

**ESTABLISHMENT OF DANGEROUS PRODUCT
(ISOPROPYL ALCOHOL) STORAGE FOR
OWN USE**

BY M/S DON VALLEY PHARMACEUTICAL PVT. LTD

31-km, Main Lahore Kasur Rd, Lahore



ENVIRONMENTAL IMPACT ASSESSMENT

Submitted by

DON VALLEY PHARMACEUTICAL PVT. LTD

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EXECUTIVE SUMMARY

In Pakistan, the pharmaceutical industry is experiencing significant growth, with several prominent manufacturers leading the market. Pharmaceuticals, which are products derived from food sources with health benefits, are increasingly sought after for their potential to improve health and manage diseases. The demand for pharmaceutical products in Pakistan is on the rise, driven by increasing health awareness among consumers, particularly post-COVID-19. The establishment of a dedicated storage facility for isopropyl alcohol is crucial for ensuring the safe and efficient handling of this highly flammable and volatile chemical, particularly in the pharmaceutical industry. Isopropyl alcohol plays a vital role in pharmaceutical manufacturing as a solvent, disinfectant, and cleaning agent, making its secure storage essential to maintain operational safety and quality standards.

This initiative focuses on creating a specialized storage facility equipped with advanced safety features, such as fire suppression systems, spill containment mechanisms, proper ventilation, and continuous monitoring. The facility will comply with stringent pharmaceutical safety regulations and industry best practices to safeguard personnel, the environment, and surrounding areas.

The proposed project requires fulfilling the legal requirements of the Punjab Environmental Protection Act (amended act 2012), Section 12, for which this Environmental Impact Assessment (EIA) report is being submitted.

i- TITLE AND LOCATION OF PROJECT:

Title: Establishment of Dangerous Product (Isopropyl Alcohol) Storage for Own Use

Location: 31-km, Main Lahore Kasur Rd, Lahore

PROJECT PROPONENT

Proponent: Saad Javed Akram

Address: House 15 C 11, Mohalla M M Alaam Road Gulberg III, Lahore

ii. BRIEF OUTLINE OF THE PROJECT

The project involves establishing a storage unit for Dangerous Product (Isopropyl Alcohol) at 31-Km Main Lahore Kasur Road, Lahore, designed to have a capacity of 40580 Liters, 8734 GLS covers an area of 21'-6 "X 32'-6 ".

iii. PROJECT IMPACTS AND RECOMMENDATIONS FOR THEIR MITIGATION

Impact assessment is crucial for project initiation as it enables the identification and comprehension of a project’s potential positive and negative effects. Understanding these impacts aids in tailoring the project to maximize benefits and minimize risks. Impact assessment assists in recognizing environmental, social and economic challenges and risks and gives the directions to develop strategies that mitigate these risks and adjust the plan accordingly.

E1: Impacts and Mitigation Measures of Construction and Operational Phase

Possible Impact	Impact Magnitude	Proposed Mitigation Measures
Construction Phase		
Dust emissions likely to occur during the excavation of the top soil and loading and transportation of the construction waste.	Minor/Short Term	<ul style="list-style-type: none"> • Watering all active construction areas when necessary. • Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard. Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging

Possible Impact	Impact Magnitude	Proposed Mitigation Measures
		<p>areas at construction sites.</p> <ul style="list-style-type: none"> • Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites. • Provision of PPEs to workers.
<p>Hydrology and water quality degradation.</p>	<p>Minor/Short Term</p>	<ul style="list-style-type: none"> • Installation of the septic tank. • The proponent will prepare a hazardous substance control systems and emergency response plans that will include preparations for quick and safe clean-up of accidental spills.
<p>Oil spills from machines to be used on site and vehicles.</p>	<p>Minor/Short Term</p>	<ul style="list-style-type: none"> • The machinery and the equipment will be regularly maintained. • The contractor will control the dangers of oil spills during construction by maintaining the

Possible Impact	Impact Magnitude	Proposed Mitigation Measures
		<p>machinery in specific areas designed for this purpose hence will not be a serious impact as a result of the construction.</p>
<p>Noise pollution due to the moving machines (mixers, tippers) and incoming vehicles</p>	<p>Minor/Short Term</p>	<ul style="list-style-type: none"> • Install portable barriers to shield compressors and other small stationary equipment where necessary. • Limit pickup trucks and other small equipment, observe a common sense approach to vehicle use and encourage workers to shut off vehicle engines whenever possible.
<p>Workers accidents and hazards during construction.</p>	<p>Minor/Long Term but reversible</p>	<ul style="list-style-type: none"> • Provision of appropriate and adequate Personal Protective Equipment (PPE) to employees. • Enforcement and proper use of PPE by all construction workers. • Provision of appropriate tools, equipment, and

Possible Impact	Impact Magnitude	Proposed Mitigation Measures
		machinery in sound working conditions to employees.
Operation Phase		
Solid waste production during the operational activities.	Major/ Long term	<ul style="list-style-type: none"> • Solid wastes resulting from the unit will be disposed of properly to avoid any threat to the environment. • Conducting public awareness campaigns to educate workers about the environmental impact of solid waste and the benefits of waste reduction. • Collection facilities will be provided.
Noise will be generated from the standby generator and machineries.	Minor/ Long Term	<ul style="list-style-type: none"> • Proper covering of standby generator, to reduce the noise. • Noise reduction measures like buffering of noise through trees will be adopted where deemed necessary to reduce the

Possible Impact	Impact Magnitude	Proposed Mitigation Measures
		noise level at the project boundary.
Air Emissions will be generated from standby generator	Minor/Long Term	<ul style="list-style-type: none"> • Tree plantation in and around the facility will be encouraged. • Ventilation System will be ensured.
Release of wastewater during operations	Minor/ Short Term	<ul style="list-style-type: none"> • No Wastewater will be produced during production of Pharmaceutical products however domestic waste will be generated which is treated through septic tanks and discharge into main drain. • Proper sampling of wastewater will be done during operational phase to ensure the quality of wastewater.

1 INTRODUCTION

The pharmaceutical industry plays a vital role in improving healthcare outcomes by providing quality medicines to address various medical needs. Recognizing the growing demand for affordable and reliable pharmaceuticals, this project aims to establish a state-of-the-art pharmaceutical unit. The primary objective of the unit is to manufacture a wide range of medications, including essential drugs, generics, and specialized formulations, to support national healthcare objectives and enhance access to life-saving treatments.

The establishment of a specialized storage facility for isopropyl alcohol (IPA) is an essential initiative for ensuring the safe and efficient handling of this critical chemical in the pharmaceutical industry. IPA is a key component in various pharmaceutical applications, including its use as a solvent, disinfectant, and cleaning agent. It plays a crucial role in maintaining sterility, producing high-quality formulations, and ensuring the integrity of pharmaceutical products. Given its flammable and volatile nature, the storage of IPA requires adherence to stringent safety protocols and standards to mitigate risks and safeguard the health of personnel, the environment, and surrounding areas. In compliance with both local and international regulations, the facility will align with Good Manufacturing Practices (GMP) and standards specific to the pharmaceutical industry. It will be designed not only to meet safety requirements but also to incorporate environmentally sustainable practices. This approach ensures that operations contribute to the organization's broader environmental and social responsibility goals, reducing the carbon footprint while maintaining high safety standards.

This initiative reflects the organization's dedication to operational excellence, safety, and sustainability. It highlights a proactive approach to addressing the challenges of handling dangerous substances in a manner that prioritizes quality and compliance, contributing to the long-term success and reputation of the organization within the pharmaceutical sector.

1.1 ECONOMIC GROWTH

The pharmaceutical sector in Pakistan has shown steady growth, contributing significantly to the economy by generating employment, fostering technological advancements, and supporting the development of ancillary industries. This pharmaceutical unit will further enhance industrial

output, create skilled and semi-skilled job opportunities, and stimulate economic activity in related sectors, such as packaging and logistics.

1.2 REGULATORY FRAMEWORK AND QUALITY ASSURANCE

Ensuring product safety, efficacy, and quality is paramount in the pharmaceutical industry. The proposed unit will strictly comply with national and international regulatory standards. This commitment to quality assurance will not only protect public health but also strengthen consumer trust in locally manufactured medicines, setting a standard for the industry. The proposed project aims to fulfill its objectives through construction and operation necessitating compliance with the legal regulations specified in Punjab Environmental Protection Act 2012, Section 12. In accordance with these requirements, this Environmental Impact Assessment (EIA) is being submitted.

1.3 PURPOSE OF THE REPORT

As per the Punjab Environmental Protection Act (PEPA), Section 12, which covers Initial Environmental Examination and Environment Impact Assessment, no project proponent is allowed to initiate construction or operations without filing the necessary documentation with the designated Government Agency under the Provincial Environmental Agencies. If the project is anticipated to cause adverse environmental effects, it necessitates an environmental impact assessment. Subsequently, approval must be obtained from the Government Agency. This requirement set forth by the Government of Punjab mandates the preparation of this Environmental Impact Assessment (EIA) Report to secure Environmental Approval (EA) from the Environmental Protection and Climate Change Department (EPCCD), Government of Punjab, Lahore.

This report provides comprehensive information and data on the environmental, economic, and social impacts of the project, enabling its assessment and justification that the project will comply with the requirements of environmentally sustainable practices during both installation and operation stages, as required by the Punjab Environmental Protection Act, 2012, the Punjab Environment Quality Standards, and the rules and regulations thereof.

1.4 IDENTIFICATION OF PROJECT AND PROPONENT

Establishment of Dangerous Products (Isopropyl Alcohol) Storage for Own Use

Location: 31-Km Main Lahore Kasur Road Lahore

PROJECT PROPONENT

Proponent: Saad Javed Akram

Address: House 15 C 11, Mohalla M M Alaam Road Gulberg III, Lahore

1.5 BRIEF DESCRIPTION OF NATURE SIZE AND LOCATION OF PROJECT

The project involves establishing a storage unit for Dangerous Product (Isopropyl Alcohol) at 31-Km Main Lahore Kasur Road, Lahore, designed to have a capacity of 40580 Liters, 8734 GLS covers an area of 21'-6 "X 32'-6 ".

The EIA study of the proposed project has been conducted according to Environmental Assessment Procedures, 1997, Review of IEE and EIA Regulation 2022 as prescribed by the Federal Environmental Protection Agency (Pak EPA), Government of Pakistan.

2 SCREENING OF THE PROJECT

Based on the Punjab Environmental Protection Act 2012 and the Review of IEE & EIA Regulations, 2022 for filing, reviewing, and approving environmental assessments, the present project is classified under Schedule II class G (3). Following list shows the projects included in Class G.

G. Waste Storage and Disposal

1. Landfill Sites
2. Waste incinerators and autoclaves
- 3. Hazardous Substance or waste storage warehouse**

Don Valley Pvt.Ltd Pakistan, has Proposed a project of Establishment of Dangerous Products (Isopropyl Alcohol) Storage for Own Use, covers an area of 21'-6 "X 32'-6 ". This project is designed to address the critical need for safe, efficient, and compliant chemical storage to support the company's expanding operations and uphold industry standards. The EIA is required because of the considerable environmental impacts these plants may have, the extensive regulations, and the need for a comprehensive assessment involving public participation, considering potential risks, mitigation term measures, and consequences.

3 SCOPING OF THE PROJECT

Scoping is a critical initial phase in the EIA process, serving as a roadmap for the comprehensive evaluation of potential environmental effects associated with a project. It is pivotal in defining the boundaries, objectives, and methodology of the EIA study. The scoping process allows for the identification and prioritization of key environmental issues, ensuring that the assessment focuses on the most relevant aspects of the project. This early stage engagement with stakeholders, including the public, governmental bodies, and experts, promotes transparency and inclusivity in decision-making. By clearly delineating the scope, the EIA process becomes more efficient, cost-effective, and targeted, streamlining the subsequent data collection and analysis phases. Ultimately, scoping enhances the overall effectiveness of the EIA, enabling a thorough examination of potential impacts, facilitating informed decision-making, and promoting sustainable development practices by integrating environmental considerations into the planning and decision-making processes.

3.1 SPATIAL AND TEMPORAL BOUNDARIES OF ENVIRONMENTAL ASSESSMENT

Spatial boundaries define the geographical extent of the assessment, allowing for the identification and consideration of potential impacts on ecosystems, biodiversity, and local communities. A precise delineation of these boundaries is crucial for capturing both direct and indirect effects, preventing oversight of critical environmental factors. Simultaneously, temporal boundaries establish the timeframe over which impacts are assessed, enabling the examination of short-term and long-term consequences. This consideration is vital for understanding the dynamic nature of environmental processes and the potential cumulative impacts over time. By addressing spatial and temporal boundaries, environmental assessments can provide decision-makers with a nuanced understanding of a project's overall impact, supporting the development of sustainable practices and fostering responsible development that aligns with environmental conservation and community well-being.



Figure 3-1 Spatial and Temporal Boundaries of the Proposed Project

3.2 IMPORTANT ISSUES AND CONCERNS RAISED DURING CONSULTATION

The EIA for the proposed project incorporates a meticulously planned two-stage consultation process, with a primary focus on one-on-one meetings. During the initial stage, targeted consultations were directed at engaging with local government authorities, affected individuals, and communities in close proximity to the project site. The primary objective of this stage was to comprehensively assess both short-term and long-term impacts anticipated from the early stages of project development. By soliciting insights and perspectives from key stakeholders, including local residents and authorities, the goal was to gain a nuanced understanding of potential environmental, social, and economic implications.

The second stage of consultations, if deemed necessary, is designed to adopt a more expansive approach through public participation. This phase aims to facilitate a broader outreach to the public, fostering a comprehensive engagement process to capture additional feedback, concerns, and insights from a diverse cross-section of the community. This inclusive approach ensures that a wide range of stakeholders has the opportunity to contribute their perspectives, concerns, and suggestions, thereby enriching the EIA process and refining it in accordance with the valuable input received from the community.

3.3 SIGNIFICANT IMPACTS AND FACTORS TO BE DETERMINED

The Establishment of Dangerous Products (Isopropyl Alcohol) Storage for Own Use involves various significant impacts and factors that necessitate thorough consideration and planning for successful implementation. Firstly, regulatory compliance stands as a paramount concern, with adherence to stringent safety, environmental, and quality standards being imperative for obtaining necessary permits and approvals. Additionally, selecting an appropriate site is crucial, considering factors such as proximity to transportation, availability of utilities, and compliance with zoning regulations. Environmental impact assessments must be conducted to identify and mitigate potential environmental impacts associated with construction and operation. Engaging with local communities and stakeholders ensures transparency, addresses concerns, and fosters positive relationships. Technological requirements, workforce development, supply chain management, risk management, and financial planning are also critical considerations to ensure efficient operations and long-term sustainability. By meticulously addressing these factors, pharmaceutical

companies can navigate the construction process effectively and establish facilities that contribute positively to healthcare advancements while mitigating potential risks and impacts.

3.4 DEVELOPMENT OF AN ENVIRONMENTAL MANAGEMENT PLAN

The EIA of an Establishment of Dangerous Product (Isopropyl Alcohol) Storage for own use is a critical process that evaluates potential environmental effects associated with the construction and operation of the facility. An Environmental Management Plan (EMP) plays a significant role within the EIA framework, serving as a roadmap for identifying, mitigating, and managing environmental impacts throughout the project lifecycle. In the context of a pharmaceutical industry, the EMP holds particular importance due to the unique environmental challenges and risks inherent in pharmaceutical formulation.

An EMP helps identify these potential environmental impacts and specifies measures to minimize or eliminate them. This may include implementing pollution control technologies, such as wastewater treatment through septic tank, air emission controls, and hazardous waste management practices, to ensure compliance with environmental regulations and protect surrounding ecosystems and communities. An EMP provides a framework for ensuring regulatory compliance by outlining specific monitoring, reporting, and mitigation measures to address environmental concerns identified during the EIA process. This helps pharmaceutical companies demonstrate their commitment to environmental stewardship and sustainability, thereby enhancing their reputation and credibility with regulatory authorities, stakeholders, and the public.

4 ALTERNATIVES OF THE PROJECT

The consideration of alternatives in an EIA provides a comprehensive understanding of the potential impacts associated with various project options. Evaluating alternatives allows decision-makers to assess not only the environmental implications but also the social and economic consequences of different project scenarios. This process aids in identifying the most sustainable and least impactful option, promoting responsible decision-making. Alternatives analysis helps to avoid or minimize adverse effects, contributing to the overall goal of sustainable development. In essence, the careful examination of alternatives in an EIA serves as a robust decision-support mechanism, guiding the selection of projects that align with environmental conservation, community well-being, and long-term sustainability.

Project Alternatives

- No project option/worst scenario option.
- Site Alternative

4.1 NO PROJECT OPTION/WORST SCENARIO OPTION

Analysis

➤ Strength and Opportunities

Establishing a dedicated IPA storage facility offers an opportunity to control environmental risks more effectively. The facility could be designed with advanced environmental safeguards such as secondary containment systems to prevent any leakage into the surrounding environment. Implementing vapor recovery systems would help reduce the release of volatile organic compounds (VOCs), and fire suppression systems would further protect against accidental fires that could have severe environmental consequences. These measures ensure that the project complies with national and international environmental regulations, minimizing the impact on air, water, and soil quality. Pharmaceutical companies play a crucial role in the research, discovery, and development of new medicines, leading to advancements in medical science that positively impact millions of lives worldwide. Additionally, careers in the pharmaceutical industry provide opportunities for scientific discovery, innovation, and access to cutting-edge technology,

competitive salaries, stability, diverse career paths, international exposure, and a strong commitment to sustainability.

Weakness and Threats

Without the establishment of a dedicated storage facility, the organization would need to rely on third-party storage or frequent transportation of IPA to and from external locations. While this option might appear to reduce immediate environmental concerns, it would increase carbon emissions due to regular transportation, contributing to air pollution and climate change. Additionally, transportation and external handling of IPA carry a higher risk of accidents, such as leaks or spills, which could contaminate soil, water, and air. Improper waste disposal or inadequate spill response could lead to long-term environmental damage, further complicating the sustainability of the project.

Conclusion

Having a pharmaceutical unit in a community offers numerous advantages that positively impact both the local population and the region as a whole. The establishment of a dedicated isopropyl alcohol storage facility by Don Valley Pharmaceutical Pvt. Ltd. would offer significant benefits to both the industry and the region. It ensures consistent access to critical raw materials, reduces dependence on imports, and supports operational efficiency. By promoting job creation and economic growth, the facility contributes to the socio-economic fabric of the community. Furthermore, it fosters innovation, strengthens regulatory compliance, and builds resilience within the pharmaceutical supply chain. Overall, the establishment of this facility is a valuable investment in healthcare, economic prosperity, and long-term sustainability, aligning with the organization's commitment to quality and community well-being.

5 DESCRIPTION OF THE PROJECT

5.1 GENERAL

The "Description of the Project" chapter within an EIA serves as the foundational narrative that intricately outlines the key facets of the proposed project. This pivotal section provides a comprehensive overview, delineating the project's purpose, scope, location, design, and methodologies. It lays the groundwork for the subsequent environmental evaluation by offering a detailed understanding of the project's intricacies, helping stakeholders, authorities, and the public grasp the potential implications. In essence, this chapter acts as the entry point, guiding readers through the project's fundamental characteristics and setting the stage for the thorough analysis of its environmental, social, and economic impacts in the subsequent sections of the EIA.

5.2 OBJECTIVES OF THE PROJECT

The primary objective of this project is to establish a safe and compliant storage facility for Isopropyl Alcohol (IPA) to support the pharmaceutical manufacturing process. The facility will ensure the safe handling, containment, and storage of IPA, minimizing environmental and health risks while adhering to safety regulations. It aims to optimize operational efficiency by reducing dependency on external suppliers and improving supply chain reliability.

5.3 LOCATION AND LAYOUT OF THE PROJECT

The project is located at 31-Km Main Lahore Kasur Rd Lahore.

GPS Coordinates: 31°18'56.32"N 74°23'41.20"E

5.4 LAND USE ON THE SITE

Currently, the proposed land for the Establishment of Dangerous Products (Isopropyl Alcohol) storage for own use is open land and within the closed vicinity of Don Valley Private Limited, They covers a total area of 21'-6 "X 32'-6 ".

5.5 ROAD ACCESS

The Proposed Project, located at Lahore Kasur Road, transportation of materials and personnel, connecting the project site to key industrial areas and essential services, ensuring smooth logistical operations.

Figure 5-1 Road Connectivity around Project Area



5.6 VEGETATION FEATURES OF THE SITE

The land earmarked for the project stands devoid of any significant vegetation, eliminating the need for cutting down or uprooting trees. It is an open land presents a unique advantage, sparing any ecological impact typically associated with land development. With no trees or major vegetation to clear, the project can progress without disturbing the natural ecosystem, allowing for a more environmentally friendly and efficient development process. The project site has minimal natural vegetation due to extensive urbanization and industrial use in the area. While the existing greenery is limited, incorporating green spaces and landscaping within the project can enhance air quality and aesthetic value, supporting sustainability efforts.

5.7 COST AND MAGNITUDE OF OPERATION

Total estimated cost for the project is 1 million PKR. This cost will be invested in infrastructure development, Management of the environment, setup development and material purchasing. The time period for the completion of the project is proposed as 6 months.

5.8 SCHEDULE OF IMPLEMENTATION

The outlined project implementation schedule is intended to be followed, contingent upon smooth execution as per the plan and the absence of significant obstacles. The implementation stages of the project activity include:

1st Stage

The stage –1 comprises the onsite contouring studies and soil investigations and the finalization of storage plant designs.

2nd Stage

The stage –2 comprises the following task:

- Digging the ground to lay foundation and starting to build or put together the structure.
- Building support structures and foundation work.
- Beginning construction, electrical and mechanical tasks.

- Establishing essential infrastructure.
- Fitting of instrumentation

3rd Stage

The stage –3 comprises the following task

- Commercial building civil structure erection completion.
- Completion of the basic infrastructures water supply system, electricity supply etc.

4th Stage

The last stage will be the commencement of regular use of the Chemical storage and re-packing unit.

5.9 DESCRIPTION OF THE PROJECT

The project involves establishing a storage unit for Dangerous Product (Isopropyl Alcohol) at 31-Km Main Lahore Kasur Road, Lahore, designed to have a capacity of 40580 Liters, 8734 GLS covers an area of 21'-6 "X 32'-6 ".

Table 5.1: Product Storage of DP Room

Tank No.	Type Product	Flash Point	Product	Room Size	Capacity in Liters	Capacity in 5% less liters
T-1	DP	54-F	ISO PROPYL ALCOHOL (IPA)	21'-6 "X 32'-6 "	40580 LIT	38541 LIT
					8734 GLS	8734 GLS

5.9.1 Land Acquisition

Since the proponent owns the project site, there is no necessity for any land acquisition process to be initiated. The absence of land acquisition requirements minimizes the risks related to potential conflicts, delays, or disruptions arising from disputes over land ownership. This scenario ensures a more seamless initiation and execution of the project, allowing resources and efforts to be focused on the project's core objectives and development activities.

5.10 RESTORATION AND REHABILITATION PLAN

The Restoration and Rehabilitation Plan for the project site outlines measures to ensure safe, environmentally sustainable demolition practices and effective site rehabilitation. As the site is already approved and within the vicinity of the project, no additional rehabilitation is anticipated until the building reaches the end of its life cycle. At that point, the building will be dismantled with careful attention to minimizing pollution, safeguarding human life, and protecting property.

Debris and other waste materials generated from demolition will be disposed of sustainably. Recyclable or reusable materials will either be sold in the market or repurposed as appropriate. Throughout the demolition process, strict adherence to government regulations and safety standards will be maintained. During construction, precautions will ensure no harm to infrastructure, such as sewer systems, power lines, and roads, and no disruption to public or private property. Dust suppression measures, such as regular water sprinkling, will control dust emissions. Post-construction, all debris and garbage will be promptly removed to maintain site cleanliness. Any land disturbances will be leveled to restore the area to a clean and orderly state, ensuring the project site and its surroundings remain free from construction residue and safe for future use.



Figure 5-2 Location of the Proposed Project

6- DESCRIPTION OF ENVIRONMENT

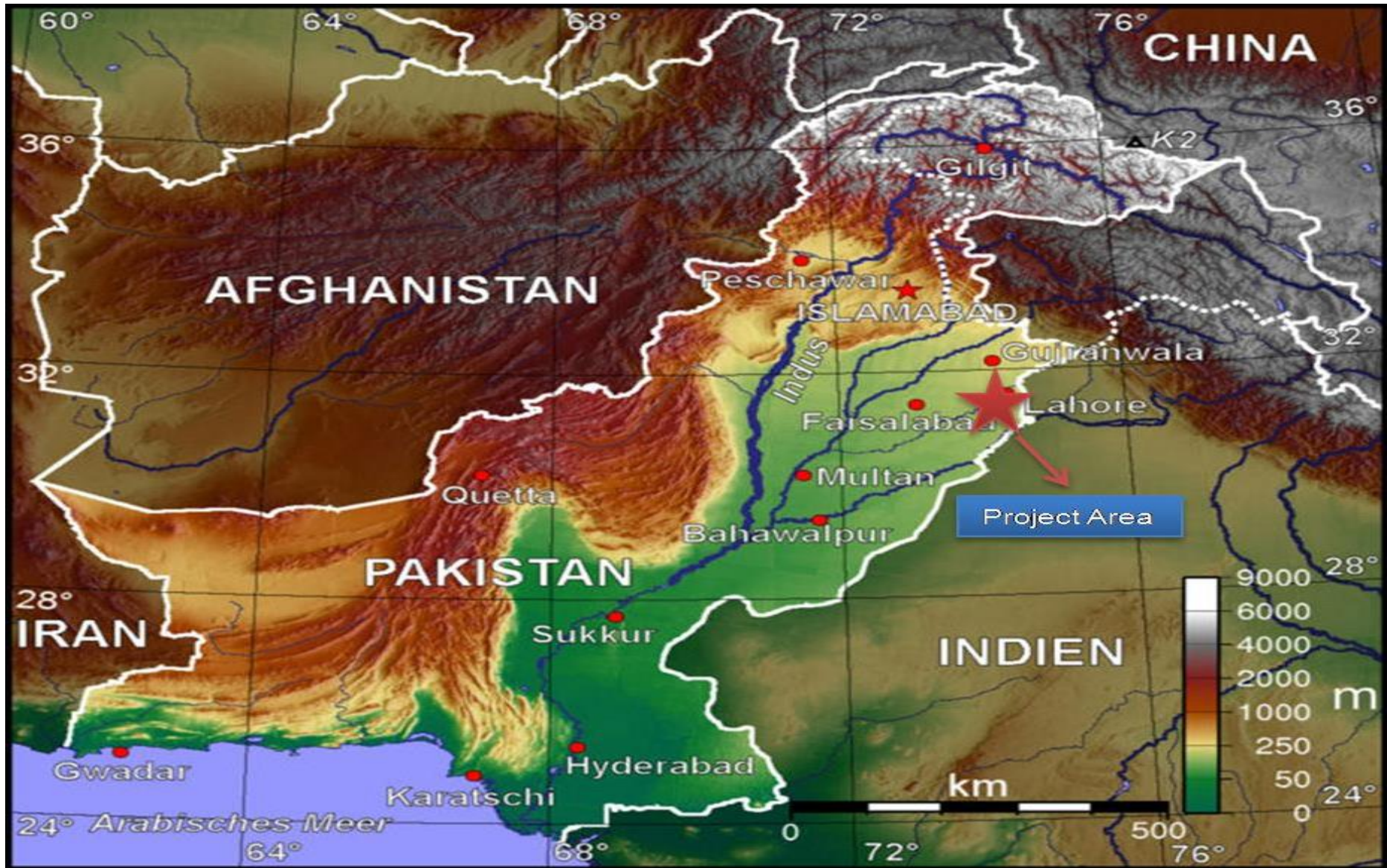
This chapter describes the baseline conditions, which cover the existing physical, ecological, and socio-economic environment of the Study Area. Information on these aspects has been derived from the desk study of available data, field visits to the project area as well as information obtained through visits to the Government departments and other agencies namely Health Department, Irrigation Department, Meteorological Department, Forest offices and prevailing environmental laws and environmental quality standards etc.

5.11 PHYSICAL RESOURCES

5.11.1 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 Sheikhpura.

Figure 6-1: Tropical Details



5.11.2 Soil

The soil is different in character and generally inclined to be dry. However, it is rich in potential plant nutrients. Rainfall is low and groundwater is saline and brackish at the shallow depth and irrigation is largely dependent on the canals. Tube wells have also been sunk to the greater depths in the Project Area where fresh water is available.

The chemical quality of groundwater in the district varies with depth. However, the sweet potable water is available in a belt five to twenty miles wide paralleling the Ravi River.

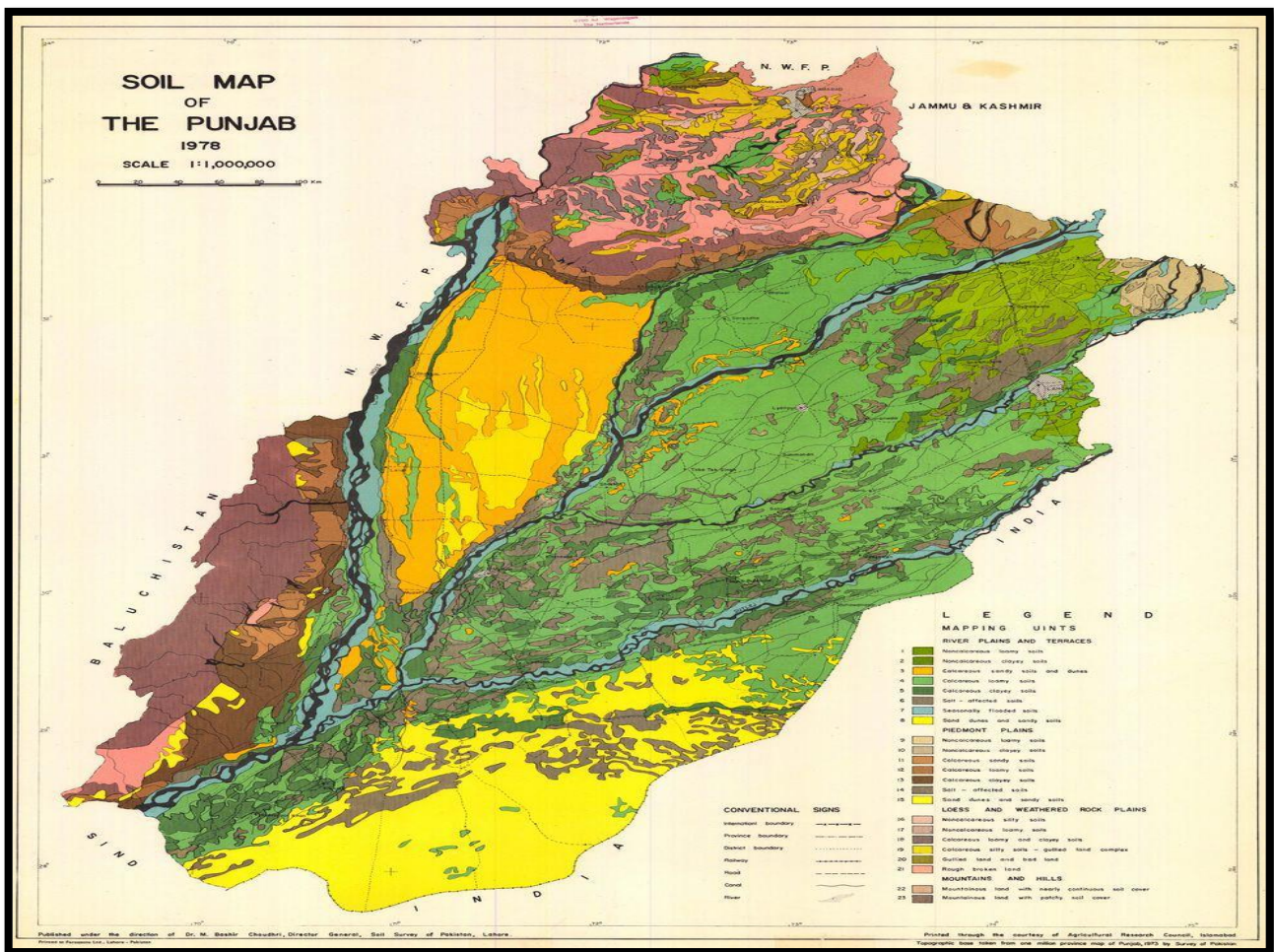


Figure 6-2 Soil map of Punjab

Alluvium is soil or sediments deposited by a river or other running water. Alluvium is typically made up of a variety of materials, including fine particles of silt and clay and larger particles of sand and gravel. A river is continually picking up and dropping solid particles of rock and soil from its bed throughout its length. Where the river flow is fast, more particles are picked up than dropped. Where the river flow is slow, more particles are dropped than picked up. Areas, where

more particles are dropped, are called alluvial or floodplains and the dropped particles are called alluvium.

5.12 CLIMATE AND METEOROLOGY

Seasonal climatic conditions must be considered for the design and execution of Project. The climate including air, temperature, precipitation, humidity, and evaporation is an influencing factor, affecting the construction of the plant and other 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 extreme climate: it has hot summer and cold winters. The summer starts from April and lasts till September. May, June, and July are the hottest months. The mean maximum and minimum temperature ranges from 40.4 °C and 27.3 °C respectively for these months.

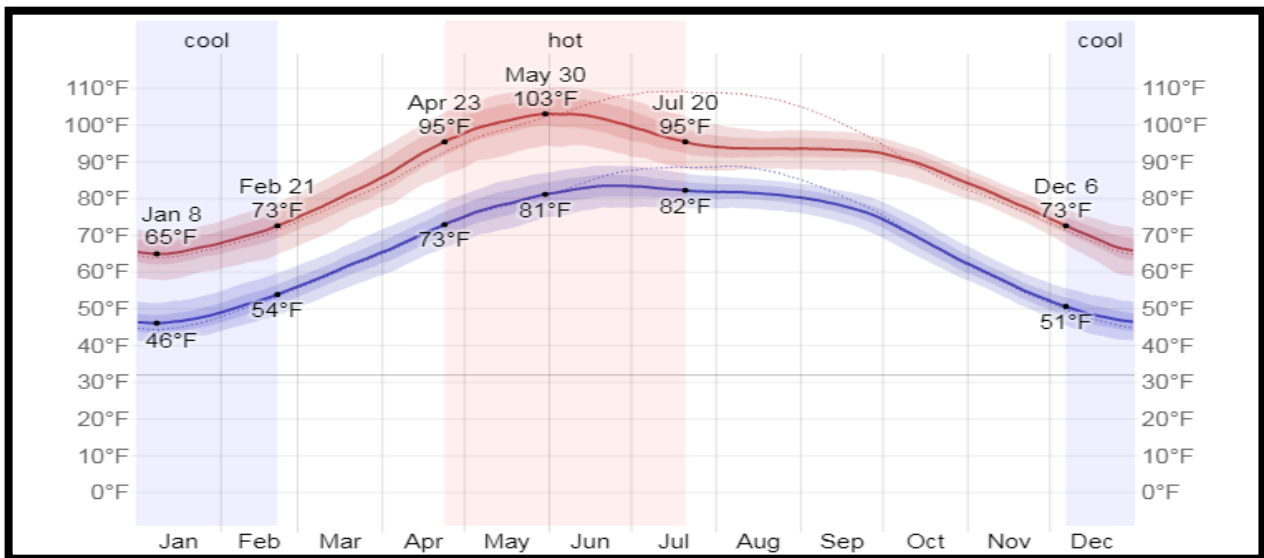


Figure 6-3 Temperature profile of Lahore

The winter seasons lasts from November to March. December, January, and February are the coldest months. The mean maximum and mean minimum temperature ranges from 19.8°C to 5.9°C in January. Temperatures in the Project Area vary from 5.9 °C to 40.4 °C.

Table 6.1 Meteorological and Climatic Features

Classification of Climate	Tropical (hot/humid)
Predominant Wind Direction	East/Northeast

Wind intensity	Weak to moderate
Average annual precipitation	>650 mm
Rainy season	July to September
Dry season	October to June
Average annual temperature	19-20 °C
Average summer temperature	36-38 °C
Average winter temperature	6.5-10.5 °C

Table 6.2 Average Monthly Temperature, Precipitation and Relative Humidity (2022)

Month	Mean Temperature		Precipitation (mm)	Average Relative Humidity (%)
	Maximum	Minimum		
January	18	8	100	72
February	24	11	31	60
March	28	15	39	54
April	37	22	62	40
May	39	26	50	37
June	37	26	176	54
July	36	27	200	68
August	35	27	184	69
September	35	25	50	63

October	34	22	0	56
November	24	13	19	72
December	22	9	31	63
Annual	30.8	17.8	666	78.34

5.12.1 Pre-Monsoon Season

Pre-monsoon refers to the period from April to June prior to the setting in of the monsoon. This is the hottest and the driest season, with persistent dry and hot winds. Daytime temperature rises to 40° C. The flows in the river begin to rise simultaneously due to snow-melt water in the high mountains. The water table falls to the maximum depth.

5.12.1.1 Monsoon Season

Monsoon is the main rainy period, which starts at the beginning of July, reaches its climax in August and gradually, subsides in September. High-intensity Rainfall causes soil erosion which is a function of erosivity and erodibility. The cool monsoon winds followed by heavy showers lower the temperature to great extent. The part of rain percolates into the soil and is conserved in the subsoil and part adds to the groundwater. The conserved moisture in the soils is generally sufficient to rejuvenate the vegetation. All plants grow rapidly and mature towards the end of the season. With the start of monsoon season, the rivers flow at their peak level. The groundwater level is improved toward the end of the season in September and October.

5.12.1.2 Post-Monsoon Season

Post monsoon season refers to autumn (October-November). The temperature starts falling but the extreme aridity prevents plants to flower early and sets seed toward mid-seasons. Groundwater level rises as a result of infiltration from rainfall.

5.12.1.3 Winter Season

Winter refers to the period from December to January. The lowest temperatures (< 20C) and cold winds characterize this season. The plants become dormant and most of them dry out. Most of the trees shed their leaves and few remain green or partly green. Sometimes this season becomes severe due to cold Siberian winds. Groundwater level declines in this season due to low flows in the rivers and no or little rains which usually fall in light showers causing little soil erosion.

5.12.1.4 Spring Season

Spring refers to the period from February to March. Temperatures become pleasant. The mean maximum temperature is 27°C with the highest precipitation of 41.2 mm and relative humidity of 57.6 percent. Some light showers of rain may also fall without generating runoff. The vegetation sprouts again because of conserved moisture from winter and spring rains, if any. The water table starts falling

5.13 SOLAR ELEVATION

Solar elevation over the year 2022, shown in the figure. The black lines are lines of constant solar elevation (the angle of the sun above the horizon, in degrees). The background color fills indicate the azimuth (the compass bearing) of the sun. The lightly tinted areas at the boundaries of the cardinal compass points indicate the implied intermediate directions (northeast, southeast, southwest, and northwest).

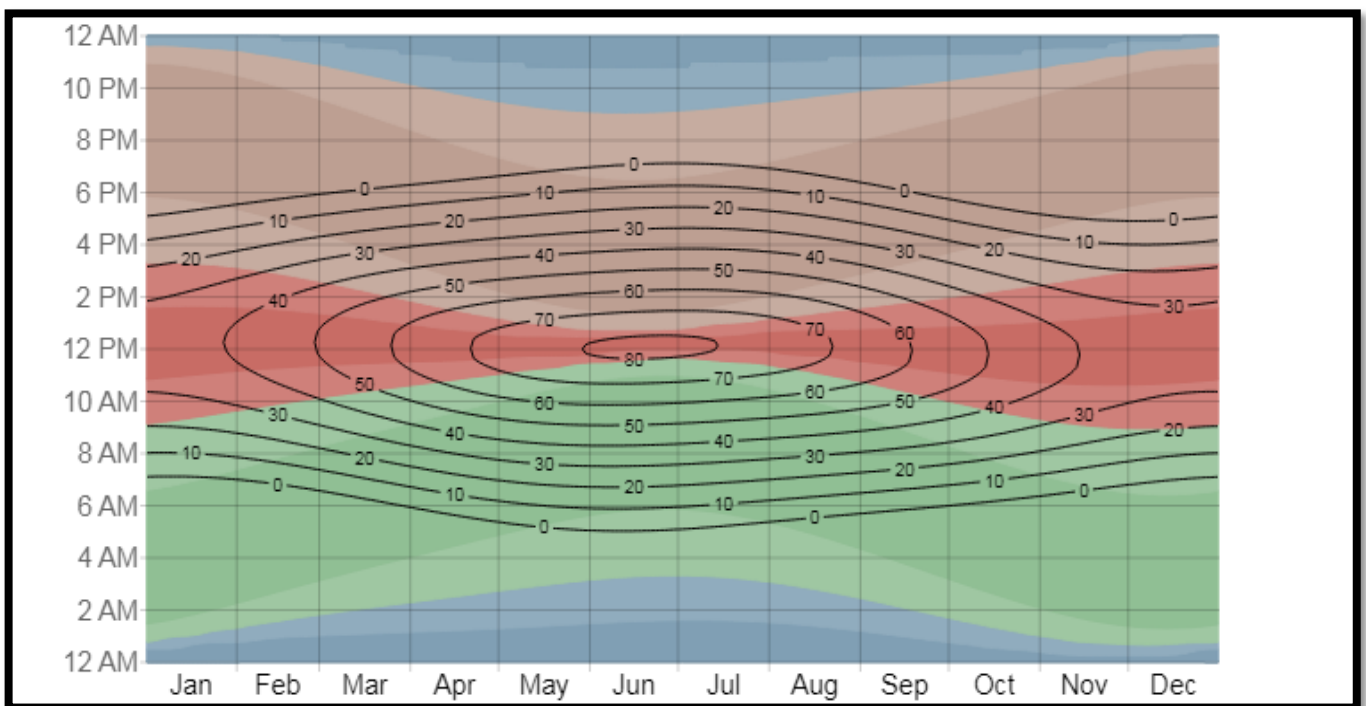


Figure 6-4 Solar Elevation Profile of Lahore

5.14 SURFACE WATER & GROUND WATER

5.14.1 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 “**Punjab**” 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.

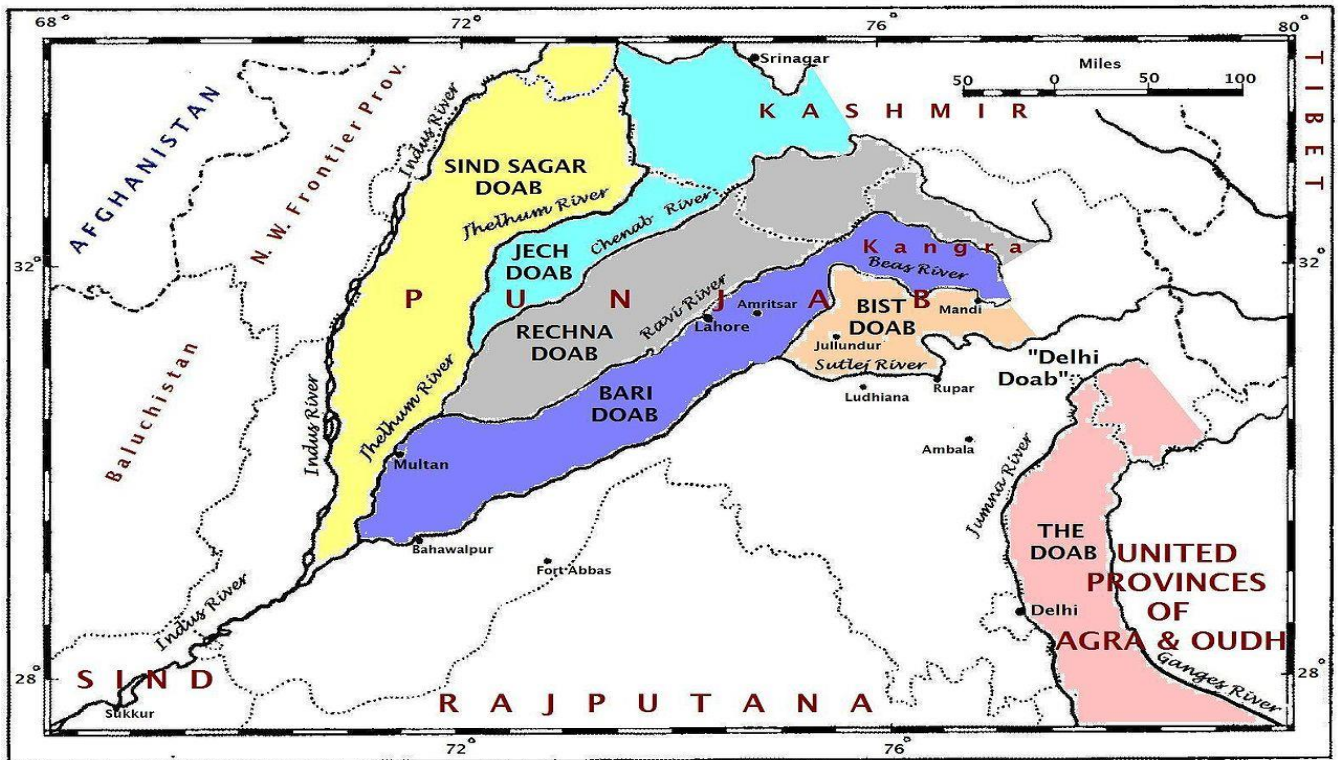


Figure 6-5 Watershed of Punjab

The only river passes from Lahore is Ravi River. The slope of the land in planned area is to the south-west, which directs the rivers to flow in this path. Average slope of the area is 0.32m/km.

The Ravi has a major contribution in glorious history of the study area. All the "historical assets" of Lahore, including but not limited to Lahore Fort, Badshahi Mosque and Kamran ki Baradari, were built adjacent to Ravi River.

As per the Indus basin treaty of 1960, six major rivers were divided among Pakistan and India. As per the treaty, the rights of Eastern Rivers (Sutlej, Bias and Ravi) were allocated to India, while the rights of Western Rivers (Chenab, Jehlum and Indus) were reserved with Pakistan. Since the Indus basin treaty, India has completed series of structures to store and divert water from upstream and use it for generation of electricity and irrigation. These interventions have put a stop to ecological and sustainable flows in these rivers, thereby depriving the downstream areas of Pakistan, including Lahore from naturally available water for irrigation. The Ravi allocated to India, still flows seasonally through the study area while Bias River have discontinued to flow.

Furthermore, the planned area has abundance of water in the form of groundwater aquifer. The aquifer of Lahore District is broadly viewed as a single contiguous, unconfined aquifer. The presence of alluvial soil, frequent flooding and excessive rains in this region for hundreds of years have enriched this aquifer with abundance of water.

5.14.2 Surface Water

No rivers exist in the vicinity; however, storm water drains cross the route for disposal into the Ravi River. Water from River Ravi, flowing on the northwestern side of the city of Lahore, is being used for other purposes other than drinking purposes. River Ravi receives almost all the municipal/ industrial wastes from the city of Lahore. The potential value as a recreational water body and breeding place for fish is threatened by the municipal and industrial pollution.

5.14.3 Groundwater

Groundwater quality is fresh (defined as acceptable in terms of its salinity). Raw water abstracted from the deep tube wells is believed to be essentially bacteria free. The status of quality of groundwater both in the country and Punjab Province is shown in fig. The water quality in the upper 50 meters' zone of the subsoil is generally brackish. For city's drinking purposes water is abstracted from groundwater aquifer by means of tube wells located throughout the city. The quality of water is generally adequate for direct consumption. About 83% of the city population is consuming groundwater for drinking purposes. Groundwater is available at a depth ranging between 15 to 23m below the natural surface level.

Water consumption varies significantly and its variation as of industrial units. Usual water consumption pattern for industrial units and data collected from the prospective industrialist will form the basis for total water demand.

According to Master Plan-2030 for the city of Lahore, the mean average decline in groundwater is about 2.03 feet per year. The water table contour map for the Year-2000 is exhibited in Exhibit 4.14. It is noted from the exhibit that groundwater is at a greater depth in the central part of the city where abstraction is more than the re-charge and close to surface waters i.e. Ravi River and Canal, the situation is in the reverse order.

5.15 AMBIENT AIR QUALITY

To ascertain the state of environment baseline environmental monitoring was carried out through EPCCD certified laboratory. The monitoring points were chosen to represent data from populated

areas or selected sensitive receptors near Akbar Chowk. Ambient Air Quality Monitoring reports are attached as Annexure-D.

5.16 NOISE LEVELS

Noise measurement was carried out at five locations around the Akbar Chowk to assess current noise condition. Noise measurement Report is attached as Annexure-D.

5.17 GEOLOGY

Geological history of Lahore along with that of the Punjab is linked with the uplift of Himalayas in the Tertiary times, where a subsiding through a fore deep was formed adjoining the mountains. The alluvium mostly derived from the Himalayan ranges has been deposited in the Punjab geosynclines by the present and the ancestral tributaries of the Indus river system. The exposed Lahore alluvial complex of Pleistocene and recent age represents the latest phase of sedimentation and subsidence. Nearly all the deposits underlying the city of Lahore and the surrounding area are the products of events that evolved during Pleistocene and recent geological times. The study of logs of boreholes and tubewells conducted in and around Lahore show that the alluvium consists principally of fine to medium sand, silt and clay. Associated with the fine grained strata are concretionary zones of nodules of Kankar and silty clay, occasionally containing beds of reddish and ferruginous material. Drilling data obtained from several deep wells shows the absence of thick horizons of clay within the alluvium. Clay lenses occur only locally and have little horizontal continuity. In 1961 bed rock (mica schist) was struck at 1,274 feet depth near Niaz Beg (Table 1) after which the drilling was abandoned by Water and Power Development Authority (WAPDA). In subsequent years drilling operations in and around Lahore did not exceed 800 feet depth. At present our knowledge of the deep geological formations underlying beneath the city of Lahore is incomplete.

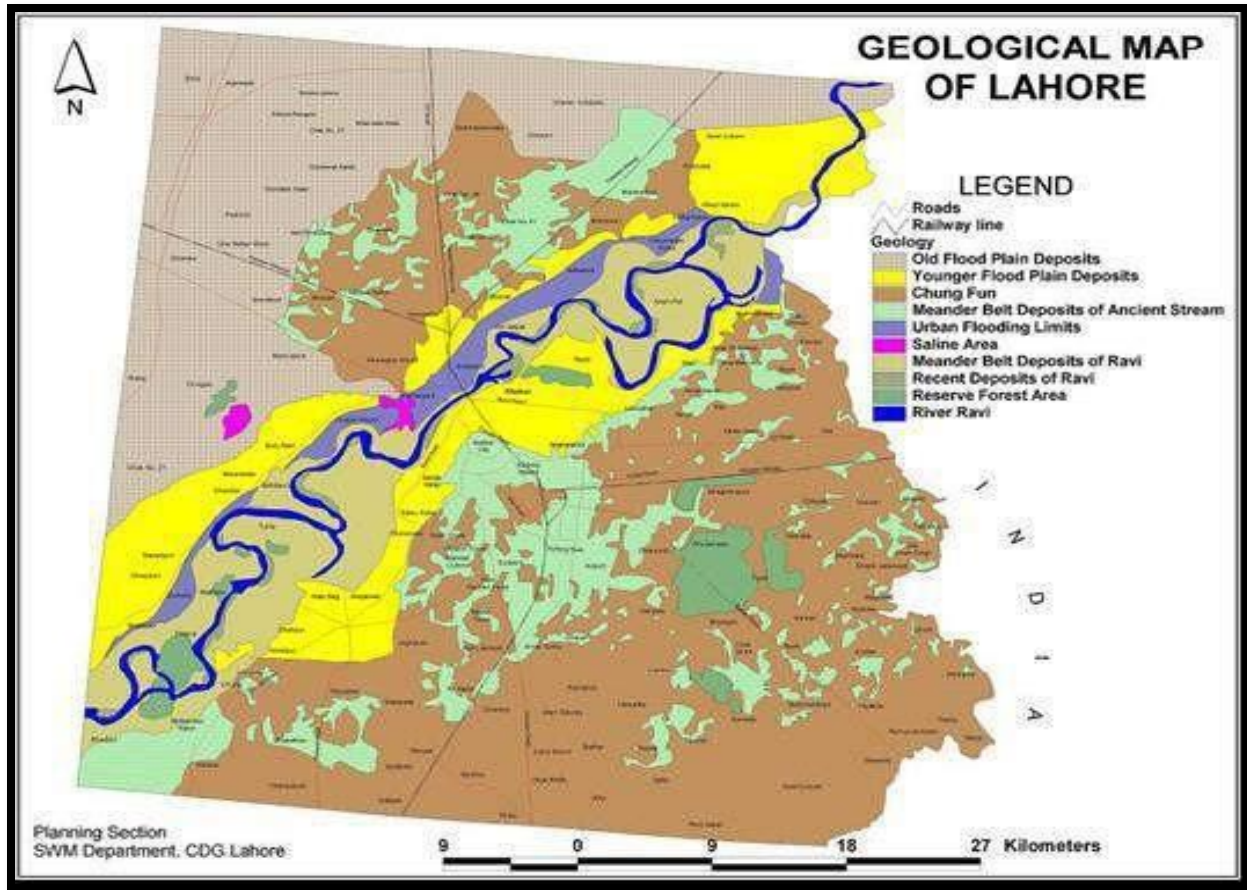


Figure 6-7 Geographical Map of Lahore

5.18 SEISMOLOGY

Pakistan Building Code distributes the country into 4-zones, fig. The project site falls in Low Hazard Zone with seismic factor ground acceleration $g/10$ or less, as such structural design of buildings and others will follow the applicable criteria for the zone. Seismic details are a very important consideration for any planning activity. As it directly lays impact on the construction of the site.

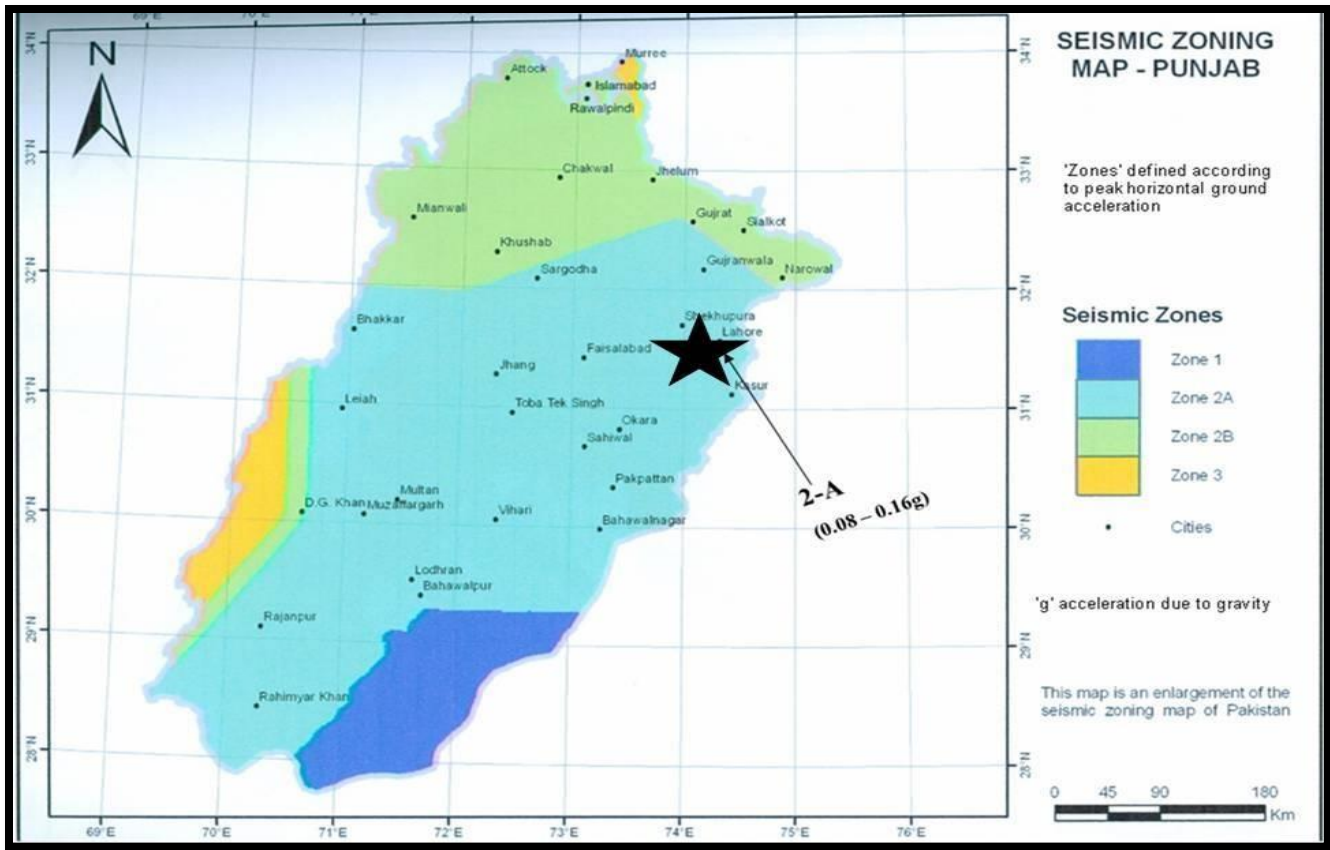


Figure 6-8 Seismic Zoning Map of Pakistan

5.18.1.1 Flooding

No surface drainage problems are foreseen as surface water can be disposed of in the existing primary and secondary drainage network including partly moving into the sewerage.

5.18.1.2 Water Logging and Salinity

There are no signs of water logging in the project site.

5.19 ECOLOGICAL RESOURCES

5.19.1 Marine and Aquatic Ecology

This is not applicable to the Project area.

5.19.2 Flora

Lahore the city of gardens is heart of Pakistan. The city has seen the heydays of the Mughals, Sikhs and the British; all left their footprints on the history and cultural mosaic of the city. Resultantly Lahore is a treasure-trove of monuments, historical relics and remains which these nations have left in this historical metropolis of Punjab.

Though an ancient city; over the years Lahore has considerably expanded. However, along these modern additions, the ancient monuments, old gardens, trees, graveyards and traditional bungalows having attached gardens, large expanses of lawn and old roadside trees some of them can still be seen, are gradually disappearing. These green areas and old endemic trees of Lahore are home to many resident bird species as well as many summer, winter and transit migrants. So, Lahore is also very important due to its ecological conditions.

Several types of floral species are present in Lahore, however, some of the principal trees, shrubs (plants) and herbs (ground covering plants) are given below, which illustrates their nomenclature including local names, English names and Botanical names.

Table 6-1 Inventory of Trees Present in Lahore District

Serial No.	Common Names	Botanical Names
1.	Arjun	<i>Terminalia arjuna</i>
2.	Dhak	<i>Butea frondosa</i>
3.	Mahwa	<i>Bassia latifolia</i>
4.	Bahara	<i>Terminalia bellerica</i>
5.	Amaltas	<i>Cassia fistula</i>
6.	Gul-e-nishter	<i>Erytrina subrosa</i>
7.	Putajan	<i>Putranjiva roxburgi</i>
8.	Gab	<i>Diospyores embryopteris</i>

9.	Berna	<i>Crateva religiosa</i>
10.	Khark	<i>Celtus australis</i>
11.	Putajan	<i>Putranjiva roxburgi</i>
12.	Fiddle wood/Kashmir Lagotis	<i>Eithrxylum ruberratum</i>
13.	Gul-e-mast	<i>Dalinia indica</i>
14.	Gul-e-mohr	<i>Poinciana regia</i>
15.	Alstonia	<i>Alstonia scholaris</i>
16.	Ashoke	<i>Saraca indica</i>
17.	Sheesham	<i>Dalbergia sisso</i>
18.	Alata	<i>Stercolia colorata</i>
19.	Kenair	<i>Nerium grandiflora</i>
20.	Weeping Willow	<i>Salix babylonica</i>
21.	Keekar	<i>Parkinsonia aculeata</i>
22.	Nilem	<i>Jacaranda mimosfolia</i>
23.	Kachnar	<i>Bauhinia purpurea</i>
24.	Molsary	<i>Mimosop elengi</i>
25.	Bel	<i>Aegle marmelos</i>
26.	Siris	<i>Albizia lebbek</i>
27.	Tun	<i>Cedrela toona</i>

28.	Jamin	<i>Eugenia jambolana</i>
29.	Moor pankh	<i>Thuja orientalis</i>
30.	Silkoak	<i>Grevillea robusta</i>
31.	Sufeda	<i>Eucalyptus citriodora</i>
32.	Peepal	<i>Ficus relegiosa</i>
33.	Simbal	<i>Hyacinthus orientalis</i>
34.	Berri	<i>Diospyros melanoxylon</i>
35.	Suk chain	<i>Pongamia glabra</i>
36.	Poplar	<i>Populus alba</i>
37.	Aam	<i>Mangifera indica</i>
38.	Shehtoot	<i>Morus alba</i>
39.	Peepal	<i>Ficus relegiosa</i>

Source: PHA, Lahore

5.19.3 Fauna

Common birds found in the area are crows and sparrows. Chirping birds are having their nests at the well-grown trees that are providing a natural habitat for the birds. Some squirrels, parrot, rats, weaver, sparrows are also found in the area. Different species of reptile and amphibians such as lizards and frogs are also found. Various bird species known to occur in the area include myna, bulbul, crow and sparrow.

5.19.4 Endangered Species

The endangered plant in Pakistan is the Elm i.e., *Ulmuswallichiana* which is not found here. No endangered species exist in the project area.

5.20 SOCIOECONOMIC ENVIRONMENT

Lying between 31°31'—08°41' N and 74°21'—18°76' E, Lahore is bounded on the north and west by the Sheikhpura District, on the east by Wagah, and on the south by Kasur District. The Ravi River flows on the northern side of Lahore. Lahore city covers a total land area of 404 square kilometers (156 sq mi) and is still growing. With a rich history dating back over a millennium, Lahore is a main cultural center of Punjab and one of the most densely populated cities in the world. The city of Lahore remains an economic, political, transportation, entertainment, and educational hub. It is referred to as the "Mughal City of Gardens" due to the historic presence of gardens in and around the city dating back to the Mughal period.

5.21 POLITICAL AND ADMINISTRATIVE SETUP

The project area falls in Lahore City of the Lahore District. District Co-ordination Officer is the highest ranked administrator of the district. For the collection of revenue and administration, the districts are subdivided into Tehsils. Local governments also administer the area through Union Councils and Tehsils. The total area of the district Lahore is 2,300 square kilometers.

5.22 ECONOMY AND INDUSTRIAL ACTIVITIES

As of 2008, the city's gross domestic product (GDP) by purchasing power parity (PPP) was estimated at \$40 billion with a projected average growth rate of 5.6 percent. This is at par with Pakistan's economic hub, Karachi, with Lahore (having half the population) fostering an economy that is 51% of the size of Karachi's (\$78 billion in 2008).

The contribution of Lahore to the national economy is supposed to be around 13.2%. As a whole, Punjab has \$115 billion economy making it first and to date only Pakistani Subdivision of economy more than \$100 billion at the rank 144.

Lahore's GDP is projected to be 102 billion\$ by the year 2025, with a slightly higher growth rate of 5.6% per annum, as compared to Karachi's 5.5%. Central to Lahore's economy is the Lahore Stock Exchange (LSE), Pakistan's second largest stock exchange.

Lahore has offices of several Pakistani government corporations including the Water and Power Development Authority (WAPDA) and Water and Sewage Authority (WASA). Food and restaurant businesses remain open all night. Lahore is the second largest financial hub of Pakistan

and has industrial areas including Kot Lakhpat and the new Sundar Industrial Estate (near Raiwand). Lahore's economic base is broad and varied.

Major industries include the manufacture of automobiles and motorcycles, Heavy machinery, railway coaches, home appliances, steel, telecommunications, information technology, chemicals, pharmaceuticals, computers, engineering, and construction material. A major industrial agglomeration with about 9,000 industrial units, Lahore has shifted in recent decades from manufacturing to service industries. Some 42% of its workforce is employed in finance, banking, real estate, community, cultural, and social services. The city is Pakistan's largest software producing Centre and hosts a growing computer-assembly industry. Arfa Software Technology Park in Lahore is the biggest and most advanced IT park in the country.

5.22.1 QUALITY OF LIFE

5.23 DEMOGRAPHIC CHARACTERISTICS OF THE PROJECT AREA

- The current metro area population of Lahore in 2022 is 13,542,000, a 3.41% increase from 2021.
- The metro area population of Lahore in 2021 was 13,095,000, a 3.58% increase from 2020.
- The metro area population of Lahore in 2020 was 12,642,000, a 3.72% increase from 2019.
- The metro area population of Lahore in 2019 was 12,188,000, a 3.83% increase from 2018

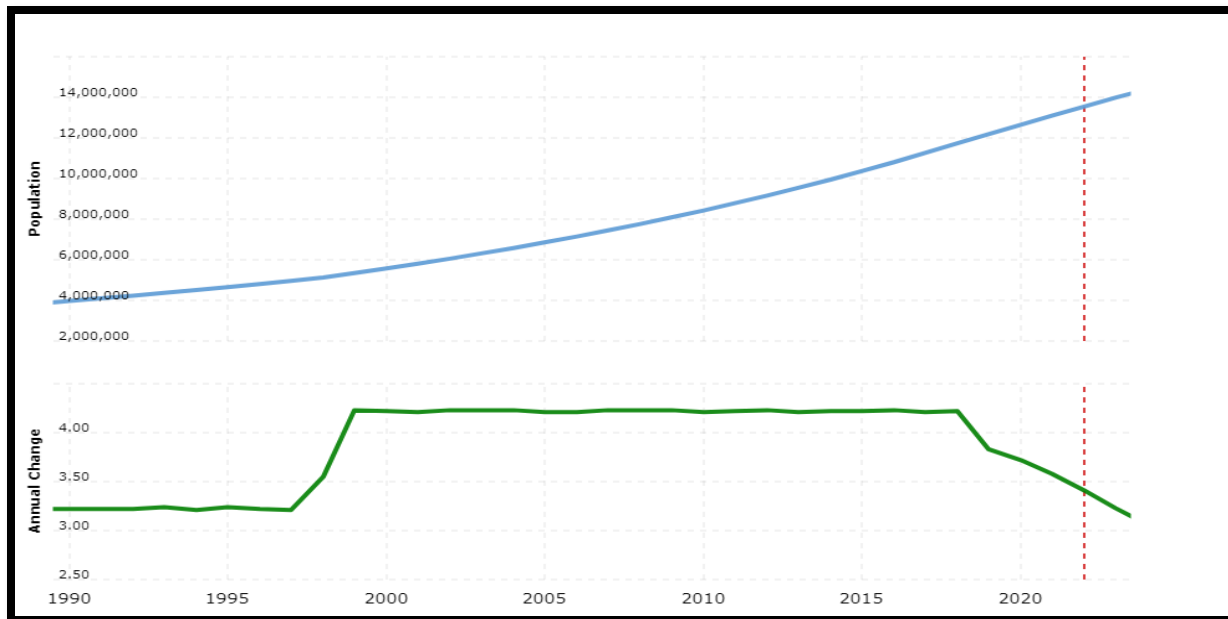


Figure 6-9 Graphical Representation of Intercensal Demographic Survey

Table 6-2 :Intercensal Demographic Survey

Year	Population	Annual Change
1990	3970000	3.22
1991	4098000	3.22
1992	4230000	3.22
1993	4367000	3.24
1994	4507000	3.21
1995	4653000	3.24
1996	4803000	3.22
1997	4957000	3.21
1998	5133000	3.55

1999	5350000	4.23
2000	5576000	4.22
2001	5811000	4.21
2002	6057000	4.23
2003	6313000	4.23
2004	6580000	4.23
2005	6857000	4.21
2006	7146000	4.21
2007	7448000	4.23
2008	7763000	4.23
2009	8091000	4.23
2010	8432000	4.21
2011	8788000	4.22
2012	9160000	4.23
2013	9546000	4.21
2014	9949000	4.22
2015	10369000	4.22
2016	10808000	4.23
2017	11263000	4.21
2018	11738000	4.22

2019	12188000	3.83
2020	12642000	3.72
2021	13095000	3.58
2022	13542000	3.41

5.23.1 Rural and Urban Distributions

The urban population was 5,209,088 or 82.4 percent of the total population of the Lahore district, which grew at an average rate of 3.3 percent during 1981-98. The growth decreased from 3.7 percent, which was observed during 1972-81. There are one Metropolitan Corporation, two Town Committees and one Cantonment in the District.

There were 261 Mauzas (the smallest revenue unit) in 1998. Of these 61 had a population over 5 thousand, another 61 had 2 to 5 thousand, 64 had one to two thousand, and 74 had under one thousand persons while one was uninhabited.

5.23.2 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.

5.23.3 Ethnic Structure

The main castes and groups of the Lahore district are Arain, Jat, Rajput, Malik, Pathan, Mughal, Sheikh, Kombh and Gujjar. Besides, there are also village artisans, which include Lohars (blacksmiths), Tarkhan (carpenter), Kumhars (potters), Mochis (cobblers), Machhis (water-carrier), barbers and weavers etc.

5.23.4 Mother Tongue

The mother tongue refers to the language used for communication between parents and their children in any household. Punjabi is the predominant language being spoken by the majority (86.2

percent) of the population of the district followed by Urdu, Pushto, and Siraiki being spoken by 10.2, 1.9, and 0.4 percent. Sindhi is spoken by 0.1 percent.

5.23.5 Institutions

Lahore is the metropolitan city and a hub of various educational, academic and flourishing government institutes. In the vicinity of the project, there are many educational institutions like Government College University, University of Veterinary and Animal Sciences, University of the Punjab, College for Women University, Forman Christian Collage, National College of Arts, King Edward Medical University, Kinnaird College for women, Shadbagh Girls College and many more renowned institutions.



Figure 6-10 Educational Institutes in Lahore

5.23.6 Transportation

The city of Lahore is one of the most accessible cities of the Punjab Province. In addition to the historic Grand Trunk Road (G.T. Road), a motorway (M- 2) was completed in 1997 from Lahore to Islamabad. The government has built underpasses to ease congestion and prevent traffic jams, and according to official figures, Lahore transportation services have improved to accommodate the growing number of visitors to the city. It is well connected by air to other countries as well as all major cities of Pakistan. Buses, trains, taxis, and rickshaws are the other means of transport available in Lahore.

5.23.7 Health Facilities

Ample medical and health facilities are available in the Lahore Metropolitan Corporation area and its suburbs. ShaukatKhanam Hospital is the latest addition to 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 coverage to the general public. 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. Services Hospital is the nearest health care facility that is present in the vicinity of the project.



Figure 6-11: Hospitals in Lahore

5.23.8 Architecture Style

The most common places of interest in Lahore city are discussed as following;

5.23.9 Royal Fort Lahore

Royal Fort Lahore/Shahi Qila is located at an eminence in the north-west corner of the Walled City. The Citadel is spread over an area of 50 acres. Many visitors from the foreign and local tours of different educational institutions come to see this historical place every year. The front gate of the Fort is called the Alamgiri Gate of the Royal Fort.

5.23.10 Minar-e-Pakistan

About 59.5 meters tall monument, called Minar-e-Pakistan is situated near the Royal Fort in the spacious Iqbal Park (previously known as Minto Park), where the historical resolution for the creation of Pakistan was adopted on the 23rd March, 1940. Around the minar, there are spacious parks with beautiful Cyprus trees and flowers all over.



Figure 6-12: Minar E Pakistan

5.23.11 Badshahi Mosque

The imperial or the Badshahi Mosque is across the courtyard from Alamgiri Gate of the Royal Fort. It has beautiful gateway and a courtyard that is said to be the largest mosque courtyard in the world for outdoor prayers.



Figure 6-13: Badshahi Mosque

5.23.12 Lahore Museum

Opposite the old Punjab University Hall, a Mughal style building on the Shahrah-e-Quaid-e-Azam, houses the Lahore Museum. The Museum contains some fine specimens of Mughal and Sikh doorways and wood work and has a big collection of paintings dating back to Indo-Pakistan, Mughal, Sikh and British times. It also has a collection of musical instruments, ancient jewelry, textile, pottery and armory. There are also relics from some Tibetan and Nepalese exhibits.



Figure 6-14: Lahore Museum

5.23.13 Shrine of Data Ganj Bakhsh

Close to the confluence of Lower mall and the Circular Road is the shrine of Data Sahib. Data Sahib was a great Sufi saint, which is well known work *Kashf-ul-Mahjub* has been translated from the original Persian version into Urdu and other several European languages and is considered a classic.



Figure 6-15: Shrine of Data Ganj Bakhsh

5.23.14 Shrine of Madhu Lal Hussain

This is the famous tomb in Lahore, where *Mela Chiraghan* is held on the last weekend of March and draws enormous crowds of devotees and others. The shrine is famous because of its antiquity and is revered by Muslims and Hindus alike.



Figure 6-16: Shrine Madhu Lal Hussain

5.24 RECREATIONAL/ENTERTAINMENT PLACES

5.24.1 Shalimar Garden

About 5 kilometers east of Lahore is the famous, Shalimar Garden laid out by the Mughal Emperor Shah-Jehan in 1642 A.D. The Garden is spread out in typical Mughal Style and surrounded by high walls with watched-towers at the four corners. It covers an area of about 42 acres. Many people from the entire city come to visit the park with their families at the weekend to spend their idle times.



Figure 6-17 Shalimar Garden

5.24.2 Jallo Park

The Jallo Park is 28 kilometers from Lahore and located on the Lahore Branch Canal. Covering an area of 450 acres, it has expanses of lawns, a forest research centre, a children's park, zoo, small museum and gift shop inside.

6 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

6.1 GENERAL

The importance of impact assessment in EIA cannot be overstated, as it serves as a fundamental tool for evaluating and understanding the potential effects of a proposed project on the environment. Impact assessment systematically identifies, predicts, and evaluates the anticipated positive and negative consequences of a project, considering various environmental aspects such as air and water quality, biodiversity, soil health, and community well-being. This process is pivotal in informed decision-making, enabling stakeholders to assess the trade-offs and make choices that balance development with environmental conservation. The impact assessment phase provides a comprehensive understanding of the project's potential impacts, allowing for the development of effective mitigation measures and strategies to minimize or eliminate adverse effects. Additionally, it fosters transparency and accountability by providing a basis for public consultation and engagement, ensuring that the concerns and perspectives of affected communities are considered. Overall, impact assessment in EIA is essential for promoting sustainable development practices, preventing environmental degradation, and fostering responsible and informed decision-making in the planning and execution of projects.

6.2 PROJECT AREA OF INFLUENCE

Before commencing the environmental analysis of the project, it is essential to define the specific area of influence. While the primary construction activities will be contained within predetermined boundaries, there are certain aspects where construction-related tasks may extend beyond these confines. These include

- Establishment of construction camps and erection of material grinding plants on temporarily acquired land
- Borrowing soil material from temporarily acquired land
- Quarrying aggregate material; and Construction of haul tracks for transportation of construction material, etc.

Environmental impacts have been identified within the Project Area of Influence; which lies within 0.5 km boundary of the proposed project site. Therefore, the identification of Project impacts and recommendations of mitigation measures will be limited within this area.

6.3 METHODOLOGY FOR IMPACT ASSESSMENT

In conducting the impact assessment for the project, a comprehensive methodology was adopted, encompassing both qualitative and quantitative assessments to provide a well-rounded understanding of potential effects. The qualitative assessment involved a systematic and in-depth analysis of the project's potential impacts on various environmental and social aspects. This included considering factors such as air and water quality, biodiversity, community health, and cultural heritage. Qualitative data, often derived from expert opinions, literature reviews, and consultations, were employed to evaluate the significance of these impacts. Simultaneously, a quantitative assessment was carried out to provide a numerical representation of specific parameters, allowing for a more precise measurement of the potential consequences. This involved data collection through field measurements, modeling, and statistical analyses to quantify environmental and social variables. The combination of qualitative and quantitative assessments ensured a holistic and rigorous evaluation, enabling a more nuanced understanding of the project's potential impacts and contributing to the formulation of effective mitigation strategies.

6.4 IMPACTS DURING CONSTRUCTION PHASE

The detailed risk Matrix of Construction phase is shown in the table.

Table 6-1 Screening of Possible impacts during Construction Phase

Potential Impacts	Likelihood (Certain, Likely, Unlikely, Rare)	Consequences (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)
Soil Erosion	Likely	Minor	Low
Land Contamination	Likely	Minor	Low

Soil Contamination	Likely	Minor	Low
Solid Waste	Likely	Minor	Low
Contractor Camp	Likely	Minor	Low
Ground Water	Likely	Minor	Low
Dust	Likely	Moderate	Low
Noise	Likely	Minor	Low

6.4.1 Land Contamination

The construction machinery, including cranes, trucks, loaders/dumpers, and batching plants, used during the construction period can release or spill lubricants, oil, chemicals, and toxic materials, contaminating the land. Paints used in the construction phase can also pose threats to both the environment and human health.

Mitigation Measures

Land contamination will be controlled by the following measures:

- Vehicles and other equipment will be maintained only in designated areas with concrete slabs.
- Prevent the release of contaminated effluent into the environment.
- Direct machinery wash and other potentially contaminated effluents will be drain to a mud pit.
- Proper Handling and storage of fuels, oils, and other hazardous substances according to standard safety practices, such as using secondary containment will be ensured.
- Fuel tanks will be properly labeled and have impervious linings and dykes.
- Leakages during fuel and oil transfer operations will be prevented.
- Checking of fuel, oil, and chemical storage daily for leaks will be ensured.

- Shovels, plastic bags, sandbags, and absorbent materials will be available near fuel and oil storage areas.
- Vehicles will be properly maintained to avoid spills.
- Maintain a leak/spill record for each vehicle.
- Control of soil contaminated by moderate spills or leaks (up to 200 liters) using shovels, sand, and mud.

6.4.2 Soil Erosion

Soil erosion may occur in the construction area due to improper runoff management from equipment washing yards and inadequate construction management practices. This impact is considered negative of minor magnitude.

Mitigation Measures

Soil erosion will be controlled by using good engineering practices especially both at construction site and peripheral area. Following measures should be taken to avoid soil erosion due to runoff water:

- Ensuring that surface run-off controls are implemented and maintained so as to minimize erosion.
- Main drainage courses within the proposed project development site will be lined to avoid erosion.
- Plantation of indigenous grass which will flourish under project site conditions. This should be done for low road embankments.

6.4.3 Soil Contamination

Soil contamination during the construction phase can occur from waste generated from construction camps, such as garbage, putrescible waste, rubbish, and residues; discarded construction materials, such as wires, plastics, cut pieces of pipes, pieces of empty fuel and lubricant tins, and cardboard packing materials; and paint, varnishes, and other hazardous

chemicals and toxic materials used in construction activities. This impact is considered negative of minor magnitude.

Mitigation Measures

- Oil, paint, and other chemical leakages will be controlled by storing these substances in special containers. Keep these containers away from unauthorized people and only allow authorized personnel to access them.
- Store other chemicals in adequate and appropriate places, depending on the type of material.
- Place safety equipment, such as fire extinguishers, near these storage areas, along with signs warning of danger and fire.
- Provide workers with Material Safety Data Sheets (MSDS) for each chemical, and take care when handling and storing these chemicals.
- Develop and implement a proper solid waste management plan to avoid waste problems.
- Collect solid waste by placing solid waste collection containers at various locations. Provide separate arrangements for organic and inorganic waste, and make workers aware of the solid waste management system in place at the site.

6.4.4 Impacts of Dust Emissions

Construction activities require machinery and equipment's such as transport vehicles, cranes, excavators, trucks for material excavation, dump/haul truck, etc. This machinery will generate air emissions that contain particulate matter (PM), smoke, dust, Carbon Monoxide (CO), and Oxides of Nitrogen (NO₂).

Mitigation Measures

- Vehicular emissions of NO_x, oxides of sulfur, PM, and CO will be controlled by tuning and maintaining vehicles in good working condition.
- Dust emissions will be controlled by regularly sprinkling water and covering trucks carrying earth, sand, aggregate, and other materials.

- Cover all trucks hauling soil, sand and other loose materials.
- Tuning of all equipment, generators, and vehicles used during the construction phase.
- Ensuring that concrete mixers meet the requirements of zero emissions.
- Daily sweeping (with water sweepers) of all paved access roads, parking areas and staging areas at construction sites.
- Minimizing dust emissions due to vehicular traffic by reducing speed, minimizing traffic through good traffic management, and sprinkling water when required.
- Minimizing dust emissions at construction sites by implementing best management practices.

6.4.5 Impact of Noise

Construction activities may increase noise levels at active construction sites. Noise impact on construction workers/ laborers may be avoided in case of loud noise by provision of adequate. This impact is considered negative of moderate magnitude.

Mitigation Measures

Following measures should be adopted to minimize the noise levels;

- Noise barriers (paneled fencing) will be installed where possible to keep the noise levels within permissible limits.
- While replacing equipment, quieter alternatives will be purchased. New equipment may introduce a noise problem; therefore, a noise assessment will be carried out while installing new piece of equipment.
- Contractor obligation will be to use appropriate and fit machinery.
- Noise analysis will be done every month during construction phase.

6.4.6 Impact of Solid Waste and Sewerage Generation

The contractor camp is expected to generate waste. Improper disposal of this waste can lead to both land and water contamination. To address this, storage and collection system will be provided. This impact is considered minor but negative.

Mitigation Measures

- Solid waste will be collected and segregated.
- Material suitable for recycling will be stored separately and will be handed to vendor.
- It will be ensured that the dumping area having construction waste will be leveled properly after disposal of waste material.

6.4.7 Safety Hazard

The construction phase poses unique safety hazards that require vigilant management to ensure the well-being of workers and the surrounding community. Common hazards include falls from heights, particularly for workers on scaffolding or rooftops, emphasizing the need for proper fall protection measures. Heavy machinery operation poses risks such as collisions and equipment malfunctions, necessitating strict safety protocols and training. Dust and debris generated during construction can lead to respiratory issues, emphasizing the importance of dust control measures and personal protective equipment. Excavation activities may pose risks of cave-ins, demanding proper shoring and trenching practices. Electrical hazards and inadequate signage can contribute to accidents. Construction sites must adhere to rigorous safety standards, enforce proper training for workers, and implement comprehensive safety plans to mitigate these hazards and ensure a secure working environment during the construction phase.

Mitigation Measures

- Enforcement and proper use of PPE by all construction workers.
- Provision of appropriate tools, equipment, and machinery in sound working conditions to employees.
- Proper arrangement of lighting to reduce accidents.

6.5 IMPACTS DURING OPERATIONAL PHASE

Table 6-2 Screening of Possible impacts during Operational Phase

Potential Impacts	Likelihood (Certain, Likely, Unlikely, Rare)	Consequences (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)
Noise	Likely	Minor	Low
Air Quality	Likely	Minor	Low
Solid Waste	Likely	Minor	Low
Safety Hazard	Likely	Moderate	Medium

6.5.1 Solid Waste

The generation of solid waste in the pharmaceutical industry has significant impacts on the environment and health. Pharmaceutical waste, particularly when improperly managed, can lead to the contamination of water sources, soils, and sediments with bioactive substances from expired or unused medications. This contamination poses risks to aquatic and terrestrial ecosystems, bioaccumulates in biota, and can potentially harm human health through food and water consumption.

Mitigation Measures

- Solid waste of empty drums and paper waste will be disposed of through a third party contractor.
- Kitchen waste of workers and other waste will be composed within the premises of the plant.
- Recycling, reusing, or safely disposing of pharmaceutical waste through authorized channels will be ensured.
- Regular monitoring, training employees on proper waste handling procedures, and conducting audits to ensure compliance with regulations.

6.5.2 Noise Pollution

Common sources of noise pollution in pharmaceutical units include the operation of machinery and equipment used in the formulation process, and other industrial machinery. Additionally, activities like, ventilation systems, and alarms from monitoring devices can contribute to elevated noise levels within pharmaceutical facilities, leading to noise pollution that can impact both workers and the surrounding environment

Mitigation Measures

- Proper maintenance of equipment and machinery.
- Enhanced management to reduce machinery noise and exhaust and its impact on the surrounding environment.
- Green belts around the project area, peripheral and internal areas

6.5.3 Air Pollution

The pharmaceutical industry has a significant impact on air pollution, contributing to the emission of greenhouse gases and other pollutants. Pharmaceutical companies generate carbon dioxide emissions. These emissions worsen air quality, leading to respiratory illnesses like asthma and other health issues. Additionally, air pollution in pharmaceutical labs poses health risks to workers and the public, emphasizing the importance of reducing air pollution in these facilities to protect human health

Mitigation Measures

- Various types of pollution control devices including ventilation fans (to vent out the Hot air), Fumes condensers.
- Vehicles and machinery will be regularly maintained and fitted with appropriate exhaust systems and devices.

6.5.4 Safety Hazard

Workers are also at risk of chemical hazards due to handling dangerous substances during manufacturing processes, requiring proper education, exposure time limitations, and safe disposal practices. Additionally, ergonomic hazards can arise from inadequate workplace design, impacting workers' movement and comfort, while physical hazards like cuts from sharp instruments and

burns from equipment pose risks that can be mitigated through worker education and adherence to safety protocols.

Mitigation Measures

- Prepare a manual for labor accident prevention including safety education and training
- Installing fire extinguishers in fire handling places
- Providing appropriate personal protective equipment (PPE)
- Conducting regular training on safe handling procedures
- Establishing containment measures to prevent exposure.
- For chemical hazards, measures include proper labeling of hazardous substances, ensuring adequate ventilation systems, limiting exposure time through job rotation, and implementing safe disposal practices to minimize risks.
- To address ergonomic hazards, ergonomic assessments of workstations should be conducted to optimize worker comfort and reduce strain, while physical hazards can be mitigated by providing safety equipment, training on equipment operation, and maintaining a clean and organized work environment to prevent accidents.

6.5.5 Socio-Economic Impacts

The Establishment of Pharmaceutical Unit can have numerous positive socio-economic impacts on a region.

- Firstly, it creates employment opportunities, supporting job growth and contributing to economic development within the community.
- Additionally, the presence of a Pharmaceutical unit can stimulate research and innovation, fostering collaborations with research institutions and universities, thereby enhancing the knowledge economy of the area.
- Moreover, the pharmaceutical industry's investment in research, manufacturing, and distribution functions can lead to increased local spending, infrastructure development, and indirect job creation in related sectors, further boosting the socio-economic landscape of the region.

6.6 POTENTIAL ENVIRONMENT MITIGATIONS

- A septic tank will be constructed during constructional phase to ensure wastewater treatment.

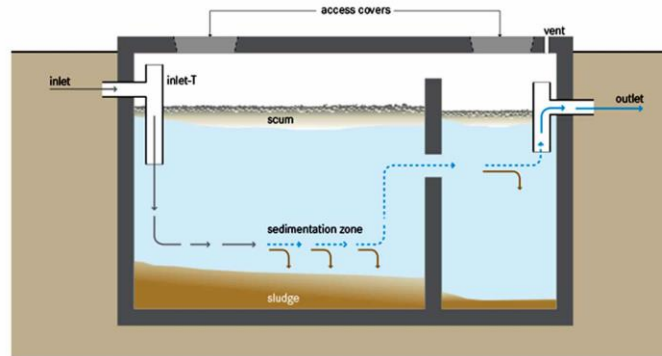


Figure 6-1Septic Tank Design

- A comprehensive tree plantation will be done.

7 ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM

An Environmental Management and Monitoring Program (EMMP) is a crucial component of an EIA because it serves as a systematic framework to ensure the effective implementation of mitigation measures and compliance with environmental regulations. The EIA process identifies potential environmental impacts of a proposed project, and the EMMP is designed to address and manage these impacts throughout the project's lifecycle. By establishing a comprehensive monitoring program, authorities can track the environmental performance of the project in real-time, allowing for timely identification and response to any unforeseen adverse effects. Additionally, the EMMP provides a mechanism for ongoing evaluation and adjustment of mitigation measures, contributing to adaptive management strategies. This proactive approach enhances environmental sustainability, helps prevent or minimize negative impacts, and fosters continuous improvement in environmental performance, thereby promoting responsible and sustainable development practices.

7.1 OBJECTIVES OF EMMP

The objectives of an Environmental Management Plan (EMP) in the context of a project or activity are multi-faceted, aiming to ensure the effective management and mitigation of environmental impacts. These objectives typically include:

- Ensure that the project adheres to local, national, and international environmental laws and regulations, thereby preventing any legal consequences and fostering a culture of environmental responsibility.
- Identify and implement measures to minimize or eliminate adverse environmental impacts associated with the project. This involves the prevention or reduction of pollution, habitat disruption, and other negative consequences.
- Promote the sustainable use of natural resources by incorporating practices that reduce resource consumption, promote recycling, and encourage the efficient use of energy and water.
- Safeguard and preserve biodiversity by implementing measures that prevent harm to ecosystems, habitats, and species. This may involve habitat restoration, conservation initiatives, and the protection of endangered species.

- Foster communication and collaboration with stakeholders, including local communities, NGOs, and governmental bodies, to ensure their concerns are considered and addressed. This contributes to transparency and the incorporation of diverse perspectives.
- Develop and implement strategies to respond effectively to environmental emergencies or accidents, such as spills or releases, to minimize the impact on the environment and human health.
- Establish a framework for ongoing monitoring, evaluation, and periodic review of the EMP to ensure its effectiveness. This includes adapting strategies as necessary to reflect changing conditions, emerging risks, and new information.
- Enhance the socio-economic well-being of local communities by considering their needs and providing opportunities for employment, training, or other community development initiatives.
- Raise awareness among project personnel and stakeholders about environmental issues, emphasizing the importance of responsible environmental stewardship and sustainable practices.
- Identify potential environmental risks associated with the project and develop strategies to manage and mitigate these risks effectively.

By addressing these objectives, an Environmental Management Plan contributes to the overall goal of achieving sustainable development while minimizing the environmental footprint of a project or activity.

7.2 INSTITUTIONAL CAPACITY

In the proposed monitoring and evaluation framework, the Project Proponent assumes a central role in overseeing the environmental aspects of the project. The Project Proponent will be responsible for the overarching Monitoring and Evaluation (M&E) process. This includes integrating environmental considerations into the main monthly reports of the project, emphasizing a holistic approach to project reporting.

To ensure a detailed and on-the-ground assessment of EMP implementation, the Project Proponent designates the Environment Consultant, who is part of the proponent's team. This consultant will be actively involved in field monitoring, observing the day-to-day activities related to

environmental management, and reporting findings to the Project Proponent. This approach ensures a real-time understanding of the project's environmental performance.

For a comprehensive evaluation at the conclusion of the project, an Environment Specialist from the Supervision Consultant will conduct a final assessment. This specialist will review the overall effectiveness of the EMP throughout the project's lifecycle, providing valuable insights into the long-term impact and sustainability of environmental management measures.

Recognizing the importance of external validation, the Project Proponent commits to engaging an independent agency for 3rd party validation of EMP implementation. This external entity, whether an NGO, an academic institute, or an individual consultant, will provide an unbiased and objective evaluation, adding credibility to the environmental performance assessment.

At the district level, the District Office of the Environmental Protection & Climate Change Department (EP&CCD) Lahore, will play a crucial role in monitoring the overall activity at the project site. This involvement ensures that the project aligns with regional environmental regulations and standards. The district-level monitoring adds an extra layer of oversight, promoting accountability and adherence to local environmental guidelines.

In summary, the proposed framework establishes a multi-tiered approach to environmental monitoring and evaluation. It leverages internal expertise, engages external validation for impartial assessments, involves EPA offices for regulatory compliance, and integrates findings into regular project reporting. This comprehensive strategy aims to ensure the effective implementation of the EMP, fostering environmental sustainability throughout the project's lifecycle.

7.3 SCHEDULE FOR IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT PLAN

The implementation stages of the project activity include:

1st Stage

The stage –1 comprises the onsite contouring studies and soil investigations and the finalization of the project designs.

2nd Stage

The stage –2 comprises the following task:

- 1) Laying of foundations excavation and commencement of erection work.
- 2) Shoring and piling
- 3) Start of civil, electrical and mechanical work.
- 4) Development of basic infrastructure.
- 5) Fitting of instrumentation.

3rd Stage

The stage –3 comprises the following task:

- 1) Civil structure erection completion.
- 2) Completion of the basic infrastructures water supply system, electricity supply etc.

4th Stage

The last stage will be the commencement of regular use.

7.4 SCOPE OF ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (EMP) outlines a comprehensive approach to identifying, evaluating, and addressing the environmental impacts of a specific project or activity. It provides a structured framework comprising strategies, procedures, and assigned responsibilities aimed at ensuring environmental sustainability and regulatory compliance throughout the project's lifecycle. Key components within this framework include the assessment of baseline environmental conditions, implementation of mitigation measures to reduce adverse effects, monitoring of critical environmental indicators, and development of protocols for emergency response and contingency planning. Additionally, the EMP extends its focus beyond the project site to encompass broader environmental considerations such as habitat conservation, waste management, energy efficiency, and pollution prevention. By encompassing these various elements, the EMP acts as a dynamic guide for integrating environmental factors into decision-making processes, facilitating ongoing improvement efforts, and safeguarding natural resources for the benefit of present and future generations.

7.5 ORGANOGRAM FOR IMPLEMENTATION ENVIRONMENTAL MANAGEMENT PLAN (EMP)

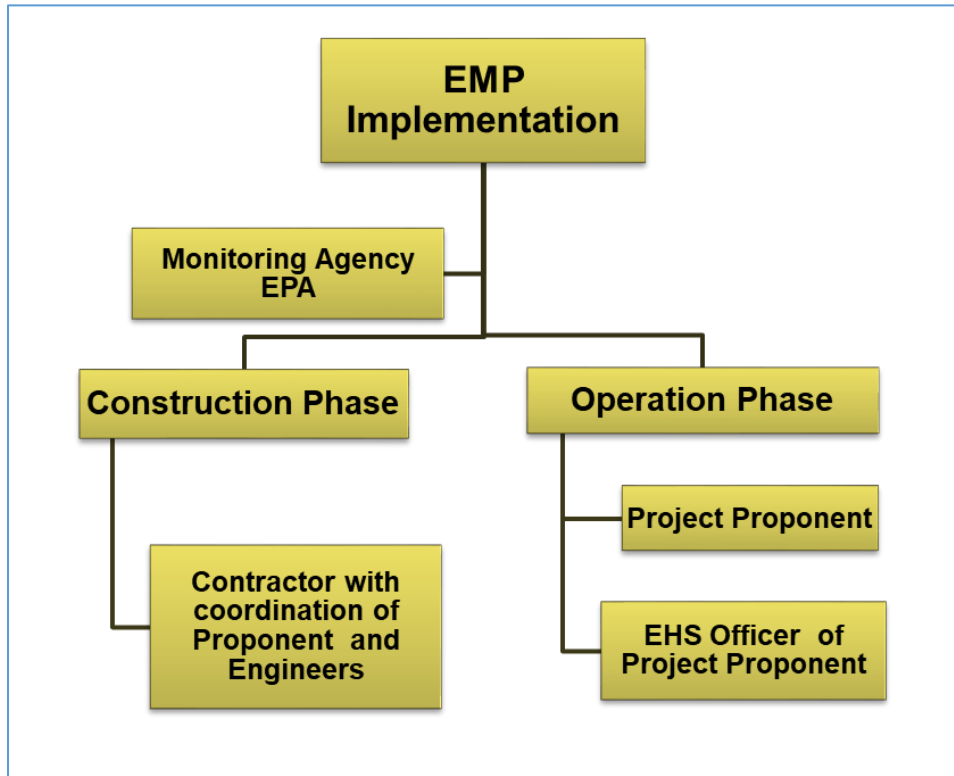


Figure 7-1 Implementation of EMP

7.5.1 CONSTRUCTION PHASE

The EMP outlines crucial management principles tailored for the construction phase of the project. This section meticulously details environmental actions, procedures, and associated responsibilities vital during the construction phase. These specifications are not merely recommendations but are integral components of the contract documentation. Consequently, the contractor is bound to adhere to these specifications with precision. The compliance requirement is stipulated to ensure that environmental considerations are seamlessly integrated into the construction process. The satisfaction of both the Project Manager and the Environmental Control Officer is paramount, as their endorsement signifies the contractor's fulfillment of contractual obligations. The EMP serves as a comprehensive guide, fostering a proactive approach to environmental management within the construction framework. By embedding these specifications in the contract documentation, the project emphasizes its commitment to responsible and sustainable construction practices, aligning with regulatory standards and ensuring that

environmental concerns are duly addressed throughout the construction phase. The coordination between the Project Manager and the Environmental Control Officer is pivotal, underscoring the importance of effective communication and collaboration in enforcing and overseeing the adherence to environmental specifications by the contractor.

7.5.2 OPERATIONAL PHASE

During the operational phase of a pharmaceutical unit, the EMP assumes a critical role in ensuring that manufacturing activities proceed in a manner that is both environmentally sustainable and compliant with regulatory standards. The scope of the EMP encompasses a range of strategies and measures aimed at minimizing environmental impacts while optimizing operational efficiency. This includes adherence to environmental regulations, efficient resource management practices, control of emissions and pollutants, effective waste management and pollution prevention strategies, conservation of water resources, implementation of energy-efficient technologies, monitoring of environmental performance indicators, and development of emergency preparedness and response protocols. By integrating these elements into its operational framework, the pharmaceutical unit can effectively mitigate environmental risks, reduce its environmental footprint, and demonstrate a commitment to environmental stewardship and sustainability.

7.6 MITIGATION PLAN FOR CONSTRUCTION AND OPERATION PHASE

Table 7-1 Environmental Management plan for Construction Phase

Project Component/ Impact	Mitigation/ Preventive Action	Responsibility	
		Implementation	Monitoring
Constructional Phase			
<p>Air quality</p> <p>Dust and particulate matter resulting from construction activities.</p> <p>Use of heavy machinery will produce dust emissions</p>	<p>Water sprinkling on regular basis will be ensured to limit pollution from dust and particulate matter.</p> <p>Proper maintenance and management of all the construction machinery and vehicles.</p> <p>Tree plantation will be done to reduce air pollution.</p>	During construction phase	Proponent and Contractor
<p>Water quality</p> <p>Run-off water from construction area.</p>	Use of impermeable sheets to avoid contamination of the groundwater/surface water.	During construction phase	Proponent and Contractor

Project Component/ Impact	Mitigation/ Preventive Action	Responsibility	
		Implementation	Monitoring
Inappropriate storage of constructional waste can cause leakages contaminating ground water.	Proper disposal of waste material on dumping sites.		
Waste Generation Construction waste will be produced from construction activities Domestic waste from workers camp	Conduct separate collection of construction and domestic waste to promote recycling and re-use. Proper disposal of waste to the authorized sites. The area to be leveled and contoured after disposing excess material. No waste or debris will be thrown in the nearest canal water or other water bodies.	During construction phase	Proponent and Contractor
Noise	The contractor will strictly follow the PEQS	During construction phase	Proponent and Contractor

Project Component/ Impact	Mitigation/ Preventive Action	Responsibility	
		Implementation	Monitoring
Noise caused by construction machinery and vehicles used for mobilization of construction equipment and workers.	<p>Proper maintenance of vehicles and construction equipment.</p> <p>Minimize/avoid unnecessary use of drills and other noisy machinery.</p> <p>Unloading of constructional material will be done during day time.</p> <p>The personal protective equipment (PPE) will be provided to the construction workers and its usage will be made mandatory</p>		
Soil Quality	<p>Chemical leakages will be controlled by storing these substances in special containers.</p> <p>Proper waste management will be ensured.</p>	During construction phase	Proponent and Contractor

Project Component/ Impact	Mitigation/ Preventive Action	Responsibility	
		Implementation	Monitoring
Materials Management	<p>Stockpiles shall not exceed a particulate height.</p> <p>Stockpiles maybe exposed to windy conditions or heavy rain, so they will be properly covered with plastic sheets.</p> <p>Stockpiles may further be protected by the construction of low brick walls around their bases.</p>	During construction phase	Proponent and Contractor
Workers Health & Safety	<p>Personal protective equipment will be provided to the workers.</p> <p>Provision of first aid box at work site to deal with emergency situation.</p> <p>Safety training to the workers.</p>	During Construction Phase	Proponent

Project Component/ Impact	Mitigation/ Preventive Action	Responsibility	
		Implementation	Monitoring
	<p>Adequate safety signs on site will be ensured.</p> <p>Provide training regarding proper handling and use of chemicals/ paints</p> <p>Install fire extinguishers at fire handling places.</p> <p>Inspection that lifting devices, such as cranes, are appropriate for expected loads.</p> <p>Stagnant water at the project site will be prohibited to avoid the dengue larva production.</p> <p>Continuous monitoring will be carried out to ensure that contractor is following safe working procedures and practices.</p>		

Project Component/ Impact	Mitigation/ Preventive Action	Responsibility	
		Implementation	Monitoring
Clearance of site from extra material and construction equipment	<p>Regular removal of extra materials from the site to avoid congestion at work place.</p> <p>Construction waste will be collected and disposed of separately from other waste.</p> <p>Careful handling of waste will be ensured.</p>	During Construction phase	Proponent and Contractor

Table 7-2 Environmental Management plan for Operational Phase

Project Component/ Impact	Mitigation/ Preventive Action	Responsibility	
		Implementation	Monitoring
Operational Phase			
Air Pollution	<ul style="list-style-type: none"> Various types of pollution control devices including ventilation fans (to vent out 	During Operational Phase	EHS officer

Project Component/ Impact	Mitigation/ Preventive Action	Responsibility	
		Implementation	Monitoring
	the Hot air), Fumes condensers. <ul style="list-style-type: none"> • Vehicles and machinery will be regularly maintained and fitted with appropriate exhaust systems and devices. 		
Noise Pollution	<ul style="list-style-type: none"> • Proper maintenance of equipment and machinery. • Enhanced management to reduce machinery noise and exhaust and its impact on the surrounding environment. • Green belts around the project area, peripheral and internal areas. 	During Operational Phase	EHS officer
Solid Waste	<ul style="list-style-type: none"> • Solid waste of empty drums and paper waste will be 	During Operational Phase	EHS officer

Project Component/ Impact	Mitigation/ Preventive Action	Responsibility	
		Implementation	Monitoring
	<p>disposed of through a third party contractor.</p> <ul style="list-style-type: none"> • Kitchen waste of workers and other waste will be compost within the premises of the plant. 		
Liquid Waste	<ul style="list-style-type: none"> • The formulation process in the pharmaceutical industry does not generate any industrial effluent. However, domestic wastewater will be treated using septic tanks and then discharged into a nearby drain, ensuring proper management of domestic waste. 		

Project Component/ Impact	Mitigation/ Preventive Action	Responsibility	
		Implementation	Monitoring
Work Safety	<ul style="list-style-type: none"> • Prepare a manual for labor accident prevention including safety education and training • Provide workers with appropriate protective equipment • Installing fire extinguishers in fire handling places • Developing fire-fighting organization and implementing fire drills 	During Operational Phase	EHS officer

7.7 ENVIRONMENTAL MANAGEMENT TEAM ALONG WITH THEIR ROLES AND RESPONSIBILITIES

The project proponent bears the responsibility for overseeing all the project activities. To cater to the varying requirements during operational phase, the proponent will hire personnel specifically dedicated to environmental management at the project site. This step is crucial to ensure the effective implementation and operations of the Environmental Management Plan (EMP).

Assigning the responsibilities to designated individuals is paramount to uphold accountability in the event of any oversight or mishap. Each appointed person will have specific duties outlined within the EMP. These responsibilities will be tailored to their roles, ensuring they are accountable for the successful execution of environmental protocols and procedures.

By delineating and assigning these responsibilities to individuals, the project proponent establishes a framework where each person understands their role and obligation within the broader context of environmental management. This structuring allows for a more efficient response to any environmental issue. This approach aims to create a clear chain of accountability, ensuring that the implementation of EMP is conducted diligently and that there are identifiable points of contact for any concerns or queries related to environmental management during the project's operational phase.

7.8 ENVIRONMENTAL MONITORING PROGRAM

An Environmental Monitoring Program (EMP) is a structured system designed to consistently observe, assess, and record the environmental conditions and impacts associated with the project. It involves systematic data collection related to air quality, water quality, soil conditions, and biodiversity. This collected data is analyzed to detect any deviations from the PEQs.

It also involves impact assessments, communication of findings to stakeholder, and adaptive management –making necessary adjustments to mitigate environmental risks and issues. The program's goal is to ensure sustainable environmental practices, minimize adverse impacts, and maintain compliance with set standards, contributing to better environmental management and long-term sustainability.

The objectives of the Environmental Monitoring Plan are given below;

- Detecting environmental changes to prevent and minimize potential negative impacts on the environment.
- Ensuring compliance with environmental laws, permits, and regulations by regular monitoring and reporting environmental parameters. This helps in meeting legal requirements and avoiding penalties or sanction.
- Assessing and managing potential risks to the environment caused by human activities. This involves evaluating the impact of these risks and implementing strategies to mitigate or manage them effectively.
- Monitoring and managing the use of natural resources such as water, air, soil, and biodiversity. The goal is to conserve these resources and maintain ecological balance.
- Assessing the impact of specific actions, projects, or processes on the environment to understand their consequences and make informed decisions regarding future actions.
- Using collected data to improve environmental performance, refine strategies, and adapt measures to achieve better outcomes over time.
- Establishing protocols and responses for emergencies or unexpected environmental incidents, ensuring a rapid and effective reaction to minimize damage.

Table 7-3 Environmental Monitoring

Sr. No.	Monitoring Parameters	Monitoring Mechanism	Frequency	Responsibility
DURING INSTALLATION				
1.	Dust Emissions	Ambient Particulate Matter Monitoring System.	Will be carried out on quarterly basis.	<ul style="list-style-type: none"> • Proponent • Site Supervisor
2.	Noise Levels	Noise meter	On quarterly basis by a third party	<ul style="list-style-type: none"> • Proponent • Site Supervisor

Sr. No.	Monitoring Parameters	Monitoring Mechanism	Frequency	Responsibility
3.	Gaseous Emissions	Emissions monitoring system. Monitoring of ambient air quality.	Will be carried out on quarterly basis.	<ul style="list-style-type: none"> • Proponent • Site Supervisor
4.	HSE Plan	Health, safety and Environmental will be monitored on daily basis	Daily	<ul style="list-style-type: none"> • Proponent • Site Supervisor
DURING OPERATION				
1.	Noise Levels	Noise meter	On quarterly basis by a third party	<ul style="list-style-type: none"> • Proponent • Project Manager
2.	Water Quality	Discrete grab sampling and laboratory testing of water samples.	As described by SMART	<ul style="list-style-type: none"> • Proponent • Project Manager
3.	Emissions	Emissions monitoring system. Monitoring of ambient air quality.	Will be carried out on quarterly basis.	<ul style="list-style-type: none"> • Proponent • Project Manager
4.	Security	Security arrangements will be made	Daily	<ul style="list-style-type: none"> • Proponent
5.	HSE Plan	Health, safety and Environmental will be monitored on daily basis	Daily	EHS officer of Project Proponent

Sr. No.	Monitoring Parameters	Monitoring Mechanism	Frequency	Responsibility
6.	Production Management	Production unit will be monitored on daily basis to control bacterial contamination of products.	Daily	<ul style="list-style-type: none"> • Proponent • Project Manager

7.9 ENVIRONMENTAL BUDGET

An environmental budget is essential in EIA as it provides a structured financial framework for the implementation of environmental management and mitigation measures identified during the assessment process. By allocating resources specifically to address environmental concerns, the budget ensures that adequate funds are available for the proper execution of mitigation strategies, monitoring activities, and other environmental protection measures throughout the project's lifecycle. This financial planning helps to integrate environmental considerations into the overall project budget, emphasizing the commitment to sustainable practices. The environmental budget serves as a tool for accountability, allowing stakeholders to track and assess the financial resources dedicated to environmental protection, thereby promoting transparency and responsible resource management in the pursuit of environmentally sustainable development.

Table 7-4 Environmental Budget

Environmental Component	Quantity	Approximate Cost (PKR)
(i) Tree Plantation	100	5000.0
(ii) Health and Safety Measures and Provision of PPEs	L.S.	8000.0
(iii) Air and Water Quality & Noise Monitoring	L.S.	3000.0
(iv) Environmental Trainings	L.S.	4000.0

Environmental Component	Quantity	Approximate Cost (PKR)
Total Environmental Management and Monitoring Cost		20,000

8 TREE PLANTATION PLAN

The incorporation of a tree plantation plan within an EIA is of paramount importance for several compelling reasons. Trees play a pivotal role in environmental sustainability, acting as natural carbon sinks, enhancing biodiversity, and mitigating the impacts of climate change. A well-designed tree plantation plan contributes significantly to offsetting carbon emissions associated with a project, thereby fostering a more balanced and ecologically friendly footprint. Beyond their role in carbon sequestration, trees contribute to soil stabilization, preventing erosion and promoting water retention. They also provide habitat for diverse wildlife, supporting biodiversity conservation. Moreover, trees contribute to the improvement of air quality by filtering pollutants and releasing oxygen, thereby enhancing the overall health and well-being of surrounding communities. Integrating a tree plantation plan into the EIA showcases a commitment to ecological stewardship and reflects a proactive approach toward environmental sustainability, aligning the project with broader conservation goals and community well-being.

8.1 OBJECTIVES OF TREE PLANTATION

The following objectives of tree plantation helps to clarify its basic purpose.

- Trees in urban areas provide shade and heat reduce heat, mitigation the urban heat island heat.
- Trees store carbon in their biomass, helping and reduce the atmospheric carbon dioxide levels.
- Trees contribute to visual appeal of urban and rural landscapes, making areas more attractive.
- Trees yield valuable resource such as timber, fruits, nuts, and medicinal plants.
- Trees plantations create employment opportunities for the people living in the vicinity of the project area.
- Trees act as a natural air filters by trapping airborne pollutants and particulate matter.
- Trees release oxygen during photosynthesis, improving air quality.

- Trees help maintain healthy watersheds, reducing the risk of floods and ensuring a consistent water supply.
- Trees help prevent soil erosion by anchoring soil with roots.
- Trees planted strategically can safeguard against landslides and protect roads and buildings.
- Trees absorb carbon dioxide and release oxygen, helping reduce greenhouse gas level and circumvent climate change.
- Trees can efficiently serve as windbreaks.

8.2 BENEFITS OF TREE PLANTATION

A well-executed tree plantation plan offers numerous advantages, covering all the environmental, economic and soil aspects. Some of the key benefits of tree plantation are enlisted below;

- Plants absorb carbon dioxide (CO₂) from the atmosphere and store this carbon in the biomass helping to circumvent climate change by reducing greenhouse gas emissions.
- Roots of the trees help to stabilize soil and prevent soil erosion.
- Trees act as a natural air filter, by trapping particulate matter which leads to healthier living environments.
- Trees can provide habitat and food residues to birds contributing to local biodiversity.
- Trees act as a natural buffer that helps to control and purify water entering into the streams and rivers reducing the risks for the contamination of water.
- Well-maintained tree plantation enhances the visual appeal of the landscapes, making area more attractive.
- Tree roots can improve soil quality by increasing its organic matter content and nutrient availability.

- Tree plantation contribute to climate resilience by moderating temperature extremes, reducing the risk of heatwaves, and providing shelter from extreme weather events.
- Trees can help to enhance the mental and physical well-being of the people living around the project area.

A well-designed tree plantation plan serves as a long-term investment in the environment and the future, as they continue to provide benefits for generations to come.

8.3 TREE CUTTING

The proposed land for the is identified as barren, non-agricultural terrain, eliminating the need for any tree cutting or uprooting during the construction phase.

8.4 AREA ENHANCEMENT PLAN

The tree plantation plan for the project area has been meticulously prepared, taking into consideration the specific characteristics and requirements of the project site. This strategic plan involves a thorough assessment of the area's ecosystem and aims to enhance environmental sustainability. The selection of tree species, their placement, and the overall design of the plantation plan are based on the best possible estimations derived from ecological studies and expert consultations.

It is important to note that the tree plantation plan is designed to be adaptable, allowing for modifications at the execution stage. This flexibility is essential to accommodate any unforeseen factors that may arise during implementation. It reflects a commitment to responsiveness and ensures that the tree plantation aligns seamlessly with the evolving needs and conditions of the project area.

The plan's adaptability is a proactive measure that acknowledges the dynamic nature of environmental conditions and the potential for unforeseen challenges. By remaining open to adjustments, the tree plantation plan demonstrates a commitment to optimizing its ecological impact and ensuring the long-term success of the afforestation efforts. This thoughtful and flexible approach not only reflects a commitment to environmental conservation but also underscores a dedication to continuous improvement and sustainable practices throughout the project's lifecycle.

8.5 TREES RECOMMENDED

Tree species are recommended for the plantation are the indigenous species.

Table 8-1 Recommended Trees

Sr. No.	Common Name	Scientific Name
1	<i>Dalbergia sissoo</i>	Shisham
2	<i>Acacia Arabica</i>	Kikar
3	<i>Albizzia lebbeck</i>	Siris



Figure 8-1 Recommended Trees

8.6 TREE PLANTATION COST

A budget for tree plantation and maintenance will be implemented. These funds will be utilized to cover the costs associated with procuring and planting trees, as well as sustaining their well-being through regular maintenance practices. This investment signifies a proactive approach to fostering a healthier and more aesthetically pleasing living environment, aligning with the community's long-term commitment to environmental stewardship.

9 OCCUPATIONAL HEALTH AND SAFETY PLAN

The Occupational Health and Safety (OHS) plan holds paramount importance within the framework of an EIA. This plan is a comprehensive document that outlines strategies and protocols to safeguard the well-being of workers involved in the project. Beyond the ethical imperative of ensuring a safe working environment, the OHS plan is integral to regulatory compliance and risk management. It identifies potential occupational hazards associated with the project, establishes preventive measures, and details emergency response procedures. By incorporating an OHS plan into the EIA, not only is the health and safety of the workforce prioritized, but it also contributes to the overall success and sustainability of the project. A well-executed OHS plan minimizes the likelihood of accidents, injuries, and occupational health issues, fostering a workplace culture that values the welfare of its personnel. In essence, the OHS plan, as part of the EIA process, aligns with responsible and ethical project management, ensuring that occupational health and safety considerations are seamlessly integrated into the project's design, implementation, and ongoing operations.

9.1 OBJECTIVES OF OHS PLAN

The Occupational Health and Safety (OHS) plan for any industry is designed to prioritize the well-being and safety of workers, contractors, and all individuals involved in the construction process. The primary objectives of an OHS plan during the construction phase include:

- Identify potential hazards and assess risks associated with the construction activities.
- Implement measures to eliminate or control hazards to prevent accidents and injuries.
- Ensure strict adherence to local and international safety regulations and standards.
- Stay updated on relevant legal requirements and ensure the project complies with all safety guidelines.
- Develop and communicate emergency response plans for various potential scenarios.
- Conduct regular drills to ensure all workers are familiar with emergency procedures.
- Implement measures to protect workers from exposure to hazardous substances, dust, noise, and other health risks.
- Provide necessary personal protective equipment (PPE) and ensure its proper use.
- Provide comprehensive safety training to all personnel involved in the construction phase.

- Ensure workers are aware of potential risks, safe work practices, and emergency procedures.
- Establish and enforce security measures to control access to the construction site.
- Prevent unauthorized entry and mitigate the risk of theft or vandalism.
- Conduct regular inspections to identify and rectify potential safety issues.
- Perform periodic safety audits to assess the overall effectiveness of the safety management system.
- Establish clear communication channels for reporting safety concerns and incidents. Ensure timely reporting and investigation of accidents or near misses.
- Collaborate with contractors and subcontractors to align safety procedures and expectations.
- Ensure that all entities working on the construction site adhere to the established safety standards.
- Establish a feedback loop for continuous improvement of safety measures.
- Review incidents, identify lessons learned, and implement changes to enhance safety.

By focusing on these objectives, an OHS plan for the construction phase aims to create a safe and healthy work environment, prevent accidents, and ensure regulatory compliance throughout the construction process.

9.2 PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment (PPE) plays a crucial role in a project, serving as a fundamental component of occupational health and safety measures. The importance of PPE in construction cannot be overstated, and here are several key reasons why it is essential:

- PPE is designed to protect workers from potential hazards and risks present in the construction environment, such as falling objects, electrical shocks, noise, and exposure to harmful substances.
- PPE serves as a barrier against injuries and accidents, reducing the likelihood of physical harm. Items like hard hats, safety glasses, and steel-toed boots are examples of PPE that prevent injuries from falling objects and impacts.

- Many occupational health and safety regulations mandate the use of specific PPE in construction settings. Adhering to these regulations ensures legal compliance and helps avoid penalties.
- Construction sites often involve various hazards, such as dust, chemicals, and noise. PPE, including respirators, gloves, and ear protection, helps mitigate these hazards, safeguarding the health of workers.
- The use of PPE reinforces a safety culture within the construction industry. It encourages workers to adopt safe work practices, as they are more likely to be mindful of potential risks and take precautions when equipped with the necessary protective gear.
- PPE minimizes the risk of injuries and illnesses, which can result in reduced downtime, worker compensation claims, and associated costs. This, in turn, contributes to the overall efficiency and productivity of the construction project.
- In emergency situations, such as fires or chemical spills, PPE can be crucial in providing immediate protection to workers while they evacuate or address the emergency. For example, flame-resistant clothing can be vital in fire-related incidents.
- PPE safeguards workers from long-term health issues caused by prolonged exposure to construction-related hazards. This includes protection from respiratory issues, skin disorders, and hearing loss.
- PPE is particularly essential when working in environments with high-risk factors, such as confined spaces, heights, or areas with heavy machinery. Helmets, fall protection equipment, and safety harnesses are critical in these situations.

Providing appropriate PPE demonstrates an employer's commitment to the well-being of their workforce. This, in turn, fosters a positive work environment, enhances employee morale, and contributes to higher job satisfaction.

9.3 PPE REQUIRED FOR CONSTRUCTION PHASE

During the construction of a project, a comprehensive set of Personal Protective Equipment (PPE) is necessary to safeguard the health and safety of workers involved in various tasks. The specific PPE requirements may vary based on the nature of construction activities, potential hazards, and regulatory standards. Here is a general list of PPE commonly required during construction:

Head Protection: Hard hats to protect against falling objects, impact, or head injuries.

Eye and Face Protection: Safety glasses or goggles to shield the eyes from dust, debris, or other airborne particles. Face shields for additional protection during tasks with a higher risk of facial exposure.

Hearing Protection: Earplugs or earmuffs to reduce exposure to loud noises, especially in areas with heavy machinery or construction equipment.

Respiratory Protection: Dust masks or respirators to protect against inhalation of dust, particulates, or hazardous substances.

Hand Protection: Safety gloves appropriate for the specific tasks, such as cut-resistant gloves, leather gloves, or chemical-resistant gloves.

Body Protection: High-visibility vests or clothing to enhance visibility, especially in areas with moving equipment. Reflective clothing for nighttime or low-visibility construction activities. Protective clothing, such as coveralls, for tasks involving exposure to hazardous substances.

Foot Protection: Steel-toed safety boots or shoes to protect against crushing injuries, falling objects, or punctures.

Fall Protection: Safety harnesses, lanyards, and other fall protection systems for workers operating at heights or in elevated areas.

Hand and Arm Protection: Elbow and knee pads for tasks that involve kneeling or crawling. Wrist support or braces for tasks with repetitive motions.

Weather Protection: Weather-appropriate clothing, such as rain gear, insulated clothing, or sunscreen, depending on the climate and weather conditions.

First Aid Kit: Access to a well-equipped first aid kit to provide immediate care for minor injuries.

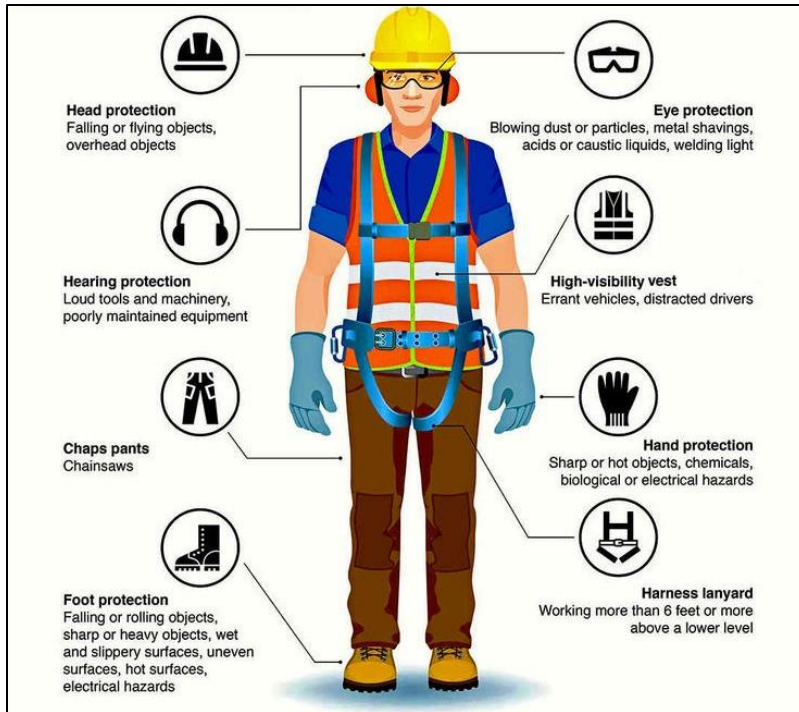


Figure 9-1 PPEs for Construction Phase

It is essential for the construction project management to conduct a thorough hazard assessment to identify the specific risks associated with each construction activity and determine the appropriate PPE for the workers involved. Regular training, monitoring, and enforcement of PPE usage contribute to a safer construction environment.

9.4 SAFETY SIGNS DURING CONSTRUCTION PHASE

Safety signs serve as critical elements in maintaining a secure and hazard-free environment at construction sites. Their importance lies in their ability to effectively communicate potential risks and hazards to workers, visitors, and contractors. By providing clear information about safety procedures, required personal protective equipment, and safe work practices, these signs play a pivotal role in preventing accidents and injuries. Moreover, safety signs contribute to regulatory compliance, ensuring adherence to local regulations and occupational health and safety standards. They also serve as essential tools for emergency response by indicating the location of emergency exits, first aid stations, fire extinguishers, and other emergency equipment. In addition to their role in risk reduction, safety signs assist in site navigation, guiding individuals to specific areas and enhancing overall organization. Beyond practical benefits, safety signs contribute to fostering a

culture of safety awareness among the workforce. They communicate important safety policies, promote compliance with site-specific regulations, and reduce the project's liability by showcasing a commitment to responsible construction practices. Ultimately, safety signs are integral components in creating a safe, compliant, and organized construction site conducive to the well-being of all involved parties.



Figure 9-2 Safety signs for Constructional Phase

9.5 SAFETY SIGNS

Fire safety signs play a pivotal role in enhancing safety protocols within a pharmaceutical industry setting. These signs serve as visual cues that communicate critical information regarding fire hazards, emergency procedures, and the location of firefighting equipment to employees, visitors, and emergency responders. In a pharmaceutical facility where the presence of flammable materials, chemicals, and intricate machinery increases the risk of fire incidents, clear and prominent fire safety signs are essential for ensuring swift and effective responses in emergency situations.

Firstly, fire safety signs help to identify the location of fire exits, emergency evacuation routes, and assembly points, enabling individuals to evacuate the premises safely and

efficiently in the event of a fire. This is particularly important in pharmaceutical facilities where the layout may be complex, and unfamiliar visitors or new employees need clear guidance during emergencies.

Secondly, fire safety signs indicate the location of fire extinguishers, fire alarms, fire blankets, and other firefighting equipment, facilitating quick access for personnel trained in fire response procedures. By promptly locating and using these resources, individuals can suppress small fires before they escalate, minimizing damage and potentially preventing injuries or loss of life.

Furthermore, fire safety signs often include warnings about specific fire hazards, such as flammable materials storage areas or chemical spill risks. These warnings serve as reminders to handle hazardous substances with care and to adhere to safety protocols to prevent fire incidents.

Overall, fire safety signs in a pharmaceutical industry not only promote awareness of fire hazards and emergency procedures but also contribute significantly to the overall safety culture of the facility. By ensuring that fire safety signs are clearly visible, well-maintained, and regularly updated to reflect any changes in the facility layout or procedures, pharmaceutical companies can enhance fire prevention measures and better protect the well-being of their employees and assets.

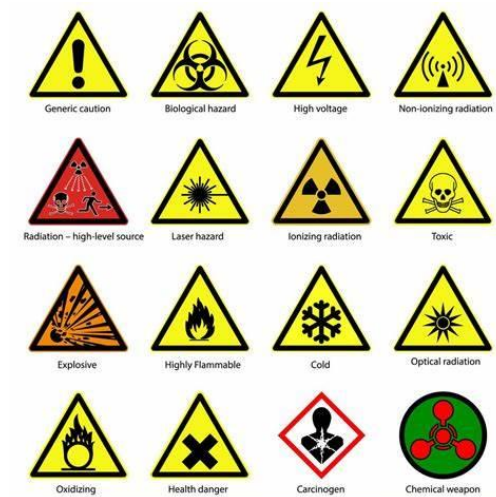


Figure 9-3 Safety Signs

9.6 FIRE SAFETY

Fire extinguishers play a critical role in maintaining safety within a pharmaceutical industry setting. Given the presence of various flammable materials, such as solvents, chemicals, and packaging materials, as well as electrical equipment and machinery, the risk of fire in pharmaceutical facilities is considerable. In the event of a fire outbreak, rapid response is paramount to prevent the escalation of flames and minimize damage to property, equipment, and most importantly, to safeguard the lives of employees. Fire extinguishers provide a first line of defense, allowing trained personnel to quickly suppress small fires before they spread uncontrollably. Moreover, having strategically placed fire extinguishers throughout the facility ensures accessibility and readiness in emergency situations. Regular maintenance and inspection of fire extinguishers further enhance their effectiveness, ensuring they are in proper working condition when needed. Ultimately, the presence of functional fire extinguishers serves as a crucial component of the pharmaceutical industry's overall fire safety strategy, contributing to a safer work environment and mitigating the potential impact of fire-related incidents.



Figure 9-4 Fire Extinguishers

9.7 PPES DURING OPERATIONAL PHASE

In the pharmaceutical industry, PPE is essential to ensure the safety and well-being of workers involved in various processes. Here are some of the key PPE required in the pharmaceutical industry:

Lab Coats: Lab coats provide protection against chemical spills, splashes, and contamination during laboratory work, ensuring the integrity of experiments and preventing exposure to hazardous substances.

Safety Glasses/Goggles: Safety glasses or goggles shield the eyes from potential hazards such as chemical splashes, flying particles, or liquid droplets, safeguarding against eye injuries in laboratory or manufacturing environments.

Disposable Gloves: Disposable gloves are crucial for preventing cross-contamination and protecting hands from exposure to chemicals, biological agents, and pharmaceutical ingredients during handling, processing, and packaging activities.

Respiratory Protection: Respiratory protection, including masks or respirators, is necessary when working with airborne contaminants, particulates, or hazardous fumes to maintain respiratory health and prevent inhalation of harmful substances.

Face Shields: Face shields provide additional protection for the face and neck against splashes, sprays, or flying debris, particularly during tasks that pose a higher risk of exposure to hazardous materials.

Protective Clothing: Protective clothing, such as coveralls or aprons, offers full-body coverage to shield against chemical spills, contamination, or exposure to potentially harmful substances during manufacturing, cleaning, or maintenance tasks.

Footwear: Chemical-resistant or closed-toe footwear with non-slip soles is essential to protect against spills, punctures, and foot injuries in pharmaceutical manufacturing facilities.

Hearing Protection: In environments where noise levels exceed safe limits, hearing protection such as earplugs or earmuffs helps prevent hearing damage and maintain auditory health among workers.

Hair Nets/Bonnets: Hair nets or bonnets prevent contamination from hair and scalp particles, ensuring product purity and compliance with hygiene standards in pharmaceutical production areas.

Safety Shower/Eye Wash Stations: Emergency safety showers and eye wash stations should be readily available in case of accidental exposure to hazardous chemicals or substances, providing immediate decontamination to minimize injury or adverse health effects.



Figure 9-5PPEs during Operational Phase

10 STAKEHOLDER CONSULTATION

Stakeholder consultation is of paramount importance in the EIA process as it facilitates inclusive decision-making, fosters transparency, and enhances the overall quality of the assessment. Involving stakeholders, including local communities, governmental bodies, non-governmental organizations, and affected parties, ensures that diverse perspectives, concerns, and local knowledge are taken into account. This inclusive approach contributes to the identification of potential environmental and social impacts that might not be evident from a solely technical or regulatory standpoint. Stakeholder consultation is a way to involve both the primary and secondary stakeholders in making decisions about the project. Stakeholder engagement builds trust, allows for the exchange of valuable information, and empowers communities by giving them a voice in the decision-making process. Moreover, it helps to align the project with the needs and expectations of the local population, minimizing conflicts and fostering a sense of shared responsibility for environmental stewardship. In essence, stakeholder consultation transforms the EIA into a more robust and credible tool, enhancing the sustainability and social acceptance of proposed projects.

10.1 OBJECTIVES OF STAKEHOLDER CONSULTATION

In 1992, the United Nations Conference on the Environment and Development (UNCED) supported the idea of involving the public in decision-making, and this was outlined in one of the key documents of the conference called Agenda 21.

Agenda 21 is a comprehensive plan for global actions focused on sustainable development and deals with how people interact with the environment. It highlights the importance of including the public in making decisions about the environment to achieve sustainable development.

The objectives of stakeholder consultation in the context of EIA are multi-faceted, aiming to foster meaningful engagement, inclusivity, and informed decision-making. Some key objectives include:

- Ensure the inclusion of diverse stakeholder perspectives in the decision-making process, promoting a more comprehensive understanding of potential environmental and social impacts.

- Provide a platform for stakeholders to express their concerns, values, and local knowledge related to the project, contributing to a more nuanced understanding of potential impacts and benefits.
- Gather valuable insights and feedback that can be integrated into the project design, helping to address and mitigate potential adverse impacts and enhance positive contributions.
- Establish trust among stakeholders by being transparent, responsive, and open to dialogue. Building trust is essential for the successful implementation of the project and its long-term acceptance by the community.
- Fulfill regulatory requirements by actively engaging with stakeholders, demonstrating a commitment to compliance with environmental and social standards, and addressing concerns raised during the consultation process.
- Facilitate an open and inclusive dialogue to build understanding and acceptance of the project within the affected communities, minimizing potential conflicts and fostering a sense of shared responsibility.
- Integrate local knowledge and community input to enhance the overall sustainability of the project, aligning it with the needs and aspirations of the affected stakeholders.
- Disseminate accurate and accessible information about the project, its potential impacts, and proposed mitigation measures to ensure that stakeholders are well-informed and can actively participate in the decision-making process.
- Consider the needs and interests of all affected parties, including vulnerable or marginalized groups, to ensure that the benefits and burdens of the project are distributed equitably.
- Create a platform for addressing conflicts and disputes, allowing for the resolution of issues through open communication and negotiation.

Stakeholder Management



Figure 10-1 Stakeholder Management

By achieving these objectives, stakeholder consultation contributes to the overall success and sustainability of the project, enhancing its social, environmental, and economic outcomes while fostering positive relationships with the communities it impacts.

10.2 PROPONENT ENVIRONMENT MANAGEMENT TEAM

A comprehensive discussion on all conceivable impacts and corresponding mitigation measures related to the project was conducted with both the proponent and project management. In this collaborative dialogue, a thorough examination of potential environmental, social, and economic implications of the project took place. The proponent and management, demonstrating a proactive commitment to responsible practices, assured the incorporation of all suggested mitigation measures to effectively control and address any discrepancies that may arise during the project's implementation. Their pledge to embrace these measures underscores a dedication to environmental stewardship and sustainable practices. By actively engaging in this discourse, the proponent and management not only exhibit a commitment to regulatory compliance but also demonstrate a broader responsibility to the well-being of the community and the preservation of the surrounding environment. This collaborative approach ensures that the project aligns with best practices, fostering a positive impact on the environment and minimizing any potential adverse effects.

10.3 THE RESPONSIBLE AUTHORITY

The Proponent assumes the crucial role of the responsible authority, pledging to undertake all necessary measures both prior to the commencement of the project and throughout its operational phases. This commitment encompasses a comprehensive approach to project management, ensuring that all regulatory requirements, environmental standards, and best practices are diligently adhered to. Before project initiation, the Proponent commits to conducting thorough assessments and implementing necessary preparatory measures to mitigate potential impacts. This includes adopting robust environmental management strategies, obtaining required permits, and addressing any concerns raised during stakeholder consultations. Throughout the operational phase, the Proponent maintains an ongoing commitment to environmental sustainability and regulatory compliance. This involves continuous monitoring, prompt response to emerging issues, and the implementation of adaptive management practices. By assuming the mantle of responsibility, the Proponent not only safeguards the project's integrity but also prioritizes the well-being of the environment, local communities, and all stakeholders involved. This proactive stance ensures that the project operates within the parameters of environmental and ethical standards, reflecting a dedication to responsible and sustainable project execution.

10.3.1 Other departments and agencies

A comprehensive impact analysis was conducted in collaboration with key stakeholders, including project management, the local community, educational institutes, health institutions, hospitals, and non-governmental organizations (NGOs). This inclusive approach sought to gather diverse perspectives and insights related to the implementation of the project. The engagement process involved scoping sessions, focused group discussions, and wayside consultations, providing a multifaceted platform for dialogue and information exchange. Through these forums, all pertinent issues associated with the project were thoroughly examined, including potential environmental, social, and economic impacts. The proactive involvement of stakeholders, representing various sectors of the community, ensured that a holistic understanding of the project's implications was achieved. This collaborative effort not only fostered transparency but also allowed for the incorporation of valuable local knowledge and concerns into the impact analysis. By actively engaging with stakeholders through diverse communication channels, the project management

demonstrated a commitment to responsible and inclusive decision-making, setting the stage for a well-informed and socially accepted project implementation process.

10.4 ENVIRONMENTAL PRACTITIONERS AND EXPERTS

Our dedicated team undertook a comprehensive site visit, engaging in extensive discussions with a broad spectrum of project stakeholders. This inclusive approach involved reaching out to residents from nearby villages and beyond, ensuring a diverse representation of perspectives to assess the socio-economic impacts of the project. The community demographic was richly diverse, encompassing individuals from various professions, such as those employed in different fields, business owners, doctors, expatriates, military personnel, and educators. In a conscious effort to ensure gender inclusivity, consultations with women were prioritized to gather their unique perspectives on how the project could contribute to the improvement of the area. While some women openly shared their thoughts, it was evident that social norms in the area made many feel hesitant, creating discomfort with speaking or being photographed. This nuanced understanding allowed our team to respect and navigate the cultural sensitivities of the community. The local community, nonetheless, proved to be a wellspring of information, offering valuable insights into the project and expressing predominantly positive views regarding its potential for development. This holistic approach to stakeholder engagement not only highlights the diverse fabric of the community but also underscores the importance of cultural sensitivity in ensuring meaningful and respectful interactions during the assessment of socio-economic impacts.

Table 10-1 Stakeholders and Their Roles and Responsibilities

Stakeholders	Roles
Proponent/Responsible Authority	The discussion with the proponent proposed the mitigation measures and alternatives to control any disparity in the project.
Environmental Expert	Consultants survey the project site to gather relevant information and to record the local community stance and behaviors regarding the project. And also the

	evaluation of socio-economic impacts of the project has been done.
Government Departments	The consulted government department includes Environmental protection agency, wildlife, planning, and development. The departments overviewed the proposed projects and its socio-economic impacts.
Local affected communities	The surveys determined the extent of community that could be affected and their verdict about the proposed project.

10.5 DISCUSSED POINTS

The points that have been kept in view while consulting stakeholders are as follows:

- Activities of the project and their consequences.
- Requirements of the people likely to be affected.
- Mitigation measures or compensation strategies.
- Role of the affected people in the implementation and development of the project.

10.6 AFFECTED AND WIDER COMMUNITY

In the vicinity of the proposed project, there is no identified affected community; however, the proactive engagement of the proponent with inhabitants from various villages has been instrumental in understanding and addressing local perspectives. The absence of a distinct affected community does not diminish the importance of comprehensive consultations. The proponent has undertaken conscientious efforts to reach out to residents across different villages, fostering a dialogue to assess the community's sentiments towards the project. Remarkably, the feedback from these consultations has been overwhelmingly positive, with residents expressing favorable views regarding the proposed endeavor. This positive reception is indicative of the proactive communication and collaborative approach adopted by the proponent, establishing a foundation of mutual understanding and support within the broader community. While the absence of an affected

community streamlines certain aspects of the engagement process, the commitment to inclusive consultations with diverse stakeholders remains integral to building a harmonious relationship with the local population.

11 GRIEVANCE REDRESS MECHANISM

A Grievance Redress Mechanism (GRM) is a structured system established to address and resolve complaints, concerns, or issues raised by individuals or entities regarding their experiences or interactions. This mechanism typically involves clear channels for lodging complaints, whether through written communication, online platforms, or dedicated grievance officers. Once a grievance is registered, the mechanism ensures a systematic and fair investigation of the matter, taking into account all relevant information and perspectives. Timely resolution and effective communication with the aggrieved party are essential components, helping to restore trust and rectify any perceived injustices. An efficient Grievance Redress Mechanism not only safeguards the rights and interests of individuals but also contributes to organizational transparency, accountability, and continuous improvement in service delivery.

11.1 OBJECTIVES OF GRIEVANCE REDRESS MECHANISM

The objectives of a GRM are designed to provide an effective and transparent process for addressing and resolving complaints or grievances raised by individuals or entities affected by a project or organization. The key objectives of a Grievance Redress Mechanism include:

- Ensure that the grievance redress process is easily accessible to all stakeholders, providing a straightforward means for individuals or communities to voice their concerns.
- Promote a fair and impartial mechanism that treats all grievances with equal consideration, regardless of the stakeholder's background, status, or affiliation.
- Establish a system that addresses grievances in a timely manner, minimizing delays and providing prompt resolution to concerns to prevent prolonged dissatisfaction.
- Foster transparency in the grievance redress process, ensuring that stakeholders are informed about the status of their complaints and the steps taken to address them.
- Hold the organization or project accountable for addressing and resolving grievances in accordance with established policies and procedures.
- Utilize the grievance redress process as an opportunity for organizational learning, collecting feedback to identify areas for improvement in project implementation or organizational practices.

- Empower affected individuals or communities by giving them a voice in the decision-making process and acknowledging the importance of their concerns.
- Serve as a mechanism for resolving conflicts and disputes in a constructive manner, minimizing the potential for escalation and promoting harmonious relationships.
- Use insights gained from the grievance redress process to enhance project design, implementation strategies, and overall organizational practices for continuous improvement.
- Ensure that the grievance redress mechanism aligns with legal requirements, industry standards, and the principles of social responsibility.
- Strengthen community engagement by demonstrating a commitment to addressing concerns and maintaining open communication channels.

By achieving these objectives, a Grievance Redress Mechanism contributes to building trust, fostering positive relationships with stakeholders, and enhancing the overall social and environmental sustainability of a project or organization.

11.2 COMPONENTS OF GRM

GRM typically involves several basic steps to address and resolve complaints or grievances effectively. While specific procedures may vary depending on the organization or context, the following are common steps in a basic GRM:

- Individuals submit their grievances through designated channels, which may include online platforms, written communication, or direct contact with a grievance officer.
- The received grievance is formally registered in the system, assigning a unique identifier. This step ensures proper tracking and documentation of each complaint.
- A preliminary assessment is conducted to determine the nature and severity of the grievance. This step helps in categorizing grievances and prioritizing them based on urgency.
- A thorough investigation is carried out to gather relevant information and facts related to the grievance. This may involve interviews, document reviews, or other means of inquiry.

- Clear and timely communication is maintained with the aggrieved party throughout the process. Regular updates and feedback are provided to keep them informed about the progress of the investigation.
- Once the investigation is complete, appropriate measures are taken to address the grievance. This may involve corrective actions, policy changes, compensation, or other forms of redress, depending on the nature of the complaint.
- The resolution is communicated to the aggrieved party, and feedback is sought to ensure their satisfaction. Follow-up may be conducted to confirm that the resolution has been implemented and to monitor any lingering concerns.
- The entire process, from grievance registration to resolution, is documented for record-keeping and reporting purposes. This documentation aids in analyzing trends, identifying systemic issues, and improving the overall grievance-handling process.

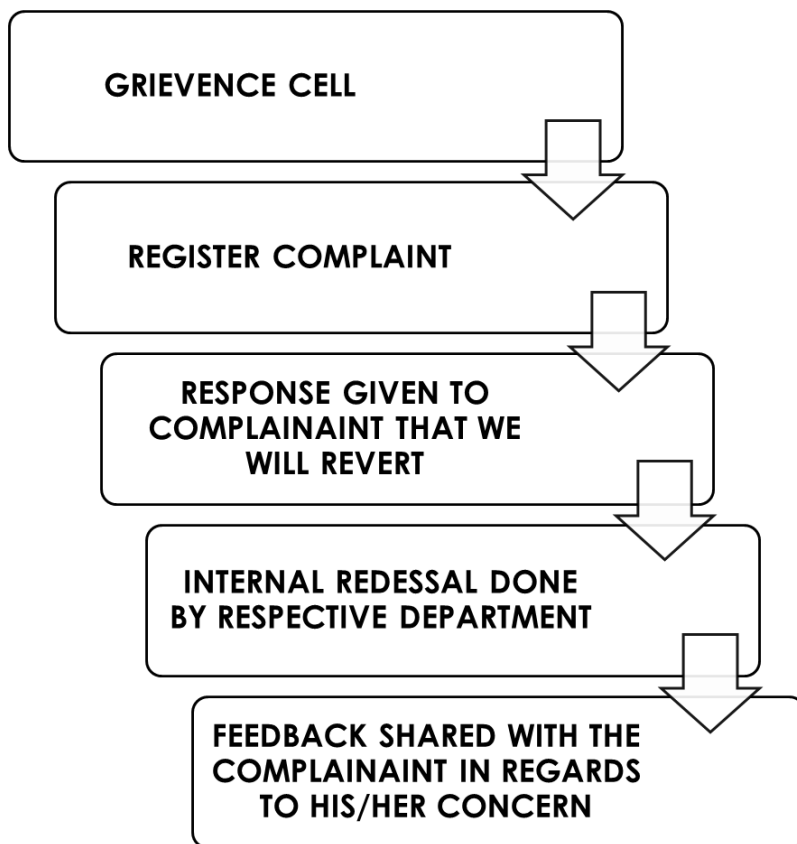


Figure 11-1 Grievance Redress Mechanism

CONCLUSION AND RECOMMENDATION

Based on the study conducted for EIA of the project, the following recommendations are made:

- Plantation as far as permissible and within the scope of the project to be carried out.
- Sustainable development approach through conservation of natural environment is followed.
- Environmental aspects of the project should be well taken care through implementation of the Environmental Management Plan as recommended in this report.
- The project management may adopt “cleaner and greener environment” as its motto and this will make the project more environment friendly.

On the basis of the findings of the EIA, it is concluded that the project will not pose any adverse impact on the local population and the environment. Therefore, it is recommended that the competent authority may please be issues Environmental Approval for the construction and operation of this project.

GLOSSARY

Air Quality	Measurement of the pollutants in the air; a description of healthiness and safety of the atmosphere.
Area	Area is the quantity that expresses the extent of a two-dimensional figure or shape, or planar lamina, in the plane.
Compensation	Includes cash payment, deferred payment, a bond, an insurance policy, stipend, payment in kind, rendition of services, grant of privileges and disturbance money, entitlement to special treatment by government and semi government entities, grant of alternative land, grant of import licenses and business, trade and commercial facilities in addition to the rehabilitation and resettlement of an affected person.
Consultation	Consultation refers to two-way transfer of information or joint discussion between project staff and the affected population. Systematic consultation implies a sustained and rigorous sharing of ideas. Bank experience shows that consultation often yields the best resettlement alternatives, fruitful procedures for continued participation, and independent information on actual conditions for implementation.
Coordinates Contaminate	Each of a group of numbers used to indicate the position of a point, line, or plane to make impure, pollute
Disclosure	The action of making new or secret information known
Disruption	Disturbance or problems which interrupt an event, activity, or process.
Environmental Management	Attempt to control human impact on and interaction with the environment in order to preserve natural resources

Evaluation	The making of a judgment about the amount, number, or value of something; assessment.
Geology	A science that studies rocks, layers of soil, etc., in order to learn about the history of the Earth and its life
Ground Water	Aquifers currently being used as a source of drinking water or those capable of supplying a public water system. They have a total dissolved solid content of 10,000 milligrams per liter or less, and are not "exempted aquifers.
Hazardous	Substance or material, which could adversely affect the safety of the public, handlers or carriers during transportation
Impact	Effect on someone or something
Land Acquisition	The process whereby a person is compelled by a public agency to cede all or part of the land a person owns or possesses, to the ownership and possession of that agency, for public purpose in return for compensation.
Mitigation	The action of reducing the severity, seriousness, or painfulness of something
Occupational Health	Maintenance of the highest degree of physical, mental and social well-being of workers in all occupations by preventing departures from health, controlling risks and the adaptation of work to people, and people to their jobs
Project Area	The area specified by the funding and/or implementing agency according to the Official Gazette Notification and includes the areas within the administrative limits of the Federal or a Provincial Government.
Proponent	A person who advocates a theory, proposal, or course of action.

Pharmaceutical	The term <i>pharmaceutical</i> refers to substances, products, or processes related to the preparation, development, and manufacturing of drugs and medicines used to diagnose, treat, prevent, or cure diseases in humans and animals. Pharmaceuticals include a wide range of products such as tablets, capsules, syrups, injections, and topical treatments, formulated to meet rigorous safety, efficacy, and quality standards.
Rehabilitation	Include all compensatory measures to re-establish; at least lost incomes, livelihoods, living and social systems. It does not include the payment of compensation for required assets.
Resettlement	Means all measures taken to mitigate any and all adverse impacts, resulting due to execution of a project on the livelihood of the project affected persons, their property, and includes compensation, relocation and rehabilitation.
Social Environment	It includes the culture that the individual was educated or lives in, and the people and institutions with whom they interact.
Scope	The extent of the area or subject matter that something deals with or to which it is relevant
Stakeholders	Include affected persons and communities, proponents, private and public businesses, NGOs, host communities and EPA.
Topography	Details of the surface features of land. It includes the mountains, hills, creeks, and other bumps and lumps on a particular hunk of earth.

List of Abbreviation

CO	Carbon Monoxide
CO₂	Carbon Dioxide
DHQ	District Headquarters
EA	Environmental Approval
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
GRM	Grievance Redress Mechanism
Gop	Government of Punjab
IEE	Initial Environmental Examination
M & E	Monitoring and Evaluation
NGO	Non-Governmental Organizations
OHS	Occupation Health and Safety
PEPA	Punjab Environmental Protection Act
PEQs	Punjab Environmental Quality Standards
PM	Particulate Matter
PPE	Personal Protective Equipment
TDS	Total Dissolved Solid
UNCED	United Nations Conference on the Environment and Development

REFERENCES

Listed below are some of the documents, reports and other references consulted during the preparation of this report:

1. Information and data provided by project proponents;
 2. Project Pre-Feasibility Study Report;
 3. Technical Design Data related to the project.
 4. Information gathered through discussions with the project related persons of the project proponent;
 5. Information collected from the Technical documents of various suppliers of machinery/equipment.
 6. Punjab Environment Quality Standards for Ambient Air August 2016;
 7. Punjab Environment Quality Standards Noise Levels August 2016;
 8. Punjab Environment Quality Standards for Drinking Water August 2016;
 9. Pakistan Environmental Protection Act, 1997;
 10. The Punjab Environmental Protection (Amendment) Act 2012 covers aspects related to:
 - The protection, conservation, rehabilitation and improvement of the environment and the prevention, control of pollution and promotion of sustainable development;
 - Establishing complete regulatory and monitoring bodies, policies, rules, regulations and national environmental quality standards; and
 - To ensure enforcement, the act establishes regulating bodies i.e. Punjab Environmental Protection Council (PEPC) and responsible bodies i.e. Punjab Environmental Protection Agency (Punjab EPA) at Provincial level.
- i. Environment related Laws in Pakistan and the Province of Punjab;
 - ii. Government of Pakistan, Pakistan Environmental Protection Agency, Policy and Procedures for Filing, Review and Approval of Environmental Assessment, 2022;
 - iii. Google earth, maps.
 - iv. Guidelines for Public Consultations - These guidelines cover:
 - Consultation, involvement and participation of Stakeholders

- Techniques for public consultation (principles, levels of involvements, tools, building trust)
 - Effective public consultation (planning, stages of EIA
 - where consultation is appropriate)
 - Consensus building and dispute resolution.
1. workplace safety and health act 2011
 2. Land Acquisition Act (LAA) of 1894
 3. The forest Act 1927
 4. Pakistan Penal Code, 1860
 5. Provincial Wildlife Act, 1974
 6. Drugs Act 1976

TERM OF REFERENCES

1. The Consultant is required to carry out an Environment Assessment Study of the Project as required under section 12 of Pakistan Environmental Protection Act 1997/ Punjab Environmental Protection Act 2012.
2. The Study should be comprehensive and should cover all aspects which are envisaged under the relevant national and provincial's laws & regulations including but not limited to:
 - Identification and recommendation for suitable solution/treatment/mitigation measures of emissions and effluents such as waste water and sludge etc. in accordance with Punjab Environmental Quality Standards (PEQS).
 - Identification and recommendation for suitable solution/treatment/mitigation measures of solvents, oils (tar), hazardous waste, organic compounds, steam, flue gases, particulate matter and chemical compounds harmful for the environment and other substances leading to air, noise, water and soil pollution in accordance with PEQS.

The Study should be acceptable to the relevant national and/or provincial authorities (relevant authorities) in Punjab