoring Plan (Pre-Construction)

#### Pak Elektron Limited Unit-II

Project Phase	Environmental Aspect	Potential Impact	Mitigation Measure	Monitoring Parameter	Responsible Party	Monitoring Frequency
Pre-Construction	Regulatory Compliance	Legal non-compliance, delays	Secure EPA NOC, align with PEPA Schedule II Category B	NOC document, approval letters	Legal Advisor / Environmental Consultant	One-time
	Design Integration	Omission of environmental controls	Include solar PV, drainage, waste storage in final plans	Final EMP-integrated design	Project Manager / Design Consultant	Once, before construction
	Land Clearing	Soil erosion, loss of green cover	Limit clearing to designated zones, install erosion barriers	Site condition reports	Site Engineer / Env. Officer	Before site mobilization
	Utility Planning	Overloading of grid, water systems	Coordinate with WASA, WAPDA for load handling	Utility approvals, water supply plans	Facility Planner / Utility Officer	One-time



### Environmental Management and Monitoring Plan (Construction)

#### Pak Elektron Limited Unit-II

Project Phase	Environmental Aspect	Potential Impact	Mitigation Measures	Monitoring Parameters	Responsible Party	Monitoring Frequency
Construction	<b>Air Pollution (Dust, PM)</b>	Respiratory issues, reduced visibility	- Water sprinkling- Cover stockpiles and trucks- Regular vehicle maintenance	PM2.5 and PM10 levels Visual dust observation	Site Environmental Officer / Contractor	Daily / Weekly
	<b>Noise Pollution</b>	Nuisance to workers and nearby population	- Use low-noise machinery- Restrict work to daytime hours- Provide ear protection	Noise level (dB) at site boundary	HSE Officer	Weekly / on complaint
	<b>Construction Waste</b>	Littering, blockage of access ways, injury risk	- Segregate waste- Provide labeled bins- Contract licensed disposal vendors	Volume of waste, disposal logs	Waste Management Officer	Weekly



<b>Oil &amp; Chemical Spills</b>	Soil and groundwater contamination	- Use bunded fuel storage- Train staff in spill response- Provide spill kits	Soil color/smell, spill incident records	Site Supervisor / Contractor	Safety /	Monthly
<b>Excavation &amp; Earthworks</b>	Soil erosion, dust emission, vibration	- Minimize excavation area- Store soil properly- Monitor for settlement	Slope stability, soil displacement	Civil Engineer / Site Supervisor		Ongoing during activity
<b>Worker Safety</b>	Injuries, health risks, non-compliance	- Mandatory PPE- Daily briefings- Maintain first aid facilities	Incident records, PPE usage	HSE Coordinator		Daily
<b>Sanitation &amp; Camps</b>	Poor hygiene, spread of disease	- Portable toilets- Regular camp cleaning- Drinking water provision	Water quality, waste removal records	Camp Manager / Contractor		Weekly
<b>Traffic &amp; Transport</b>	Road safety, public disturbance	- Schedule material transport during off-peak hours- Flagmen for traffic control	Traffic log, accident register	Logistics Coordinator		Daily / Weekly
<b>Resource Consumption</b>	Overuse of water, diesel	- Monitor consumption- Use efficient equipment- Prevent leakage	Water and fuel usage records	Utilities Supervisor		Weekly

**Community Disruption**

Noise, dust, traffic inconvenience

- Install visual barrier- Grievance redress mechanism- Local community updates

Complaint records, community meeting minutes

Admin Officer

Monthly / On complaint

**Environmental Management and Monitoring Plan (Operational)****Pak Elektron Limited Unit-II**

Project Phase	Environmental Aspect	Potential Impact	Mitigation Measures	Monitoring Parameters	Responsible Party	Monitoring Frequency
Operational	<b>Air Emissions (Generators)</b>	Release of NO <sub>x</sub> , SO <sub>x</sub> , CO, PM affecting air quality	- Maintain DGs and filters- Use low-sulfur fuel- Comply with NEQS stack height	Stack emissions: NO <sub>x</sub> , SO <sub>x</sub> , CO, PM levels	Maintenance Supervisor	Quarterly
	<b>Industrial Effluent (Septic Tanks)</b>	Contamination of sewer/drains if untreated	- Continuous septic tanks operation- Routine testing- Sludge handling protocol	BOD, COD, TSS, pH, Oil & Grease	Environmental Lab	Quarterly
	<b>Noise (Testing Bays)</b>	Occupational noise hazard and community nuisance	- Enclose high-noise areas- Schedule daytime testing- Provide hearing PPE	Noise level (dB) at source and boundary	HSE Officer / Testing Manager	Quarterly



<b>Solid Waste (Production)</b>	Scrap metals, packaging, insulating materials	- On-site segregation- Recycle and dispose through licensed vendors	Scrap logs, disposal records	Waste Management Officer	Monthly
<b>Energy Use (Grid &amp; Solar)</b>	High grid dependency, increased carbon emissions	- Operate 2 MW solar system- Monitor solar-grid energy ratio	kWh from grid vs solar, GHG reduction estimate	Energy Manager / Facility Engineer	Monthly
<b>Worker Health &amp; Safety (OHS)</b>	Chemical exposure, electric hazards, ergonomic risks	- Safety trainings- PPE enforcement- Periodic health screening	Incident records, training logs, PPE usage	HR Manager / HSE Department	Monthly / Daily checks
<b>Fire &amp; Chemical Safety</b>	Equipment fire, oil spill, or chemical accident	- Fire alarms, extinguishers- Chemical storage SOPs- Emergency drills	Fire drill reports, inspection checklists	Safety Officer / Emergency Response Team	Quarterly
<b>Water Use Efficiency</b>	Overuse of WASA supply and groundwater	- Install flow meters- Promote reuse for cleaning/gardening	Daily consumption, meter readings	Utility Engineer	Weekly
<b>Occupational Exposure</b>	Heat, electromagnetic fields, repetitive strain	- Ventilation systems- Use protective gear- Rotational duties	Workplace condition reports, health checkups	HSE Coordinator / Shift Supervisor	Bi-monthly
<b>Environmental Training</b>	Lack of awareness or compliance	- Inductions for new staff- Refresher courses- Posters & awareness materials	Attendance logs, knowledge assessments	HSE Trainer / HR Department	Quarterly



	<b>Community Relations</b>	Traffic, delivery noise, local grievances	- Designated delivery times- Maintain grievance redress mechanism	Complaint register, delivery logs	Admin / Security Officer	Monthly / On complaint
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## Chapter 7

### Stakeholders Consultation

Stakeholder consultation is a **critical component** of the Environmental Impact Assessment (EIA) process. It helps in identifying concerns, improving project design, and ensuring that all affected or interested parties are informed, engaged, and given an opportunity to contribute to the environmental decision-making process.

The primary objective of stakeholder consultation is to **enhance the transparency**, acceptability, and sustainability of the project by incorporating stakeholder feedback into planning, implementation, and monitoring processes.

Stakeholders were consulted at multiple levels to assess:

- Environmental concerns
- Safety considerations
- Social and economic impacts
- Long-term community and ecological implications

#### 7.1. Proponent's Environmental Management Team (PEMT)

The **Proponent's Environmental Management Team (PEMT)**, representing **Pak Elektron Ltd.**, plays a central role in **designing, coordinating, and overseeing** all environmental and social aspects of the project. The team was actively involved in internal consultations to review the environmental implications of the project and propose feasible mitigation and management strategies.

The consultation focused on the following key areas:

- **Identification of significant environmental risks**
- **Confirmation of EMP integration into project design**
- **Discussion on monitoring frameworks**
- **Clarification of team roles and responsibilities**
- **Commitment to compliance and community engagement**

The **consultation was held at the head office of Pak Elektron Ltd.**, attended by the senior management, engineers, operations team, and HSE professionals. The team demonstrated a proactive stance in not only complying with the PEPA 1997 and NEQS standards but also exceeding them by integrating **renewable energy solutions** and expanding **waste management systems**.

**Table 10-1: Summary of Internal Consultation with Proponent’s Environmental Management Team**

Date	Location	Participants	Discussion Topics	Key Outcomes
April 18, 2025	Pak Elektron Ltd. Head Office, Lahore	<ul style="list-style-type: none"> <li>- Project Director</li> <li>- HSE Manager</li> <li>- Facility Engineer</li> <li>- Design Consultant</li> <li>- STP Operator (Nominee)</li> </ul>	<ul style="list-style-type: none"> <li>- Project footprint &amp; land suitability</li> <li>- EMP integration</li> <li>- Roles &amp; SOPs</li> <li>- Compliance with EPA Punjab</li> </ul>	<ul style="list-style-type: none"> <li>- Commitment to environmental compliance</li> <li>- Approved STP &amp; Solar system integration</li> <li>- Designated internal roles</li> </ul>
April 24, 2025	On-Site (Factory Premises)	<ul style="list-style-type: none"> <li>- Site Manager</li> <li>- Environmental Officer</li> <li>- Safety In-charge</li> <li>- Utility Engineer</li> </ul>	<ul style="list-style-type: none"> <li>- On-ground environmental risks</li> <li>- Safety protocols</li> <li>- Water &amp; energy resource planning</li> </ul>	<ul style="list-style-type: none"> <li>- Agreed on daily dust/noise monitoring</li> <li>- Confirmed green buffer development</li> <li>- Scheduled staff trainings</li> </ul>

### Key Issues Raised and Addressed

**Table 10-2: Raised concerns**

Concern Raised	Response / Action Committed
Will the STP be operational before production begins?	Yes, construction and commissioning will be prioritized in pre-operational phase.
How will energy efficiency be achieved?	A 2 MW solar PV system will offset grid energy; energy audits will be conducted monthly.
What about occupational health during transformer testing?	Testing rooms will be acoustically enclosed and PPE will be mandatory.
Will there be local hiring?	Yes, the proponent plans to hire skilled and unskilled labor locally where possible.

### Outcome of Consultation

The proponent’s Environmental Management Team has shown strong commitment to:



- **Environmental performance and regulatory compliance**
- **Transparent monitoring and reporting mechanisms**
- **Operational sustainability through renewable energy and efficient water use**
- **Maintaining an open-door policy for future stakeholder engagement**

The consultation served as a **foundation for aligning internal commitments with regulatory expectations** and will be followed up with **external stakeholder consultations** in the next sections of the report.

## 7.2 The Responsible Authority

The **Punjab Environmental Protection Agency (EPA Punjab)** is the designated **regulatory authority** responsible for evaluating and approving the Environmental Impact Assessment (EIA) under the provisions of the **Pakistan Environmental Protection Act (PEPA), 1997** and the **Punjab Environmental Protection (Amendment) Act, 2012**.

EPA Punjab's role includes:

- **Reviewing the submitted EIA report** for adequacy, accuracy, and compliance.
- **Facilitating public hearings** and integrating stakeholder feedback into the decision-making process.
- **Issuing the Environmental Approval/NOC** after satisfaction with the mitigation plans and compliance measures.
- **Monitoring environmental performance** post-approval through inspections, audits, and review of submitted monitoring reports.
- **Ensuring compliance with NEQS (National Environmental Quality Standards)** for air, water, and noise.

As the **primary authority**, EPA Punjab has the power to:

- Impose conditions, require additional data, or request amendments in the EMP.
- Suspend or revoke the environmental approval if serious violations or environmental risks are detected.

Pak Elektron Ltd. will maintain regular communication with EPA Punjab through:

- Quarterly progress and compliance reports.
- Annual Environmental Performance Reports (AEPR).
- Immediate incident reporting in case of environmental emergencies.

### 7.3 Other Departments and Agencies

In addition to EPA Punjab, several **other governmental departments and agencies** play a direct or indirect role in the environmental governance and operational facilitation of this project:

Supporting Departments and Their Roles	
Department / Agency	Role in Project / Environmental Oversight
WASA Lahore	- Provision of treated water supply - Coordination on wastewater discharge standards
WAPDA / LESCO	- Grid electricity connection approval - Oversight of industrial energy consumption
Punjab Industrial Estates Development & Management Company (PIEDMC)	- Zoning and industrial development compliance within designated estate zones
Local Municipal Corporation	- Solid waste removal coordination - Enforcement of local building and safety codes
Civil Defence Department	- Approval and inspection of fire safety systems and emergency response facilities
Labour & Human Resource Department	- Enforcement of labor laws, workplace safety, and compliance with labor welfare regulations
Irrigation Department	- Consultation for managing stormwater and surface runoff
Rescue 1122	- Emergency response in case of chemical leaks, fire, or workplace incidents
Punjab Energy Department	- Monitoring of solar system integration and reporting under industrial energy efficiency
Environmental Laboratories (EPA certified)	- Sampling and testing of air, water, soil for environmental monitoring and compliance

### Coordination Framework

Pak Elektron Ltd. will establish a **liaison mechanism** with these departments through:

- **Formal letters and approvals** during the construction and commissioning stages.
- **Joint inspections** (e.g., with WASA or Civil Defence).

- **Emergency drills** conducted in partnership with Rescue 1122 and local authorities.
- **Environmental sampling** conducted by EPA-certified labs and shared with EPA Punjab.

#### 7.4 Environmental Practitioners and Experts

To conduct this Environmental Impact Assessment (EIA) and ensure a technically sound and regulatory-compliant submission, **Pak Elektron Ltd.** appointed **Pak Green Enviro-Engineering (Pvt.) Ltd.**, a registered environmental consultancy firm with experience in industrial and infrastructure sector assessments.

#### Role of Environmental Practitioners

**Table 10-3: Role of Environmental Practitioners**

Name / Firm	Designation	Key Responsibilities
<b>Pak Green Enviro-Engineering (Pvt.) Ltd.</b>	Independent Environmental Consultant	<ul style="list-style-type: none"> <li>- Conduct baseline studies</li> <li>- Identify environmental impacts</li> <li>- Develop mitigation and monitoring plans</li> <li>- Assist with stakeholder engagement</li> </ul>
<b>Mr. Iftikhar Ahmad</b>	EIA Project Lead	<ul style="list-style-type: none"> <li>- Supervise entire EIA process</li> <li>- Represent consultant in EPA communication</li> </ul>
<b>Mr. Muhammad Ahmad</b>	Environmental Analyst	<ul style="list-style-type: none"> <li>- Collect and analyze lab data</li> <li>- Support in EMP and Monitoring Plan</li> </ul>
<b>Engr. Irfan</b>	Civil /STP Specialist	<ul style="list-style-type: none"> <li>- Provide technical input on wastewater treatment planning and land suitability</li> </ul>
<b>Mr. Ahmad Raza</b>	Occupational Health Expert	<ul style="list-style-type: none"> <li>- Advise on health risks, safety strategies, and chemical exposure mitigation</li> </ul>

These experts participated in **site visits, community meetings,** and **internal consultations,** contributing to a scientifically valid and context-specific EIA report.

#### Expert Contributions

- Reviewed **project design documents** to assess the scope of environmental interventions.
- Proposed a **2MW solar integration strategy** to reduce carbon emissions.
- Designed a **wastewater treatment scheme** based on local hydrology and NEQS.
- Developed a **worker safety protocol,** especially for high-risk operational activities.

## 7.5 Affected and Wider Community

There is no affected community present in the radius of our study area. PGEE team has consulted with the inhabitants of the different area. They provided positive remarks regarding the subject project and in the Favor of the subject petroleum products process activity for the proposed plant. Stakeholders' participation Performa's and socioeconomic questionnaire were get filled by the inhabitants to evaluate the project socio-economic impacts. Stakeholders' participation Performa & socioeconomic questionnaire annexed.

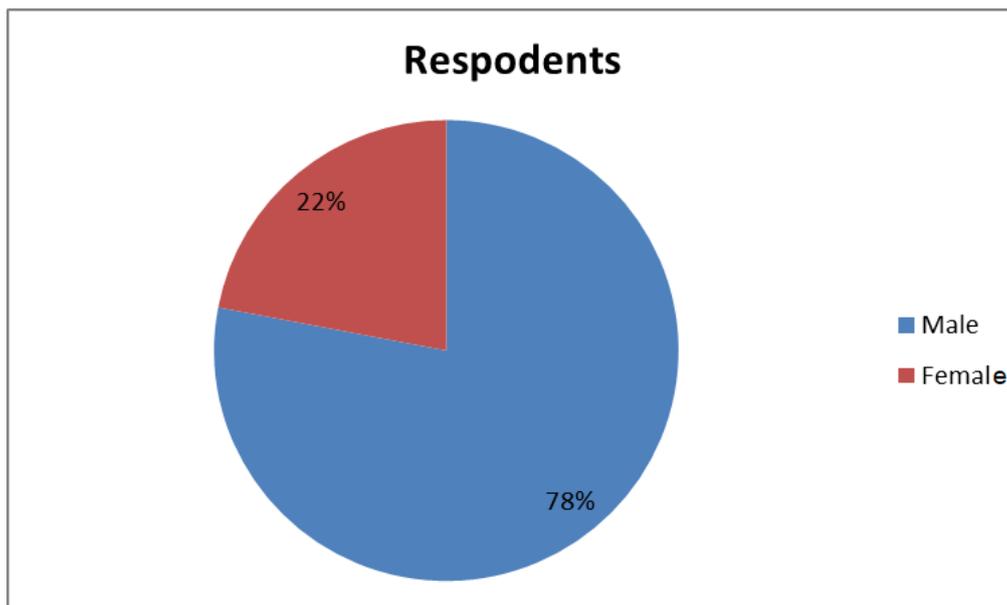
### 7.5.1 Sample size

15 sample sizes were selected by the Team of consultants for conducting the socioeconomic survey. Women were also consulted for the said survey; some of their names are mentioned in the above list of respondents while most of them were not willing to give personal information.

### 7.5.2 Statistical Analysis

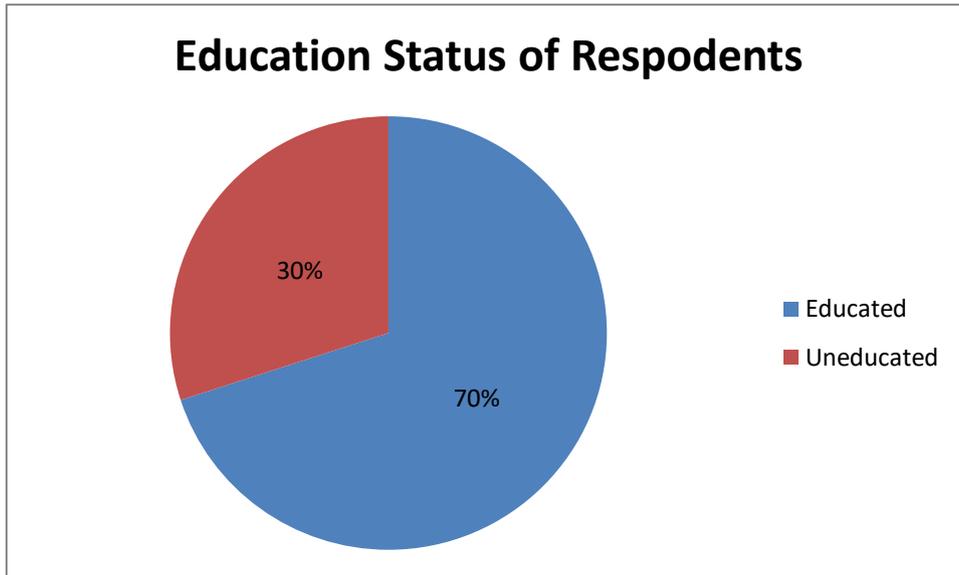
SPSS 19.0 has been used for the statistical analysis of the data collected during the visit of study site villages through questionnaires.

## Results & Discussion



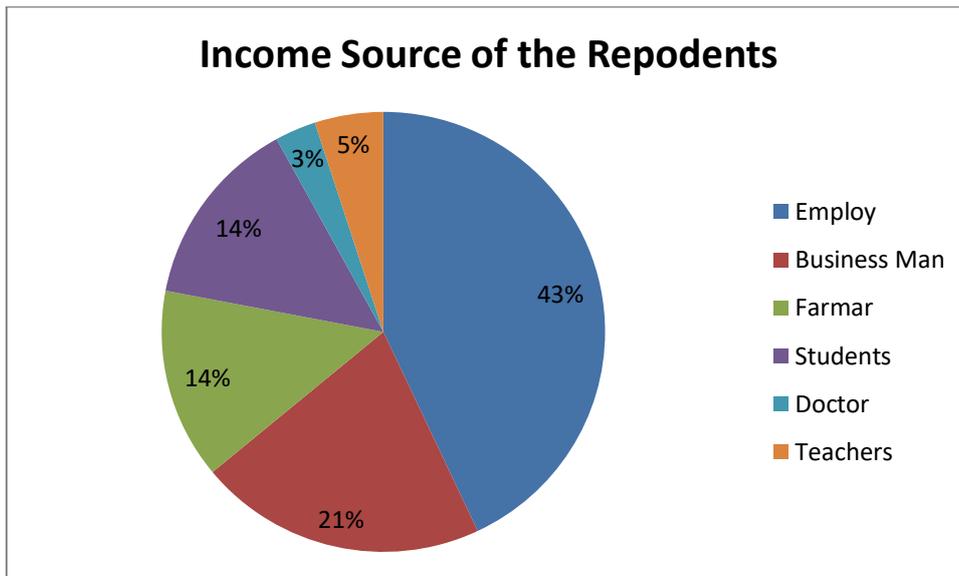
### Discussion:

According to graphical representation, 78% respondents were male while 22 % respondents were female. The number of female respondents is less as compared to male respondents because according to the social binding female hesitates to respond or communicate comfortably.



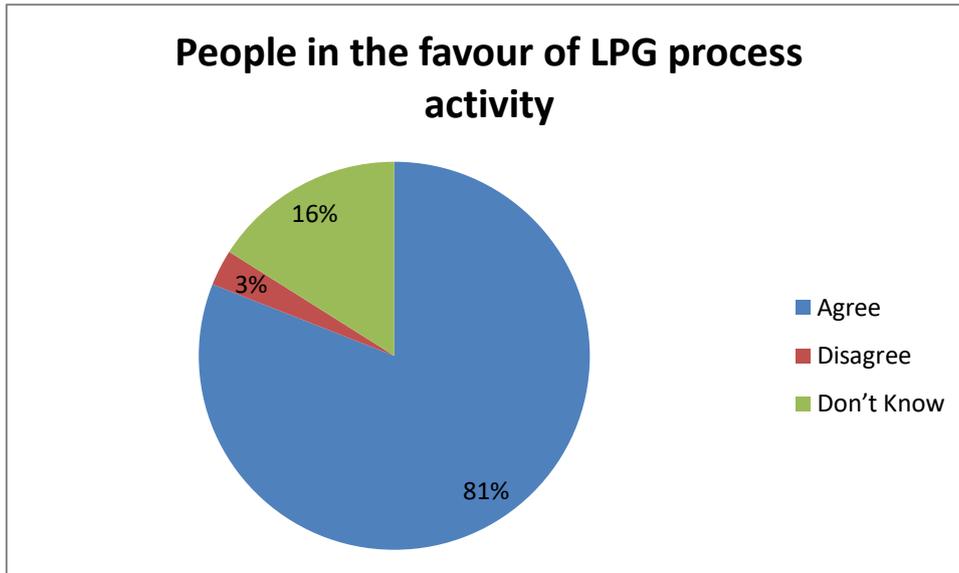
**Discussion:**

According to above graphical representation, 70 % respondents were educated while 30 % were uneducated. So, according to the survey overall education status of the area is good.



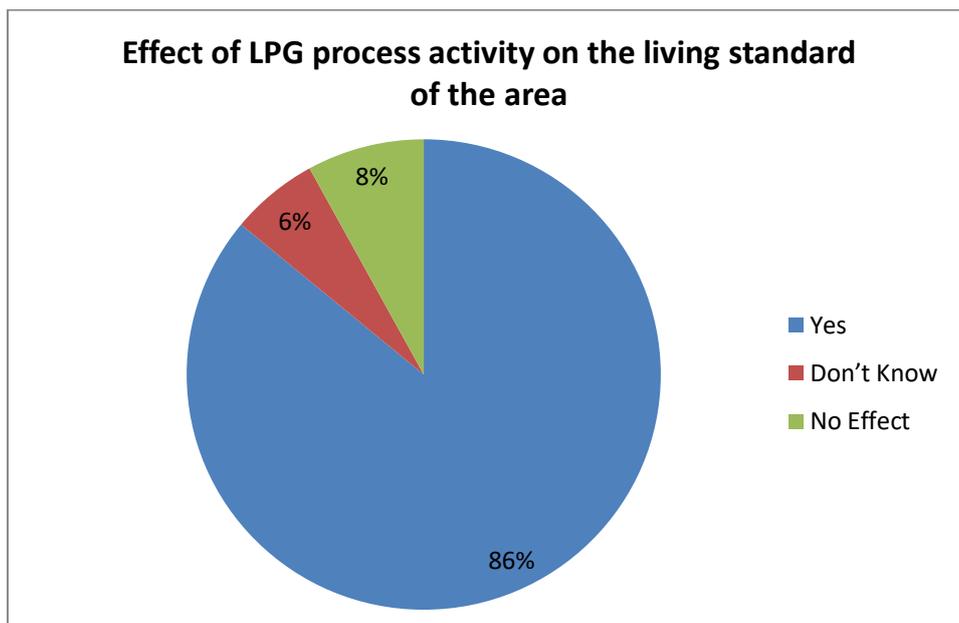
**Discussion:**

According to above graphical representation, source of income of majority of the respondents in the area was mainly employee in the private and government sectors while all other respondents' source of income was business man, farmers, students, doctors and teachers.



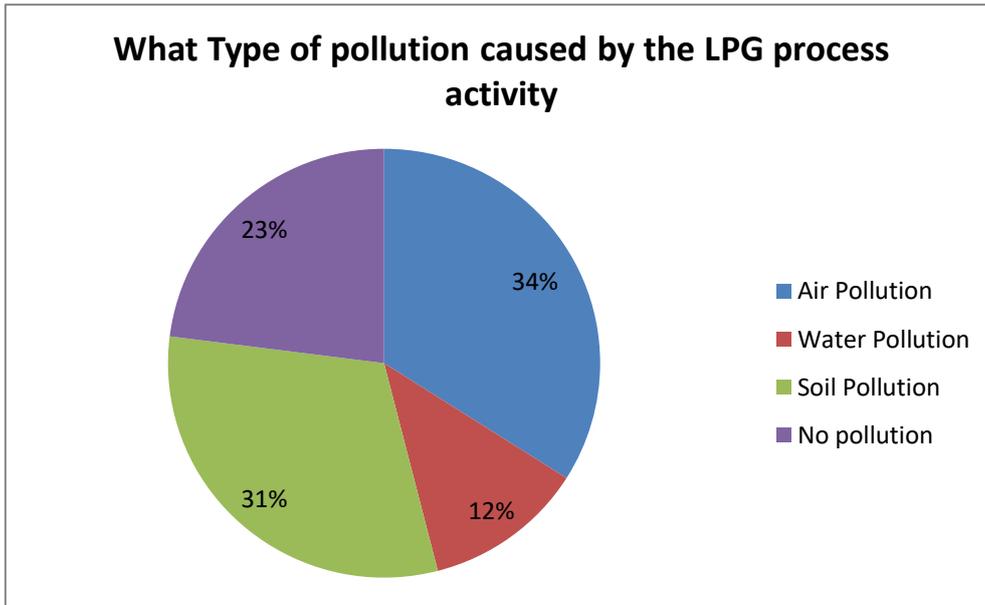
**Discussion:**

As per survey, 81% people were in the favor of the process activity and they gave positive remarks regarding the subject project while 16% respondents were having no opinion regarding the project and only 3% respondents were not in the favor of the subject project due to their concern regarding the aesthetic degradation of the and no preference to local people for jobs.



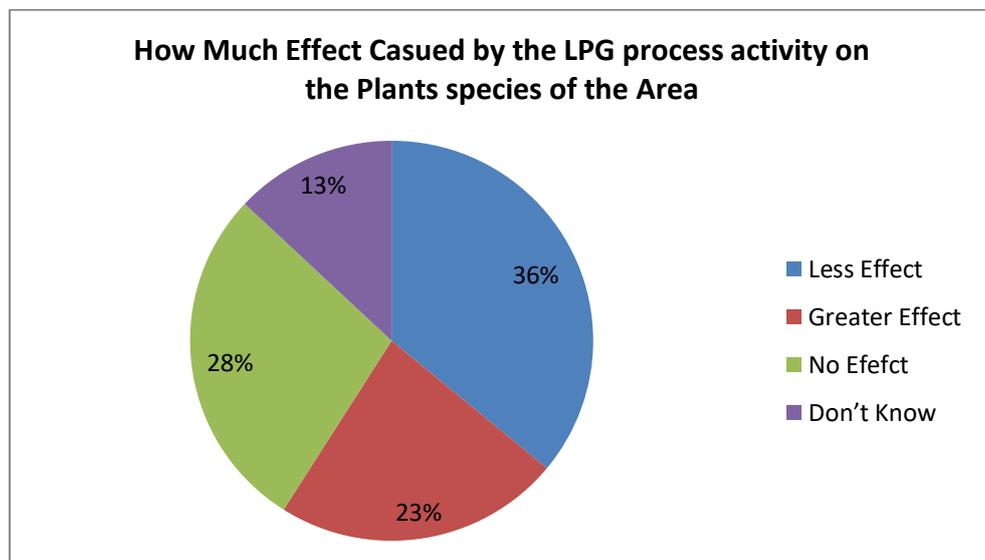
**Discussion:**

As per survey, 86% respondents said that process activity will enhance the living standard and income level of the area, 8% said that there will be no effect on the living standard and income level while only 6% respondents had no remarks regarding the subject project.



**Discussion:**

As per survey of the area and graph indicates, some people gave remarks that there will be higher air pollution (i.e. 34%) by the subject petroleum products process activity, some people said that there will be soil pollution (i.e. 31%) by the subject activity, some people said that there will be no pollution caused by the subject project while some people said that there will be water pollution (i.e. 23%) caused by the subject activity.





### Discussion:

As above graph indicates, 36% of the respondents remarked that there will be less effect caused on the plant's species by the petroleum products process activity, 28% said that there will be no effect caused on the plant's species by the subject activity and 23% said that greater impact will be caused by the subject project on the plants species while 13% respondents had no remarks regarding the subject project effect on the plant's species.

## Chapter 8

### Conclusion and Recommendations

#### 8.1 Conclusion

The Environmental Impact Assessment (EIA) for the proposed **extension, capacity enhancement, and technological upgradation** of **Pak Elektron Ltd's Power Products Unit**, located at **34-Km Ferozepur Road, Lahore**, has been completed in accordance with the requirements of the **Pakistan Environmental Protection Act, 1997** and the **Punjab Environmental Protection (Amendment) Act, 2012**.

The project falls under **Category B of Schedule II** of the Punjab EPA Regulations 2022, as it involves **expansion of transformer manufacturing capacity** and addition of technologically advanced systems for switchgear, instrument transformers, and energy meters. The project also integrates a **2MW solar PV system**, a **Septic Treatment plant (STP)**, and comprehensive environmental controls.

#### Key Findings:

- **Environmental Baseline:** The project is located in an industrial/semi-urban zone, with no sensitive ecological habitats, protected areas, or water bodies in close proximity. Baseline air, soil, and water conditions are within acceptable limits.
- **Project Design:** Environmental safeguards such as solar energy integration, and waste segregation areas have been incorporated into the design phase.
- **Impact Assessment:** Most environmental impacts are **moderate, localized, and reversible**, provided that the mitigation and monitoring plans are effectively implemented.
- **Stakeholder Engagement:** Consultations with internal management, local residents, and regulators confirmed the **positive perception of the project**, with concerns effectively addressed.
- **Environmental Management Plan:** A robust, multi-phased **Environmental Management and Monitoring Plan (EMMP)** has been developed, covering air, water, waste, noise, energy use, occupational safety, and community relations.

The proponent has demonstrated a clear commitment to **sustainable industrial development**, compliance with **NEQS/PEQS**, and a willingness to undertake **environmental enhancement measures**.

#### 8.2 Recommendations

To ensure long-term environmental and social sustainability of the project, the following recommendations are made:

#### Environmental Compliance and Monitoring



- Strictly implement the **Environmental Management and Monitoring Plan (EMMP)**, including the mitigation measures and monitoring frequencies outlined in Chapters 5 and 6.
- Maintain **monthly environmental monitoring records** and submit **Annual Environmental Performance Reports (AEPR)** to the Punjab EPA.
- Contract **EPA-certified laboratories** for air, water, and soil testing, and retain third-party consultants for unbiased evaluations.

### Technological Enhancements

- Ensure that the **2 MW solar system** is installed and commissioned before full-scale production begins, to reduce dependency on fossil fuels.
- Maintain and regularly service the **STP** and enforce **zero-discharge** policies for untreated effluent.

### Occupational Health and Safety

- Establish a **dedicated HSE (Health, Safety, Environment) team** responsible for risk management, safety audits, and emergency response.
- Conduct **regular staff training programs** on PPE usage, chemical handling, and emergency evacuation procedures.

### Community Engagement

- Appoint a **Community Liaison Officer** to handle public grievances and community communication.
- Prioritize **local hiring** for both construction and operational phases to enhance community goodwill.
- Conduct **periodic community awareness sessions** regarding environmental protection, road safety, and job opportunities.

### Documentation and Transparency

- Maintain a **public environmental notice board** at the factory gate showing compliance status, emergency contacts, and project updates.
- Develop a **digital document management system** to archive all monitoring data, incident logs, and compliance certificates.

### Final Recommendation

Based on the detailed analysis of potential environmental impacts, mitigation plans, stakeholder input, and the proponent's capacity and commitment to implement the EMP, it is recommended that the **Punjab Environmental Protection Agency (EPA Punjab)**:



**Grant Environmental Approval (NOC)** to the proposed expansion project of **Pak Elektron Ltd.**, subject to strict implementation of the mitigation measures, monitoring framework, and compliance conditions detailed in this report.