(EIA-REVISED)

BIO CEUTICA LABORATORIES

(PHARMACEUTICAL UNIT)

PLOT#45, PHASE II, M-3 INDUSTRIAL ESTATE FIEDMC, TEHSIL CHAK JHUMRA, DISTRCIT FAISALABAD

ENVIROSTEWARDS COMPANY (PRIVATE) LIMITED
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EXECUTIVE SUMMARY

Title of the project:	Bio Ceutica Laboratories
Description of project	The proposed pharmaceutical project is pharmaceutical laboratory.
Location of the project	Plot # 45, Phase II, M-3 industrial City, Sahianwala, Tehsil Chak Jhumra, Faisalabad
Proponent:	Mr. Muhammad Kashif

Introduction

The executive summary is an outline of the key outcomes in EIA (environment impact assessment) Report. The proponent intends to establish pharmaceutical laboratory to meet the demands of the vicinity by the title "Bioceutica Laboratories" at Plot# 45, Phase II, M-3 industrial City, Tehsil Sahianwala, Faisalabad over an area of 161101 Sq.Ft. This pharmaceutical project specific Environmental Impact Assessment (EIA) presents a detailed account of the foreseeable environmental and social impacts likely to emanate from the installation of pharmaceutical laboratory. In this pre-feasibility study, all calculations have been based on a production capacity of about 30k packs daily. The Environmental Impact Assessment (EIA) report is prepared to assess the potential impacts likely to occur from the pharmaceutical project's entire life cycle on the local environmental quality and communities.

Details of the process description are given in **Chapter 3** under heading process details.

The assessment came up with a set of impact mitigation measures for the pharmaceutical project to pursue to minimize the adverse impacts on the environment and nearby communities.

Brief Outline of the Pharmaceutical project

Name of the Pharmaceutical project:	Bio Ceutica Laboratories
Proponent:	Mr. Muhammad Kashif S/O Muhammad Iqbal
Total Area:	161101 Sq.Ft.
Raw material	• Active Pharmaceutical Ingredients (APIs) • Inactive Ingredients or Excipients
Product	Syrups, Tablets, Capsules
Purpose of the project	Pharmaceutical laboratory
Capacity of project:	30k packs daily
Cost of the project	PKR 160 million
Site Coordinates	**31.616472N, 73.173972E**
Nature of Area	Industrial Area
Ground Water	100-150ft
Manpower:	Construction: 20-25 Persons
	Operation: 100-200 Persons
Power Source	FESCO (WAPDA)
Water Availability	Tube Wells of depth> 250ft.
Period of Construction	Approx. 01 Year
Assessed Environmental issues	Solid and liquid waste will be environmental issues. So, these wastes should be disposed of as per guidelines by EPA & proposed in EIA (Environment impact Assessment) report
Solid Waste Management	Managed as per standard practices suggested by EPA
Wastewater Management	Wastewater after primary treatment will be disposed off in FIEDMC wastewater drain
Consultant Name	Enviro stewards Company (Pvt.) Limited
Compliance	Punjab Environmental Quality Standard (PEQS 2016) and time to time guidelines by EPA and other enforcement Department / Agencies.

Legal and Administrative Framework

The national guidelines and legislations relating to the environment considered for the pharmaceutical project include, National Conservation Strategy (1992), National Environment Policy (2005), Pakistan Labor Policy (2010), Punjab Environmental Protection Act (PEPA 1997), amended PEPA, (2000), National Environmental Quality Standards (NEQS), Land Acquisition

Act (1894), Cutting of Trees (Prohibition) Act (1975), Punjab Wildlife Act (1974), Punjab Plantation and Maintenance of Trees Act (1974), Antiquities Act (1975) etc.

Current national environmental policy as well as administrative and legal framework of PEPA, 2000 has been reviewed comprehensively which provides an overview of the national policies, laws, guidelines, and regulations related to the EIA (Environmental Impact Assessment) study of the proposed pharmaceutical project. Environment related documents have been reviewed including submission of environmental assessment study report to obtain environmental approval was made mandatory by the Pakistan Environmental Protection Ordinance (PEPO), 1983 and the Pakistan Environmental Protection Act (1997). Section 12(1) of the PEPA (1997) stipulates that no pharmaceutical project involving construction or any change in the physical environment can be undertaken unless an IEE or an EIA is conducted, and approval (NOC) is received from the relevant provincial environmental agency.

This EIA (Environment Impact Assessment) report has been prepared with due consideration of PEPA, 1997, Punjab Environmental Protection (Amendments) Act, 2012 and all other legal requirements of Pakistan and Punjab Government Including LAA, 1894.

Impacts and mitigation Summary.

Since that, the proposed pharmaceutical project is pharmaceutical laboratory, it is therefore likely to produce effects onto the air quality of the pharmaceutical project site unless appropriate mitigation measures are employed for balancing out the identified adverse impacts. Innumerable environmental and social impacts are expected during installation and operation, significant ones of which would be:

Impact	Mitigation Measure	
	Construction Phase	**Operation Phase**
Solid Waste Generation	• Solid waste handling facilities such as; waste bins and skips in all sections of the factory. • Ensure that solid waste generated is regularly disposed off appropriately. • Waste will be managed by as per municipal practices. • Non-biodegradable and recyclable matter, such as containers, wastes, used materials and waste packaging materials will be sold to local contractors for recycling or reuse purpose.	• Proper domestic solid waste handling and management practices will be adopted. • Packaging waste, cutting waste will be properly disposed off at solid waste handling area. • Process solid waste will be disposed off through EPA Certified Contractor. • Sludge from ETP will be handled by waste contractors and the suggested method for safe disposal.
Wastewater Generation	• No water will be disposed off into sewer lines without proper treatment. • Municipal wastewater will be handled by septic tank and disposed off into M-3 industrial city drain.	• ETP of adequate capacity will be installed before disposing off in nearby wastewater drain named M-3 Industrial city drain. • Process wastewater will be managed through ETP. • The treatment system shall bring the values of untreated effluent within the limits of treated effluent discharge also to ensure this treatment as an environmental friendly method to comply with PEQS.

Air Pollution	• Management needs to regularly carry out checks of all machinery and carry out regular servicing and maintenance of it to keep the environmental impact on account of their emissions to its minimum level. • For reducing fugitive dust, regular water sprinkling on roads has been carried out. • All vehicles transportation will be covered with tarpaulin, maintained, and optimally loaded. • Generators will be installed with proper enclosure, tuning and maintenance to control emissions.	• Air emissions will chiefly arise from machinery along with solvent vapor, odor, from floor cleaning and from the generators. • Proper ventilation plan, good housekeeping, and regular monitoring for preventive maintenance of the generators are the control measures which will check air pollution. • Air masks, helmets and safety uniforms will be provided to the workers and proper check will be made to check its compliance in the premises. • Moreover, the green zone will be developed and tree plantation activities of proponent during operational phase would ensure minimal impact of fugitive dust emissions.

Proposed Monitoring

During construction ambient air quality for dust quality in particular, vehicle and equipment exhaust, noise level, solid waste management and soil contamination and worker's safety need to be monitored on regular basis.

During operation, ambient air quality for dust level in particular, noise level, solid waste management and soil contamination, and community & workers safety need to be monitored on quarterly basis. Monitoring Plan has been included in **Chapter 05**.

Conclusions and Recommendations

The major positive impacts of the pharmaceutical project include job opportunities and new business opportunities. The pharmaceutical project will raise the people's income, enhance social infrastructure, and improve socioeconomic conditions in the area. The pharmaceutical project is expected to stimulate greatly the local economies around the pharmaceutical project area and to benefit people who have a low standard of living.

Negligible to low negative impacts can be foreseen during pharmaceutical project implementation including air quality, noise, biodiversity, and dust. Mitigation measures will be implemented to minimize environmental impacts. All the impacts can be managed cost effectively. Careful mitigation and monitoring, specific selection criteria and assessment procedures for subpharmaceutical projects have been specified to ensure that minimal impacts take place.

It is recommended that the proponent should obtain an environmental approval (No Objection Certificate) from the Punjab-EPA before proceeding further into the construction activities as per regulatory requirements.

1. INTRODUCTION

1.1. General

Pakistan, with a local market of 215 million consumers and more than 700 pharmaceutical companies is poised well to gain from opportunities provided under these shuffling global patterns of supply and demand. However, the current practice of simply importing 95 per cent of the raw material, compounding active ingredients with excipients, coating the pills, and packaging the drugs cannot continue to be the long-term goal of the sector.

A larger vision recognizes the gains from becoming leading global drug formulators of generics and branded generics, diversifying the product offering to include human vaccines, attracting foreign clients through contract manufacturing (outsourcing) facilities and/or clinical trials or Contract Research and Manufacturing Services (CRAMS), and limited drug discovery.

1.2. Consultant Details

The proponent has engaged M/s Enviro stewards Company (Pvt.) Limited to conduct the EIA Study of aforesaid pharmaceutical project in accordance with guidelines issued by EPA, Punjab. For this purpose, M/ Enviro Stewards Company (Pvt.) Limited has engaged the group of professionals which comprises of environmental specialists, environmental engineers, and chemical engineer. The details of the consultants are given below:

Sr No.	Consultant Details	
1	Consultant	Enviro Stewards Company (Pvt) Limited
2	Address	40/8 New Civil Lines Regency Road Behind State Bank of Pakistan Faisalabad.
3	Contact No.	041-2619600
Team leader		
1	Name	Miss Sara Fatima
2	Designation	Senior Environmentalist
3	Contact No.	+92-301-1198600

List of Environmental Experts

Sr. #	Name	Qualification
Team Leader		
1	Miss. Sara Fatima	M.Phil. Environmental Sciences
Environmental Scientist		
3	Mr. Zia ur Rehman Farooqi	Ph.D. Environmental Sciences (Scholar)

4	Hafiz Zeeshan Safder	M.Sc. Analytical Chemistry
5	Mr. Saffi Ahmed	M.Phil. Environmental Sciences
Environmental Engineers		
7	Miss Misbah Ali	B.Sc. Environmental Engineering
8	Engr. Muhammad Bilal	B.Sc. Environmental Engineering
Sociologist		
9	Qazi Muhammad Ahmed Raza	M.Phil Sociology

1.3. Purpose of 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 pharmaceutical project shall commence construction or operation unless he has filed with the Provincial Agency an initial environmental examination or where the pharmaceutical project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof."***

The proponent feels its social, moral, and legal obligation to protect the environment. It is in this context that the company initiated the process of gaining Environmental Approval from the EPA, Government of Punjab. Accordingly, it on its own approached EPA for guidance in this regard. According to the direction of the EPA, as detailed in the preceding para under "Introduction" this Environment Impact Assessment (EIA) is being submitted for issuance of the said Environmental Approval in compliance with the Punjab Environmental Protection Act -1997 (Amended 2012) Section 12.

The proponent affirms that environmental management order will prevail both during construction and regular operation in accordance with the Punjab Environment Quality Standards (PEQS).

The (Environment Impact Assessment) EIA report considers socio economic, physical, and environmental, land use, forestry, crops, water bodies, biodiversity (flora and fauna), heritage, and other relevant aspects associated with the pharmaceutical project itself and the area around the pharmaceutical project. The report also describes mitigation measures that will be adopted to undo

environmental impacts on any segment of the environment i.e., human health and environmental health around the pharmaceutical project site both during construction and normal operation of the pharmaceutical project. The report provides relevant information, as required under the officially approved format, to help the decision makers (EPA Punjab in the Present case) before issuing the desired environmental approval.

1.4. Identification of proponent

The details of the proponent of said pharmaceutical project are as follows,

Sr. #	Proponent Details	
1.	Proponent Name	Muhammad Kashif
2.	Designation	Proponent/CEO
3.	Address of Proponent	House# 46-p, Street#2, Mohalla Hafeez Park, Gojra, District Toba Tek Singh
4.	Contact #	03011199600

1.5. Nature and size of the pharmaceutical project

The proposed pharmaceutical project is a pharmaceutical laboratory with capacity of about upto per 30k packs daily. The pharmaceutical project will spread over an area of 161101 Sq.Ft.. As a result of the pharmaceutical project, around 50-65 persons will get jobs during the construction phase and another around 100-150 persons will be engaged during the operation phase of the pharmaceutical project.

1.6. Location

The pharmaceutical project site is located at Plot# 45, Phase II, M-3 Industiral City, FIEDMC (Faisalabad Industrial Estate Development and Management Company) Sahianwala Faisalabad. The coordinates of the pharmaceutical project area are **31.616472N, 73.173972E.**

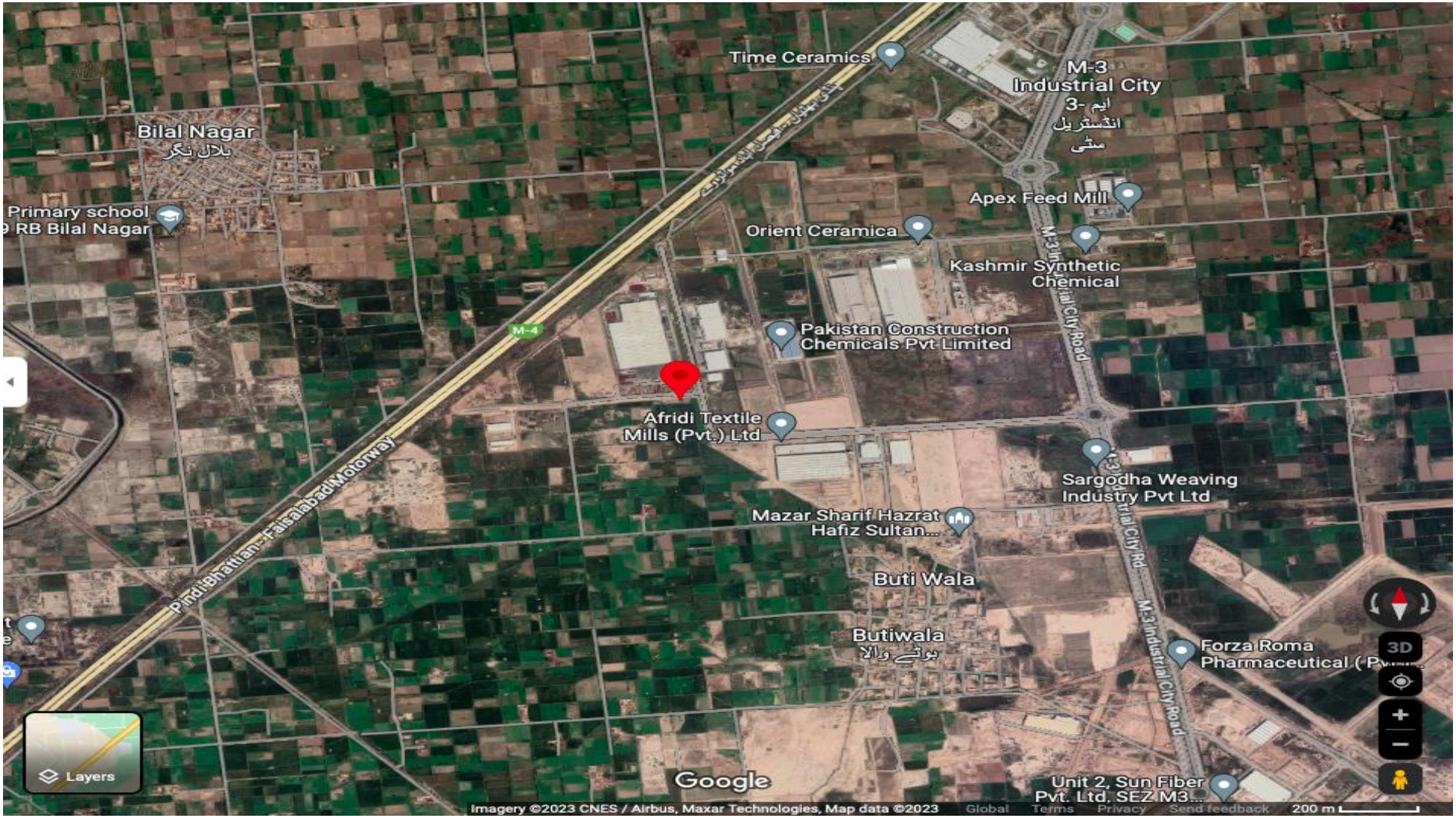

Figure 1-The Pharmaceutical project Location

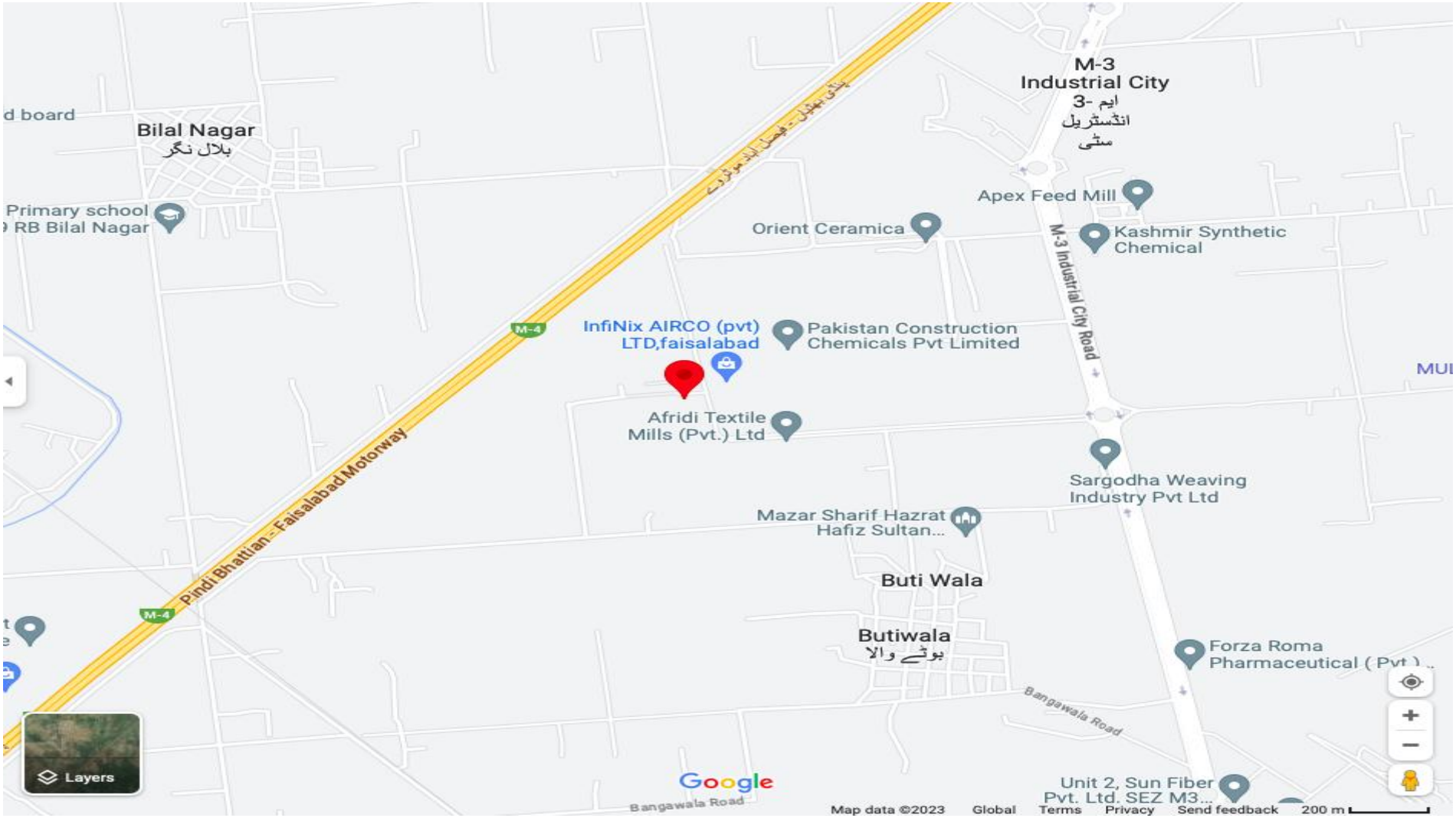

Figure 2- Location of the pharmaceutical project site

There are no places of historical importance such as ancient monuments, forts, sculpture, etc. and there are no other sensitive land uses such as archeological sites, national parks or wildlife reserves found in or around the pharmaceutical project site.

1.7. Extent of the EIA study, scope of the study, magnitude of the efforts

This Environment Impact Assessment (EIA) study has been accomplished following the requirements serial 2.3 of the "Guidelines for the preparation and review of Environmental Reports, October 1997". In compliance of PEPA, 1997(amended 2012) requirements, an EIA report has been prepared by the team of environmental experts. This document covers all environmental impacts, due to the proposed pharmaceutical project, in and around the pharmaceutical project area comprising the physical, ecological, and socio-economic aspects together with identification of the potential positive and negative impacts. Any developmental activities outside the pharmaceutical project area like rehabilitation of the road and establishment of the other factories outside the pharmaceutical project vicinity have not been covered under this EIA (Environment Impact Assessment) study.

The EIA (Environment Impact Assessment) report covers the examination of the physical, biological, and environmental socioeconomic impact of the following:

- Construction activities including the leveling and marking of land division.
- Relevant off-site construction activities like construction of access road.

2. POLICY, LEGISLATION, LEGAL & ADMINISTRATIVE FRAMEWORK

2.1. General

This section deals with the current policy as well as legal and administrative framework related to carrying out Environmental Impact Assessment (EIA) of various pharmaceutical projects. Several laws exist in Pakistan, containing several clauses concerning protection of the environment. Like other Pharmaceutical projects, this pharmaceutical project is also required to go through an Environmental Assessment for getting a NOC under Section 12 of the Punjab Environmental Protection Act – 1997 (Amended 2012).

According to environmental laws of the country development pharmaceutical projects must undergo the process of Environmental Impact Assessment (EIA) or Initial Environmental Examination (IEE) to predict and mitigate the impacts of the development at an early stage. Based on nature, size, cost and associated impacts, the pharmaceutical project under consideration has been categorized for EIA study according to the regulation 3 of Statutory Notification issued on June 13, 2000 (S.R.O.339 (1) /2001).

2.2. Screening

The pharmaceutical project is the establishment of pharmaceutical productionmanufacturing and falls under ***Schedule II*** (list of pharmaceutical projects requiring an EIA), ***Category B (Manufacturing and processing) and sub sector 2*** (*Chemical Manufacturing Units including Pharmaceutical and cosmetics*) of the IEE / EIA Regulations 2022 made under section 12 of Punjab Environment Protection Act 1997 (Amended 2012). The Director General, EPA Punjab is the authority to issue the requisite Environmental Approval after proper review of the pharmaceutical project.

2.3. Existing Regulation and Framework

This EIA study has been carried out in the light of the policy guidelines for the preparation of IEE/EIA Reports under the procedure and practices formulated by the Provincial Environmental Protection Agency (EPA).

2.4. Relevant Legal / Institutional Framework

The applicable laws for the environmental study of the pharmaceutical project are briefly given below. The proponent of the pharmaceutical project will abide by the applicable laws and regulations.

2.4.1. National Conservation Strategy, 1992

On March 1, 1992, the Cabinet of Pakistan approved the National Conservation Strategy. It describes the stark reality of the country's deteriorating resource base and its implications for what is still largely a natural resource-based economy. It sets forth the beginnings of a plan to integrate environmental concerns into virtually every aspect of Pakistani economic life. The strategy has three overriding objectives: conservation of natural resources, sustainable development, and improved efficiency in the use and management of resources.

2.4.2. PEPO, 1983 and PEPA 1997 (Amended 2012)

In 1983, the Government of Pakistan issued an Environmental Protection Ordinance (EPO), which was replaced by the Pakistan Environmental Protection Act (PEPA) 1997, through an Act of Parliament. Now the PEPA 1997 has been replaced by Punjab Environmental Protection Act 1997 (Amended 2012) on 18th April 2012.

Under Sec. 8 of Environment Protection Ordinance (EPO) 1983, it was necessary to carry out EIA/IEE for all development pharmaceutical projects, but there were no EIA/IEE regulations under that ordinance.

Under section 12 of the Punjab Environmental Protection Act, 1997 (Amended 2012) it is mandatory to take an Environmental Approval Environmental Protection Agency for commencement of any construction of pharmaceutical project.

2.4.3. National Environmental Policy 2005

The Government of Pakistan (GOP) has notified National Environmental Policy 2005, for different pharmaceutical projects/aspects in which guidelines/priorities have been given to undertake the pharmaceutical projects having significant environmental impacts.

2.4.4. Review of EIA and IEE Regulations, 2000

The GOP has issued Review of Initial Environmental Examination and Environmental Impact Assessment Regulations 2000, to review the Initial Environmental Examination (IEE) / Environmental Impact Assessment (EIA) Reports.

2.4.5. Guidelines for the Preparation and Review of Environmental Reports, 1997

The GOP has also framed guidelines for the preparation and review of IEE/EIA of pharmaceutical projects in various developmental sectors.

2.4.6. National Environmental Quality Standards (NEQS)

According to Punjab Environmental Protection Act, 1997 (Amended 2012), National Environmental Quality Standards (NEQS) were established for municipal and industrial effluents and air emissions.

2.4.7. Guidelines for Sensitive and Critical Areas

GOP has issued Guidelines for Sensitive and Critical Areas in October 1997. The objective of the guideline is to provide guidance to pharmaceutical project proponents and other stakeholders in the environmental assessment process, so that the pharmaceutical projects are planned and sited in a way that protects the values of sensitive and critical areas.

2.4.8. Policy and procedures for the Filing, Review and Approval of Environmental Assessments, November-1997

Environmental Assessment is the Primary means of managing the approval of new development proposals in Pakistan. Environmental Assessment allows for the systematic examination of proposals, clear procedures which provide for the interests of relevant Government Departments and other stakeholders to carefully consider.

2.4.9. Guidelines for Public Consultation, Pakistan Environmental Protection Agency October 1997

This guideline is part of a package of regulations and guidelines which include:

- Punjab Environmental Protection Act, 1997 (Amended 2012)
- Policy and Procedures for filing, review and approval of environmental assessments
- Guidelines for the preparation and review of Environmental Reports
- Guidelines for sensitive and critical areas

- National Environmental Quality Standards (NEQS)
- Detailed sectoral guidelines

2.4.10. Punjab Wildlife Protection Act, 1974

This act was framed in 1974 by the province Punjab and is about of protection and conservation of Wildlife.

2.4.11. Forest Act, 1927

This act was framed in 1927. The Forest Act, 1927 is still the basic charter for the forest departments in Pakistan. This law empowers provincial governments to manage forest areas.

2.4.12. Explosive Act, 1884

This act deals with explosives in prohibiting either absolutely or subject to conditions, the manufacture, possession, or importation of any explosive which is so dangerous in character that, in the opinion of the appropriate Government, it is expedient for public safety to issue the notification.

2.4.13. Punjab Local Government Ordinance, 2001

Schedules 4 and 8 of this Ordinance pertain to environmental pollution. Under the Ordinance, the local councils are authorized to restrict pharmaceutical projects causing pollution to air, water, or land. They may also initiate schemes for improving the environment.

2.4.14. Pakistan Penal Code, 1860

This defines the penalties for violations concerning pollution of air, water bodies and land. Sections 268 to 291 are about offences affecting public health. The offences relating to public health safety and environment are as under.

Sec 268: Public Nuisance

Sec 269: Negligent act likely to spread infection of disease dangerous to life:

Sec 270: Malignant act likely to spread infection of disease dangerous to life:

Sec 278: Making atmosphere noxious to health:

Sec 284: Negligent conduct with respect to poisonous substance:

Sec. 290: Punishment for public nuisance in cases not otherwise provided for:

Sec. 291: Continuance of nuisance after injunction to discontinue.

2.4.15. Punjab Land Use Rules 2009

In January 2009 the Punjab Government notified **"**Punjab Land Use Rules 2009" for the clarification of Lahore Master Plan. In these rules permissible land use according to area type is defined.

2.4.16. Antiquities Act 1975

The law relates to protection of Antiquities, monuments, National &International heritage. The compliance of this Act is mandatory for the Installation of Generators. Under section 22 of the Act no development plan or scheme or new construction can be done within distance of 200ft from the boundary of the monuments/ National Heritage. There is no historical Site or monuments in the proximity of the pharmaceutical project.

2.4.17. Solid Waste Management Rules 2005

The Solid Waste Management Department, CDGF has notified these rules for proper waste management.

2.4.18. Labor Laws

The labor laws apply on child labor and measuring instruments.

2.4.19. Safety & Civil Defense Laws

The civil defense laws provide details about safety, fire protection and civil defense.

2.4.20. Guidelines for Critical and Sensitive Area

These guidelines have been prepared under section 12 of Punjab Environmental Protection Act 1997 (Amended 2012) for protection and safety of critical and sensitive localities.

3. PROJECT DESCRIPTION

3.1. Type and category of the project

The capital cost of the pharmaceutical project is PKR 160 million. The pharmaceutical project will spread over an area of 161101 Sq.Ft.. The proposed pharmaceutical project is pharmaceutical laboratory with capacity of 30k packs daily. As a result of the pharmaceutical project, around 10-15 persons will get jobs during the construction phase and another around 60-65 persons will be engaged during the production phase of the pharmaceutical project.

The pharmaceutical project is the establishment of pharmaceutical formulation unit and falls under ***Schedule II*** (list of pharmaceutical projects requiring an EIA), ***Category B (Manufacturing and processing) and sub sector 2*** (*Chemical Manufacturing Units including Pharmaceutical and cosmetics*) of the IEE / EIA Regulations 2022 made under section 12 of Punjab Environment Protection Act 1997 (Amended 2012). The Director General, EPA Punjab is the authority to issue the requisite Environmental Approval after proper review of the pharmaceutical project.

3.2. Objectives of the project

The objective of aforesaid pharmaceutical project i.e., establishment of pharmaceutical laboratory is to go for forward integration and manufacture high quality medicines with good market potential. The pharmaceutical project will encompass modern state-of-the-art facility with the objective of producing superior quality products. The pharmaceutical project will have following advantages:

The pharmaceutical project will provide additional income and gainful employment to local people.

- Pharmaceutical companies aim to expand their market presence and achieve sustainable growth. This objective includes identifying and entering new markets, both domestically and internationally, to reach a wider customer base and increase revenue.
- The objective is to create comprehensive marketing strategies, building strong sales teams, conducting targeted advertising campaigns, and establishing relationships with key opinion leaders and healthcare providers.
- The said pharmaceutical project is itself value addition pharmaceutical project.
- Socio-economic up-lift of the proponent

Creation of new job opportunities and promoting income prospects for those engaged in the allied activities associated with operation of pharmaceutical project is considered as indirect objectives of the pharmaceutical project.

3.3. Location and Layout

The site under consideration for the establishment of "pharmaceutical laboratory" by M/s Bio Ceutica Laboratoris is located at Plot # 45, Phase II, M-3 industrial City, FIEDMC, Sahianwala, Faisalabad. The coordinates of site are **31.616472N, 73.173972E.** The location of aforesaid pharmaceutical project is given below, and the layout of aforesaid pharmaceutical project is attached within file

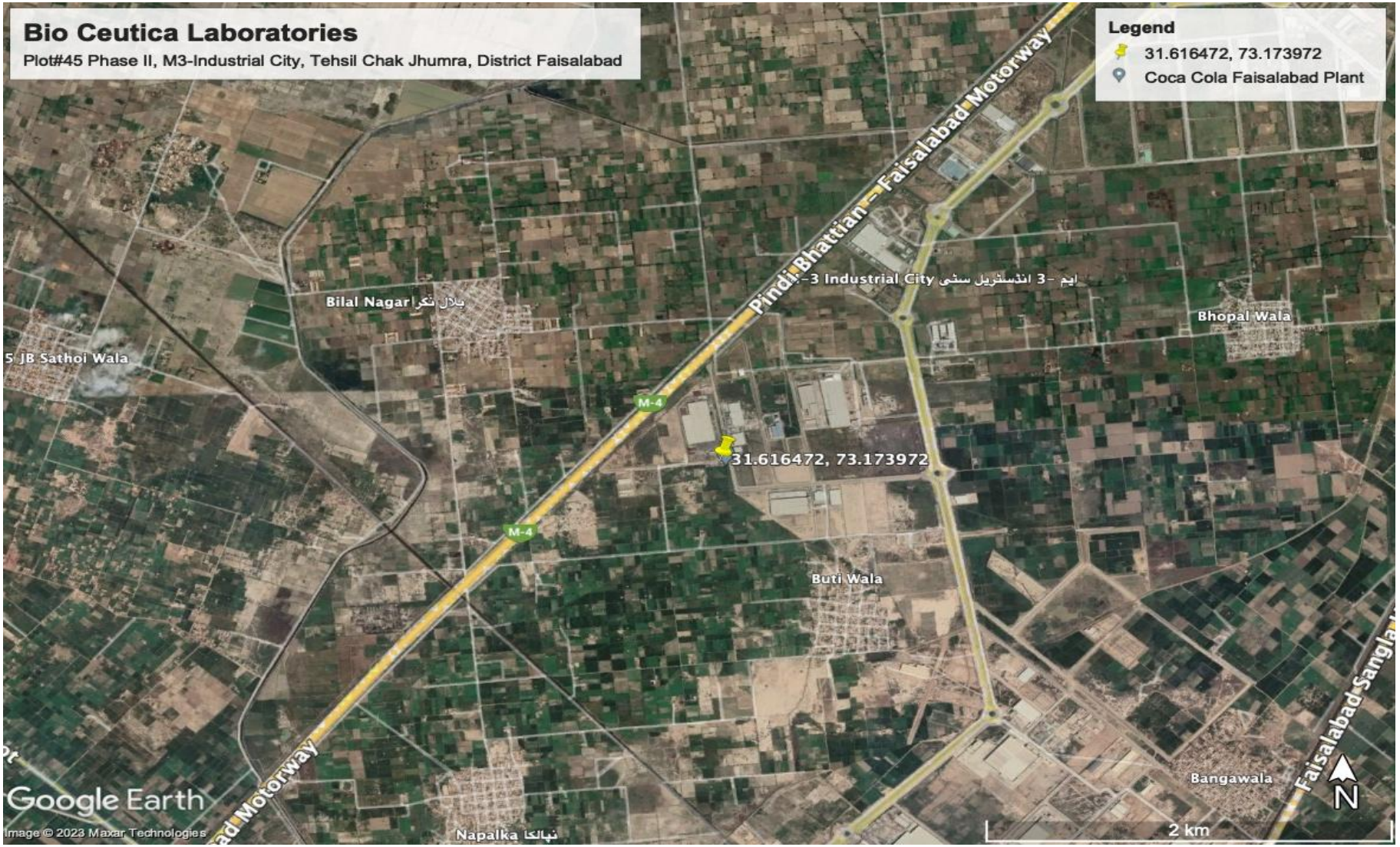

Figure 3-Google Map

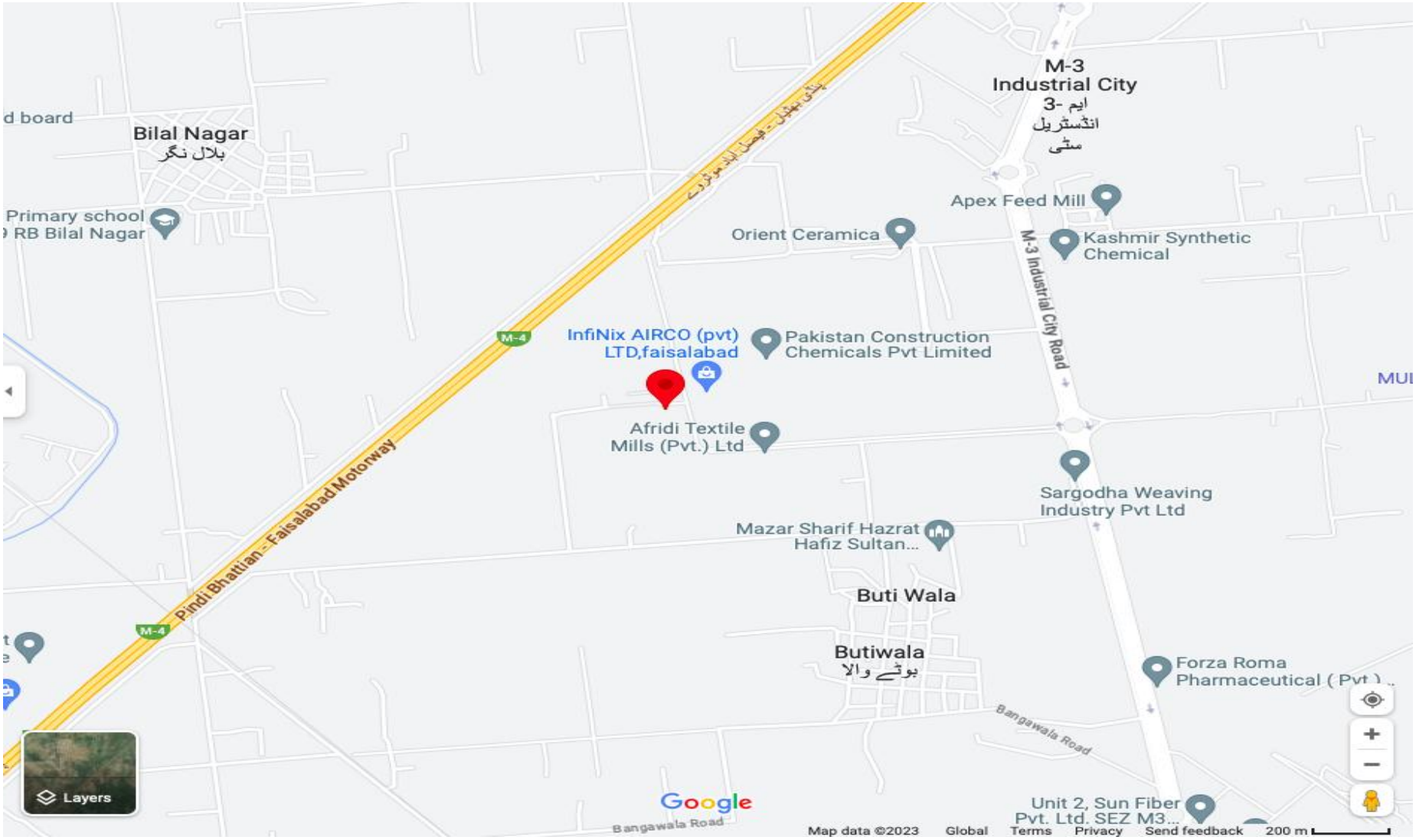

Figure 4-Industries nearby Pharmaceutical project Site

3.4. Land use of the site

Land selected for the pharmaceutical project is industrial in nature. Land use will change from open to industrial.

3.5. Magnitude & Cost of the pharmaceutical project

The estimated initial capital cost of aforesaid pharmaceutical project is approximately 160 million**.** Purchase of raw material, operation and maintenance of production machinery are the costly activities involved in the operation phase of said pharmaceutical project. Equipment safety will be assured if these operations are carefully managed. No separate fund allocation is required.

Amenities	Cost in PKR
Land cost	90 million
Infrastructure development, machinery	50 million
Solid waste management:	10 million
Landscaping & tree plantations	10 million
Total Cost	**160 million**

However, budget will be allocated for purchase and maintenance of standardized PPEs for workers and for waste management and environmental enhancement. Despite these costs, this pharmaceutical project was found to be financially feasible in the feasibility report. Magnitude of operations includes:

- Installation of machinery
- Installation of firefighting equipment
- Marking of emergency exits and assembly points.
- Tree plantation and landscape

The allocated environmental budget is **PKR 20 million approx.** as mentioned in pharmaceutical project cost breakup. The environmental budget will be spent on landscape/green zone management, solid waste management. The proponent will plant indigenous and ornamental plants to increase the aesthetic value of the area. Thus, the

pharmaceutical project is also a source of employment for locals and would help in economic development activities of the area.

Environmental Budget

Environmental Component	Quantity	Amount Pak Rs.	Details/Basis
Tree Plantation/Green Belt Development	5k-10k	10 million	Cost includes plantation and maintenance up to three years
Wastewater treatment (WWT)	1	10 million	Cost includes maintenance up to three years
Solid waste management	L.S	10 million	Cost includes maintenance up to three years
Health & Safety Measures PPEs	L.S	0.5 million	Lump sum
Miscellaneous Cost	L.S	12,000	Lump sum
Air Quality Monitoring	2	15,000	2 samples @ 7500/sample
Water Quality Monitoring	2	10,000	2 samples @ 6000/sample
Noise Level Monitoring	2	10,000	2 samples @ 5000/sample
Soil Tests	2	10,000	2 samples @ 5000/sample
Training		10,000	Lump sum
External Monitoring		50,000	
Total Environmental and Social Management Cost		**30.5 million approximately**	

3.6. Vegetative Features of Land

Bushes and wild grasses are present in the nearby surroundings of pharmaceutical project area. During operation phase, green belts will be developed, and it will serve as a useful buffer to contain the menace of pollution from different sources. As a control measure of atmospheric pollution, as a barriers noise generated within the premises it is recommended to develop green belt.

3.7. Plantation Plan

Approximately 5K-10K plants will be planted in and around the pharmaceutical project vicinity to enhance the landscape beauty and to make the ambient air quality better. These plants will include ornamental plants as well. But most trees will be shade providing. The funds allocated to the plantation is about PKR 1 million and is included in the environmental budget.

3.8. Proposed schedule for implementation (Tentative)

Proposed pharmaceutical project will be completing in period of year schedule (tentative) is described here under.

Stage I: The clearing of land, preparation of land for construction activity.

Stage II: During this phase machinery will be brought to the site and installed.

Stage III: In this phase all the outstanding activities will be completed, construction activities will be initiated.

Stage IV: after completing construction, employees will be hired, and staff will be assigned their respective work. The operation activities will be initiated.

Activities	Times Frame									
	Four Week		Four Week			Four Week		Four Week		Four Week	
Preliminary Phase (Land Acquiring etc)											

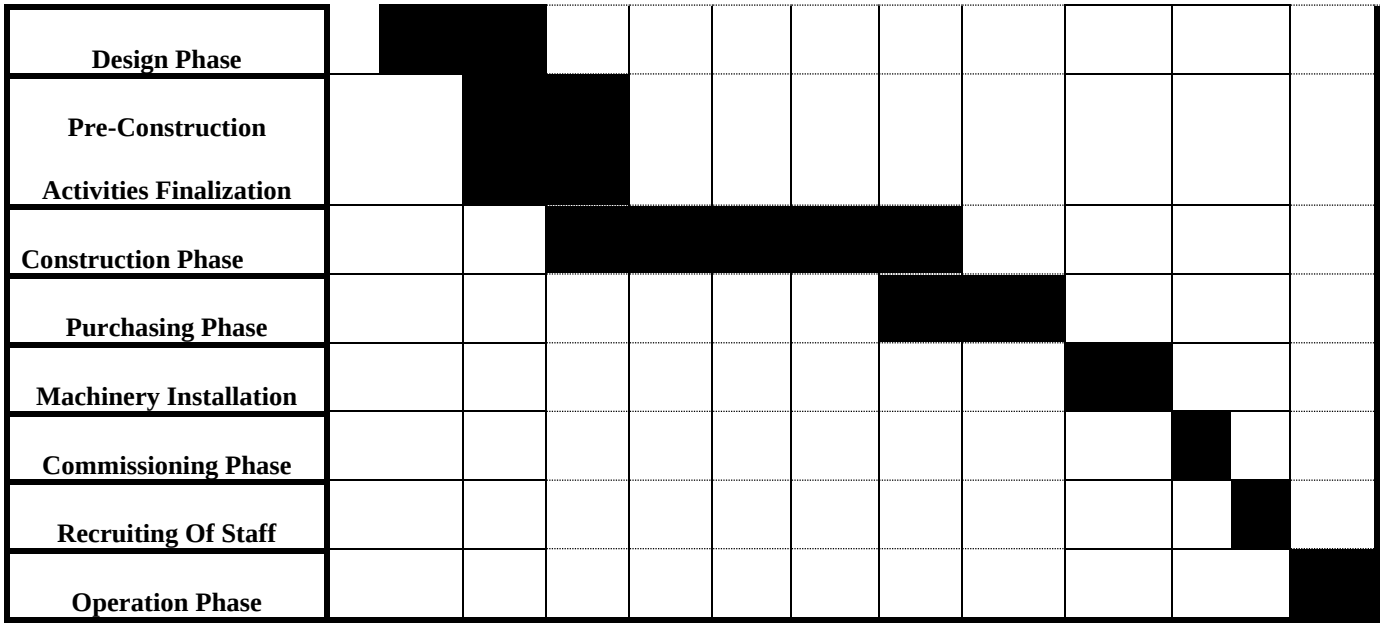

Figure 5-Schedule of Implementation

3.9. Road Access

The road that will be used for the transportation is known as Chak Jhumra Road, and Canal Expressway". Following is the Road access map of proposed pharmaceutical project site:

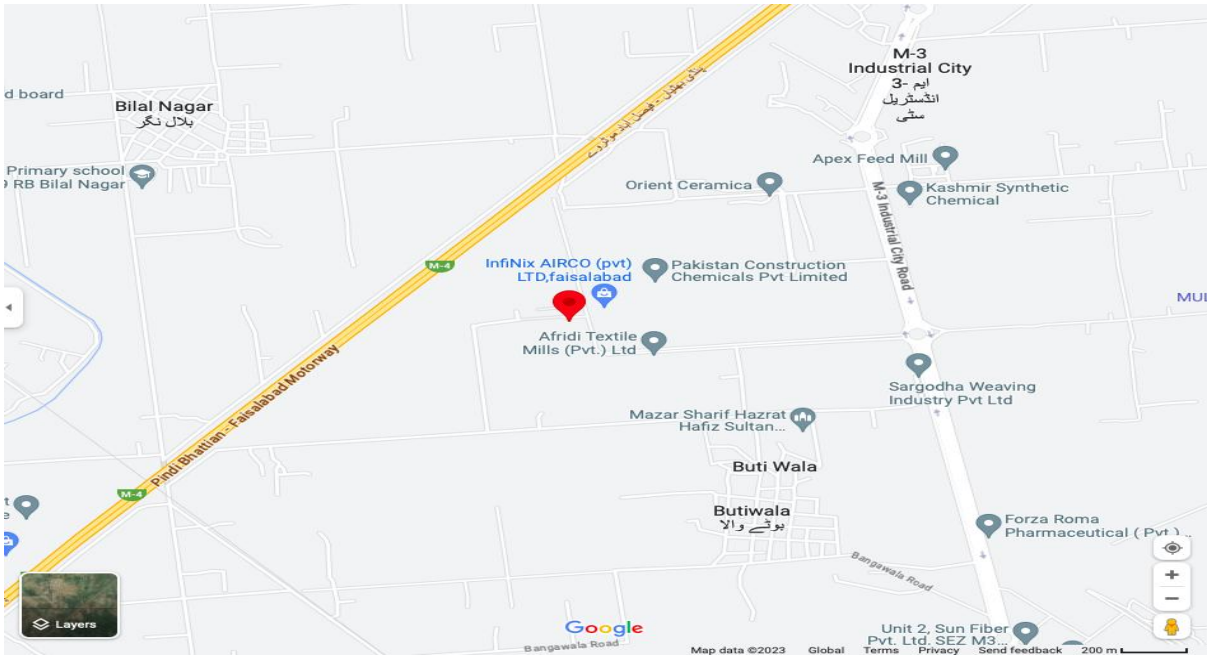

Figure 6 Road Access Map

3.10. Description of the pharmaceutical project

The proponent has planned to establish a pharmaceutical laboratory to fulfill the need of market. The production capacity of said pharmaceutical facility will be 30k packs daily. The formulation of pharmaceutical products involves a complete mechanism mentioned in this EIA (Environment Impact Assessment) Report.

The process of pharmaceutical formulation consists of following steps:

1. **Raw Material Procurement and Storage:**
   - Establish a system for raw material selection and evaluation.
   - Identify approved suppliers and establish procurement agreements.
   - Develop a controlled storage area for raw materials, including appropriate labeling and segregation.
2. **Formulation Development and Validation:**
   - Conduct formulation development studies to optimize product composition.
   - Validate formulation processes through a series of experiments.
   - Perform stability studies to determine product shelf life and storage conditions.
3. **Production and Packaging:**
   - Establish batch production records and ensure proper documentation.
   - Adhere to good manufacturing practices (GMP) during production.
   - Implement packaging processes that maintain product integrity and comply with regulatory requirements.
4. **Quality Assurance Systems:**
   - Develop and implement standard operating procedures (SOPs) for each operation.
   - Establish a robust quality management system (QMS) and documentation practices.
   - Implement quality control measures, including in-process testing and final product analysis.
   - Set up a dedicated quality assurance (QA) department and hire qualified personnel.

Process Description of Tablet Manufacturing

I. Arrival of Raw Material

A **standardized** herbal **extract** is an herb **extract** that has one or more components present in a specific, guaranteed amount, usually expressed as a percentage. The intention behind the **standardization** of herbs is to guarantee that the consumer is getting a product in which the chemistry is consistent from batch to batch.

II. Dispensing

These standardized extracts will be checked in the quality lab, where these products are processed into various quantities of the products. Products will have different doses of the standardized extracts.

The SOPs for the dispensing are following. The procedure is as follows,

The material to be dispensed as per manual calculation and system generated SAP pre dispensing sheet, duly signed, and checked by Q.A production person and store person. The full batch once dispensed in dispensing area is transferred to the day store to warehouse. The dispensed material container will be labeled as per Batch size, Batch weight, Mfg Date, Sign & Date.

After dispensing there will be two processes for tablet manufacturing.

- Direct Mixing
- Wet granulation

a. Direct Mixing

I. Sieving

A **sieve analysis** (or **gradation test**) is a practice or procedure used in chemical engineering to assess the particle size distribution (also called *gradation*) of a granular material by allowing the material to pass through a series of sieves of progressively smaller mesh size and weighing the amount of material that is stopped by each sieve as a fraction of the whole mass.

The size distribution is often of critical importance to the way the material performs in use. A sieve analysis can be performed on any type of non-organic or organic granular materials including sands, crushed rock, clays, granite, feldspars, coal, soil, a wide range of manufactured powders, grain and seeds, down to a minimum size depending on the exact method. Being such a simple technique of particle sizing, it is probably the most common.

II. Mixing

In industrial process engineering, mixing is a unit operation that involves manipulation of a heterogeneous physical system with the intent to make it more homogeneous. Familiar examples include pumping of the water in a swimming pool to homogenize the water temperature, and the stirring of pancake batter to eliminate lumps (deagglomeration).

III. Filling and Sealing

Fillers (or filling machines) are used for packaging, mainly for final product into the packaging. These are used to fill either a bottle or sachet, depending on the product. Sealers are used to seal the product in to the packaging.

IV. Packing

The final products of sachet will be packaged into cartons of bulk. It's mostly done mechanically or manually.

V. Transfer to Finished Goods Store

Using loaders, the cartons will be transferred to the store for storage.

b. Wet granulation

Wet granulation involves the massing of a mix of dry primary powder particles using a granulating fluid (the process of adding a liquid solution to powders). The fluid contains a solvent which must be volatile so that it can be removed by drying and be non-toxic. Typical liquids include water, ethanol, and isopropanol, either alone or in combination. The granulation liquid may be used alone or, more usually, as a solvent containing a dissolved adhesive (also referred to as a binder or binding agent) which is used to ensure particle adhesion once the granule is dry. The density of each granule is increased by increasing the amount of binding solution as well as the mechanical action of the mixer. Therefore, controlling the amounts of solution, binder, and mechanical action allows one to control the strength and density of the granule.

I. Binders

In wet-granulation process, binders promote size enlargement to produce granules and thus improve flowability of the blend during the manufacturing process.

Natural Polymers: Starch, Pregelatinized Starch

Synthetic polymers: PVP, Methyl cellulose, HPMC

New Natural and Synthetic binders: Khaya gum, Leucaena leucocephala seed gum, Anacardium occidentale gum. Gellan gum, Combination of detarium gum and veegum.

II. Drying

The granulated mixer will be dried after binding properly. This drying process is done by Tray Drying Ovens (several hours). Older technology (like baker's ovens) with a lot of manual manipulation -liquid can only be lost from the upper surface of the granule packed in the tray.

III. Sizing

Wet Milling - directly after the mixer granulator and before the dryer Dry Milling - directly after the dryer

The mills used are to break down lumps or agglomerates by screening and not for high This helps to give a more uniform granule size A typical mill for wet or dry milling would be a Comil. The impeller blade is not in contact with the screen but it "pushes" the granule through when it rotates.

IV. Granule Lubrication

After drying and before compression a lubricant is added, and the granule is blended for a short time (the lubrication blend). The lubricant forms low strength bonds on the surface for the granules which helps flow and prevents the granules sticking to the compression punches, -It also helps prevent the tablet sticking in the die and assists in tablet ejection. The most common lubricant is Magnesium stearate.

V. Filling and Sealing

Fillers (or filling machines) are used for packaging, mainly for final product into the packaging. These are used to fill either a bottle or sachet, depending on the product. Sealers are used to seal the product in to the packaging.

VI. Packing

The final products of sachet will be packaged into cartons of bulk. It’s mostly done mechanically or manually.

VII. Transfer to Finished Goods Store

Using loaders, the cartons will be transferred to the store for storage.

Process Description of Capsule

I. Arrival of Raw Material

A **standardized** herbal **extract** is an herb **extract** that has one or more components present in a specific, guaranteed amount, usually expressed as a percentage. The intention behind the **standardization** of herbs is to guarantee that the consumer is getting a product in which the chemistry is consistent from batch to batch.

Raw material including extracts from various products will be stored in the warehouse. These will be imported from various countries. These include various extracts like vitamins, multivitamins, and minerals. The ultimate raw material from this is garlic, ginger, Glycyrrhiza.

II. Dispensing

These standardized extracts will be checked in the quality lab, where these products are processed into various quantities of the products. Products will have different doses of the standardized extracts.

The SOPs for the dispensing are following. The procedure is as follows,

The material to be dispensed as per manual calculation and system generated SAP pre dispensing sheet, duly signed and checked by Q.A production person and store person. The full batch once dispensed in dispensing area is transferred to the day store to warehouse. The dispensed material container will be labeled as per Batch size, Batch weight, Mfg Date, Sign & Date.

III. Sieving

A **sieve analysis** (or **gradation test**) is a practice or procedure used in civil engineering and chemical engineering to assess the particle size distribution (also called *gradation*) of a granular material by allowing the material to pass through a series of sieves of progressively smaller mesh size and weighing the amount of material that is stopped by each sieve as a fraction of the whole mass.

The size distribution is often of critical importance to the way the material performs in use. A sieve analysis can be performed on any type of non-organic or organic granular materials including sands, crushed rock, clays, granite, feldspars, coal, soil, a wide range of manufactured powders, grain and seeds, down to a minimum size depending on the exact method. Being such a simple technique of particle sizing, it is probably the most common.

IV. Mixing

In industrial process engineering, mixing is a unit operation that involves manipulation of a heterogeneous physical system with the intent to make it more homogeneous. Familiar examples include pumping of the water in a swimming pool to homogenize the water temperature, and the stirring of pancake batter to eliminate lumps (deagglomeration).

V. Filling and Sealing

Fillers (or filling machines) are used for packaging, mainly for final product into the packaging. These are used to fill either a bottle or sachet, depending on the product. Sealers are used to seal the product in to the packaging.

VI. Packing

The final products of sachet will be packaged into cartons of bulk. It's mostly done mechanically or manually.

VII. Transfer to Finished Goods Store

Using loaders, the cartons will be transferred to the store for storage.

Process Description of Syrup manufacturing

I. Dispensing

These standardized extracts will be checked in the quality lab, where these products are processed into various quantities of the products. Products will have different doses of the standardized extracts.

The SOPs for the dispensing are following. The procedure is as follows,

The material to be dispensed as per manual calculation and system generated SAP pre dispensing sheet, duly signed and checked by Q.A production person and store person. The full batch once dispensed in dispensing area is transferred to the day store to warehouse. The dispensed material container will be labeled as per Batch size, Batch weight, Mfg Date, Sign & Date.

II. Filtration

Filtration is the **process** in which solid particles in a liquid or gaseous fluid are removed using a filter medium that permits the fluid to pass through but retains the solid particles. ... In

some **processes** used in the production of chemicals, both the fluid **filtrate** and the solid filter cake are recovered.

III. Bulk Syrup Preparation

Syrup will be manufactured in bulk. After filtration bulk syrup material will be allowed to cool. The material from tanks will be transferred to the processing machine, where it will be filtered again for the solid particles.

I. Filling of syrup and Sealing of Bottles

The final product of syrup will be filled in syrup bottles mechanically. The bottles will be sealed later for final storage I store room.

List of Machinery

Following machines will be used for the pharmaceutical laboratory.

Table 1-List of Machinery

WAREHOUSE

Sr. #	Name of Machinery & Equipment	Specification	Qty.
1.	Digital Weighing Balance	Weigh up to 250 kg	04
2.	Digital Weighing Balance	Weigh up to 500g	02
3.	Dispensing booth	-	02
4.	Sampling booth	-	01

DRY/POWDER SECTION

Sr. #	Name of Machinery & Equipment	Specification	Qty.
1.	Filling Machine with Accessories	Automatic	02
2.	Cone Mixer	100 kg	01
3.	De-humidifier	5 L/hr	04
4.	Dry granulator	-	01
5.	Tray dryer	100 kg	01

LIQUID SECTION

Sr. #	Name of Machinery & Equipment	Specification	Qty.
1.	SS Double Jacket Tank with mixer	500Liter	01
2.	SS Formulation Tank with silver san	1000 Liter	01
3.	SS Formulation Tank with silver san	500 Liter	02
4.	SS Formulation Tank	100 Liter	04
5.	SS Storage Tank with mixer	1000 Liter	01
6.	SS Filling tank	500 Liter	01
7.	SS Filtration Assembly	-	01
8.	SS Syrup Filling Line	Automatic 6- Nozzle	01
9.	SS Doze Filling	2- Nozzle	02
10.	Labeling Machine	Semi-automatic	02
11.	Colloidal Mill	25 Liter	01
12.	Transfer Pump	-	10
13.	Reverse Osmosis & Deionizer Plant	2500 Liter/hr	01

HVAC SYSTEM

Sr. #	Name of Machinery & Equipment	Specification	Qty.
1.	HVAC	-	25

QUALITY CONTROL LABORATORY

Sr. #	Name of Machinery & Equipment	Specification	Qty.
1.	Hot Plate Magnetic Stirrer	-	01
2.	Melting Point Apparatus Digital	-	01
3.	Drying Oven	50 Liter	01
4.	Water Distiller	5 Liter	01
5.	Stability Chamber	-	01

6.	Conductivity meter + TDS meter	-	01
7.	Ultrasonic Bath	5 Liters	01
8.	Water Bath	6 Wholes	01
9.	Dissolution Apparatus	6 Vessels	01
10.	Disintegrator	2 stations	01
11.	Friabilator	Single Drum	01
12.	Hardness Tester	Semi-Auto	01
13.	Vacuum Desiccators	-	01
14.	Polarimeter	-	01
15.	Heating Mantle	1Lit Flask	01
16.	Centrifuge	6 wholes	01
17.	Digital Balance	-	03
18.	Analytical Balance	-	03
19.	Muffle Furnace	Temp. 1100^{o}C	01
20.	Viscometer	-	01
21.	Moisture Analyzer	-	01
22.	pH Balance Bench Top	-	01
23.	Vacuum Pump	-	01
24.	Micrometer	-	01
25.	Vernier Calliper	-	01
26.	Sonicator	2.5 Liter	01
27.	Thin layer Chromatography	-	01
28.	UV Spectrophotometer	Split Double Beam	02
29.	High Pressure Liquid Chromatography (HPLC)	Gradient	02
30.	Gas chromatography	-	01

31.	Atomic absorption	-	01

LAB

Sr. #	Name of Machinery & Equipment	Specification	Qty.
1.	Hot Incubator	-	01
2.	Cool Incubator	-	01
3.	Colony Counter	Digital	01
4.	Autoclave	-	01
5.	Vortex Shaker	-	01
6.	Laminar Air Flow Hood	-	01
7.	Manometer	-	01

Supplies

Following supplies will be required/utilized to produce the 30k packs of pharmaceutical products daily.

Water Supply

The source of water for the proposed site is ground water at the depth of 150-200 ft.

Electricity

FESCO (WAPDA) will be the main source of the power.

Manpower

There will be approximately 100-200 workers during construction phase and 150-200 workers on the unit during operational phase.

Personnel Protective Equipment

Following Personnel Protective equipment will be provided to the workers for their safety:

- Protective Gaggles
- Protective leather/rubber shoes
- Gloves-leather, canvas, rubber, and plastic
- Gas masks
- Protective shields
- Helmets
- Overcoats

Management Plans

For the management of the wastewater and air emissions following measures will be adopted:

Wastewater

This generated wastewater will be treated through ETP of adequate capacity before disposal.

Air Emissions

The only source of air emissions is VOCS, NOX, SOX. Wet scrubber will be installed to control emissions.

No air emission is likely to be released during operation of aforesaid pharmaceutical project; except the dust or particulate matter to be produced during floor cleaning and other such operations, which also will not be posing any environmental threat (will not breach the safe standards). Wet suppression will be done to control dust emissions. Generator will be kept in proper enclosure.

Noise

All the machinery will be installed and operated in a closed hall and from operation of machinery; generator noise will not be a problem as the residential area is at adequate distance. Further, administration of unit it will take the precautionary measures to avoid the noise emissions. There is no possibility of noise pollution from aforesaid activity. Installation activities will however add great to the noise, but that noise will be temporary and will be mitigated by measures as stated in Chapter-08.

Further trees to be planted within the facility which will act as noise absorbers and workers will used as PPEs whenever and wherever might be necessary.

Solid Waste

Waste generated during construction included mostly construction material (mainly steel and wood), empty cement bags, excavated earth, and general packaging waste. Waste will be stored within the facility until transfer to the ultimate waste disposal site. Estimated solid waste generated during operational phase comprise of dust and sticks, empty packages, and domestic solid waste. The quantity of solid waste will be generated at the rate of **60-70 kg/day**. Most of process waste will be recyclable while domestic waste will be handled as per practices of area.

3.11. Details of restoration and rehabilitation at the end of the pharmaceutical project life

The estimated life of the pharmaceutical project is about 25 years approximately. Much before the pharmaceutical project approaches the end of its first life cycle it will be completely renovated; refurbished and even new/latest art of the equipment will replace the older one. All civil structures and related infrastructures will be extensively renovated.

All activities will be carried out in accordance with prevailing environmental management laws and controls to avoid any damage to any segment of environment or human health around the pharmaceutical project site. Rehabilitation would not be required as such at current pharmaceutical project site, however, restoration plans to be practiced during different phases of the pharmaceutical project at various levels are illustrated hereunder:

3.12. Government approvals and leases:

As the approval from Environmental Protection Agency (EPA), Government of Punjab, and Lahore is mandatory before the start of construction of the pharmaceutical project in compliance with Section-12 of the Punjab Environmental Protection (Amendment) Act 2012, therefore, this EIA report has been prepared to submit in EPA Punjab

4. ALTERNATIVES CONSIDERED

Alternatives are recommended and examined to determine the best method of achieving pharmaceutical project objectives, while minimizing environmental impacts (WB December 1996). The discussion and analysis of alternatives in an Environmental Impact Assessment (EIA) study should consider other practicable strategies that will promote the elimination of negative environmental impacts identified.

This section covers the pharmaceutical project alternatives which were examined for the proposed pharmaceutical project in Faisalabad. An analysis of the available alternatives is necessary to establish that the most suitable management and technology options will be adopted for the pharmaceutical project, while minimizing environmental impacts. This evaluation explains the selection of the most feasible alternative in terms of economics, environment, and health & safety. It outlines the following options that were considered for this pharmaceutical project:

- Site Alternative their selection and rejection criteria
- Design/technology alternatives, their selection and rejection criteria
- Environmental Alternatives, their selection and rejection criteria
- Economic Alternatives, their selection and rejection criteria

4.1. Site Alternative their selection and rejection criteria

The selected site for said pharmaceutical project is located at industrial area. The area is developed as an industrial and many industries are in operation in pharmaceutical project proximity. The selected pharmaceutical project site is ideal from the point of view of compatibility with other land use of the area. The site is also spacious enough to accommodate the proposed facility and its infrastructure. Due to existing infrastructure and its strategic location, it is our considered view that the selected site is ideal and suitable for the proposed development. Additionally, the piece of land is owned by Proponent.

4.2. Design/technology alternatives, their selection and rejection criteria

For installation of current pharmaceutical project state of art technology will be selected to avoid emissions.

Other alternatives include, Controlled Release Systems, Liposomes, Nanoemulsions, Solid Dispersions, 3D Printing, Supramolecular Chemistry, Co-crystals but this formulation method was selected for the proposed peoject.

Proponent is doing heavy investment for this pharmaceutical project so latest/state of art technology will be preferred to ensure good quality products.

4.3. Environmental Alternatives, their selection and rejection criteria

After completion of construction, proper landscaping will be done. Moreover, the proponent is very concerned and conscious about the quality and equally about the environmental protection and resource conservation.

4.4. Economic Alternatives, their selection and rejection criteria

- Currently selected technology and design is economically efficient.
- Tree plantation will be done that will reduce temperature of the area and act as noise barrier.
- Building design will be such that maximum use of day light and LED lights will be installed to minimize electricity consumption.

5. DESCRIPTION OF THE ENVIRONMENT

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

Data Collection

A site visit was conducted to survey the field area for collection of relevant data. Interviews were conducted with the public and stakeholders of the pharmaceutical project area to seek the public opinion on the implementation of the proposed pharmaceutical project. Various Governmental and Non-Governmental Organizations (NGOs) were also visited for the collection of relevant data and their views on the proposed pharmaceutical project were recorded for incorporation into the EIA report. The environmental impacts of any activity or process will be assessed based on deviation from the baseline or normal situation. The following components form part of the baseline:

i. **Physical Environment**
ii. **Ecological Environment**
iii. **Socioeconomic Environment**

5.1. Physical Environment

The proposed pharmaceutical project lies in M-3 industrial City, Sahianwala, tehsil chak jhumra Faisalabad where proponent intends to install pharmaceutical laboratory. There are different industrial units within the M-3 industrial city in operational, constructional, and planning phase. These units King kong Industries, Karss Paint Industries, Markhor Industries, Khadim Steel,etc. The pharmaceutical project lies in district Faisalabad, and it has detail background history.

5.1.1. Geological Formation

Faisalabad previously known as Lyallpur was established as a Mandi Town in 1895 as a part of the program of colonization of West Punjab. It was formerly a part of Tehsil Jhang of Multan Division. Because most of the area was un-cultivated and there were no regular crops, it served

the purpose of only a meadow for the cattle of the indigence. The opening of Lower Chenab Canal in 1892 and its extension to the area in the form of Rakh Branch, Jhang Branch and Gogerah Branch coupled with the introduction of a Canal Irrigation system, brought the whole area under regular cultivation. The city was named in honor of Sir James Lyall, the then lieutenant Governor of the Punjab. The design of the Town was prepared by Mr. Young, and it was further improved by Sir Gunga Ram, a renowned Town Planner of the time. It was laid down on a parcel of land measuring 110 acres in a square from with eight bazaars radiating from the central Clock Tower. The district of Faisalabad is situated in the center of the lower Rachana Doab, the area between Chenab and Ravi rivers, which has a mild slope from North-East to South-West with an average of about 0.2-to-0.3-meter drop per kilometer or about 1 to 1.5 feet per mile. The city is situated at an elevation of about 183.35 meters above the Sea level. The topography is however marked by valleys, local depression, and relatively high ground.

5.1.2. Seismicity

Pakistan lies on an active seismic belt of earth. Seismic observations indicate that hundreds of shocks originate every year. Mostly, these seismic waves are of low intensity and do not have significant effect. According to seismic zones of UN- Habitat the pharmaceutical project area falls under Zone 2A. The seismic zoning is shown in the figure.

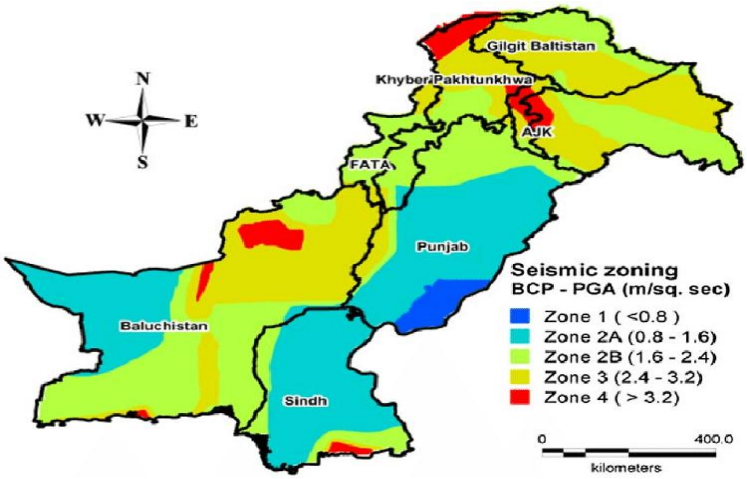

Figure-7 Seismic Zone Map

5.1.3. Climate

The meteorological data from Faisalabad has been used to identify the baseline climatic condition of the pharmaceutical project area and surroundings. The proposed pharmaceutical project lies in arid climate region. The last five years data was obtained from Pakistan Meteorology Department,

meteorological station at Faisalabad to have an overview of the area's climatic regime. The metrology data of the site is briefly described below:

Table 2-Mean Temperature, Precipitation, Humidity

Month	Mean Temperature Max	Mean Temperature Min	Precipitation	Relative Humidity
January	19.7	5.0	33.8	66.2
February	21.6	7.7	50.0	60.0
March	26.0	12.5	60.5	53.8
April	33.0	17.7	36.5	41.8
May	38.1	22.0	31.8	32.5
June	40.5	25.8	51.6	37.8
July	35.7	25.8	23.3	67.8
August	34.4	25.3	22.2	70.8
September	35.0	23.0	77.7	65.5
October	33.1	16.6	12.2	55.6
November	27.8	9.9	9.9	62.7
December	21.5	5.7	30.4	68.9
Annual mean	30.6	16.4	36.6	56.4

5.1.4. Seasons and Rainfall

The proposed pharmaceutical project is situated in district Faisalabad which has hot summers and moderately cold in winter. It is in the region that encounters four seasons, the hot summer starts from May and continues till July, monsoon starts from July and continues to September while winter season end in February starting from November and spring season lasts for two months from March and April. The last five years annual rain fall data from 2009 to 2013 shows variation between -1 – 243.1 mm

5.1.5. Soils

The city is located on the "Bar Upland" which is relatively older alluvium deposit as found in the central part of the Doad. Because of its elevation above the bordering flood plains, the upland is

generally beyond the reach of flood spills, which is the significant physiographic feature of the alluvial plan. Like other Punjab plains, the alluvium is quaternary and has been deposited on semi-consolidated tertiary rocks or on a basement of metamorphic and igneous rocks of Precambrian age. It emanates from the mountain ranges of the north and has been deposited by the present and ancestral streams. The deposition is predominantly fluviatilo sediments.

5.1.6. Temperature

The ambient temperature of proposed pharmaceutical project region varies from summer to winter. The change in temperature has a direct influence on the environment of the pharmaceutical project area. Hot and dry conditions during summer season changes the air quality by increase in particulate matters due to drying of road pavements and open soil. According to last five years data, mean monthly minimum temperature in the area varies from 3.5 to 28.6 C° and mean monthly minimum temperature were found 16.6 – 41.9 C°.

5.1.7. Water Resources

Water resources of the area are discussed under two broad headings, surface water resources and groundwater resources.

5.1.8. 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. Among surface waters, district & near the pharmaceutical project extremities there is a distributor canal of Rakh Branch, which is used for the irrigation purpose etc.

5.1.9. 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 unconfined 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. Main visible pollutants such as turbidity, color and odor usually remain absent in ground extracted waters. Invisible biological

contaminants such as Bacteria, Protozoa and Viruses are also not expected in sub- surface water regimes unless it is contaminated by un-expected upheaval. Water constitutes an important section of Physical Environment of an EIA Study to define its magnitude, quality, and occurrence throughout the entire pharmaceutical project corridor. On geo-sphereic earth water is amounting to 3% as freshwater resource of the total water reserve. Of this groundwater comprises 95%, surface water 3.5% and soil moisture 1.5%. Out of all the fresh water on the earth, only 0.36% is readily available for diversity uses and applications. The pharmaceutical project area lies in the district of Faisalabad; the groundwater table normally exists 25 to 30 meters below the ground level and contains high level of salinity.

5.2. Environmental Baseline Monitoring

5.2.1. Noise Levels

Noise is described as an unwanted sound emitted from un-avoidable sources of anthropogenic activities. Daily based natural induced sources of noise are rare to none but human induced noise sources are plenty and un-avoidable. Physically, there is no distinction between sound and noise. Sound is sensory.

The perception and the complex pattern of sound waves is labeled noise, music, speech, low altitude aero plane flying etc. The noise pollution in the pharmaceutical project area is source of pollution and nuisance. Among eight noise measurement locations in the cities, the study says, on average, the noise level ranged from 57-60 dB (A) in and around the pharmaceutical project site.

5.2.2. Ambient Air Quality

Atmospheric pollution means the imbalance in the normal air chemistry. It can occur due to the addition of a new chemical into atmosphere or by the change in concentration of the chemicals already existing in the atmosphere. Atmospheric pollution particularly in urban area has a strong impact upon daily life. The reasons of such changes can both be natural as well as anthropogenic. Ambient air quality is a key to measure the concentration of the various chemicals in atmosphere; especially of the chemicals which pose detrimental effects on health, safety, and environment, to have a comparison with their safe concentrations, as established in WHO Standards and NAAQS.

5.2.3. Surface Water and Ground Water

There are no surface water resources like canal or ponds, near the pharmaceutical project area. The area surrounding the pharmaceutical project site is poorly drained.

Ground water is the principal source of municipal water supply Faisalabad. This is also the case in the immediate vicinity of the site. The City's drinking water is obtained from groundwater aquifer by means of tube wells located throughout the area. Groundwater is pumped from 60-65 ft feet and is generally good for direct consumption.

5.3. Biological Environment

In this section, the baseline environmental conditions pertaining to biological environment are described. These conditions have subsequently been used to identify the potential impacts on the biological environment that are likely to arise from the pharmaceutical project activities.

5.3.1. Fauna

The main fauna of the pharmaceutical project comprises of mammals, birds, and reptiles.

Mammals Although most of the study area comprises agricultural lands, but due to presence of shrubs of grass, shrubs, and several agricultural crops like wheat in the surroundings 10 mammalian species have been recorded. Dense vegetation provides living shelter to the mammals like Asiatic Jackal, Five Stripped Palm Squirrel, Indian Crested Porcupine, Indian Desert Jird, Indian Gerbil, Cape Hare, Small Indian Mongoose, House Mouse, House Rat, and Jungli Cat. All the 10 species are commonly found in the pharmaceutical project areas as well as in country and no significant threat can be expected from any activity.

Reptiles During the study several types of burros and droppings were found which indicate the presence of respected reptiles. None of the reptiles and mammalian species found here are listed under any category of the IUCN Red List. Ten species of reptiles were also recorded including snakes, lizards, and agamas.

Table 3- Type of Fauna at the Pharmaceutical project Site

English Name	Scientific Name
Mammals	

Asiatic Jackal	*Canis aurius*
Five Stripped Palm Squirrel	*Funambulus pennanti*
Indian Crested Porcupine	*Hystrix indica*
Indian Desert Jird	*Merioneshurrionae*
Reptiles	
Brilliant Agama	*Trapelus (Agama) agilisisolepis*
Indian Cobra	*Najanajanaja*
Pakistan Ribbon Snake	*Psammophisleithii*
Saw scaled Viper	*Echiscarinatus*

5.3.2. Endangered Species

There is no floral or faunal species inhabiting the pharmaceutical project area that are included in the Red Data Book of IUCN. The populations of birds are reported to be reduced over time due to excessive pesticide sprays in agricultural crops and loss of habitat.

5.3.3. Flora

Based upon observations during the field visit many species of plants were directly observed in the pharmaceutical project area. List of the floral species in the pharmaceutical project area are given in the following.

Table 4-Type of Flora in the Pharmaceutical project Area

Tree Species	Species name
Kikar.	*Acacia nilotica*
Talhi.	*Alhaji maurorum*
Neem.	*Dalbergia sissoo Roxb*
Gaah	*Albizzia lebbek*

Jawar.	*Calotropis procera*
Gandum.	*Azadirachta indica (L.) Adelb.*
Makae.	*Triticum aestivum*
Kahi.	*Veazea nays*
Lawo.	*Tamarix indica*
Jhangoori Ber.	*Tamarixaphylla*

5.3.4. Archaeological Sites or Wetlands

It is envisaged that no building of archaeological, cultural, and historical importance is expected to be damaged due to the installation of said pharmaceutical project at the selected site. Moreover, there is no wetland or surface water body reported to be affected due to the installation of the aforesaid pharmaceutical project.

5.4. Socio Economic Assessment

Faisalabad is the third-most-populous city in Pakistan, and it is the second largest in the eastern province of Punjab. Historically, one of the first planned cities within British India, it has long since developed into a cosmopolitan metropolis. The total area of Faisalabad District is 5,856 km2 while the area controlled by the Faisalabad Development Authority (FDA) is 1,280 km2 Faisalabad has grown to become a major industrial and distribution center because of its central location in the region and connecting roads, rails, and air transportation. It has been referred to as the "Manchester of Pakistan". Faisalabad's GDP in 2013 was $43 billion (USD). The average annual GDP of Faisalabad is $20.5 billion calculated by averaging GDP pharmaceutical projections from 2015 to 2025.

5.4.1. Demographic Profile

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

in the nearest Chaks of the pharmaceutical project area is expected to be more than 50 thousand individuals.

Table 5-Demographic Profile of Faisalabad

Sr#	Parameters	Rural	Urban	Total
1	Population	4113582	3760328	7873910
2	Male	2102745	1931770	4034515
3	Female	2010623	1828231	3838854
4	Transgender	214	327	541
5	Household	631434	593832	1225266

5.4.2. Languages and Major Casts

There is no specific tradition on specific occasion and are same as other cities of Punjab. There are no clashes found in the area, people live peacefully however there is a combination of different cast and creeds and religions because district Faisalabad is industrial city and people from different cities live for the jobs and different business. Major casts dwelling there, are Sheikh, Araeen and Rajput

5.4.3. Religion

The population of Bahawalpur is over 99% Muslim. Islamic influences are evident in the fundamental values of various inhabitants including cultural traditions, marriage, education, ceremonies and policies with may reflect stark differences in rural villages as compared to urban areas.

5.4.4. Dress

Majority of the people wear Qameez and Shalwar. English dress, shirt and Trousers are also common in Bahawalpur as well like other big cities of Pakistan.

5.4.5. Industrial Setup

Faisalabad contributes over **05%** toward Pakistan's annual GDP; therefore, it is often referred to as the "Manchester of Pakistan". Faisalabad's average annual GDP is **$20.55 billion (USD)** of which **21%** comes from agriculture. The surrounding countryside, irrigated by the lower Chenab River, produces agricultural commodities such as; cotton, rice, sugarcane, wheat, fruit and vegetables. It is a producer of industrial goods and textile

manufacturing including; cotton and silk textiles, super phosphates, hosiery, pharmaceutical products, industrial chemicals, clothing, pulp and paper, printing, agricultural equipment, ghee (clarified butter), and beverages.

The Faisalabad Chamber of Commerce and Industry monitors industrial activity in the city and reports their findings to the Federation of Pakistan Chamber of Commerce and Industry and provincial government. The city has a major dry ports and international airport.

Faisalabad is recognized as the center of the textile industry in Pakistan, contributing to half of Pakistan's total textile shipments. At the end of June 2012, Textiles employed **20%** of the nation's workforce and generated **1.3 trillion rupees ($13.8 billion)** in textile products, most of which were exported to the US and Europe. While Punjab's economy is driven primarily by agriculture, the textile industry along with leather products and light engineering goods play an important role, with more than **48,000** industrial units spread across Punjab. To boost bilateral trade, Romania and Turkey have honorary-consulates in Faisalabad which enable trade links with the city.

5.5. Quality of Life Values

5.5.1. Health Facilities

Hospitals exist in the pharmaceutical project area. There is a government hospital or Basic Health Unit (BHU) available in Chak Jhumra. People also access to private hospitals in city and sometimes to nearby private dispensaries. Fever, malaria and chest congestion, Hepatitis-C were reported as the common diseases of the pharmaceutical project area. In the pharmaceutical project area, health conditions are much developed.

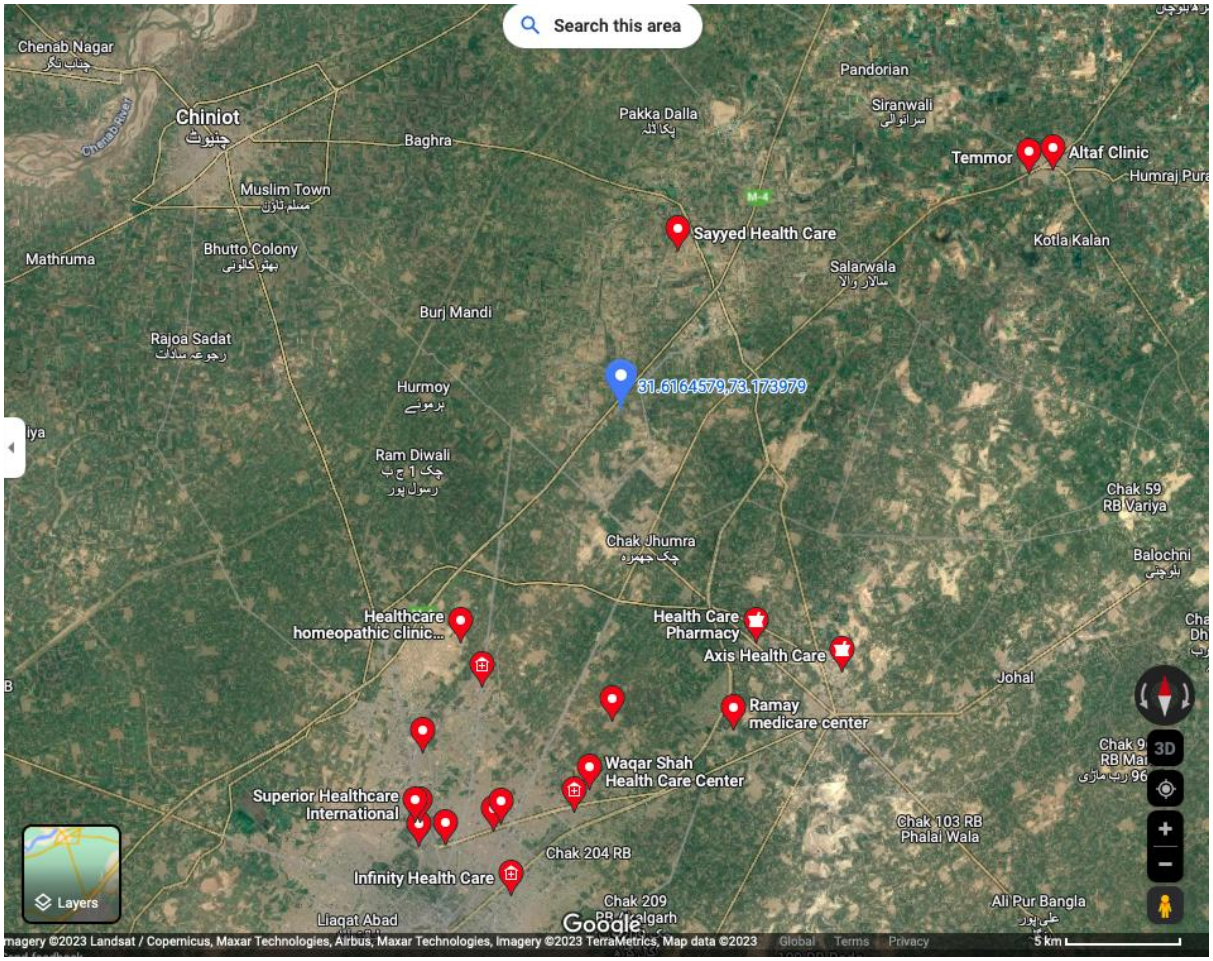

Figure 8-Health Facility Nearby

5.5.2. Customs

The peoples are very much concerned about castes and beliefs, visiting shrines is very common among them.

5.5.3. Electric Supply

Power supply line goes all along the pharmaceutical project area, and approximately 90% of the community can acquire electricity. Gas supply has been provided to the area, but few of the houses cannot afford to avail the service, so these houses depend upon fuel wood. But majority of the people belong to business communities, government sectors and having small jobs in district Faisalabad.

5.5.4 Telephone Facilities

PTCL telephone facility is available in all parts of the pharmaceutical project area. Similarly mobile service is also available and is being used efficiently as mode of communication in the pharmaceutical project area.

5.5.5 Educational Facilities

In the 1998 census Literacy was defined as the "ability of a person to read a newspaper or write a simple letter in any language". The Literacy is also measured in terms of literacy ratio and computed as percentage of literate persons among the population aged 10 years and above. The literacy ratio of the district Faisalabad is 60%, with a split of 60% for males and 56% for females. There are sharp differences in the literacy ratios by sex and areas. There are different government and private sector school near the vicinity of pharmaceutical project area. People go to Faisalabad and other cities of Pakistan for university education.

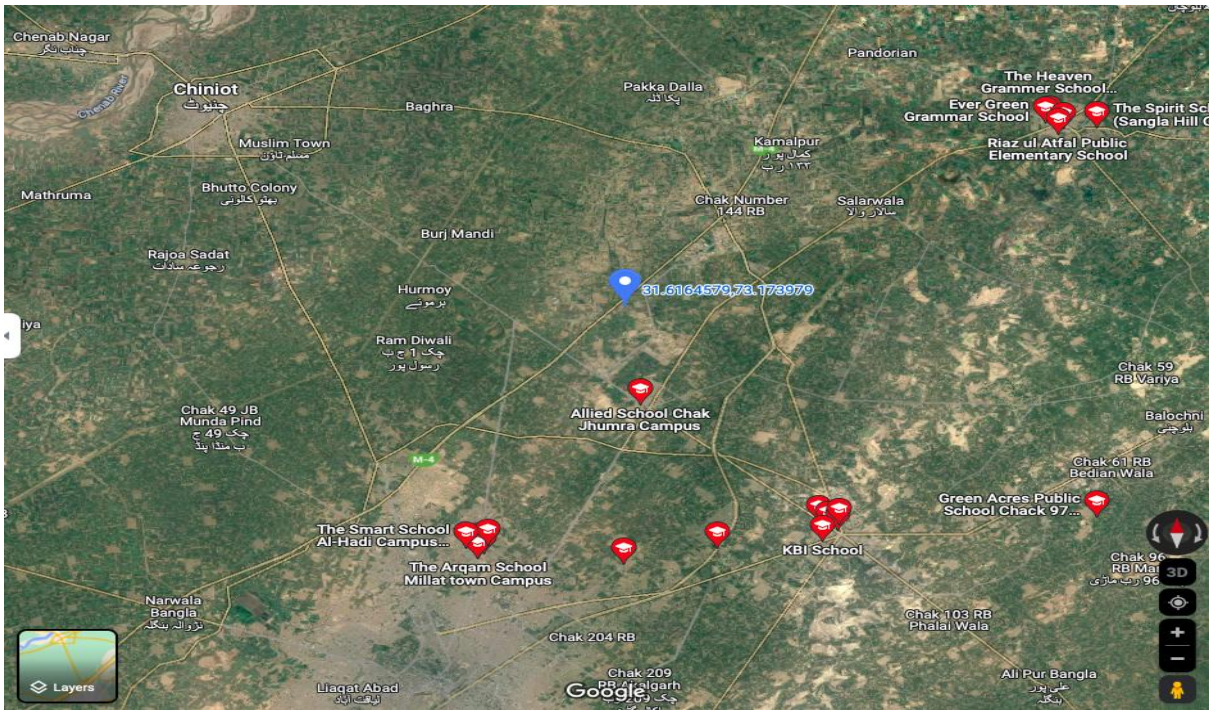

Figure 9-Educational Facility Nearby

5.5.6 Agriculture

Major crops of the town are wheat, grain, peas, barley are the important crops of Rabi season, while Kharif crops are cotton, sugarcane, potato, bajra, oil seeds which are shipped by rail and road to other parts of the country.

5.5.7 Site of Physical, Cultural Heritage

There are no documented or protected sites of archaeological, cultural, historical & religious significance in the pharmaceutical project area. No visible signs were observed of such sites while conducting the field work.

Site Suitability

As the site is surrounded by various other industrial activities and no relocation is required for establishment of current pharmaceutical project. The site do no fall in environmental sensitive area and all commodities are at a suitable distance from pharmaceutical project site as they will not impacted by the construction activities even locals will get more benefits and job opportunities. No replacement, relocation and rehabilitation is required for the development of above-said pharmaceutical project.

Favor of the Pharmaceutical project

Almost 87% of the people of the area and vicinity are in the favour of the pharmaceutical project. Most people think that will uplift the socio-economic value of the pharmaceutical project site.

Common Diseases

Respondents were asked about the common diseases prevailing within their area. Majority of the respondents suffered from diarrhea, cough, diabetes and hypertension. Hepatitis also prevailed in the few communities.

Community Issues

Community was asked about the burning issues they are facing. Majority of the respondents complained about lack of safe drinking water and lack of the job opportunities.

Quality of Life Values

Respondents were inquired about the quality-of-life values available in their respective areas during socio-economic survey of the study area. Most of the respondents had the basic amenities to sustain life such as; electricity, water supply services, sewerage collection system, gas and transport facilities. Adequate educational facilities such as

Government College University Faisalabad, Agricultural University Faisalabad, National Textile University, Nuclear Institute for Agriculture and Biology, University of Faisalabad, and the University of Engineering & Technology of Lahore. The healthcare facilities include Allied Hospital, Institute of Child Care, PINUM Cancer Hospital.

Objectives

The objective of screening is identification of the adverse as well as beneficial impacts and then mitigating the effect of adverse impacts up to acceptable limits or within PEQS. Following are the objectives of screening out all significant environmental and social impacts:

6. IMPACT ASSESSMENT METHODOLOGY

This section discusses the potential environmental impact for the establishment of pharmaceutical laboratory by M/S Bio Ceutica Laboratories. The impacts may include soil contamination, water resources depletion, biological resources disturbance and socio-economic impacts and, where applicable, identifies mitigation measures that will reduce significantly, if not eliminate, its adverse impact. The assessment carried out in this Section is based on potential impacts on overall environmental receptors within the pharmaceutical project area.

- To find different alternatives and ways of carrying out the pharmaceutical project activities, this may cause adverse environmental and social impacts on the surroundings.
- To enhance the Environmental and Social benefits of pharmaceutical project.
- To avoid, minimize and remediate adverse impacts.
- To ensure that residual adverse impacts are kept within acceptable limits.

In the sub-sections below the impacts assessment methodology for the operation of above stated pharmaceutical project at FIEDMC, M-3 industrial City Tehsil Chak Jhumra, Faisalabad has been defined. It includes the magnitude, the extent of the impact and the nature of the anticipated impact that is likely to be occurred from the proposed pharmaceutical project activity.

Methodology

This section discusses the pharmaceutical project's potential environmental impact of establishment of veterinary pharmaceutical manufacturing unit. The adverse impact may occur on; the area's geomorphology, soil, water resources, air resource, biological resources, and socio-economic condition and where applicable, identifies mitigation measures that will reduce significantly, if not eliminate, its adverse impact. The assessment carried out in the sub-sections below is based on potential impacts on overall environmental receptors within the pharmaceutical project area. Impacts are evaluated based on magnitude, immediacy, and sustainability.

Evaluation of the Residual Impacts

Incorporation of suggested mitigation measures may reduce the magnitude of the environmental impacts of above stated pharmaceutical project but sometimes, it may fail in bringing them within the acceptable limits. This step refers to the identification of the anticipated remaining impacts after mitigation measures have been applied.

It can be concluded in view of these reasons that the selected site is best suited for the pharmaceutical project and the technology adopted to produce passenger vehicles. The said pharmaceutical project will not pose any adverse impact or threat on any component of the environment. The impact assessment criteria are given below along with their impacts:

Table 6-Imapct Significance Criteria

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

Table 7- Impact Matrix Checklist for Designing Phase

Environmental Sensitivities	Intensity of Impact						Impact Nature		Impact Significance				
	Low Intensity	Moderate Intensity	High Intensity	Local	National	Regional	Beneficial	Adverse	Insignificant	No Impact	Short Term	Moderate	Long Term
Physical Parameters													
Topography													
Land Acquisitions													
Seismicity													
Biological Parameters													
Land Environment													
Flora													
Fauna													
Social Parameters													
Local Economy													
Social Impacts													

Table 8- **Impact Matrix Checklist for Construction Phase**

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

Table 9- Impact Matrix Checklist for Operational Phase

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

Identification of Monitoring Requirements

The last step in the assessment process is the identification of minimum monitoring requirements. The scope and frequency of monitoring depends on the residual impacts. The purpose of monitoring is to confirm that the impact is within the prescribed limits and to provide timely information if acceptable limits are being breached.

Methodology for Impact Evaluation

These tools have been used to identify the significance and magnitude of the impact as well as the nature, reversibility, and extent:

An Impact Screening Checklist

Pharmaceutical project Impact Evaluation Matrix

Following is given a brief description of assessment tools:

a. Impact Screening Checklist

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

Table 10- Characteristics of Impacts

Sr#	Environmental Component	Impact Characteristics												
		Duration		Location		Frequency		Extent		Significance			Reversibility	
		Long	Short	Direct	Indirect	Cont.	Intermittent	Wide	Local	Large	Moderate	Minor	Rev.	Irrev.
Beneficial Impacts														
1	Employment	◙		◙		◙			◙		◙		◙	
2	Export of finished goods	◙		◙		◙			◙		◙		◙	
3	Appreciation in Land	◙			◙	◙			◙			◙		◙
4	Tree Plantation	◙		◙		◙			◙		◙		◙	
Adverse Impacts														
1	Air Pollution		●	●			●		●			●	●	
2	Wastewater		●	●		●			●			●		●
3	Solid Waste and By-	●		●		●			●		●			●
4	Health and Safety		●		●		●		●			●		●
5	Chemical Hazards	●		●		●			●		●			●
6	Physical Hazards		●	●			●		●			●		●
7	Security Risks		●		●		●		●		●		●	

b. Pharmaceutical project Impact Evaluation Matrix

The Pharmaceutical project Impact Evaluation Matrix was developed by placing different environmental parameters that are likely to be affected by the proposed pharmaceutical project actions, grouped into categories i.e., physical, ecological, socio-economic environment and hazards. For assessment of associated impact risk assessment methodology was used. Moreover, the risk assessment was done based on pharmaceutical project phases (planning & designing, construction and operation). A Pharmaceutical project Impact Evaluation Matrix is attached as **Table 16** below:

Table 11- Impact Evaluation Matrix

Environmental Parameters	Impact Assessment during Different Phases	
	Construction	**Operational**
Planning and designing		
i. Location	+2p	+2p
ii. Design	+1p	+1p
A: Physical		
1. Land Resources		
i. Soil Erosion and Contamination	-2t	-2p
ii. Transportation	-1t	-1t
iii. Solid Waste and By-Products	-2t	-2p
iv. Land Use	NA	NA
2. Air Resources		
i. Noise Pollution	-1t	-1t
ii. Air Pollution	-1t	-1t
iii. Dust Emissions	-1t	NA
3. Water Resources		
i. Ground Water	-1p	-2p
ii. Surface Water	0	NA
iii. Wastewater	-1p	-2p
B : Ecological		
Flora		
i. Tree Cutting	-1p	+1p

7. SCREENING OF IMPACTS AND MITIGATION MEASURES

This chapter provides a review of the potential impacts that could occur because of the pharmaceutical project activities. These impacts could be both positive and negative in nature and have been classified accordingly by a thorough review of the construction and operational phases of the pharmaceutical project. This assessment numerates the magnitude of these impacts with the aid of environmental matrices and presents effective mitigation measures to counter their adverse nature.

7.1. Purpose of Environmental Mitigation Measures

For the pharmaceutical project to be running successfully and compliance with environmental regulations mitigation of impacts caused by the pharmaceutical project is required. The purpose of the need of mitigation can be answered by various questions as follows:

1. **What is the problem?**

When the resources of the environment are being used ruthlessly, it results in degradation of the environment to the extent that the environment loses its resilience and the carrying capacity reduces the resources found and the recovery process is too slow or nearly no recovery is possible.

2. **When will the problem occur and when should it be addressed?**

The problems that would occur fall within the pharmaceutical project premises, and near the boundaries of the pharmaceutical project location. The impacts would range up to the distance where pharmaceutical project related activities are performed or up-to the geographical zone where the effects spread. Impacts would show their presence soon after the pharmaceutical project development starts.

3. **Where the problem should be addressed?**

The problems should be addressed where they originated. That is at the pharmaceutical project location.

4. **How should the problem be addressed?**

Problems can be addressed by using environmentally friendly practices. Such practices can be followed by following mitigation plans.

7.2. Impact Identifications Methodology

Potential impacts from the pharmaceutical project activities were identified by a thorough review of the pharmaceutical project activities, study of surrounding environment, review of literature, from previous similar studies and expert judgment.

Approaches for Mitigation Measures

Following approaches may be used to mitigate the impacts of the pharmaceutical project

Table 12- Approaches for Mitigation Measures

Avoid: Change of route or site details, to avoid damage important ecological or Archaeological features.
Replace: Regenerate similar habitat of equivalent ecological value in different Location.
Reduce: Filters, cyclones, noise barriers, dust, enclosures, visual screening, Wildlife corridors and changed time of activities to reduce the impact.
Restore: Site restoration at the end of the operational activities.
Compensate: Relocation of displaced communities, facilities for the affected communities, financial compensation for the affected individuals, etc.

Once the potential impacts had been identified, the assessment of each potential impact follows these steps:

7.2.1. Characterization of environmental impacts:

Primarily, anticipated impacts have been categorized as direct, indirect and induced impacts. These groups of impacts can be further broken down according to their nature into:

- Positive and negative impacts.
- Minor, major and moderate impacts.
- Local and widespread impacts.
- Temporary and permanent impacts.
- Short- and long-term impacts and
- Reversible and Irreversible impacts

The following scale has been used for the evaluation of potential impacts on different environmental settings:

- **Prediction of the magnitude of the potential impacts:**

This step refers to the description, quantitatively (where possible) or qualitatively, of the anticipated impacts of the pharmaceutical project. This may be achieved with models or comparison with other similar activities. The predicted level of impact magnitude may be due to uncertainties in the baseline conditions, the proposed activities, external developments, or the prediction model.

- **Identification of the mitigation measures:**

If it is determined that the predicted impact is significant when compared with the Criteria for Determining Significance, suitable mitigation measures are identified. There is a range of mitigation measures that can be applied to reduce impacts.

- **Evaluation of the residual impacts:**

Incorporation of the suggested mitigation measures reduces the adverse impact of the pharmaceutical project and brings it within the acceptable limit. This step refers to the identification of the anticipated remaining impacts after mitigation measures have been applied. These impacts are referred to as residual impacts.

7.3. Impacts Significance:

The impacts significance has been described in detail in the checklist made for the impacts assessment and analysis on three different environments (i.e. physical, ecological and socio-economic). The further detail is given here under:

7.3.1. Ecological importance:

- **Potential issues:**

Impacts on wildlife may arise from the following pharmaceutical project activities:

- Noise generated from pharmaceutical project activities.
- Air pollution due to emissions
- Movement of personnel and vehicles.

- Clearing of vegetation.

Likely impacts of these activities can include:

- Temporary migration of mammals and bird from the area.

Assessment of potential impacts:

Wildlife may be disturbed due to sensory disturbance from earthwork, construction, movement of vehicles and crew personnel. This can possibly result in changes in distribution and abundance.

- **Mitigation measures:**

The following mitigation measures will reduce the adverse impact on the wildlife of the pharmaceutical project area:

- Vegetation loss will be kept to an absolute minimum. Cutting of large trees will be avoided.
- Fires in the open will not be allowed.
- A 'no-hunting, no-trapping, no-harassing' policy will be strictly enforced, unless threatening to human life.
- Uncontrolled discharge of waste of any kind will not take place in the area.
- Discharging firearms will be explicitly prohibited.
- General awareness of the crew will be enhanced regarding the wildlife, through environmental training, notice board postings, toolbox talks etc.;
- The pharmaceutical project staff will be educated and instructed to avoid killing. Feeding or harassment of wildlife will not be allowed.
- Physical disturbance to areas outside the work corridors will be avoided.
- The total duration of activities will be minimized by good management.
- Food wastes will not be disposed-off in the open.
- Movement of all pharmaceutical project personnel will be restricted to work areas and
- Night travelling will be kept to a minimum.

Residual impact:

Once the mitigation measures given above are implemented, it is expected that the pharmaceutical project will have lesser significant impacts on the area's wildlife.

7.3.2 Social importance:

- **Potential impacts:**

Potential sources of positive and negative impacts on local communities can include:

- Safety and security
- Mobility and operation
- Pharmaceutical project and Community Interface
- Cultural and religious sites
- Archaeological Sites
- Local Economy
- Local Employment

7.4 Assessment of potential positive impacts:

Increase in Employment Opportunities Due to installation of aforesaid pharmaceutical project, the employment opportunity will be slightly enhanced. During construction phase, 15-20 workers will be hired from local community include skilled and un-skilled workers. During operational phase, approximately 500-600 persons will be required. It will include hiring of technical and non-technical staff. Locals will also diversify their income by being employed. Hence, there will be an increased employment opportunity for the local people which will have a positive impact on the socio-economic status of the area.

Tree Plantation At the end of the construction phase, 3-5 times of removed trees or as per condition by EPA mentioned in said case Environmental Approval/NOC will be planted in the designated green areas, this will enhance the aesthetic beauty of the area.

Environmental standards:

All the impacts have been assessed and incorporated in accordance with the Punjab Environmental Quality Standards (PEQS), 2016. All the parameters measured for drinking water, ambient air, noise is within the permissible limits of PEQS.

Adverse Impacts and Mitigation Measures

This section identifies the potentially significant and in-significant adverse environmental and social impacts anticipated during the operation phase of said unit. Appropriate mitigation and management measures, where applicable, have also been suggested to reduce the severity of anticipated impact up to the extent possible.

7.5 Anticipated Environmental Impacts during Pre-Construction Phase

The impacts have been identified using matrix method. Major impacts which have been

considered while evaluating any environmental impacts caused due proposed pharmaceutical project location and design are as under:

6.5.1. Impacts due to pharmaceutical project location:

The nearest residential community (Guna Chak) is located at the distance of **0.95 km**. There is no human settlement, heritage building, social structure, grassland, or preserved area in the pharmaceutical project vicinity that could be damaged, dislocated or dismantled due to the pharmaceutical project activity in proposed area. Hence, the impact of location is in-significant as the pharmaceutical project site is away from the surface water body (within 2.0 km of pharmaceutical project area), residential area (Guna Chak at 0.95 km) and no protected area (is reported in 5.0 km vicinity of the pharmaceutical project area).

Nature of Impact

The nature of proposed impact will be direct, low, short-term, and hence in-significant.

Mitigation Measures

Following mitigation measures has been adopted to reduce the impact of said pharmaceutical project location on sensitive receptors:

- The selected site located at adequate distance from the various sensitive receptors.
- The site is accessible through metaled road network; Jhumra Road.
- The selected site is in industrial area and due to establishment of aforesaid pharmaceutical project no change in the land use of area is being envisaged.
- The site is owned by the proponent and no dispute is associated.
- Air emissions generated from the said will be controlled by adopting pollution abatement technology such as multi-tube cyclones.
- The wastewater will be treated prior to its disposal in Industrial City Wastewater Drain
- The generated solid waste will be collected by Contractor, and it will be disposed off through the standard practices of area.

It is envisaged that no mitigation measures will require as the said pharmaceutical project had been constructed in industrial area and no adverse impacts on its surroundings due to significant distances from all sensitive receptors.

6.5.2. Impacts related to the pharmaceutical project design:

During designing phase of aforesaid pharmaceutical project optimized the use of best available technology to prevent or minimize potentially significant environmental impacts associated with the pharmaceutical project as well as to ensure high level business and environmental performances were adopted. In pre-construction/design phase, a management system was provided at design level to control all anticipated impacts.

The aforesaid pharmaceutical project will adhere to all standards, technical and legal requirements to avoid adverse impacts on the socio-environment and human health. Efficient infra-structure has been developed. Construction materials have been procured from approved dealer. The technology adopted for the manufacturing of synthetic pharmaceutical products is the state of the art. This process is employed because of the following reasons:

- Construction material has been procured from approved dealers.
- For the protection of workers PPEs (dust masks, gloves & shoes) has been provided during construction and it will be provided during operational phase too.
- The proposed emergency system is semi-automatic which is being control through computerized systems and it relates to smoke alarms.
- In this process almost 98% of raw material will be converted into the final good.
- Through the selected system high quality of goods will be produced.
- The generated wastewater will be treated through ETP.
- The Proponent intends to reduce the environmental and social issues up to practically possible safe limit. The Client had adopted SOPs for Emergency Reponses Plan, Fire Fighting Plan and Disaster Management Plan which are explained in sub-sections below.
- Planning principles and design considerations have been reviewed and incorporated into the site planning process to the extent possible. The concepts considered in the design of the proposed pharmaceutical project are:
- No additional land acquisition will be required.
- Substantial reduction of environmental degradation in pharmaceutical project area.
- Augmentation in adequacy of sanitation conditions at the user end enhancing the efficiency of existing infrastructure.

Nature of Impact

The nature of the proposed impact will be direct, low, short-term, and hence in-significant.

Mitigation

No additional mitigation measure will be required as state of art technology is being adopted to produce pharmaceutical products. For the treatment of the generated wastewater proper wastewater treatment plant will be installed. This generated wastewater will be given primary and secondary treatment before final disposal in industrial drains.

6.5.3. Safety of infrastructure:

Impacts

As we already mentioned the pharmaceutical project area is an isolated area, consequently, the building structures have been designed in accordance with the requirement of seismic factor as well as after due consideration given to other structural design parameters.

Mitigations

No mitigation is required.

6.5.4. Transportation:

Impacts

There is only one entrance and one exit point provided at the proposed site and the same shall be used in future. Hence, traffic patterns of the area will not be disturbed. Also there is not much traffic in the vicinity. This pharmaceutical project is located far from the commercial areas.

Mitigations

No mitigation is required.

6.5.5. Wastewater drainage:

Impact

The development of infrastructure like road network, security wall or any other buffer zone, etc. shall not restrict the natural drainage ways and even alterations in drainage pattern of the pharmaceutical project design and construction features shall be implemented after the approval from the EPA and TMA.

Mitigations

Municipal wastewater drainage will be properly handled. After primary treatment in the sedimentation tank, the wastewater will be used for watering the plantation and trees on the pharmaceutical project site. Punjab Hospital Waste & Management Rules (PHWMR),2014 & Punjab Environmental Quality Standards (PEQS) will be compliance for waste management and disposal.

6.5.6. Water availability:

Impact

Ground water will because for the water requirement. But due to increasing demand of water nearby water resources may be affected, however the impact shall be lesser in magnitude.

Mitigations

Water will be handled with great care. Pipes and containers will be used for further usage of water. Water will be saved at maximum possibility during construction.

6.6. Impacts and mitigation during Construction Phase

Pharmaceutical project construction phase was of 01 year whose activities will surely show effects on land environment, water, air, noise level, soil quality, socio-economic trend of area, etc. These impacts had been controlled effectively by adopting best management practices.

By the implementation of said pharmaceutical project, a positive impact on the socio-economic culture for the people has been observed. The chance for local employment, fabrication, brick masonry, painting and machinery erection works had been increased.

The construction phase of aforesaid pharmaceutical project will include activities associated with the site leveling, construction of civil structures, architectural works and building services. The construction phase would bring in immediate but short-term changes on various components of environment near the pharmaceutical project site. This section explains how aforesaid pharmaceutical project will affect different environmental aspects and its mitigation measures to manage the impact. The impacts during construction phase will be temporary and localized. Even though, the measures proposed to minimize such impacts.

6.7. Impacts & Mitigation during Operational Phase

This section delineates the potential impacts during operation phase of the pharmaceutical project and the mitigation measures to counteract these impacts. The summary of the impacts and possible mitigation measures are as follows:

6.7.1. Impact on Ecology

Currently, the site is being use for industrial & commercial activities. After the completion of said pharmaceutical project different native and ornamental plants species has been planted in designated green spaces and along boundary of pharmaceutical project site. The overall aesthetic beauty of the area has been enhanced and it will have a significant impact on the overall ecology, aesthetic, and landscape of the area.

Nature of Impact

The nature of proposed impact will be direct, low, short-term, and hence in-significant.

Mitigation Measures

This impact is positive, long-term and significant. Hence, it doesn't require any mitigation measure.

6.7.2. Impact on Air Environment

Air emissions will be generated from production of pharmaceutical products. This would be the source of air emissions that would deteriorate the pharmaceutical project area air quality. Moreover, dust will be generated due to the frequent movement of vehicles carrying the raw-material and finished goods. During operational phase, suspended particulate matter and gaseous emissions will be the main pollutant. Gaseous emissions from generators will be controlled as waste heat recovery boiler will be installed to capture waste heat generated from the generators.

Due to increased vehicular movement increase in NOx, SO_X, VOC and CO concentrations will be observed at the pharmaceutical project site. As most of the construction equipment will be mobile, the emissions are likely to be fugitive and not concentrated on a single source or place. As the impacts will be localized in nature, the areas outside the said pharmaceutical project boundary are not likely to face any significant adverse impacts with respect to ambient air quality.

Nature of Impact

The nature of proposed impact will be direct, low, short-term, and hence in-significant.

Mitigation Measures

Following mitigation measures will be adopted:

- For dust suppression regular sprinkling of water will be carried out.
- Vehicles used for transportation of raw material as well as finished product and the utility vehicles will be regularly serviced and maintained to keep the environmental impact on account of their exhaust emissions to its minimum level.
- Native tree would be planted along the boundary of pharmaceutical project area to keep environment healthy. For removal one tree, 3-5 trees will be planted.

6.7.3. Noise Environment

Noise, an unwanted sound, affects human being. Excessive exposure to noise produces varying degree of damage to hearing system. It leads to headache, fatigue, etc. Continuous exposure of increased level of noise will have an adverse impact on the health of workers as well as the people residing in surrounding area.

Nature of Impact

The nature of proposed impact will be direct, low, short-term, and hence in-significant.

Mitigation Measures

In general, the following methods will be adopted to control the noise pollution from the proposed units;

- Proper encasement of noise generating sources will be done to control the noise levels within prescribe PEQS 2016 limits.
- A thick greenbelt will be developed all around the plant which will be acting as noise barrier.
- The use of concrete and masonry walls & barriers keeping in view the benefits of stiffness weight & cavity construction & the need to provide well sealed sound attenuating doors & windows.
- Attenuation by use of sound absorbents on walls and fixed or suspended ceilings.
- The use of mufflers, sound attenuation and acoustic louvers in air flow paths, taking particular care to direct inlet and discharge an opening away from critical areas wherever possible, so as to take advantage of direct effects.

All the transporters will be vised to carry out regular maintenance of their vehicles

6.7.4. Solid Waste Management

There will be no solid waste in the operation except emergency spill, expiry of medicine etc. The key solid wastes and by-products; directly re-useable and recyclable matter (such as; containers, waste papers, used materials, waste packaging materials, scrap of clothes).

Segregation of waste will be done at source. Transfer of waste from waste yard will be done on daily basis, some item will be directly re-used by another party and few will be recycled and Sludge of waste water treatment plant, Oil sludge, used oil and lubricants incinerated in environmentally friendly manner via EPA Approved Vendor/incineration facility.

Record of waste generation and quantity of waste provided to vendor for re-used and recycling and incineration will be maintained at main store office on daily basis for necessary verification at any time.

After collection of solid waste vendor will be responsible to provide certificate about quantity of waste: -

1. Directly re-used by another party.
2. Recycled and sale to the market.
3. Incinerated by vendor.

Nature of Impact

The nature of impact will be direct, low, long-term, and significant.

Mitigation

Following mitigations should be adopted to manage generated solid waste:

- The spills, expired batch will be managed as per hazardous substances management rule by EPA verified vendors.
- The recyclable and reusable waste will be sold to the contractor which will include paper, plastic, and non-ferrous material.
- Waste bins will be placed in the unit at the strategic position for the collection of solid waste.
- The installed bins will be covered to reduce the chances of the disease vector production.
- Record of generated waste during the pharmaceutical project activity should be maintained on the regular basis. Quantity of the waste disposed, recycled or reuse will be logged on a waste tracking register.
- Regular training will be given to the workers dealing with the waste. management it will include identification, segregation, and management of waste.
- The sludge removed from WWTP will be sold to the certified contractor for the management of the generated solid waste.

6.7.5. Water Environment

Wastewater will be generated at rate of approximately at the rate of 450m^3/day. This generated wastewater may impact the surface & ground water quality of area, if not treated. Moreover, the use of chemicals during process may pose threat and cause water pollution. In addition to the use of chemicals, its spillage may deteriorate water quality.

Nature of Impact

The nature of impact will be direct, low, long-term, and significant.

Mitigation

Following mitigations should be adopted to manage generated wastewater:

- The domestic wastewater will be treated through septic tank prior to disposing off in nearby in Industrial city wastewater drain.
- For the treatment of wastewater, WWTP of adequate capacity and technology will be installed. It will consist of;
- Screening
- Grid Removal
- Primary Sedimentation
- Aeration
- Secondary Sedimentation
- Aeration
- Sludge drying bed.
- Water conservation activities will be adopted for the preservation of water.
- RO reject will be reused after primary treatment for on-site horticultural activities.
- Water conserving methods will be applied by placing taps and toilets.
- All faults will be monitored and fixed.
- Freshwater conservation techniques should be adopted to ensure sustainable development such as wastewater recycling plant.
- Monitoring of effluents shall be carried out as per requirement of Self-Monitoring and Reporting Tools (SMART) to ensure compliance with the PEQS.
- It will be ensured that no solid waste will be entered in the wastewater.

6.7.6. Health & Safety of Workers

Improper handling of chemicals, pharmaceutical products and raw material may cause various health issues such as inhaling, injection, work place incident, physical hazards, chemical hazards, etc. It can cause allergy reaction and many other issues. To ensure the safety of workers these impacts need to be managed effectively.

Nature of Impact

The nature of impact will be direct, low, long-term, and significant.

Mitigation

Following mitigations should be adopted to improve the health and safety:

- Regular inspection and maintenance of the plant will be carried out to eliminate the risk and associated hazards of any unfortunate incident.
- Workers will be trained on the regular basis regarding personal safety, disaster management physical and chemical hazards.
- Operators operating the plant should be fully trained and equipped.
- Training regarding HSE should be given on the regularbasis.
- Workers will be given PPEs such as; helmets, mask, ear-plugs/muffs, safety boots, etc.
- It should be strictly enforced to wear PPEs whileworking.
- Incidents should be reported directly to the concerned authority.
- Spillage prevention plan should be adopted and it should be implemented effectively.
- Floor surfaces shall be maintained and cleaned on regularbasis.
- Floor should be kept clean and free of oil spills, other slippery fluids or materials and obstructions.
- The effective use of hearing-protection devices shall beensured.
- Protective measures and emergency rescue procedures should be followed strictly.
- Only authorized persons shall be allowed in the processing and chemical storage areas.
- Unloading of the raw-material and loads of the final products should be controlled, supervised, slow and smooth.

6.7.7. Chemical Hazards

Direct exposure to pharmaceutical products may occur during the handling of chemicals related to pharmaceutical production. Avoid unnecessary chemical exposure to the workers who are working in the process area or related to the process. A long term and direct chemical exposure may impact the health of the workers and the risk of the spillage may increase. Nature of Impact

The nature of impact will be direct, low, long-term, and significant.

Mitigations

Following mitigation measures will be adopted:

- Personal Protective Equipment (PPEs) should be given to workers including protection and impermeable clothing for use during processing and handling chemicals, gloves, mask, safety boots, goggles, etc.
- Proper plan for the movement of the raw materials should be planned.
- Only authorized persons should be allowed for the handling of the chemicals.
- Wearing of the PPEs should be regulated strictly by the concerned authority.
- Chemical spillage will be avoided by developing proper SOPs for the handling of the chemicals.
- Chemicals and final products will be stored properly, and all precautionary measures will be adopted to eliminate all the hazards and risks associated with the handling and storage of material.
- There will a complete chemical store cleaning procedure/plan which will be cleaned & washed periodically.
- The ZLD & ZDHC guidelines will be followed maintaining of chemical storage area.

6.7.8. Security Risks

Many workers will be hired including skilled and un-skilled laborers. The increase in the number of the individuals residing in the area, may lead to an increase in crime and violence in surrounding areas. The nature of the impact is low as the locals will be preferred for hiring.

Nature of Impact

The nature of impact will be direct, low, long-term, and significant.

Mitigation Measures

Following mitigation measures will be adopted:

- Proper security will be provided to the workers working in the premises of proposed pharmaceutical project.
- Before hiring any worker and his criminal record may be checked.
- CNIC of all the workers will be kept by the proponent.
- Strict law will be enforced to control the crime at site.
- Security to the workers should be provided.

6.7.9. Emergency Response

Emergency response preparedness committee will be formulated consisted of heads of all the departments. Emergency Response Leader will be the head of the team assisted by safety team and safety supervisors. Emergency Response Leader along with his team will ensure that in the case of emergency, team is prepared for firefighting and the first aid kits will be provided which may include blankets, hot water bottles, stretchers, benches, sterilized dressing, snake bite kit, cotton and iodine (2% alcohol).

Incidents and accidents may take place unexpectedly during pharmaceutical project operations no matter how effective, strong, and efficient the mitigation measures for all adverse impacts; especially the safety issues may be adopted. These may include accident and natural disasters.

Nature of Impact

The nature of impact will be direct, low, long-term, and significant.

Mitigation

Following mitigation measure will be adopted:

- Site in-charge should be responsible to ensure that fire-fighting plan has been implemented with true spirit.
- Safety team will be responsible to monitor the activities and to act on the approved firefighting plan in the case of fire.
- Designated area fire marshals will be responsible to monitor their respective areas and act on firefighting plan in case of fire.
- Workers should be given adequate training of handling machinery.
- Emergency call service must be made available.
- The drills to check the response of the workers against any emergency will be carried out on the regular basis.
- Safety and hazards signs will be displayed with the facility to avoid any unfortunate incident.
- Only authorized persons will be allowed for the handling of the chemicals.

6.8. Socioeconomic Impact

It is envisaged that the adverse impacts associated with the operation of said pharmaceutical project includes local community will be disturbed due to increase in the traffic load (i.e., vehicles carrying raw material and final products), wastewater management, solid waste management & disposal, soil pollution, etc. The intensity of the aforesaid pharmaceutical project will be quite low. The commencement of the aforesaid pharmaceutical project will have a beneficial impact on the surrounding community such as; increase in employment opportunity, increase in the wages of the local area employees, increase in revenue generation, provision of social welfare funds of the employees and appreciation of land value.

Impacts

The aforesaid impact is positive and will have a direct, medium, long- term and significant impact.

Mitigation Measure

No mitigation measures will be required.

6.9. Environmental Enhancement Measures

The said pharmaceutical project will be result in following benefits:

- Direct and indirect employment opportunities,
- Gains in the local and national economy,
- Industrial development in region
- Business spin-offs in the factory area,

Tree plantation along boundary of pharmaceutical project will act as environmental enhancement measure. Trees including Shatoot, Jaman, Moor Pankh, Fish Paam, Trysenia, etc. will be grown on all open spaces and along boundary of pharmaceutical project.

7. ENVIRONMENTAL MANAGEMENT & MONITORING PLAN (EMMP)

A comprehensive management plan is necessary to implement the recommendations and suggestions for environmental protection included in chapter 7.

The objective of the Environmental Management and Monitoring Plan (EMMP) is to address all the major environmental issues and provide a framework for the implementation of the proposed mitigation measures during the construction and operational phases of the pharmaceutical project. The proper implementation of the EMP will ensure that all the adverse environmental impacts identified in the EIA report are adequately mitigated, either totally prevented or minimized to an acceptable level and required actions to achieve those objectives are successfully adopted by the concerned institutions or regulatory agencies.

The implementation of EMMP should be carefully coordinated with the design and construction program of the pharmaceutical project to ensure that relevant mitigation measures are implemented at the appropriate stage and that adequate resources are properly allocated to achieve the desired results. This EMMP has been prepared to satisfy the requirements of the Pakistan Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Review Procedures, 2000.

For effective environmental management, the management of the pharmaceutical project should assign the necessary responsibilities to its Health, Safety and Environment team, which should be responsible for environmental monitoring of the pharmaceutical project.

7.1. Objectives of Environment Management Program

The EMMP provides a delivery mechanism to address potential impacts of the pharmaceutical project activities, to enhance pharmaceutical project benefits and to introduce standards of good practice to be adopted for all pharmaceutical project works. The EMMP has been prepared with the objectives of:

- Defining roles and responsibilities of the pharmaceutical project proponent for the implementation of EMMP and identifying areas where these roles and responsibilities can be shared with other parties involved in the execution and monitoring of the pharmaceutical project.

- Outlining mitigation measures required for avoiding or minimizing potential impacts assessed in the (Environment Impact Assessment) EIA report.
- Developing a monitoring mechanism and identifying requisite monitoring parameters to confirm effectiveness of the mitigation measures recommended in the (Environment Impact Assessment) EIA report.
- Defining the requirements for communication, documentation, training and monitoring, management, and implementation of the mitigation measures.

7.2. Components of EMMP

Components of EMP are as follows.

- Management plan
- Monitoring Plan
- Communication and documentation
- Institutional capacity
- Environmental

Environment Management and Monitoring Plan for Bioceutica Laboratories				
S. #.	**IMPACT**	**MITIGATION MEASURE**	**RESPONSIBILITY**	
			IMPLEMENTATION	**MONITORING**
A.	**CONSTRUCTION STAGE**			
1.	**AIR QUALITY**			
	Dust, SO_2, NO_x & CO emissions from trucks, cause health issues to workers.	Spray by water trucks to minimize the dust. Maintenance of construction machinery should be made mandatory to reduce emissions. Haul-trucks carrying earth, sand, aggregate and other materials will be kept covered with tarpaulin to reduce dust pollution.	Contractor	Proponent through Consultant
2.	**NOISE**			

	The impact of noise generated during construction.	Engines of vehicles visiting project site should be properly tuned-up. The green zone of plants will also help decrease sound levels.	Contractor	Proponent through Consultant
3.	**OCCUPATION, HEALTH, AND SAFETY**			
	There will always be the possibility regarding hazard to health and safety of workers to occur during construction stage, lying of piles, and machines installation.	First aid facilities should be readily available for the workers at the site. The contractor will ensure the availability of transport and driver to handle any misshape which may occur. Relevant safety devices like belts, gloves and testers should be strictly used by the Labor force at the work site. Implement training programs that support the achievement of the staff and personnel's competency in relation to HSE.	Contractor	Proponent through Consultant
4.	**DISPOSAL OF CONSTRUCTION DEBRIS**			

	Each phase of the development shall produce solid waste, disposal of which, if not managed properly could have negative impacts on the site and surrounding area.	A site waste management plan should be made the responsibility of the contractor. The wastes should be properly segregated and separated to encourage recycling of some useful waste materials. Train or educate the involved stakeholders on the importance and means of waste management and handling.	Contractor	Proponent through Consultant
5.	**GROUND WATER QUALITY**			
	No appreciable impacts on the ground water quality are anticipated.	Avoid accidental spills through good work practice.	Contractor	Proponent through Consultant
6.	**SOIL CONTAMINATION**			
	Any improper storage or handling of materials including paints, fuels, solvents, oil, cement, etc. would result in soil contamination.	The contractor should be required to impart proper training to their workforce in the storage and handling of materials.	Contractor	Proponent through Consultant
7.	**FLORA & FAUNA**			

	No negative impact on the ecological environment will take place on account of cutting of any trees in the project area and clearing of vegetation from the site.	Trees and ornamental plants shall be planted along the project boundary which increase the aesthetic value of the site and will combat pollution. Landscaping is deemed to be a powerful mitigation activity with a positive impact.	Contractor	Proponent through Consultant
8.	**SOCIO-ECONOMIC ENVIRONMENT**			
	Several categories of employees will be required during the construction phase. This would have a positive impact on the local economy and on regional unemployment.	Socially responsible attitude of the project management towards local people and resources can make project people friendly. Awareness and educational programs introduced by the project management or e area can reduce the fear among the people regarding non-local people.	Contractor & Proponent	SIE
B.	**OPERATIONAL STAGE**			
9.	**AIR QUALITY**			

	Pharmaceutical manufacturing processes may release air pollutants such as volatile organic compounds (VOCs), particulate matter, and greenhouse gases. These emissions can contribute to air pollution and climate change. Implementing air pollution control measures, such as using emission control technologies, optimizing ventilation systems, and monitoring and managing air quality, can help mitigate these impacts.	Optimize ventilation systems within the facility to ensure proper air circulation and control pollutant dispersion. Use high-efficiency air filters to remove particulate matter and ensure regular maintenance to keep ventilation systems in optimal working condition.	Proponent	EPA
10.	**NOISE QUALITY**			
	Noise due to movement of vehicles, during traffic of materials.	No Mitigations required except for keeping maintenance of vehicles. Plantation along with roads will make buffer zone to avoid noise.	Proponent	EPA
11.	**OCCUPATION, HEALTH, AND SAFETY**			

	There will always be the possibility regarding hazards to health and safety of workers to occur during the operational phase of the project.	All the workers involved in transport of the materials will be suggested to wear boots, gloves, safety cap to avoid injury. All the vehicles should be properly tuned up and regular maintenance and periodic monitoring must be done. Strict rules should be made by the project administration to control speeds of vehicles.	Proponent	EPA
12.	**SOLID WASTE**			
	Pharmaceutical formulation facilities generate different types of waste, including hazardous chemicals, packaging materials, and byproducts from manufacturing processes. Improper handling, storage, or disposal of these wastes can pose risks to the environment and human health. Implementing waste management strategies, such as segregation, recycling, and proper disposal methods (including incineration or treatment), is crucial to minimize environmental impacts.	Solid waste will be collected by management, which will be managed by Bioceutica Laboratories waste management. • Waste Segregation method will be employed. • Recycling and Reuse: Identification of opportunities for recycling and reusing materials within the facility • Hazardous Waste Management: Development of a comprehensive hazardous	Proponent	EPA

		waste management program that includes proper storage, labeling, and disposal of hazardous chemicals. • Responsible Disposal: Engage with licensed waste management companies to ensure the proper disposal of non-recyclable and non-treatable waste		
13.	**WASTEWATER QUALITY**			
	The sewage effluents shall be discharged after primary treatment into the main sewerage tank.	The system for the primary treatment of the sewage effluent should be appropriately installed and maintained.	Proponent	EPA
14.	**FLORA & FAUNA**			
	Excessive plantation shall be done on the walls. This will act as a buffer zone and bring healthy change in the environment during the operational phase of the project.	The process of plantation should be kept sustainable throughout project life.	Proponent	EPA
15.	**SOCIO-ECONOMIC ENVIRONMENT**			

	Several employees will be required in the operational phase, and this would have a positive impact on the local economy and on regional unemployment.	The management of the project can capitalize the positive attitude of people of the study area towards this project by offering them maximum employment opportunities. Measurements and steps should be taken to keep undisturbed the privacy of adjoining workplaces.	Proponent	EPA

7.3. Proposed Mitigation actions

Table 13-Environment Management Plan

Category	Impact	Pharmaceutical project Activity	Monitoring Mechanism	Frequency	Monitoring Agency
Construction and Operation Phases					
Land Resource	Solid Waste	Implementation of SW* Management System	Record keeping and timely transfer of SW from bins to the disposal. site for composting	Daily	Manager HSE / Pharma ceutical project Proponent
	Soil Contamination	Implementation of Management Plans	Visual monitoring and complete soil analysis	Daily and Annually	
Air Resource	Air Emission	Dust emissions during construction and operation.	Monitoring of the emissions as per applicable standards Water sprinkling will be done regularly to avoid dust emissions	Once before start of operation and after that as when required during operation	
	Dust				
Ecological	Flora	Uprooting of trees	Inventory of uprooted	During Baseline	
Resource		during construction phase and maintenance of photographic record	trees and vegetation during operation phase	Survey, once in a year and after the completion of the Pharmaceutical project	
Noise		Plant operation & material transportation	As per applicable Standards	Fortnightly	
**SW= Solid Waste, **EA= Executive Agency*					

7.3. Institutional Capacity

Following functionaries will be involved in the implementation of EMMP:

- Mr. Muhammad Kashif, as the proponent of the pharmaceutical project and owner of Environmental Management Plan during construction as well as operation stage.
- Pharmaceutical project contractor(s) as executors of the EMMP during the construction phase of the pharmaceutical project.
- Operational & Maintenance (O&M) and the Health, Safety and Environment team of the pharmaceutical project as an executor of the EMMP during the operational phase of the pharmaceutical project.
- Environmental Protection Agency (EPA), Punjab as Government Department to review and monitor the implementation of remedial and mitigation measures as given in (Environment Impact Assessment) EIA.

7.3.1. Responsibilities of functionaries:

Specific responsibilities of key role players are illustrated hereunder:

7.3.2. Responsibilities of management of pharmaceutical project:

Management of the pharmaceutical project **Bio Ceutica Laboratories** will be responsible for the environmental management and supervisory affairs during the pharmaceutical project activities. Environmental personnel designated by the management of the pharmaceutical project will look after the environmental related issues during the pharmaceutical project activities. The responsibilities of Environmental personnel are as follows:

- Monitoring progress of the pharmaceutical project as per planned schedule of activities.
- Exercising oversight over the implementation of environmental mitigation measures by the contractor.
- Documenting the experience in the implementation of the environmental process.
- Preparing training materials and implementing programs.
- Maintaining interfaces with the other lined departments/ stakeholders and
- Reporting to the management of the pharmaceutical project on the status of EMMP implementation.

7.3.3. Responsibilities of pharmaceutical project contractor:

Contractor appointed for the commissioning of the pharmaceutical project including the auxiliary facilities is responsible for:

- Implementation of, or adherence to, all provisions of the EMMP and with any environmental and other codes of conduct required by the pharmaceutical project.
- Provision of proper Personal Protective Equipment (PPE) to the workers and train them for their proper use.

7.3.4. Responsibilities of EPA:

To review and monitor the implementation of remedial and mitigation measures as given in the (Environment Impact Assessment) EIA.

7.4. Training of Workers:

One of the most important mechanisms for the enhancement of the pharmaceutical project's overall environmental performance will be the implementation of a program of environmental training for the pharmaceutical project personnel and the Contractor's team. Environmental training will form part of the ongoing environmental management of the pharmaceutical project. It will help to ensure that Proponent's environmental policies and principles are followed. The Contractor will be expected to implement a formalized training program as to the extent feasible, building on the recommendations supplied in the Environment impact Assessment (EIA).

Suggested components of an environmental training program may be as follows:

- Promotion of environmental protection measures in company literature, broadsheets, posters, pharmaceutical project updates, etc.
- Provision of guidance notes on environmental protection to Contractor/s.
- Clear signs at worksites highlighting prohibited activities (discarding of wastes, smoking).
- Clear signs indicating sanitary disposal areas, safe drinking water sources, etc.

Adoption of these measures should help Proponent and the Contractor to achieve a high level of environmental awareness in the pharmaceutical project team, which should, in turn, promote sound environmental management during pharmaceutical project lifespan.

The Table 7-14 provides a summary of various aspects of the environmental and social training.

7.4.1. Training schedule:

A training log will be maintained by the management of the pharmaceutical project and contractors. The training log will include:

- Topic
- Date, time and location
- Trainer
- Participants

Important training under the spectrum needs to include:

- Training on fire fighting and safety management.
- Training on environmental safeguards and compliance.
- Staff training on environmental monitoring and reporting.
- Training on occupational health and safety measures.

Table 14-Training Schedule

Participants	Date, Time & Location	Training Topics	Schedule	Responsible Authority
Staff of Bio Ceutica Laboratories and the contractor	As specified	✔ Introduction to pharmaceutical project EIA and EMMP ✔ EMMP communication, documentation, monitoring and reporting requirements	Every month	Pharmaceutical project Manager
All site personnel	As specified	✔ Site induction training on HSE system and requirements at Incinerating Site ✔ Environmental sensitivities of the pharmaceutical project area ✔ Communication of environmental problems to corresponding officials ✔ Waste disposal	After every week	Pharmaceutical project Manager
Drivers	As specified	✔ Road safety ✔ Road restrictions ✔ Vehicle restrictions ✔ Waste disposal ✔ Defensive driving	After every 3 months	Pharmaceutical project Manager

Camp Staff	As specified	✔ Camp operations ✔ Waste disposal ✔ Good housekeeping	Monthly	Pharmaceutical project Manager

7.5. Equipment Maintenance Details

The proposed pharmaceutical project is the installation of Bio Ceutica Laboratories. at FIEDMC, Faisalabad. Actions necessary for retaining or restoring a piece of equipment, machine, or system to the specified operable condition to achieve its maximum useful life.

All tools, equipment and vehicles must be properly maintained so that workers are not endangered. Construction regulations require inspections of vehicles, tools, machines, and equipment before use. We must always be aware that maintenance tasks themselves are potentially hazardous and can result in injury.

The successful maintenance program is:

- well organized and scheduled,
- controls hazards,
- defines operational procedures, and
- Trains key personnel.

The degree of detail to include in your company's program regarding equipment maintenance will depend on the kinds of tools/equipment used. Some construction equipment (cranes) has very specific inspection and maintenance requirements. Passenger Vehicles (company trucks, cars and vans) may require only basic maintenance. Power Tools should be maintained in good working order. This may be limited to ensuring that blades/bits are replaced when needed and that guard or other safety devices are operable, and any damaged electrical cords/plugs are repaired or replaced. Damaged or defective equipment/tools should be tagged and removed from service.

7.6. Proposed Environmental Monitoring

Environmental monitoring can be categorized into two types:

- Compliance Monitoring
- Effects Monitoring

The environmental monitoring will be conducted according to SMART rules and EPA regulation.

7.6.1. Compliance Monitoring

Compliance monitoring will be carried out to ensure compliance with the requirements of the EIA and EMMP. The pharmaceutical project staff and contractors will carry out the inspections on a routine basis. This will also include the routine monitoring at the pharmaceutical project site as specified in EMMP.

7.6.2. Effects Monitoring

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

7.6.3. Monitoring components

Baseline environmental monitoring will be carried out for the following essential parameters.

- Noise Levels
- Ambient Particulate Matter
- Ambient Air Gases
- Ground Water
- Wastewater
- Soil Contamination
- Solid Waste
- Stack Emissions
- Vehicular Monitoring
- Flora & Fauna
- Health & Safety
- Machinery Maintenance

8. PUBLIC CONSULTATION

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 pharmaceutical project, plan future actions. This practice initiates a need assessment and identify areas of concern for all the parties that maybe affected by the pharmaceutical project activities.

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

Pharmaceutical project can actively participate in decisions on planning and management. The stakeholders including regulators, government representatives and NGOs were met to appraise and discuss the environmental and social perspective of pharmaceutical project activities related to the construction and operation of incineration unit. Their valuable concerns and suggestions were noted and thereafter incorporated in the EIA process and study.

During the field survey for this EIA study, meetings were held with the communities residing within the pharmaceutical project area. The objective of these meetings was to solicit and record their views and concerns for inclusion in pharmaceutical project design at the planning phase. In the same vein, meetings were held with the members of local and provincial government, NGOs and district government representatives.

All the stakeholders were briefed about the pharmaceutical project verbally. Their feedback was noted, and all the concerns voiced in the discussion were relayed to the management team of the pharmaceutical project.

9.1. Benefits and Objectives of Stakeholders Consultation

Consultation with stakeholders leads to an overall better understanding of the pharmaceutical 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 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 pharmaceutical project benefits and disadvantages; be able to contribute meaningfully to the pharmaceutical project design; and have greater trust with the pharmaceutical project proponent and support for the pharmaceutical project, says the Asian Development Bank. These factors contribute towards improved pharmaceutical 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 pharmaceutical project plans are finalized and development begins, thereby, avoiding public outcry and resentment.
- Instill trust between various stakeholders and the proponent to promote cooperation.

9.2. 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 pharmaceutical project and helps to evaluate and envisage the role of stakeholders. The influence or impact of the pharmaceutical 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. The stakeholders that are likely to be influenced by the pharmaceutical project activities or would like to participate in the pharmaceutical project include:

- **Industries surrounding the pharmaceutical project area.**

Stakeholders can be classified depending on the influence of the pharmaceutical project activities on them. The stakeholders for the pharmaceutical project are classified as follows:

- Industries: Industries, groups or institutions directly affected by the pharmaceutical project and can influence the pharmaceutical project outcome.
- Local communities: Residential areas around the pharmaceutical project site.

9.3. Views, Concerns and Suggestions of Various Stakeholders

The major socio-economic concerns and problems of the affected persons of various communities have been given in tabulated from along with their main concerns and remarks. Community showed a lot of concerns; a few are being mentioned here:

- Removal of shrubs and trees should be avoided to the extent possible in the case of clearance green zones should be established within the facility.
- Indigenous tress around the facility should be planted to control air pollution and as the compensation of construction activity.
- The pharmaceutical project will become the source of income for local to earn their livelihood easily and honorably, so locals should be preferred.
- For the solid waste management and waste disposal, proper disposal techniques should be adopted.
- Water spraying/sprinkling should be done on the regular basis during construction phase to avoid dust emissions.
- Employment opportunities will be generated, and locals should be hired on the priority basis.
- The air pollution is one of the major impacts from which Punjab is being affected at the large scale. So, ambient air quality should be monitored regularly, and air pollution expected to generate from the operation should be mitigated beforehand by installation of wet scrubber.
- Good relations with the local communities will be promoted by encouraging Contractor to provide opportunities for skilled and unskilled employment to the locals as well as on-job training.
- Noise generated activities should be carried out during day hours.

9.4. Methodology for Consultation

Stakeholder consultation is a two-way flow of information and dialogue between the pharmaceutical project proponent and stakeholders, specifically aimed at developing ideas that can

help shape pharmaceutical 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 informal focus group discussions were carried out with local communities and local government representatives. The meetings were held at various locations.

9.5. Environmental Practitioners and experts

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

Table 15-List of Experts

Sr. No	Name	Designation	Comments/Suggestions
1.	Engr. Muhammad Bilal	Environmental Engineer	Following comments are summarized to control the air pollution generation during operational phase • It should be ensured that the pollution abatement technique.
2.	Sara Fatima	Environmentalist	• She said that Installation of textile industry will have positive impact on economy, but its construction should be done in Environment Friendly way • During construction and operation emissions must be controlled properly • Basic facilities should be provided to local. Community
3.	Zia ur Rehman Farooqi	Ph.D. Scholar Environmental Sciences	Following mitigation measures should be adopted: • Tree plantation in designated green zones should be carried out. • Proper disposal of the solid waste • HSE management measures should be adopted and implemented effectively.
4.	Mr. Saffi Ahmed	Environmentalist	• He said that locals should be preferred for employment. • Value addition of area • In case of outsider's residence must be provided • Proper mitigation measures must be adopted while construction and operation of this pharmaceutical project

5.		Environmentalist	• She said that in case of removal of vegetation trees must be planted after construction at designated green areas. • Water conservation strategies must be adopted. • Solid waste must be collected and dispose off properly
6	Hafiz Zeeshan Safder		• Wastewater should not mix with surface water channels it must be properly dispose off after meeting PEQS. • Avoid groundwater contamination
7	Miss Misbah Ali	Environmental Engineer	According to her following mitigation measures should be adopted during construction. • Site re-vegetation must be done. • Latest technology must be installed. • Residence must be provided to contractors and workers. • Locals must be preferred for employment

Pictorial View of Consultation

Figure 10- Consultation with Nearby Community

Figure 11-Consultation with nearby Industries

9.3.1. Study area:

The area of M-3 industrial City was the part of our study boundaries but specifically, it included. The land for proposed unit is situated at M3 Indsutrial City, FIEDMC, Faisalabad.

9.3.2. Study schedule:

The composition and schedule to conduct the group discussions and interviews and impact location profile was prepared using the attached Performa in annexure.

9.3.3. Local community

Concerns of the locals of the pharmaceutical project were solicited and collected in the following manner:

- A field visit was arranged to contact the communities within 5km of the pharmaceutical project area.
- The team was completely aware of the processes and environmental issues related to the pharmaceutical project.

- A brief description of the pharmaceutical project was provided verbally to the local community, and they were asked to express their concerns regarding the pharmaceutical project.
- Concerns, complaints, and suggestions were recorded in written form.

9.3.4. Local Communities Concerns

The issues and suggestions raised were recorded in field notes for analysis, and interpretation, by reaching out to a wider segment of the population and using various communication tools such as participatory needs assessment, community consultation meetings, and focus group discussions. The findings of the Community consultations have been addressed in various sections of the EIA report, and the mitigation plans have been incorporated into the EMMP.

9.4. Key Findings of Study:

The study findings depict that people perceive overall positive social impacts by development of proposed pharmaceutical project. Their attitude towards pharmaceutical project development is highly positive with the expectation that locals are provided with jobs especially where unskilled labor is required. Majority of the people is convinced for positive sign for development in area and they correlate this change with the pace of their upward social mobility and progress. However, they want wastewater treatment plants to be installed.

9.5. Other department and agencies

Following officers of government departments were consulted by the socio-environmental team of the consultants and concerned details about the pharmaceutical project were noted down through personal interviews, group meetings, etc., in their offices, for instance,

Table 16- Views of Participants of Public Sector Stakeholders

Sr.#	Names	CNIC/Designation	Concerns
Environmental Protection Department			
1	**Imad Iqbal Gill**	**GM (FWMC)**	Following comments area summarized to control the pollution: • Solid waste should be managed in Environmentally friendly manner. • Wastewater should be treated effectively & approval should be acquired from concerned agency before disposing off in nearby drain. • HSE* at the site should be managed effectively. • No impact is being foreseen due to the selected location. • Locals should be given job opportunity.
2	**Ahmad Hassan**	**Environmental Inspector**	

Social Welfare Department			
3	**Sadia Rasheed**	**Deputy Director Officer**	Following comments are suggested by the Deputy Director on the behalf of Social Welfare Department: • Final goods should be affordable. for the locals. • The proposed product should facilitate locals and they should be economical. • Job opportunities should be given. to the locals. • Wages should be given according to the work assign to them. • Life insurance of the workers should be given as well as all the facilities should be given as per labor laws.
Irrigation Department			
4		**Subdivision**	Following comments were suggested:
	Sabir Hussain Ansari	**Executive Engineer**	• Untreated wastewater should not be disposed off in the nearby drains without proper treatment. • Beneficial as job opportunities will be available to the residents.
Forest Department			
5	**Ijaz Hakim**	**District Forest Officer Faisalabad**	Following recommendation were suggested by the forest department: • Planation and landscape activities should be carried out on broader scale. • Indigenous species such as; Arjarn, Barna, Neem, Suharjna, Amaltas and Jaman should be planted. • Proper drainage system must be available at site.

Figure 12-Consultation with Govt. Departments

9.6. Results of Survey

Following are the results of the survey with the local stakeholders:

8.6.1. Occupation of Respondents

Majority of the respondents (**38%**) belongs to the labor class, **16%** associated with their own business, **13%** were daily wagers, **13%** of respondents were associated with agriculture, **7%** were shopkeepers and remaining **7%** were the private employees. During survey, efforts were made to interact with local stakeholders representing all walks of life. The detailed graphic representation of occupational status is given below,

9.6.2. Personal Income

Based on the sample survey results, as the figure shows that 5% of the respondents were earning less than 20,000 rupees, 24% of respondents fall within the income range of 20,000–25,000, 41% respondents earn 30,001–40,000 while only 16% of the respondents earn within the range of 40,001–45,000 and 14% of respondents were earning more than 45,000 rupees.

9.6.3. Facilities Available

Basic facilities available in the study area are depicted here. It shows that electricity, telecommunication, gas supply water supply, sewerage system and every other routine facility is available in study area.

9.6.4. Acceptance Level of the Pharmaceutical project

The opinions of the respondents were noted during the public consultation. Most respondents (**94%**) of were in favor of aforesaid pharmaceutical project. They expect that establishment of aforesaid pharmaceutical project will also increase the economic value of local assets. According to them the proposed pharmaceutical project will boost the employment opportunities, mobility access to resources and social amenities.

Figure 13-Acceptance Level

10. CONCLUSION

The pharmaceutical project is aiming at providing pharmaceutical laboratory for the nearby market to meet the demand. The pharmaceutical project falls under the category of the pharmaceutical projects requiring Environment Impact Assessment (EIA).

At the end of this study, it has been found that:

- It has also developed ways and means for environmentally sustainable disposal of solid wastes to be generated from the pharmaceutical project operations.
- The noise levels will be kept well within the required limiting values of the NEQS Pakistan.
- This pharmaceutical project will create job opportunities during construction and operation stages leading towards reduction of poverty.
- Sewage will be passed through septic tanks before final treatment and disposal.
- It will help in improvement of community/social service status in the local area. It will also provide such facilities for people from other places.
- Pharmaceutical project site means the development criteria like electricity supply, gas supply, water supply and sewage system.
- There are no sensitive elements/segments of environment around the pharmaceutical project site.
- EMP, as recommended in this EIA Report, is to be put in place during all operational stages of the pharmaceutical project.
- Environmental monitoring by the pharmaceutical project proponent and a third party also ensures that the pharmaceutical project will run in accordance with legal requirements,
- Availability of water for the pharmaceutical project is ensured from the underground water sources without any effect on the needs of the people around the pharmaceutical project area.

Based on these findings of the EIA Report the pharmaceutical project merits for issuing of Environmental Approval by the Environmental Protection Agency, Government of Punjab, and Lahore.

Sources of Data

- Punjab Environmental Protection (Amendment) Act 2012 (PEPA)
- Guidelines for the preparation and review of Environmental Reports, October 1997
- Review of IEE/ EIA Regulation, 2000
- The 2004 Baseline Survey on Millennium Development Goals in AACs, Pakistan
- World Weather Online.com
- Water and Sanitation Agency (WASA), Lahore.
- RED Data Book of IUCN
- Material Safety Data Sheet (MSDS) of chemicals
- /www.wsask.ca/Global/Water%20Programs/Water%20Conservation/SWA-Water_Efficiency_on_the_Farm_Booklet_WEB.pdf
- http://www.madehow.com/Volume-2/Lead.html
- https://www.gravitatechnomech.com/Battery-Recycling/Environment-Guidelines.html
- https://www.gravitatechnomech.com/Lead-Metal/Lead-Pollution-Control-Solutions.html
- https://www.ila-lead.org/UserFiles/File/ILA9927%20FS_Recycling_V06.pdf
- http://www.ijirset.com/upload/2013/november/18_Disposal.pdf
- https://www.who.int/news-room/fact-sheets/detail/health-care-waste
- https://www.env.go.jp/recycle/3r/en/asia/02_03-2/04.pdf
- https://www.env.go.jp/recycle/3r/en/asia/02_03-2/04.pdf
- https://www.slideshare.net/DebajyotiBose/dioxin-and-furans-control-from-waste-to-energy-plants

GLOSSARY

Accommodate	(Of a building or other area) provide lodging or sufficient space for. "the cottages accommodate up to six people
Assessment	The action of assessing someone or something. "the assessment of educational needs"
Aspects	A distinct feature or element in a problem
Adverse	– Preventing success or development; harmful; unfavorable. "taxes are having an adverse effect on production"
Authorized	– having official permission or approval. "an authorized dealer"
Amendment	a minor change or addition designed to improve a text, piece of legislation, etc. "an amendment to existing bail laws
Ambient Air	Ambient air quality refers to the quality of outdoor air in our surrounding environment. It is typically measured near ground level, away from direct sources of pollution
Archaeological	the scientific study of material remains (as fossil relics, artifacts, and monuments) of past human life and activities
Annunciation	A formal public statement
Baseline	The existing conditions against which impacts of the proposed action and its alternatives can be compared.
Crushing	Deform, pulverize, or force inwards by compressing forcefully. "you can crush a pill between two spoons"
Containers	An object for holding or transporting something. "the cakes will keep for up to two weeks if kept in an airtight container"
Compliance	Acting according to certain accepted standards

Discrepancies	A difference between conflicting fact, claims or opinions
Disposal	the action or process of getting rid of something
Dumped	Deposit or dispose of (rubbish, waste, or unwanted material), typically in a careless or hurried way
Effluent	Any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapor
Environmental impact statement (EIS)	A document prepared to analyze the impacts on the environment of a proposed action and released to the public for review and comment. An EIS must meet the requirements of NEPA, CEQ, and the directives of the agency responsible for the proposed action.
Emission	The production and discharge of something, especially gas, or radiation." The effects of lead emission on health"
Evaluated	Estimate or determine the nature, value, quality, ability, extent or significance
Graded	Arranged in a sequence of grades or ranks; "stratified areas of the distribution"
Generation	– The production or creation of something
Incinerator	A furnace or a container for burning waste materials
Inadequate	Not capable or competent; lacking
Implementation	The process of putting a decision or plan into effect; execution
Intends	To have in mind as something to be done or brought about; plan:

	to design or mean for a particular purpose, use, recipient, etc.
Landfill site	for the disposal of solid waste in which refuse is buried between layers of dirt so as to fill in or reclaim low-lying ground
Legislation	Law enacted by a legislative body
Mobilization	To release or make available, as cells or chemical substances
Mitigation	The action of lessening in severity or intensity
Noise	Loud, unpleasant, unexpected, or undesired sound that disrupts or interferes with normal human activities
Potential	Having or showing the capacity to develop into something in the future
Pedestrian	A person who goes or travels on foot; walker
Proponent	The person who proposes or intends to undertake a pharmaceutical project
Sanitary	Relating to the conditions that affect hygiene and health, especially the supply of sewage facilities and clean drinking water
Segregate	Set apart from the rest or from each other; isolate or divide. "disabled people should not be segregated from the rest of society
Settlement	An official agreement intended to resolve a dispute or conflict. "unions succeeded in reaching a pay settlement
Ton	A short or net ton is equal to 2,000 pounds; a long or British ton is 2,240 pounds; a metric ton is approximately 2 to 205 pounds
Transportation	The action of transporting someone or something or the process of being transported. "the era of global mass transportation"

Ultimate	Being or happening at the end of a process; final. "their ultimate aim was to force his resignation"
Violations	the action of violating someone or something
Working place	From the out by side of the last open crosscut to the face
Flora	All the plant life in a particular region or period
Fauna	All the animal life in a particular region or period
Demarcated	Separately clearly, as if by boundaries
Screening	The display of a motion picture
Substitutions	An event in which one thing is substituted
Smelting	extract (metal) from its ore by a process involving heating and melting
Regulations	An authorized rule
Recycling	process of converting waste materials into new materials and objects
Stakeholders	A person or organization with an interest or concern in something
Rehabilitation	The conversion of waste land into land suitable for use of habitation or cultivation

LIST OFABBREVIATIONS

AA	Ambient Air
APHA	American Public Health Association
AOI	Area Of Influence
BOD_5	Biological Oxygen Demand
CMS	Convention On Migratory Species
COD	Chemical Oxygen Demand
dB(A)	Decibel
EA	Environmental Assessment
EHS	Environmental Health Safety
EIA	Environmental Impact Assessment
EPD	Environmental Protection Department
PEPA	Pakistan Environmental Protection Act
EPA	Environmental Protection Agency
ESIA	Environmental And Social Impact Assessment
ESA	Environmental And Social Assessment
ESMP	Environmental/Social Management Plan
EMP	Environmental Management Plan
EC	Electrical Conductivity
GIS	Geographical Information System
GOP	Government Of Pakistan
GPS	Global Positioning System
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HSE	Health Safety & Environment
HWMS	Hazardous Waste Management System
IEE	Initial Environmental Examination
I & D	Irrigation And Drainage
IAIA	International Association For Impact Assessment
IWM	Industrial Waste Management
IUCN	International Union For Conservation Of Nature

KM	Kilometers
LGO	Local Government Ordinance
MW	Mega Watt
MEAS	Multilateral Environmental Agreements
MSDS	Material Safety Data Sheets
NEQS	National Environmental Quality Standards
PMD	Pakistan Meteorological Department
PPE	Personal Protective Equipment
PEQS	Punjab Environmental Quality Standards
NEAP	National Environmental Assessment Plan
NWFP	North West Frontier Province
Q&EHS	Quality, Environment, Health & Safety
O & M	Operation And Maintenance
PKR	Pak Rupees
PPM	Parts Per Millions
PAP	Pharmaceutical project Affected People
PEPC	Pakistan Environmental Protection Council/Punjab
PSC	Pharmaceutical project Steering Committee
QA/QC	Quality Assurance/Quality Control
RAP	Resettlement Action Plan
ROG	Reactive Organic Gas
SWM	Solid Waste Management
TDS	Total Dissolved Solids
TT	Technology Transfer
UNFCCC	United Nation Frame Work Convention On Climate Change
UNCC	United Nation Convention To Combat Desertification
UNEP	United Nations Environmental Programs
GOP	Government Of Pakistan
WHO	World Health Organization
R&R	Rehabilitation And Resettlement
WWTP	Waste Water Treatment Plant

Terms of References

* According to regulation 7 of Review of IEE and EIA regulations, 2000, proponent shall pay, at the time of submission of IEE/EIA, a nonrefundable review fee to EPA, in accordance with rates specified in schedule-III.

* Provide all documents/details required for completion of IEA report

* Proponent shall be responsible for paying any fines/ penalties levied by the EPA Punjab or Environment Tribunal.

* Proponent shall be responsible correctness and validity of all information and documents provided to the consultant for onward submission to EPA Punjab and consultants will bear no responsibility.

In M/S Bio Ceutica Laboratory

for Enviro Stewards Co. (Pvt.) Ltd.

Ms. Sara Fatima

Mr. Zia ur Rehman

Table Pharmaceutical project Team and Responsibility

NAME	DESIGN	QUALIFICATION	TERM OF REFERENCES
Miss. Sara Fatima	Environmental Reporting Export	M.Sc Environmental Science	**Miss. Sara Fatima was responsible for:** • **IEE report writing** • **EIA report writing** • **Assessment of physical and socioeconomic baseline conditions at the pharmaceutical project Site.** • **Impacts assessment and proposed their mitigation measures.**
Ms. Mehvish Akbar	Environmental Engineer	B.Sc. Environmental Engineering	**Ms. Mehvish Akbar was responsible for:** • **IEE report writing** • **Biodiversity assessment** • **Detailed flora and fauna survey of pharmaceutical project site** • **Identification of threat to endangered species** • **Pharmaceutical project impacts on flora and fauna**
Mr. Zia Ur Rehman Farooqi	Technical Head	Ph.D Scholar	**Mr. Zia Ur Rehman Farooqi was responsible for:** • **Capacity building & training** • **Conducting and monitoring of health assessment surveys** • **Environment health risk assessment and management**
Ms. Misbah Ali	Environmental Engineer	B.Sc. Environmental Engineering	**Ms. Misbah Ali was responsible for:** • **Collection of baseline data.** • **Public consultation.** • **Preparation of survey tools including socio-economic survey tool and environmental checklist.**
Mr. Muhammad Ahmad Raza	Sociologist	M.Phil Sociology	**Mr. Muhammad Ahmad Raza** • **Public Consultation** • **Public Hearing** • **Site Visit**