EXECUTIVE SUMMARY

TITLE OF PROJECT

This executive summary presents an overview of the main findings of the Environmental Impact Assessment Report for Establishment of Pharmaceuticals (Nutraceuticals, Herbal and Consumer Products) Manufacturing Unit of **"M/s Bless Laboratories (Pvt.) Limited."**

As per the statutory notification of Review of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Regulations, 2022 made under Section 12 of Punjab Environmental Protection Act, 1997 (Amended 2012), The project for the Establishment of Pharmaceutical Unit falls under **Schedule II** (List of projects requiring an EIA). For this instance, Environmental Impact Assessment of the Project has been conducted in accordance with the Punjab Environmental Protection (Amendment) Act, 2012 and IEE/EIA Regulations 2022. The process for conducting environmental assessment and the results of EIA is described in this document.

LOCATION OF PROJECT

Proposed Unit of M/s Bless Laboratories (Pvt.) Limited is located at Factory No. 179, 1.5-KM, Kattar Band Road, Off Multan Road, Thokar Chowk, Lahore. Coordinates of site are 31.476391, 74.225693. Access to project site is provided through Kattar Band Road and M2.

NAME OF PROPONENT AND ORGANIZATION PREPARING THE REPORT

The details of the proponent are as follow:

Proponent Details	
Proponent Name	Naman Farooq S/o Muhammad Yaqoob
Address	House No. 330/331, Huma Block, Allama Iqbal Town, Lahore

In order to comply with the regulatory requirement of environmental laws of Punjab, management of project has entrusted M/s EHS Services with the assignment of carrying out an EIA Study of the said project. The details of the consultant are as follows:

Consultant Details	
Consultant	EHS Services Pvt. Ltd.

Address	House No.#12, Street No.#06, V-Lane Cavalry Ground Extension, Lahore Cantt
Focal Person	
Name	Engr. Muhammad Asif
Contact No.	0304-4404111, 0345-3122696

PROJECT OUTLINE

This report is related to the Construction of Pharmaceutical Manufacturing Unit. Project will be comprised of nutraceuticals products manufacturing. Total area of land for establishment of unit is 6 Kanal. Total cost of project is 25 crore. The production process for finished products begins with the collection of the right raw materials. When new raw materials arrive, they are first placed in quarantine until they are analyzed and cleared for release. This is always carried out by a qualified person. M/s Bless Laboratories (Pvt.) Limited manufactures many pharmaceutical products of different categories. The raw materials are mixed in a mixer. When the mixture is ready in its finished form, it is packed into blisters or bottles. The product categories include Tablets, Capsules and Liquids mainly. After a product has been filled and packed, it is labelled and packed in final cartons or containers which is then placed in finished products storage area from where they are delivered to market for sale.

MAJOR IMPACTS AND RECOMMENDED MITIGATION MEASURES:

Beneficial/Positive Impacts:

- The establishment of the said project will contribute to enhancing Pakistan's domestic productivity, and help diversify Pakistan's economy
- Provision of employment and stimulation of local economy.
- Provision of local high quality medicine

- Potential of improvement for social and cultural values of local people's exchange of values and standards through positive social interactions. Positive changes in lifestyles will occur due to availability of income when the natives take up Company jobs.

Negative Impacts:

Impacts	Mitigation measures
Construction	
Dust emissions	Most of the dust generating activities during construction lasts for a brief period. Thereafter, vehicular movement generates most of the dusts. Dusts will be suppressed using water bowser to spray exposed land surfaces and particularly areas likely to be disturbed by trucks and other vehicles during the construction of the factory premises. Vehicular speed limits of 20 km/h will be ensured in order to minimize dust generation. Further mitigation measures will be: • Covering haulage vehicles transporting aggregate, soil and cement • Covering onsite stockpiles of aggregate, cement, soil, etc. • Providing workers with the necessary Personal Protective Equipment (PPE) e.g. dust masks and ensure that they are worn • Operating well maintained vehicles and equipment
Impacts of accidental spillages	• The integrity of storage facilities will be ensured • Drip pans will be made available where necessary
Safety	• Safety signage will be put in relevant places within the construction site • Reckless driving by construction workers will be prohibited and monitored. • Workers will be given PPEs such as; helmets, mask, ear-plugs/muffs, safety boots, safety goggles, safety jackets, harnesses etc. and its use will be strictly enforced • Workers will be trained on regular basis regarding personal safety

	• Incidents will be reported directly to the concerned authority
Solid waste management	• Recycling or reuse of waste wherever possible. • Application of a good strategy to collect, remove and safely dispose of waste on daily basis to ensure a clean environment in the factory site • Integrated waste management system will be adopted for the proper management of the waste at site • At the end of the construction phase, left-over waste will be removed as per practices of area • All the idle machinery and equipment will be immediately removed from the site • Scrap and the debris will be removed from the site at the end of the construction stage after appropriate segregation of the material
Operation Phase	
Particulate emissions and generator stack 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 is done to control dust emissions. Generator emissions will be controlled by providing proper enclosure, tuning and maintenance.
Degradation of surface waters quality due to process water and sewage direct disposal	• No wastewater will be generated from process as medicines will be prepared in closed equipments and will not be wasted. Municipal wastewater coming from various municipal works, such as cleaning will be generated, which will be treated via a Septic Tank. Washing wastewater of tanks will be treated in cleaner production tanks (settling tanks) where water will be chemically treated according to its composition. This wastewater will then be used for sprinkling purpose. Approximately 2000-4000 liters/day washing wastewater will be generated for

	washing of all tanks.
To minimize loss work injury/hazards/incidents/accidents	• Training regarding HSE should be given on the regular basis • Workers will be given PPEs such as; helmets, mask, ear-plugs/muffs, safety boots, etc. • It should be strictly enforced to wear PPEs while working • Workers will be trained on the regular basis regarding personal safety and disaster management • Incidents should be reported directly to the concerned authority
To minimize disturbance of communities due to 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 • A thick greenbelt will be developed all around the plant which will be acting as noise barrier. • Introduction of control and monitoring rooms having good sound insulation properties. • All the workers will be provided with ear plugs. • All the transporters will be advised to carry out regular maintenance of their vehicles.
Solid waste management	No process waste will be generated as the whole project will be carried out in closed tanks, while domestic waste will be handled as per area practices. For collection of solid waste dust bins are kept in the unit premises to manage the waste. Discarded/Rejected material will be sent back to supplier.

ENVIRONMENTAL MANAGEMENT PLAN & PROPOSED MONITORING:

For effective implementation and management of mitigation measures, an Environmental Management Plan has been prepared. The EMP provides a delivery mechanism to address

potential impacts of project activities, to enhance project benefits and to introduce standards of good practice in all project activities. The EMP has been prepared with the objective of:

- Defining legislative requirements, guidelines and best practices that apply to the project;
- Defining mitigation/ monitoring plan required for avoiding or minimizing potential impacts assessed by the EIA;
- Defining roles and responsibilities of the project proponent and the contractor;
- Defining requirements for environmental monitoring and reporting;
- Defining the mechanism with which training will be provided to the project personnel.
- Environmental sensitivities and impacts, as well as the associated mitigation plan have been addressed in the EMP.

An Environmental Management Plan (EMP) has been prepared and provided in report, providing:

- A systematic approach to ensure that mitigation strategies prepared in this EIA are implemented during project activities.
- An appropriate monitoring plan is devised to ensuring strict adherence to the environmental mitigation and control measures.
- A training program is devised to providing awareness training on all potential environmental issues of the project to all personnel at site.
- A waste management plan, identifying the most suitable waste disposal and pollution control options throughout the project lifecycle.

Proposed Environmental Monitoring

To oversee the environmental performance of the project through its lifecycle enforcing the PEQS an Environmental Monitoring Program should be formulated which ensures effective

surveillance of the environmental parameters at various stages of the project development and compliances with PEQS and legal obligations. During construction phase ambient air quality for dust level in particular, vehicle and equipment exhaust, noise level (tests), solid waste management and soil contamination, and community and workers' safety (visual) need to be monitored. During operation solid waste management and community and workers' safety (visual), generator exhaust needs to be monitored. **Plan has been included in Chapter 6**

CONCLUSION

The Environmental Impact Assessment contains description of the project, description of the environmental baselines, potential environmental impacts and suggested mitigation measures. It is concluded in this study that all potential environmental concerns associated with the project have been adequately addressed, and no further study is required in this context. This report further draws the conclusion that the impacts identified are easily manageable and reversible, no long-term impact is expect and no deterioration or consequential depletion of local natural resources is expected. It is accordingly recommended that Environmental Approval for the project should be issued by the Punjab Environmental Protection Agency, subject to payment of the requisite scrutiny fee by the proponents of the project.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF ANNEXURES

Annexure I: Proponent CNIC

Annexure II: Land/Property Documents

Annexure III: Site & Layout Map of Project

Annexure IV: Approvals

Annexure V: Environmental Monitoring Reports

Annexure VI: Glossary

Annexure VII: List of Abbreviations

Annexure VIII: TORs

Annexure IX: List of Experts

Annexure X: References

Annexure XI: List of Individuals and Organizations Consulted

1 INTRODUCTION

1.1 GENERAL

This chapter includes the data relevant to the undertaking of the Environmental Impact Assessment (EIA) and details of the project title, project proponent, Consultants, the rationale of the project and the approach taken to the EIA study.

1.2 OVERVIEW

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%.

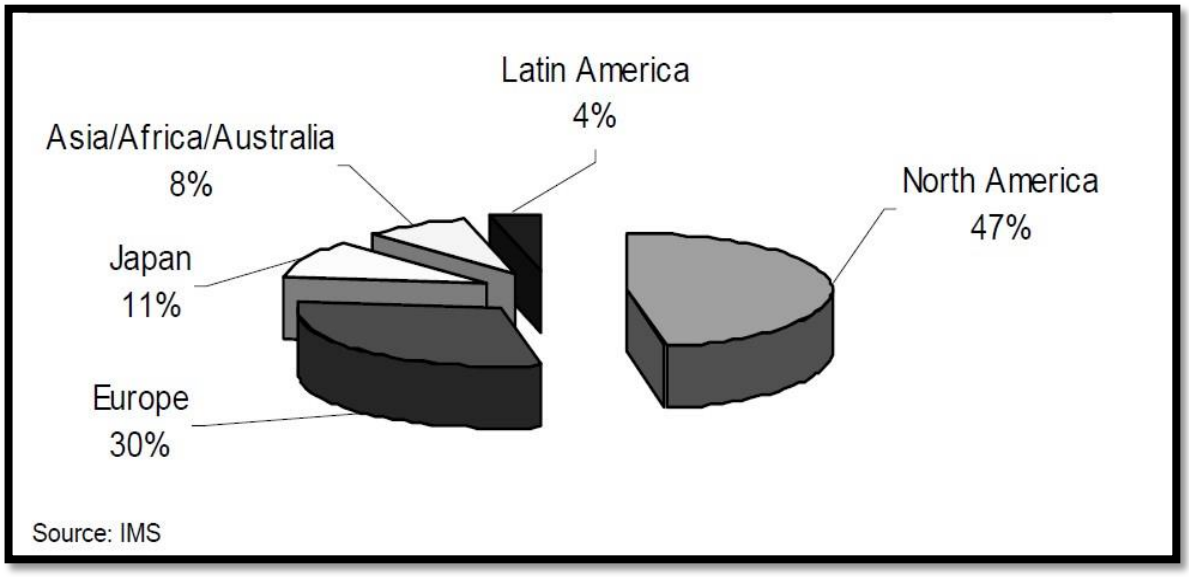


Figure 1-1: Global Sale-Pharmaceuticals (%)

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.

Pakistan's Pharmaceutical industry started out slowly but gradually became an integral contributor to the developing economy of Pakistan.

Pharmaceutical industry is one of the most organized industries in Pakistan, employing a large number of professionals in all areas of operations. Pakistan meets 80% of its domestic demand of medicines from local production and 20% through imports. The market for pharmaceuticals in Pakistan has been expanding at a rate of around 10 to 15% since last few years.

Pakistan is also exporting its surplus drugs to a large number of countries particularly to the Asian and African regions with an expanding trade in the newly emerged Central Asian States. Presently, the pharmaceutical industry in Pakistan is producing all the major pharmaceutical dosage forms. Similarly, there are some special products e.g. immunologicals, anti-cancer drugs, certain anti-diabetics, antidotes and products manufactured from biotechnology, which are still being imported, in the finished form. These specific areas provide excellent opportunities for investment. Only few bulk pharmaceutical raw materials are being manufactured locally and most of the pharmaceutical raw materials are being imported in large quantities from different countries of the world. This sector also gives challenge to explore and avail the opportunities.

Pakistan's Pharmaceutical market is very significant in the World market as it is the 10th largest in Asia Pacific and the 4th fastest growing market (2008/09) after China, India & Vietnam. The total worth of Pakistan's Pharmaceutical industry is measured at Rs. 191 Billion (USD 1.8 Billion) in September 2015 most of which is down to private sector investment. The private sector contributes to an overwhelming 82.5% of the total

health expenditure. Figure below provided insight of growth trend for both MNC's and National pharmaceutical companies.

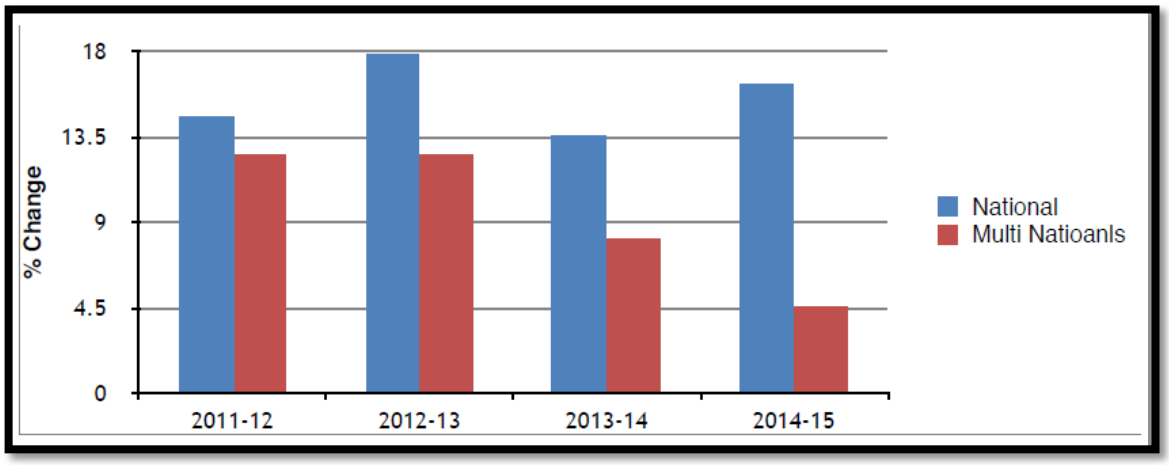


Figure 1-2: Growth trend of National and Multinational Pharmaceutical Companies

Some key statistics of Pakistan Pharmaceutical Market are as follows:

Table 1-1: Statistics of Pakistan Pharmaceutical Market

Enterprises / Companies active in the field	600
Number of Employees	Over 100,000
R&D Expenditure	1% of profit (by each company) goes to R&D Fund of the Ministry of Health
Registered Drugs	47000
Registered Molecules	1100
Controlled Price Drugs	Almost All
Estimated Size of the Pharmaceutical Market	2.6 Billion US $ (IMS Q4, 2015)
Total Registered Pharmaceutical in Pakistan	Approx. 660

Multinational Pharmaceutical Company	18
National Pharmaceutical Company	641
Projected Growth of Market in 2016	13.06%

The pharmaceutical industry in Pakistan comprises of over 400 pharmaceutical manufacturing units including around 30 operated by multinationals present in Pakistan. Province wise break up of Pharmaceutical Manufacturing Units in Pakistan is given below:

Table 1-2: Province wise breakup of Pharmaceutical Manufacturing units in Pakistan

Province	National	Multinational	Total
Punjab	205	4	209
Sindh	92	23	115
KPK	50	0	50
Balochistan	7	2	9
AJK	3	0	3
Total	356	30	386

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 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. For this purpose, the proponent has decided to engage environmental consultants, **M/S EHS Services** to conduct Environmental Assessment for the execution 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 critically examining 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. EIA Punjab before issuing for the Environmental Approval.

1.3 IDENTIFICATION OF THE PROJECT AND PROPONENT

1.3.1 Nature of Project

The Environmental Impact Assessment (EIA) report covers the project "Establishment of Medicines and personal care manufacturing unit". The salient features of this project have been described in Chapter 3, and briefly in Executive Summary of EIA.

1.3.2 Area/Size of project

Total area of project is 26932sft (6 kanal).

1.3.3 Location of the Project

Aforesaid project is to be located at Factory No. 179, 1.5km Kattar Band Road, Off Multan Road, Thokar Chowk, Lahore.

1.3.4 Proponent

The details of the proponent are as follow:

Proponent Details	
Proponent Name	Nauman Farooq S/o Muhammad Yaqoob
Address	House No. 330/331, Huma Block, Allama Iqbal Town, Lahore

1.4 DETAILS OF CONSULTANTS

For the preparation of the EIA Report of the said project, the proponent has hired the services of the environmental consultants; **M/S EHS Services (Pvt.) Limited.** Team comprising of environmental engineers, chemical engineers, environmental experts and environmentalists has worked on this report. EHS Services is one of the pioneers Environmental Consultancy Companies in Pakistan with an unrivalled reputation for providing expert, tailored services and solutions. EHS Services provides the environmental services, litigation and consultancy to clients both industry and government.

EHS Services is providing quality services in various environmental sectors i.e.

- Environmental Assessment Reports i.e. IEE/EIA
- Environment Management Plans (EMP)
- Designing of Emission Control Equipment
- Waste Water Treatment Plant (WWTP) Designing
- WWTP Construction Supervision, Commissioning and Operations
- Establishing Bottled Water Plant based on RO or UF
- Lab testing (Drinking Water & Waste Water Analysis , Soil Analysis, Sludge Testing, Petroleum/ Lube Oil Testing, Fertilizer Analysis, Pesticides in Water, Soil, Fertilizer, Coal, Coke Analysis)
- Monitoring and inspection
- Environmental modeling

Consultant Details	
Consultant	EHS Services Pvt. Ltd.
Address	House No.#12, Street No.#06, V-Lane Cavalry Ground Extension, Lahore Cantt
Focal Person	

Name	Engr. Muhammad Asif
Contact No.	0304-4404111, 0345-3122696

Study team:

The following table lists the names of experts involved in the making of EIA report:

Table 1-3: List of Experts

Sr. #	Name	Qualification	Role
Engineers			
i.	Engr. M. Asif	M.Sc. Chemical Engineering	Monitoring and Testing
ii.	Engr. Muzna Manzoor	M.Sc. Environmental Engineering	Designing and report review
iii.	Engr. Fahad Nazir	M.Sc. Chemical Engineering	Socioeconomic Survey
iv.	Engr. Rida Azhar	B.Sc. Environmental Engineering	Report preparation
v.	Mahtab Alam	M.Sc. Chemical Engineering	Collection of baseline data
vi.	Saad Khattak	B.Sc. Chemical Engineering	Site survey and analysis of impacts on surroundings

1.5 PURPOSE OF REPORT

The establishment/development/construction of any Project leads to positive and adverse changes in environmental and change in social settings of the Project Area. The intensity and

level of change, however, depends upon the nature of the Project and the baseline environmental conditions of the area. The construction of said project will cause minor to moderate adverse environmental and social impacts on the surrounding area. Thus, an environmental and social study is mandatory to establish the baseline conditions, evaluate the possible adverse impacts if any, and devise the mitigation measures.

Section 12 of Pakistan Environmental Protection Act, 1997 (PEPA, 1997) states "No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency an Initial Environmental Examination (IEE) and, where the project is likely to cause an adverse environmental effect, an Environmental Impact Assessment (EIA), and has obtained approval from the Provincial Agency in respect thereof." Later on, Punjab Environmental Protection Agency (Review of IEE and EIA) Regulations, 2022 provided the guidelines for categorizing the Projects. According to Schedule-II of PEPA (Review of IEE and EIA) Regulations, 2022; the construction of the said project falls under category B(2). i.e., the project requires an EIA study.

1.6 OBJECTIVES OF EIA

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 said 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 strengthen environment, improve ecological resilience, 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.

1.7 APPROACH & METHODOLOGY

The following approach and methodology was adopted for carrying out the EIA study of the proposed project:

1.7.1 Approach for EIA

The approach for conducting EIA of said Project is to follow the requirement of Punjab Environmental Protection Act 1997, Initial Environmental Examination and Environmental Impact Assessment Review Regulations 2022 and the guidelines provided in the Pakistan Environmental Assessment Procedures, 1997

1.7.2 Orientation

Meetings and discussions were held among the members of the EIA Consulting Team. This activity was aimed at achieving a common ground of understanding of various issues of the study. Subsequent to the concept clarification and understanding, a detailed data acquisition plan was developed for the internal use of the EIA consulting team. The plan identified specific data requirements and their sources; determined time schedules and responsibilities for their collection; and indicated the logistics and facilitation needs for the execution of the data acquisition plan.

1.7.3 Desktop Studies

Prior to mobilization, the consultants conducted a desktop study through collection and review of guidelines, data and reports related to the proposed project, that included (a) review of National and Provincial Environmental Legislations; (b) Google Earth Satellite Imagery; (c)) and other relevant documents/drawings and design data provided by the Client.

1.7.4 Review of Environmental Laws and Institutional Requirements

All applicable national and international laws, legislations, guidelines along with relevant international protocols were reviewed relevant to the proposed project components.

1.7.5 Delineation of Study Area / AOI

For an EIA Study, a clear delineation of the Study Area / Area of Influence (AOI) is required. Study Area / AOI is the area within which the potentially significant impacts of the proposed Project activities (direct or indirect) are envisaged. In this report, the Study Area / AOI is the area where the Project impacts has been accessed on the environment due to the proposed Project activities. Based on the available Google Earth Imagery, Project footprints were overlaid on the existing Project Area Imagery. Utilizing the information collected through the detailed site visit, consultations with the locals and concerned departments and foreseen impacts of the proposed Project, a tentative AOI was delineated.

1.7.6 Survey of AOI

A team of Environmental Scientists, Environmental Engineers and Sociologist carried out the environmental and social survey of the AOI to familiarize themselves with the local conditions and the environmental settings. During the survey, the information regarding the topography, soils, surface water, groundwater, flora & fauna, social settings and major settlements along the AOI were observed.

1.7.7 Environmental Baseline Survey of the Project

Detailed environmental and social survey was carried out within the AOI as mentioned above. For data collection, formal meetings were held and data collected through visual observations, interviews with the local residents and officials. In order to collect the relevant published information, government offices were also visited. Prior to the start of field activities comprehensive checklists, proformas and maps were developed to collect the information

1.7.8 Stakeholder Consultations

The Consultant identified Project stakeholders and held meetings with them during the surveys to receive feedback on the expected environmental issues related to the Project and suggested

mitigation measures. Meetings were carried out with stakeholders to discuss the issues/constraints and get their views and feedback to mitigate the potential environmental as well as social impacts associated with the implementation and operation of the Project.

1.7.9 Screening of Potential Environmental Impacts and Mitigation Measures

Based on the generally established baseline conditions in the adjacent as well as in the Project Area, potential physical, ecological and social impacts of the proposed Project were identified, evaluated and quantified, wherever possible. A logical and systematic approach was adopted for impact identification and assessment by utilizing a combination of the secondary data, satellite imagery, environmental checklists, socioeconomic survey proformas, field observations and discussion with the local residents of the Project Area. To mitigate the significant adverse impacts, adequate mitigation measures and implementation framework were proposed so that the proponent could incorporate them beforehand in the design phase.

1.7.10 Environmental Management Plan (EMP)

An EMP has been prepared to ensure the adequacy and effectiveness of the proposed protocol by clearly identifying the roles and responsibilities of the agencies, responsible for implementation, monitoring and auditing of EMP activities, existing and suggested framework, necessary approvals and the required further studies. EMP also include organizational setup, a monitoring mechanism, monitoring plan, environmental and social parameters to be monitored with their frequency. Similarly, costs for environmental monitoring and social component/social mitigation measures were also included as part of the EMP. Environmental monitoring, evaluation, auditing and reporting mechanism were also proposed in the EMP.

1.8 STRUCTURE OF REPORT

This EIA reviews information on existing environmental attributes of the Study Area. Geological, hydrological and ecological features, air quality, noise, water quality, soils, social and economic aspects and cultural resources are included. The report predicts the probable impacts on the environment due to the said project. This EIA also proposes various environmental management measures. Details of all background environmental quality, environmental impact/pollutant generating activities, pollution sources, predicted environmental

quality and related aspects have been provided in this report. The structure of the assessment report will be as follow;

Section 1 "Introduction" briefly presents the project background, objectives, methodology and need of the EIA study.

Section 2 "Description of Project and Alternative" furnishes information about the studied alternatives, location of the proposed project, cost and size of the project, its major components and alternatives considered for the proposed project to select at the preferred alternative for detailed environmental assessment.

Section 3 "Environmental Baseline" describes physical, biological and socio-economic conditions prevalent in the project area.

Section 4 "Anticipated Environmental Impacts and Mitigation Measures" identifies and evaluates impacts of the project activities during the construction and operation stages and recommends with the measures proposed to mitigate potential environmental impacts of the project.

Section 5 "Environmental Management Plan" outlines roles and responsibilities for the implementation of the proposed mitigation measures, training needs of the staff for implementation of the mitigation measures, monitoring requirements, monitoring cost etc.

Section 6 "Public Consultation" identifies the main stakeholders and their concerns raised through scoping sessions, and deals with the measures to mitigate the social impacts.

Section 7 "Conclusion and Recommendations" elaborates the conclusion of subject environmental study and suggests the recommendations to address the issues raised from proposed construction activities.

2 SCREENING

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

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

As per the statutory notification of Review of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Regulations, 2022 made under Section 12 of Punjab Environmental Protection Act, 1997 (Amended 2012), the project for the Construction of medicines manufacturing Unit falls under **Schedule II** (List of projects requiring an EIA), B(2) category i-e Manufacturing and Processing (Chemical Manufacturing Units including Pharmaceuticals and Cosmetics)

For this instance, Environmental Impact Assessment of the Project has been conducted in accordance with the Punjab Environmental Protection (Amendment) Act, 2012 and IEE/EIA Regulations 2022.

3 SCOPING

3.1 Introduction

The scoping identifies the key issues and impacts that should be further investigated. The Scoping defines the spatial and temporal boundaries, important issues and concerns raised during consultation and significant impact factors to be determined.

3.2 Objectives

The key objectives of this scoping are to:

- ✓ Inform the public about the proposed project
- ✓ Identify main stakeholders and their concerns and values
- ✓ Define reasonable and practical alternatives to be addressed
- ✓ Focus the important issues and significant impacts to be addressed in the EIA report
- ✓ Define the boundaries in time, space and subject matter
- ✓ Set requirements for the collection of baseline and other information
- ✓ Establish the Terms of Reference (TOR's) for the EIA study

3.3 Spatial and Temporal Boundaries of Environmental Assessment

Construction of said project will be completed in 1 year. Operation Lifespan will be till 2050. Said project will have positive and negative impacts at local and national level. Most of the Project's environmental and social impacts will be beneficial, including for example the availability of high quality medicines locally. Positive changes in lifestyles will occur due to availability of income when the natives take up jobs.

3.4 Important issues and concern raised during consultation

During consultation it was observed that maximum of people was in favour of project and following issues and concerns were raised during Stakeholder Consultation:

- Proper emergency response plan should be developed
- Loading and loading vehicles should be avoid during busy hours to avoid traffic congestion
- Air and noise emissions should be controlled during construction

3.5 Significant impacts and factors to be determined

Main impacts and factors to be determined are;

- Occupational Health and safety
- Traffic Management
- Community disturbance
- Control Air emissions
- Job opportunities for locals
- Confined noisy activities
- Resource conservation
- Avoid excessive water consumption
- Energy efficient techniques must be adopted
- Proper site restoration after construction
- Emergency preparedness

4 ALTERNATIVES

This chapter deals with an analytical overview of the different alternatives that have been considered while planning of the proposed project. The analysis has been carried out critically so as to justify the need of the Project. The following alternatives considered during the conduct of the study are given as below:

- No Project Option (NPO).
- Location/Site Alternatives, their selection and rejection criteria.
- Design/Technology alternatives, their selection and rejection criteria.
- Environmental Alternatives, their selection and rejection criteria.
- Economic Alternatives, their selection and rejection criteria.

4.1 No Project Option (NPO).

The project will encompass a modern state-of-the-art Pharmaceutical facility with the objective of producing superior quality pharmaceutical products. The proposed project will provide additional income and gainful employment to the local people. The "No-Project" option if undertaken will prevent the country from being self-reliant. Although, the Pakistan's pharmaceuticals and healthcare sectors are expanding and evolving rapidly, about half of the population has no access to modern medicines. Pakistan's pharmaceutical sector is simply unable to local demand. Clearly, this presents an opportunity, but much more work need to be done by the government and industry's stakeholders. The current project will benefit from production of superior quality medicinal drugs enabling the direct marketing of pharmaceutical products.

Other impacts of the "No-project" option would be loss in employment and infrastructure development in the project area, as the project is likely to create jobs and improve the existing infrastructure of the area. From the environmental point of view, this option would result in a loss of opportunity in further improvement of the environmental management of the area, through generation of environmental baseline data, and the mitigation and monitoring plans.

4.2 Site Alternatives

An open land under undisputed ownership is selected for the Establishment of pharmaceutical Unit. Selected site is an unproductive land and is going to be brought into industrial use which

will be beneficial for the locals as they will get jobs. The site is well located in regard to the following:

- Located near cluster of industries
- Easy road access to the market
- No settlements at a safe distance
- No watercourse within a safe distance
- No ecologically sensitive or declared protected area in safe radius

Distances (areal distances) of receptors from site are:

Receptors	Name	Distance
School	GGPS Gopi Ray School	0.4km
Residence	Gulshan Town	0.7km
Hospital	Farooq Hospital	1.4km
Industry	Yums Ketchup	Adjacent
Road	Kattar Band Road	Adjacent

Distance of nearest Receptors from project site is shown in fig 4-1

4.3 Technology Alternative

Unit proposes to manufacture superior quality pharmaceutical products involving various chemical and physical operations. The proponent intended to install modern facilities using latest and best technology available. The unit is very concerned and conscious about the product quality and equally about the environmental protection and resource conservation. In tablet manufacturing process, the wet granulation process is the traditional and frequently used method in the pharmaceutical industry. This process improves flow and cohesion reduces dust and cross contamination and permits the handling of powder blends without loss of homogeneity. The most striking feature of direct mixing process is its simplicity and hence economy. Less equipment is required and the number of stages in the process is greatly reduced with reduced processing time and lower power consumption. The selection of fluid bed dryer is done on the basis that it takes less time to complete drying with shorter handling time. Closed process is suitable to minimize product / operator exposure, cross contamination and product loss. Rotary tablet press is a multi station press that increases the output of tablets and is used for large scale production. It consists

of a number of dies and set of punches. Automatic capsule filling machines are suitable for filling powders and pellets. These machines have high filling accuracy and can accommodate capsule sizes. Most machines conform to various safety features for maximum operator protection.

4.4 Environmental Alternative

The unit site is located in an area which is devoid of any biodiversity including forestry, wildlife, migratory birds, game reserves (flora and fauna), or protected species of fauna & flora; fishery or aquatic biology; watershed. There is no cultural or any other heritage in the project area. Summarily, there is no environmental sensitivity in the project area. These factors are also strongly supportive of the proposed project site.

4.5 Economic Alternative

Selected land is under ownership of proponent and no cost is required to purchase other land so it is viable and economic option for proponent to construct unit. The cumulative effect of this types project would result in noticeable economic growth. The project will also make a positive consideration to the industrial growth.

Figure 4-1: Sensitive Receptors near Project site

5 PROJECT DESCRIPTION

This section of the study renders a detailed account of the project and its salient features, such as location and various phases. Inputs and discharges relevant to different phases of the project, such as electricity & material have also been examined as a response to possible environmental concerns.

5.1 OBJECTIVE OF THE PROJECT

The objective of the proposed project i.e., establishment of pharmaceutical unit is to go for forward integration and manufacture high quality medicinal drugs with good market potential. The project will encompass modern state-of-the-art pharmaceutical manufacturing facility with the objective of initiating, producing and market safe efficacious and superior quality pharmaceutical products to improve the health and quality of life of well-being. The project will have following advantages:

- The project will provide additional income and gainful employment to local people.
- It will help to produce superior quality pharmaceutical products for consumers.
- The proposed project will itself process or produce pharmaceutical products with value addition.

5.2 LOCATION AND LAYOUT OF PROJECT

5.2.1 Location of the Project

Particulars	Details
Latitude	31°28'35.0"N
longitude	74°13'32.5"E
location	Factory No. 179, 1.5km Kattar Band Road, Off Multan Road, Thokar Chowk, Lahore
District	Lahore
Road connectivity	Kattar Band Road

5.3 LAND OWNERSHIP

Land/property documents are attached in Annexure II.

5.4 GOVERNMENT APPROVALS

Following NOCs are obtained and annexed:

- License from Drug Regulatory Authority
- SECP Registration
- ISO 9001 and 14001 Certifications

5.5 LAND USE ON SITE

Site is surrounded by open lands and industries. The land is owned by proponent. The land use on the site will be industrial only. There is no settlement, surface water body, grassland or preserved area in the proximity of the project area that could be damaged or dismantled

5.6 ROAD ACCESS

Main roads and markets are in easy and close access of the proposed project site. Said project site is easily accessible through Kattar Band Road. Road Network around project site is shown in below fig:

5.7 RELOCATION AND REHABILITATION PLANS

The main areas to be considered for site restoration include the construction area, temporary tracks; land used for vehicle and material stores, material excavation pits etc. These areas should be restored to its original condition with the maximum possible effort. The restoration work comprises the removal of temporary construction works and removal of any fence installed, leveling of areas (wherever required), etc. The following procedures will be adopted for the restoration of the site:

- All temporary construction built for the site development will be removed.
- Any debris from construction activities should be removed properly from the site.
- All fencing and gates will be removed and pits will be backfilled.
- Whole of the site will be covered with the original soil to the original levels and grades and re-vegetation will be done, where required.

None of the locals or residents will be relocated or infrastructure will be affected or destructed because land is already under the ownership of the project owner. There is no need for the relocation or dismantling of significant structure. Hence, no relocation and rehabilitation is required.

5.8 VEGETATION FEATURES OF SITE

The project area is surrounded by green areas and open lands. Site is vacant, only some shrubs are present.

5.9 DESCRIPTION OF PROJECT

5.9.1 Raw Materials

List of raw materials is attached as annexure.

5.9.2 Final Product and Capacities

Following is the list of products of aforesaid project along with capacities:

Table 5-1: Product Capacities

Sr. No	Products	Quantity/day
1.	Syrup	26000 pcs
2.	Tablet	50000 tablet
3.	Drops	30000 drops
4.	Cream Ointment	15000 pcs
5.	Sachet	50000 pcs
6.	Capsule Filling	150000 pcs
7.	Granulation	300kg
8.	Extraction	3000 liter
9.	External Preparation	15000 packs
10.	Soft Gel	150000 ovual
11.	Soap	8000 packs

5.9.3 Area of Project

Total Area of the Project is 26932 Sq. Ft (6 kanal). Area distribution is presented in table 5-2

Table 5-2: Area Distribution

Area	SFT

Covered Area (G.F)	18530
Covered Area (F.F)	12544
Total Covered Area	31074
Nutraceutical Section	
Liquid Section	1260
Tablet section	1310
Extract section	280
Powder section	580
External preparation	560
Cream and ointment section	420
Granulation section	435
Capsule section	489
Soft gel section	820
Drop section	423

5.9.4 Process Description

Said Project is involved in manufacturing nutraceutical medicines. Procedure for manufacturing of medicines is given below:

RECEIVING BAY AND DEDUSTING AREA

The raw material, both active and inactive is received in receiving bay and dusting is done to remove any dust from packs to avoid any contamination.

QUARANTINE AREA

Qunarantine area is classified into three sections via three different color boundaries including yellow, red and green lines. Yellow boundary line area is for the raw material which is under quality control testing, while green line area is for the raw materials which

have been released by quality control department for manufacturing. Red boundary line area is for those raw materials which have been rejected by quality control department and should not be used in manufacturing, which will be sent back to company from where purchased. The raw materials, in their final containers are transferred to quarantine area of yellow boundary 1st until they are under testing by quality control department. Once it gets released by quality control department, it is shifted to green colored line boundary area for use in manufacturing process of syrups. The temperature and humidity is controlled properly and maintained at a temperature of 25±5^{0}C and humidity of 55±5%. Separate rooms are provided for storage of active ingredients and inactive ingredients. Regular temperature and humidity testing is conducted in these storage rooms. Relative Humidity of 45 and Temp of 25^{0}C is being maintained

SAMPLING AREA

Sampling area is the specified area with proper air circulation via HVAC system. In this area, the raw materials are selected by random sampling under the supervision of qualified pharmacist. Samples are taken from upper, medium and bottom layer of containers and are supplied to quality control department for testing of raw material. Once the raw material has been approved and released by quality control department for manufacturing, it is transferred to dispensing area.

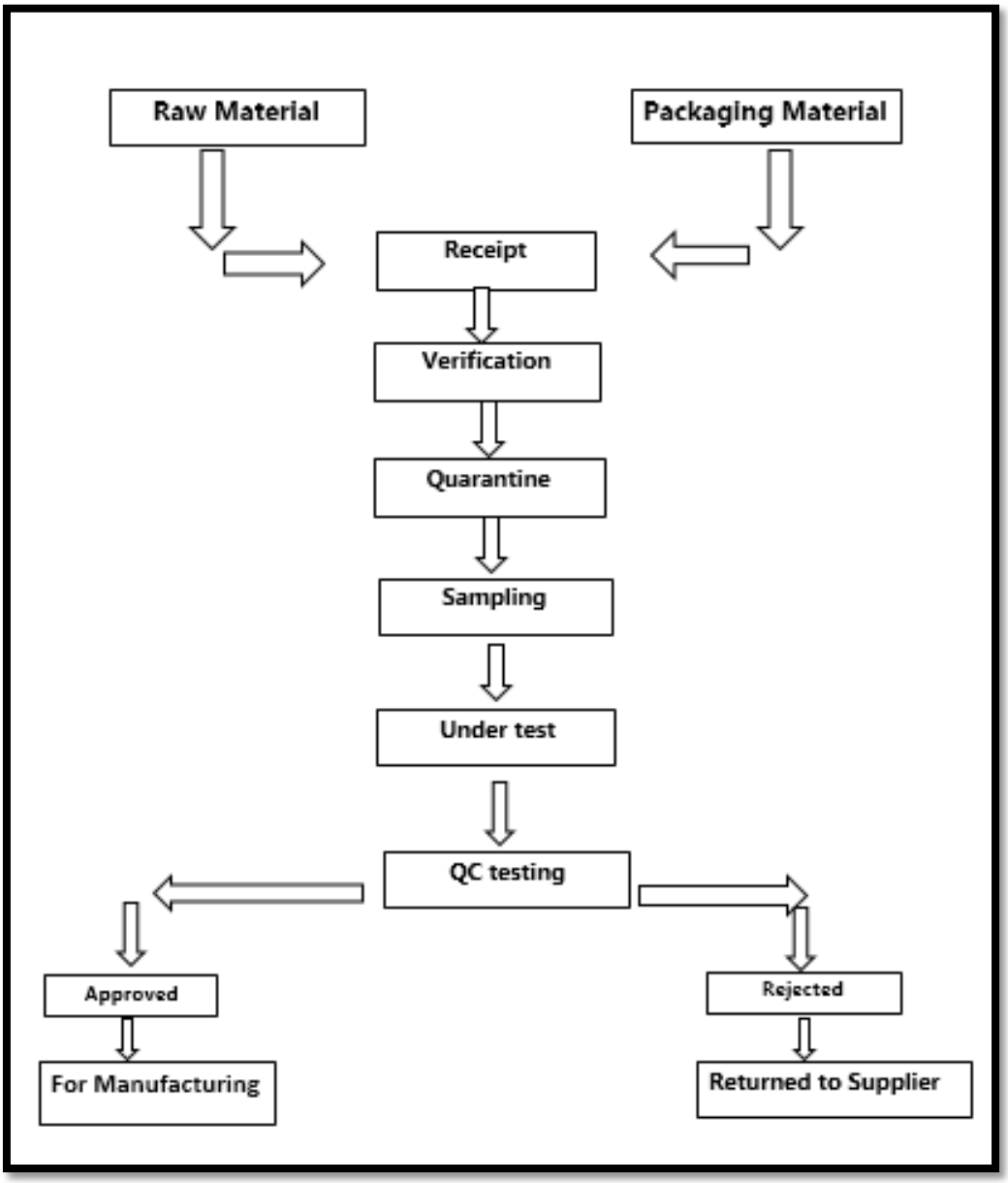
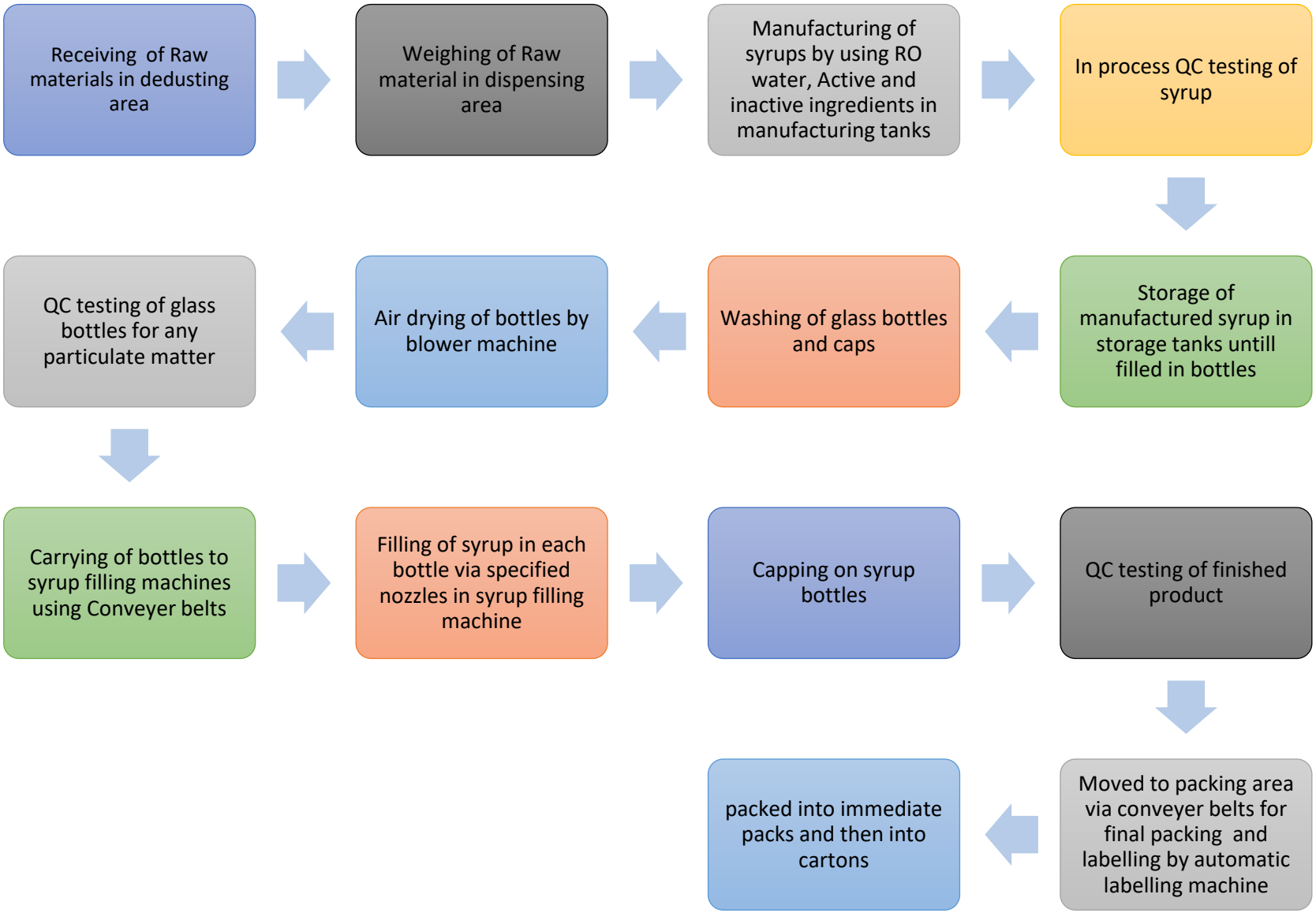


Figure 5-1: QC Testing of Raw Material

5.9.4.1 Syrup Manufacturing

Oral–liquid manufacturing in pharmaceutical terminology involves the preparation of oral and topical preparations. Preparations for oral use are usually solutions, emulsions or suspensions containing one or more active ingredients in a suitable vehicle; they may in some cases consist simply of a liquid active ingredient used as such. Liquid preparations for oral use are either supplied in the finished form or, with the exception of Oral emulsions, may also be prepared just before issue for use by dissolving or dispersing granules or powder in the vehicle stated on the label. The topical one includes lotion, creams and emulsions. The manufacturing process for liquid preparations for oral use should meet the requirements of

Good Manufacturing Practice (GMP). Oral liquid syrups are manufactured in liquid-liquid manufacturing section. The manufacturing process involves the following steps:


Receiving of Raw materials in dedusting area
Weighing of Raw material in dispensing area
Manufacturing of syrups by using RO water, Active and inactive ingredients in manufacturing tanks
In process QC testing of syrup
Storage of manufactured syrup in storage tanks untill filled in bottles
Washing of glass bottles and caps
Air drying of bottles by blower machine
QC testing of glass bottles for any particulate matter
Carrying of bottles to syrup filling machines using Conveyer belts
Filling of syrup in each bottle via specified nozzles in syrup filling machine
Capping on syrup bottles
QC testing of finished product
Moved to packing area via conveyer belts for final packing and labelling by automatic labelling machine
packed into immediate packs and then into cartons

DISPENSING AREA

The released raw materials, both active and inactive ingredients by quality control department are dispensed in this section using digital weighing balances under supervision of pharmacist. These are dispensed and are transferred to manufacturing areas.

MANUFACTURING AREA

Manufacturing area contains large stainless steel tanks. The purpose of double jacketed container is basically to control the temperature of manufacturing contents as it contains cooling or heating jacket around its vessel to maintain the temperature.

The active and inactive raw materials are transferred to manufacturing tank and RO water is stored in RO water tank from where it is supplied to manufacturing tanks via some pipes. Automatic Mixing is done to prepare homogeneous solutions. In process samples are taken and supplied to quality control department. Once released the manufactured syrup is transferred to storage tank until filled, labeled and packed.

WASHING AND DRYING AREA

In washing area the vials are washed along with caps using RO water. These washed bottles are then sterilized and oven dried at 250 ^{0}C to remove any dust or any particulate matter.

FILLING AREA

Filling area contains syrup/suspension filling machines. The bottles are arranged properly on round plated area of filling machine, from where they are transferred under nozzles one by one via conveyer belts and are filled. The caps are placed in caps holding area and are place on in bottle automatically after filling and are locked and sealed. From this point, filled bottles are selected randomly and are inspected for proper filling, any leakage and particulate matter by quality control department. Once the samples get approved by quality control department, they are transferred for labeling and packaging.

LABELLING AREA

The filled bottles are labeled by automatic labeling machine that pastes label on every bottle one by one. In labeling section, the various manufacturing details are printed onto the primary pack like batch number, date of manufacturing, maximum retail price of the therapeutic, etc. as required by Drugs Act

PACKAGING AREA

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.

After labeling section, the filled and labeled bottles are packed into primary packaging material along with the product leaflets. Some of the primary packed bottles are supplied to quality control department for in process quality control testing to check label and its specifications. Once approved these bottles are then packed into secondary packaging materials i.e. cartons and are stored in finished goods are till they are dispatched in market.

5.9.4.2 Drops Manufacturing

Pre-Formulation and Formulation Development

Once the molecule is identified and a process to mass produce the molecule is created, the final product development work begins. The initial goal is to get the product to a semi-formulated state so it can be administered to animals for safety/toxicology studies (pre-clinical). For the early phases of animal and human studies (clinical trials) it is common to use drug products that are not in the final formulated state. While these early phase studies are conducted, development scientists work to identify the final formulation that will offer the best stability, safety, and efficacy. Pre-Formulation studies may include:

- pH stability
- pH solubility
- identifying a stability indicating analytical method

- thermal stability
- oxidation potential
- light stability
- hydrolysis potential

Filtration

At this point in the manufacturing process the formulated drug product enters the Class A clean room. It remains under these conditions until the product is filled, stoppered, and capped. Only then does the product exit the clean room, unless it is destined to be freeze-dried, at which point the product is aseptically transported to the freeze-dryer. There are four primary types of filters used in the parenteral and biopharmaceutical industry (the type of filter chosen depends on the type of material to be removed). The filter types include:

- clarifying filters—large particles
- microfilter—bacteria and yeasts (used for injectable drug products)
- ultrafilter—viruses
- nanofilter—small organic compounds and ions

Filling

Once the product has been filtered into a sterile filling container and the filter passes the postfill integrity test, it is now ready to fill into its primary container. Sterile tubing is placed into the sterile solution, which leads first to pumps and then to filling needles

The product is generally filled into glass vials; however, different types of containers can be filled depending on the product. Vials that have been pre-sterilized travel down the filling line and stop below the filling needles. The needles descend into the vials and slowly rise as the required amount of product is dispensed. This method of filling minimizes splashing of product on the sides of the container The weight of the vials must be initially checked after filling to ensure the proper dose is being dispensed; it should also be checked periodically throughout the run to ensure nothing has changed with the filling equipment that would cause either a low or high product fill.

Capping

If the vials are not scheduled to be freeze-dried they travel down the filling line to the capping station. Caps are used to secure the stopper in the neck of the vial to prevent the stopper from coming out either over time or during handling. The caps are fed down a chute to the vials as the vials travel down the filling line. One cap is loosely placed on the top of each vial. The vials then travel to the crimping station where rotating blades crimp the bottom of the aluminum skirt around a lip on the neck of the vial, producing a tight fit that locks the stopper into the neck of the vial. At the time of use the plastic cap is removed; this exposes the top of the stopper, which is then pierced with a needle to remove the contents inside the vial. At this point in the production process the vials exit the Class A environment through a port in the wall and are ready for inspection and final packaging.

Inspection

After the product has been manufactured, tested by Quality Control (QC), and released by Quality Assurance (QA), it moves to Inspection. Inspectors look for defects in both the container (cracks, poor seals, etc.) and the product (particles, discoloration, etc.). Every vial of product must be individually inspected. The three types of inspection include:

- manual inspection: human inspection (by hand) in a light box
- semi-automated inspection: human inspection with the vials delivered on a conveyor
- automated inspection: camera/computer inspection with the vials on a conveyor

Labelling

Once the product is released from Inspection by Quality Assurance, it moves to Labeling. Labeling is performed in order to provide accurate information regarding the product and avoid misrepresentation of the ingredients or effects of a drug, whether accidental or intentional. Stringent controls are placed on the printing and handling of labels in order to prevent errors.

Packaging

The final container/packaging should be suitable for use and should not compromise the stability and efficacy of the topical preparation.

Many compounded drops can be packaged in either sterile plastic bottles with integrated dropper tips or in glass bottles with separate droppers.

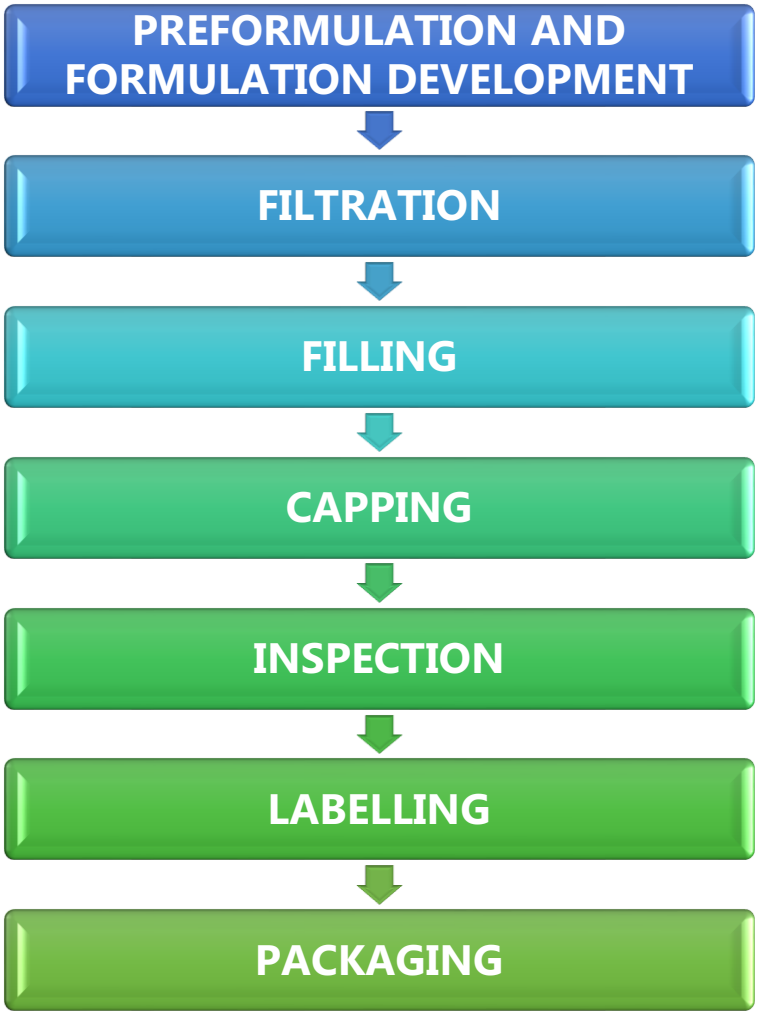


Figure 5-2: Drops Manufacturing Process

5.9.4.3 Cream/Ointment and Soft Gel Manufacturing

There are different parts of the Ointment Manufacturing Plant which play a key role in the manufacturing process of Ointment and creams.

Water phase vessel

Water phase vessel is a first step in the ointment manufacturing plant. In this phase, the water-soluble ingredients are dissolved in water. And the mixing is done mechanically by a stirrer. For further heating is applied to mix.

Wax heating vessel

Wax heating vessel is the second step in ointment manufacturing plant in this stage the oil and wax type of ingredient is dissolved and melted by heating and mechanical way of stirrer mixer.

Manufacturing vessel

This is the third step in the ointment manufacturing plant. Here the mixing of both the filtered solvents occurs. Water phase vessel solvent and oil phase solvent are collected in the manufacturing vessel and the mixing is started. This mixing is done with the help of a planetary mixer. The heating and cooling of ingredients are done in a jacketed way. And the jacket is supplied with hot water or steam for heating the ingredients. And for cooling of ingredients chilled cooled water is circulated in the jacketed system. Here is a glass window for observation of ingredients. Safety valves are present. The interlock system is present for safety purposes. Temperature regulators are present in this section of the ointment manufacturing plant. And pressure safety valves are present. Which controls the pressure which is present inside the ointment plant.

Planetary mixer

The planetary mixer is a mixer that is present in the manufacturing vessel of the ointment manufacturing plant. And the function of it is mixing by agitator way.

Colloid mill

Colloid mill is a special type of grinder which is present in an ointment manufacturing plant. And it breaks down large molecules, sometime lumps are formed inside the vessels. So these lumps are broken down.

Storage vessel

The storage vessel is a special type of tank in which ointment, cream, get, lotions, etc. are stored. It is freely attached and is removable from the ointment manufacturing plant. It is freely moveable from place to place by its wheels. It is a skid type in structure. And the lower portion is jacketed in which the ointment preparations can be heated.

Homogenizer

Homogenizer is present in the main axis of the ointment manufacturing plant. Homogenizer helps in achieving high shear and homogeneity of the product.

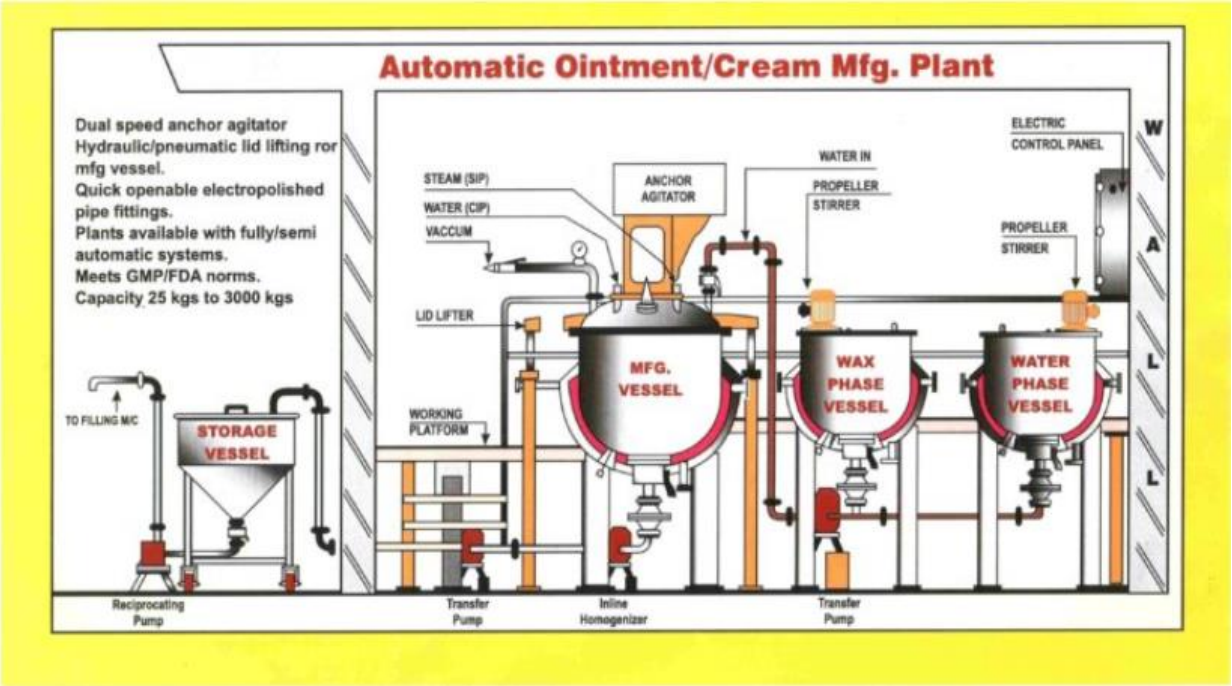


Figure 5-3: Ointment/Cream Manufacturing

5.9.4.4 Sachet Manufacturing

Oral Powders (Sachet) are preparations consisting of solid, loose, dry particles of varying degree of fineness. They contain one or more active ingredients with or without excipients. They are generally administered in or with water or another suitable liquid. In the production of oral powders, the components of powdered mixture are passed through a **sieve** to remove lumps and aggregates. The weighed masses of the sieved components, preferably of a narrow particle size distribution are then transferred for mixing or **blending**. After blending, the **filling** of oral powders is performed. The primary objectives of **packing** in pharmaceutical industry are to protect the drugs and medicines against all adverse external influences that can alter the properties, physical damage, mechanical damage, biological contamination and degradation and counterfeiting. After packing, the finished goods are transferred to **finished goods quarantine** followed by **transfer to finished goods store**.

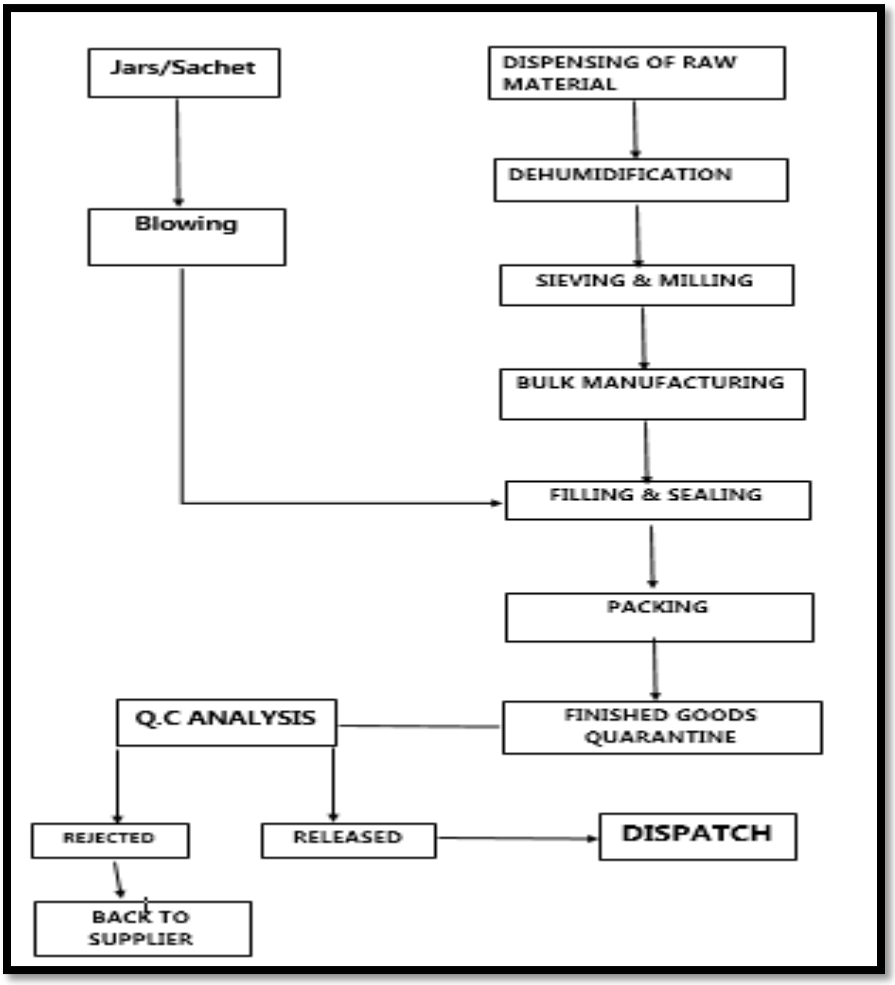


Figure 5-4: Sachet Manufacturing Process

5.9.4.5 Tablets Manufacturing and Granulation

The manufacture of oral solid dosage forms such as tablets is a complex multi-stage process under which the starting materials change their physical characteristics a number of times before the final dosage form is produced. The ease of manufacturing, convenience in administration, accurate dosing, stability, tamper-proofness compared to capsules and safe compared to parental dosage forms makes it a popular and versatile dosage form. Numerous unit processes are involved in making tablets.

One of the most critical steps in pharmaceutical manufacturing is **Dispensing**. It is the first step in any pharmaceutical manufacturing process. During this step, the weight of each ingredient in

the mixture is determined according to dose. Issues like weighing accuracy, dust control (laminar air flow booths, glove box) during manual handling, lot control of each ingredient as well as material movement should be considered during dispensing. In manufacturing of tablets, the **mixing** or blending of several solid pharmaceutical ingredients is easier and more uniform if the ingredients are about the same size. This provides a greater uniformity of dose. A fine particle size is essential in case of lubricant mixing with granules for its proper function.

In the pharmaceutical industry, **granulation** refers to the act or process in which primary powder particles are made to adhere to form larger, multiparticle entities called granules. It is the process of collecting particles together by creating bonds between them. Bonds are formed by compression or by using a binding agent. Granulation is extensively used in the manufacturing of tablets and pellets. **Dry Mixing** is a popular choice because it provides the shortest, most effective and least complex way to produce tablets. The manufacture can blend API with the excipient and the lubricant, followed by compression, which makes the product easy to process. No additional processing steps are required.

Wet granulation is the widely used technique and granules are produced by wet massing of the excipients and API with granulation liquid with or without binder.

Drying is the most important step in the formulation and development of pharmaceutical product. It is an important step when wet granulation is done. It refers to the process of evaporating the liquid contained within aggregates produced by a wet granulation process to pre-determined moisture content. Fluidized bed dryer will be utilized for this purpose in which there will be an indirect contact of the product with the heating medium. Milling / Screening / **Sizing** process are carried out. The mills are used to break down lumps or agglomerates by screening. This helps to give a more uniform granule size. **Lubricants** are agents added in small quantities to tablet and capsule formations to improve certain processing characteristics. These are the agents that act by reducing friction by interposing an intermediate layer between the tablet constituents and the die wall during compression and ejection.

After the preparation of granules (in case of wet granulation) or mixing of ingredients (in case of direct mixing), they are compressed to get final product. The **compression** will be done by rotary tablet press. The tablet press is a high speed mechanical device. It squeezes the ingredients into

the required tablet shape with extreme precision. **Coating** is an important unit operation used to either modify color, give protection, for taste making or to create modified release form in pharmaceutical production. Tablet coating takes place in a controlled atmosphere. **Blister packing** is a pre-formed plastic packaging that uses a backing card which usually has some featured artwork on it and a clear plastic pocket known as blister. Blister packing consists of two primary components 1) the cavity – made from either plastic or aluminum foil 2) the lid made from paper board, paper, plastic or aluminum. The cavity contains the product and the lid seals the product in the package. The primary objectives of **packing** in pharmaceutical industry are to protect the drugs and medicines against all adverse external influences that can alter the properties, physical damage, mechanical damage, biological contamination and degradation and counterfeiting. After packing, the finished goods are transferred to **finished goods quarantine** followed by **transfer to finished goods store**.

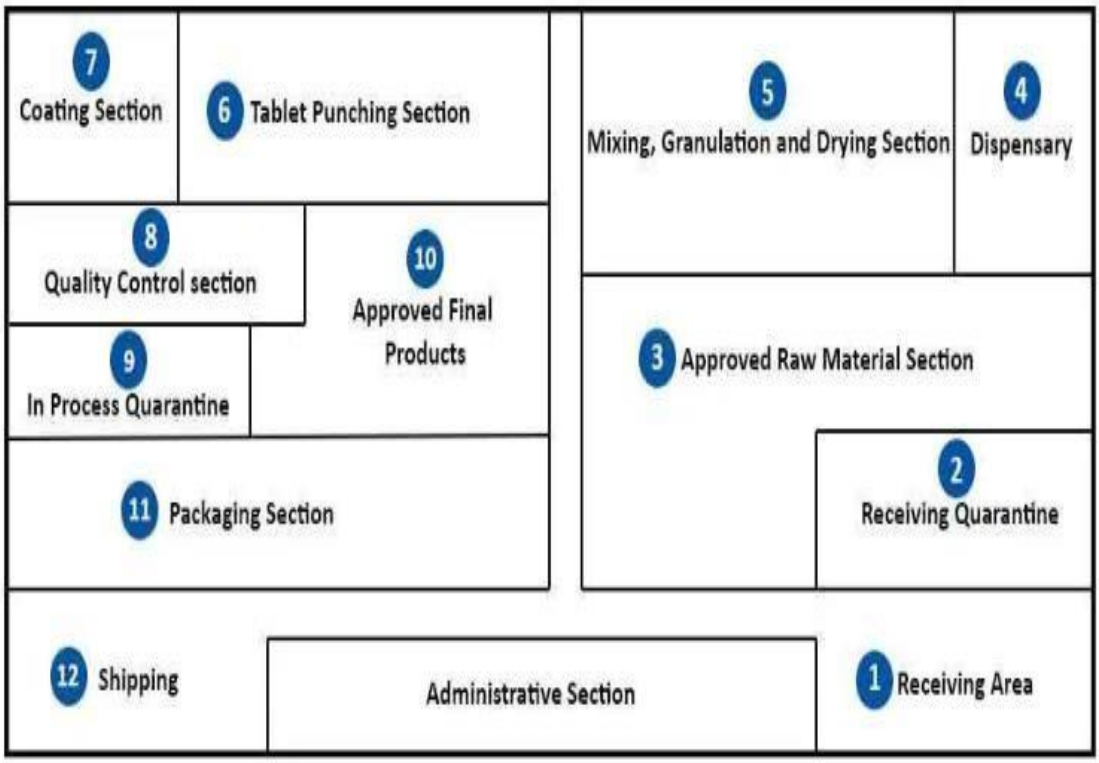


Figure 5-5: Tablet Manufacturing Process

5.9.4.6 Capsule Manufacturing Process

Capsules are solid dosage forms in which drug substance is enclosed within hard and soft soluble shells. The shells are generally formed from gelatin. Capsules are of two types; hard gelatin capsules and soft gelatin capsules. One of the most critical steps in pharmaceutical manufacturing is Dispensing. It is the first step in any pharmaceutical manufacturing process. During this step, the weight of each ingredient in the mixture is determined according to dose. Issues like weighing accuracy, dust control (laminar air flow booths, glove box) during manual handling, lot control of each ingredient as well as material movement should be considered during dispensing. The mixing or blending of several solid pharmaceutical ingredients is easier and more uniform if the ingredients are about the same size. This provides a greater uniformity of dose. Capsules are prepared by filling the powder or formulation containing active ingredients and the mixture of active ingredients with combination of different excipients by the usage of different capsule filling machines. The filling is done with the help of fillings rings into the body of the capsule from the powder hopper and then closes the body of the capsule with the cap by the help of second filling ring.

Automatic filling capsule machines will be utilized in this current pharmaceutical unit. High speed automatic filling machines are suitable for filling powders and pellets. These are versatile machines with outstanding functional and mechanical features.

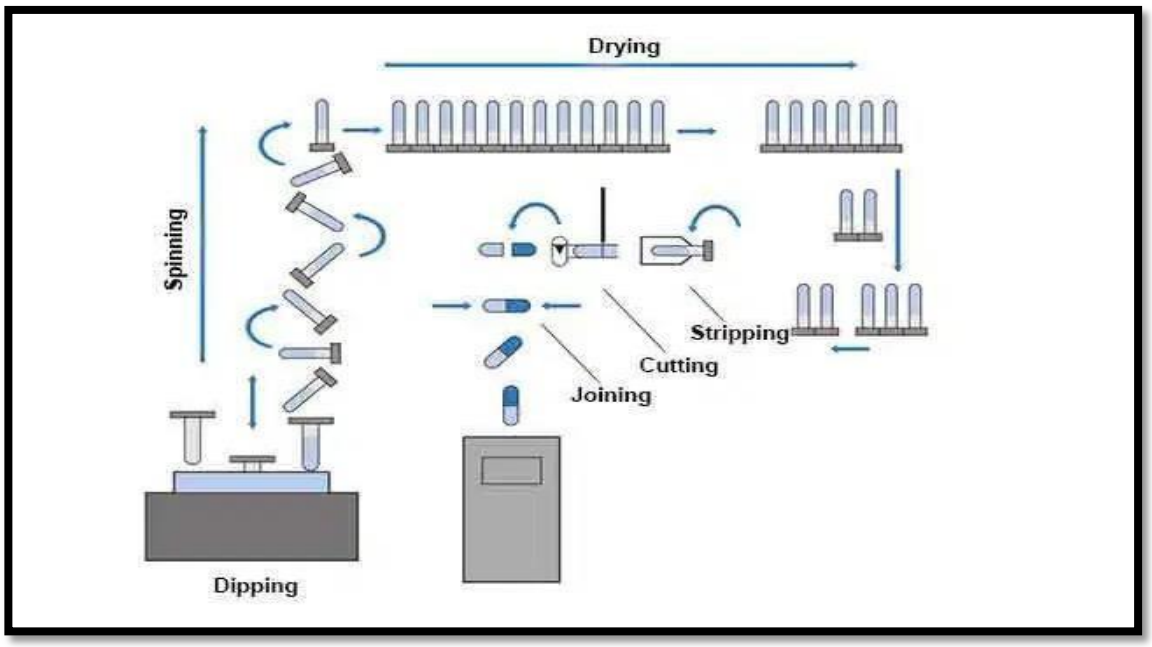


Figure 5-6: Capsule Manufacturing Process

5.9.4.7 Soap Manufacturing

Soap is manufactured by Sponification Process**.** Sponification is a exothermic reaction occur when oil come in contact with Caustic soda(a base). In this reaction, triglyceride units of oil react with caustic soda (Sodium Hydroxide) at 100^{o}C and are converted to soap and glycerol. From where soap is separated from glycerol.

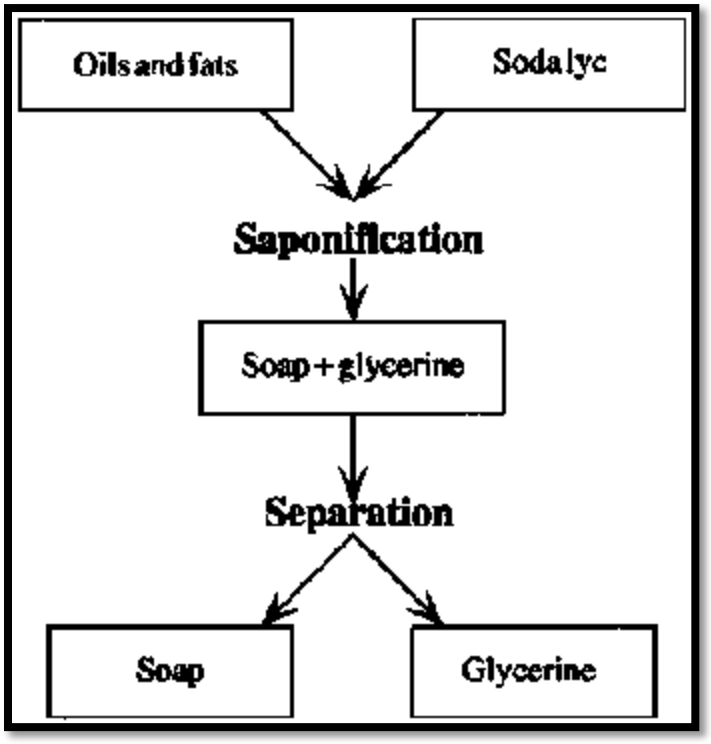


Figure 5-7: Soap Manufacturing Process

5.10 SUPPLIES

5.10.1 Machinery

List of machinery to be used is as follows:

Table 5-3: List of Machinery

Sr. No	Machinery
1	Syrup manufacturing tank 3000 liter with silver son mixer
2	Syrup storage tank 3000 liter with mixer
3	Double jacket tank with silver son mixer 500 liter
4	Syrup filling line automatic 6 nozzle
5	Bottle blowing machine
6	Automatic Labeling machine
7	Conveyor Belt 16 feet
8	Semi-automatic liquid filling machine

9	Conveyor Belt 10 feet
10	Filter press
11	R.O Plant 1000 Liter / Hour
12	Steam Generator
13	Transfer Pumps
14	Rotary Tablet Press
15	Automatic capsule filling machine
16	Wet mixer / granulator
17	Dry mixer / granulator
18	Fluid Bed Dryer
19	Thai coat machine
20	Sachet Filling / Sealing machine
21	Blister Packing machine
22	Dry powder filling / packing machine
23	Storage tanks

5.10.2 Water supply

The water requirement for the project includes drinking water, Process water and water for fire hydrants. Ground water supply is used to fulfill this demand. Water treatment plant is provided for quality medicines.

5.10.3 Electricity

WAPDA will be the main source of electricity for this project while diesel generator will be present as stand-power source with a capacity of 250 KVa.

5.10.4 Manpower

The Project requires manpower during both the construction and operational phases. During construction phase 60-70 workers will be involved. During the operation phase of the project, the total manpower requirement is estimated to be 80-100 people (Both Direct & Indirect) comprising administrative, technical, and non-technical persons. These include pharmacists, chemists, computer operators, accountants, administrative assistances, secretaries, etc. All recruited staff will be given appropriate training in order to educate them on the specific job tasks to be performed.

5.10.5 Firefighting

Administration has planned a proper evacuation plan for the unit to cope with any emergency situation. Emergency exit passageways are established and maintained. Proper assembly points have been mentioned and proper training will be provided to workers and staff. Proper fire-fighting plan has been devised. Some key features of the fire-fighting plan include provision of fire extinguishers, sand buckets and fire hydrants as well as presence of smoke and fire alarms. The emergency evacuation and fire-fighting plan is annexed

5.11 Emissions and effluents

5.11.1 Wastewater

No wastewater will be generated from process as medicines will be prepared in closed equipments and will not be wasted. Municipal wastewater coming from various municipal works, such as cleaning will be generated, which will be treated via a Septic Tank. Washing wastewater of tanks will be treated in cleaner production tanks (settling tanks) where water will be chemically treated according to its composition. This wastewater will then be used for sprinkling purpose. Approximately 2000-4000 liters washing wastewater will be generated. Advanced Oxidation treatment is proposed for said pharmaceutical industry. Iron Coagulant and Polyelectrolyte Flocculent will be added to wastewater for treatment. After treatment water will be used for sprinkling.

5.11.2 SOLID WASTE

No process waste is generated as the whole project will be carried out in closed tanks, while domestic waste is handled as per area practices. For collection of solid waste dust bins are kept in the unit premises to manage the waste. Discarded/Rejected material will be sent back to supplier.

5.12 COST AND MAGNITUDE OF OPERATION

Total project cost is estimated to be PKR 25 crore. 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. Magnitude of operations includes:

- Applying for and getting all necessary approvals and contracts
- Construction of boundary wall and other structures
- Installation of machinery
- Installation of firefighting equipments
- Marking of emergency exits, assembly points
- Tree plantation and land-scapping

5.13 SCHEDULE OF IMPLEMENTATION

The project extension intends to take 1 year from start to completion.

Sr. #	Activities	3 Months			3 Months			3 Months			3 Months		
1	Detailed Designing												
2	Mobilization of Contractors												
3	Lean Construction Period												
4	Peak Construction Period												
6	Installation of machinery												
7	Installation of firefighting equipments & emergency exits												
M=Month													

6 DESCRIPTION OF THE ENVIRONMENT

6.1 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 concerned government departments and the first-hand surveys and field measurements has been presented in this section. This chapter 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 Project and its impacts on their daily life/future in the short and long term.

6.2 Purpose of Baseline

For any development project, the prevailing environmental conditions need to be assessed prior to the stages of planning, designing and execution of the project. Identification of physical, ecological and social aspects of environment and collection of relevant data is essentially important for the evaluation of impacts as well as for the suggestion of adequate mitigation measures, which forms the basis for the implementation of the proposed project in terms of prevailing environmental and social conditions in the study area.

6.3 Study Area/ AOI

It is imperative to delineate the area where the potential significant impacts of the proposed Project are envisaged. The Study Area is the area within which the potentially significant adverse environmental and social impacts of the proposed intervention are envisaged. In the light of this, potential impacts on the existing environment have to be considered in a larger geographical area than the proposed "Project Area" depending upon the extent of direct/indirect impacts.

So the "Study Area" includes the Project Area, nearby land having settlements, agriculture fields, etc. The Study Area map is shown in Figure 5.1.

6.4 Site Visits

A team of experts carried out field visits to the proposed project site (Project and Study Area), adjoining areas in order to collect the baseline data on physical, ecological and socio-economic aspects. Primary data was collected from various sources. The people living around the proposed project were interviewed to have their views about the proposed project and the perceived impacts on the natural environment around the proposed project. This included information on land, surface water, groundwater, air, vegetation, animals and human.

6.5 Physical Environment

This part examines the physical resources such as topography, soil, climate, surface and ground water resources and quality, ambient air quality and noise of the Project site to assess whether the project under assessment can or does have any impacts on any of these parameters. The description of physical environment of project site is presented in the following sub sections.

6.5.1 Topography

The topography of the project area is flat. The General height of the area is approximately 220 meters above the Mean Sea Level (MSL). The district Lahore is divided into two parts. The low lying alluvial soil is along the Ravi River, and the upland in the east. Upland is a plain slope from north-east to south-west. The lowlands are generally inundated during the monsoon season by Ravi River, flowing in the west of district along its boundary with district Sheikhupura. Figure below represents the topography of the area.

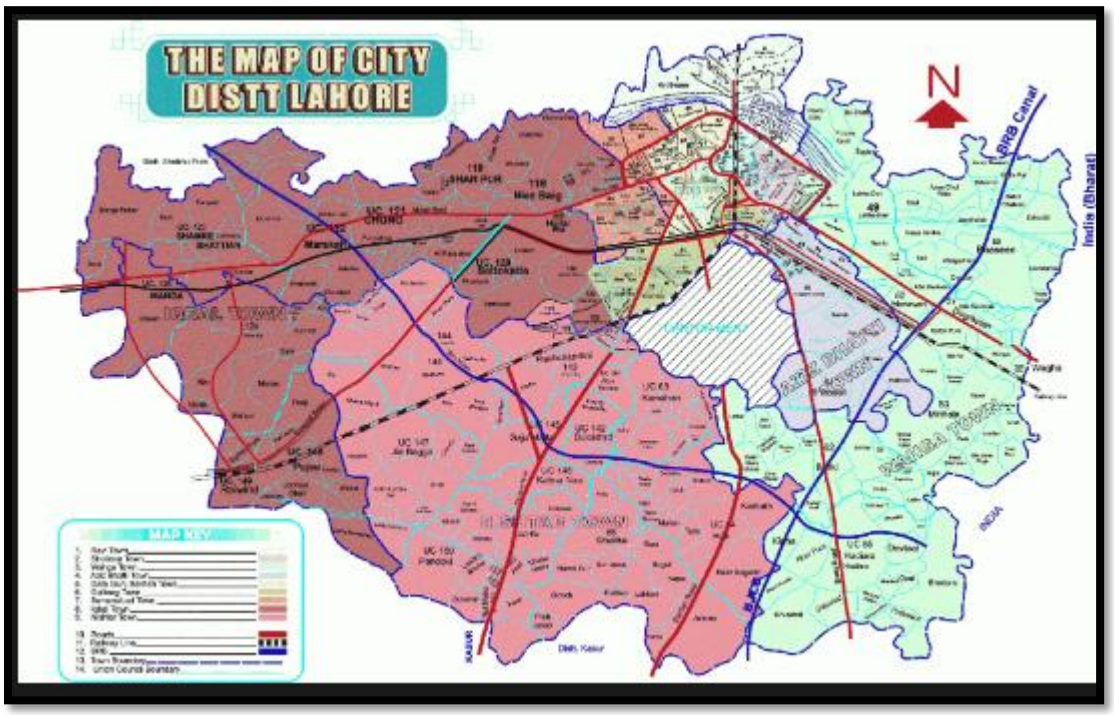


Figure 6-1: Location Map of District

6.5.2 Seismicity

The project site falls in the Punjab plain which shows low to moderate level of seismicity. The project region has also been subjected to severe shaking in the past due to earthquakes in the Himalayas. The epicenters of low to moderate magnitude earthquakes recorded in the Punjab Plain are associated with the subsurface fractures in the basement rocks which are concealed by the thick alluvial deposits. The known main active fault near Lahore is the Main Boundary Thrust (MBT) which passes at a distance of about 180 km towards northeast along the Himalayan front. Probabilistic seismic hazard assessment recently carried out for Lahore area as part of the revision of seismic provisions of the Building Code of Pakistan shows that

the project area falls in Zone 2A. Seismic zone of Pakistan is shown in Figure below. It is therefore recommended that the project structures should be designed to cater the requirements of Zone 2A of Building Code of Pakistan (2007). Based on the evaluation of tectonic setting and seismicity of the project region, it is recommended that the important project structures should be designed to withstand a horizontal peak ground acceleration of 0.15g with 10% probability of exceedance in 50 year.

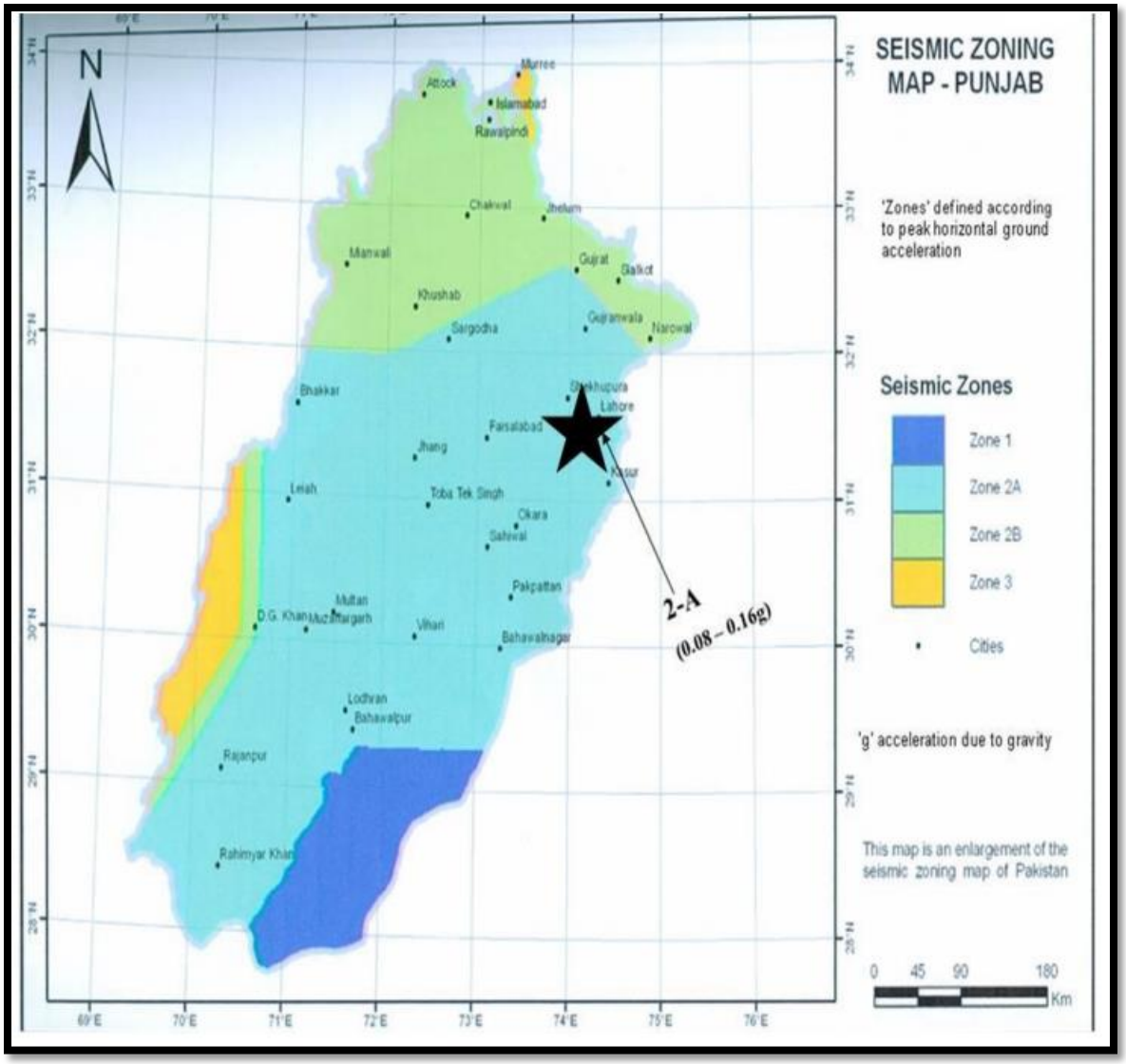


Figure 6-2: Seismic Zoning

6.5.3 Geology

The project site is located in Punjab which is a vast plain of alluvial material, deposited by Indus basin and five main rivers crossing the Punjab Plain. The soil deposits at the project site belong to Chung Fun formation indicating the last glacial cycle. It was followed by the period of melting of glaciers, resulting in deposition of clay, silt and sand deposits in late Pleistocene to recent. With gradual withdrawal of the sea during the late territory time, shallow water and possibly deltaic deposits were laid down. It became a vast flood plain on which debris of numerous streams have mingled to load it with huge thickness of alluvial material derived from the Himalaya. Though, there is no evidence of any glaciations in the area, the series of great climatic changes during the Pleistocene period had impact on the sedimentation in physiographic of this region. The presence of old channels of Ravi River indicates conformity of the stream oscillation to terrestrial rotation in the deflection of streams. However, abrupt migration indicates period of excessive flooding during which earlier channels were choked with sediments and the streams were forced to create new channels (Kamzi 1964). These alluvial deposits comprise earthy brown to brown silt, clay and sand. The beds are largely hard, laminated and sandy with inter-beds of clay and layers or lenses of sand. Geological map of the study area is given in Figure

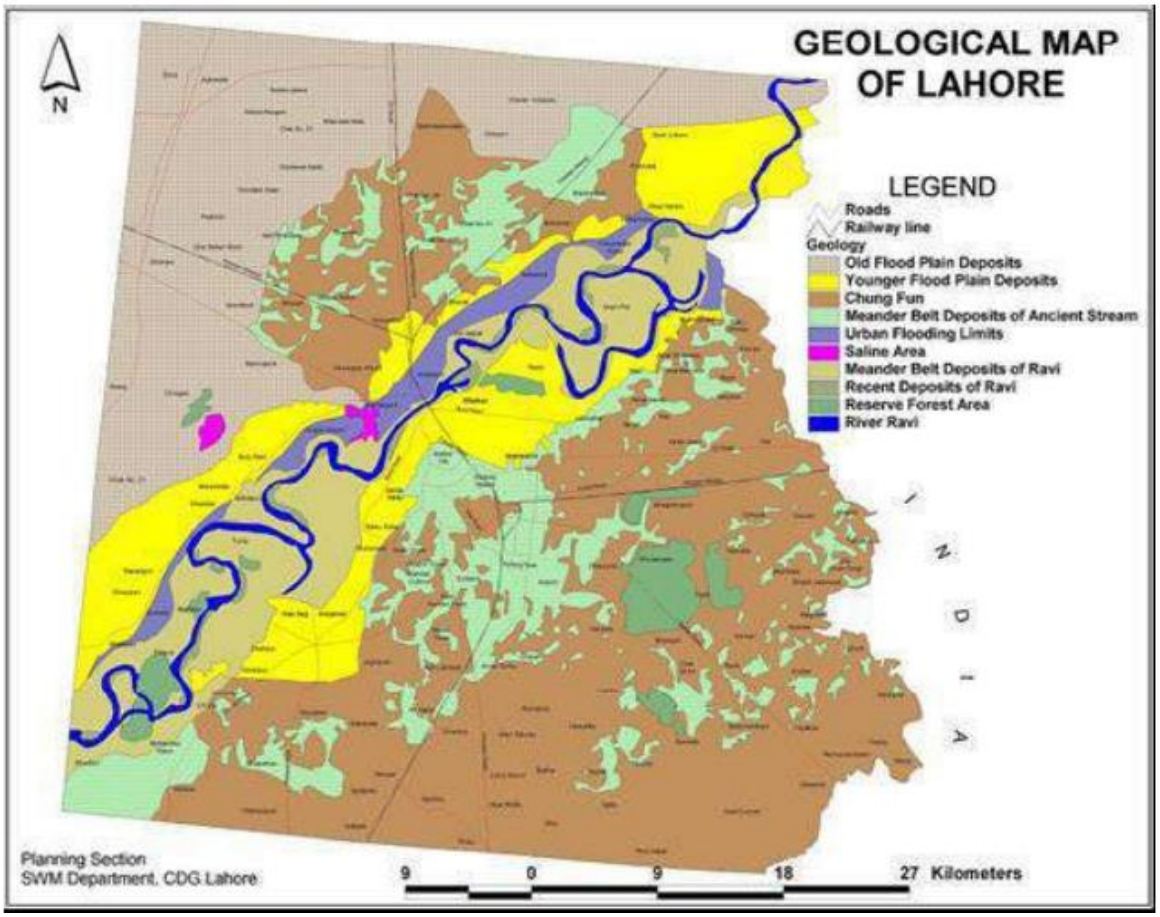


Figure 6-3: Geological Map of Lahore

6.5.4 Hydrology

Lahore division is a part of Punjab Province of Pakistan. Geologically, this area is a part of lower Indus Basin. The name "Punjab" itself is an indicative of healthy presence and importance of rivers in this area. This word "Punajab" comes from 'punj-aab' meaning five rivers. The five rivers of Punjab were Sutlej, Bias, Ravi, Jehlum and Chenab Rivers. It is to be noted here that Bias River have discontinued to flow in Pakistan, as discussed later. This blessing has resulted in cultivation on mast part of land in Punjab as well as in the study area.

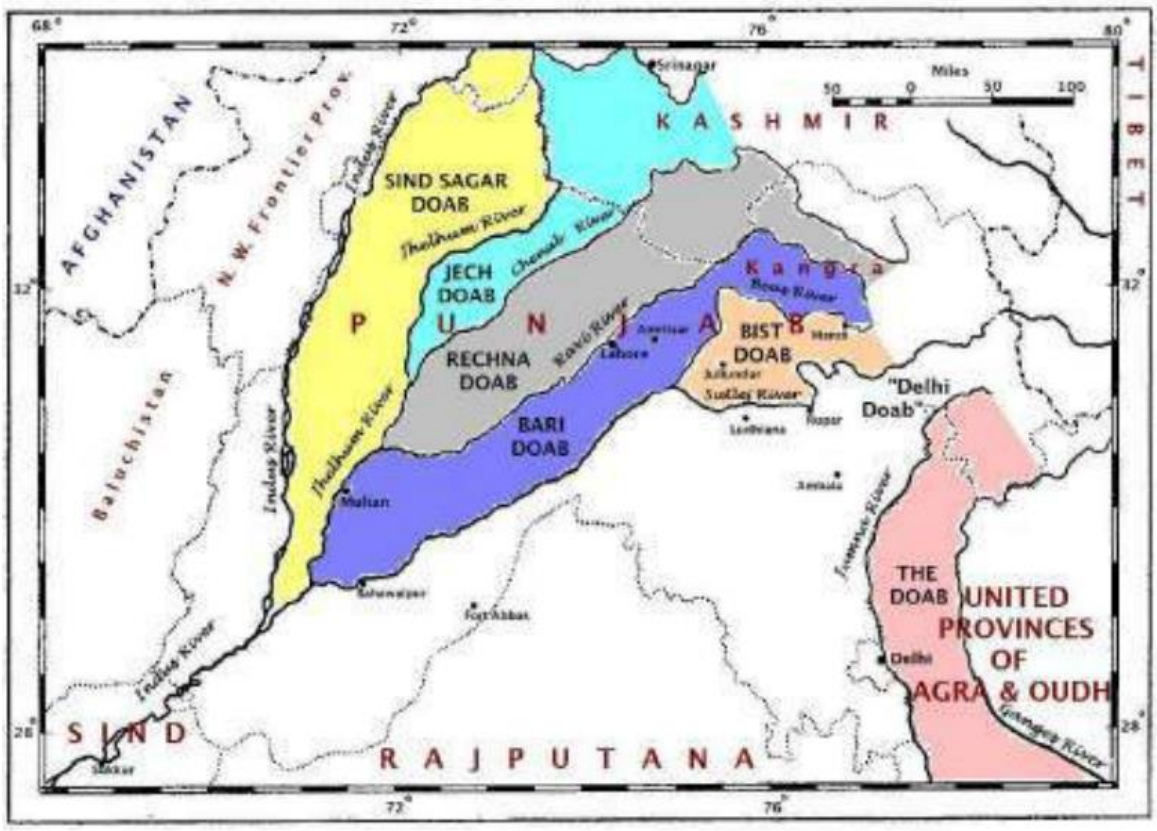


Figure 6-4: Watershed of Punjab Province

Project site:

Groundwater from depth of 200-250ft can be used for drinking and other purpose. Lab reports of water quality are annexed.

6.5.5 Climate

The seasonal climatic conditions must be considered for the design and execution of the developmental projects. The climate including air, temperature, precipitation, humidity and evaporation are an influencing factor, affecting the construction of engineering structures. However, to determine the overall effect of the climatic stresses, daily and seasonal temperature changes, site altitude, direct solar radiation, and precipitation must be considered. The Project area has moderate to extreme climate conditions, with hot summers and cold winters. The summer starts from April and lasts till September, with mean minimum and maximum temperature ranges from 270C to 470C. The winter seasons lasts from November to March, with mean minimum and mean maximum temperature ranges from 20C to 18 0C.4 The project area receives rains in all the seasons but monsoon rain is pronounced

and constitutes rainy season between the month of July and September. The average rainfall is about 1,172 mm per year.

Temperature:

Table below shows mean minimal and maximal temperatures observed for each month between year 2010 to 2020 in the study area. The highest temperature measured is 47°C in June, 2014, and the lowest temperature was observed in December, 2020 i.e. 7°C. Moreover, Figure 4.6 shows the graphical presentation of mean temperatures in the Study Area for the year 2010 to 2020.

Table 6-1: Mean Maximum Temperatures (oC) between 2010 and 2020

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2010	24	25	36	42	45	46	42	28	37	36	31	25
2011	22	23	31	37	44	44	40	36	35	34	30	25
2012	19	20	29	35	42	46	45	38	37	36	30	24
2013	22	22	31	37	44	46	43	38	40	36	29	25
2014	22	23	28	36	41	47	44	42	36	35	29	22
2015	22	26	28	6	43	42	39	39	38	36	30	24
2016	24	28	31	37	43	45	41	40	40	39	32	28
2017	21	27	31	40	44	43	41	41	41	39	30	26
2018	25	27	33	38	43	44	40	40	39	36	30	24
2019	20	22	27	38	41	45	41	39	39	36	28	22
2020	18	25	27	36	41	45	44	40	41	38	28	23

Table 6-2: Mean Minimal Temperatures (oC) between 2010 and 2020

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2010	9	11	18	24	28	30	30	28	25	23	17	11
2011	8	10	15	20	29	32	31	27	26	23	19	13
2012	7	8	14	22	28	33	33	29	26	23	18	13
2013	9	11	15	22	30	34	33	28	27	25	17	13
2014	9	9	14	22	28	34	32	3	26	23	17	10
2015	9	12	15	23	30	33	31	30	26	25	18	13
2016	10	12	16	23	31	34	32	30	28	24	18	14
2017	9	11	15	24	30	32	32	31	29	26	20	16
2018	13	14	19	25	31	35	32	31	28	25	20	14
2019	11	12	16	26	30	34	31	29	27	24	19	13
2020	10	13	16	24	30	35	34	31	30	26	18	14

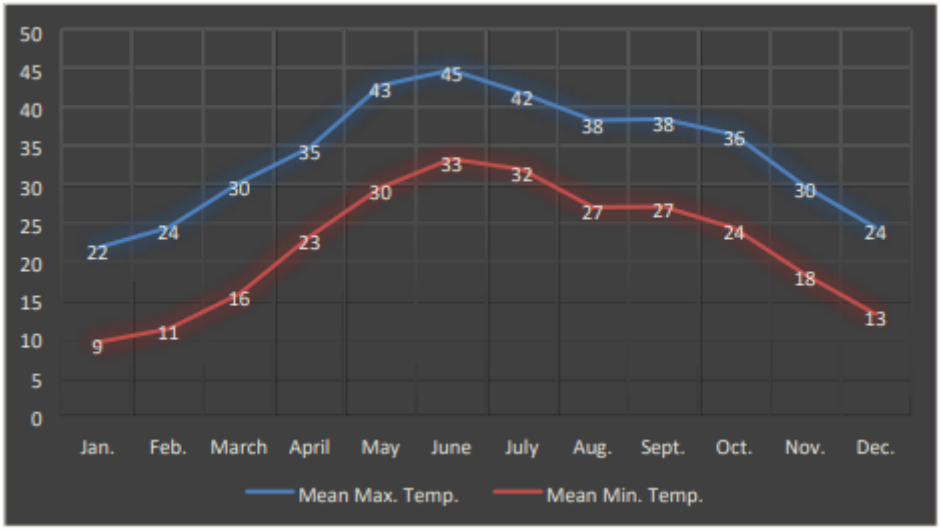


Figure 6-5: Mean Maximum and Minimum Temperature in the Study Area (2010-2020))

Precipitation:

Mean monthly precipitation observed in the study area from 2010 to 2020 with an annual average rainfall of 409.2 mm. Figure below shows the mean monthly precipitation in the study area for the year 2010-2020.

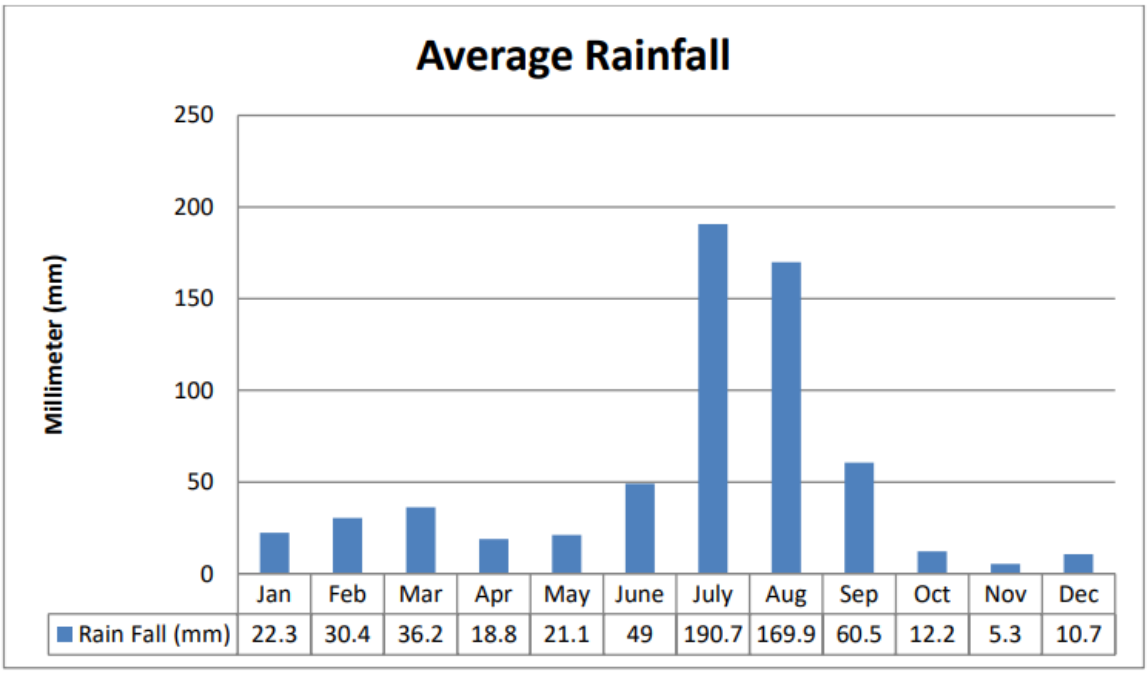
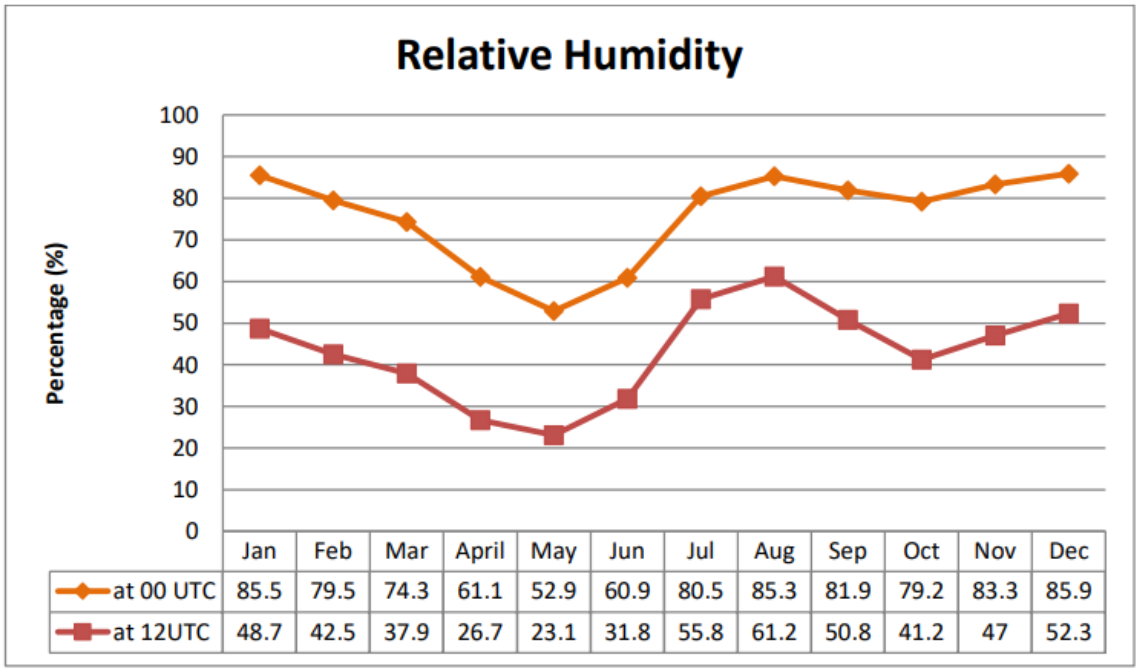
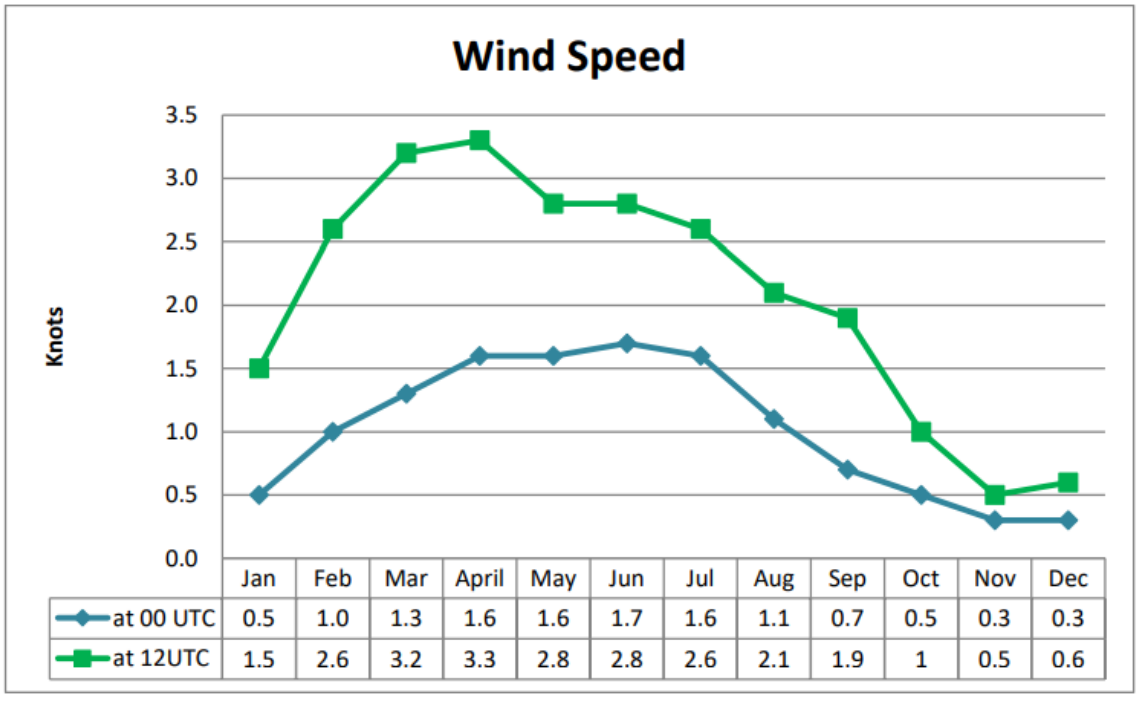


Figure 6-6: Average Rainfall of Lahore Region (Data Source: Climatic Data)



	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
at 00 UTC	85.5	79.5	74.3	61.1	52.9	60.9	80.5	85.3	81.9	79.2	83.3	85.9
at 12UTC	48.7	42.5	37.9	26.7	23.1	31.8	55.8	61.2	50.8	41.2	47	52.3

Figure 6-7: Average Relative Humidity of Lahore Region (Data Source: Climatic Data Processing Center)



	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
at 00 UTC	0.5	1.0	1.3	1.6	1.6	1.7	1.6	1.1	0.7	0.5	0.3	0.3
at 12UTC	1.5	2.6	3.2	3.3	2.8	2.8	2.6	2.1	1.9	1	0.5	0.6

Figure 6-8: Average Wind Speed of Lahore Region (Data Source: Climatic Data)

The wind direction is highly variable and is not predominantly from any single direction. The wind is least often out of the south (4% of the time) and south west (5% of the time). This is shown in Figure 6-9.

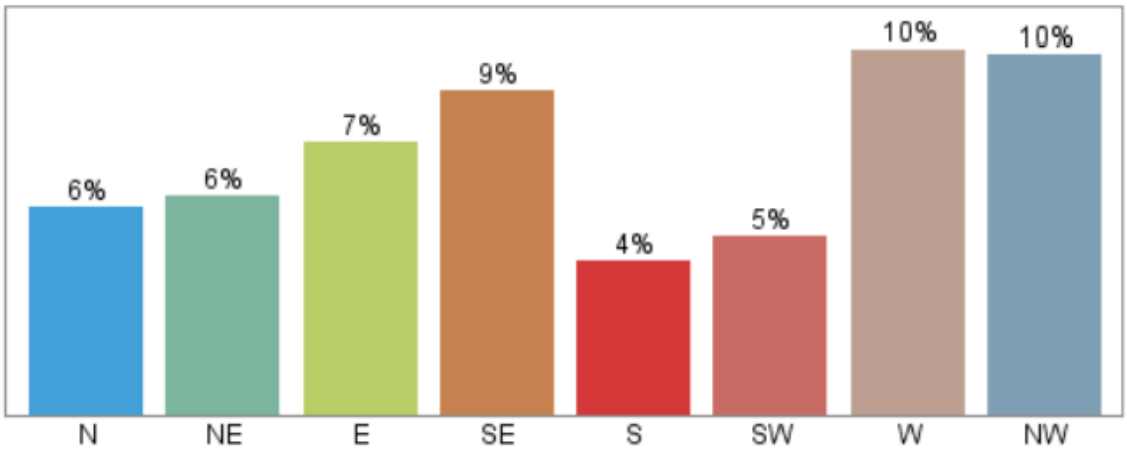


Figure 6-9: : Fraction of Time Spent with Various Wind Directions

6.6 Biological Environment

6.6.1 Flora

The dominant vegetation of Lahore consists of vann or peelu/ tooth brush tree (Salvadora oleoides), jhand or long tree (Prosopis cineraria), farash (Tamarix aphylla), karir or kair (Capparis deciduas), arjun or white marudah (Terminalia arjuna), dhak or flame tree (Butea frondosa), mahwa or Indian butter tree (Bassia latifolia), bahara or beech almond (Terminalia bellerica), amaltas (Cassia fistula), gul-e-nishtar or corky coral tree (Erythrina suberosa), barringtonia/ Indian oak or fresh water Mangrove (Barringtonia acutangula), neem (Melia indica), gab or white/ black ebony (Diospyoros embryopteris), berna or sacred garlic pear (Crataeva religiosa), khark or nettle wood (Celtis australis), putajia or lucky bean tree (Putranjiva roxburgii), fiddle wood/ Kashmir lagotis (Erithroxyllum rubber ratum), gul-e-mast or elephant apple (Dillenia indica), gul-e-mohr or flame tree (Poinciana regia; now rare), chattian or dita bark tree (Alstonia scholaris), ashoka tree (Saraca indica; now rare), sheesham (Dalbergio sissoo), alata or bonfire tree (Sterculia colorata), kenair or oleander (Nerium grandiflora), weeping willow (Salix babylonica), kikar or jellybean tree (Parkinsonia aculeata), blue jacaranda or blue gul mohar (Jacaranda mimosifolia), kechnar or orchid tree (Bauhinia purpurea), molsary or Spanish cherry (Mimosa elengi), bel giri or bael fruit (Aegle marmelos), siris (Albizia lebbek), tun or red cedar (Cedrela toona), jaamun or black plum (Eugenia jambolana), moor pankh (Thuja orientalis), silk oak (Grevillea robusta), sufaida or lemon scented gum (Eucalyptus citriodora), peepal (Ficus religiosa), simbal or hyacinth (Hyacinthus orientalis), berri or eastern ebony (Diospyros melanoxylon), sukh chain or

Indian beech tree (Pongamia glabra), poplar (Populus alba), aam or mango (Mangifera indica), shehtoot or mulberry (Morus alba), banyan (Ficus bengalensis), bottle palm (Cocos species), and bottle brush (Callistemon lanceolatus).

The shrubs include tecoma or yellow bells (Tecoma stans), queen of night or raat ki raani (Cestrum nocturnum), motia (Jasminum sambac), haar singhaar (Nyctanthes arbotrists), henna (Lawsonia inermis), jasmine (Jasminum grandiflora), golden durant (Duranta plumier), gul-e-fanoos (Lagerstromia indica), bottle brush (Calistimon linciolatus), and bougain bail (bougainvillea glabra).

6.6.2 Fauna

Since the district is fully urbanized, the only mammalian fauna are dogs, cats, house rats, and bats. Small Indian mongoose and Indian palm squirrel have also been seen. Reptiles such as cobra, and kraits were once common but are now rare.

Avifauna of Lahore include bank myna, blackbird, black drongo, rock pigeon, common babbler, common myna, garden warbler, Indian robin, white-rowed wagtail, little green bee-eater, Asian pied starling, red-vented bulbul, ring-necked dove, long-tailed strike, great spotted woodpecker, white-browed wagtail, Asian koel, common hawk-cuckoo, common koel, pied cuckoo, red turtle dove, dove, rose-ring parakeet, white-backed vulture, white-breasted kingfisher, finch, and lark..

6.6.3 Protected areas / National Sanctuaries

Following are the wildlife protected areas of the district:

- Game Reserve, a part of 5-Mile Border Strip
- Jallo Wildlife Park
- Tehra Plantation Wildlife Sanctuary

Mammals found and protected in Jallo Park include Asian black bear, Bactrian camel, cheetal, chinkara, and sambar deer. Reptiles given sanctuary are Indian cobra, and mugger crocodile. Birds that are protected include Indian pea fowl and game birds.

There is no wildlife sanctuary or game reserve or any other protected area within the project area.

6.7 Socioeconomic Baseline

This section outlines the results of the social assessment, through primary and secondary data, and other studies, with information and/or data disaggregated by gender, vulnerability, and other social groupings, including:

a. Define, identify, and enumerate the people and communities to be intervened bythe proposed development interventions; describe the likely impacts on the people and communities taking social, cultural, and economic parameters into account.

b. discuss the project's impacts on the poor, indigenous and/or ethnic minorities (ifany), and other vulnerable groups; and

c. Identify gender and resettlement impacts (if any), and the socioeconomic situation, impacts, needs, and priorities of women.

6.7.1 Reconnaissance Field visit

A reconnaissance visit to the project, before conducting detailed survey was conducted by the consultant, that helped in collection of necessary data/information for primary assessment through consultations with project stakeholders including project beneficiaries and project affected persons.

6.7.2 Data Collection and Field Survey

The Consultant conducted field survey/investigation on various socio-economic aspects to assess the existing socio-economic environment of the project as well as identify likely impacts under a changing situation with and without the proposed Project. Accordingly, the social study covered the beneficiaries, the affected people and concerned stakeholders in the area and elicited their views / suggestions for mitigation / enhancement of different types of impacts.

6.7.3 Community/Stakeholders' Participation

Community consultations with different stakeholders, beneficiaries and affected communities of the Project Area were organized to facilitate stakeholders' / peoples' participation in the project activities of the proposed project and their views and feedbacks were incorporated for planning/preparation of the project. Such consultations would strengthen the commitment of

a wide cross-section of the affected people, public representatives, government employees and professional groups by giving them an opportunity to participate in key decisions.

6.7.4 Population

After the Local Government Act of 2013, Lahore District was divided into 9 towns and one cantonment.

For 2017 Census the City District was divided into 5 Tehsils. The population of District Lahore is 11,126,285

6.7.5 Religion

The population of the district is predominantly Muslims i.e. 93.9 percent. The next higher percentage is of Christians with 5.8 points followed by Ahmadis 0.2 percent. While other minorities like Hindu etc. are very small in number.

Table 6-3: Percentage of Population by Religion and Rural/ Urban Areas

Religion	Lahore District		
	All Areas	Rural	Urban
Muslims	93.9	90.9	94.5
Christians	5.8	8.9	5.2
Hindu	0	*	0
Ahmadis	0.2	0.1	0.3
Others	*	*	*

** Refers to a very small number* *Source: DCR Lahore District, 1998*

6.7.6 Language

Punjabi is the most common language spoken by majority of population in the area. Urdu is spoken as secondary language.

Table 6-4: District Languages

Urdu	10.2%
Punjabi	86.2%
Sindhi	0.1

Pushto	1.9%
Balochi	Negligible
Siraiki	0.4%
Others	1.2%

6.7.7 Agriculture

The district belongs to the Northern Irrigated Plains Agro-Ecological Zone of Pakistan. The crops grown in the district include wheat, rice, sugarcane, jowar, bajra, tobacco, moong, maash, masoor, maize, rapeseed & mustard, and sunflower.

The vegetable crops include potatoes, carrots, cauliflower, cabbage, turnip, okra, onions, tomatoes, bottle gourd, bitter gourd, peas, garlic, and chilies.

The fruit crops are citrus, guavas, mangoes, leechee, pomegranate, jaamun, peaches, dates, phalsa, and bananas.

6.7.8 Industries

After Karachi, Lahore is the biggest industrial area in Pakistan. There has been a steady expansion of industries in and around Lahore since independence. There are many large industrial units in the district. These units manufacture cotton, woolen and silk cloths, carpets and rugs, textile products, lather and rubber foot wears, wearing apparel, pharmaceutical goods, soap, iron and steel products, heating, plumbing and lighting equipment, hardware, miscellaneous fabricated products, agriculture machinery, engines and turbines, textile machinery, printing machinery, metal working machinery, pumps and compressors, household machinery, water generators, motor generators, transformers, electric fans, communication equipments, cycles and rickshaws. There are also a good number of printing and publishing units and body building workshops. Besides, there are units of canning and preservation of food, edible oils, beverages, metal and wood furniture, rubber products, chemicals, glass products, repair of railway equipment, toys, stationary etc.

Industries nearby project areas are shown in fig 6-7.

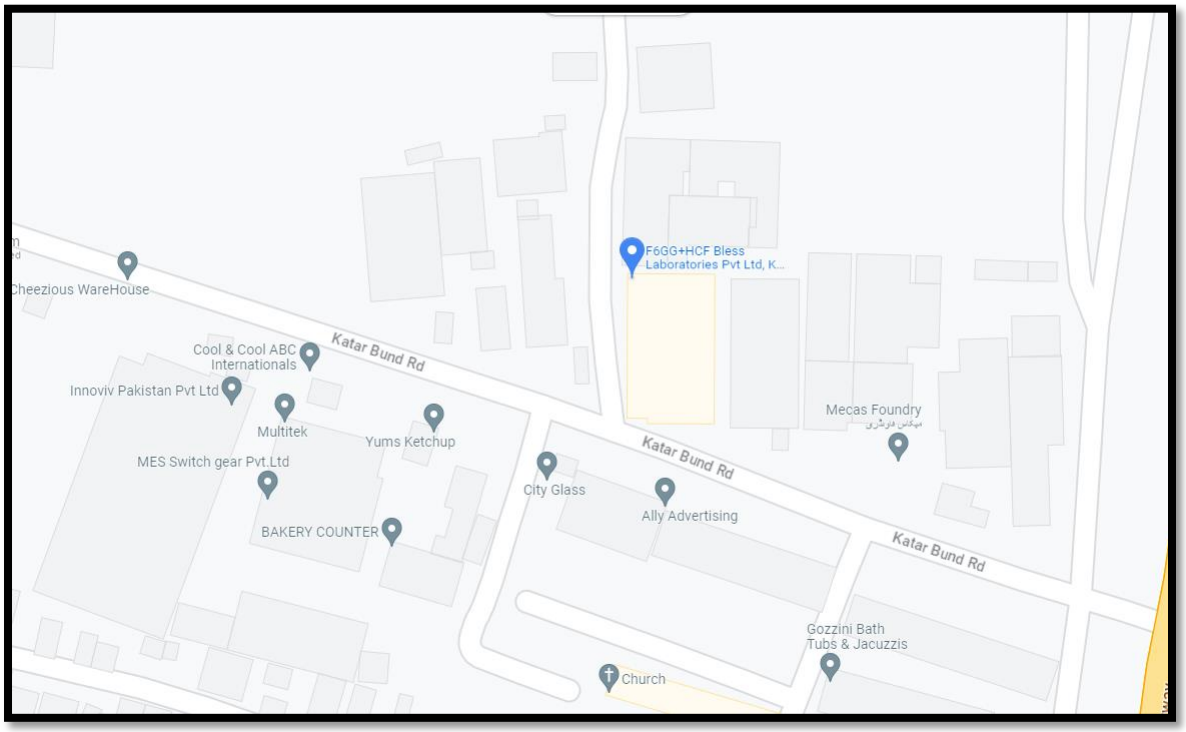


Figure 6-10: Industries in Project Area

6.7.9 Educational Facilities

Educational facilities in Lahore are mainly being provided by the Government of Punjab, the city government and the private sector and voluntary organizations. To a limited extent the high school education is also being managed by the Federal Government through the operation of few institutes located in the cantonment area. Of the total educated persons 12.6 % are below primary, 23.2 % had passed primary, 22.5 % middle, 18.2 % Matriculation, 9.3 % Intermediate, 7.2 % Graduates, 2.6 % Post graduates while 0.6 % were certificate holders. Total number of Government schools in Lahore District is 409 out of which, 223 are boy schools and 186 are girls schools while total number of students studying in these schools are 121,417 out of which, 46,625 are boys while 74,792 are girls. Similarly, total numbers of Municipal Corporation based schools in Lahore are 103 out of which, 44 are boy schools and 59 are girl schools. In these 44 boy schools total number of students is 4,575 and the total number of girl students is 9,606. Similarly, there are number of colleges and universities are dealing with all fields of Science and arts. The Educational Facilities located at in Ferozepur Road include Beacon House School, Superior College, Central College, Kim's College, Hailey College, GC university Qurish University , Punjab college, Quaid-e-Azam College, Govt. Centre Model School etc. The numeric details of these institutes are given in Table

below

Table 6-5: Education Facilities in District

Sr. No.	Type of Institutions	Number	Number of population served
1	Higher Secondary Schools and Intermediate Colleges	36	182990
2	Degree Colleges	38	173359
3	Universities	52	48025

Source: *DCR of Lahore District, 1998*

Figure 6-11 represent Educational Institutes present in project area:

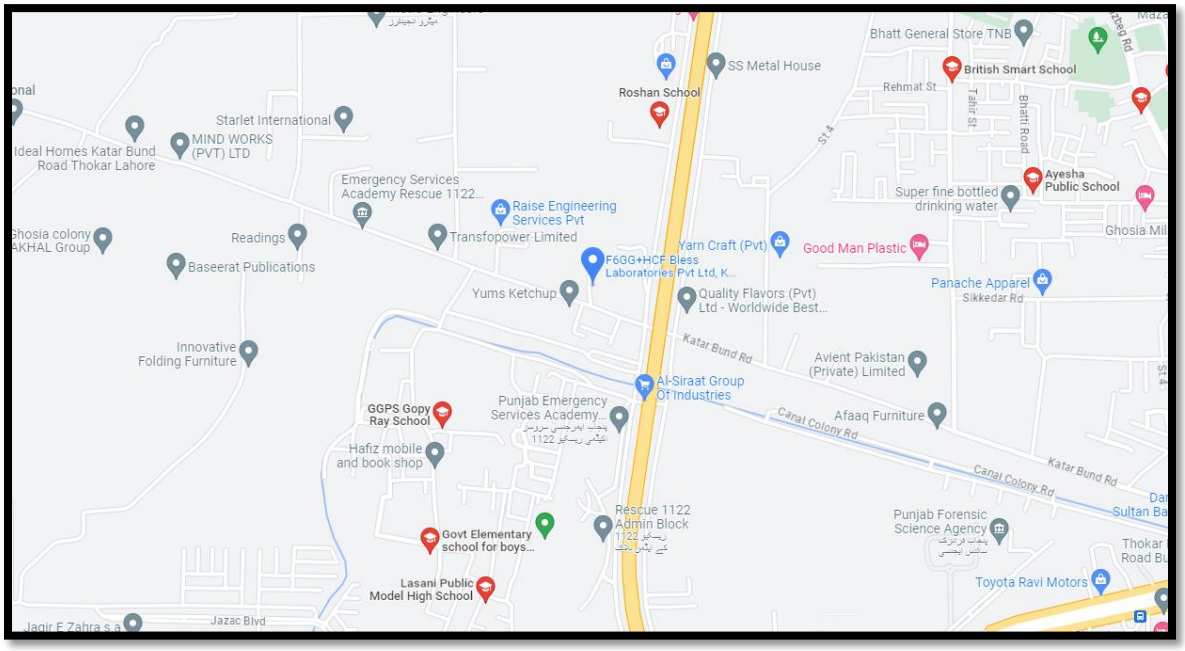


Figure 6-11: Education Institutes in Project Area

6.7.10 Social and Cultural Values

The existing communities reflect rural culture with its characteristic norms and values. Women do all household work by themselves. Mostly women do the teaching job. Majority of the population follows Islamic tradition. Common food is wheat bread. Yogurt, Lassi and

milk are also used. The common dress for males is Shalwar Qameez and for females Shalwar, Qameez and Dupatta/Chadar. Marriages are celebrated in traditional manners.

6.7.11 Conflict Resolution Mechanism

The people of the area were found to be loving, caring and hardworking. They reported that for petty conflicts resolution, they involve the senior and influential people of the area, who after listening to both the parties try to reach an unbiased decision which is acceptable to the aggrieved. Generally, the people accept the decisions of the influential

6.7.12 Health Facilities

Ample medical and health facilities are available in the Lahore Metropolitan Corporation area and its suburbs. Shaukat Khanam Hospital is the latest addition in the medical care facilities in Lahore for the most dangerous disease in the country. i.e. Cancer. There are also other hospitals of voluntary organizations which provide health cover to the general public. King Zaid Bin Sultan Hospital is also a very advanced addition in the medical care for Lahore. Among the prominent hospitals are General Hospital, Lady Willington Hospital, Mayo Hospital, Fatima Jinnah Hospital, The Children Hospital, Services Hospital, and Ganga Ram Hospital etc. Besides, a number of private medical practitioners, Hakims and homeopathic doctors are also practicing in the city. There is Masood Hospital, a famous private health facility located at Kalma Chowk. The following table shows the number of health care institutions in the district as per Punjab Development Statistics 2018-19.

Table 6-6: Health Facilities in Lahore

Facility	No./Beds	Facility	No./Beds
Government Hospitals	45/12,044	Dispensaries[13]	151/218
Rural Health Centers[14]	06/120	Basic Health Units[15]	36/72
T.B. Clinics[16]	22/-	Sub-Health Centers	22/56
Mother Child Health Centers	60/-	Private Hospitals	09/2,836

Health Facilities in Project Area are given in fig

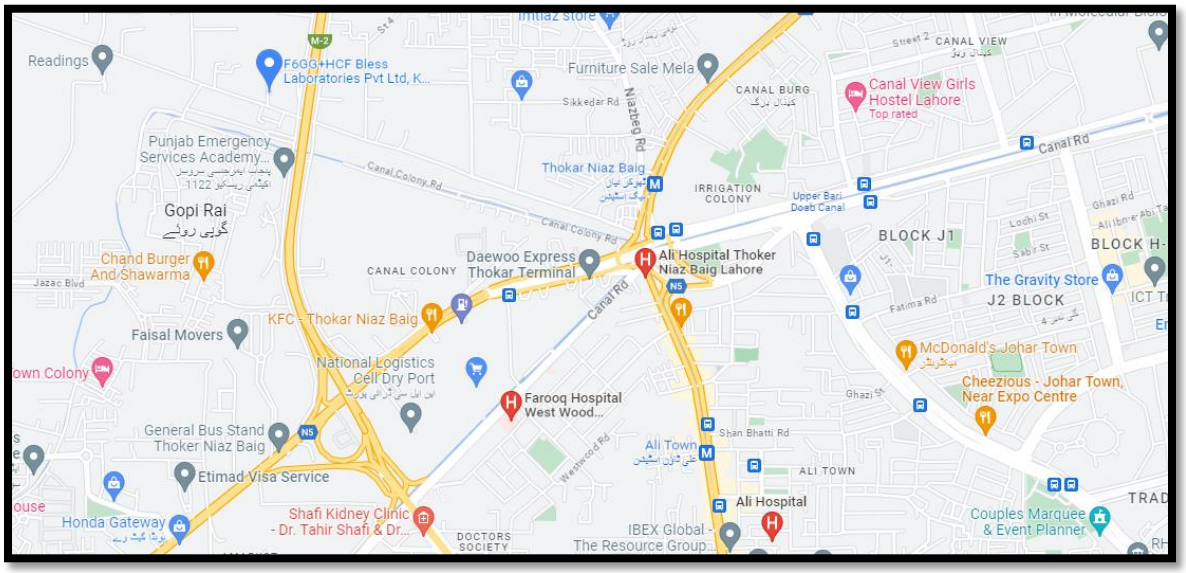


Figure 6-12: Health Facilities in Project Area

6.8 Lab Reports of Environmental Analysis

Water quality was tested by Punjab EPA certified laboratory. Grab sampling was conducted at existing water bores, which are being used by the community. The parameters were analyzed against Punjab Environmental Quality Standards (PEQS). Lab reports are annexed as Annexure IV

6.9 Site Suitability

Wetlands

There are no wetlands in the project area.

Endangered Species

There are no endangered species of flora and fauna in the project area.

Wildlife Sanctuaries and Game Reserves

No wildlife sanctuary or game reserves are located in the vicinity of the project area.

Critical Habitats

No wildlife sanctuary or game reserve (Critical Habitats) exists in the project area

7 IMPACT ASSESSMENT

7.1 General

This chapter identifies the beneficial as well as the potentially significant adverse environmental and social impacts during design/pre-construction, construction and operation phases of the proposed Project on the physical, ecological and socio-economic domains of the environment. The appropriate mitigation and remedial measures are proposed in this chapter. A project impact evaluation matrix has been developed to evaluate the potential impacts of the proposed Project. A brief qualitative description of each aspect and the affected environment in Study Area / AOI is presented below.

7.2 Notion of Significance / Characteristics of Impacts

The term "Environmental Impact" or simply "Impact" covers the negative, adverse or harmful as well as positive, desirable or beneficial impacts of the project on environmental settings. Prediction of impacts of the proposed activity is based on factual data; however, the significance of these impacts involves a value judgment technique. The nature of the impacts may be categorized in terms of:

Direction - Positive or Negative

Duration - Long or Short Term

Effect - Direct or Indirect

Extent - Wide or Local

Impact significance depends on both the nature of the impact and on the sensitivity of the receptor. The more sensitive the receptor the greater will be the significance of impact from that proposed activity. For this EIA, activities and nature of impact are combined with the sensitivity of the receptor to evaluate the significance of the impact. The significance of impact is characterized as very low, low, moderate, high and very high. Environmental issues having "moderate", "high" and "very high" significance is provided with mitigation measures. Following the assessment of magnitude, the quality and sensitivity of the receiving environment or potential receptor has been determined and the significance of each potential impact established using the impact significance criteria matrix as shown below. Most of the potential impacts can be mitigated by implementation of various types of mitigation measures; however, some residual environmental impacts may remain after mitigation.

7.3 Methodology for Impact Evaluation

Evaluation of impacts signifies the potential impacts in terms of its likelihood nature as per the following criteria:

- The impacts are further classified based on their spatial distribution, i.e. *local*, when impacting an area of approximately 1 km radius from the project area, *moderate spread*, when impacting an area of 1 to 2 km radius and *regional* beyond 2 km.
- The impacts are classified as *short term*, *moderate term* and *long term* in terms of their existence in temporal scale. Impacts less than 1 year existence as *short term*, while those with 1 to 3 years as *moderate term* and more than 3 years as *long term*.
- The negative impacts are termed as *adverse impacts* while positive impacts as *beneficial.*

The significance of environmental impacts of various involved activities has been evaluated based on the criteria outlined in Table 8-1.

Table 7-1: Impact Significance Criteria

Impact Significance	Criteria
Long term	When the impact is of high intensity with high spread and high duration
Moderate term	When the impact is of moderate intensity with high-moderate spread and high-moderate duration
Short term	When the impact is of low intensity but with moderate spread and moderate duration or of moderate intensity
Insignificant	When the impact is of low intensity, low spread and low duration
Beneficial	When the impacts are positive

Based on the above-specified criteria, Matrix method has been used to describe potential environmental impacts due to proposed project as shown in Table 8-2 and 8-3. It is important to note that one activity may have varying impacts on different receptors i.e. different components of the environment. To avoid repetitions, this section describes various activities, which may have wide impacts on many receptors.

Table 7-2: Impact Screening Checklist (Construction Phase)

Environmental Sensitivities	Nature of Likely Impacts						Impact Significance				
	Low Intensity	Moderate Intensity	High Intensity	Local	Moderate Spread	Regional	Beneficial	insignificant	Short Term	Moderate	Long Term
Air Quality		✓		✓							
Noise	✓			✓							
Water Quality		✓			✓						
Land Environment			✓		✓						
Flora		✓		✓							
Fauna	✓			✓							
Local Economy			✓		✓						
Social Impacts			✓	✓							
Health & Safety		✓		✓							

Table 7-3: Impact Screening Checklist (Operational Phase)

Environment Al Sensitivities	Nature of Likely Impacts						Impact Significance				
	Low Intensity	Moderate Intensity	High Intensity	Local	Moderate Spread	Regional	Beneficial	insignificant	Short Term	Moderate	Long Term
Air Quality		✓			✓						
Noise		✓		✓							
Water Quality			✓		✓						
Land Environment	✓										
Flora	✓			✓							
Fauna	✓			✓							
Local Economy			✓		✓						
Social Impacts			✓	✓							
Health & Safety		✓		✓							

8 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

8.1 GENERAL

Assessment of impacts depends on the nature and magnitude of the activity being undertaken, as well as the type of environmental control measures that are envisaged as part of the project proposal. The potential impacts from the project area are identified and assessed based on the type and scale of the various activities associated with this project.

Several aspects and potential impacts were identified for each phase (Project Location, Construction and Operation) of the development, with impacts evaluated in terms of their nature, occurrence, possibility and severity potential.

8.2 SCREENING OF POTENTIAL IMPACTS

Several impacts are likely as a result of the construction and operation of the project. Such impacts may be direct, indirect or ultimate. For the purposes of this EIA, these potential impacts (whether direct, indirect or ultimate), are assessed based on their magnitude (short-term or long-term) and effect (positive or negative). Impacts are also classified in three groups: impacts due to project location, impacts as a result of project construction and impacts as a result of project operation.

All the potentially significant environmental impacts from the project are grouped below:

Air Environment

- Impact on ambient air quality

Noise Environment

- Impact on ambient noise

Water Environment

- Impacts on surface and ground water quality

Land Environment

- Impacts on land use

Ecological Impacts

- Impacts on trees/vegetation
- Impacts on forests and wildlife

Socio-Economic Impacts

- Impacts on other infrastructure
- Impacts on employment
- Impacts on public health and safety
- Impacts on cultural resources
- Impacts on aesthetics

8.3 IMPACTS DUE TO PROJECT LOCATION

Proposed project will have both socio-economic and environmental implications as discussed in the sub-sections below.

8.3.1 Relocation of People

Currently, there are no infringements on the project site that may be affected therefore relocation exercises are not required.

8.3.2 Loss of Vegetation

Considering the scale of the project and commonly found flora and fauna within the project influence area, no significant adverse effects are envisaged on the ecology of the area.

8.3.3 Shifting of Utilities

There will not be any shifting of existing utilities such as water supply pipelines, sewers, electrical lines, etc. due to the proposed project.

8.3.4 Impact on Archaeological/Cultural Property

Within the project influence area there are no significant archaeological properties, hence no impact in this area is anticipated.

8.4 IMPACTS DUE TO PROJECT DESIGN

In general, the design of the said project optimized the use of best available technology in order to prevent or minimize potentially significant environmental impacts associated with the project as well as to ensure high level business and environmental performances. In pre-construction / design phase, a management system will be provided at design level for the reduction of impacts. Design of the said project will be adhered to all standard technical requirements in order to avoid adverse impacts on the environment and human health.

Efficient infrastructure will be developed. Procurement of construction materials from approved dealers will be ensured.

8.5 IMPACTS DURING CONSTRUCTION PHASE

Environmental Aspects	Impacts and Mitigation Measures	
	Impacts	**Mitigation Measures**
Economy Improvement	• During construction Phase, through the use of locally available materials including cement, building blocks, metals, concrete, ceramic tiles, timber, sand, electrical cables etc, the project will continue towards the growth of economy by contributing to the gross domestic product.	• No mitigation measures required.
Employment Opportunities	• With the implementation of the project, there will be employment opportunities for casual workers from the local community. The exact number of workers to be hired will depend on the magnitude of construction activities during construction.	• No mitigation measures required.
Air Quality	• During construction phase particulate matter will be the main pollutant which will be generated during the site development activities such as leveling of land, filling activities, transportation of	• Dust emission will be minimized through strict enforcement of onsite speed controls as well as limiting unnecessary traffic within the project site. • The traffic routes on site will be sprinkled with water regularly to

	construction material to the project site from various places. • Due to increased vehicular movement increase in NO_x and CO concentrations will be observed at the project site. However, the pollution levels in the ambient air will be negligible and also it is a temporary phenomenon. As most of the construction equipment will be mobile, the emissions are likely to be fugitive and not concentrated on a single source or place. As the impacts will be localized in nature, the areas outside the proposed project boundary are not likely to face any significant adverse impacts with respect to ambient air quality.	reduce the amount of dust generated by construction vehicles. • Construction machinery will be kept away from walkways and at safe places where the chances of human interventions are relatively less. • Construction machinery will be properly tuned, serviced and monitored on regularly basis. • All vehicles, construction machinery etc will be maintained in good working condition in order to minimize pollutant emissions.
Water Quality	• During construction phase, water will be required only for construction of structures, sprinkling on roads for dust suppression, domestic uses of the construction workers, that too only during day time. • Water will be used mainly for concrete mixing, sanitary and	• Workers will be trained for water conservation and reuse of water where possible.

	washing purposes. • No high water consuming activity is likely to occur during construction so the water usage during development of proposed project would not reduce the water availability for other activities within the area.	
Relocation of Utilities	• The construction of the project will not relocate the existing public utilities.	• No mitigation measures required.
Poverty Alleviation	• Construction of the proposed project will generate the employment opportunities. This will be a temporary minor positive impact.	• No mitigation measures required.
Solid Waste Generation	• During excavation of the site for foundation works and landscaping, solid waste will be generated. The waste will consist of metal cuttings, rejected materials, surplus materials, excavated soil, paper bags, empty cartons, empty cement bags among other types of wastes.	• Waste generated during construction will be recyclable and will be reused during construction. The left over construction materials at the end of construction will be used in other projects rather than being disposed-off (if required). • Recyclable material will be separated at source which will then be handed over to the waste contractor. • Waste bins will be placed at the construction site for waste materials including plastic, paper,

		and wood. • The cement bags and other such items will be handed over to contractor.
Noise Pollution	• During construction phase, the major sources of noise will be due to operation of construction equipment such as concrete mixers, generators, cranes, pumps, compressors, vibrators etc. The operation of such equipment will generate noise ranging between 70-85 dB. Due to moderate levels of construction activities, the anticipated noise generation during construction phase will be mostly confined to the facility itself and not anticipated to have significant adverse impacts on the surrounding ambient noise levels.	• Unnecessary blowing of horns will be strictly prohibited. • In order to safeguard the construction workers working at noise generating sources, these personnel will be provided with proper personal protective equipment such as earplugs, earmuffs etc. Hence, no significant impact is envisaged due to the operation of the noise generating equipment at the project site, if suitable mitigation measures are adopted. • In order to have less impact on noise levels in the air, the major works will be carried out during day time as far as possible. • Equipment noise will be reduced at source by proper maintenance and repair of construction machinery and equipment
Ecology	• The proposed project site is devoid of forest or thick vegetation. Only wild grasses or small bushes which have grown due to non-cultivation of the area will be removed	• After completion of the construction work, the damaged area due to construction works will be restored. • After the project completion, plants and trees will be planted on

	during levelling operations. Hence, there will not be any major impact on the terrestrial ecology of the project site due to construction activities.	the proposed site that will in turn enhance the aesthetic value.
Workers Health, Safety and Environment	• The construction activities may pose negative impacts on the health and safety of workers	• The contractor will ensure that the workers and labors are trained in safety procedures for all relevant aspects of construction. • Workers will be provided with proper safety equipment such as helmets, goggles, masks where required. • Formal emergency procedures will be developed. First Aid Kit will be kept available at the site along with list of emergency phones to be contacted in case of any emergency. • Warning signs will be displayed in local language where required.

8.6 IMPACTS DURING OPERATIONAL PHASE

8.6.1 Solid Waste Management

Solid waste generated from a pharmaceutical unit comprises of raw materials packaging waste like cartons, material bags, finished goods packaging waste etc. Most of the generated waste will be recyclable. The rejected raw material will be handed back to the supplier. The generated domestic solid waste will be handled as per area practices. If the waste management is not carried out properly, it can affect health of workers, pollution of soil, surface or ground water. All waste generated from the project will be managed by proposed controls. The environmental impacts will be minimized after the implementation of the proposed mitigations.

MITIGATION MEASURES

The following mitigation measures will be implemented:

GENERAL WASTE MANAGEMENT PRACTICES

During operational phase of the project, a proper waste management plan will be devised and implemented. Key elements of the waste management system will include the following:

ON-SITE HANDLING

- Proper waste collection system will be ensured. For this purpose, waste bins will be placed inside the boundary.
- The recyclable waste will be sent to waste contractors.
- Records of generated waste should be maintained.
- All non-hazardous waste that can be recycled or reused will be handed over to the contractors.

OTHER MANAGEMENT MEASURES

- Training will be provided to personnel for identification, segregation and management of waste.
- All containers of waste will be labeled properly.
- In-house audits of the waste management will be undertaken on regular basis.

RESIDUAL IMPACTS

Proper implementation of the mitigation measures will minimize the residual impact from waste. Monitoring and inspection will be undertaken to ensure the implementation of mitigation measures.

8.6.2 Wastewater

No wastewater will be generated from process as medicines will be prepared in closed equipments and will not be wasted. Municipal wastewater coming from various municipal works, such as cleaning will be generated, which will be treated via a Septic Tank. Washing wastewater of tanks will be treated in cleaner production tanks (settling tanks) where water will be chemically treated according to its composition. This wastewater will then be used for sprinkling purpose. Approximately 2000-4000 liters/day washing wastewater will be generated.

RESIDUAL IMPACTS

Implementation of the proposed mitigation measures and regular monitoring is not likely to leave any significant impact of the waste water from the pharmaceutical unit.

8.6.3 Air pollution

POTENTIAL IMPACTS

Air emissions from the project are relatively small. Particulate emissions are typically not significant. Fugitive dusts and emissions may result during raw material handling and storage which is relatively less likely to occur. Other potential sources for air emissions are combustion products (nitrogen oxides, sulfur dioxide, particulate matter, carbon monoxide) from standby diesel generators and combustion products from vehicles used for project activities. The emissions from standby generators will be less in concentration. The emission levels depend on the type and quality of fuel and the manner in which it is burnt.

MITIGATION MEASURES

The following mitigation measures will be implemented. The proposed mitigation measures to reduce the impacts on air quality during the proposed operation activities are:

- Clean and maintain a sufficient level of temperature and humidity in every section.
- Proper handling of raw material to minimize the likelihood of fugitive dust and emissions during storage.
- Monitoring of Ambient air parameters (Particulate matter, SOx, NOx) emissions should be carried out on regular basis to ensure compliance with the PEQS.
- Plantation of indigenous trees within the premises and along the boundary.

RESIDUAL IMPACT

If proper mitigation measures are effectively implemented, the residual impact of the proposed activities on the area's air quality is expected to be low in terms of significance.

8.6.4 Noise

POTENTIAL IMPACTS

The main sources of pollution from noise are during raw material and finished good loading and unloading, vehicle movements, operation of machines. The increased noise may be a source of disturbance to workers, working near to the machines. Noise level during operation phase of pharmaceutical unit will be limited to operational site. Workers could be exposed to

high noise levels, however only concerned staff will be working in the area with required personal protective equipment (PPE) to minimize or reduce the noise exposure. The residential area is located at a distance of more than 1.5 km away from the project site and there will be no significant impact on the community.

MITIGATION MEASURES

The following mitigation measures will be undertaken in order to further reduce the noise levels:

- Effective noise suppression design and plan will be made for all noise producing equipment i.e. high noise generating machines will be kept in isolation from other machines to minimize the overall cumulative noise.
- It will be ensured that generators, vehicles and other potentially noisy equipment are in good condition. Noise from generators, vehicles, other equipment and machinery will be kept to the minimum through regular maintenance.
- Noise monitoring will be carried out periodically.

RESIDUAL IMPACTS

Implementation of the mitigation measures proposed above will result in negligible to no residual impact due to pharmaceutical unit noise on the surrounding environment.

8.6.5 Traffic management

Proper parking area is provided for traffic management. Traffic management plan will be as follows:

<table>
<tr><td></td><td colspan="2">Traffic Management Plan</td></tr>
<tr><td>Management Plan</td><td colspan="2">• Heavy vehicles shall only be to enter and leave the site during day hours.
• Speed limit will be ensured
• Cars will be parked on proper parking area.</td></tr>
<tr><td rowspan="2">Monitoring</td><td>Responsible</td><td>Monitoring Duration</td></tr>
<tr><td>Environmental manager</td><td>Weekly basis</td></tr>
</table>

8.6.6 Emergency Response

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

- Fire hazard

FIRE HAZARD

During operational phase of the project, fire hazard poses a serious threat. Firefighting equipment details are mentioned on map.

Mitigation

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

8.6.7 Safety Concerns

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 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 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 project premises.

8.7 Potential Environmental Enhancement Measures

Following are the positive impacts of the Proposed Project that will enhance the overall socio-economic and ecological condition of the Project Area.

8.7.1 Employment/Poverty Alleviation

The employment opportunities in the Project Area will be increased due to the construction and operation of the proposed project. During construction and operation of the proposed project unskilled workers will be required as labours, sanitary workers and sweepers as well as for the skilled workers such as; accounts and managers to run the administration office. In totality, the overall economic conditions of the area will be improved.

8.7.2 Increased Business Opportunities

For construction of the proposed building a number of raw-material will be required. Many venders can supply the required stuff on daily and weekly basis. This will serve as a new business opportunity and it will enhance the socio-economic status of the people direct linked with it.

8.7.3 Tree Plantation

The tree plantation will be carried out along the boundary of the Project Site, and open green spaces as the part of the proposed Project. This will include plantation of ornamental as well as indigenous species of the plants. The plantation will improve the overall ecological conditions of the area. Trees height will be between 3-7 ft. Total number of plants and trees will be approximately 50. Spacing between plant to plant will be 6-8m.

9 ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

9.1 GENERAL

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

Outline and key features of the EMP for construction and operations phase is presented in sub-sections below. 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 regular monitoring. This section also underlies 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.

a. OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN

The primary objectives of the EMP are to:

- Facilitate the implementation of the mitigation measures identified
- 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.

b. 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. Concerned Departments 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.

c. COMPONENTS OF THE EMP

THE EMP CONSISTS OF THE FOLLOWING:

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

d. ENVIRONMENT MANAGEMENT PLAN

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

Table 9-1: Environmental Management Plan

Objective	Management Action	Responsibility	Time framework	Residual impact
Construction phase				
Employment Opportunities				
To promote the employment of local persons	Recruitment of local workers will be undertaken without discrimination and in accordance with company recruitment policy by contractors involved in construction	Contractor	On commencement of construction activities	Unemployed people of area will get job opportunities and their standard of living improved
To promote the use of local service providers	Local procurement of goods and services will be undertaken wherever possible and cost effective and where practicable to the project	Contractor	On commencement of construction activities	Indirect job opportunities
Safety during construction				
To ensure safety on construction site	• Safety signage will be put in relevant places within the construction site • Construction drivers are subjected to public safety awareness • Reckless driving by construction workers will be prohibited and monitored • Workers will be given PPEs such as; helmets, mask, ear-plugs/muffs, safety boots, etc. and its use will be strictly enforced • Workers will be trained on the regular	Contractor/Environmental manager/HSE manager	On commencement of construction activities	Safety of workers will be ensured by implementing proposed mitigation measures

	basis regarding personal safety • Incidents will be reported directly to the concerned authority			
Construction waste management				
To prevent the contamination of soils and water resources due to inappropriate management and disposal of waste	• The construction site has litter bins for waste collection • Recycling or reuse of waste wherever possible. • Application of a good strategy to collect, remove and safely dispose of waste on daily basis to ensure a clean environment in the factory site • Integrated waste management system will be adopted for the proper management of the waste at site • At the end of the construction phase, left-over waste will be removed by using the standard waste management procedures • All the idle machinery and equipment will be immediately removed from the site • Scrap and the debris will be removed from the site at the end of the construction stage after appropriate segregation of the material	Contractor	Throughout construction stage	Waste will be disposed of/reused/ recycle or resale as per practices of area
Pollution control management				

To contain spillages	• Proper maintenance of construction vehicles and equipment will be undertaken • Appropriate environmental security measures including shovels and plastic bags etc will be provided to prevent accidental release to ground. • Appropriate procedures and protocols will be established and monitored for materials transport and handling whilst on the site.	Contractor	On-site establishment	Potential for accidental release of materials during transport and handling on the site will be minimized.
To manage sewage	Existing toilets will be used	Contractor	On commencement of construction	
Protection of biodiversity				
To avoid unnecessary disturbance of and quick recovery of biodiversity in the plant site	• Avoid destruction of biodiversity outside the designated factory construction site • Minimize clearing of vegetation during construction • Surface soil excavated during construction to be placed back on the sub-soil to fast vegetation recovery • Prepare and implement an appropriate landscaping programme to help in re-vegetation of affected project areas after construction • The flora of the site will be restored at	Contactor	Throughout construction phase	Vegetation loss cannot be avoided, but successful restoration, improvement and long-term management of the surrounding areas and maintenance of planted trees will be provided

	the end of the construction phase by landscaping and planting native vegetation			
Air quality & dust management				
To minimize the dust entrainment during construction	• Regular surface wetting will be implemented on dusty sections in the factory construction site • Strict on-site speed controls will be enforced for construction vehicles • All trucks hauling soil, sand and other loose materials will be covered • No excavation activity will be carried out during windy days • Fuel-efficient and well-maintained haulage trucks will be employed to minimize exhaust emissions • Construction workers will be sensitized on measures to reduce air pollution	Contractor	On commencement of construction activities	Dust propagation was limited to construction area and did not influence local community. However workers will be supplied with dust masks especially on dry days.
Noise				
To minimize disturbance due to noise	• Loading and unloading of materials will be done carefully to reduce noise disturbances to surrounding households • Residences are at a safe distance from site so no disturbance is envisaged. • Drivers will be instructed to avoid	Contractor	On commencement of construction activities	Noise level will be within PEQs

	unnecessary gunning of vehicles, hooting and buzzing. • Regular maintenance of the machinery will be done to reduce the noise • Vehicles will be tuned on regular basis			
Occupational health & safety				
To ensure healthy and Secure/safe environment in the construction site for all workers	• Management will ensure that fire extinguishers are located in strategic and visible places • All vehicles and construction equipment will be under control of competent personnel • Inspection of material and harmonization to the occupational health and safety standards. • Adequate security for workers will be be provided during construction • Sensitize workers to operate in teams	Contractor	Throughout construction phase	Record of all incidents will be maintained and reported to HSE manager.
Operation phase				
Wastewater management				
Degradation of surface waters quality due to process water and sewage direct disposal	No wastewater will be generated from process as medicines will be prepared in closed equipments and will not be	Bless Laboratories	Throughout project life cycle	None

	wasted. Municipal wastewater coming from various municipal works, such as cleaning will be generated, which will be treated via a Septic Tank. Washing wastewater of tanks will be treated in cleaner production tanks (settling tanks) where water will be chemically treated according to its composition. This wastewater will then be used for sprinkling purpose. Approximately 2000-4000 liters/day washing wastewater will be generated from washing of all tanks.			
Air quality management				
Particulate emissions and generator stack 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 is done to control dust emissions. Generator emissions will be controlled by providing proper enclosure, tuning and maintenance.	Proponent Team	Throughout operation phase	Local air quality will be virtually unaffected and will be based on PEQs

Noise & vibration				
To minimize disturbance of communities due to 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 • A thick greenbelt will be developed all around the plant which will be acting as noise barrier. • Introduction of control and monitoring rooms having good sound insulation properties. • All the workers will be provided with ear plugs. • All the transporters will be advised to carry out regular maintenance of their vehicles.	Proponent Team.	Throughout project life cycle	Noise level will be based on PEQs
Traffic & transport				
Increased heavy vehicles traffic both locally and nationally.	• Restricting delivery hours to reduce noise nuisance; avoid heavy truck movements in the night hours will be considered whether deliveries should	Management of project	Throughout project operation	The traffic has the potential to contribute to congestion and lead to complaints due to noise/vibration nuisance on a

	be scheduled to avoid peak times to reduce congestion			local basis. However, the study indicates that there will not be a significant impact.
HSE				
To minimize loss work injury/hazards/incidents/ accidents	• Training regarding HSE should be given on the regular basis • Workers will be given PPEs such as; helmets, mask, ear-plugs/muffs, safety boots, etc. • It should be strictly enforced to wear PPEs while working • Workers will be trained on the regular basis regarding personal safety and disaster management • Incidents should be reported directly to the concerned authority	Environmental manager/HSE	Throughout life cycle of project	Potential of injuries will be minimized
First aid				
To ensure safety and health	• First aid box will be available at the site • First aid training will be given to the employees on the regular basis • Numbers of all the concerned/authorized persons that will be contacted in the case of emergency will be displayed on-site	Environmental manager/HSE	Throughout life cycle of project	None
Fire hazard				

To prevent any disaster	• Firefighting equipment including DCP type fire extinguisher, CO2 Type extinguisher, sand buckets, sand drums with spade and hose pipe cabinet will be installed inside the plant • All the equipment will be placed at strategic locations where the risk of out-burst of the fire is high. List of fire posts is annexed. • Smoking will not be permitted in the vicinity of the plant • Regular site inspection will be done to eliminate all the chances of the hazards • Checking and maintenance of the fire-fighting equipment will be carried out on the regular basis • Emergency evacuation plan is annexed.	Environmental manager/HSE	Throughout life cycle of project	Potential of disaster will be minimized by suggested mitigation measures implementation
Employment				
To provide job opportunities and helping in improving living standard of people	• During this phase, skilled and unskilled labour will be required. • Employment opportunities for the un-skilled workers will therefore increase which will enhance the positive benefits for the local people who are	Proponent	During construction and operation phase	Direct and indirect jobs

	in dire need of income for sustenance. • Indirect opportunities for employment will arise from the provision of services to the construction teams, such as sale of raw-material such as cement, bricks, sand etc., as well as food and beverages for the labour and after completion of construction phase serve as a permanent business opportunity.			

9.2 ENVIRONMENTAL MONITORING PLAN

Based on the baseline conditions of the area and the environment management plan, a detailed monitoring plan for the operation phase is designed. Environment monitoring will serve as an indicator for any deterioration in environmental conditions due to operation of the project. Regular monitoring of environment parameters will serve as a measure to check the efficiency of pollution and to implement control measures. The main attributes for which monitoring shall be carried out are:

- Air quality.
- Noise Level.
- Waste Collection, Storage and Disposal.
- Worker's Safety

Table 9-2: Environment Monitoring Plan

Env. Components	Project Stage	Parameters	Instrument	Standards	Monitoring			Institutional Responsibility
					Location	Frequency	Duration	
Air	Construction	PM_{10}, SO_2, NO_2, CO, SPM ,O_3	Air Quality Monitors/Gadgets	PEQS	Project site	Twice during construction	As per approved testing method	Contractor through approved monitoring lab
	Operation	Stack emissions	Air Quality Monitors/Gadgets	PEQs	stack	Monthly	As per approved testing method	Through approved third party/monitoring lab
Noise Levels	Construction	Noise levels on dB(A) scale	Digital Sound Meter	PEQs	Project site	Twice during construction	Reading to be taken at 15 seconds interval for 15 minutes every hour and then averaged	Contractor through approved monitoring lab

	Operation	Noise levels on dB(A) scale	Digital Sound Meter	PEQs	Project site	Annually	Reading to be taken at 15 seconds interval for 15 minutes every hour and then averaged	Through approved third party/monitoring lab
Wastewater	Operation	BOD, COD, TSS etc	Through approved equipments	PEQs	ETP	Monthly	As per approved testing method	Through approved third party/monitoring lab

9.3 REPORTING AND REVIWING PROCEDURES (Communication and Documentation)

An effective program for storing and communicating environment information during the project is an essential requirement of an EMP. This activity will be done by an independent monitoring consultant. The key features of such a mechanism are:

- Precise recording and maintenance of all information generated during the monitoring in a predetermined format.
- Communicating the information to a central location
- Storing the raw information in a central database
- Processing the information to produce periodic reports

Data recording and maintenance: All forms will be numbered and a tracking system will be developed for each. Whenever a form is released for use in the field, its number will be recorded. The monitors will be required to account for each form after completion. In this manner, it will be ensured that all forms are returned to the office, be they filled, unused or discarded.

Storage of information: A database for information collected during the project will be prepared. The database may include information on training programs, staff deployment, non-compliance, corrective actions, water resources, results of effects monitoring.

Meeting: For effective monitoring, management and documentation, of the environmental performance during the operation, environmental matters will be discussed during a daily meeting held on-site. Environmental concerns raised during the meetings will be mitigated after discussions with the proponent site representatives.

Reporting: Monitoring body will produce daily, weekly, monthly and another periodic report, as well as a final report of the project based on the information collected. The proponent site representative and the contractors will also prepare a weekly environmental report. Copies will be provided to the proponent and contractor's higher management

9.4 ROLES AND RESPONSIBILITIES OFF ENVIRONMENT MANAGEMENT TEAM

Implementation of EMP is the responsibility of proponent and contractor. This section provides institutional arrangements for environmental management during the proposed activity and defines the roles and responsibility of the various Organizations/departments. The responsibilities of different organizations/departments are summarized below:

9.4.1 Proponent

Responsibility of Proponent includes the following:

- Must take ownership of the process to ensure that its responsibilities are met.

- Supervising construction works.
- Schedule preparation and resource forecasting for engineering and other technical activities relating to the project.

9.4.2 Contractor

The contractor of construction activities will be responsible for:

- Develop and review work instructions and procedures.
- Review and improve method statements for environmental aspects prior to work starting.
- Monitor construction activities to ensure that control measures are effective and ensure compliance with the EMP.
- Coordinate with construction teams to ensure that environmental risks are identified and appropriate controls are developed.
- Coordinate environmental training for site personnel and subcontractors.
- Liaison with the project's environmental manager, and project public liaison officer.
- Ensure correct procedures are followed in the event of an environmental incident.
- Maintain training register, identify training needs and provide training where required.

9.4.3 EIA/IEE Expert

EIA/IEE Expert (Environmental Specialist) is the member of the supervising consultant's team. The responsibilities of EIA/IEE Expert include:

- Work with proponent to ensure all statutory environmental submissions under PEPA 1997 (Amended 2012) and other environmentally related legislation are thoroughly implemented.
- Work with proponent to ensure all environmental requirements and mitigation measures from the environmental assessment of the proposed project are included in the contract prequalification and bidding documents.
- Work with proponent to execute any additional EIA requirements needed due to fine tuning of the proposed project and that environmental performance targets are included in the contracts prior to project commencement.

9.5 ENVIRONMENTAL TRAINING

Training is an integral part of a preventive strategy. Environmental and disaster management training will be required to ensure proper implementation of effective environmental management and monitoring plan; and disaster management plan. However, training could be organized by Owner involving relevant staff. As a trainer, competent Consultant can be outsourced. Important training under the spectrum needs to include:

- Training on firefighting and safety management;
- Training on environmental safeguards and compliance;
- Staff training on environmental monitoring and reporting;
- Training on occupational health and safety measure.

9.6 Schedule for Implementation & Environmental budget

Lumpsum of PKR 500,000 budget will be reserved for tree plantation, solid waste management and environmental monitoring. Monitoring tests for ambient air quality, noise and groundwater quality will also be conducted.

Table 9-3: Schedule for Implementation & Environmental budget

Amenities	Frequency	Cost in PKR (Million)
Environmental testing and monitoring	Annually	100,000/-
Tree Plantation/Green Belts Development		100,000/-
Trainings	Biannually	100,000
Health and safety arrangements, Firefighting arrangements and PPEs	Monthly	200,000

10 SOCIOECONOMIC SURVEY AND PUBLIC CONSULTATION

Public consultation refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. According to the IEE and EIA Review Regulations, public consultation is mandatory for any socio-environmental study.

Impact assessment survey and public consultation sessions held with different stakeholder groups that may be impacted by the said project development. The consultation process was carried out in accordance with the guidelines laid by EPA. The objectives of this process were to:

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

This report includes all the comments, which were taken into account in preparing the definitive development concept for the establishment of said project..

10.1 OBJECTIVES OF CONSULTATION

Public consultation plays a vital role in studying the impacts said project on stakeholders in its successful implementation and execution. It provides an opportunity to exchange knowledge with theall stakeholders. Referring particularly to a project related to environmental assessment, involvement of public is all the more essential, as it leads to better and more acceptable decision-making. The overall objective of the consultation with the stakeholders is to help verify the environmental and social issues, besides technical ones, that have been presumed to arise and to identify those which are not known or are specific to the

project. In fact, discourse with many who have thoroughly observed the site conditions in the pre-developmental phase, goes a long way in updating the knowledge and understanding.

10.2 IDENTIFICATION OF STAKEHOLDERS

All the people who are directly or indirectly affected or concerned with the project are the stakeholder. Besides the living population of the surrounding areas, some other stakeholders were identified and contacted. They are the key players including; shops owners, vendors, public offices, school, university, hospitals,. Not only published material (Both brief and comprehensive literature were obtained on request) but also noted their views and the concerns. Following stakeholders are identified for this project:

Project stakeholders include the settled families, either property owners or the tenants, businessmen (land owners, traders, shopkeepers, vandors, transporters, restuarent owners etc.), employees of the commerical entities. PAPs are of two types, for instance:

- **Direct**

In this case, the PAPs are those who will be benefited directly by project. No disturbance on the local community is being foreseen due to the installation of the said plant.

- **Indirect**

Indirect impact will occur on those who are living or doing business within project area of influence. Indirect respondents include;

- ✓ Government agencies responsible to deal with the project related activities
- ✓ Government Agencies directly, indirectly or widely involved in the execution and monitoring of the said project
- ✓ Workers of political, cultural, religious or social scientific bodies, directly or indirectly related

10.3 PUBLIC DISCLOSURE

Public disclosure is the outcome of all such activities where public is involved at least in the information sharing process. This is an integral part of that process so before the proponent applies for NOC to the EPA, this disclosure will be distributed properly among all stakeholder. It is the responsibility of the proponent and the consultants to display public disclosure document at prominent places where community has easy access.

10.4 CONSULTATION PROCESS

Information disclosure, public consultation and discussion regarding the various aspects of the project with the people of the area are necessary. This process is intensified during the EIA Studies, and separate rounds of public consultations were held. Surveys were carried out in order to investigate physical, biological and socio-economic resources falling within the immediate area of influence of the project. Primary data collection included:

- Data collection regarding the socio-economic condition of the study area
- Pretesting of socio-economic survey tools in the field
- To consult the locals for collection of information on biological environment

Various meeting with the stakeholders were held the following objectives:

- Share information with stakeholders on the said project and expected impacts on community in the vicinity of the project
- Understand stakeholders' concerns regarding various aspects of the project, including the existing condition of the upgrading requirements, and the likely impact of construction and operation activities
- Provide an opportunity to the public to influence the project design in a positive manner
- Obtain local and traditional knowledge, before decision making
- Increase public confidence about the proponent, reviewers and decision makers
- Reduce conflict through the early identification of controversial issues, and work through them to find acceptable solutions
- Dissemination of information through discussions, education and liaison
- Documentation of information narrated by the stakeholders and mitigation measures proposed by the stakeholders
- Incorporation of public concerns and their address in the EIA; and eliciting their comments and feedback

10.4.1 Consultation Methodology

The methodology adopted for consultations is summarized below.

10.4.2 Consultation Material

The main document for distribution to stakeholders during the consultations was Social Impact Assessment Interview.

10.4.3 Consultation Mechanism

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

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

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

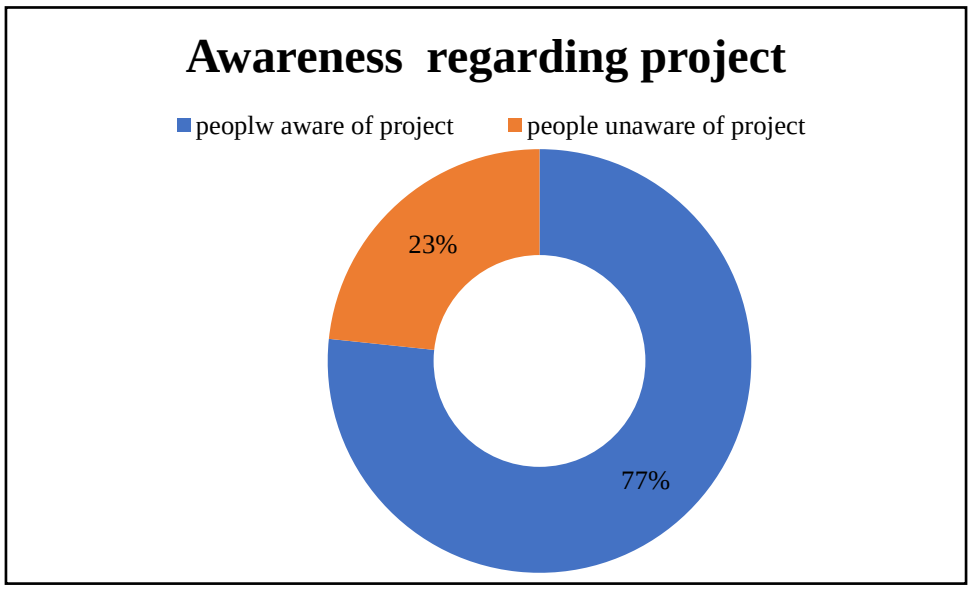
10.5 PRIMARY STAKEHOLDERS CONSULTATION

The community consultations were conducted with the community members outside their settlements to encourage and facilitate their participation. Consultation was done for 1 day.

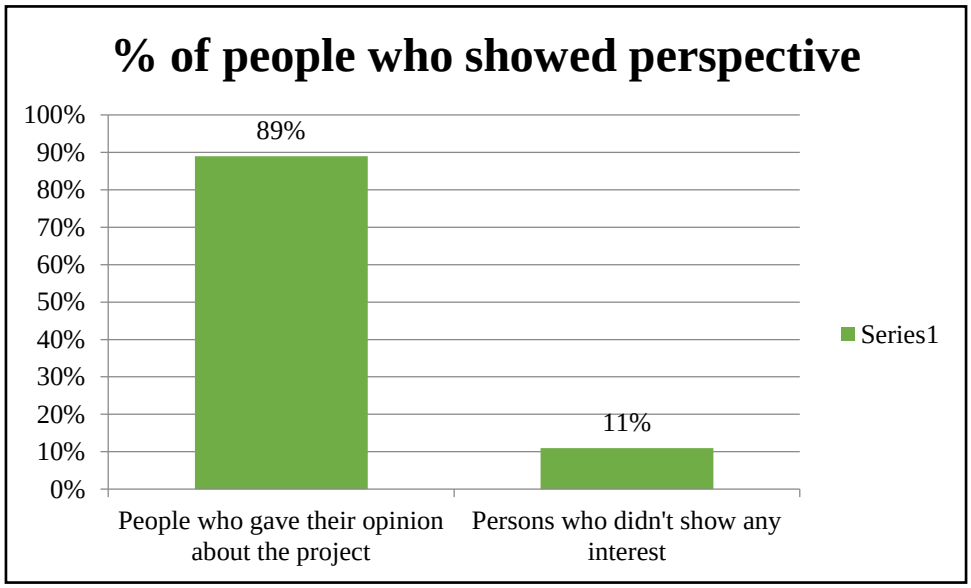
10.5.1 Stakeholder Concerns and Recommendations

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

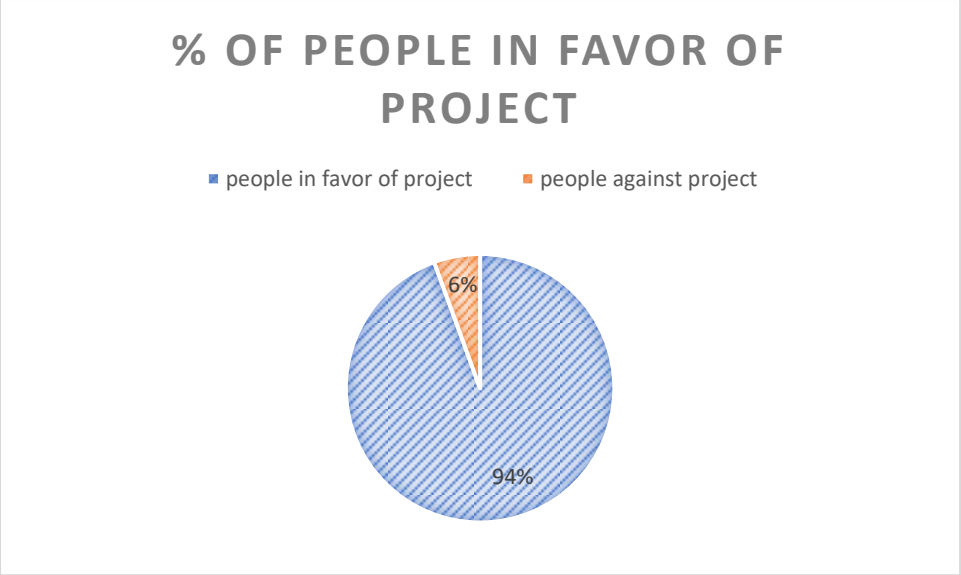
Out of total respondents of, 77% knew about the project whereas 23% were not aware of the project planning and implementation. All people were then briefed about the project.



89% commented their views about the project and 11% didn't respond.



Out of 89%, majority of the people (about 94%) favored the construction of the project keeping in view its importance and 6% people showed pessimistic views in general but mitigation measures and solutions to their concerns were provided.



Majority of people were in favor of project. They said that project will result not only in direct jobs opportunities for locals but also will enhance subsidiary business, trade, education, and community development. The people were of the view that industry might also elevate education standards, struggle for career enhancement besides improvement in standard and quality of living in area. People were also of the view that industry may also be instrumental in connecting the local people with major cities and will result in increase in GDP.

All approached parties signed the questionnaire and were very enthusiastic in giving their comments. They gave several reasons on why the project should start immediately, including security, creation of more employment opportunities for the youth, and the fact that gas would be available at a close range and affordable. However, the neighbors had specific concerns such as wastewater, solid waste, fire break-outs and distance of the project work from residents. Their worries were explained to them and the measures to be taken. Moreover, the EMP provides for such impacts.

10.6 Secondary Stakeholders Consultation

The consultations were carried out with the local government officials. Comments and recommendations of all consulted stakeholders are presented in table below:

S#	Participant	Designation	Concerns/Remarks
Responsible Authority			
1	Mr. Mumtaz	Inspector Environment	• HSE plan should be enforced strictly • Proponent should install proper wastewater treatment plant

			• Should work for local people benefit • Preventive measures should be adopted to avoid any unfortunate incident • Environmental enhancement measures such as; Tree plantation, monitoring and safety should be ensured
Departments and Agencies			
Livestock Department			
Wildlife Department			
1	Tanveer Ahmad Janjua	Assistant Director wildlife	• There is no endangered species of animals/birds near factory area. • Mostly common birds like sparrow, crow etc visit this area. So there is no such danger to wildlife.
Proponent			
1	Nauman Farooq	Proponent	• Local employment will be ensured • Tree plantation will be done to make project environment friendly • Wastewater treatment plant will be installed • No waste will be dumped improperly
Environmental Practitioners and Experts			
1	Dr. Muhammad Faqir Irfan	PhD. Environment Lawyer	• To avoid violation of section 11 Wastewater Treatment Plant should be installed
Affected and Wider Community			
1	Mr. Khurram	NGO (Parho Barho Punjab)	• Local employment should be ensured • Proponent shall work for betterment of community

11 CONCLUSION AND RECOMMENDATIONS

11.1 CONCLUSION

The report presents Environmental Impact Assessment (EIA) of the Proposed Construction of Nutraceuticals Manufacturing Plant

EIA of Proposed 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 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 Environmental Protection Agency, subject to payment of the requisite scrutiny fee by the proponent of the project.

11.2 RECOMMENDATIONS

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

- Implementation of EMP must be given top priority.
- Proper PPEs including ear plugs, ear muffs, mufflers, goggles, gloves and shoes etc. should be provided to workers
- Train workers to use PPEs
- Advise workers to follow SOPs.
- Installation of fire extinguishers in the premises and their monitoring must be ensured.
- Equipment maintenance and efficiency must be checked.

- No compromise on public health and environment should be allowed.
- Waste minimization practices should be employed and workers should be encouraged to adopt such methods.
- Wages should be distributed on time.
- 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.
- Proper dispensary and first aid box should be provided for workers
- Smoking should be avoided within premises of project site and near fuel storage areas.
- 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 proposed Environmental Management & Monitoring Plan should be implemented.