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LIST OF ABBREVIATIONS

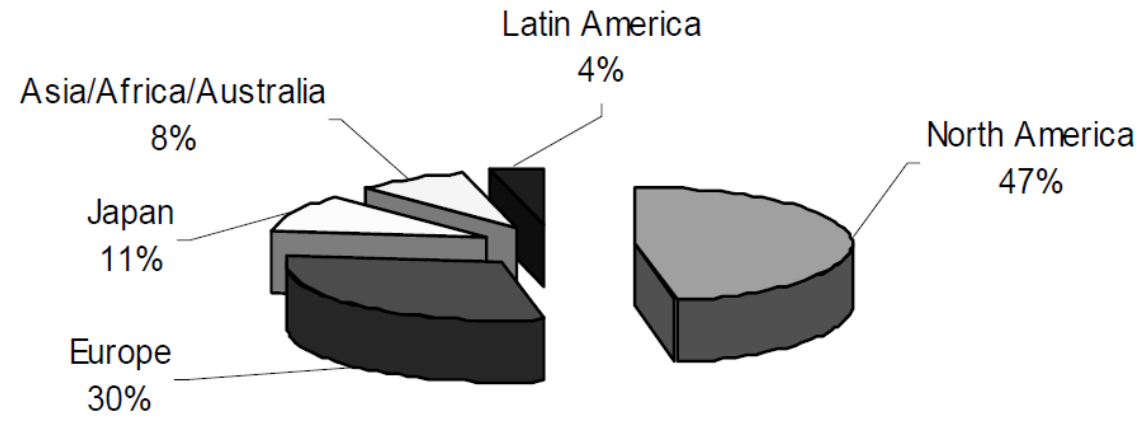
°C	Degree Celsius
dB(A)	A weighted decibel scale
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
EMP	Environmental Management Plan
Engr.	Engineer
EPA	Environmental Protection Agency
EPD	Environmental Protection Department
EPO	Environmental Protection Ordinance
GEL	Global Environmental Lab
IEE	Initial Environmental Examination
km	Kilometer
Ltd.	Limited
LTI	Loss Time Injury
LWI	Loss Work Injury
m^3/h	Cubic meter per hour
M/S	Masses
NEQS	National Environmental Quality Standards
No.	Number
NOC	No Objection Certificate
PEPC	Pakistan Environmental Protection Council

PEPA, 1997	Pakistan Environmental Protection Act, 1997
PEPA, 2012	Punjab Environmental Protection (Amendment) Act, 2012
PEPO	Pakistan Environmental Protection Ordinance
PKR	Pakistani Rupees
PM	Particulate Matter
PPEs	Personal Protective Equipments
Pvt.	Private
SMART	Self Monitoring and Reporting
SOPs	Standard Operation Procedures
TMA	Town Municipal Authority
WAPDA	Water and Power Development Authority

CHAPTER 1: INTRODUCTION

1.1 GENERAL

The pharmaceutical industry in any country is considered as the mainstay of public health. Looking at the global scenario, the importance given by developing nations to the pharmaceutical sector can be clearly identified by including healthcare and pharmaceutical industry in their health and welfare strategy. The global pharmaceutical market is valued at no less than US$440 billion, with annual growth of 6%.



Source: IMS

Figure 1: Global Sale- Pharmaceuticals (%)

The pharmaceutical industry is considered the backbone of public health services in Pakistan.

This is strategically important both for the well being of the population in general and for the provision of good yet affordable healthcare in particular. The low cost of production and the huge potential of this sector has attracted major multinationals to establish their operations and production facilities in Pakistan.

Local (Pakistani) pharmaceutical companies started in the 1960s but their growth increased in the 1980s. During the last decade, they made substantial investments in

production facilities and introduced the latest technology along with many new high quality products that were previously either unavailable or available on a limited scale at very expensive prices. By providing quality medicines at economical rates in this fashion, Pakistani pharmaceutical companies have contributed substantially towards public health.

The key to the success of Pakistani pharmaceutical companies is based on a simple formula, i.e. the production of high quality products at current Good Manufacturing Practices (cGMP)- compliant facilities and offering them at the most economical rates. Nearly all of Pakistan's leading pharmaceutical companies has maintained high standards to ensure compliance of all operations of production and quality control under the cGMP guidelines. As a result, they are now successfully exporting their products to various international territories.

For any development project to be initiated in Punjab, it is mandatory to accord Environmental Approval from EPA Punjab under Section-12 of the Punjab Environmental Protection (Amendment) Act, 2012 by filing an IEE or EIA before EPA Punjab, as may be defined in Review of IEE/EIA Regulations, 2022 or recommended by EPA Punjab. This Report presents the Environmental Impact Assessment for the Establishment of **Selmore Pharmaceuticals** is aiming to construct a pharmaceutical manufacturing plant of Activated Pharmaceutical Ingredient (API) at **PLOT NO-. 14 B, PHASE-II, QUAID-E-AZAM BUSINESS PARK, SHEIKHUPURA**. For this purpose the proponent has decided to engage environmental consultants, **M/S TETRATECH Environmental Consultancy** to conduct Environmental Impact Assessment for the Construction of project. The purpose of this study is to identify the environmental baseline i.e. physical, biological and socio-economic/cultural conditions and assess all possible impacts arising during the construction and operation phase of the project and to find out appropriate measures for their mitigation, to either eliminate those impacts or to bring them to acceptable level and formulation of Environmental Management Plan (EMP) for implementation of the project in environment friendly manner.

This report is prepared by critical examine of the environmental factors which might be affected due to construction and operation of the project. The purpose of this report is to analyze impacts of the project. This EIA provides the basis for a determination of the degree of the environmental impacts of the project.

The report provides relevant information, as required under the officially approved format, to help the decision makers i.e. EPA Punjab before issuing for the Environmental Approval.

1.2 THE PROPONENT

Name: Akbar Ali S/o Muhammad Sharif

Address: R/O House No-89, Block-A, PCSIR Phase-1, Lahore

Cell Number (Contact Person): 0321-4989420

1.3 THE PROJECT

The Project under study is titled as Establishment of **Selmore Pharmaceuticals Pvt. Ltd.** For the production of Activated Pharmaceutical Ingredient **(API)**. Its salient features have been described later in this Chapter, Chapter 3 and briefly in Executive Summary of the EIA.

1.3.1 NATURE OF PROJECT

This project is the Establishment of Pharmaceutical Unit.

1.3.2 SIZE OF PROJECT

Project will have a capacity of 600 Tons/ Annum .

1.3.3 LOCATION OF PROJECT

This project is to be located PLOT NO-. 14 B, PHASE-II, QUAID-E-AZAM BUSINESS PARK, SHEIKHUPURA.

1.3.4 AREA OF PROJECT

4.26 Acre will be the total area of project.

1.4 DETAILS OF CONSULTANTS

For the preparation of the EIA Report of this Project, the proponent has hired the services of the environmental consultants; **M/S TETRATECH Environmental Consultancy.** Team comprising of environmental engineers, chemical engineers, environmental experts and environmentalists has worked on this report. The following table lists the names of those experts:

Table 1: list of experts

Name of expert	Position held	Highest Qualification
Dr. Mateen Shafqat	Chief Advisor	PhD Environmental Sciences, PMAS, Arid Agriculture University
Naveed Ahmed	Chief Environmentalist	M. Phil Environment Sciences, Arid University, Islamabad BS Environment Sciences, UOG, Gujrat
Mr. Shahzaib Ahmed	Social Scientist	M. Phil Development Studies, PIDE, Islamabad.
Jawad Shafiq	Environmentalist	BS Environmental Sciences

		University of Gujrat
Amna Hafeez	Environmentalist	MS Environmental Science, Punjab University, Lahore
Rahma Butt	Environmentalist	MS Environmental Science, UET, Lahore BS (Hons) Environmental Science, Lahore college for women University.

1.5 PURPOSE OF REPORT

The main objectives of this EIA study were:

- To determine and document the state of the environment of the project area to establish a baseline in order to assess the suitability of the Project in that area.
- To identify pre-construction, construction and operation activities and to assess their impacts on environment.
- Provide assistance to the proponent for planning, designing and implementing the project in a way that would eliminate or minimize the negative impact on the biophysical and socio-economic environment and maximizing the benefits to all parties in cost effective manner.
- To present Mitigation and Monitoring Plan to smoothly implement the suggested mitigation measures and supervise their efficiency and effectiveness.
- To provide opportunity to the public for understanding the project and its impacts on the community and their environment in the context of sustainable development.

- Prepare an EIA Report for submittal to the Environmental Protection Agency, Punjab for according Environmental Approval.

1.6 SCOPE OF STUDY

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

- Description of physical, ecological and socio-economic conditions in and around the facility.
- Project impact identification, prediction and significance at all stages of the project including planning, implementation and operation.
- Identification and assessment of the workability of mitigation measures to offset or minimize negative project impacts on environment.
- Identification of occupational hazards during all stages of the project and laying down suggestions for improvement in the conditions.

1.7 METHODOLOGY

Methodology of preparing EIA report follows:

1.7.1 SCOPING

The key activities of this phase include:

Project Data Compilation: A generic description of the activities relevant to environmental assessment is compiled with the help of the proponent.

Published Literature Review: Secondary data on weather, water resources and vegetation, and other relevant environmental features of the project area and the similar projects, is reviewed and compiled.

Legislative Review: Information on relevant legislations, regulations, guidelines, and standards is reviewed and compiled.

Identification of Potential Impacts: The information collected is reviewed and potential environmental issues are identified.

Identification of Mitigation Measures: Mitigation measures are identified for all the likely impacts in order of preference for avoiding the impacts altogether, minimizing their frequency or extent and compensating or rectifying the losses; as may be found practicable in the project.

Selection of Alternatives: Based on the potential impacts and the cost required to mitigate them, most crucial project employing the best available technology at the most feasible site is selected.

Scoping Meeting: A scoping meeting is held to share this basic level of project information with all the project stakeholders before the information is incorporated into the report, so that some improvement can be sought out in the data as may be necessary, better or more friendly alternatives can be selected, and better and more practicable mitigation measures can be suggested

1.7.2 BASELINE DATA COLLECTION

A considerable amount of baseline information on the project area was available from the environmental studies previously conducted in the region of other projects. A field visit was conducted to collect primary data on the water quality, ambient air quality, noise level, and ecological species surviving in the area and the ecosystems prevalent, and the lifestyle, socio-cultural setup, income and sources of income and the facilities available for the residents in the areas around the unit. For ambient air and water quality, tests were conducted by an EPA-certified laboratory, noise level was measured using noise meter, and for socioeconomic profile, people around the site were interviewed.

1.7.3 IMPACT ASSESSMENT

The environmental and socio-economic features and other project information collected, is used to assess the potential impacts of the activities. The issues studied include potential project impacts on:

- Geomorphology
- Meteorology
- Groundwater and surface water quality
- Ambient air quality & noise level
- The ecology of the area, including flora and fauna
- Local communities

Wherever possible and applicable, the discussion covers the following aspects:

- The potential change(s) in environmental parameters likely to be effected by project related activities
- The identification of potential impacts
- The evaluation of the likelihood and significance of potential impacts
- The defining of mitigation measures to reduce impacts to as low as practicable
- The prediction of any residual impacts, including all long-term and short-term, direct and indirect, and beneficial and adverse impacts
- The drafting of monitoring arrangements of residual impacts

1.7.4 DOCUMENTATION

This EIA Report is prepared according to the relevant guidelines prescribed by the Punjab Environmental Protection Agency at the end of assessment. It includes findings of all the phases of the assessment process. Before preparation of the final report for

submittal to the EPA Punjab, draft report was presented to the Proponent for review and comments.

1.8 STRUCTURE OF REPORT

EIA Report comprises following chapters:

Chapter 1: Introduction (A description of the project, proponent and consultants, the need for the project and the report and method of preparing it).

Chapter 2: Policy, statutory, and institutional Framework (A description of the pertinent national & provincial legislations, regulations and policies that are relevant and applicable to the project and a demonstration of how the project conforms to them).

Chapter 3: Project Description (Full description of the relevant parts of the project and summary of project inputs and outputs).

Chapter 4: Baseline Study (Description of project area's existing physical, biological and socio-economic condition, including geomorphology and soils, water resources, air quality, flora, fauna and demography).

Chapter 5: Stakeholder Consultation (All stakeholders are consulted in a public hearing and their concerns are considered)

Chapter 6: Project Impacts and mitigation measures (Presents an assessment of the project's impacts, suggested mitigation measures in order of eliminating or minimizing the impacts or compensating for the loss or rehabilitating the environment, residual impacts and the monitoring requirements).

Chapter 7: Environmental Management & Monitoring Plans (Provides Environmental Management Plan & Environmental Monitoring Plan for both construction and operation phases of the project).

Chapter 8: Conclusions & Recommendations (Concludes the EIA Report with a few recommendations to conduct the project in environment-friendly manner).

CHAPTER 2: STATUTORY REQUIREMENTS & STANDARDS

2.1 GENERAL

Sustainable development and green economy is a concept that has emerged over the past decades to describe a new framework aimed at economic and social development while maintaining the long term integrity of the ecological system and environmental resources. The principal of sustainable development is in the process of being incorporated into the national policy and legislation through various statutory instruments. This chapter describes the current legal responsibilities of the proponent in context of environmental and sustainable development, and the institutions that exist in the country that may influence the environmental management of the project.

This section deals with the current policy as well as legal and administrative framework related to carrying out of Environmental Impact Assessment (EIA) of the project. An efficient and effective organizational structure is essential for successful implementation of the mitigation measures identified for the project. Like other projects, the project, before its implementation, is required to go through an Environmental Assessment, in accordance with the provisions of the Punjab Environmental Protection (Amendment) Act 2012.

2.2 EXISTING LEGISLATION AND LEGAL FRAMEWORK

The Federal Ministry of Environment was responsible authority for policy making on environmental protection in Pakistan but after 18th Amendment in the Constitution, the Provincial Governments have taken over the subject of Environment. This EIA study has been carried out in the light of the policy guidelines of the Preparation of IEE/EIA Reports under the procedures and practices formulated by the Pak EPA and adopted by the Punjab Environmental Protection Agency (EPA).

2.3 INSTITUTIONAL SETUP

2.3.1 ENVIRONMENTAL PROTECTION COUNCILS

The Punjab Environmental Protection Council (PEPC) is the apex decision-making body of Punjab. It has been developed under the provision of Punjab Environmental Protection (Amendment) Act 2012. It is headed by Chief Minister of Punjab with other members. The purpose of EIA is basically to obtain Environmental Approval from the Environmental Protection Agency (EPA), Punjab in compliance with Pakistan Environmental Protection Act (PEPA) - 1997, now having been replaced by Punjab Environment Protection (Amendment) Act 2012.

2.3.2 ENVIRONMENTAL PROTECTION AGENCIES

Pak EPA has been established at the Federal level and EPAs are established at Provincial level also. In Punjab an independent Environmental Protection Agency is constituted headed by the Director General.

2.3.3 ENVIRONMENT PROTECTION DEPARTMENT, PUNJAB

The Punjab Government has established Environment Protection Department (EPD) administratively controlled by the Secretary, Government of Punjab. The EPD has its independent Minister. According to the provisions of the Punjab Environmental Protection (Amendment) Act, 2012, EPD has a significant role in policy making and implementation of the environmental laws in the Punjab Province.

2.4 RELEVANT LEGAL / INSTITUTIONAL FRAMEWORK

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

A number of laws have been promulgated by the Government of the Pakistan to deal with the environmental and social aspects related to the implementation of various

development projects in the country. In 1983, the Government of Pakistan issued an Environmental Protection Ordinance (EPO) that was replaced by the PEPA, 1997, through an Act of Parliament. According to the 18th Amendment in Constitution, the PEPA 1997 has been confined to Federal Area and provinces have been allowed to formulate their own environmental legislation in the subject of environment.

Under the PEP Act, it is mandatory to carry out IEE or EIA for all development projects. The Pak EPA has also framed guidelines for environmental assessment of projects in various developmental sectors, According to PEPA 1997; the National Environmental Quality Standards (NEQS) were established for effluents discharges and gaseous emissions of various Municipal and Industrial sources. The latest revision of NEQS as carried out in year 2000.

Provincial Environment Protection Departments are also working on the formulation and enforcement of environmental statutes and by-laws. The Pak EPA has issued several policies guidelines and adopted measures for streamlining the environmental assessment. Though, the need for environmental screening and assessment has received some weight during the recent past, strict implementation of the NEQS is still a dream to be realized. The applicable laws for the environmental study of the Project are briefly described below:

2.4.1 PAKISTAN ENVIRONMENTAL PROTECTION ORDER (PEPO) 1983

In 1983, the Government of Pakistan issued an Environmental Protection Ordinance (EPO) 1983. It was the first legislation promulgated for the protection of environment. According to PEPO, 1983 it was necessary to carry out IEE / EIA for all development projects, but there were no IEE / EIA regulations under that ordinance.

2.4.2 PUNJAB ENVIRONMENTAL PROTECTION (AMMENDMENT) ACT2012

Section 12 of the Punjab Environmental Protection (Amendment) Act 2012 makes it mandatory for the proponent of a project to file with the Environmental Protection Agency either an Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA), as the case may be, in respect of the project.

As per definition given in the Punjab Environmental Protection (Amendment) Act 2012, Environmental Impact Assessment (EIA) means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory, and compensatory measures, formulation of environmental management & training plans & monitoring arrangements, and framing of recommendations and such other components as may be prescribed. The provision of Section 12 has been incorporated “as it is” in the new Punjab Environmental Protection (Amendment) Act, 2012.

2.4.3 NATIONAL ENVIRONMENTAL POLICY 2005

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

The National Environmental Policy (2005) provides a framework for addressing the environmental issues (particularly pollution of fresh water bodies and coastal waters, air pollution, lack of proper waste management, deforestation, loss of bio diversity, desertification etc.) confronting Pakistan. It recognizes the goals and objectives of the Pakistan National Conservation Strategy (PNCS, 1992), National Environmental Action Plans, and other existing environment related national policies, strategies, and action plans. It also provides broad guidelines to the Federal Government, Provincial Governments, federally administrated territories and local governments to address

their environmental concerns and to ensure effective management of their environmental resources.

2.4.4 REVIEW OF IEE / EIA REGULATIONS 2000

The Pak EPA has issued Review of the Initial Environmental Examination and Environmental Impact Assessment Regulations 2000, to review the Initial Environmental Examination (IEE) / Environment Impact Assessment (EIA) reports. Categorization of the projects for IEE and EIA is one of the main components of the Regulations. Projects have been classified on the basis of expected degree of adverse environmental impacts. Projects type listed in Schedule I are designated as potentially less adverse effect, schedule I projects require an IEE and projects given in schedule II require EIA to be conducted.

Salient features of the Regulations are listed below:

- Categories of project requiring IEE and EIA are issued through two schedules attached with the regulations
- A fee depending on the cost of the project has been imposed for the review of IEE and EIA.
- The submittal is to be accompanied by an application in prescribed format included as Schedule IV of the Regulation.
- The EPA is required to issue conformation of compliance within 15 days of receipt of request and complete documentation.
- The IEE / EIA approval for construction of the project will be valid for three years from date of accord.

2.4.5 GUIDELINES FOR THE PREPARATION OF IEE/EIA REPORTS

The Pak EPA has also framed Guidelines for the Preparation of IEE / EIA of projects in various developmental sectors.

2.4.6 THE PUNJAB LOCAL GOVERNMENT ORDINANCE, 2001

Schedules 4 and 8 of this Ordinance pertain to environmental pollution. There are not withstanding any specific provisions, every local government may perform functions conferred by or under the Punjab Local Government Ordinance, 2001, and in performance of such functions may exercise such powers, which are necessary and appropriate. Under the ordinance, the local councils are authorized to restrict projects causing pollution to air, water or land. They may also initiate schemes for improving the environment.

2.4.7 PAKISTAN PENAL CODE, 1860

This defines the penalties for violations concerning pollution of air, water bodies and land. Sections 272 and 273 of this Act deal with the adulteration of food or drink. Noise pollution has been covered in section 268, which defines and recognizes noise as a public nuisance. ''A person is guilty of a public nuisance who does any act or is guilty of an illegal omission which causes any common injury, danger of annoyance to the public or the people in general who dwell or occupy property in the vicinity, or which must necessarily cause injury, obstruction, danger or annoyance to persons who may have occasion to use any public right''.

2.4.8 THE LAND ACQUISITION ACT, 1894

The Land Acquisition Act (1894) deals with the acquisition of private properties for public purposes. There are 55 sections in this Act mainly dealing with area notification, surveys, acquisition, compensation, apportionment awards, disputes resolution, penalties and exemptions.

Although quite old, this act laid out the legal basis for any property affected by a project and for compensating the effected owners of the land.

2.4.9 FACTORIES ACT, 1934

The clauses relevant to the project are those that concern the health, safety, and welfare of workers, disposal of solid waste and effluent and damage to private and public property. The Factories Act also provides regulations for handling and disposal of toxic and hazardous materials. Given that construction activity is classified as 'industry', these regulations will be applicable to the project contractors.

2.4.10 LABOR LAWS

Construction and operational activities during the course of construction may affect occupational health of workers. Employers are required to abide by labor laws in respect of their own employees and also to ensure that contractors to follow the relevant labor laws and rules relating to safety of the workforce and creating a healthy working environment. The proponents shall ensure that the labor force engaged at the project site is not exposed to any danger by monitoring the contractor's work frequently.

CHAPTER 3: DESCRIPTION OF PROJECT

3.1 GENERAL

This section of the study concentrates on details of the project and its salient features; such as location, site layout, objectives, selection of alternatives, cost and magnitude of operation and various phases. Inputs and discharges relevant to different phases of the project, such as electricity & materials, etc. have also been examined as a response to possible environmental concerns.

3.2 TYPE AND CATEGORY OF PROJECT

As per Review of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Regulations, 2022 the proposed project; i.e. Establishment of **Selmore Pharmaceuticals Pvt. Ltd** falls in the category of projects mentioned in under ***Schedule II (B-manufacturing and processing),*** Subsection-2" Chemical Manufacturing units, Including Pharmaceuticals and Cosmetics.

3.3 OBJECTIVES OF PROJECT

The main objective for the Establishment of Project is to carry out the competitive business of manufacturing high quality (API) pharmaceutical products and to meet market demand at affordable prices through dedication, sincerity, hard work and attitude. Also Proponent's intention is to become one of the most valued Pharma industry by continuously manufacturing a wide range of (API) pharmaceutical products that comply with the highest regulatory standards.

3.4 ALTERNATIVES

3.4.1 Site Alternatives

A land under undisputed ownership of the proponent is selected for the Establishment of Unit. Selected site is located in Quaid-e-Azam Business Park, Sheikhupura so no other alternative site is feasible for Proposed Project. The site is well located in regard to the following:

- Easy road access to the market
- No settlements in close vicinity
- No watercourse within a safe distance
- No ecologically sensitive or declared protected area within 10 km of the selected site

In view of these facts, it can be concluded that the Selected Site is best suited for the project, and will not pose any adverse impact or threat on any component of the environment.

3.5 LOCATION AND LAYOUT OF PROJECT

3.5.1 Location of the Project

The proposed project of the Establishment of Pharmaceuticals for (API) is PLOT NO-. 14 B, PHASE-II, QUAID-E-AZAM BUSINESS PARK, SHEIKHUPURA.

3.5.2 Layout of the Project

Layout map of the project site is attached with the report.

3.6 LAND OWNERSHIP

Allotment documents have been attached with this report clearly showing that the site selected for the Project lies under the proponent’s ownership without any dispute.

3.7 GOVERNMENT APPROVALS

Management has applied for Environmental Approval and after getting Environmental Approval, they will apply for other required approvals. All the licenses and approvals required by a pharmaceutical industry only be obtained when company launches its products in market. At this time, the project is proposed only and Drug Regulatory Authority will issue license to **Selmore Pharmaceuticals Pvt. Ltd** after launch of their products.

3.8 LAND USE ON SITE

Land is currently open and will be used for industrial purpose in an industrial estate.

3.9 ROAD ACCESS

Main roads and markets are in easy and close access of the project site

3.10 RELOCATION AND REHABILITATION PLANS

There exists no human settlement **above 1.49 km** radius of the selected project site to be displaced owing to the commencement of the Project as it is located in industrial area. No structure of any significance stands at the site to be relocated or dismantled. Land is already under proponent's ownership, and no fresh land is to be occupied; hence, no relocation and rehabilitation is required.

3.11 VEGETATION FEATURES OF SITE

Land is clear and there are no plants or vegetation on site.

Various local plants will be grown at the project site in the open areas, and along the boundary.

3.12 DESCRIPTION OF PROJECT

3.12.1 Raw Material

API(Active pharmaceutical ingredient)

It is raw material for the manufacture of tablet, syrup, injection and other finished drugs formulation, although API pharmaceutical product but cannot be used without final formulation by pharmaceutical formulation unit. Therefore it is called pharma raw material for pharmaceutical industry.

SELMORE Pharmaceutical will be manufacturing raw materials for pharma industry after reacting with different raw materials. The basic raw materials such as Liquid Solvent, Solids for Reaction and Gases will be used for manufacturing of finished products of Activated Pharmaceutical Ingredient (API). About 600 Ton/Year of above-mentioned Products raw materials will be used to manufacture different products.

3.12.2 Finished Product

Raw Material (API) for Tablets, Dry powder and liquid injectables, Capsules, Syrups, Sachet and suspensions will be the finished products.

3.12.3 Capacity

The basic raw materials such as Liquid Solvent, Solids for Reaction and Gases will be used for manufacturing of finished products of (API). About 15 Ton/Month of above-mentioned Products raw materials will be used to manufacture different products of API.

3.12.4 General Process

3.12.4.1 Tablet manufacturing process

Tablets are solid dosage forms consisting of active ingredient(s) and suitable pharmaceutical excipients. They may vary in size, shape, weight, hardness, thickness, disintegration and dissolution characteristics, and in other aspects. They may be classified, according to the method of manufacture, as compressed tablets or molded tablets.

Mixing

It is the process in which two or more than two components in a separate or roughly mixed condition are treated in such a way so that each particle of any one ingredient lies as nearly as possible to the adjacent particles of other ingredients or components. Usually mixing is done to ensure that there is uniformity of composition between the mixed ingredients which may be determined by taking samples from the bulk material and analyzing them, which should represent overall composition of the mixture.

Granulation

Granulation may be defined as a size enlargement process which converts small particles into physically stronger & larger agglomerates. Granulation method can be broadly classified into two types: The ideal characteristics of granules include spherical shape, smaller particle size distribution with sufficient fines to fill void spaces between granules, adequate moisture (between 1-2%), good flow, good compressibility and sufficient hardness.
The effectiveness of granulation depends on the following properties:

- Particle size of the drug and excipients
- Type of binder (strong or weak)
- Volume of binder (less or more)
- Wet massing time (less or more)

- Amount of shear applied
- Drying rate (Hydrate formation and polymorphism

Drying

Drying is an important step in the formulation and development of a pharmaceutical product. It is important to keep the residual moisture low enough to prevent product deterioration and ensure free flowing properties. The commonly used dryers include Fluidized – bed dryer, Vacuum tray dryer, Microwave dryer, Spray dryer, Freeze dryer, Turbo - tray dryer, Pan dryer, etc.

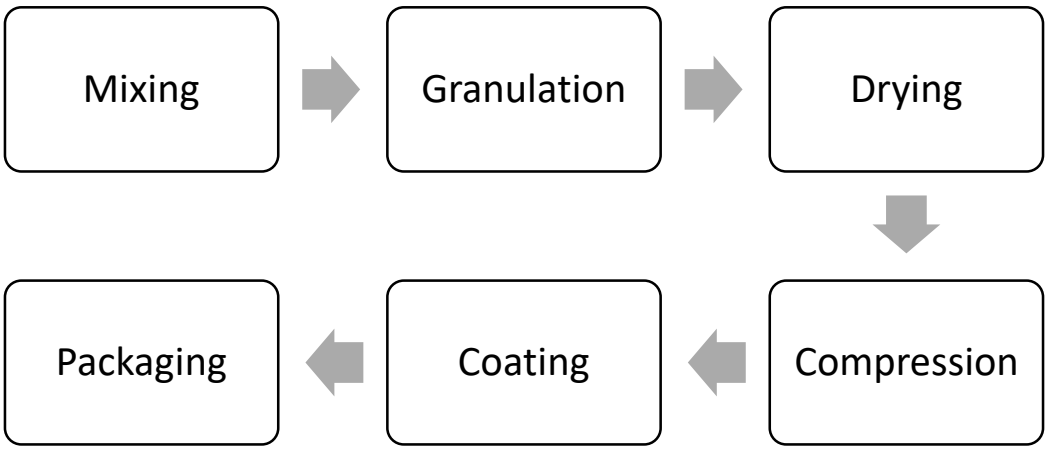
Compression

The compression stage of the tablet manufacturing process forms the tablet. This stage involves bringing together the upper and lower punches under pressure within the die to form the tablet. As the punches enter the compressing stage, the upper and lower punches move between two large wheels called pressure rolls. These pressure rolls push the punches together to form the tablet. The distance between the upper and lower punches determines the thickness and the hardness of the tablet. When the punches are close together, a thin and hard tablet is created. When the punches are farther apart, the tablet made is softer and thicker. The proper balance of thickness and hardness determines the optimum roll distance for any specific product. These adjustments are made while keeping the tablet weight constant.

Coating

Once a good tablet is made, we often need to add a coating. The coating can serve many purposes; it makes the tablet stronger and tougher, improves taste, adds color, and makes the tablet easy to handle and package.

The



reasons for tablet coating are to protect the medicinal agent against destructive exposure to air and/or humidity, to mask the taste of the drug, to provide special characteristics of drug release, to provide aesthetics or distinction to the product, to prevent inadvertent contact by non patients with the drug substance

Packaging

Pharmaceutical manufacturers have to pack their medicines before they can be sent out for distribution. The type of packaging will depend on the formulation of the medicine. 'Blister packs' are a common form of packaging used for a wide variety of products. They are safe and easy to use and they allow the consumer to see the contents without opening the pack.

Primary packaging is the material that first envelops the product and holds it. This usually is the smallest unit of distribution or use and is the package which is in direct contact with the contents. Secondary packaging is outside the primary packaging – perhaps used to group primary packages together. Tertiary packaging is used for bulk handling, warehouse storage and transport shipping. The most common form is a palletized unit load that packs tightly into containers.

3.12.4.2 Capsule Manufacturing Process

In the manufacture of pharmaceuticals, **encapsulation** refers to a range of dosage forms—techniques used to enclose medicines—in a relatively stable shell known as a **capsule**, allowing them to, for example, be taken orally or be used as suppositories. The two main types of capsules are:

- Hard-shelled capsules, which are typically made using gelatin and contain dry, powdered ingredients or miniature pellets made by e.g. processes of extrusion or spheronisation. These are made in two halves: a lower-diameter "body" that is filled and then sealed using a higher-diameter "cap".
- Soft-shelled capsules, primarily used for oils and for active ingredients that are dissolved or suspended in oil.

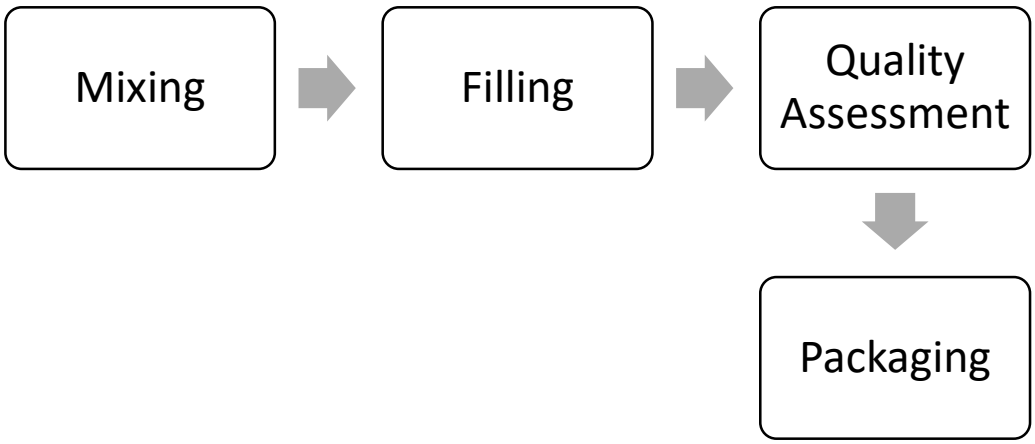
Mixing:

Once the raw material has been collected or released by quality control it is weighed and mixed in desired proportions for each type of product according to the master formula.

Filling:

Mixture is then filled in capsule shell. A number of different manually and mechanically operated capsule filling machines are commercially available for filling up to 100 to 100000s capsules at a time. The method of using these machines requires a careful determination of the capsule formulation. Empty gelatin capsule shells are placed in the machine and, oriented so that the caps are placed in the caps holding plates and body portion are placed in body holding plates. The machine works by separating the base from the cap and the portion of the machine holding the caps is removed and set aside. The powder is poured into body portion and the caps are placed on body portion later on and are pressed to lock.

Quality Assessment:



Capsule quality is monitored throughout the production process including size, moisture, content, thickness and color. Capsules are also visually inspected and monitored on specially designed inspection stations.

Packaging:

The pharmaceutical manufacturers have to pack their medicine before they can be sent out for distribution. The type of packaging depends on the formulation of the medicine. Blister packs are a common form of packaging used for a wide variety of products. They are safe and easy to use and they allow the consumer to see contents without opening the pack. Products are packed in following sequence:

Primary packaging is the material that first envelops the product and holds it. This usually is the smallest unit of distribution or use and is the package which is in direct contact with contents. Secondary packaging is outside the primary packaging-perhaps used to group primary packages together. Tertiary packaging is used for bulk handling, warehouse storage and transport shipping. The most common form is a palletized unit load that packs tightly into containers.

3.12.4.3 Injectables Manufacturing

Injectable refers to the dosage form that is delivered via an injection. Liquid injectables are stored in vials, IV bags, ampoules, cartridges, and prefilled syringes. As with solid formulations, liquid formulations combine the drug product with a variety of

compounds to ensure a stable active medication following storage. These include solubilizers, stabilizers, buffers, tonicity modifiers, bulking agents, viscosity enhancers/reducers, surfactants and chelating agents.

Vials /Ampoules Washing:

For cleaning of vials, wash the vials with a normal lab dish washer to remove any dust particles.

Sterilization:

Sterilization is generally referred to any process that eliminates (removes) or kills (deactivates) all forms of life and other biological agents. Sterilization can be achieved by heating, using chemicals, irradiation, high pressure and filtration. Chemicals used for sterilization are Ethylene Oxide, Nitrogen Dioxide, Ozone, Glutaraldehyde and formaldehyde, Hydrogen Peroxide and peracetic acid.

Mixing:

Mixing is the process in which two or more than two components in a separate or roughly mixed condition are treated in such a way so that each particle of any one ingredient lies as nearly as possible to the adjacent particles of other ingredients or components. It includes the dissolution of soluble solids in viscous liquids for dispensing in the preparation of injectables. Usually mixing is done to ensure that there is uniformity of composition between the mixed ingredients which may be determined by taking samples from the bulk material and analyzing them, which should represent overall composition of the mixture.

Filling:

Vial filling machines are used to fill vials and bottles with liquids, viscous material , suspensions and powders. Vial Filling Machine comprises of an intake section which loads the vials, which are then transferred through an intermittent transport section.

These pharmaceutical equipments also have a liquid filling section which fills the vials with predetermined quantity of liquid or viscous material. Finally the filled and rubber stopper vials are released and discharged from the machine outlet. Check weight feature enables to maintain consistency in the weight of vials.

Autoclave:

Sterilization is again done using autoclave. Autoclave destroys microorganisms more efficiently than dry heat and hence the materials are exposed to a lower temperature for a shorter period. It is used for sterilization of a large number of official injections.

3.12.4.4 Liquid Syrup Manufacturing

In medical terminology, medicinal syrups are nearly saturated solutions of 85% of sugar in water in which medicinal substances or drugs are dissolved. Due to the inability of some children and elderly people to swallow solid dosage forms, it is fairly common today for a pharmacist to be asked to prepare an oral liquid dosage form of a medication available in the pharmacy

The general process: › Filling › Sealing › Capping › Coding & labeling › Wrapping Packaging of Syrup

Process Involved in Syrup Packaging – Empty Bottles are rinsed though Air-jet cleaning .After complete cleaning, bottles are tested & transferred ahead for filling .Filling machines with their automatic piston fills the bottles with accurate volume of syrup . Capping is done on bottle through capping machines . Plastic or aluminum capsules are bound over the neck of the bottle for secure sealing . Important details regarding packaging date & expiry date are printed on bottles. Syrup, as a pharmaceutical product requires safe, secure and tamper-proof handling while packaging. Packaging of syrups needs to ensure complete protection from contamination and microbial growth.

3.12.5 Quality Control

Products will be monitored closely for their quality at each step to ensure high standards.

3.12.6 Machinery Details

The machinery details are annexed with this report

3.12.7 SUPPLIES

Water supply

The water requirement for the project includes only drinking water, Process water and water for fire hydrants. Ground water (150-200ft) will be used to fulfill this demand. Water to be used in medicines manufacturing will be used after passing through RO Plant.

3.12.7.1 Electricity

WAPDA will be the main source of electricity for this pharmaceutical unit. Stand-by generator will provide electricity for this Unit in load-shedding conditions. One diesel fired generator of 100KVa will be used.

3.12.7.2 Manpower

There will be approximately 50 workers on the unit during the construction and 80-120 workers will be hired for operation of said unit. The profile of the personnel is as follow.

- Operating staff with medical background
- Maintenance staff, including craftsmen, with skills in one or more area (e.g. electrical, mechanical and instrumentation)

- Clerical and administrative staff.
- Locally based staff as guard and for catering and cleaning.

3.12.7.3 Firefighting

The fire fighting system will include water and gas devices / extinguishers. Plant will establish a proper fire fighting system. Indoor and outdoor fire hydrants will be installed according to the codes and standards. Fire Extinguishers will be installed and will always remain in ready state. Map showing fire fighting equipments is annexed.

3.12.8 WASTEWATER

Wastewater will be generated from process is 15-17^{m3} and will be treated trough Wastewater Treatment plant and Design of the treatment plant is attached. Municipal wastewater coming from various municipal works, such as cleaning will be generated, which will be treated via a Septic Tank. Washing wastewater will be disposed off into the Industrial Estate Drain.

3.12.9 AIR EMISSIONS

No air emission is likely to be released during operation of the project; except the dust or PM 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 emissions will be controlled by providing proper enclosure and tuning and maintenance.

3.12.10 NOISE

All the machinery will be installed and operated in a closed hall and from operation of machinery noise will not be a problem for the residents in the area nearby. Further Administration of the unit will take the precautionary measures to avoid the noise

emissions. There is no possibility of Noise pollution. Construction activities will however add great to the noise, but that noise will be temporary, and will be mitigated by measures as stated in Chapter-5.

Further trees to be planted in the unit which will act as noise absorbers and workers will use PPEs whenever and wherever might be necessary.

3.12.11 SOLID WASTE

Waste generated during construction would include mostly construction material (mainly steel and wood), empty cement bags, excavated earth and general packaging waste. Reusable construction material will be recovered from the waste as much as possible. Most of process waste will be recyclable while domestic waste will be handled by solid waste management contractor. For collection of solid waste dust bins will be kept in the unit premises to manage the waste. Audit for the solid waste generation will be conducted from time to time in order to figure out the main source of waste stream and to see how to manage it in future.

3.12.12 COST OF PROJECT

Cost of project is 250 million approx.

3.12.13 EVACUATION PLAN

The layout is designed in view of security and it would be maintained according to policy of the company executing the project. Emergency exit passages will be established and maintained. A proper evacuation plan will be formulated to cope with any emergency situation. Assembly points will be set and proper training will be provided to the workers and staff. Proper emergency plan and ventilation plans are annexed.

3.12.14 AREA AND COORDINATES

4.26 Acre will be the total area of project.

3.12.15 COST AND MAGNITUDE OF OPERATION

Raw Material, Operation and maintenance of the Production machinery are the costly activities involved in the operation phase of the project. Equipment safety will be assured if these operations are carefully managed. No separate fund allocation is required. 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 project was found to be financially feasible in the feasibility report.

3.12.16 SCHEDULE OF IMPLEMENTATION

The proponent will complete construction of the Project in a period of 6 months after obtaining Environmental Approval from EPA Punjab.

CHAPTER 4: DESCRIPTION OF THE ENVIRONMENT

4.1 GENERAL

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

A Social survey in the Project Area was also carried out through consultation with the various communities. Local residents living in the Project Area were interviewed to obtain their feedback regarding the construction of the Project and its impacts on their daily life/future in the short and long term.

4.2 PHYSICAL ENVIRONMENT

This part examines the physical resources such as topography, soil, climate, surface and ground water resources and quality, ambient air quality and geology of not only the Project site but also the city as a whole to assess whether the project under assessment can or does have any impacts on any of these parameters. The description of physical environment of Sheikhupura city and the project site is presented in the following sub sections.

4.2.1 Topography

Topographically speaking, Sheikhupura lies between the river Ravi which flows along its boundaries with India and river satluj which flow its boundary with Sheikhupura District. The districts may be divided into two parts, a low lying or riverine area along the two bordering rivers and upland, away from the rivers. The riverine area is generally

inundating during monsoon season. The water level in this area is higher than in the upland. The soil is sandy. The upland is flat plains sloping from north-west to south-west. The general height of the area is from 150 to 200 meters above the sea level.

Project Site:

The proposed project site is located in Tehsil & District Sheikhupura.

4.2.2 Hydrology

The sub soils and sub strata encountered in the area have been formed by alluvial deposits transported by ancient streams of the Indus River System. The unconsolidated sediments are to a depth of about 900 feet. The groundwater recharge is mainly derived from the seepage of unlined canals, watercourses and from irrigation practices. Recharge directly from rainfall is small. Also, some recharge takes place from ponds, water supply and sewerage systems.

Groundwater is the major source of water in the study area, which is extracted with the help of pumps and motors. The groundwater extracted is used to fulfil various domestic, irrigation and industrial needs. Unfortunately, the ground water of the city Sheikhupura is satisfactory, hence, acceptable for human intake.

Project site:

No fresh water body is available near site. Groundwater from depth of 70-75 ft can be used for drinking and other purpose available

4.2.3 Soils

Soils form major relation with environment. They influence environment by their special qualities and more so through fertility. Types of soils besides providing food, clothes or housing population serve with special food and lumber products, medicinal plants etc.

Soil should not be taken as a lifeless residual layer but it is a very dynamic element of

environment in which very complicated physical, chemical and biological activities are constantly proceeding. In this way it is a dynamically changing and developing body. Soil scientists restrict the word soil or solum merely to the surface material, which has come to have distinct layers or horizon over the extended period of time.

Soils have different meanings for different people. To a soil scientist it means the upper a few layers created through weather effect in which plants are grown .The solid portion of soil is both organic and inorganic. The organic part consists of both living and decayed plant and animal materials.

The soils of the adjoining project area are fertile and rich in both organic and inorganic mass because the project site lies right into the centre of the Ravi and Chenab River called as Rachna Doab. The area is made up of flood plain deposits of Qmx (Stream bed and meander belt deposits) and Qfx (flood plain deposits of lower terraces).

The adjoining rural area gives higher yields of crops through the use of synthetic fertilizers and pesticides. Their irrational use is adding to pollution of soil, and water bodies.

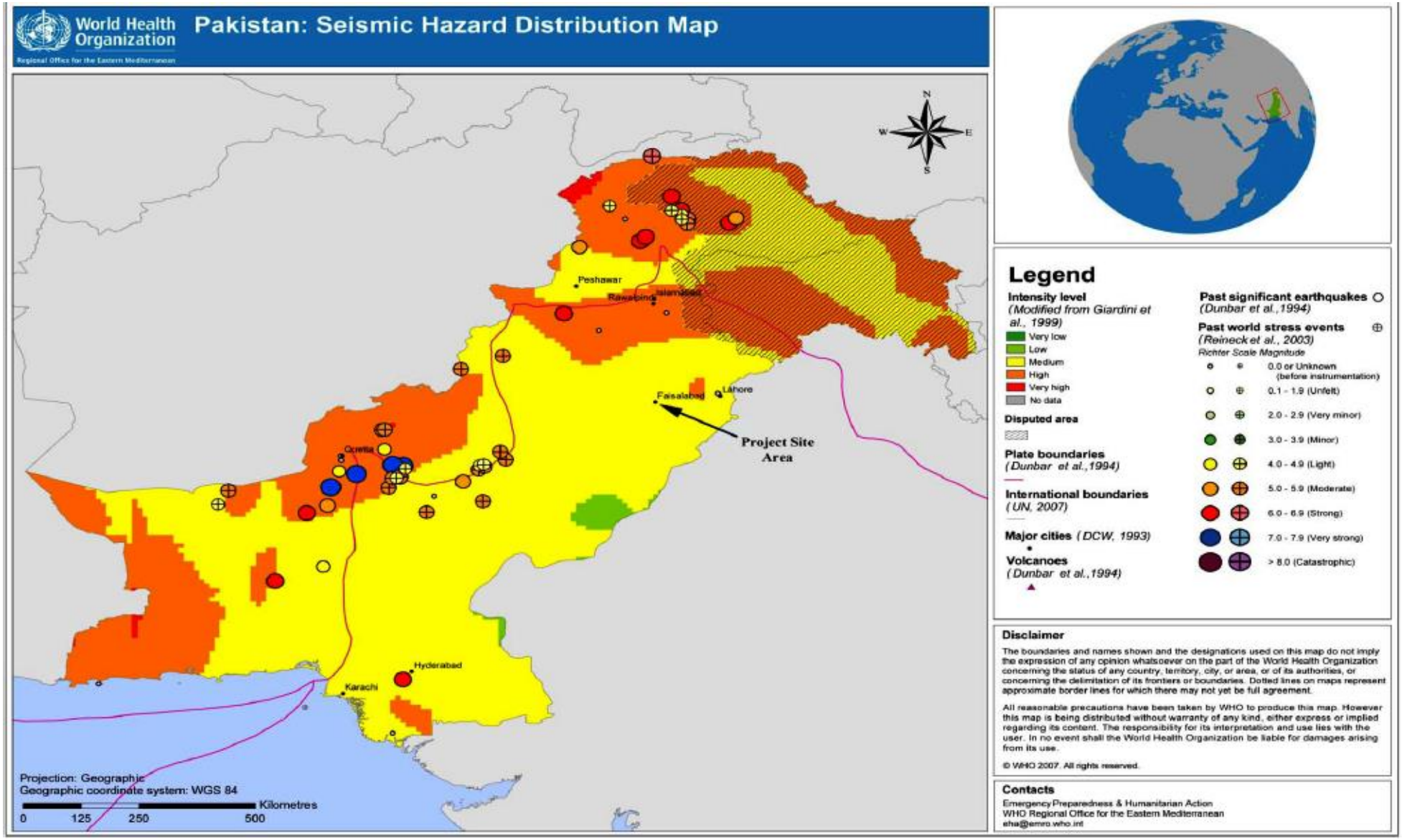
4.2.4 Seismicity

Seismic Zoning Map of Pakistan showing Project site area is presented as

Figure - 4.1, indicating zones according to the Building Code of Pakistan - 2007. The city of Sheikhupura the project site falls in Seismic Zone 2A according to the Seismic Zoning Map of Pakistan.

Figure - 4.2 presents the WHO Seismic hazard map of Pakistan prepared for Peak Ground Acceleration (PGA) for 500 years return period, with intensity level at "medium category".

Figure 2: Seismic Zoning of Pakistan


World Health Organization
Regional Office for the Eastern Mediterranean
Pakistan: Seismic Hazard Distribution Map
N
W
E
S
Peshawar
Rawalpindi
Islamabad
Lahore
Faisalabad
Project Site Area
Quetta
Hyderabad
Karachi
Projection: Geographic
Geographic coordinate system: WGS 84
Kilometres
0
125
250
500
Legend
Intensity level
(Modified from Giardini et al., 1999)
Very low
Low
Medium
High
Very high
No data
Disputed area
Plate boundaries
(Dunbar et al.,1994)
International boundaries
(UN, 2007)
Major cities (DCW, 1993)
Volcanoes
(Dunbar et al.,1994)
Past significant earthquakes
(Dunbar et al.,1994)
Past world stress events
(Reineck et al., 2003)
Richter Scale Magnitude
0.0 or Unknown (before instrumentation)
0.1 - 1.9 (Unfelt)
2.0 - 2.9 (Very minor)
3.0 - 3.9 (Minor)
4.0 - 4.9 (Light)
5.0 - 5.9 (Moderate)
6.0 - 6.9 (Strong)
7.0 - 7.9 (Very strong)
> 8.0 (Catastrophic)
Disclaimer
The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the status of any country, territory, city, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.
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WHO Regional Office for the Eastern Mediterranean
eha@emro.who.int

4.2.5 Geography

The Sheikhupura is an industrial center, and satellite town, located about 38 km northwest of Lahore. It is also connected to District Faisalabad. Geographical coordinates of the city are 31° 42’ 47” °N (latitude) and 73° 58’ 41” °E (longitude), and it is 774.27 ft. (236 m) above sea level. The city’s total area is 75 km2 (29 mi2) and the metropolitan is 3,030 km2 (1,170 mi2) in length.

Sheikhupura consists of five Teshsils, which are as follows:

1. Sheikhupura.
2. Ferozewala.
3. Muridke.
4. Sharaq Pur.
5. Safdarabad

4.2.6 Temperature

Due to its high evaporation, Sheikhupura features a hot desert climate in Köppen-Geiger classification. The climate of the district can see extremes, with a summer maximum temperature 50 °C (122 °F) and a winter temperature of −2 °C (28 °F). The mean maximum and minimum temperature in summer are 39 °C (102 °F) and 27 °C (81 °F) respectively. In winter it peaks at around 17 °C (63 °F) and 6 °C (43 °F) respectively. The summer season starts from April and continues until October. May, June and July are the hottest months. The winter season starts from November and continues until March. December, January and February are the coldest months.

Detail description of the seasons is as under:

- Winter (October to February: Moderate to extreme and dry
- Spring (March & April): Pleasant and moderately cold
- Summer (May to September): Very hot to humid
- Monsoons (June to August): Wet. Although the temperatures are milder but due to appreciable humidity, the heat is oppressive; and

- Post-Monsoon Summer (September & October): Moderate and slightly humid

Given below are the maximum and minimum temperatures of Sheikhupura throughout the figure.

Figure 3: Average Annual Temperature in Sheikhupura

4.2.7 Rainfall

The average yearly rainfall lies only at about 300 mm (12 in) and is highly seasonal with approximately half of the yearly rainfall in the two months July and August.

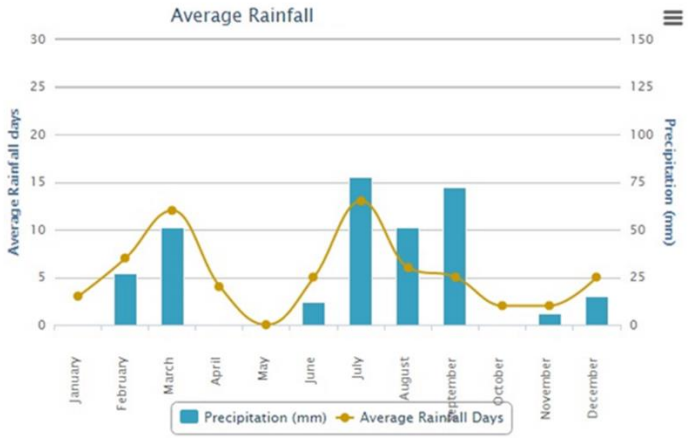

Figure 4: Average Yearly Precipitation in Sheikhupura

Relative humidity in Sheikhupura varies between 31.9% and 69%. The higher humidity during summer is due to the higher rates of evapo-transpiration, as the monsoon rain, irrigation and Kharif cropping pattern favor its rise.

4.2.8 Wind

The Sheikhupura region experiences westerly and north westerly winds during the winter and spring seasons, known usually as the dry stable times of year and southerly and south easterly winds during summer and monsoons. Wind speeds are low during winter picking up during spring season and peaking during the summer months**.** The prevalent wind speed ranges from 10-25 km/h, however on some days, there appear storms of 60 km/h.

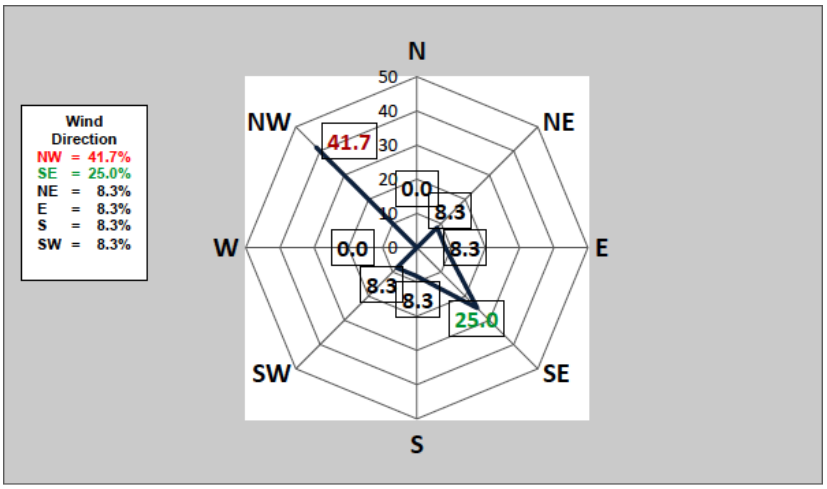

Figure 5: Direction of Winds (%)

4.2.9 Noise Level

There are many a large, medium and small industries which are still working within the city premises. Industrial activity and vehicular emissions are causing excessive noise in the city.

The affluent areas of Sheikhupura are quieter than rest of the city. The noise level in these areas is still far higher than the standards set by the World Health Organization and the Punjab-EPA as the safe noise level; i.e. 60-85 dB(A).

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 a sensory perception and the complex pattern of sound waves is labeled noise, music, speech, low altitude aero plane flying etc. Environmental noise is a common cause of hearing loss of people indulged in industrial activities. Noise pollution in the city is on the rise with most residents complaining that the noise is becoming a public nuisance.

4.2.10 Ambient Air Quality

The degradation of air quality in all the large cities is a major environmental concern these days. Air pollution levels in urban centers have either crossed safe limits given in the NEQS or have reached the threshold values.

About 60 to 70 % of the deterioration in the air quality is due to the vehicular emissions. The parameters which have proved to be the major threat are particulate matter and concentration of oxides of nitrogen that are relatively higher in all the large cities of Punjab.

Atmospheric pollution particularly in urban area has a strong impact upon daily life. Sheikhupura is the third largest city of Pakistan. Its economic growth, industrial progression & transport have raised to grounds responsible for growing energy consumption leading ultimately to the consequences of increase in air pollution. The main sources of air pollution are exhaust from motor vehicles and industries. The main exhaust gases include SO_2, NO_2, CO, etc. Particulate Matter (PM) and noise which are inspected as the pollution indicators. Sheikhupura experiences the values of a few of these pollutants in excess of Punjab Environmental Quality Standards for Ambient Air near the industrial establishments but PM concentration exceeds the standard value in almost the entire of Sheikhupura.

It was observed during the visit that Petrol and Diesel operated vehicles are emitting smoke and exhaust gasses in excessive quantity which are the leading sources of environmental pollution and responsible for the air quality worsening. In fact, exhaust emissions (including dangerous gases such as carbon monoxide, oxides of nitrogen, hydrocarbons and particulates) and Evaporative emissions (including vapors of fuel which is released into the atmosphere, without being burnt) are the prime reasons of deterioration of air quality. It was however observed during the visit that environment of the project area is clean.

4.2.11 Water Resources

Surface Water

There are no surface water resources like ponds or wetlands near the project area.

Ground Water

The city of Sheikhupura is underlain by the deep permeable aquifer formed within the alluvial plane of the River Ravi and Chenab, which is the part of Greater Indus Plain. Ground water is the principal source of municipal water supply in Sheikhupura. 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 400-800 feet and is generally good for direct consumption. About 83% of the city's population is consuming groundwater for drinking purposes.

The project area lies in the district of Sheikhupura where the groundwater table normally exists 40 to 50 ft below the ground level and contains high level of salinity, and in order to assess the quality of ground water, chemical parameters were analyzed using Method (APHA).

4.2.11.1 *Drinking Water Quality*

WASA (Water and Sanitation Agency) Sheikhupura is providing drinking water to the residents of Sheikhupura. WASA claims the quality of water conforms to the Drinking Water Standards.

The increase in population will have direct impact on the water sector for meeting the domestic, industrial and agricultural needs. Pakistan has now essentially exhausted its available water resources and is on the verge of becoming a water deficit country. The quality of water supplies in many cities of Pakistan is waning fast. Over pumping of groundwater due to extended drought is however affecting the water quality adversely.

4.3 BIOLOGICAL ENVIRONMENT

Sheikhupura is enriched with the presence of natural flora and fauna, although with the growing population and development activities, the presence of the some has been somewhat affected.

There are however no significant or well-shaped trees and shrubs on the project site. There are some trees only along the main roads.

4.3.1 Flora

Trees, also called the 'lungs' of the earth, are important for the restoration of the ecosystem. People can benefit incalculably from their survival and existence. Trees have also been a source of medicine for thousands of years and a refuge for various species of birds. No threatened or endangered species and medicinal plants are present anyhow in the project area.

4.3.2 Fauna

With an increase in the rate of urbanization, the ecology of Sheikhupura has been considerably affected but there is no threatened or endangered species found in the project site. Similarly no wildlife is present within the project corridor.

4.4 SOCIOECONOMIC ASSESSMENT

Socioeconomic Assessment is represented by the human and economic development and quality of life values. For the study of socio-economic environment of the project area, field surveys were conducted and interviews were held with the general public and neighbors.

4.4.1 Demographic Profile of Sheikhupura

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 works, values and facilities have to be related to planning considerations and decisions. Individuals are the raw material of society, therefore, society is directly affected by size, growth, composition and distribution of its individuals.The term population refers to the number of individuals living within a geographical area at a given time.

Different community individuals in the vicinity of the project area have different family sizes depending upon their living setups. Average family size is however 5-9 individuals per family with 1-4 earning hands per family. Since the project is located in an agricultural area, most of the individuals are associated with the agricultural activities. In Sheikhupura people use languages like English, Punjabi and Pashto besides Urdu for communication. It is remarkable that Pakistan is an Islamic country, where the majority of the population is Muslim. Sheikhupura, being a city in Pakistan, could not be an exception to this. As a result, 96% of the total population in Sheikhupura is Muslim. Other religions in the city accounting for the rest 4% are Christianity, Hinduism and Sikhism.

4.4.2 Population Growth:

The fact of the emergence of Sheikhupura as a major Agriculture-cum-Industrial center is reflected by the phenomenal increase in the city's population. From a population of less than 29,000 in the year 1950, it went up to a figure of 573,000 in the year 2024.

4.4.3 Health Facilities

Hospitals exist in the project area. There is a government hospital or Basic Health Unit (BHU) available in district Sheikhupra.

Type of Health Facility	Name of Health Facility	Beds
DHQs/Tertiary Care Hospitals	DHQ Hospital Sheikhupura	687
THQ Hospitals	THQ Hospital Muridke	186
	THQ Hospital Ferozewala	60
	THQ Hospital Safdarabad	60
	THQ Hospital Sharaqpur	60

Type of Health Facility	Number
Civil Hospital Manawala	1
RHCs	07
BHUs	81
MCH Centers	04
GRDs	05
Zila Councils Dispensaries	49

4.4.4 Educational Facilities

There are many Educational Institutions present in the District.

H.Sec	High	Middle	Primary	Total
18	168	220	752	1158

:

4.4.5 Transportation and Communication

The project area is rich in the means of transportation. Main and side roads are metallic so transportation is properly available inside the residential colonies. Chingchi (four seated vehicle supported by bike), Rickshaw, bikes and some buses are the main means of transport for the residents of the area. Sheikhupra is one of the most accessible cities of Pakistan and that city of Pakistan where you can find Public and private Transport, 24 hrs a day and 7 days in a week. Public transport is always available in the project area. To fulfill the remaining needs of transport, there are thousands of rickshaws and taxis

which run on compressed natural gas to reduce pollution in the city and of course about 75 percent of the residents have their own conveyances.

4.4.6 Products

Main agricultural products include wheat, cotton and vegetables. Major industrial products include processed sugar, flour and oil, textile products, jewellery, home furniture and pharmaceuticals.

4.4.7 Sites of Historical Significance

Most Famous historic places in district sheikhupura are Hiran Minar and Clock Tower

The project area is also present in Industrial area and is surrounded by similar industries and agricultural land.

4.4.8 Water Supply

Water for domestic purposes will be supplied by the Industrial Estate.

4.4.9 Electric Supply

LESCO Power supply will be available at the site.

4.5 SOCIO-ECONOMIC SURVEY

From socio-economic survey and interviews conducted, it is concluded that no residential area is present near the project site. The individual assessed from the neighboring communities of the project area were involved in industrial and commercial practices.

Neighboring community inhabitants involved in different occupations were asked about their monthly income but most of them hesitated to tell and stated that they earn just enough to fulfill their basic demands. Regarding the project, almost all of the interviewed members were in favor of the project as it does not involve any chemical manufacturing or pollution causing operational activities which generate pollution.

4.6 QUALITY OF LIFE VALUES

Majority of people in project area are working in shops and some are doing jobs in industries. The locals of area are provided with basic facilities like electricity, roads, transport etc. If we talk about educational facilities then education up to primary level are available in almost all the localities and are easily approachable. They are also provided with health facilities including dispensary and hospital where basic health facilities are provided to workers and community. Common diseases observed in that area were diabetics and heart diseases.

4.7 LAB REPORTS OF ENVIRONMENTAL ANALYSIS

Testing of different parameters was done from a certified laboratory to check the quality of different environmental parameters. The copy of the lab reports of these parameters (ambient air analysis, water quality analysis) is given in annexure.

CHAPTER 5: STAKEHOLDER CONSULTATION

5.1 GENERAL

Any person, group or organization with an interest in the project or who can be affected directly or indirectly, negatively or positively by the project activities is a project stakeholder. Because of their interests and concerns, it is very important to take stakeholders into confidence regarding the project need and impacts, and their management. Stakeholder consultation is a mean of involving the entire primary and secondary stakeholders in the project decision making process in order to address their concern, improve project design and give the project legitimacy. Stakeholder consultation, if conducted in a participatory and objective manner, is a mean of enhancing the project stability.

Community input (both of knowledge and values) on socioeconomic and environmental issues can greatly enhance the quality of decision making. Stakeholder consultation was therefore conducted in the project area, not only to satisfy legal requirement of EIA in Punjab but also to improve and enhance the social and environmental design of the project.

5.2 OBJECTIVE OF THE STAKEHOLDER CONSULTATION

Role of the public participation is very important in the design making process to achieve the goal of sustainable development. The major objectives of public consultation are as follows:

- Promote better understanding of the project, its objectives and its likely impacts and their management.
- Identify and address the concerns of all interested and affected parties of the project.
- Provide a mean to Identify and resolve issues before plans are finalized and development commences, thus avoiding public anger, resentment and potentially costly delays.
- Encourage transparency, and inculcate trust among various stakeholders to promote cooperation and partnership with the communities and local leadership.\

5.3 CONSULTATION PROCESS

Primary stakeholders were consulted during informal and formal meetings held in the project area. The consultation process was carried out in Urdu and native language. During these meetings, a simple, non-technical, description of the project was given, with the overview of the project's likely human and environmental impacts. This was followed by an open discussion allowing participants to voice their concerns and opinion. In addition to providing communities with information on the project, their feedback was documented during the primary stakeholder consultation. The issues and the suggestions raised were recorded in field notes for analysis and interpretation.

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

Secondary stakeholder consultations were more formal as they involved government representatives and local welfare organization, NGOs consulted during face to face meetings and through telephonic conversations. They were briefed in the EIA process about the potential negative and positive impacts of the project on the area's environment and communities.

It is important not to raise community expectation unnecessarily or unrealistically during the stakeholder consultation meetings in order to avoid undue conflicts with tribal leaders or local administrators. The issues recorded in the consultation were examined, validated, and addressed in EIA report.

5.4 STAKEHOLDER CONSULTATION TECHNIQUES

In recognition of diversity of views within any community, it is very important to obtain a clear understanding of the different stakeholders' views and concerns regarding the project and to analyze their capacity and willingness to be involved in some or all of the project and its planning process. It is important to be aware of how different power relations can distort the participation. It is also important to know that how community skills, resources and knowledge can be applied to improve the project implementation. All of this can be achieved by careful use of various tools of stakeholder consultation. Therefore the following participatory techniques were employed during stakeholders' consultation:

- Focused Group Discussion
- Scoping Sessions
- Formal Group Meetings
- Informal Group Meetings

5.5 STAKEHOLDERS CONSULTED

In consultation process for EIA, the following stakeholders were consulted.

- Local communities, men, women and elders attended the meetings
- Local Government representatives

Meeting with stakeholders comprised of community consultation meeting, focus group discussion interviews with men and limited focus discussion with women.

Local Community:

Hassan Ali	Mohtishim Abbas
Moshahdullah	Hamza Ali
Muhammad Faisal	Aslam Baig

Asghar Ali	Arslan Haider
Zeeshan Barkat	Farman Ali
Malik Akbar	Faisal Ali
Junaid Aslam	Asraf Ali
Faizan Aslam	Asif Ali
Waqas Amir	Anzaq Abbas
Abdul Ghaffar	Shehzad

Table 2: List of people consulted

5.6 STAKEHOLDER CONCERNS AND RECOMMENDATIONS

The finding of the community consultation has been addressed in various sections of EIA. Mitigation plan has been incorporated into EMP. The summary of consultation with various stakeholders is given below:

5.6.1 Awareness Regarding the Proposed Project

Out of total 20 respondents, 56% knew about the project whereas 44% were not aware of the project planning and implementation.

5.6.2 Acceptability of the Proposed Project

Majority of the respondents, 99% favored the construction of the project keeping in view its importance

Concerns and solutions

Main Theme	Concerns	Solutions
Employment	To engage local people during construction and operation phases on priority basis	Proponent will try to engage local people on priority basis.
Environmental Enhancement	Trees should be planted to avoid any impact	Trees will be planted along boundary of project
Quality	Quality of medicines should be maintained	No compromise on quality
Cost of medicines	Medicines should not be costly and should be easily available to poor prople	Suggestion will be surely considered.

CHAPTER5: POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1 GENERAL

This section discusses the project's potential environmental impact on the area's geomorphology, soil, water resources, air, biological resources and socioeconomic condition and, where applicable, identifies mitigation measures that will reduce, if not eliminate, its adverse impact. The assessment carried out in this section is based on potential impacts on overall environmental receptors within the project area.

6.2 OBJECTIVES

Objectives of screening out all possible impacts and then providing their mitigation measures are:

- To find different alternatives and ways of carrying out the project activities.
- To enhance the Environmental and Social benefits of proposal.
- To avoid, minimize and remediate adverse impacts.
- To ensure that residual adverse impacts are kept in acceptable limits

6.3 IMPACT ASSESSMENT METHODOLOGY

- **Screening of Potential Impacts**

  Based on site visit, observation, brain storming, provided information and social interviews, significant impacts are anticipated and evaluated. Then qualitative and quantitative (where possible) assessment of these anticipated impacts is carried out.

- **Identification of Mitigation Measures**

  After anticipation and screening of significant impacts, certain mitigation measures are provided in order to enhance benefits of project and reducing impacts. These measures can be classified as:

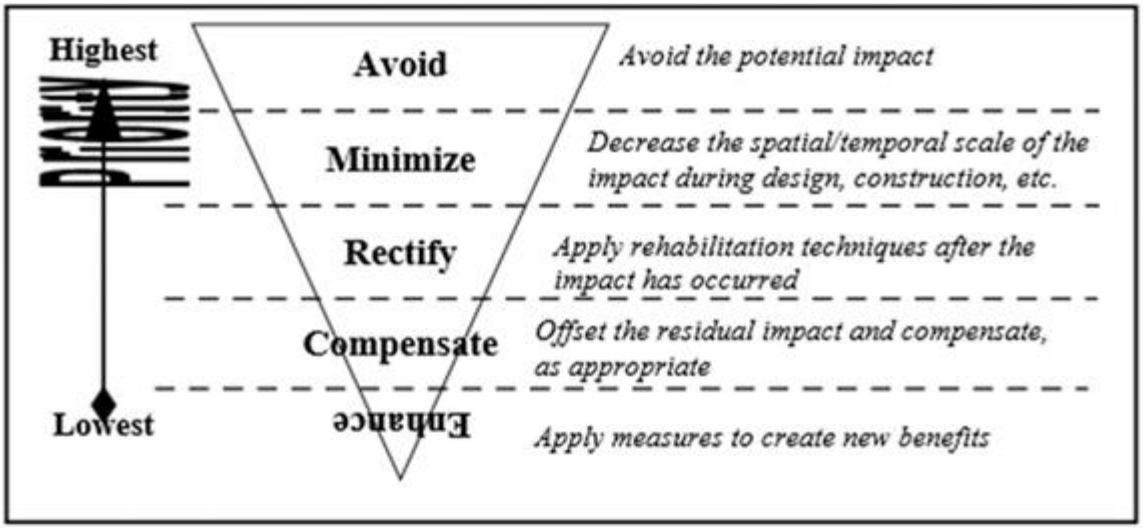

Figure 6: Hierarchy of Mitigations

- **Evaluation of the Residual Impacts**

  Incorporation of suggested mitigation measures may reduce the magnitude of the environmental impacts of the 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.

- **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 the monitoring is to confirm whether the impacts are within the prescribed limits and to provide timely information if acceptable limits are being breached.

6.4 Impacts Associated with Project Location

The proponent has selected the site owing to the following reasons:

- The site is undisputed and under the ownership of the proponent
- Site is located in industrial estate.
- There is no community or human settlement above 2km of the site
- There is no fauna flora (particularly belonging to an endangered species) within a 2 km radius of the site
- Main road network runs in front of the industrial estate
- There is no ecologically sensitive or declared protected area (PA) like forest, fish hatcheries, Territorial Waters, wildlife or game reserves, any structure of socio-cultural significance (historical or archaeological site or religious structures; Masjid, temples, etc.) within 10 km of the selected site

It can be concluded in view of these reasons that the selected site is best suited for the project, and will not pose any adverse impact or threat on any component of the environment.

6.5 Impacts Associated with Design Phase

At the design phase, no considerable impact will occur on land, soil, topography, ground water, and on people of the area. However in pre-construction phase a management system should be provided at design level so impacts can be reduced. Design of the building will adhere to all standard technical requirements in order to avoid adverse impacts on environment and human health.

Mitigation Measures at Design Phase

At design phase special attention should be given to the design of the project in the sense that it has been designed in such a way as to cause minimum disruption and deterioration of environment and surroundings.

6.6 Impacts Associated with Construction Phase

The Environmental and Socio-Economic Impacts associated with the construction activities of the plant are the following:

- Construction Noise
- Dust Emission During Construction
- Change of Land Use
- Water Sourcing
- Vehicle and Equipment Exhaust
- Soil Contamination
- Socioeconomic Impacts
- Community and worker's Safety
- Traffic Disturbance
- Employment Conflicts
- Archeological Resources
- Project and Community Interface

6.6.1 IMPACTS ON PHYSICAL ENVIRONMENT

6.6.1.1 Effect on Geomorphology and soil

Potential Impacts:

Spills of fuel and lubricants during handling, transportation and storage may result in contamination of soil at the construction site. Significance of this impact will depend on the nature of spilled material, location of spill and quantity of spill.

The likely impacts of these activities may include:

- Physical scarring of the landscape
- Increased risk of land slippage
- Soil contamination

Impact Assessment

Soil contamination may occur due to spillage and leakage of fuels. This possibility of impact is higher at fuel storage areas at campsites, vehicles and machinery used in the field and areas of vehicle fueling and maintenance.

There are no visible signs of any adverse impacts on the soils and to avoid any such condition to arise, following mitigation measures are provided and will be followed

Mitigation Measures

- Spill Prevention and Response Plan for storage, use and transfer of fuel should be prepared.
- Workers should be trained on spill prevention and response plan.
- Thick Plantation is recommended after completion of construction
- Maintenance and washing of vehicles and equipment should be carried out at designated areas
- Any hard surface or tarpaulin should be spread on area to prevent soil contamination.
- Regular inspections should be carried out to detect leakages in construction vehicles and equipment
- Spill prevention trays should be provided and used at refueling stations

- Drivers of construction vehicles should drive slow following traffic rules to avoid accidents

Residual impacts

No residual impact to soil will be caused provided the above-mentioned measures are implemented properly.

Monitoring requirement

Document all related accidents of spillage with the corrective actions taken in order to avoid reoccurrence.

6.6.1.2 Water Quality

Potential impacts

The quality of surface and groundwater supplies may deteriorate if pollutants get mixed with surface runoff during rain and carried to water reservoirs in the vicinity, or if pollutants leach into the ground.

The storage and handling of fuels and lubricants may also contaminate surface and groundwater resources, if there are spillages that wash into surrounding areas or seep into the ground.

Improper disposal of domestic effluent from the camp may result in contamination of soil and water and become a health hazard. A significant impact on the environment will be interpreted if the wastewater discharged is not in compliance with the National Environmental Quality Standards for municipal effluent

Impact Assessment

A significant amount of sediment may get washed into fields and watercourses if it rains during the construction period; however the impact is not expected to be significant. Potential sources of pollution in such cases may include:

- Domestic wastewater (sanitary and kitchen discharge)
- Oil and grease from vehicles
- Sediments from exposed land surfaces

Mitigation Measures

- Septic tanks will be provided

Residual Impacts

Implementation of the mitigation measures is not likely to leave any significant impact on the ground or surface water quality.

6.6.1.3 Water use

The water during the construction activity will be required for the domestic water consumption at the construction camp and for the construction activities including sprinkling of water for dust suppression.

Potential impacts

In the case of the said Project, water requirement is too small to disturb groundwater yield and water availability. Moreover, the soil of the area is rich in groundwater reserve.

Mitigation measures

Careful earthwork, frugal water use employing reuse and treatment of the wastewater via a Septic Tank will mitigate the issue.

6.6.2 Dust Emissions

Dust generated during construction activities can be substantial. Dust emission from construction sites is a concern particularly if the site is near residential areas. Dust or the equivalent technical term 'particulate matter,' is generally defined as any airborne

finely divided solid or liquid material up to the size of about 100 microns (micrometers or one millionth of a meter).

Potential Impacts

Particulate matter emitted during construction activities can result in deterioration of ambient air quality in the vicinity of the source, and be a nuisance to the communities and plant workers. The main health hazards are the particles smaller than 10 microns (designated as 'PM_{10}') as they are Respirable. Larger particles also tend to settle rapidly and often do not reach receptors. In cases where they reach the receptors, the dust is considered a nuisance as it may spoil property and affect visibility.

A significant effect on the environment will be interpreted if there is an increase in visible dust beyond the boundaries of the Project due to activities undertaken at the site, or the dust affects local property or results in complaints from the community.

Impact Assessment

Potential sources of particulate matter emission during construction activities include exposed surfaces, exposed storage piles, truck dumping, hauling, vehicle movement on unpaved roads, and concrete mixing and batching. The quantity of dust that will be generated on a particular day will depend on the magnitude and nature of activity and the atmospheric conditions prevailing on the day.

Mitigation measures

- The most effective means of reducing the dust emission is wet suppression. Watering exposed surfaces and soil with adequate frequency to keep soil moist at all times can reduce the total dust emission from the project by as much as 75%
- Dust emission from soil piles will be reduced by covering the piles, for example with tarpaulin or thick plastic sheet.
- Good quality (low-sulfur) fuel will be used for vehicle and machinery

- Construction materials that are susceptible to dust formation will be transported only in securely covered trucks to prevent dust emission during transportation.
- Provision of dust respirators to equipment operators who are exposed to dust while operating their equipment.
- Tree planting on open and areas which will not be used by the operations.

Residual Impacts

The effects of the dust nuisance are temporary with no long lasting impact expected after the completion of the construction.

Monitoring requirements

- Dust emission will be visually monitored
- Ambient air quality will be checked near or at project site.

6.6.2.1 Noise

Potential issues

Depending on the Construction Equipment used and its distance from the receptors, the community and workers may typically be exposed to intermittent and variable noise levels. During the day such noise results in general annoyance and can interfere with sleep during the night.

Impact Assessment

The potential sources of significant noise during the construction period include the construction machinery and construction related traffic. The noise will be the maximum during the day time when construction activities are ongoing.

Mitigation Measures

- Reduce equipment noise at source by proper design, maintenance and repair of construction machinery and equipment

- Minimize noise from vehicles by use of proper silencers and mufflers
- Use noise-abating devices wherever needed and practicable.
- The movement of vehicle should be restricted during night time.
- Providing workers with noise related PPEs
- Planting of trees that could serve as sound buffers.
- Noise barriers must be put in on and around the project boundary
- Hauling trucks shall be operated at low speed to minimize vibration.

Monitoring requirement

Monitoring will be done on regular basis to avoid increase in noise beyond NEQS

6.6.3 IMPACTS ON BIOLOGICAL ENVIRONMENT

6.6.3.1 Vegetation loss

Vegetable loss can only be an issue during construction phase of any project if land clearance is required for the project to be commenced in an area rich with natural vegetation. The project area experiences a rich flora but since the land selected is open so, no cutting of trees or land clearance is to be commenced.

6.6.4 SOCIO-CULTURAL IMPACTS

6.6.4.1 Possible Displacement

As the site is owned by proponent and resettlements and community are at a safe distance from site, so no displacement or rehabilitation of people is expected.

6.6.4.2 Induction of Labor

Potential Issues

Potential employment related issues include dissatisfaction among the locals over the number of jobs offered to them.

Impact Analysis

Persons required at the unit during the construction phase will be locally hired and hence, this issue will be eliminated.

Residual Impacts

As workers will be locally hired, employment conflict is not expected to be created.

Monitoring Requirements

The following data should be recorded and maintained on the employment:

- Total number of jobs offered during construction.
- Name and place of residence of the employed staff.

6.6.4.3 Community Health

Workers will undergo medical examinations before being hired, and will be screened for communicable diseases. In addition, there will be very little contact between workers and local people. The project is therefore very unlikely to lead to an epidemic of any sort among local communities.

Mitigation Measures

The crew will undergo medical examinations before being hired, and will be screened for communicable diseases. The project is therefore very unlikely to lead to an epidemic of any sort among local communities.

- All employees shall undergo regular check up with physician to ensure that they have good health.
- The proponent will provide regular medical practitioner for the regular checkup of the employees' health.

- Conduct free clinic and medical mission to regularly check the health condition of the residents of the community

6.6.4.4 Safety

Potential Issues

Safety always remains an area of utmost concern in any occupational activity; construction being one. Not only workers but the people from surrounding communities on the roads adjacent to the site are at stake of safety risks as well.

The safety issue is that of traffic entering and leaving project site for transport of goods and materials. Workers' safety is also an issue because of machinery if they show carelessness.

Mitigation measures

To reduce the hazard, the following mitigation measures will be implemented:

- Standard Operation Procedures (SOPs) shall be developed for all construction works and workers will be advised to strictly observe them
- Workers will be provided with the adequate PPEs and told and encouraged to use them
- No careless attitude shall be bothered and born at the site
- A stop sign will be put up on the access road
- A speed breaker will be constructed on the access road
- The speed limit for the access road will be kept low
- A public safety plan should be developed and displayed
- Community complaint register and other mean should be adopted for the community to complain.
- No machinery should be left unattended, particularly in the running condition.
- Nighttime driving of project vehicles should be limited.
- Drivers will be trained to drive slowly following traffic rules.

Residual Impacts

Long-term safety issues in terms of permanent damages to health and bodily injuries can prevail only if the above-mentioned mitigation measures are not observed.

Monitoring Requirements

Visual monitoring will be required for the likelihood (and causes if they happen) of near-miss, incidents and accidents, so that preventive approach can be adopted towards safety. And in case any such event breaks out, first aid facility provided is required to be monitored.

6.7 Impacts during Operational Phase

The Environmental and Socio-Economic impacts associated with the operation phase are the following:

- Air Emissions
- Noise
- Wastewater
- Waste Management
- Occupational Health and Safety

6.7.1 IMPACT ON PHYSICAL ENVIRONMENT

6.7.1.1 Noise

Potential Issues

The noise may affect the community and the workers.

Impact Analysis

Noise, if emitted during the project operation can potentially be a nuisance for the nearby surroundings. In this project noise shall be emitted during running of machinery. Sound proof room will isolate the noise to the room.

Mitigation

- Controlling noise at its source is the best method of noise control. Therefore, put silencers on the machines.
- Workers should be told and encouraged to use PPEs (ear plugs or ear muffs).
- Proper muffling of operating equipment should be done.
- Proper enclosure of machinery, thermal oil heater and generators.
- Regular maintenance and servicing of the machines
- Tree plantation

Residual Impacts

No significant increase in noise level in the surroundings is envisaged under normal operation.

Monitoring Requirements

During project operation, it should be ensured that the noise level at the project site does not exceed the prescribed limits.

6.7.1.2 WASTEWATER

Potential Issues

There would be wastewater regarding domestic use only.

Impact Analysis

There is negligible impact of this wastewater on the environment.

Mitigation

There will be no wastewater generated from process as there is no involvement of water at any stage. The domestic wastewater will be flushed by septic tank and wastewater will be discharged into sewerage system. Washing wastewater will be responsibility of FIEDMC.

6.7.1.3 AIR POLLUTION

Potential Impacts

Air pollution becomes a significant issue in any project operation if any of the raw material, main product or intermediate product is in gaseous form. Besides this, dust or PM becomes an issue if any small size particle is released and remains suspended in air.

Impact Analysis

Air pollution will not be a major problem in the case of the said project operation as no such process is involved in it ,emissions will be from generator only which will be enclosed and will be provided proper tuning and servicing. Further tree plantation will also be done. Wet suppression will be done to control dust emissions.

Residual Impacts

Dust will remain within the limits described by NEQS.

6.7.1.4 SOLID WASTE MANAGEMENT

Potential issues

Waste minimization is very important part; focusing on the waste avoidance and reduction through the use of cleaner production processes and practices, pollution control and waste disposal cost can be lowered. Preference will be given to waste avoidance and reduction instead of recycling and reuse.

Impact Analysis

Entire of the solid waste generated in unit operation is reusable and recyclable, and hence, can be sold out. Municipal solid waste will be managed as per the municipal work practices being observed in the area. Solid waste is not a prime issue.

Mitigation

A useful approach to waste minimization involves the preparation of proper waste minimization plan. The starting point for the waste minimization will be waste audit. This includes:

- Recyclable material should be separated at source.
- All recyclable material will be used.
- No waste should be dumped at any location outside the boundary.
- Separate dust bins should be placed within each premises
- Waste will be completely managed by solid waste management contractor.

6.7.1.5 SAFETY HAZARDS, PUBLIC HEALTH AND NUISANCES

Operation of the project may cause some concerns for safety, public health and nuisances within the project area.

Mitigation:

- Personal Protection Equipment (PPEs) such as ear plugs, safety Helmets, Gloves, Goggles and Masks will be provided to the employees and visitors to ensure their safety at work place.
- Workers' awareness and safety wall chart showing safety symbols and other necessary information will be displayed at various places.
- First Aid Box will be kept in every department which will be will within the approach in case of any injury or mishap.

- To avoid any chance of fire, a comprehensive firefighting system will be developed that includes all types of fire Extinguishers, fire hydrants, sand Buckets and firefighting Vehicles.
- Basic medical and safety training will be held from time to time to minimize the risk of health and safety issues which can result from ignorance (ergonomic hazards in particular) in the industry premises.

6.7.2 SOCIO-ECONOMIC IMPACTS

6.7.2.1 EMPLOYMENT CONFLICTS

The project is creating skilled and unskilled labor opportunities during operational stage. 70% unskilled labor is to be employed from the local communities, which will reduce unemployment in the area and improve living conditions of the local population. This is a moderate positive impact.

6.7.2.2 EMERGENCY RESPONSE

Incidents and accidents may take place unexpectedly during project operations. These may include;

- Fire hazard

6.7.2.3 FIRE HAZARD

Working operation of unit will be manageable but negligence in operations may cause risk of safety and health problems. Mishandling or mismanagement may lead to fire hazard, which poses a serious threat. Short circuiting in electrical switches and frayed electrical wires can cause fire.

Mitigation

- The fire fighting system will include water and gas devices / extinguishers.

- Indoor and outdoor fire hydrants will be installed according to the codes and standards.
- Fire extinguishers should be properly maintained and checked periodically.
- Flammable materials in the premises should be prohibited.
- Fire alarm systems should be maintained for detection and warning of fire.
- Adequate training of workers on use of fire fighting system to deal with emergency situation.
- Administration of the unit will develop the proper evacuation plans from all halls.

6.8 Potential Environmental Enhancement Measures

6.8.1 Tree Plantation

Tree plantation and cropping within the premises have been planned by the proponent for environmental enhancement. Green area is marked on map. A large area will be reserved for the plantation and among plants native flora like Peepal and Amaltas will be involved which have maximum capacity to reduce noise pollution and tolerance index of these species are more than 10. Some floral species like rose will also be introduced in the lawn for aesthetic beauty and trees like sufaida will be planted as boundary wall inside the lawn which will look like green wall. The Proponent will also make arrangements for protection and maintenance of trees.

CHAPTER 6: ENVIRONMENTAL MANGEMENT AND MONITORING PLANS

7.1 GENERAL

This EIA provides the Environmental Management Plan (EMP) of the project for its construction and operation phases to keep it environment benign as well as the monitoring plan to ensure the compliance of the established EMP.

As per the environmental legislation in Pakistan, the EMP for the operations phase, along with other documents, is to be submitted to the Environmental Protection Agency to obtain confirmation for compliance and Environmental Approval for project operation.

Even after implementation of the suggested mitigation measures, the impact may remain significant, and require monitoring. This section also underlines the monitoring framework for both construction and operation phases to check compliance of the EMP and to take timely actions for correction in case any accidence of significant criteria, requirements or goals are found.

7.2 OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN

The primary objectives of the EMP are to:

- Facilitate the implementation of the mitigation measures identified in the EIA.
- Define the responsibilities of the project proponent and contractor and provide a means of effective communication of environmental issues between them.
- Identify monitoring parameters in order to ensure the effectiveness of the mitigation measures
- Provide a mechanism for taking timely action in the face of unanticipated environmental situations.
- Identify training requirements at various levels.

7.3 MANAGEMENT APPROACH

The organizational roles and responsibilities of the key players are summarized below:

Proponent*:* The project proponent will undertake overall responsibility for compliance with the EMP. Proponent will carry out verification checks to ensure that the contractors are effectively implementing their environmental and social requirements.

Contractors*:* The contractors will implement the majority of environmental and social mitigation measures. The contractors will carry out field activities as part of the project. The contractors are subject to certain liabilities under the environmental laws of the country, and under its contract with proponent.

7.4 COMPONENTS OF THE EMP

The EMP consists of the following:

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

7.5 ENVIRONMENT MANAGEMENT PLAN

It lists all the mitigation measures identified in the EIA and the associated environmental or social aspect, during construction and operation phase with the administrative framework involving all the responsible implementing authorities required to take the planned actions/measures. It enhances project benefits by reducing its impacts and making it environment-friendly.

Table 3: Environmental Management Plan for Pre-Construction, Construction and Operation Phase

PROJECT ACTIVITIES	TYPE OF IMPACT	POTENTIAL IMPACTS ON ENVIRONMENT	EXTENT / MAGNITUDE	MITIGATION MEASURE	INSTITUTIONAL RESPONSIBILITY	
					IMPLEMENTING BODY	SUPERVISION
PRE-CONSTRUCTION						
Land acquirement and land use	Physical , Social and Aesthetical	Positive use of land but proper planning will be required	More/at community level and to Proponent	• Land is owned by proponent and there is no settlement so no impact will be there.	Contractor	Proponent*
Use of local manpower	Social	Employment Generation	Less / Adjacent area	• Local people will be hired for less technical work or non-skilled work	Contractor	Proponent*
Wildlife protection	Biological	Accidents/ dangers to fauna	Less/	**Avoidance**	Contractor	Proponent*

			Adjacent area	• A 'no-hunting, no trapping, no harassment' policy will be strictly enforced. • Trading of wild animals or birds by project personnel will also be prohibited. • Wildlife protection rules will be included in the Camp Rules		
CONSTRUCTION						
Civil works	Physical, Social, Biological Aesthetical	Soil Erosion, Emissions, Water Contamination, Noise & Vibration, Wildlife affected, Employment,	More/ Adjacent area	**Minimization:** • Dust emission from soil piles and aggregate storage stockpiles will be reduced by keeping the material moist by sprinkling of water at appropriate frequency **Avoidance:**	Contractor	Proponent*

		Health & Safety of Workers		• Covering the pile, for example with tarpaulin or thick plastic sheets, to prevent emission. • Noise control measures will be implemented • Wildlife protection rules will be included in the Camp Rules • Off-road driving will be minimized in order to avoid accidental killing of fauna.		
Movement and fueling of vehicles	Physical & Aesthetical	Soil & Water Contamination due to Fuel Leakages & Spillage, Emissions, Noise & Vibration	Moderate/ at the site	**Avoidance:** • Periodic maintenance and inspection of vehicles • Vehicles with leaks will not be operated.	Contractor	Proponent*

				• Vehicles should not be washed or serviced in the field. • No vehicle-related waste, such as oils, filters, old tires or parts, will be left in the field • All vehicles will be maintained in good working condition • All vehicles will have properly functioning silencers (mufflers).		
Transportation of construction material	Bio-physical	Dust and Particulate Emissions, Noise Generation, Safety and Health Effects	Moderate/ Adjacent area	**Minimization:** • Excessive use of horns will be avoided • PPE's will be provided to workers **Avoidance:**	Contractor	Proponent*

				• Covering of transporting material trucks • Nighttime driving of project vehicles will be limited where possible • Low speed limit will be maintained on the section of the access road that is adjacent to the community and site. • The fence surrounding the site will be put in on during the construction to prevent access to the construction site		
Use of local water resources	Physical, Social & Biological	disturbance to local community	Less/ adjacent area	**Avoidance:** • Initiation of water conservation program **Reduction:**	Design engineer & Contractor	Proponent*

				• Where possible, water should be reused		
POST-CONSTRUCTION/OPERATION						
Wastewater management	Physical/social	Degradation of water quality	Moderate/local	**Reduction:** • Domestic Wastewater will be handled using septic tanks. • No process related wastewater is there.	Contractor	Proponent *
Air quality management	physical	Dust and PM	Moderate/adjacent areas	**Avoidance:** • No waste should be burnt at the premises. • Machinery will be properly maintained regularly • Generators will be provided acoustic enclosure and proper tuning and maintenance. **Reduction:**	Contractor	Proponent*

				• Tree plantation will also be done.		
Noise generation	Physical, social, biological	Psychological and hearing problems	Moderate/local	▪ Put silencers on the machines. ▪ Noisy machines should not be operated in night shifts ▪ Workers should be told and encouraged to use PPE's (ear plugs or ear muffs). ▪ Proponent has planned a proper plantation plan which will also act as barrier for noise.	Contractor	Proponent*

Solid Waste Generation	Physical, Biological, Social	Soil Contamination, effecting GW Quality, vectors production, odor, Health, Welfare	Severe/ local and global	**Avoidance:** • The solid waste from the project should not be allowed to pile up . **Reduction :** • Solid waste will be managed entirely by the solid waste management contractor. • Provision of Separate waste bins • Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register.	contractor	Proponent*
Disaster Planning	physical , social	reduction of biodiversity, community grievance,	severe/local	• Proper disaster planning should be done to meet any emergency situation • Firefighting equipment and other safety appliances should be kept	contractor	Proponent*

		economy, welfare		ready for use during disaster/emergency situation including natural calamities like earthquake/flood		

7.6 ENVIRONMENTAL MONITORING PLAN

Environmental monitoring is a vital component of the Environmental Management Plan. It is the mechanism through which the effectiveness of the Environmental Management Plan in protecting the environment is measured. The feedback provided by the environmental monitoring is instrumental in identifying any problem or lapse in the system under implementation and planning corrective actions. The main objectives of the environmental monitoring are:

- To provide a mechanism to determine whether the project construction contractors are carrying out the project in conformity with the EMP.
- To identify areas where the impacts of the project are exceeding the criteria of significance and, therefore, require corrective actions.
- To document the actual project impacts on physical, biological, and socio-economic receptors, quantitatively where possible, in order to design better and more effective mitigation measures.

Following environmental record should be maintained:

- Periodic inspection reports of the site
- Audit reports
- Incident record of all moderate and major spills and other incidents and accidents. The record will include:
    - ✓ Location of spill or battery limit of the accident
    - ✓ Estimated quantity or the amount of injury (as may be reported in LTI or LWI)
    - ✓ Spilled material or nature of injury or loss (temporary or permanent)
    - ✓ Restoration measures
    - ✓ Photographs

- Description of any damage to vegetation, water resource, or community asset.
- Corrective measures taken, if any
- Waste Tracking Register that will hold records of waste generated during the construction period. This will include quantities of waste disposed, recycled, or reused.
- Records of water consumption with use wise breakdown
- Survey reports, in particular, the following:
  - ✓ Vehicle and equipment noise.
  - ✓ Ambient noise survey reports.
  - ✓ Ambient level of PM
  - ✓ Vendor data—all vendors disturbed by the project and compensation paid Public infrastructure: Record of all damages and repair work undertaken.
  - ✓ Employment
  - ✓ Total number of unskilled, semi-skilled, and skilled jobs offered during Construction.
  - ✓ Name and domicile of the employed staff.
  - ✓ Project and Community Interface
  - ✓ Record of community complains and the measures taken to address them.
  - ✓ Number of meetings held in various communities and data of persons who attended
  - ✓ Environmental and social training records

Table 4: Environmental Monitoring Plan for Construction Phase

Components	Objective of Monitoring	Parameter to be Monitored	Measurement	Frequency	Location	Responsibility
Noise Levels	To determine the effectiveness of the noise abatement measures on the sound level	Noise level on the site and adjacent area on dB(A) scale	Noise level reading will be taken	at least 3 working days and on weekend	At least three locations on the unit boundary and three locations at the receptor end	Environment Officer /manager

The monitoring of the EMP and the communication and documentation mechanism that will be employed during the operational phase will be based on the Environmental Management System (EMS) of the project proponents and the certification and legal bindings. The management system of the project proponents will be the same as the certified EMS in

Waste Collection, Storage and Disposal	To check the availability of Waste Management System and Implementation	Inspection of Waste Generation, collection, Storage and Disposal at site	Visual inspection	Once daily	Construction site	Environmental officer/manager
Soil contamination	To determine the effectiveness of the control measures taken to minimize the spillage of oil and chemicals	Inspection of equipment and vehicles	Visual inspection and availability checks	monthly inspection	all vehicles and equipments in use at construction site	Contractor/Environmental officer

place at the company. Approximately PKR 30,000 per month budget will be reserved for the Environmental Monitoring and

Workers safety	To check and evaluate the effectiveness of the workers' safety plan	Injuries and accidents	Recording injuries	daily	Onsite	HSE/contractor
Water conservation	To determine the effectiveness of the Water Conservation Techniques in Practice	leakages, spills and wastages	Visual inspection and record tracking	On monthly basis	at all points of use	Environmental officer/manager

measures.

Table 5: Environmental Monitoring Plan for Operation Phase

Potential activity and	Objective of monitoring	Parameter to be monitored	Measurement	Location	Frequency	Responsibility

Vehicle and equipment exhaust	To confirm the availability of exhaust control devices with the construction vehicles and equipment and their maintenance levels	Air quality at different points around the vehicles and equipment	Readings will be taken	on three typical working days	At least three points around the vehicles and equipment and three points at some distance downwind	Administration
potential impact						

Disturbance due to noise from operational activities	To check whether the existing noise control measures are able to bring the sound level within prescribed limits	Noise level near the receptor	Noise Measurement	At least three location on the plant boundary and three location at the receptor level	Quarterly	Environment officer
Waste disposal, procedure for waste collection, storage, and disposal	To check the availability of waste management system and implementation	Inspection of waste generation, collection, storage, and disposal will be undertaken at each site of the project activity	Visual inspection	Entire unit	Once daily	Administration Officer

Safety	To check and evaluate the effectiveness of the workers' safety plan and availability and access of first aid facilities	Injuries	Injuries will be recorded	Entire unit	Daily	HSE officer

7.7 INSTITUTIONAL CAPACITY OF THE UNIT

The organizational structure for the Environment Management Plan is outlined below:

7.7.1 PRIMARY RESPONSIBILITIES

The primary responsibility for implementing EMP within the company lies with the owner of **Selmore Pharmaceuticals Pvt. Ltd**.

7.7.2 OPERATION MANAGEMENT & CONTROL

Conducting the operational activities in environmentally sound manner will be the responsibility of the concerned Manager; for which he will be trained.

7.7.3 SUPERVISION & MONITORING

Senior Supervisor will be responsible for all environmental issues and for the implementation of EMP.

7.7.4 COMMUNICATIONS AND DOCUMENTATION

An effective mechanism to store and communicate environmental information during the project is an essential requirement of an EMP.

7.7.4.1 MEETINGS

Two kinds of environmental meetings will take place during the project:

- Kick-off meetings
- Weekly meetings

The purpose of the kick-off meeting will be to present the EMP to project staff and discuss its implementation and to discuss any event of environmental significance that has happened in the under-discussion industry or a similar industrial unit to investigate its route causes and develop its solutions.

The purpose of the weekly meetings will be to discuss the conduct of the operation and environmental issues and their management. The proceedings of the meeting will be recorded in the form of a weekly environmental report.

7.7.4.2 CHANGES-RECORD REGISTER

A change-record register will be maintained at the site, in order to document any changes in project design. These changes will be handled through the change management mechanism.

7.8 ENVIRONMENTAL TRAINING

Environmental training will help to ensure that the requirements of the EIA and EMP are clearly understood and followed by all project personnel in the course of the project.

Table 6: Training Program

Target audience	Trainers	Contents	Schedule
Selected management staff	Contractors	Key finding of mitigation measure	After every five months
All personnel	HSE Officer	Mitigation measures	Monthly
Technical Staff	HSE Officer	Waste disposal or sale out status, vehicle movement restriction and other mitigation measures	After every three month
Other staff	HSE Officer	Waste disposal, resource conservation and other mitigation workers	Monthly

7.9 EQUIPMENT MAINTENANCE DETAILS

PPEs and other required machinery of latest technology with high efficiency will be purchased by the Proponent. Maintenance of Equipment will be done twice year for the smooth operation and maximum production of Pharmaceutical unit

7.10 ENVIRONMENTAL BUDGET

Approximately PKR 30,000 per month budget will be reserved for the Environmental Monitoring and measures.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

8.1 CONCLUSION

The report presents Environmental Impact Assessment (EIA) of the Establishment of Pharmaceutical unit. Its main objective is to meet market demand of medicines at affordable price.

EIA of Project is performed according to guidelines of EPA. It includes description of the project, description of the environmental baselines, potential environmental impacts and suggested mitigation measures. An implementation mechanism for mitigation measures in the form of an Environmental Management Plan is included in the study.

The performed EIA showed all anticipated impacts (both positive and negative), associated with the project. Appropriate mitigation measures as explained in the environmental study shall reduce, if not eliminate, these impacts so that these are within acceptable limits. Moreover, no deterioration, depletion or exploitation of local natural resources is expected to be caused by this project.

Based on overall assessment of the environmental impact of the project, it is concluded that the project is not likely to cause any significant adverse impact on the social, physical and biological environment of the area, provided that suitable mitigation measures as identified in this study are implemented.

It is accordingly recommended that Environmental Approval for the project may be issued by the Punjab Environmental Protection Agency, subject to payment of the requisite scrutiny fee by the proponent of the project.

8.2 RECOMMENDATIONS

The Environmental Impact Assessment study and survey results are finally evaluated to recommend the following:

- No activity should be undertaken at the site which could pose any sort of a threat to public health.
- Worker should be provided with ear plugs or ear muffs (PPEs) like mufflers, goggles, gloves and shoes etc.
- Separate parking spaces should be demarcated at the site for parking of vehicles.
- Establishments shall be regularly advised to keep noise levels within acceptable limits.
- Waste minimization practices should be employed and workers should be encouraged to adopt such methods.
- Wages should be distributed on time.
- Wages should not be below minimum wages as prescribed.
- Workers should be told and encouraged to use PPE's.
- Proper ventilation can limit the amount of indoor air pollutants.
- Proper tree plantation plan should also be developed in order to make the unit environment friendly.
- Small waste storage bins should be installed at different corner for proper waste collection and discharge.
- Obligatory insurance should be provided to work laborers against accidents.
- Basic medical training should be provided to the specified work staff and basic medical service and supplies to workers.
- Prohibiting flammable materials in the warehouse premises.
- Stop the source of the spill immediately.
- The Security Guards shall also be trained to act in case of all possible emergency situations. The fire alarms can be activated to signal evacuation. At the same time, communication shall be made with hospitals, emergency services and police for urgent support.
- The Environmental Management & Monitoring Plan should be implemented.