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EXECUTIVE SUMMARY

Title and Location of Project

M/s Faiz Chemical Industries Pvt. Ltd. intends to establish chemical manufacturing plant near Defence road, Bhobatian chowk, off raiwand road, Lahore.

The proposed project falls under Section B-1 of Schedule II of Review of IEE and EIA Regulations, 2000 (amended in 2022).

Name of the Proponent

The affairs of the company are controlled by Muhammad Abid who is the proponent of the company.

Name of the Proponent	M/s Faiz Chemical Industries Pvt. Ltd.
Representative	Muhammad Abid
Address	Defence Road, Bhobatian Chowk, off Raiwand Road, Lahore.

Name of Organization Preparing the Report

Hi-Tech Environmental Services (Pvt.) Ltd. is a business entity managed by geoscientists and environmental experts. The company has the expertise of highly diversified experience and has completed a total of more than 300 environmental studies across Punjab. The consultant has a range of expertise available in following areas:

a) Economic Geology
b) Determination of geological exploratory techniques and mine design
c) Preparation of feasibility reports, IEE report, EIA reports, Development Schemes & Prospecting Scheme.
d) Preparation of Environment Management Plans
e) Preparation of reports on HRD /Mines Rescue &Recovery.
f) Assessment of Impact of mining on environment and mitigating measures.
g) Mine surveying & interpretation of boundary disputes.
h) Legal opinion on mine regulatory regime.
i) Energy fuels and selection of choice fuels for specific energy
j) Drilling and blasting for underground and surface mining techniques.
k) Safety measures for mines operation.

Contact Details	
Consultant Company	Hi-Tech Environmental Services (Pvt.) Ltd.
Address	26-B, Zahoor Elahi Road, Gulberg-II, Lahore.
Representative	Advocate Chaudhry Awais Ahmed
Contact	(+92) 3219443210

e-Mail	consultantshtma@gmail.com | info@hitechma.com

Sr.	Name	Qualifications & Brief Experience	Roles Assigned
1	M. Hamza Tariq	BS Hon. Environmental Sciences	• Preparation of Environmental Management Plan (EMP) • Preparation of Environmental Monitoring Plan (EMP) • Author of EIA Report
2	Engr. Maryam Nazir	Mining Engineer and GIS Management B.Sc. Mining Engineering	• Author of EIA Report • Development of Maps
3	Ch. Awais Ahmad	LLM (London)	• Site Visits • Legal Reviews • Coordination with Locals
4	Engr. Harris Naeem	B.Sc. Mining Engineering	• Review of the Report • Mining Techniques

Brief Outline of the Project

Name of the Project	Construction of Chemical Manufacturing Plant by Faiz Chemical Industries (Pvt) Ltd
Location of the Project	Defense Road, Bhobatian chowk, off raiwand road, Lahore, Punjab, Pakistan
Proposed Area	Total Covered Area for the Plant is 18,900 sq. m Total Plant Land: 42 Kanal
Nature of the Project	Project is for the construction of the Chemical Manufacturing Unit
Cost of the Project	310 Million PKR
Project Process	Project process will include the manufacturing of Acetates and Plasticizers through esterification process.
Raw Materials	Phthalic Anhydride
Production Capacity	19.584 Spindles
End Product	Acetates and Plasticizers
Power Source	WAPDA
Labor / Workforce	During construction: 18-20 (estimated) During Operations: 450-500 (estimated)

Water Requirement	During the constructional phase of the project approximately 1500-gallon water will be required per day for constructional and domestic uses.
Solid Waste	Approx. 400-500 kg/day constructional and domestic waste will be produced during the constructional phase of the project.

Objectives of the project

a) To establish a Chemical Manufacturing Unit to meet the market requirement.
b) To contribute to the national economy of the country.
c) To generate more employment during such difficult economic conditions of country.
d) To meet the increasing demand of the Chemical Industry.

Major Impacts

To identify all the activities associated with the project during construction and operation phase with potential to cause adverse environmental impacts and harm a thorough review has been conducted. Project will not have any significant adverse impacts on the nearby community and on environment. Overall, the project will have positive impacts on the local population and country.

- **Summary of the Potential Impacts and mitigation measures during the construction phase is as follows**

Item	Potential Impact	Criteria for determining Significance	Key Mitigation Measures
Dust Emissions	Particulate matter emitted during construction activities and gaseous emissions from site generators and transportation vehicles can result in deterioration of ambient air quality in the vicinity of the project site and be a nuisance to the surrounding workers.	PEQS for Ambient Air	Sprinkling water on dusty tracts and surfaces is recommended. Use of wind shield around stockpiles is recommended. Vehicle speed restrictions should be applied in the project area. Raw materials should be transported in covered trucks. Ensuring that no stockpile is within 250 m of the community.

Item	Potential Impact	Criteria for determining Significance	Key Mitigation Measures
Construction Noise	Disturbance to surrounding communities due to operation of construction machinery at the project site.	PEQS for Noise OSHA standards	Activities generating high levels of noise should be minimized at the project site. If the noise level will exceed the permissible limits with reference to national and OSHA standards, following recommendations are suggested to take action against the high noise levels: • Proper tuning of construction machinery and vehicles is recommended. • Training of the people and professionals involved in the installation of the plant is recommended. Earmuffs and ear plugs are recommended in case of high noise levels.
Solid Waste Management	Improper waste management may generate health and aesthetic issues	Generation of excessive waste; Recyclable waste and reusable waste is discarded; Littering; Improper disposal.	A proper solid waste management plan should be devised and implemented; Constructional waste should be utilized for road filling and maintenance. Domestic waste should be disposed of properly, handed over to contractors, placed in bins.

Item	Potential Impact	Criteria for determining Significance	Key Mitigation Measures
Vegetation Loss / Soil erosion	Loss of vegetation because of land clearance for the construction purposes	Unnecessary or excessive removal of trees and shrubs	Preparation of a Reinstatement Plan; Minimization of the felling of trees and clearing of vegetation; and avoidance of the use of fuel wood
Water Resources	The extraction of water for the project construction activities can affect the groundwater availability for the project area communities	Water extracted for the project has directly affected the ability of the community to meet their water needs	No impact on the community groundwater needs is envisaged because of the project.
Soil Contamination	Oil and chemical spills can contaminate the soil	Presence of visible amount of hydrocarbon in soil	Provision of spill prevention and control kits. Use of impermeable surfaces in workshops, and storage areas; Contaminated soil will be collected and incinerated.
Socioeconomic Issues Workers Safety	Safety hazards associated with the construction activity, particularly with the increase in traffic at the project site.	No specific guidelines exist. A significant impact will be interpreted if there are complaints from the community or the occurrence of any injury or loss	Speed limit of 10 km/h will be maintained on the access road. Traffic controller will be stationed on the access road; night driving will be kept to a minimum
Project and Community Interface	Inter-cultural differences between the project staff from other areas and the local community	No community complaints	Training of the non-local project staff on local culture and norms; Avoidance of unnecessary interaction of local population with the non-local project staff

- **Summary of the Potential Impacts and mitigation measures during the operational phase is as follows**

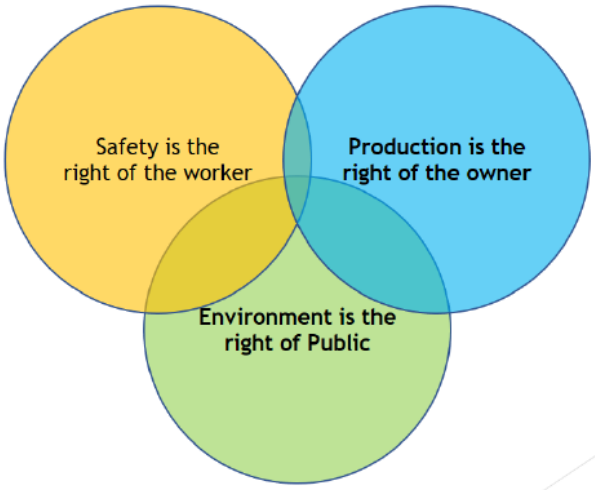
Item	Potential Impact	Criteria for determining Significance	Key Mitigation Measures
Dust Emissions	Particulate matter emissions during project process can deteriorate the air quality in the working area and be a nuisance for the workers' health. Gaseous emissions from site generators, boiler and transportation vehicles can result in deterioration of ambient air quality of the outdoor environment.	OSHA Standards PEQS for Ambient Air	PPEs i.e. masks will be provided to workers during the working hours. Proper ventilation should be ensured in the working area. Vehicles to use for the transportation of materials should be properly tuned. Generators should be tuned regularly and their PEQS compliance should be ensured. Venturi and wet scrubber will be installed at the stack of boiler to control the air emissions from the boiler. Monitoring should be conducted on Monthly basis as per EPA PEQS Rules.

Item	Potential Impact	Criteria for determining Significance	Key Mitigation Measures
Machinery Noise	Working of machinery can be a nuisance for the workers in the working area.	OSHA Standards	PPEs i.e. earmuffs should be provided to workers in case of high noise.
Health & Safety Issues	Health and Safety issues e.g. Cuts and Injuries may be caused during the machinery handling.	OSHA Standards	Proper training of the staff should be conducted to avoid the accidents. First aid measures should be provided at the workplace.
Discharge of wastewater	The discharge of untreated wastewater can be a negative impact.	PEQS for Municipal and Liquid Industrial Effluents (mg/l, unless otherwise defined)	Compliance of PEQS for Municipal and Liquid Industrial Effluents will be ensured. Monitoring will be conducted as per PEQS, and reports will be submitted to EPA.
Solid waste management	Improper solid waste management may cause health problems and aesthetic issues	Exposure to potentially hazardous waste; Generation of excessive waste; Recyclable waste and reusable waste is discarded;	Waste bins should be placed at suitable places. Domestic and process related waste should be handed over to contractors.

Item	Potential Impact	Criteria for determining Significance	Key Mitigation Measures
		Littering; Improper disposal.	
Groundwater	The increased withdrawal of groundwater for the project will affect the groundwater resources of the project area	Water extracted for the project has directly affected the ability of the community to meet their water needs	No impact on the community groundwater needs is envisaged as a result of the project.

The EMP covers information on the management and mitigation measures that will be taken into consideration to address impacts in respect of the operational phase of project.

Noise Management & Monitoring Plan



Environmental Management Plan			Environmental Monitoring Plan	
Sr.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Authority
Minimization of Excessive Noise and Vibrations				

1	Noise and Vibrations	• Aware vehicles machinery operators to switch off engines of vehicles or machinery not being used to avoid excessive noise and vibrations.	Throughout operational period	Proponent
		• Ensure that vehicles and equipment are kept in good condition to reduce generation of excessive noise and vibrations.	Throughout operational period	Proponent
		• Develop awareness among drivers to avoid gunning of vehicle engines or unnecessary hooting especially when passing through sensitive areas such as churches, mosques, residential areas and schools.	Throughout operational period	Proponent
		• The noisy excavation works will entirely be planned during daytime when most of the neighbors will be at work.	Throughout operational period	Proponent

Waste Management & Monitoring Plan

Environmental Management Plan			Environmental Monitoring Plan	
Sr.	**Potential Impacts**	**Management & Monitoring Measures**	**Timeframe**	**Responsible Authority**
Minimization of Solid Waste Generation				
1	Solid Waste Generation	• Provide facilities for proper handling and storage of materials to reduce the amount of waste caused by damage or exposure to the elements.	During operational period	Proponent
		• Use of an integrated solid waste management system i.e. through a hierarchy of options:	During operational period	Proponent

		1. Reduce 2. Reuse 3. Recycle		
		• Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of waste generated over time.	During operational period	Proponent

Air Quality Management & Monitoring Plan

Environmental Management Plan			Environmental Monitoring Plan	
Sr.	**Potential Impacts**	**Management & Monitoring Measures**	**Timeframe**	**Responsible Authority**
Minimization of Dust Emissions				
1	Dust Emissions	• Vehicles speed limits monitoring at excavation site.	Throughout project's life-cycle	Proponent
		• Ensure water sprinkling at site when necessary to reduce dust spread.	Throughout project's life-cycle	Proponent
		• Ensure the use of Personal Protective Equipment (PPEs) by workers and staff.	Throughout project's life-cycle	Proponent

Surface Water Quality Management & Monitoring Plan

Environmental Management Plan			Environmental Monitoring Plan	
Sr.	**Potential Impacts**	**Management & Monitoring Measures**	**Timeframe**	**Responsible Authority**
Avoid Surface Water Quality Degradation				
1	Surface Water	• Ensure the implementation of dust and soil-erosion control measures.	Once off	Proponent

	Quality Degradation	• Ensure that solid waste and wastewater must not be allowed to dispose of in river.	Continuous	Proponent
		• Provide awareness to the workers and staff about practices to conserve river water quality.	One-off	Proponent

Health and Safety Management & Monitoring Plan

Environmental Management Plan			Environmental Monitoring Plan	
Sr.	**Potential Impacts**	**Management & Monitoring Measures**	**Timeframe**	**Responsible Authority**
Minimization of Occupational Health and Safety Risks				
1	Health and Safety Risks	• PPEs; safety footwear, dust masks, gloves, ear protection equipment etc. should be made available and personnel must be trained to use them.	Once off	Proponent
		• Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises.	Continuous	Proponent
		• Provision of first aid box must be ensured within the premises of the project site.	One-off	Proponent

1 INTRODUCTION

1.1 Purpose of the Report

This report has been prepared to conform to the requirements of the Punjab Environmental Protection (Amendment) Act 2012 (PEPA), which states that:

"No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency an initial environmental examination or where the project is

likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof."

It is of utter importance to examine the environmental impacts, both beneficial and adverse, of the proposed project, and to recommend and propose mitigating measures to prevent, minimize or mitigate such impacts. The EIA study of the proposed project is necessary to assess the environmental consequences of the extraction at the proposed sites and to suggest appropriate, practical and site-specific mitigation as well as enhancement measures.

The objectives of EIA study are to:

- To establish a chemical manufacturing plant to meet the market requirement.
- To contribute to the national economy of the country.
- To generate more employment during such difficult economic conditions of country.
- To meet the increasing chemical industry.

1.2 Identification of the Project and Proponent

1.2.1 Details of the Project

M/s Faiz Chemical Industries Pvt. Ltd. intends to establish chemical manufacturing plant near Defence road, Bhobatian chowk, off raiwand road, Lahore.

The proposed project falls under Section B-1 of Schedule II of Review of IEE and EIA Regulations, 2000 (amended in 2022).

1.2.2 Details of the Proponent

The affairs of company are controlled by Muhammad Abid who is the director of the company.

Table 1-1 Details of the Proponent

Name of the Proponent	M/s Faiz Chemical Industries Pvt. Ltd.
Representative	Muhammad Abid
Address	Defence Road, Bhobatian Chowk, off Raiwand Road, Lahore.

1.3 Brief Description of the Project

Name of the Project	Construction of Chemical Manufacturing Plant by Faiz Chemical Industries (Pvt) Ltd
Location of the Project	Defense Road, Bhobatian chowk, off raiwand road, Lahore, Punjab, Pakistan
Proposed Area	Total Covered Area for the Plant is 18,900 sq. m Total Plant Land: 42 Kanal
Nature of the Project	Project is for the construction of the Chemical Manufacturing Unit
Cost of the Project	310 Million PKR
Project Process	Project process will include the manufacturing of Acetates and Plasticizers through esterification process.
Raw Materials	Phthalic Anhydride
Production Capacity	19.584 Spindles
End Product	Acetates and Plasticizers
Power Source	WAPDA
Labor / Workforce	During construction: 18-20 (estimated) During Operations: 450-500 (estimated)
Water Requirement	During the constructional phase of the project approximately 1500-gallon water will be required per day for constructional and domestic uses.
Solid Waste	Approx. 400-500 kg/day constructional and domestic waste will be produced during the constructional phase of the project.

2 SCREENING AND SCOPING

2.1 Details of Consultant

Hi-Tech Environmental Services (Pvt.) Ltd. is a business entity managed by geoscientists and environmental experts. The company has the expertise of highly diversified experience and has completed a total of more than 300 environmental studies across Pakistan. The consultant has a range of expertise available in following areas:

l) Economic Geology
m) Determination of geological exploratory techniques and mine design
n) Preparation of feasibility reports, IEE report, EIA reports, Development Schemes & Prospecting Scheme.
o) Preparation of Environment Management Plans
p) Preparation of reports on HRD /Mines Rescue &Recovery.
q) Assessment of Impact of mining on environment and mitigating measures.
r) Mine surveying & interpretation of boundary disputes.
s) Legal opinion on mine regulatory regime.
t) Energy fuels and selection of choice fuels for specific energy
u) Drilling and blasting for underground and surface mining techniques.
v) Safety measures for mines operation.

Table 2-1 Details of the Consultant

Contact Details	
Consultant Company	Hi-Tech Environmental Services (Pvt.) Ltd.
Address	26-B, Zahoor Elahi Road, Gulberg-II, Lahore.
Representative	Advocate Chaudhry Awais Ahmed
Contact	(+92) 3219443210
e-Mail	consultantshtma@gmail.com | info@hitechma.com

The team carrying out the research project is presented in the Table 2-2.

Table 2-2 Team Carrying Out the Study

Sr.	Name	Qualifications & Brief Experience	Roles Assigned
1	M. Hamza Tariq	BS Hon. Environmental Sciences	• Preparation of Environmental Management Plan (EMP) • Preparation of Environmental Monitoring Plan (EMP) • Author of EIA Report
2	Engr. Maryam Nazir	Mining Engineer and GIS Management B.Sc. Mining Engineering	• Author of EIA Report • Development of Maps

3	Ch. Awais Ahmad	LLM (London)	• Site Visits • Legal Reviews • Coordination with Locals
4	Engr. Harris Naeem	B.Sc. Mining Engineering	• Review of the Report • Mining Techniques

2.2 Screening

Section 12 of Punjab Environmental Protection Act (PEPA), 1997 (Amended 2012) states:

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

As per Review of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Regulations, 2000 made under Section 12 of Punjab Environmental Protection Act, 1997 (Amended 2012), current project falls under Schedule II (List of projects requiring EIA), Category B-I (Chemical Manufacturing Units, including pharmaceuticals and cosmetics).

2.3 Scoping

2.3.1 Spatial and Temporal Boundaries of Environmental Assessment

Project site is open land. After its development with time nature of area will change from open land to project site.

2.3.2 Important issues and concern raised during consultation

During consultation it was observed that maximum of people was in favor of project and following issues and concerns were raised which have also been discussed in length in Chapter 9 Stakeholder Consultation:

- Air pollution should be controlled effectively.
- Locals should be preferred for the job opportunities.
- Wastewater should be treated prior to final disposal.
- Solid waste should be managed effectively by adopting the standard practices of the area.
- Cleanliness of the area should be ensured.
- An effective EMMP should be designed and enforced with true spirit.
- Health of the workers should be ensured.
- Workers should be hired from local community.
- Indigenous tress around the facility should be planted to control air pollution.

2.3.3 Significant impacts and factors to be determined

Main impacts and factors to be determined are;

- Occupational Health and safety

- Site Security
- Traffic Management
- Hygiene management
- Community impacts
- Control Air emissions
- Job opportunities for locals
- Confined noisy activities
- Resource conservation
- Avoid excessive water consumption
- Energy efficient techniques must be adopted
- Proper site restoration after construction
- Tree plantation at designated green areas
- Emergency preparedness

3 CONSIDERATION OF ALTERNATIVES

3.1 Alternative considered realistically and reason for their rejection

The analysis has been carried out critically to justify the need of the Project and to select the most feasible alternative. Besides the economic viability; environmental sustainability and social soundness of the proposed Project has also been considered while analyzing different alternatives.

3.1.1 The No Project Alternative

A zero-alternative entail maintaining existing use to which the proposed project site has previously been put to. This alternative would eventually evade any short-term potential negative impacts from project execution. To this end, any potential positive impacts envisaged during midterm and long-term project implementation will be missed.

Adopting zero alternative would mean abandoning all the potential that the site offers to investor(s), contribution to government revenue and even local community livelihoods improvement.

3.2 Alternative Considerations and Reasons for their Rejection

3.2.1 Location/Site alternatives

To fulfill the commercial aspects of the project under reference of this IEE Report, it is to be sited at a place where commercial processing activity is either already going on or there are bright prospects of the same. Concurrently, it must also meet the legal requirements of the Punjab Environmental Protection Act, 1997 (Amended 2012). Availability of land at the best convenient place is equally important among other considerations for the site selection. Availability of access roads, communication facilities, electricity, basic infrastructure, sewerage etc. is yet the other necessary requirements.

Obviously, environmentally sound, neat and clean environment are the other considerations for site selection. The project will also facilitate the people of the area with increasing the opportunity of employment, and other related facilities.

Keeping these requirements and their feasibility and other basic infrastructural requirements, the selected site is ideally suited for Construction of the subject proposed project. No alternative site/location for the proposed project was considered because the subject project is proposed construction of the Chemical Manufacturing Plant under the name of M/s Faiz Chemical Industries (Pvt) Ltd.

3.2.2 Process/Technology Alternatives

The best available yarn manufacturing technology will be used in the project manufacturing process which possesses less environmental impacts. Internationally manufactured machinery will be used list of the machinery has been provided in the chapter above.

3.2.3 Modified Construction Technology Alternatives

The proposed development will be constructed using modern, locally and internationally accepted technology and materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given priority without compromising on cost or availability factors.

The concrete pillars and walls will be made using locally sourced stones, cement, sand (washed and clean), metal bars and fittings that meet the quality standards

4 DESCRIPTION OF THE PROJECT

4.1 Objectives of the Project

The objectives of the project are:

e) To establish a Chemical Manufacturing Unit to meet the market requirement.
f) To contribute to the national economy of the country.
g) To generate more employment during such difficult economic conditions of country.
h) To meet the increasing demand of the Chemical industry.

4.2 Location and Site Layout of the Project

To define the boundaries of the EIA study, location and site layout map is prepared. The project location is represented in Figure No. 4-1 and more detailed colored image is present in ***Appendice VIII*** on A3 size.

Figure 4-1 Location of The Project

The coordinates of the proposed plant is given in Table No. 4-1.

Table 4-1 Coordinates of the Project area

Point	Latitude	Longitude
Faiz Chemical Industry	31.397386°	74.227436°

The distances of major locations from project site are shown in Table No. 4-2.

Table 4-2 Distance of the Important Areas

Location	Approximate Distance (KM)
POPULATION CENTERS	
Timber Market	0.06

Qila Lachman Singh	1
Karim Park	1.5
Ameen Park	4
Niazi Chowk Matro Bus Stand	0.3
Lahore Ring Road	0.5
Badami Bagh	3
WATER BODIES	
River Ravi	2

4.3 Land Use on the Site

The Land is mainly barren land.

4.4 Road Access

The project site is easily accessible through timber market road and the ring road

4.5 Vegetation Features of the Site

No significant vegetation cover is on the site.

4.6 Cost and the Magnitude of Operation

The Cost of the project is 310 Million PKR. The details of project costing is presented in Table 4-3.

Table 4-3 Cost breakdown of the project

Sr.	Description	Amount (Million PKR)
1	Land Cost	200
2	Infrastructure Cost	50
3	Machinery Cost	60
Total Development Cost		**310**

4.7 Schedule of Implementation

The Plant will be installed with due work diligence. The timeline for the installation of the plant will be 01 year.

4.8 Raw material

Phthalic Anhydride and 2-Ethylhexanol used as the main raw material.

4.9 Project process flowchart

Dioctyl phthalate (DOP) is produced via an **esterification reaction** between **phthalic anhydride** and **2-ethylhexanol**. This process occurs in the presence of an acidic catalyst. The overall process involves several steps: mixing, reaction, separation, purification, and cooling.

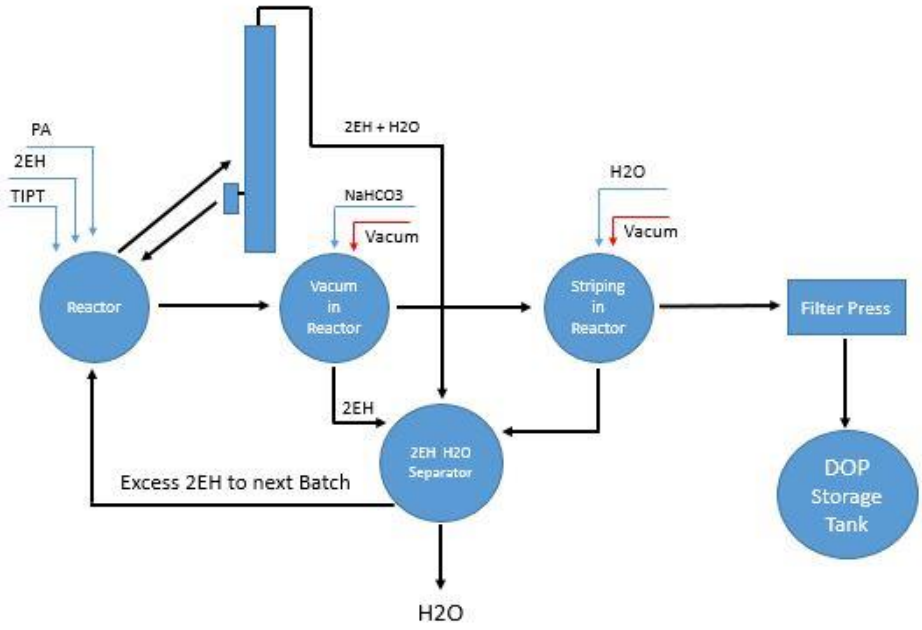


Figure 4-2 Project Flowsheet for DOP Production

- **Raw Material Preheating and Mixing:**

Phthalic Anhydride is a solid at room temperature, so it is heated and melted before being mixed with liquid 2-ethylhexanol.

The raw materials are fed into the esterification reactor along with the catalyst. Typically, a batch or continuous stirred tank reactor (CSTR) is used for efficient mixing.

- **Esterification Reaction:**

The esterification process takes place at 150-200°C under atmospheric or slightly elevated pressure.

The catalyst speeds up the esterification reaction by lowering the activation energy, helping to form dioctyl phthalate (DOP) and water.

The reaction is slightly exothermic, so cooling control systems are necessary to maintain the temperature within the desired range.

- **Condensation and Water Removal:**

Water produced in the esterification reaction is condensed and removed to drive the reaction toward completion (Le Chatelier's principle).

A reflux condenser system can be used to condense the water vapor and return any unreacted alcohol to the reactor.

- **Distillation and Separation:**

Once the esterification is complete, the reactor contents are sent to a distillation unit to separate unreacted 2-ethylhexanol and phthalic anhydride.

Vacuum distillation or simple distillation is used to remove these impurities. The unreacted 2-ethylhexanol can be recycled back into the process.

- **Product Purification**:

The crude DOP product from the distillation column may still contain small amounts of byproducts or impurities. These are removed through further distillation or filtration steps.

If necessary, the mixture is neutralized using sodium carbonate to remove residual acid from the catalyst.

- **Cooling and Packaging:**

The final product, dioctyl phthalate (DOP), is cooled through a heat exchanger to ensure it is in the correct state for handling and packaging.

DOP is typically stored in large storage tanks and later filled into drums or containers for shipment.

4.10 Water requirements

During the constructional phase of the project approximately 1500-gallon water will be required per day for construction and domestic uses.

During the operational phase of the project approx. 60m^3 /day water will be required for project process and domestic purposes. For the process, water is mainly used during the colling process.

4.11 Wastewater treatment

Water produced as the byproduct of the reaction. Around 18m3/day of water is produced as result of the reaction. If any wastewater is produced, it is treated in the septic tank before discharging to nearby Ruhi Nullah. Only the treated water is discharged.

4.12 Solid waste

Solid waste produced is mainly biomass residual used for the heating process. The residuals are dump in the open barren self-owned land.

4.12.1 Solid waste management system/practices

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

- Placement of separate waste bins for domestic and project related waste in all working halls and designated points.

- Collection of waste from all the working halls at one designated point by the sanitary workers on daily basis.
- Careful collection of ash and sludge on regular basis and temporary storage at designated point.
- Collection of waste from designated area and handling to the solid waste contractors for its final disposal.

Solid waste management plan flowchart is given in following figure 3-2.

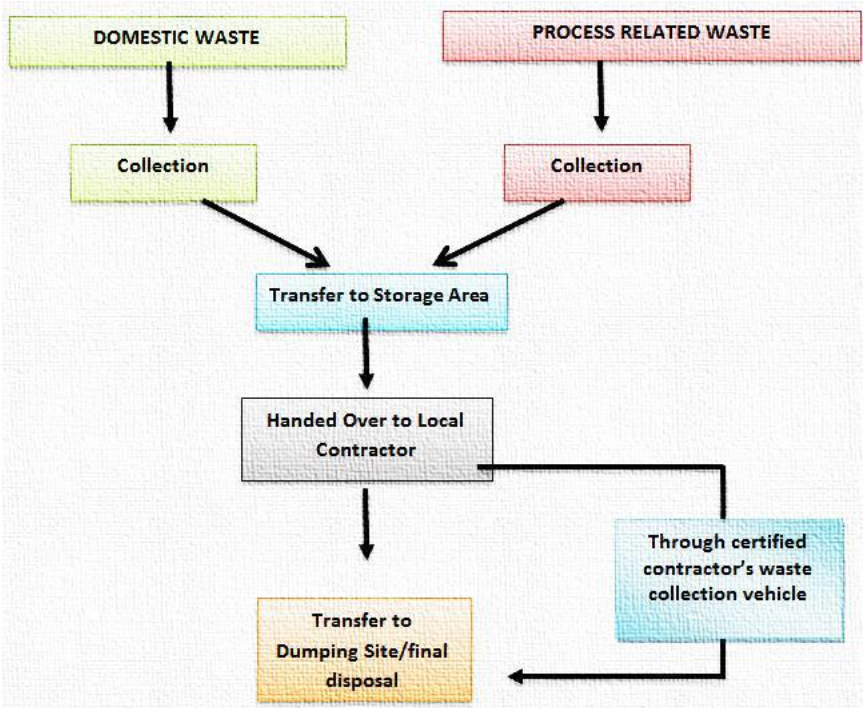


Figure 4-3 Solid waste management plan flowchart

4.13 Ventilation system for maintenance of indoor air quality

Roof overhangs, window size and placement, and overall building shape will be designed in a way to ensure good ventilation. Further the direction of prevailing winds will be considered, and maximum solar gain will be ensured. The placement of porches, garages, trees will also be ensured.

4.13.1 Mitigation measures to control air emissions

The undersign will install scrubbers and multicyclones for the air quality control.

4.13.2 Mitigation measures to control the emissions of generators

- Firstly, the generator made up of latest and environmentally friendly technology will be used.
- Standard fuel will be used in the generator.
- Proper and regular tuning of the generator will be done.

- Double glazed glass and thick walls canopy of the generators will be installed which will limit the emissions of the noise.

All these measures will ensure the PEQS compliance of generators and emissions will not exceed the limits.

4.14 Parking Area

Parking area will be made available within the unit for cars, motorcycles, trucks etc.

4.15 Occupational Health and Safety

All the methods and procedures for machinery and chemical handling and storage will be displayed and implemented at the project site. Health and safety rules for chemical handling and storage will be maintained.

4.16 Personal Protective Equipment (PPEs)

Following PPEs will be available for the workers in the proposed unit:

- Dust Mask
- Ear Plugs
- Earmuffs
- Safety Boots
- Safety Gloves
- Safety Belt
- Helmet
- Goggles

Types of PPEs used during different construction and Operational activities are given in table 4-4.

Table 4-4 PPE using summary for different operations

Protection	Occupational Hazards	PPEs
Head Protection	Falling objects, inadequate height clearance, and overhead power cords	Helmets with or without electrical protection
Hand protection	Hazardous material, cuts or lacerations, vibrations, extreme temperatures	Synthetic or Rubber gloves, leather, insulating material etc.

Eye and face protection	Flying particles, molten metal, liquid chemicals, gases or vapors, light radiation	Glasses, shield protective, etc.
Hearing protection	Noise, ultrasound	Hearing protectors like ear plugs, earmuffs
Respiratory protection	Dust, fogs, fumes, gases, smokes, vapors, oxygen deficiency	Facemasks or air supply
Body protection	Extreme temperatures, hazardous materials, biological agents, cutting and laceration	Aprons, insulating clothing etc. of appropriate materials

4.17 Fire Protection System

An addressable argus type fire protection system with detection and alarm annunciation and other installations etc. would be provided to protect against any fire hazards. Fire buckets and fire extinguishers will be installed at all sensitive places within the unit.

4.18 Emergency Exits

Emergency exit points will be made available for easy evacuation in case of any emergency.

4.19 Project Security

The present site will be secured by means of boundary walls along with the presence of security guards round the clock which will improve the security of the project site and in its vicinity.

4.20 Power sources and transmission

Power Supply will be ensured by WAPDA.

4.21 Available Facilities

The plant land is in the city center of Lahore. Therefore, all basic infrastructural facilities are available at the site.

4.22 Restoration / Rehabilitation Plan

All possible precautions will be taken to prevent an untoward incident in terms of life and property losses. The demolition materials will possibly be reused and recycled. All excavated surfaces will be termite proofed.

On completion of the project, the debris will be removed from the site to maintain aesthetics of the project. All measures will be undertaken for ensuring occupational safety, security and clean environment in the project area. Ornamental trees and flower plants will be planted on inside peripheral of the unit premises to restore the land.

5 DESCRIPTION OF THE ENVIRONMENT

5.1 GENERAL

An environmental baseline study is intended to establish a data base against which potential impacts can be predicted and managed subsequently. The IEE of the proposed project covers a comprehensive description of the project area, including regional resources which are expected to be affected by the project, as well as, those which are not expected to be directly affected by the operation of the project.

A site visit was conducted to survey the field area for collection of relevant data. Interviews were conducted with the general public and stakeholders of the project area in order to seek the public opinion on the implementation of the proposed project. The environmental impacts of any activity or process will be assessed on the basis of deviation from the baseline or normal situation. The following components form part of the baseline study:

- Physical Environment
- Ecological Environment
- Socioeconomic Environment.

5.2 PHYSICAL ENVIRONMENT

5.2.1.1 Physical Features around the Project Area

Lahore is a city in the Pakistan province of Punjab. Lahore is the country's second-most populous city after Karachi and is one of Pakistan's wealthiest cities with an estimated GDP of $58.14 billion as of 2015. Lahore is the largest city, and historic cultural centre of the Punjab region, and one of Pakistan's most socially liberal, progressive, and cosmopolitan cities. It is in the west of the Punjab province.

5.2.1.2 Geography

The district is located between 31° 25′ 0″ N, 74° 20′ 0″ E. Lahore is bounded on the north and west by the Sheikhupura District, on the east by Wagah, and on the south by Kasur District. The Ravi River flows on the northern side of Lahore. Lahore city covers a total land area of 1,772 km^2 (684 sq mi) and is still growing. Under the Local Government Act of Punjab, 2013, Lahore District has been declared a Metropolitan Area and divided into nine zones which are as follows:

- Ravi Zone
- Shalimar Zone
- Aziz Bhatti Zone
- Data Gunj Bakhsh Zone
- Samanabad Zone
- Gulberg Zone
- Wahga Zone
- Allama Iqbal Zone
- Nishtar Zone

The location of Lahore within Punjab is shown in Figure 5-1.

Figure 5-1 Location of District Lahore

5.2.2 Seismic Zone

According to seismic zoning of Pakistan the project area lies in seismic zone 2A and represents minor damage. Seismic zoning map of Pakistan is given in Figure 4-2.

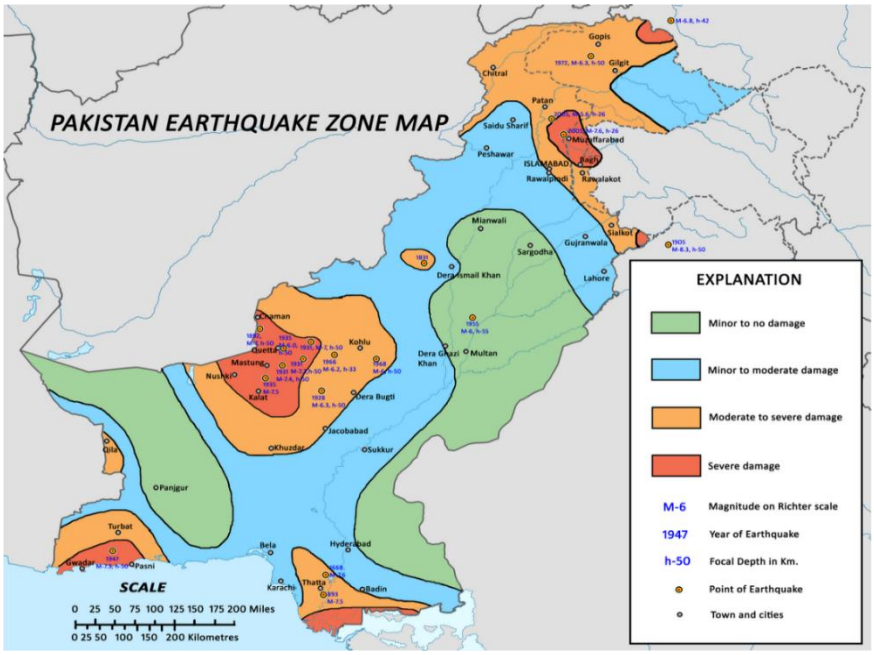


Figure 5-2 Seismic Zoning Map of Pakistan

5.2.3 Climate

Lahore's climate is a local steppe climate. During the year there is little rainfall. According to Köppen and Geiger, this climate is classified as BSh. The temperature here averages 24.1 °C. The average annual rainfall is 607 mm. Precipitation is the lowest in November, with an average of 4 mm. Most of the precipitation here falls in July, averaging 189 mm.

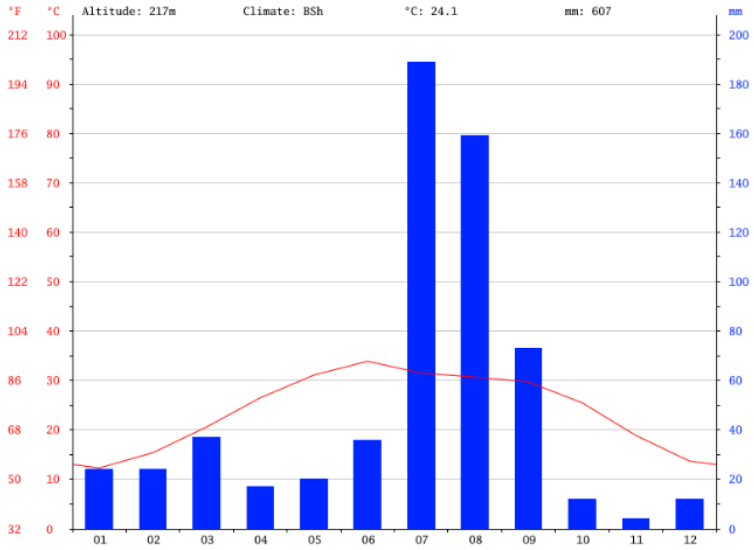


Figure 5-3 Graphical Representation of Climate

5.2.4 Temperature

At an average temperature of 33.9 °C, June is the hottest month of the year. January is the coldest month, with temperatures averaging 12.3 °C. Between the driest and wettest months, the difference in precipitation is 185 mm. Throughout the year, temperatures vary by 21.6 °C.

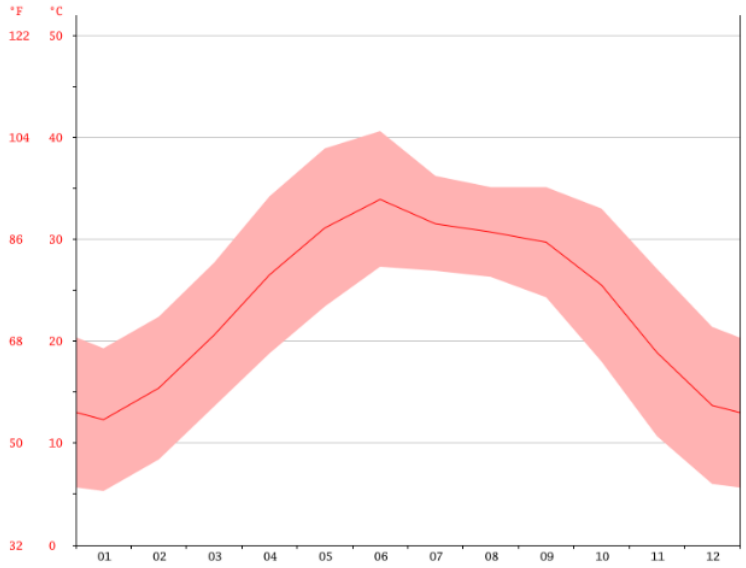


Figure 5-4 Average temperature of Lahore

Table 5-1 Temperature Variations during Different Months

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	12.3	15.4	20.6	26.5	31.1	33.9	31.5	30.7	29.7	25.5	18.9	13.7
Min. Temperature (°C)	5.3	8.4	13.6	18.8	23.4	27.3	26.9	26.3	24.3	18	10.7	6
Max. Temperature (°C)	19.3	22.4	27.7	34.2	38.9	40.6	36.2	35.1	35.1	33	27.1	21.4
Avg. Temperature (°F)	54.1	59.7	69.1	79.7	88.0	93.0	88.7	87.3	85.5	77.9	66.0	56.7
Min. Temperature (°F)	41.5	47.1	56.5	65.8	74.1	81.1	80.4	79.3	75.7	64.4	51.3	42.8
Max. Temperature (°F)	66.7	72.3	81.9	93.6	102.0	105.1	97.2	95.2	95.2	91.4	80.8	70.5
Precipitation / Rainfall (mm)	24	24	37	17	20	36	189	159	73	12	4	12

5.2.5 Water Resources

Water constitutes an important section of the physical environment of an IEE Study to define its magnitude, quality and occurrence throughout the entire project corridor. Water resources of the area are discussed under two broad headings, surface water resources and groundwater resources.

5.2.5.1 Surface Water

Surface waters resources are usually exposed to the surface of earth in the form of mobile and immobile situation which includes snow-clad mountains, rivers, non-river streams, rain, sleet, wetlands and oceans. Surface resourced waters are highly susceptible to natural and anthropogenic derived contamination in terms of Chemical and Biological contamination and thus are not used for sensitive applications such as drinking directly,

unless it is pre-treated. There is no surface water body found near the vacinity of the project area.

5.2.5.2 Ground Water

Ground water resources are found hidden and camouflaged into the surface of earth in the form of mobile and immobile state and exist as shallow and deep wells, confined and un-confined aquifers, springs and watersheds. Ground resourced waters are not easily susceptible to natural and anthropogenic derived contamination caused by Chemical/Biological pollution and thus is directly used for sensitive applications such as drinking even it is un-treated. As per data available the water levels are generally shallow – within 20 feet as shown in following figure.

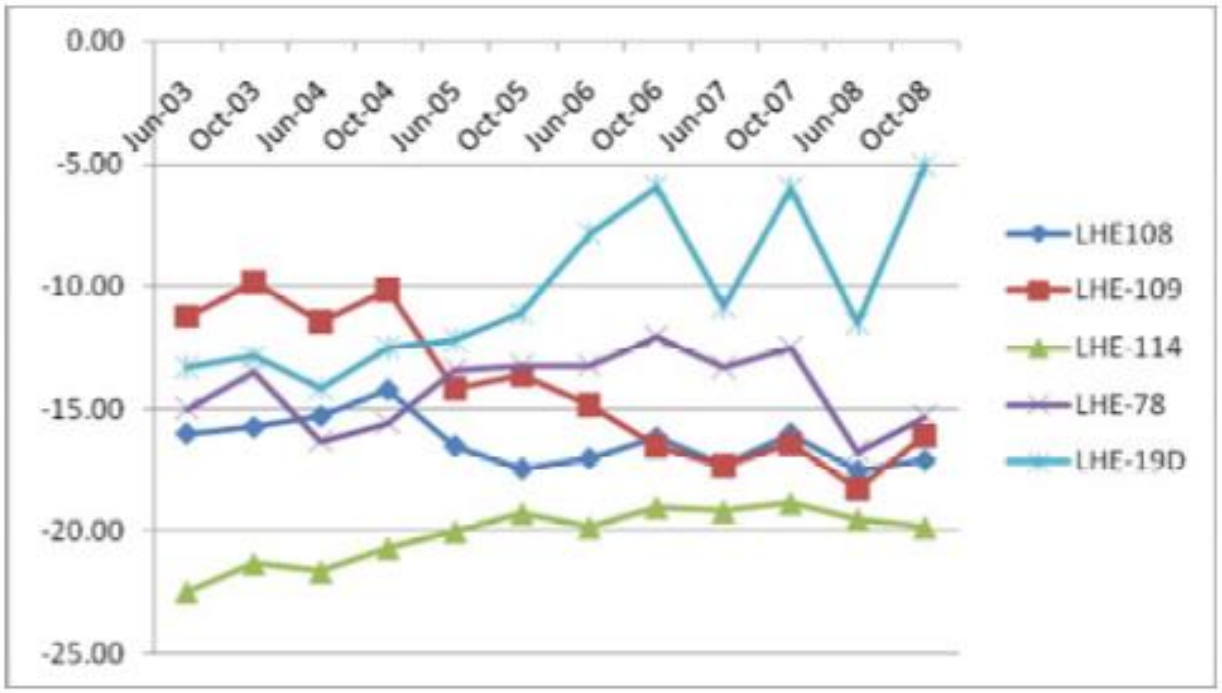


Figure 5-5 Graphical Representation of Groundwater Level Trends

5.2.6 Ecological Environment

Ecological Environment includes:

- Flora
- Fauna
- Endangered Species

The wildlife of the Lahore District of Pakistan includes a diverse range of natural and cultivated flora and fauna. The introduced flora of the city of Lahore comes from its cultural heritage as the regional capital of various Indian kingdoms from the 11th century to the early 20th century. Much of the Indian flora was introduced during the reign of Akbar, the third Mughal emperor.

- **Flora**

Common trees of Lahore include:

- Alstonia scholaris - locally termed **ditabark** - native to South Asia
- Bombax malabaricum- locally termed **sunbal** or **silk cotton tree** - native to the Himalayas
- Callistemon citrinus - locally termed **bottle brush** - native to Australia
- Dalbergia sissoo - locally termed **shisham** - native to South Asia
- Delonix regia - locally termed **gulmohar** - native to Madagascar
- Erythrina suberosa - locally termed **coral** or **gul nister** - native to Burma
- Ficus benghalensis - locally termed **banyan** - native to Bangladesh
- Ficus religiosa - locally termed **pipal** - native to South Asia
- Ficus retusa - locally termed **bobari** - native to Malaysia
- Kigelia pinnata - locally termed **gul-e-fanoos** or **sausage** - native to Africa
- Livistona chinensis - locally termed **bottle palm** - native to China
- Mangifera indica - locally termed **aam** - native to South Asia
- Mimusops elengi - locally termed **molsery** - native to South Asia
- Pongamia pinnata - locally termed **such chayn** or **Indian beech** - native to Himalayas
- Syzygium cumini - locally termed **jamu** - native to South Asia
- Ziziphus zizyphus - locally termed **jujube** - native to Himalayas

➢ **Fauna**

The Changa Manga forest near Lahore is a hotspot for wildlife in Punjab. Wildlife within the borders of the plantation includes small remnant populations of nilgai, hog deer, wild boar and possibly axis deer. Jackal and Asiatic wild cat can be found there as well. It also serves as a wildlife breeding center. Changa Manga plantation is an important place for restocking projects of Asiatic vultures in Pakistan. A *Gyps Vulture Restoration Program* was started in 2006 by WWF-Pakistan to conserve and breed endangered species of *Gyps*, especially the white-rumped vulture.

5.2.7 Endangered Species

There are no floral or faunal species inhibiting in the project area that are included in RED Data Book of IUCN.

5.3 Socioeconomic Environment

Socio-economic and other relevant information revealed from Multiple Indicator Cluster Survey (MICS) 2007-08. One of the main objectives of Multiple Indicator Cluster Survey (MICS) was to establish credible baseline for socio-economic status at each District and Tehsil Level.

Table 5-2 Summary of Socio-Economic Indicators

Socio-economic Indicators	District Lahore
Number of Households	7,755
Number of Under-5 Children	615
Solid Fuel Used	16.2%

Improved Source of Drinking Water	98.6%
Water Treatment Used in the Household	24.3%
Percentage of Population Using Sanitary Means of Excreta Disposal.	95.4%
Proper Disposal of Solid Waste	56.9%
Literacy Rate	74.1%
Percentage of Children for Primary School Entry	25.4%
Total Child Labor	3.3%
Had cough for more than Last Three Weeks	1.6%
Diagnosed with Tuberculosis during Last One Year	0.4%
Diagnosed with Hepatitis during Last One Year	1.2%
Employed	93.6%
Unemployed and Seeking Job	6.4%
Household Utilities	
Electricity	99.6%
Gas	79.7%
Radio	56.3%
TV	90.9%
Cable TV	69.2%
Telephone	36.3%
Mobile	87.2%
Socio-economic Development	
Livestock	11.7%
Population	11126285 persons
Average Annual Growth Rate (1998-2017)	3.00
Mean Household Size	6.4
Govt. Hospitals	14.8%

5.4 Quality of Life Values

5.4.1 Religious, Ethnic Groups and Languages

Of the people in Lahore, 87% of them speak Punjabi; however, this language can be broken down into many different dialects which make for a diverse speaking population. Other languages spoken include Urdu–the national language, English-which is spoken and understood by a large number of people; especially those from an educated background.

The main religions in Lahore are Muslim–mostly Sunni or Shia- which makes up 94% of the population. The remaining 6% are nearly all Christians. There are also a small number of minority religions such as Sikh and Hindu. The Lahoris are a cultural bunch of people celebrating many festivals around in the year–some religious, some historical and some are combinations of ancient and modern even western celebrations.

5.4.2 Social Infrastructure and Facilities

Overall the social and physical infrastructure is up to the mark in the project area. A brief account of the education, health, infrastructure and markets of the area is as follows:

5.4.3 Educational Institutions

There are a number of educational institutions found in Lahore. The educational status is up to the mark in the district. A list of some of the educational institutions is given below.

- Grand Charter School
- St. Anthony's High School
- Government College of Science
- Forman Christian College
- University of Engineering and Technology, Lahore
- COMSATS Institute of Information Technology

5.4.4 Health Facilities

There are different Basic Health Units (BHUs), Rural Health Centers (RHCs), Tehsil Headquarter Hospitals (THQs) and District Headquarter Hospitals (DHQs) in the district. List of some of them have been given below.

- DHQ Govt M.M.Munshi Hospital,Lahore
- DHQ Govt Kot Kawaja Saeed Hospital, Lahore
- BHU Manawan
- BHU Narwar
- RHC Raiwind
- RHC Manga Mandi
- THQ Govt. Mozang Hospital, Lahore
- THQ Govt Said Mitha Hospital, Lahore

The total number of health facilities in the district is given in following table

Table 5-3 Health Facilities in Lahore

Sr. No.	Hospitals	Number
1	DHQ Hospitals	01
2	THQ Hospitals	03
3	RHCs	05
4	BHUs	40
5	Govt. Rural Dispensaries	25
6	MCH Centre	02
7	Sub Health Center	13
Total		**89**

5.4.5 Economy of the Area

As of 2008, the city's gross domestic product (GDP) by purchasing power parity (PPP) was estimated at $40 billion with a projected average growth rate of 5.6%. This is at par with Pakistan's economic hub, Karachi, with Lahore (having half the population) fostering an economy that is 51% of the size of Karachi's ($78 billion in 2008). The contribution of Lahore to the national economy is estimated to be 11.5% and 19% to the provincial economy of Punjab. As a whole, Punjab has $115 billion economy making it first and to date only Pakistani Subdivision of economy more than $100 billion at the rank

144. Lahore's GDP is projected to be $102 billion by the year 2025, with a slightly higher growth rate of 5.6% per annum, as compared to Karachi's 5.5%.

A major industrial agglomeration with about 9,000 industrial units, Lahore has shifted in recent decades from manufacturing to service industries. Some 42% of its work force is employed in finance, banking, real estate, community, cultural, and social services. The city is Pakistan's largest software & hardware producing centre and hosts a growing computer-assembly industry. The city has always been a centre for publications where 80% of Pakistan's books are published, and it remains the foremost centre of literary, educational and cultural activity in Pakistan.

The Lahore Expo Centre is one of the biggest projects in the history of the city and was inaugurated on 22 May 2010. Defense Raya Golf Resort, also under establishment, will be Pakistan's and Asia's largest golf course. The rapid development of large projects such as these in the city is expected to boost the economy of the country. Ferozepur Road of the Central business districts of Lahore contains high-rises and skyscrapers including Kayre International Hotel and Arfa Software Technology Park. Here are some of pictures that can show the economy of Lahore.

Figure 5-6 Pictorial View of Economy of Lahore

5.4.6 Agriculture

Main Crops: Wheat, Rice, Maize, Millet and Barley.

Main Fruits: Citrus, Mango, Guava, Date Palm and Jamun.

Main Vegetables: Garlic, Onion, Radish, Potato, Carrot, Spinach and Cauliflower.

5.4.7 Livestock

The major livestock includes Mules, Horses, Donkeys, Camels, Bullocks, Buffaloes and Cows. The statistics of these animals are given in following table.

Table 5-4 Statistics of Livestock in Lahore

Livestock	Number
Mules	4207
Horses	8599
Donkeys	71364
Camels	112
Bullocks	40069
Buffaloes	3067
Cows	458
Total	**127876**

5.4.8 Archeological and Cultural Sites

Lahore is famous as being the cultural center of Pakistan, every nook and corner of Lahore has a rich history and cultural importance. However following historic sites and buildings are must if one visits Lahore.

- Badshahi Masjid
- Lahore Fort (Sheesh Mahal, or Palace of Mirrors)
- Azeri Bagh
- Mausoleum of Muhammad Iqbal
- Data Sahib (Data Darbar)
- Shahi Mohalla
- Mina-e-Pakistan
- Anarkali
- Chauburji
- Lahore Museum
- Gawal Mandi
- Ichhra
- Shalimar Gardens
- Shahdara
- Shimla Pahari

However, there were no archaeological sites near the project area although nearest chaks do have mosques, graveyards and darbars.

5.5 Environmental Baseline Monitoring

To assess the baseline conditions of the project area, following environmental components were monitored:

- Ambient Air Quality

- Drinking Water Quality
- Noise Levels

5.6 Suitability of the Site

The site does not fall in environmental sensitive area and all commodities are at a suitable distance from project site as they will not have impacted by the establishment activities even locals will get more benefits and job opportunities. No replacement, relocation and rehabilitation are required for the development of proposed project.

6 ENVIRONMENTAL IMPACT ASSESSMENT

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

6.1 Methodology for Impact Identification

The potential impacts due to chemical production unit can be both positive (beneficial) and negative (adverse) depending on the resources and receptors involved along with other parameters such as geographical scope (magnitude and extent), temporal scope (duration) and reversibility.

It is anticipated that this project will have positive impacts on sectors such as the economy, employment and foreign exchange earnings among others. Moreover, the project is expected to result in negative impacts of short-term duration and transient in nature.

Environmental sensitivity of the project area is described through a thorough review of the project activities and the evaluation of significance of impacts is carried out through Environmental Checklists and GIS and computer expert system. In checklists, the impacts have been given magnitude based on their severity. A detailed map of the project area is developed on GIS to study the impacts on nearby environmental settings. This chapter then suggests effective mitigation strategies to help combat the adverse nature of these impacts and delivers a monitoring scheme to manage them.

6.2 Impacts Analysis and Prediction

The impacts on different environmental settings were analyzed by conducting different consultation sessions with environmental experts and individuals. Their views were recorded and incorporated in the report. The list of stakeholders and individuals consulted will be provided in the chapter of Stakeholder's Consultation.

6.3 Characterization of Impacts

Impacts were characterized based on following parameters:

- Nature
- Magnitude
- Extent
- Duration
- Spatial Boundaries
- Reversibility

Categories	Characteristics
Nature	Direct: The environmental parameter is directly changed by the project. Indirect: The environmental parameter changes because of a change in another parameter.
Duration of impact	Short-term: Lasting only for the duration of the project such as noise from the construction activities. Medium-term: Lasting for a period of few months to a year the project before naturally reverting to the original condition such as loss of vegetation due to the clearing of the construction site, contamination of soil or water by fuels or oil. Long-term: Lasting for a period much greater than medium-term impact before naturally reverting to the original condition such as loss of soil due to soil erosion and air emissions.
Geographical extent	Local, regional (spatial dimension)
Reversibility of impact	Reversible: When a receptor resumes its pre-project condition. Irreversible: When a receptor does not or cannot resume its pre-project condition.
Likelihood of the impact	High: Impact expected to occur under most circumstances Moderate: Impact will probably occur under most circumstances. Low: Impact could rarely occur at some time.
Significance of impact	Categorized as Positive or Negative. Based on the consequence, likelihood, reversibility, geographical extent, and duration; the level of public concern; and conformance with legislative of statutory requirements.

The impacts characterization for the project has been given in Table 6-1.

Table 6-1 Characterization of Impacts

Environmental Component	Impacts		Nature of Impact		Duration			Spatial Boundaries			Likelihood			Reversibility	
	Positive	Negative	Direct	Indirect	Short Term	Intermediate	Long term	Local	National	Global	Low	Moderate	High	Reversible	Irreversible
Water Resources	Nil														
Acid Mine Drainage	Nil														
Land Resources	■		■				■	■				■			■
Air Quality		■	■		■			■			■			■	
Climate Change	Nil														
Noise		■	■		■			■			■			■	
Solid waste		■	■		■			■			■			■	
Wastewater		■	■		■			■			■			■	
Flora & Fauna	■		■				■	■				■			■
Community Amenity		■		■	■			■			■			■	
Afforestation	■		■				■	■				■			■
Local Economy, Community Development and Employment	■		■			■		■				■		■	
Resettlement	Nil														
Health & Safety		■	■			■		■				■			■

6.4 Impact Significance

After the evaluation of all the potential impacts, the impacts significance is being given using Impact matrix. The impacts significance of Physical importance, Ecological importance, Social importance is given using the matrix approach. The impacts significance is given based on the characterization of impacts. From the Table 6-1 which is showing the characterization of each impact the following significance is given to each physical, biological and socio-economic impact.

Table 6-2 Significance of Environmental Impacts

Environmental Parameters	Significance
Water Resources	None
Land Resources	None
Air Quality	Require mitigation
Climate Change	None
Acid Mine Drainage	None
Noise	Require mitigation
Solid waste	Require mitigation
Wastewater	Require mitigation
Flora & Fauna	Acceptable
Community Amenity	Acceptable
Afforestation	Acceptable
Local Economy, Community Development and Employment	Acceptable
Health & Safety	Require mitigation

7 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

The potential impacts due to chemical manufacturing unit can be both positive (beneficial) and negative (adverse) depending on the resources and receptors involved along with other parameters such as geographical scope (magnitude and extent), temporal scope (duration) and reversibility.

It is anticipated that this project will have positive impacts on sectors such as the economy, employment and foreign exchange earnings among others. Moreover, the project is expected to result in negative impacts of short-term duration and transient in nature.

The following chapter suggests effective mitigation strategies to help combat the adverse nature of these impacts and delivers a monitoring scheme to manage them.

Impacts were characterized based on following parameters:

- Nature
- Magnitude
- Extent
- Duration
- Spatial Boundaries
- Reversibility

The impacts characterization for the project has been given in Table 5-1.

Table 7-1 Characterization of Impacts

Categories	Characteristics
Nature	Direct: The environmental parameter is directly changed by the project Indirect: The environmental parameter changes as a result of a change in another parameter.
Duration of impact	Short-term: Lasting only for the duration of the project such as noise from the construction activities. Medium-term: Lasting for a period of few months to a year the project before naturally reverting to the original condition such as loss of vegetation due to the clearing of the construction site, contamination of soil or water by fuels or oil. Long-term: Lasting for a period much greater than medium-term impact before naturally reverting to the original condition such as loss of soil due to soil erosion and air emissions.

Geographical extent	Local, regional (spatial dimension)
Reversibility of impact	Reversible: When a receptor resumes its pre-project condition. Irreversible: When a receptor does not or cannot resume its pre-project condition.
Likelihood of the impact	High: Impact expected to occur under most circumstances Moderate: Impact will probably occur under most circumstances. Low: Impact could rarely occur at some time.
Significance of impact	Categorized as Positive or Negative. Based on the consequence, likelihood, reversibility, geographical extent, and duration; the level of public concern; and conformance with legislative of statutory requirements.

Anticipated environmental impacts are discussed as.

7.1 Project location

The project location is surrounded by many industrial units. The Project location will therefore have no major impact on the localities. Skilled manpower is available in the area. After environmental assessment of the study area the subject project site is most suitable to execute the project regarding the location environmental impacts.

Impact significance: Low or may be positive

Nature of impact: Direct

Duration: Long-term

Timing: Operation phase

Reversibility: NA

Likelihood: Low (unlikely),

Consequences: Mild or may be positive

Mitigation Measures for location phase impacts

- Project site should have good road infrastructure and efficient road infrastructure already exists there that is used currently to access the site and there is no issue of the road congestion due to the wide, good and paved road.
- Location can be considered as the positive impact due to utilization of the product in the same District.
- The project will provide the jobs to the local residents as well as to those from the suburban areas.

7.2 Project Design

Subject project is the proposed construction of proposed project. Area for parking, solid waste management and wastewater treatment facility will be made available within the subject project.

Firefighting plan, health & safety plan, tree plantation plan, emergency response plan will be incorporated during the designing phase of the project. The subject project will consist of,

- Cotton Godowns
- Cotton Yards
- Blow room
- Production floors
- Finishing hall
- Storage area
- Boiler
- Underground tank
- Store
- Residential colony for workers and employees
- Cafeteria etc.

Following are the major Environmental impacts due to the development related to the design:

- Structural stability of the proposed project.
- Soil structure and soil bearing capacity
- Road infrastructure design
- Emergency exit in the proposed project
- Firefighting system
- Wastewater disposal system design
- Rain water harvesting capacity of the drainage system
- Electricity hazards

Impact significance: moderate to high or may be negative

Nature of impact: direct

Duration: Long-term

Timing: Constructional phase & Operation phase

Reversibility: NA

Likelihood: moderate to high

Consequences: moderate to high or may be negative

Mitigation measures and recommendations

Following are the mitigation measures and recommendations to minimize the anticipated impacts:

- Emergency exist points should be marked within the project building.
- Firefighting system should be designed for the emergency situations.
- Geo-technical investigation of the project site should be conducted.
- Electricity system should be designed safe and sound.
- Electricity wires should be covered by thick plastic/electricity resistant covers.

7.3 Construction Stage

Impacts related to the construction phase of the subject project are discussed below:

7.3.1 Impacts on the Physical Environment

7.3.1.1 Soil Erosion and Pollution

There is a possibility of soil erosion and pollution to occur during construction phase of the project. The clearing of vegetation could lead into soil erosion when the cleared land is exposed to natural agents such as wind and surface run-off. Removal of topsoil after site clearance by agents such as wind, rain water, and surface run off is a likely action to occur. Similarly, accidental oil spills from construction equipment and discharge of wastewater from equipment washing to the environment might accelerate soil pollution to some extent. Oil spills may infiltrate into soil causing soil pollution and later water pollution during rainy season.

However, this impact is localized around machinery, maintenance areas or garage and areas of concentrated activities. Severity of impact is localized with low intensity due to the nature of project, which shall require minimum number of people during construction and shall not require heavy construction equipment. It is expected that the impacts will be low, local, and they will occur mostly during the construction stage (short term).

7.3.1.2 Air Pollution

Air pollution is quite likely to occur during construction phase. This is due traffic and other equipment using fossil fuels that release hydrocarbons and other gases including carbon dioxide, nitrous oxides, sulphur oxides, and particulate matters which may pollute the air. Likewise, activities like land clearing, vehicle movement, excavations for buildings foundations, construction drive ways and landscaping may generate dust especially during the dry season.

Other sources of air pollution will occur due to decomposition and/or burning of the cleared vegetation and dust from gravel driveways. The level of air pollution originating from the above-mentioned sources are expected to be low, localized and short term. No serious impacts are expected on people and the environment as whole.

7.3.1.3 Surface Water Pollution

No surface water entity i.e. streams, canal, river is present in the vicinity of the subject project so there no impact of subject project on the surface water.

7.3.2 Impacts on Biological Environment

7.3.2.1 Impacts on Flora

The clearance of most vegetation during construction to leave space for construction of proposed unit and other building facilities and access roads will bring negative impacts to flora population. Moreover, direct exposure to nitrous oxides (NOx) may cause growth inhibitions in plants to some extent. No special plant species of international conservation importance was recorded at proposed site. The impacts are therefore considered of low significance.

7.3.2.2 Impacts on Fauna

The nature of the site has not attracted several organisms to find refuge in the area although some including different types of birds, reptiles, amphibians and invertebrates are found. The clearance of vegetation and presence of noisy machinery, trucks and workforce will create unfavorable environment for most of these organisms while crawling organisms will eventually vanish following construction of paved surface. However, the temporary nature of the construction activities will result in impacts of short-term duration and therefore the impact is considered of low significance.

7.3.3 Impacts on Socioeconomic Environment

7.3.3.1 Workers Accidents and Hazards during Construction

Construction workers are prone to accidents resulting from construction activities. These accidents may have acute or chronic impacts depending on nature, severity and intensity. In this regard, construction and mobilization activities of the proposed unit could result into accidental injuries and hazards, etc. which could negatively impact the workforce.

Because of the intensive engineering and construction activities including erection and fastening of roofing materials, metal grinding and cutting, concrete work, steel erection and welding among others, construction workers will be exposed to risks of accidents and

injuries. At times, such injuries may be from accidental falls from high elevations, injuries from hand tools and construction equipment cuts from sharp edges of metal sheets and collapse of building sections among others.

7.3.3.2 Vibration and Noise

The level of noise and vibration are likely to increase during the construction phase. The noise will be mainly come from vehicles and equipment operation during construction activities as well as people working on the project construction. This is a short-term impact, and it will be felt mostly around construction sites and its peripherals.

There will be no drilling activities or involvement of heavy or high noise machinery. For residential areas located within 20km from the Project site boundary, it is predicted that the construction phase and operation of the proposed project will not pose any significant and the annoyance level is within the “no to little” impact category.

Considering technological advancement in construction industry, it is anticipated that machinery and equipment to be used during construction will be modern, versatile, and quieter than the old ones. It is also likely that they will require fewer numbers of operators reducing noise from workers. Therefore, the levels of noise and vibrations are anticipated to be within the tolerable limits, short term and localized. In view of the above and the fact that construction will concentrate on non-residential area, no significant impact is anticipated, and the impact can be highly mitigated.

7.3.3.3 Employment Opportunities

On the other hand, the proposed project will have, during construction phase, potential positive impact to the local community through provision of employment. It is expected that maximum people will be employed during construction phase. Employment will be in form of managers, skilled labors as well as unskilled laborers. Therefore, apart from employment benefits accruing to local people other national and international experts are likely to be employed by the project especially at senior positions.

7.3.3.4 Income Generation among Suppliers

During construction phase, the proposed project plan to source most construction materials from local and/or national sources including cement, iron sheets, steel bars, pipes, etc, from local shops. This demand therefore, will create market for local people and/or elsewhere in the country engaged in supplying construction materials leading to significant positive economic benefits to suppliers on short term basis.

7.3.4 Impacts on Security

The presence of laborers and expensive construction equipment, machinery and materials in the sites could potentially pose a security risk at the project site. Furthermore, offenders may capitalize on increased movement during construction and anonymity created by the construction activities to carry out criminal activities in the site and surrounding areas. This impact is likely probable due to low security measures from the fact the site is slightly far from police station(s) that could otherwise prevent criminal activities around the project site.

Accordingly, the impacts on the area's security are considered to be of medium significance. Therefore, appropriate security measures should be provided at the site through fencing, security checks/screening of workers and their guests and 24 hours security watch by expert security men (normally privately contracted) to prevent such criminal activities from happening at the site.

7.3.5 Mitigation Measures

7.3.5.1 Protection of Flora

In order to protect plant species from potential negative impacts, the proponent shall ensure that:

- The contractor is responsible for informing all employees about the need to prevent any harmful effects on natural vegetation on or around the construction site as a result of their activities;
- Clearing of natural vegetation is kept to a minimum;
- Unnecessary removal, damage and disturbance of natural vegetation are prohibited;
- Re-vegetation of the proposed project site is undertaken;
- Indigenous trees are planted around project area to enhance natural habitat

7.3.5.2 Land Degradation and Soil Erosion Control

Potential negative impacts on land and soils shall be mitigated by ensuring that:

- The contractor implements erosion control measures as an on-going exercise;
- During construction, the contractor protects all areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking any other measures necessary to prevent storm water from concentrating in streams and scouring slopes, banks, etc.;
- Any tunnels or erosion channels developed during the construction or maintenance period shall is backfilled and compacted and the areas restored to a proper condition;

- Areas where construction activities have been completed and where no further disturbance would take place are rehabilitated through re-vegetation;
- Ground clearance is minimized and if possible concentrated only to the specific building foundation areas, and only when it is necessary;
- Prompt reclamation of exposed soils is done;
- Construction during long rains period should be done with caution to avoid soil from being washed away;
- Topsoil excavated from buildings foundations is stored for re use on other areas like rehabilitations of quarries

7.3.5.3 Soil and Water Pollution Measures

Measures to mitigate soil and water pollution impacts during construction phase shall ensure that:

- Concrete mixing directly on the ground is prohibited and only be undertaken on impermeable surfaces;
- Concrete batching activities are located in an area of low environmental sensitivity;
- All runoff from batching areas is strictly controlled, cement-contaminated water is collected, stored and disposed of at an approved site;
- Contaminated water storage facilities are not left to overflow and appropriate protection from rain and flooding are implemented;
- Unused cement bags are stored out of the rain where runoff won't affect it;
- Used (empty) cement bags are; collected, stored in weatherproof containers to prevent windblown cement dust and water contamination, not to be used for any other purpose and shall be disposed of on a regular basis via the solid waste management system;
- All excess concrete is removed from site upon completion of concrete works and disposed of whilst preventing washing of the excess concrete into the ground;
- Entrance or accidental spillage, of solid matters, contaminants, debris and other pollutants and wastes into surface and ground water is prevented;
- Awareness of employees to prevent unnecessary oil spills and protection of environment in their daily duties is promoted; and
- All excess aggregate is removed from site and properly disposed.

7.3.5.4 Waste Management

To ensure that solid waste is properly managed and potential negative impacts are mitigated, the contractor shall ensure that:

- All facilities are maintained in a neat and tidy condition. Measures to reduce the negligent behavior with regard to the disposal of all refuse are taken, bins, containers and refuse collection facilities for later disposal are provided at all places of work;

- Solid waste may be temporarily stored on site in a designated area prior to collection and disposal;
- Waste storage containers are covered, tip-proof, weatherproof and scavenger proof;
- No burning, on-site burying or dumping of waste shall occur;
- Inert construction rubble and waste materials are disposed of by burying in the borrow pits or a designated site;
- All excavated materials, debris from construction works are not to be stockpiled or deposited near or on stream banks or other watercourse perimeter where they can be washed away by high water or storm runoff or can any way enters to water sources itself;
- Metal refuse bins or equivalent plastic refuse bins, all with lids, are provided to all buildings;
- Domestic refuse is collected and removed from all facilities at least twice per week and transported to the approved refuse disposal site in covered containers or trucks;
- Used oil, lubricants, cleaning materials, etc. from the maintenance of vehicles and machinery are collected in holding tanks and sent back to the supplier;
- Runoff from fuel depots / workshops / machinery washing areas and concrete batching areas is collected into a conservancy tank and disposed of designated site

7.3.5.5 Air Quality Control

The contractor shall ensure air quality by undertaking the following measures:

- Ensure that the generation of dust is minimized and implement a dust control programme to maintain a safe working environment, minimize nuisance for surrounding residential areas/dwellings and protect damage to natural vegetation, crops, etc.;
- Exposed soil and material stockpiles shall be protected against wind erosion and the location of stockpiles shall take into consideration the prevailing wind directions and locations of sensitive receptors;
- To minimize the pollution caused by dust generation during the construction stage, water will be sprinkled on the construction site and on drive ways as frequently as possible;
- To minimize exhaust fumes, machinery and equipment shall not be running when not in use while ensuring that they regularly serviced; and
- Construction vehicles and machinery shall be equipped with pollution-control devices to minimize emissions

7.3.5.6 Vibration and Noise Control

Vibration and noise produced by construction work will be manages as follows:

- The contractor shall strive to keep noise generating activities to a minimum;

- The contractor shall restrict all operations that result in undue noise disturbance to local communities and/or dwellings (e.g. drilling etc.) to daylight hours on weekdays;
- The contractor shall inform in advance any local communities and/or residents that could be disturbed by noise generating activities such as drilling or compacting and shall try to keep such activities to a minimum;
- The contractor shall be responsible for compliance with the relevant legislation with respect to noise;
- Provision of earplugs and earmuffs to the workers working in high peak noises during the construction stage;
- Use of modern low noise machinery and vehicles is recommended;
- Activities that may involve noises and vibration should be withheld at night especially close to human dwellings.

7.3.5.7 Landscape and Topography

As construction activities are very likely to lead to negative impact on landscape and topography at project site, such impacts will be brought to a minimum by executing the following measures:

- Planting of appropriate indigenous trees, grass cover and other vegetation types on project area should be encouraged so as to enhance scenic beauty of the area; and
- Removal and proper disposal of construction debris need to be effected after completion of construction works and shall not be stockpiled or deposited near or on water sources or other watercourse perimeter where they can be easily be washed away by high water or storm runoff or can any way enter these sources.

7.3.5.8 Occupation Health and Safety Measures

The following safety measure should be observed during the construction stage:

- Provision of health and safety induction course to all workers;
- Instilling proper code of conduct and work ethics among construction workers and ensure that they are observed;
- Provision of Personal Protective Equipment (PPE) to all workers and enforce their use;
- Installing first aid kit and hire trained personnel to provide first aid;
- Reporting to OSHA within 24 hours of occurrence of any accident or near miss which can cause fatal or permanent disability; and
- Workers should be educated on their own safety and safety of others; For covid-19 prevention it is recommended:
- Workers are well-trained to practice and implement social distancing.
- No one is allowed to enter the premises of the project site without wearing proper mask.

- Personal hygiene practices are ensured and labor is trained for it by the contractor and the management of the unit.
- The proponent/contract provides masks to all the construction workers on daily basis and sanitizers are available at specific points of the project site

7.4 Environmental Impacts during Operation Stage

Main environmental issues associated with Project operation are as follows.

Health and safety issues for workers may arise during the project process e.g. Particulate matter may be generated during the project process, which may cause the health issues for the workers and noise of machinery can also be a negative impact on the health of workers.

- Waste water due to domestic and process activities.
- Fire due to short circuits and other activities.
- Solid waste generation due to domestic and project related activities.
- Noise pollution from generator and other machinery.
- Health hazards including the electricity hazards.
- Emissions will be generated from working of boiler.
- Ash from the boiler.
- Sludge from wastewater treatment facility will be generated.

Vehicle access is required especially for transportation. The site is well served with the road network. Heavy traffic will be allowed only during tight time during operational phase. The traffic issues at any stage of project life cycle will not arise.

Impact significance: moderate to high or may be negative

Nature of impact: direct

Duration: Long-term

Timing: operational phase

Reversibility: NA

Likelihood: moderate to high

Consequences: moderate to high or may be negative

7.4.1 Recommendations

- Safety of workers should be ensured through proper training and PPEs must be ensured during the working hours.
- Wastewater treatment facility should be constructed within the premises of the unit.

- A well design firefighting system will be constructed to cope with fire situations in the subject project.
- Solid waste bins should be installed at designated processes and Installed Solid waste bins should be regularly cleaned and solid waste must be handed over to the EPA Approved contractor.
- Cyclones will be installed at the stack of boiler.
- Ash will be handled carefully.
- Sludge from the wastewater treatment facility will be handed over to the certified contractors.
- Electricity monitoring/Thermography should be conducted by the proponent quarterly for the safe supply.
- Noise levels should not exceed the PEQS.
- Project proponent should submit all the monitoring reports in the EPA Punjab for the compliance of the PEQS.

7.5 Potential Environmental Enhancement Measures

The proposed project will be installed with all precautionary measures to enhance and safe the environment. Following necessary measures will be adopted during construction and operation:

- Sprinkling of water will be done on dusty roads and tracks.
- PPEs will be provided during construction activity.
- Constructional waste and domestic solid waste will be disposed-off or utilized properly.
- Local people will be informed in advance when work is about to start in an area.
- Machinery will never be left unattended.
- Efforts should also be made to discuss traffic conditions so that regular traffic is not disturbed. Transporters engaged for the project would be forced to adhere to the load specifications of the access road. No overloading would be allowed in any case.
- Safety signs and boards will be placed during construction.
- Air pollution controlling devices will be installed within the project during operation.
- Scrubbing system will be installed at stack of generators.
- Machinery will be kept maintained.
- Waste water will be treated through waste treatment system that will be installed within the premises of the subject project.
- Proper SOPs will be followed with proper schedule along with the HSE conditions.
- Area will be restored with native plants. A proper tree plantation plan will be formulated to save the environment.
- Solid waste will be handed over to contractors and agreement will be made.
- Noise will be controlled by adopting proper measures.
- PPEs will be provided to workers during working.

- Firefighting equipment's and system will be installed.
- Safety signs will be placed at all locations where required.
- Hygienic conditions will be ensured and proper quality will be maintained by quality control testing.
- First aid facilities will be made available.

8 ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

8.1 Introduction

This section presents the environmental management plan (EMP) for the project. The EMP specifies the mitigation and management measures which the Proponent will undertake and shows how the Project will mobilize organizational capacity and resources to implement these measures.

The EMP covers information on the management and mitigation measures that will be taken into consideration to address impacts in respect of the operational phase of project.

8.2 Objectives

The primary objectives of the EMP are to:

- Facilitate the implementation of the mitigation measures identified in the IEE.
- Define the responsibilities of the HSE manager of proposed project.
- Define a monitoring mechanism and identify monitoring parameters in order to:
- Ensure the complete implementation of all mitigation measures.
- Ensure the effectiveness of the mitigation measures.
- Provide a mechanism for taking timely action in the face of unanticipated environmental situations.
- Identify training requirements at various levels.

8.3 Schedule of Implementation of EMMP

The implementation of EMMP should be carefully coordinated with the design and operational program of the project. This will ensure the implementation of relevant mitigation measures at the appropriate project stages. It will also ensure that adequate resources are properly allocated to achieve the desired results. This EMMP has been prepared to satisfy the requirement of “IEE and EIA Regulations, 2000”.

8.4 Environmental Management Team along with their roles and Responsibilities

The overall responsibility for compliance with the environmental management plan rests with the project proponent.

Roles and Responsibilities:

Environmental Management should become an integral part of policy of proposed project. Therefore, committing to reduce the environmental impacts will reflect the management approach and believe that good performance in this area is synonymous with running well

managed efficient proposed project operation. During the construction main responsibility of environmental performance will be followed by the EHS Officer on daily basis.

In case of normal operational phase, main responsibility for environmental performance will be supervised by the site manager while daily management will be performed under the site officer who in turn charges of environmental matters. Under their surveillance, environmental management during operations will be performed as per mitigation and monitoring plans outlined in this IEE. A brief role and responsibilities is given below;

- Top Management

Environmental management plan will regulate by the top management of plant operations; therefore, they will play an important role. Some of the key roles and responsibilities are given below;

  - To cooperate and consult with relevant environmental agency in order to perform in better way.
  - To evaluate the progress of development and implementation of this management plan.
  - To approve any change in decision making with the consultation of respective managers, if appropriate.

Following functionaries will be involved in the implementation of EMP:

  - Project Proponent
  - HSE/Project Manager
  - In-Charge Administration
  - Supervisor of project
  - Environmental Engineer
- Project Manager

The role of project manager is very important. The success of an EMP will mainly depend upon effective management of the EMP by project manager. Some of the key roles and responsibilities given to project manager are given below;

  - Ensure that contractor is aware of all specifications, legal constraints, standards and procedures pertaining to the project specifically with regards to environment.
  - Ensure that all stipulations within the EMP are communicated and adhered to by the contractor.
  - Monitor the implementation of EMP throughout the project by means of site inspections and meetings.

- Be fully aware of the environmental assessment of the project, the conditions of approval of IEE and all relevant legislations.
- To monitor the progress of development and implementation of this management plan.
- To improve coordination and exchange of communication between higher management and staff.

- Contractor for Construction and Operation

On behalf of contractor, the main responsibilities of all matters pertaining to environment will be that of chief of the assigned contractor. Following are the roles and responsibilities of contractor.

- To carry out constructional and operational activities in an environment friendly manner.
- Shall propose measures to minimize environmental impacts during constructional and operational phase and submit to environmental officer.
- In case of having impacts on the environment, the contractor will inform to project manager in time to get instructions and to take next step.
- Comply with the environmental management specifications.
- Maintain a public complaint register.
- Submitting a report at each site meeting which will document incidents that have occurred during the period before the site meeting.

8.5 Proposed Monitoring Program to assess performance or output of EMP

Following aspects need to be monitored regarding the subject project during pre-construction, during construction and post construction.

- Air quality
- Water quality
- Noise level
- Management of utility services including water supply, sewerage disposal, electric supply and solid wastes.

Table 8-1 Environmental Monitoring Plan

Environmental Component	Frequency	Responsibility
Construction Phase		
Air Quality	Quarterly basis	Proponent
Noise Levels	Quarterly basis	Proponent
Water Quality	Quarterly basis	Proponent

Operational Phase		
Air Quality	Quarterly basis	Proponent
Noise Quality	Quarterly basis	Proponent
Wastewater Quality	Bi-annually	Proponent
Drinking water Quality	Quarterly	Proponent

8.6 Environmental Budget

Company will allocate the Environmental Budget of 10,000,000/- annually for the Training, maintenance and management of Environment that will include filling and maintenance of equipment's, restoration, plantation, and availability of PPEs, strategic planning to cope with any emergency and formulate the disaster management plan to cope with natural disaster. Any equipment or devices failure or replacement will not be included in this budget

8.7 Environmental Management Plan

Table 8-2 EMP for Construction Phase

Potential Negative Impacts	Recommended Mitigation Measures	Monitoring responsibility	Parameters For Monitoring
Dust emissions	On exposed construction surface during windy periods fugitive dust generation will be suppressed by spraying water.	Proponent/ contractor	Air quality
	The construction material will be covered with polyethylene sheets to prevent dust emissions.		
Soil Erosion	Exposed surface will be resurfaced and stabilized as soon as possible.	Proponent/ contractor	Soil
Solid Waste Generation	Solid waste may include waste/unused construction materials, which should be disposed of properly.	Proponent/ contractor	Solid waste management

Vehicular Traffic And Noise	Vehicles and other noisy equipment will be kept in good conditions and their regular maintenance will be done.	Proponent/ contractor	Noise level
	Noisy construction activities will be carried out only during normal working hours.		
Health And Safety of Work Force	The contractor will ensure that the workers are trained in safety procedures for all relevant aspects of construction.	Proponent/ contractor	Health and safety
	Regular checks will be made to ensure that the contractor is following safety working procedures/safety measures.		
	Formal emergency procedures will be developed for construction site in case of an accident.		
	First aid kits and other necessary equipment will be kept available at site along with the list of emergency phone numbers to be contacted in case of any accident.		
	Produced during construction phase will be collected by vehicle for dispose of it at a particular dumping site of the industrial estate from it will be reused. Waste segregation units will be provided. Recyclable items will be provided to recycling contractors		
Water Supply	Water use will be planned depending upon the supply and timing to avoid and inconvenience.	Proponent/ contractor	Water supply

	Water conservation practices will be adopted.		
Surface and Groundwater	At project site, the septic tank will be installed if required for the disposal of wastewater into the nearby drain. The storage of lubricant materials such as oil and grease will be confined to a specific area so that in case of any leakage or spillage, the lubricant materials do not contaminate the entire project site.	Proponent/ contractor	Surface and groundwater

Table 8-3 EMP for Operational Phase Impacts

Potential Negative Impacts	Recommended Mitigation Measures	Monitoring Responsibility	Parameters for Monitoring
Dust emissions	In operational phase, dust generation by vehicles will be suppressed by spraying water. Scrubbers will be used to control dust emissions	Proponent	Air quality
Noise	Use of PPEs (noise suppression equipment-ear mufflers etc.) will be ensured by the workers where noise levels are higher than 85 (dBA). Plant activities will be ensured at daytime when background noise levels are high. Vehicles speed limit will be maintained to avoid excessive vibrations. Regular maintenance of machinery will be ensured.	Proponent	Noise
Waste water	Wastewater will only be of residents. No wastewater will be produced due to the project activities. During the process, water will be produced as byproduct and all water will be disposed off to the sewerage after proper treatment	Proponent	Wastewater management

Flora and fauna	The unit includes a plan of the green yard area which is a positive impact on the flora and fauna. There is no significant fauna in that area. However, it is suggested that maximum number of trees should be planted by the management inside and outside the boundary wall to enhance aesthetics of the area.	Proponent	Biodiversity
Social impacts	During the operation stage, any social issue will be resolved in consultation with the stakeholders. Moreover, the residents may get opportunities to work in the plant based on skills.	Proponent	Social impacts
Occupational health and safety	There may be occupational health and safety risks associated with different operational activities. Health risks may occur in case of unsafe and/or unfavorable work conditions The mitigation measures include: The workers should get trained in safety procedures for all relevant aspects of processes. Enforcement of work safety measures. Formal emergency procedures will be developed for the segregation hall in case of any accident. First aid kits and other personal protective equipment (safety gloves, goggles, welding shields etc.) Should be kept available.	Proponent	Health & safety

8.8 Proposed EMP Reporting and Reviewing Procedures

8.8.1 Aim

In the context of industrial unit, the monitoring and evaluation is carried out to achieve following objectives:

- To access whether the project site is being managed in a sustainable manner as planned or certain bottlenecks are experienced both qualitatively and quantitatively.
- To ensure compliance of environmental parameters (i.e. ambient air and noise, water quality) with PEQS.
- To ensure the implementation of mitigation measures for overall conservation of environment at the project site.
- To undertake effective environmental surveillance of the site.
- To assess effectiveness of mitigation measures and potential environmental enhanced measures.
- To ensure compliance with national environmental obligations.
- To monitor rehabilitation of recovered land including afforestation.

8.8.2 Environment, Health &Safety Policies

8.8.2.1 Environment Policy

The environment policy right from initiation of project installation to its proper operations will be based on:

- Compliance of applicable regulatory requirements;
- Conservation of natural resources;
- Assurance of sustainable development;
- Maintaining a safe working environment;
- Providing high environmental expertise and know-how; and
- Regular training and refresher courses to achieve continuous improvement of environment.

8.8.2.2 Health & Safety Policy

The proponent identifies safety and health of the personnel as integral part of every work aspect at every level. In addition to compliance with the statutory rules and regulations as the minimum acceptable, the proponent will set nationally acceptable standards for practice and will intend to achieve the above by the following:

- Provide adequate and continuous training to all personnel;
- Prepare an over-all safety & health manual giving general requirements of leadership, planned inspections, job analysis & procedures, emergency preparedness, organizational rules, necessity and use of protective equipment, health control, etc.;
- Systematic evaluation & measurement of system performance at all operational levels and continuously update the over-all safety & health manual;
- Carrying out regular publicity campaigns effective personnel safety and health conscious; and

- To employ a person as in-charge for planning, training & safety and make him responsible for implementation of safety and health policy.

8.9 Training Needs

Training for the management/contractors/engineers and workers on environmental aspects of the project will be arranged. It will be imparted by a team of experienced trainers.

- Training of staff:

Training of staff & workers will be the part of the TORs regarding the subject project. The provisions given in EIA Report Chapter Screening of Potential Environmental Impacts & Their Mitigation Measures will be followed.

TORs will be including the training and submission of reports in the following area:

- Handling of Machineries in a safe way.
- Proper fencing design.
- Proper training and schedules
- Use of PPEs
- Maintenance of vehicles and submission of Environmental Monitoring Reports Maintenance of Water Consumption records
- Testing of water and waste water and submission of Environmental Monitoring Reports
- Placement of safety signs/boards during construction
- Sprinkling of water on the roads and dusty tracks
- Monitoring of generator emissions Training regarding all other aspects of HSE will be ensured by the contractor during the construction and operational activity.

9 INVOLVEMENT OF STAKEHOLDER'S / PUBLIC CONSULTATION

9.1 Introduction

Stakeholder's consultation is a tool used for communication with a diverse group of stakeholders having multifarious aims such as information dissemination, exchanging views, soliciting feedback and suggestions on issues pertaining to the project, plan future actions. This practice initiates a need assessment and identifies areas of concern for all the parties that maybe affected by the project activities.

Stakeholders are all those people and institutions who have an interest in the successful design, implementation and sustainability of the project. This includes those positively and negatively affected by the project.

9.2 Benefits and Objectives of Stakeholder's Consultation

Consultation with stakeholders leads to an overall better understanding of the project on the part of the communities and gives the Proponent a clearer understanding of the stakeholders' perspective. Effective public consultation can add substantial value to the EIA study process. The information gained through public consultation on the stakeholders' concerns, interests, and their ability to influence decision-making helps identify key cause of environmental problems.

This can be used to evaluate direct and indirect environmental impacts and assess short term and long-term resource use implications. The input from local communities and NGOs can help evaluate alternatives and strengthen the management planning by incorporating local input and know-how.

An informed public will better understand the tradeoffs between project benefits and disadvantages; be able to contribute meaningfully to the project design; and have greater trust with the project Proponent and support for the project, says the Asian Development Bank. These factors contribute towards improved project implementation sensitized to the human environment of the area. The objectives of stakeholders' consultation are to:

- Promote better understanding of the proposed operation through explaining its objectives and its potential positive and negative impacts.
- Identify and address concerns of all interested and affected stakeholders.
- Provide a mechanism to resolve issues identified by communities, before project plans are finalized and development begins, thereby, avoiding public outcry and resentment.
- Instill trust between various stakeholders and the Proponent to promote cooperation.

9.3 Identification and Classification of Stakeholders

During the field survey, significant efforts were made to identify the possible categories of stakeholders and their stakes. Identification of stakeholders is important for the sustainability of a developmental project and helps to evaluate and envisage the role of stakeholders. The influence or impact of the project on stakeholders can be elaborated in

the form of a matrix and the mitigation measures are proposed accordingly. All the stakeholders had different types of stakes according to their professions.

9.4 Methodology for Consultation

Stakeholder consultation is a two-way flow of information and dialogue between the project Proponent and stakeholders, specifically aimed at developing ideas that can help shape project design, resolve conflicts at an early stage assist in implementing solutions and monitor ongoing activities.

Various techniques are used worldwide to carry out the stakeholder consultation that includes discussions, meetings and field visits. A series of scoping sessions and formal focus group discussions were carried out with environmental experts and individuals. The meetings were held at various locations.

9.5 Key Consulted Stakeholders

The stakeholders consulted in this case are public as well as environmental experts and individuals working in profession of environment. The list of stakeholders consulted and their feedback is given below.

The organizations consulted are as under:

- Chief Inspectorate of Mines Punjab its related field office
- DG Mines and Minerals Punjab, its related field office
- Representative of the Forest Department of the area
- Surface Landowners
- Nearby Village Numberdar
- Mines Labor Welfare Commissioner
- Civil Defence Officer

Each department was contacted to seek wisdom during an interaction of 4-6 man-hours each.

9.5.1 Responsible Authority

The proponent is the responsible authority to take all measures prior to the project.

9.5.2 Other departments and agencies

For the impact analysis detailed meetings of local community, education institutes, health institutes, hospital and NGOs were held with the management. Issues were discussed that may affect the environment and also the implementation of proposed project. All possible mitigation measures were considered and incorporated in the Environmental Management

Plan. Scoping sessions, focused group discussion and way side consultations were held with the relevant stakeholders in the area. The purpose of such consultations is to obtain the feedback from the relevant persons.

9.5.3 Environmental Practitioners and Experts Team

Experts of M/s Hi-Tech Environmental Services (Pvt.) Ltd. visited the project site, had discussions with stakeholders and consulted with the local people of nearby and other areas to evaluate the project socio-economic impacts. People of the area belong to different professions like mostly belong to employment, own businesses, doctors, some in abroad, in Army, teaching, in agriculture, etc. Women were also consulted for their point of view regarding the betterment of the area by this project, some of them communicated but according to social value of the area they mostly hesitate to communicate comfortably and get pictured. People provide the massive information about the project and have positive remarks regarding the project development.

9.5.4 Affected & Wider Community

There is no affected community present in the radius of our study area. The team has consulted with the inhabitants of the different areas. They provided positive remarks regarding the subject project and in the favor of the subject project activity for the proposed project.

9.5.5 Summary of Concerns of Consulted Stakeholders

The summary of stakes of consulted stakeholders is given below.

- The activities of the project must be studied in detail to assess all the impacts resulting from the project.
- All the environmental parameters i.e. ambient air quality, noise levels and water quality must be kept within permissible limits of PEQS.
- Project specific mitigation measures must be implemented during project's lifecycle.
- A proper Environmental Management and Monitoring Plan should be prepared to reduce adverse environmental impacts.
- Waste management must be taken into consideration (if generated during project activities).
- Management practices suggested in EMMP for solid waste should be implemented during operation of the project.
- The findings of the EIA report must be incorporated into the design and planning phase of the project.
- The EIA report should be compiled appropriately according to reporting style as suggested in Guidelines/Checklist.
- The project holds a good economic circulation. The advantages of the project seem more than its disadvantages. Therefore, the project should be operational as soon as possible.

List of Individuals Consulted Along with their Written Feedback

No. of individuals=11

Day & Timing= 03-AUG -2023 (1.30 P.M)

Sr.	Names/ Person consulted	CNIC	Concern/Comments
Government Department			
1.	Chief Inspectorate of Mines Punjab	-	Project activity should follow rules and regulation. No project activity should be done without submitting environment report to EPA.
2.	DG Mines and Minerals Punjab	-	PPEs should be given to the workers. No Natural reserve will be affected by the project activity. Proper implementation of mitigation should be done. Job Opportunities will be provided to locals.
3.	Representative (Forest Department)	-	Vegetation should be done. No forest should be affected.
Local Residents			
4.	Ali Mehmood	37302-1843660-7	Dust Issues
5.	M. Zaheer	38201-8924524-3	Job Opportunity + Dust Issues
6.	Amjad Iqbal	38201-5715106-1	Job Opportunity
7.	Muhammad Shamim	37202-4629486-1	Road Construction
8.	Muhammad Javed	42401-9795969-7	Job Opportunity
9.	Naeem Khan	37202-2019837-9	Job Opportunity
10.	Mudassir Ameen	37202-3733815-9	Water Problem
11.	Rana Wali M.	38201-1054401-7	Water Problems + Dust Issues

10 CONCLUSIONS AND RECOMMENDATIONS

At the end of this EIA study, following conclusions are drawn and recommendations have been given accordingly.

10.1 Conclusions

- The EIA study reveals that the project is economically viable, socially acceptable and environment friendly.
- It will generate additional jobs during construction and operation phases.
- The proponent has committed to implement the project in the environment friendly manner.
- Proponent intends to register the project with local Government.
- Proponent has prepared and implemented very comprehensive Emergency Preparedness and Response Standard Operating Procedures.
- Proponent has prepared and implemented very comprehensive Security and Fire Fighting Standards Operating Procedures.

10.2 Recommendations

- In view of the comprehensive screening process and findings of the present study there is no need to conduct further investigations.
- Tree plantation inside the unit and near the unit is recommended.
- The untreated wastewater will not be reused for irrigating the vegetation and lawns.
- High standards of biosecurity and safety will be enforced during operation stage. The safety of the workers will be top priority for the management.
- The management of Faiz Chemical Industry (Pvt) Ltd will continue to assist the local communities as a corporate/social responsibility.
- The present EIA report is enough to meet the administrative and legal framework.

Therefore, environmental approval may be accorded for the present project.

APPENDICES

APPENDICES-I: GLOSSARY

Act means the Pakistan Environmental Protection Act, 1997.

Contaminationis introduction of impurities in the environment.

Environment means (a) air, water and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities and works; (f) all social and economic conditions affecting community life; and (g) the inter-relationships between any of the factors in sub-clause (a) to (f).

Environmental Assessment a technique and a process by which information about the environmental effects of a project is collected, both by the developer and from other sources, and taken into account by the planning authority in forming their judgments on whether the development should go ahead.

Environmental Management to carry out the developmental activities in sustainable manner.

Impact on Environment means any effect on land, water, air or any other component of the environment, as well as on wildlife harvesting, and includes any effect on the social and cultural environment or on heritage resources.

Mitigation Measures means the measures for the control, reduction or elimination of an adverse impact of a development on the environment, including a restorative measure.

Project Proponent is a person, company, NGO or any agency that sponsors and promotes a project.

Regulations means the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environment Impact Assessment Regulations, 2000.

Pollution means the presence in the environment or the introduction into it, of substances that have harmful or unpleasant effects.

Social Cohesion is defined as the willingness of members of a society to cooperate with each other in order to survive and prosper.

Screening is the first step of IEE/EIA study. It helps in determining whether a project requires an IEE or EIA.

Sensitive Receptors include, but are not limited to, hospitals, schools, daycare facilities, elderly housing and convalescent facilities. These are areas where the occupants are more susceptible to the adverse effects of exposure to toxic chemicals, pesticides, and other pollutants.

Afforestation is the planting of trees on land which was formerly used for land uses other than forestry is called afforestation.

APPENDICES-II: LIST OF ABBREVIATIONS

NCS	National Conservation Strategy
NOC	No Objection Certificate
EA	Environmental Approval
OHS	Occupational Health and Safety
MICS	Multiple Indicator Cluster Survey
mm	Millimeters
EPA	Environmental Protection Agency
IEE	Initial Environmental Examination
NEQS	National Environmental Quality Standards
EMP	Environmental Management Plan
EMP	Environmental Monitoring Plan
GOP	Government of Pakistan
km	Kilometer
m	Meters
NGO	Non-Governmental Organization
BDL	Below Detection Limit
SWM	Solid Waste Management
TMA	Tehsil Municipal Authority
PPC	Pakistan Penal Code
PEPA	Pakistan Environmental Protection Act
NDWQS	National Drinking Water Quality Standards
LAA	Land Acquisition Act
sq mi	Square Miles
PPE	Personal Protective Equipment
MMD	Mines and Minerals Department
CSR	Corporate Social Responsibility
M. Tons	Metric Tons
in	Inches
GLS	Ground Level Surface
MTa	Metric Tons Annually
TPD	Tons Per Day
HSE	Health Safety and Environment

APPENDICES-III: REFERENCES

- https://www.scribd.com/document/385301710/First-Report-of-ethnobotanical-studies-of-tehsil-Noorpur-Thal-District-Chakwal-Punjab-Pakistan
- Multiple Indicator Cluster Survey(MICS)2007-08
- The IUCN Red List-A Key Conservation Tool
- Punjab Development Statistics 2005
- Pakistan Highway Rehabilitation Project Sectoral Social and Environmental Assessment Phase I &II.
- (Khawaja, Saima Amin and Nusrat Jahan Nabeela. 2014), "Review of Pakistan Environmental Protection Agency Regulations, 2000", Published by: IUCN Pakistan (National Impact Assessment Programme), pp.7,11&13).
- (J.Yamatomi and S.Okubo), "Surface Mining Methods and Equipment",CIVIL. ENGINEERING – Vol. II, pp. 1-2.
- (Alecia M. Spooner), Environmental Science for Dummies, "The Environmental Science of Surface Mining".
- Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Initial Environmental Examination Regulations. 2000.
- Guidelines for the preparation and review of Environmental Reports, Pakistan Environmental Protection Agency, Government of Pakistan, October 1997.
- Pollution Prevention and Abatement Handbook, The World Bank, 1998.
- The Pakistan National Conservation Strategy, Environment and Urban Affairs 'Division (Presently-Ministry of Environment, Urban Affairs and Wild Life), Government of Pakistan, Islamabad.
- Punjab Environmental Quality Standards for Drinking Water.
- Punjab Environmental Quality Standards for Motor Vehicle Exhaust and Noise.
- Punjab Environmental Quality Standards for Ambient Air.
- Topographical Maps of Punjab.
- Punjab Environmental Quality Standards for Noise.
- The Canal and Drainage Act, 1873.
- The Punjab Plantation and Maintenance of Trees Act, 394.
- The Punjab Wildlife (Protection, Preservation, Conservation and Management) Act and Rules, 394.
- Information and data provided by the project proponent.
- Technical design data related to the project.
- Information gathered through discussions with the project related persons of the project proponent.
- 29."Guidelines for Self-Monitoring and Reporting by the Industry (SMART)," Final

Report, March 1998, approved by PEPC, August 1999

- Mining & Environment by Prf. Bharat B. Dhar.
- Mining Environmental Handbook by Jerrold J.Marcus.
- https://mnm.punjab.gov.pk/important_minerals_occurring_in_punjab#14
- https://en.wikipedia.org/wiki/Marl

APPENDICES IV: TERMS OF REFERENCE FOR EIA REPORT

The agreement hereinafter called Agreement, is made between M/s Hi-Tech Environmental Services (Pvt.) Ltd. (Consultancy Firm/Consultant) and M/s Faiz Chemical Industries Pvt. Ltd.(Client) to prepare and carry out follow up of Environmental Study Report for obtaining Environmental approval under Section 12 of Punjab Environment Protection Act 1997 (Amended 2012) for proposed project of "Mining Lease For Coal over an area of 527.37Acres of Land Situated Near Basharat in District Chakwal".

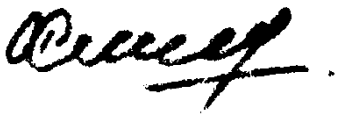
The client has requested the consultancy firm to provide consultancy service to prepare and follow up of EIA Report and so that client may obtain Environmental Approval from EPA, Punjab under the Section 12 of PEPA 1997 (As Amended 2012) so mutually agreed terms and conditions are as under:

NOW THEREFORE, the parties here to hereby agree as follow:

- The client shall provide assistance and access to the information contained in the feasibility study, layout plan and other project relevant documents as and when required by the consultancy firm/consultant for performance of his obligations.
- The client shall provide all available data, maps, reports, etc. about the project including but not limited to layout plan of the project. Client will provide Lab Test Reports from EPA certified lab including noise level monitoring, wastewater analysis and ambient air monitoring report or any report/document/information demanded by the EPA.
- The client will provide to the consultancy firm with the letter of introduction and authorization and other documents as may be needed to enable consultancy firm consultant to perform the service.
- Responsible to pay all the dues of the consultants as per the agreed terms and conditions.
- The consultancy firm/consultant shall carry out the services in accordance with the provisions of the agreement including:
- Shall follow up the EIA Report and other file required with due diligence necessary/required for obtaining its approval from EPA Punjab under the statutory requirements of PEPA 1997 (amended in 2012).
- Shall give the consultancy for the preparation of the detailed Environmental Management & Monitoring Plan for enhancing the environmental conditions during installation and operational phases such as mitigation measures for wastewater, solid waste, air emissions, plantation, management of surface runoff, mitigation of socially adverse impact, if any.
- Will evaluate all the activities during the installation and operational phases and recommend suggestions/actions to comply with PEQS.
- Will follow up the EIA Report and file documents considering information/documents provided by the client.
- Shall examine the entire activities and list of the details of activities likely to cause

adverse impacts during and after installation phase.

- Shall suggest mitigation measures for all such activities which may cause adverse impacts.



For and Behalf of	For and Behalf of
M/s Hi-Tech Environmental Services (Pvt.) Ltd. (Consultancy Firm/Consultants)	M/s Faiz Chemical Industries (Pvt) Ltd

APPENDICES-V: CONSULTANT TEAM

Hi-Tech Environmental Services (Pvt.) Ltd. is a business entity managed by geoscientists and environmental experts. The company has the expertise of highly diversified experience and has completed a total of more than 300 environmental studies across Punjab. The consultant has a range of expertise available in following areas:

w) Economic Geology
x) Determination of geological exploratory techniques and mine design
y) Preparation of feasibility reports, IEE report, EIA reports, Development Schemes & Prospecting Scheme.
z) Preparation of Environment Management Plans
aa) Preparation of reports on HRD /Mines Rescue &Recovery.
bb) Assessment of Impact of mining on environment and mitigating measures.
cc) Mine surveying & interpretation of boundary disputes.
dd) Legal opinion on mine regulatory regime.
ee) Energy fuels and selection of choice fuels for specific energy
ff) Drilling and blasting for underground and surface mining techniques.
gg) Safety measures for mines operation.

Contact Details	
Consultant Company	Hi-Tech Environmental Services (Pvt.) Ltd.
Address	26-B, Zahoor Elahi Road, Gulberg-II, Lahore
Representative	Advocate Chaudhry Awais Ahmed
Contact	(+92) 3219443210
e-Mail	consultantshtma@gmail.com | info@hitechma.com

The team carrying out the research project is presented in the Table:

Sr.	Name	Qualifications & Brief Experience	Roles Assigned
1	M. Hamza Tariq	BS Hon. Environmental Sciences	• Preparation of Environmental Management Plan (EMP) • Preparation of Environmental Monitoring Plan (EMP) • Author of EIA Report
2	Engr. Maryam Nazir	Mining Engineer and GIS Management B.Sc. Mining Engineering	• Author of EIA Report • Development of Maps

3	Ch. Awais Ahmad	LLM (London)	• Site Visits • Legal Reviews • Coordination with Locals

APPENDIX VI: ENVIRONMENTAL MAP