Document Control

Document:	**ENVIRONMENTAL IMPACT ASSESSMENT**
Project Name:	Installation of Vertical Lime Kiln Plant for the calcination of Limestone near Katha Masral, Tehsil and District Khushab by Sangha Premier Chemical Industries Pvt. Ltd
Project Ref.:	HTMA-EIA-KHB-KILN-0325
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HTMA-EIA-KHB-KILN-0325 (r1)	**05-08-2025**

FOR SANGHA PREMIER CHEMICAL INDUSTRIES PVT. LTD

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EXECUTIVE SUMMARY

Title and Location of Project

Sangha Premier Chemical Industries Pvt. Ltd intends to install an unit for the **Installation *of Vertical Lime Kiln Plant for the calcination of Limestone*** near Katha Masral, District Khushab.

Under the Section 12 of the Environmental Protection Act 1997, Environmental Impact Assessment (EIA) of plants has been made mandatory and has also been demanded by the Mines and Minerals Department.

The plant is located near Katha Masral District Khushab. The google earth map showing the boundary of the proposed plant is shown in Figure below. A more detailed colored google earth image is presented in Annexure III on A3 size.

The project site is located in Khushab District, Punjab. It is well-positioned with convenient access to key regional locations. The site is approximately 12 kilometers from Khushab city, providing access to basic infrastructure, utilities, and workforce. It is located about 38 kilometers from Jauharabad, the district headquarters, ensuring access to administrative and civic services. The main Sargodha-Mianwali Road (N-60) is around 10 kilometers from the site, offering direct connectivity to major cities. Sargodha city—a significant urban and commercial center—is approximately 65 kilometers away, while Mianwali city is about 75 kilometers distant. This strategic location facilitates smooth transportation of raw materials, equipment, and finished goods, making it ideal for industrial development.

Name of the Proponent

The details are given below;

Proponent Name	Sangha Premier Chemical Industries Pvt. Ltd
Representative	Asad Abbas Sangha
Address	Sangha Premier Industries Pvt. Ltd near Wapda Colony, Sargodha Mianwali Road, Khushab.
Contact No.	+92 321 6090165

Name of Organization Preparing the Report

HTMA (Pvt.) Ltd. is a business entity manned by geoscientist, environmentalist, Technological & mineral clustering experts, surveyors and IT experts. The company has a wide range of experience in mining, regulatory regime, drafting of technical agreements, service agreements, management of mining, teaching & training, planning and development, IEE and EIA reports, preparation of feasibility reports and their implementation.

The Consultants preparing this report are specialists in the fields of geology, geological mapping, exploration, Mineral Resource estimation and classification, open pit mining, geotechnical and environmental field. Some of the listed areas highlight the chapters of services:

- Economic Geology
- Determination of geological exploratory techniques
- Mine design
- Selection of mine machinery and equipment
- Mine Development
- Mine Management
- Rescue and Recovery services
- Mine surveying & interpretation of boundary disputes
- Minerals processing
- Preparation of feasibility reports
- SWOT Analysis
- Establishment of Mining Villages and Mineral Cities
- Environmental Impact Assessment and Rehabilitation Studies
- Human resource development
- Legal opinion on mine regulatory regime
- Energy fuels and their selection on techno economic parameters

- Special focus on coal and rock salt mining
- Drilling and blasting for underground and surface mining techniques
- Safety measures for mines operation
- Consultancy relating to manufacturing, marketing & service areas

The contact information of the consultant is presented in Table.

Company	HTMA (Pvt.) Ltd.
Address	81-A Bridge Colony, Lahore Cantt
Representative	Engr. Harris Naeem
Designation	Director Operations
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e-Mail	harris.naeem@hitechma.com
Website	www.hitechma.com

Purpose of Report

The purpose of the EIA study is to identify the possible beneficial and adverse environmental impacts of the project as presently envisaged and propose the applicable mitigation measures to be implemented during the construction and operational stages of the project in order to minimize the negative impacts and preparation of Environmental Management Plan (EMP) to obtain No Objection Certificate (NOC) from Punjab-EPA.

The current project is about the Installation of Vertical Lime Kiln unit for the calcination of Limestone. Site selected for proposed is under the ownership of company. The capacity of said plant is 100 tons per day. The estimated project cost is PKR 200 million approx. the breakdown of the project cost and detail process of the proposed project is given in Chapter 04 of this EIA Report

This EIA report has been prepared keeping in view the following regulations and guidelines:

- Pakistan Environmental Protection Act (PEPA), 1997 & Punjab Environmental Protection Act (PEPA), 2017.
- Pakistan Environmental Protection Agency Regulations, 2022 for review of IEE and EIA.
- Pakistan Environmental Impact Assessment procedures, 2022.
- Guidelines for Preparation and Review of Environmental Reports

Environmental Legislative, Regulatory and Institutional Framework

National environmental laws, regulations, guidelines and policies applicable to proposed project have been provided below:

- Pakistan Environmental Protection Act 1997 is the supreme environmental legislation in Pakistan.
- "Pak-EPA Review of IEE and EIA Regulations, 2022" make the provisions for the

preparation, submission, review and approval of the Initial Environmental Examination (IEE) and the Environmental Impact Assessment (EIA) reports and post monitoring of environmental approvals by Pak-EPA. Regulations, 2022 also provide the classification of projects requiring IEE and EIA. According to the classification provided by the Regulations, 2022, the proposed project having significant environmental and social impacts, requires an Environmental Impact Assessment (EIA) to be conducted.

- Pak-EPA Policy and Procedures for Filing, Review and Approval of Environmental Assessment establish a policy context and administrative procedures for environmental assessment in Pakistan.
- Pak-EPA Guidelines for "Preparation and Review of Environmental Reports" is confined to general aspects of the environmental reports.
- Pak-EPA Guidelines for Public Consultation during IEE/EIA.
- Pak-EPA Sectoral Guidelines for Major Thermal Power Stations.
- National Environmental Institutions in Pakistan.

Pakistan Environmental Protection Agency (Pak-EPA)

Key functions of Pak-EPA are: Implementation of PEPA, 1997 i.e., to develop regulations and guidelines as referred by the Act. Review and approval of IEE and EIA reports submitted to them. In addition, Pak-EPA is mandated to prepare or revise, and establish the National Environmental Quality Standards (NEQS) with approval of Pakistan

Provincial Environmental Setup in Punjab

Punjab EPA enacted the Provincial Environmental Protection Act in November, 2017 by making appropriate amendments in PEPA, 1997. The EPA; Punjab now undertakes functions as delegated under the Punjab Environmental Protection Act, 1997.

EIA related functions are performed through Environmental Approval Section of the Punjab EPA. Environmental Protection Council (PEPC).

International Environmental Requirements

Provided below is a listing of international environmental and social requirements relevant to the proposed project.

Environmental Requirements of IFC

- IFC Sustainability Framework.
- IFC Performance Standards on Environmental and Social Sustainability.
- IFC Environment, Health and Safety (EHS) Guidelines.
- IFC's "Environmental and Social Review Procedures.

ADB Environmental Assessment Guidelines

ADB Environmental Assessment Guidelines describe how to fulfill the requirements outlined in ADB's Environment Policy and Operations Manual on Environmental Considerations in ADB Operations. Information on ADB's policies and procedures for conducting and reporting on the environmental assessment is also provided for all types of projects.

Environmental and Social Safeguard of the World Bank

The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP)/Bank Procedure (BP) Environmental Assessment. This policy is considered to be the umbrella policy for the Bank's environmental 'safeguard policies.

Alternative Considerations

Alternatives are generally identified and analyzed to determine the most viable method of achieving the project objectives. During the recent years, environmental and social concerns related to the developmental activities, are gaining significant momentum all over the world. Therefore, besides the technical and financial considerations, it is also required to recognize the environmental and social consequences of developmental projects,

Alternatives considered in this EIA include following:

- No project option;
- Alternate technologies for Economical Zone;
- Site Alternatives, their Selection and Rejection Criteria
- Design/technology alternatives, their selection and rejection criteria
- Environmental Alternatives, their selection and rejection criteria
- Economic Alternatives, their selection and rejection criteria

Need of Environmental Assessment

The preparation and submission of an Environmental Impact Assessment (EIA) report for any development project is a statutory obligation under Punjab Environmental Protection Act, 2017 (PEPA, 2017) in terms of Section 12 of the Act which states as under:

"*No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency, an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof."*

The current Project falls under Schedule- II of subsection C "Mining and Mineral Processing" of IEE/EIA Regulation 2022 and thus requires Environmental Impact Assessment-EIA.

Major Impacts

The development of the proposed project will have both positive and negative impacts during construction and operational phases; appropriate mitigation measures are proposed for negative impacts. Following are the major concerns and potential impacts

- Ambient air quality can get deteriorated both during pre-construction (site clearing) and construction phases of the proposed industrial unit. The major contributing factors will be generation, suspension and deposition of particulate matter and gaseous emission due to vehicular movement.
- Noise levels can rise around the project site due to operation of machinery and equipment and transportation of construction materials etc.
- Construction waste, if not managed properly, can have negative impacts on the site and surrounding area
- Poor maintenance if vehicles, machinery and generator can cause increased noise levels as well as gaseous emissions
- Wastewater, if disposed of without any prior treatment, can cause surface and groundwater contamination.
- Oil spillages from construction machinery can result into soil and water contamination
- There will always be the possibility regarding hazard to health and safety of workers to occur during construction and operational phases of the proposed project

Recommendations for Mitigation Measures

All the potential impacts of the proposed project should be prevented through appropriate measures and if happen, they should be properly mitigated. Appropriate mitigation measures have been suggested after this EIA study and a comprehensive Environmental Management and Monitoring Plan (EMMP) has been formulated and given in this EIA study. The execution of EMP will help to reduce the adverse impacts of the proposed project. Thus, the project should be made environment friendly by implementing this Environmental Management & Monitoring Plan (EMMP) with fidelity.

Proposed Monitoring

The environmental performance of the proposed project should be overseen through proper monitoring during its construction and operational phases. The Environmental Monitoring Plan should be enforced during the project lifecycle to ensure effective surveillance of the environmental parameters at various stages of the project development and compliances with NEQS and legal obligations. Following parameters should be monitored;

- Ambient air quality should be monitored as per EPA NEQS Rules 2001
- Monitoring for noise level should be conducted as per EPA NEQS Rules 2001
- Monitoring for waste water & drinking water quality should be conducted as per EPA NEQS Rules 2001

The proponent shall be responsible for environmental monitoring and reporting throughout project life and assure proper implementation of mitigation measures, where needed, through adequate monitoring.

Conclusions and Recommendations

The establishment of this vertical lime kiln plant is expected to significantly contribute to the national economy and meet the growing industrial demand for quicklime. By purchasing limestone from the open market, the project will support the regional economy, reduce

transportation costs, and generate local employment opportunities. This industrial development is a valuable step towards better resource utilization and fostering economic growth in the area.

While the project offers substantial benefits, it is important to acknowledge the potential for adverse environmental impacts during all phases. The majority of these impacts, particularly during construction, are temporary. However, with the proactive adoption of suitable mitigation and remedial measures outlined in this EIA Report, these potential impacts can be effectively avoided or minimized.

Recommendations

Based on the findings of this EIA study, the following recommendations should be adopted:

- **Implementation of Mitigation Measures:** All mitigation and remedial measures proposed in this report must be strictly implemented to prevent and minimize potential environmental impacts.
- **Adherence to EMMP:** The Environmental Management and Monitoring Plan (EMMP) must be fully implemented and enforced throughout all three project phases. This plan should be made a binding part of all contractor documents to ensure proper execution.
- **Personnel Training:** Mandatory training programs should be arranged for all working personnel and contractors before construction begins. This training will ensure they are fully aware of their onsite responsibilities regarding all environmental and social issues.
- **Tree Plantation:** A comprehensive tree plantation plan should be developed and followed to enhance local green cover and biodiversity.

Environmental and Social Impact and Mitigation Measures

Potential impacts described in this EIA are primarily caused by changes to the existing socioeconomic and bio physical environment brought on by the proposed project and thus should be interpreted in conjunction with the sections of the report addressing these biophysical and socio-economic dimensions.

Table: Environmental and Social Impacts of the Proposed Project

Subject Area		Potential Impacts During Construction	Potential Impacts During Operation	Mitigation
Physical Environment	**Air Quality**	• Dust from construction activities. • Traffic-related air quality impacts.	• Effects of stacks emissions on ambient air quality. • Traffic-related air quality impacts. • Green House Gas emissions	• Watering of the material stockpiles, access roads and bare soils on an as required basis to minimize dust. • Increase the watering frequency during periods of high risk (e.g. high winds). • Stored materials such as gravel and sand should be covered and confined • Vehicles with appropriate exhaust systems will be used. • Maintenance of all vehicles on regular basis. • Establish and implement vehicle speed limits to minimize dust generation • Cover haul vehicles transporting dusty materials (cement, borrow) moving outside the construction site • Use of specified haulage routes and reduce vehicle speed where required.
	Water Resources	• Control and management of site drainage. • Wastewater discharge, Sewage disposal and foul drainage	• Water requirements for operation • Discharge of process and wastewater.	• Stockpiles of potential water pollutants (i.e. oils, construction materials, fuel, etc.) shall be placed so as to minimize the potential of contaminants to enter local watercourses or storm-water drainage.

		• Effects on groundwater quality.	• Operation of drainage systems on site. • Discharge of storm water, sewage and drainage	• Preparation of Emergency Spills Contingency Plan. • Storm-water runoff from all fuel and oil storage areas, workshop, and vehicle parking areas is to be directed into an oil and water separator before being discharged to any watercourse
	Soils, Geology and Topography	• Effects on soils and topographic features. • Soil contamination	• Soil contamination during the project activities.	• Ensure the topography of the final surface of all raised lands are favorable to enhance natural draining of rainwater / flood water • Restore the natural landscape of the construction sites after completion of work
	Land Use, Landscape and Visual Issues	• Impacts on existing land use on site. • Impacts on existing land use in the surrounding area. • Effects of construction • activities on landscape character. • Visual impact of construction activities.	• Impacts on existing land use on site. • Impacts on existing land use in the surrounding area. • Effects on landscape character. • Visual impact of operating facilities.	• Stop work and inform the site manager Immediately if, during construction, an archaeological or burial site is discovered. • It is an offence to restart work in the vicinity of the site until approval to continue is awarded by the plant management. • Resolve landscape change issue in consultation with local leaders and supervision consultants.

Ecological Environment	**Flora**	Loss of natural vegetation and crops	• Impacts on flora due to altered drainage and runoff patterns	• Removal of trees should be limited to the development footprint • Construction activities shall reduce the loss or disturbance of vegetation • Use clear areas to avoid cutting of trees • A procedure shall be prepared to manage vegetation removal, clearance and reuse • Inform the plant management before clearing trees
	Fauna	• Losses of habitat or species due to land lake. • Disturbance or damage to adjacent habitat of species	• Disturbance or damage to adjacent habitat • Effects on birds migration routes	• Project should ensure the safety of various animals in construction and operation camp area.
	Economy Related Impacts	• Impacts on local skilled and un-skilled labor and • businesses.	• Impacts on local labor and businesses	• The increased government revenue could be used to meet objective by improving infrastructure and services in areas local to the project.
	Social Settings and Services	• Demographic changes due to influx of people. • Pressure on existing infrastructure, utilities and services.	• Small scale demographic and cultural changes.	• Safe, reliable water supply, Sufficient housing for all. • Treatment facilities for sewerage of toilet and domestic wastes • In-house-community entertainment facilities.

	Related Impacts			
	Public Health Related Impacts	• Traffic congestions and disruption to road users • Health impacts due to • construction related dust and • air emissions and • wastewater/effluents release • Traffic-related air quality. • Traffic-related noise	• Health impacts due to air emissions and noise and effluents released. • Traffic-related air quality impacts. • Traffic-related noise impacts.	• Implement proper safety standards. • Provide personal protection equipment (PPE) for staff, such as safety shoes, helmets, masks, gloves, protective clothing, goggles, full—face eye shields, and ear protection. • Maintain the PPE under a regular checking and replacement program. • Provide safe and healthy work environment to workers, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas.
	Occupational Health safety	• Accidents. • Effects on health of workforce. • Safety at work.	• Accidents. • Effects on health of workforce. • Safety at work.	• A traffic management plan will be developed by the construction contractor to prevent incidents of accidents which may occur due to transportation of machinery and equipment to the project site. • Undertake a full project community risk assessment followed by the development of a community emergency preparedness and response plan appropriate to its findings

	National and Regional Impacts	• Human resources development. • Economic development at regional and national level	• Industrial development in Punjab and Pakistan • National and regional (Punjab) power cities • Impacts on regional and national air quality	• The increased government revenue could be used to meet development objective by improving infrastructure and services in areas local to the project
	Global impacts	• Purchase of equipment and machinery from global markets • Hiring the international contractors and consultants	• Green-house gas emission and climate change • Impacts on global air quality and global warming	• Maintenance of all construction machinery on regular basis • Use of machinery with appropriate exhaust system • In order to control the particle emission all stages filtering system, duct collectors or humidification or other techniques(as applicable) to the concrete batching and mixing plant will be provided.

1. INTRODUCTION

1.1 Purpose of the Report

The purpose of the EIA study is to identify the possible beneficial and adverse environmental impacts of the project as presently envisaged and propose the applicable mitigation measures to be implemented during the construction and operational stages of the project in order to minimize the negative impacts and preparation of Environmental Management Plan (EMP) to obtain No Objection Certificate (NOC) from Punjab-EPA.

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1.2 Need of Environmental Assessment

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"No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency, an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof."

The current Project falls under Schedule- II of subsection C "Mining and Mineral Processing" of IEE/EIA Regulation 2022 and thus requires Environmental Impact Assessment-EIA.

1.3 Details of the Proponent

The details are given below;

Table 1-1 Details of the Proponent

Proponent Name	Sangha Premier Chemical Industries Pvt. Ltd
Representative	Asad Abbas Sangha
Address	Sangha Premier Industries Pvt. Ltd near Wapda Colony, Sargodha Mianwali Road, Khushab.
Contact No.	+92 321 6090165

1.4 Details of Consultant

HTMA (Pvt.) Ltd. is a business entity manned by geoscientist, environmentalist, Technological & mineral clustering experts, surveyors and IT experts. The company has a wide range of experience in mining, regulatory regime, drafting of technical agreements, service agreements, management of mining, teaching & training, planning and development, IEE and EIA reports, preparation of feasibility reports and their implementation.

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- Mine surveying & interpretation of boundary disputes
- Minerals processing
- Preparation of feasibility reports
- SWOT Analysis
- Establishment of Mining Villages and Mineral Cities
- Environmental Impact Assessment and Rehabilitation Studies
- Human resource development
- Legal opinion on mine regulatory regime
- Energy fuels and their selection on techno economic parameters
- Special focus on coal and rock salt mining
- Drilling and blasting for underground and surface mining techniques
- Safety measures for mines operation
- Consultancy relating to manufacturing, marketing & service are

The contact information of the consultant is presented in Table 1-2.

Table 1-2 Details of the Consultant

Company	**HTMA (Pvt.) Ltd.**
Address	81-A Bridge Colony, Lahore Cantt
Representative	Engr. Harris Naeem
Designation	Director Operations
Contact	0304 0444440
e-Mail	**harris.naeem@hitechma.com**
Website	**www.hitechma.com**

1.5 Brief Description of the Project

The current project is about the Installation of Vertical Lime Kiln unit for the calcination of limestone. Site selected for proposed project is under the ownership of company near Katha Masral, District Khushab. The capacity of said plant is 100 tons per day. The estimated project cost is PKR 200 million approx. the breakdown of the project cost and detail process of the proposed project is given in this EIA Report

The google location of the plant site is given in Figure 1-1 and attached as **appendix IX.**

Figure 1-1 Google Location of Plant site

2. SCREENING AND SCOPING

2.1. Screening

The preparation and submission of an Environmental Impact Assessment (EIA) report for any development project is a statutory obligation under Punjab Environmental Protection Act, 2017 (PEPA, 2017) in terms of Section 12 of the Act which states as under:

"No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency, an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof."

The current Project falls under Schedule- II of subsection C "Mining and Mineral Processing" of IEE/EIA Regulation 2022 and thus requires Environmental Impact Assessment-EIA.

2.2. Scoping

2.2.1. Spatial and Temporal Boundaries of Environmental Assessment

Project site is open land. After its development with time nature of area will change from open land to project site. Currently there is no significant population center present in the lease area. The current project site is 1-2 kilometers from population centers and all the parameters are within PEQS. No

The temporal boundaries refer to the specific timeframes over which environmental effects are assessed. These include the pre-construction or baseline phase, during which data on existing environmental and socio-economic conditions are collected and analyzed. The construction phase follows, usually spanning 12 to 24 months, during which impacts such as dust emissions, noise, soil disturbance, and increased traffic may occur. Next is the operational phase, which could last 20 to 30 years or more depending on the project type. During this period, potential long-term impacts related to emissions, resource use, waste generation, and community interaction are evaluated and managed. Finally, the decommissioning phase, if applicable, involves the cessation of operations, dismantling of infrastructure, and site rehabilitation, with its own set of environmental considerations, including safe disposal of materials and restoration of land to acceptable conditions.

2.2.2. Important issues and concern raised during consultation

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

- Air pollution should be controlled effectively.
- Locals should be preferred for the job opportunities.
- Wastewater should be treated prior to final disposal.
- Solid waste should be managed effectively by adopting the standard practices of
- the area.

- Cleanliness of the area should be ensured.
- An effective EMMP should be designed and enforced with true spirit.
- Health of the workers should be ensured.
- Workers should be hired from local community.
- Indigenous tress around the facility should be planted to control air pollution

2.2.3. Significant impacts and factors to be determined

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

3. CONSIDERATION OF ALTERNATIVES

The EIA guidelines define alternatives as "different means of meeting the general purpose and requirements of the activity, which may include alternatives to the: Site (location of property), Type of Activity to be undertaken; Design or Layout; Technology to be used"

It is a specific requirement of EIA process that includes the identification and consideration of feasible alternatives in the early stage or during scoping stage of environmental assessment. The value of this requirement is that alternatives are a form of mitigation, in that certain options may avoid or reduce the nature, extent or duration of one or more impacts, on one or more aspects of the receiving environment. The following section presents an outline of the alternatives which were considered for the project.

Alternatives are generally identified and analysed to determine the most viable method of achieving the project objectives. During the recent years, environmental and social concerns are gaining significant momentum all over the world. Therefore; besides the technical and financial considerations, it is also required to recognize the environmental and social consequences of developmental activities. Alternatives considered in this Chapter include:

- No project option;
- Site Alternatives, their Selection and Rejection Criteria
- Environmental Alternatives, their selection and rejection criteria
- Economic Alternatives, their selection and rejection criteria

3.1. No Project Option

A "no project option" (or "no development") simply implies no harm to environment and society. However, almost all types of economic development have some social and environmental benefits associated with it. The ultimate objective of this EIA is to look into the options (measures) which can be adopted to maximize the positive effects and minimize the adverse effects of the proposed Project on environment and society.

3.2. Site alternatives, their Selection and Rejection Criteria

Selection of the site for the proposed plant was governed by many considerations, both the economic analysis of the estimated costs as well as judgment as to the modifying effects of other factors which are more the matter of judgment rather than mathematical calculations, and have considerable effect on the smooth working of the business unit.

- **Land:** Suitability, adequacy, and comparable cost of the sites to install the plant and to expand it whenever feasible.
- **Labor:** Availability and affordable wage rates — taking cost to benefit analysis into consideration — of the skilled, semi-skilled, un-skilled person is required.
- **Transportation:** Regular and sufficient transportation facilities for delivery of materials, dispatch of finished products and for the use of the employees.

- **Market:** Size of the local market and the cost of transporting to central markets vis-a-vis the extent of demand.

3.3. Design/Technology Alternatives, Their Selection and Rejection Criteria

Several kiln technologies were evaluated, including rotary kilns, shaft kilns, and horizontal kilns. The vertical lime kiln was selected due to its higher energy efficiency and fuel economy, lower emissions and better combustion control, compact footprint suitable for the available land, and simpler operation and maintenance requirements. In contrast, rotary kilns were found to have higher fuel consumption and emissions; shaft kilns offered less uniform calcination and required more maintenance; and horizontal kilns required a larger area and involved complex material handling systems, making them less favorable.

3.4. Environmental Alternatives, their Selection and Rejection Criteria

Every development project causes alteration in the existing environment inevitably that can be positive as well as negative. The negative environmental impacts of the proposed industry can be gaseous emission, increased noise levels, excessive water usage, groundwater contamination, and surface water contamination etc. The `no-go' alternative, also referred as the 'no-action' alternative or 'zero-alternative', can be a consideration in this case. It assumes that the activity does not go ahead, implying a continuation of the current situation or the status quo. It is basically a consideration of the original and undisturbed environment without any development. This option is considered to ensure that all possibilities have been taken into consideration before deciding on a final course of action and also to provide a baseline situation against which the other suggested alternatives can be measured.

In a situation where negative environmental impacts have high significance, the `no-go' alternative takes on particular importance. In some cases, the `no-go' alternative may be the only realistic alternative and then it has a critical role to play. It is not true to assume that the `no-go' alternative is necessarily the best from an environmental perspective. In many cases, expansions and upgrades of existing industries (the 'go' alternative) permit the implementation of technological improvements such as the replacement of outdated equipment that leads to reduced emissions to the air or water, in addition to the primary aim of increased production capacity.

The `no-go' alternative provides the means to compare the impacts of project alternatives with the scenario of a project not going ahead. In evaluating the `no-go' alternative here; the benefits of the proposed project are more valued for the country.

3.5. Economic Alternatives, their Selection and Rejection Criteria

Economic alternatives were considered taking into consideration the capital and operational costs for the proposed unit. Land cost, infrastructure cost and machinery cost were taken into account as the deciding economic factor. Also, state of the art machinery will be employed considering it as one-time investment and thus minimizing the maintenance cost during the operational phase. Additionally, it will contribute towards uninterrupted production during operational phase.

4. DESCRIPTION OF THE PROJECT

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

Punjab Environmental Protection Act, 2017 (PEPA, 2017) stipulates that an EIA/IEE is mandatory for Development Projects. Therefore, an IEE/EIA is required for projects for policy procedure, filing, review and approval of environmental assessment. The proposed project is to Installation of Vertical Lime Kiln for the calcination of Limestone.
"The current Project falls under Schedule- II of subsection C "Mining and Mineral Processing" of IEE/EIA Regulation 2022 and thus requires Environmental Impact Assessment-EIA".

4.1. Objectives of the Project

The primary objective of this project is to establish a vertical lime kiln facility to produce quicklime, a material essential for sectors like construction, metallurgy, and chemicals. The project aims to meet growing industrial demand by efficiently utilizing locally available crushed limestone, which will be sourced from the open market, thereby excluding any mining operations. This approach not only reduces transportation costs and supports the regional economy but also ensures the implementation of environmentally sustainable practices through energy-efficient technology and pollution control measures. By doing so, the project will generate local employment, contribute to infrastructure development, and foster industrial growth in the area while ensuring full compliance with national environmental regulations.

4.2. Nature, Location and Site Layout of the Project

The proposed project involves the installation and operation of a vertical lime kiln for the calcination of limestone to produce quicklime. The nature of the project is industrial, focusing on the processing of raw limestone into lime through a thermal decomposition process. The project will include a kiln structure, storage facilities for raw and processed materials, a fuel storage area, water supply and drainage systems, and environmental management components such as air pollution control devices and green belt development.

The project site is located at Latitude 32.4934190 and Longitude 72.436060 in a region that is suitably distanced from residential areas and environmentally sensitive zones. The site is accessible via existing road networks, including the Mianwali-Talagang Road (approximately 2.5 km to the east) and the Rawalpindi Road (about 6 km to the northeast). The closest major population center is Talagang, which lies roughly 10 km southeast of the site, while other nearby villages include Qasba Thatta (around 3.5 km west) and Dhok Sumbal (approximately 4.2 km southwest). This ensures minimal risk of disturbance to human settlements and convenient logistical access.

The site layout is designed for optimal operational efficiency and environmental safety. The kiln will be centrally positioned, surrounded by designated zones for raw material handling, product storage, utility support infrastructure, and administrative offices. Proper setbacks and

internal roads will be maintained for safe vehicular movement, while environmental buffers such as green belts will be established along the periphery to minimize the visual and ecological impact. The project location is represented in Figure No. 4-1.

Figure 4-1 Location of the Project

4.3. Land Use on the Site

The land designated for the project is currently categorized as non-agricultural and barren, with no significant vegetation or prior development. It is not used for any residential, commercial, or agricultural purposes and does not fall within any protected or reserved land classification. This makes it well-suited for industrial use with minimal displacement or land conversion impacts. The proposed land use will involve development of industrial infrastructure including the kiln, storage areas, service roads, and green buffers. A portion of the land will be allocated for green belt development to mitigate environmental impacts and enhance site aesthetics, while designated zones for material handling and worker facilities will be incorporated based on safety and functional efficiency standards. The project design ensures that land use is optimized with environmental compliance and minimal disruption to local land-use patterns.

4.4. Road Access

The site connects to Mianwali-Talagang Road (~2.5 km east) and Rawalpindi Road (~6 km northeast), providing good transport access. Talagang city is 10 km southeast. Internal roads will facilitate safe vehicle movement within the site.

4.5. Cost and the Magnitude of Operation

The total estimated cost of the project is approximately PKR 200 million. This includes land preparation, construction, kiln installation, utility infrastructure, and environmental

management systems. The kiln will operate continuously with a daily production capacity of around 50–100 tons of quicklime, depending on operational parameters.

- Detailed site survey, planning and demarcation of the various regions in the project area
- Site suitability assessment
- Process of designing
- Purchase and delivery of equipment
- Development of industries
- Testing and commissioning
- Plantation of various ecologically important species on the designated green space

4.6. Schedule of Implementation

4.7.1 Planning

The proposed project is at its feasibility study stage. This EIA study is a basic and necessary part of the overall planning for the project and will be integrated into the feasibility study.

4.7.2. Design

The construction contractor and fabrication contractor will be hired based on the cost. The technology adopted for the proposed project establishment will be up to date. Tentative project implementation schedule is presented below in Table 4-1.

Table 4-1 Time Schedule for the Project Development

Sr.	Description	Months
1	Soil Report	2
2	Civil Design	4
3	Process and Electrical Design	8
4	Equipment Manufacturing and Delivery	12
5	Civil Construction	10
6	Mechanical and Electrical Erection	10
7	Testing & Commissioning	3
Total Months		**49**

4.7. Cost and Magnitude of Operation

The total estimated cost of the project is approximately PKR 200 million. This includes land preparation, construction, kiln installation, utility infrastructure, and environmental management systems. The kiln will operate continuously with a daily production capacity of around 50–100 tons of quicklime, depending on operational parameters.

Table 4-2 Cost Breakdown of the Project

Sr. No.	Component	Description	Estimated Cost (PKR)	% of Total
1	**Land Preparation & Site Development**	Land leveling, grading, access roads, fencing, site office setup	20 million	10%
2	**Civil Works & Construction**	Foundations, kiln base, control room, storage sheds, workshop, security room	30 million	15%
3	**Kiln Procurement & Installation**	Vertical shaft kiln system including refractory lining, steel structure, elevator, burners, etc.	70 million	35%
4	**Machinery & Equipment**	Crushers, feeders, lime discharge system, conveyor belts, storage silos	25 million	12.5%
5	**Utility Infrastructure**	Electrical connection, transformer, internal wiring, water supply, compressed air system	15 million	7.5%
6	**Environmental Management Systems**	Dust collection system, emission control, stack monitoring, noise control barriers	10 million	5%
7	**Project Engineering & Consultancy**	Feasibility study, design, engineering drawings, supervision, quality control	8 million	4%
8	**Contingency Reserve**	Inflation buffer, unforeseen site conditions, technical changes	10 million	5%
9	**Logistics & Commissioning**	Transport of equipment, erection labor, trial runs, testing, commissioning support	7 million	3.5%
10	**Regulatory, Licensing, & Safety Setup**	NOCs, environmental approvals, worker safety gear, fire protection	5 million	2.5%

4.8. Description of the Project

The project uses a vertical lime kiln technology for calcining limestone. The process involves the following steps:

1. Crushed limestone is fed into the vertical kiln.
2. Inside the kiln, the material is heated to temperatures of 900–1100°C.
3. Calcination converts calcium carbonate ($CaCO_3$) into quicklime (CaO) and releases CO_2.
4. The quicklime is collected and stored.

Technology: Vertical shaft kiln with fuel-efficient burners and emission control systems.

Raw Material: High-purity limestone sourced locally.

Product: Quicklime (CaO), used in construction, metallurgy, and chemical industries.

By-product: Carbon dioxide (CO_2), which will be vented in compliance with environmental standards.

4.9. Restoration and Rehabilitation Plans

After project commissioning, disturbed land areas not used in operation will be stabilized and rehabilitated through soil grading, compaction, and plantation. A green belt will be developed around the site to reduce dust and enhance aesthetics. Solid waste generated during construction will be properly disposed of or reused where feasible. Environmental monitoring will ensure restoration measures are effective and sustained.

5. DESCRIPTION OF THE ENVIRONMENT

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

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

- Physical Environment
- Ecological Environment
- Socio-economic Environment

5.1. Baseline Physical Environment

5.1.1. Physical Features of the Project Area

Khushab District is a district in the province of Punjab, Pakistan, with its administrative capital in Jauharabad. The district is named after the historical city of Khushab located within its boundaries. The district consists of four tehsils; Khushab, Noorpur Thal, Quaidabad and Naushera.

Based on geography, topography and geology, the project area is briefly described below:

5.1.2. Geography

The district is located between 32°01'7.57" N and 72°12'16.21" E. Khushab is situated between the cities of Sargodha and Mianwali, near the river Jhelum. The district capital is Jauharabad. The total area of Khushab district is 6,511 square kilometres (km²).

Khushab consists of agricultural lowland plains, lakes, and hills. Parts of the Thal desert touch the district, which has a breadth of over 70 miles (110 km) and is situated between the Indus River and the Jhelum River.

There are three lakes (Ochali, Khabbaki and Jahlar) in the district. Kanhatti Garden is the largest forest in Khushab district, near Khabbaki village in the Soon Valley. Khabikki Lake is a salt-water lake in the southern Salt Range. The lake is one kilometres wide and two kilometres long. Khabikki is also the name of a neighboring village. Sakesar is the highest mountain in the Salt Range, and is the site of the ancient Amb Temples. Sakesar's summit is 1522 metres / 4946 feet high and is situated in Khushab District.

5.1.3. Seismic Zone

According to seismic zoning of Pakistan the project area lies in seismic zone 2B and represents minor damage. Earthquake with high intensity for a fundamental

period of more than 1 second may cause damage to infrastructure. Seismic zoning map of Pakistan is given in Figure 5-1.

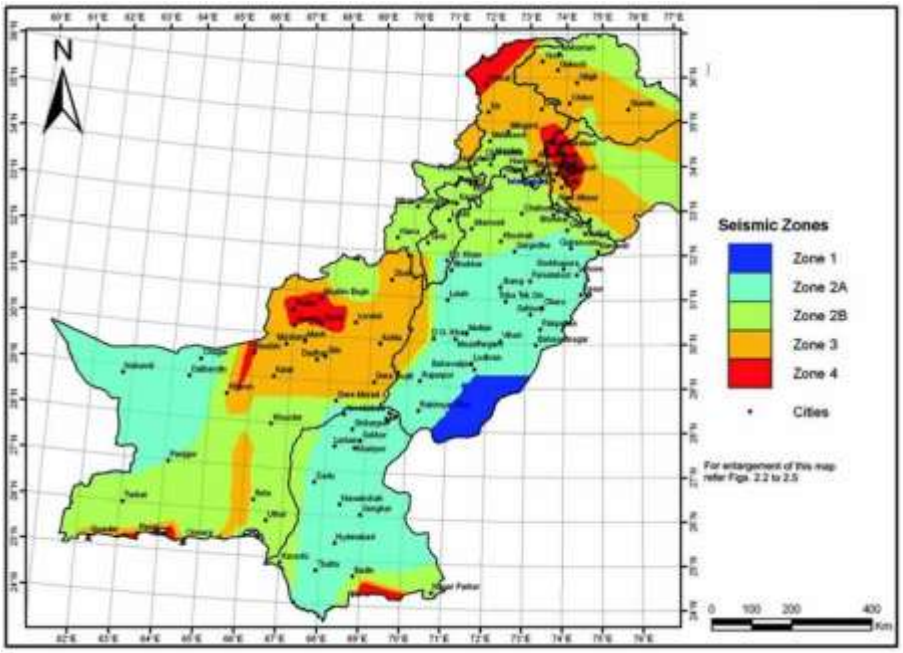

Figure 5-1 Seismic Zoning Map of Pakistan

The prevailing climate in Khushab is known as a local steppe climate. There is little rainfall throughout the year. The Köppen-Geiger climate classification is BSh. The average temperature in Khushab is 24.3 °C. Precipitation here averages 400 mm. The driest month is November. There is 5 mm of precipitation in November. The greatest amount of precipitation occurs in July, with an average of 100 mm.

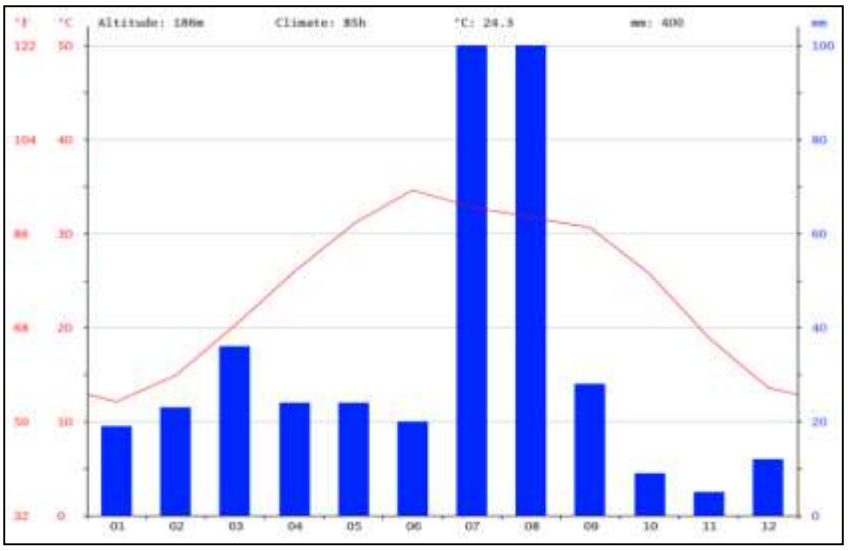

Figure 5-2Climate of Khushab

5.1.4. Temperature

The project area is semi-arid and characterized by large seasonal variations of temperature. The average value of temperature is about 34.6 °C, June is the warmest month. The lowest average temperatures in the year occur in January, which is around 12.1 °C

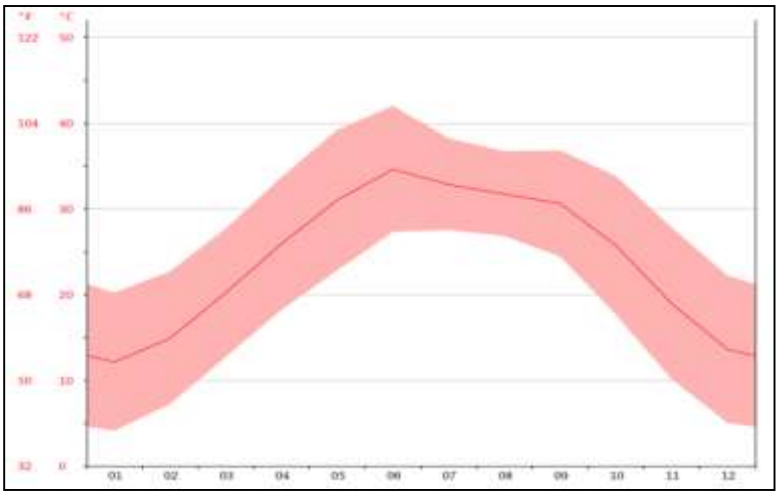

Figure 5-3Average Temperature in Khushab

5.1.5. Rainfall

In Khushab District, precipitation averages 400 mm. The driest month is November. There is 5 mm of precipitation in November. The greatest amount of precipitation occurs in July, with an average of 100 mm.

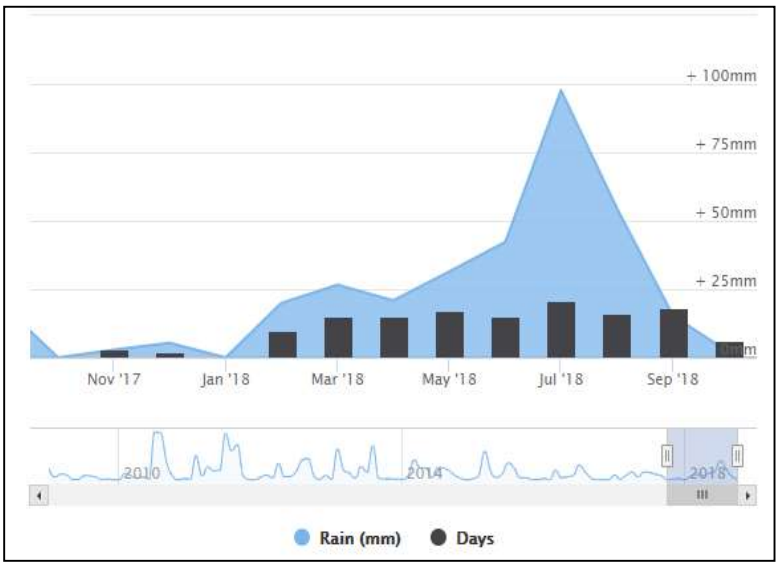

Figure 5-4Average Rainfall Amount (mm) and Rainy Days in Khushab

July, August and September are the most humid months in the area, whereas May and June are the least humid months. Average monthly relative humidity values at various locations in the project area are 55%.

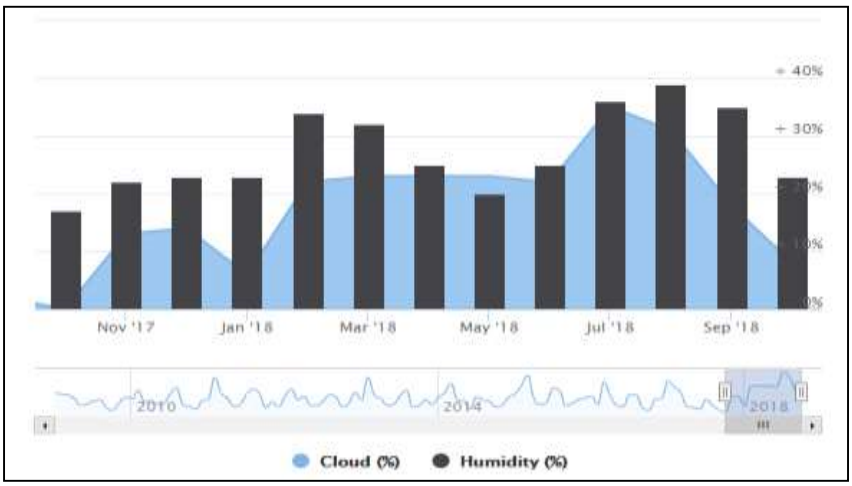

Figure 5-5Average Percentages of Humidity in Khushab

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

- **Surface Water**

Surface waters resources are usually exposed to the surface of earth in the form of mobile and immobile situation which includes snow-clad mountains, rivers, non-river streams, rain, sleet, wetlands and oceans. Surface resourced waters are highly susceptible to natural and anthropogenic derived contamination in terms of Chemical and Biological contamination and thus are not used for sensitive applications such as drinking directly, unless it is pre-treated. There is no surface water body found near the vacinity of the project area.

- **Ground Water**

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

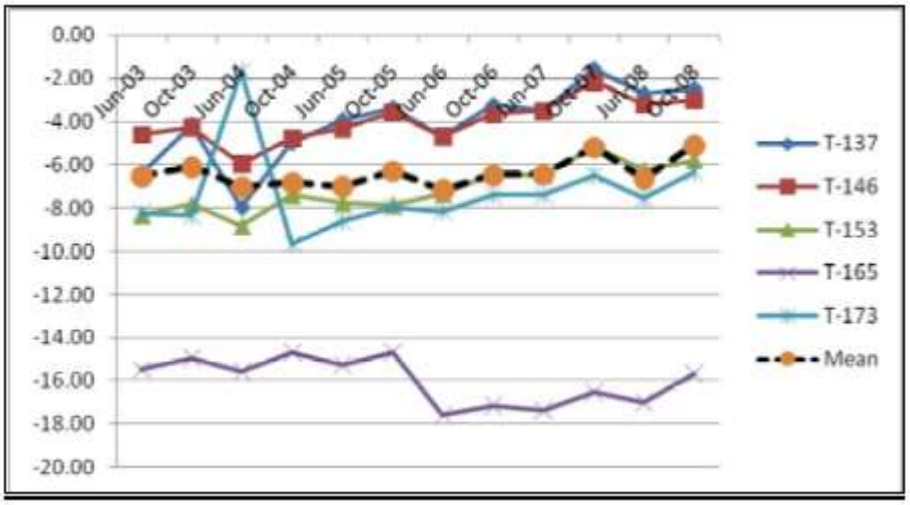

Figure 5-6Khushab District – Water Table Trends (Feet below GLS)

- Groundwater water levels are generally shallow - less than 10 feet to around 15 feet below the GLS; and
- Have shown slightly rising trend during 2003 to 2008. Mean water table stage also shows a flat to slightly rising trend.

5.2. Baseline Ecological Environment

Ecological Environment includes:

- Flora
- Fauna
- Endangered species

5.2.1. Flora

The few trees to be found in district are Jund, which is found in graves protected by the reputation of some departed scunt, stunted kikar, rarely found the round pondsand a grave of beri. The trees found in the town of Nurpur, which are specially protected by a clause in the village administration paper. The characteristic bushes of the region are the lana, akk, harmalphoy; a goodfodder plant, catkins, khipp, summa and karturnma etc.

5.2.2. Fauna

The faunal species which exist in various areas of Khushab district are:

- **Grey partridge**– found all over the district, especially in areas, which are sparsely populated.
- **Black partridge**– found along the seasonal channels and water holes in the bellas through out the district.
- **Chakore**– found in dry rocky areas in the district especially in the Choa Saidan Shah area.
- **See See partridge–** found at a number places in the district in the dry rocky area especially in the Kallar Kahar mountain belt leading into subdivision Talaga

5.2.3. Endangered Species

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

5.3. Baseline Socio-economic Environment

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

Table 5-1Summary of Socio-economic Indicators

Socio-economic Indicators	**District Khushab**
Number of households	992
Number of under-5 children	704
Improved source of drinking water	96.7%
Water treatment used in the household	1.2%
Percentage of population using sanitary means of excreta disposal.	65.3%
Proper disposal of solid waste	3.0%
Literacy rate	57.5%
Percentage of children for primary school entry	26.7%
Total child labor	3.2%
Had cough for more than last three weeks	0.5%
Diagnosed with Tuberculosis during last one year	0.3%
Diagnosed with Hepatitis during last one year	0.6%
Employed	87.9%
Unemployed and seeking job	12.1%
Household Utilities	
Electricity	91.7%
Natural Gas	7.7%
Radio	38.2%
TV	59.6%
Cable TV	6.2%
Telephone	10.9%
Mobile	72.7%
Socio-economic Development	
Livestock	59.3%
Mean household size	6.7%

5.4. Quality of Life Values

5.4.1. Settlement Patterns

Different type of houses were observed in Khushab during survey i.e., katcha, pakka, semi pakka etc having poor drainage system. Majority of people live within the village, a few in their farmhouses (Deras) while some make their homes on their agricultural land. So there is no formal pattern of settlements. Family

composition of both the villages is dominantly joint family system but a few nuclear families also exist in the area.

5.4.2. Indigenous People

People inhibiting the project area are of different castes and races. Most of the families have been living here from 20 to 25 years which has led to homogeneity of culture and the development of a closed economy. There is no danger of damage or elimination of indigenous community as the locals are steeped in their customs and have no intention of relocating.

5.4.3. Religious & Ethnic Groups and Caste Patterns

People of Khushab speak Punjabi, Urdu etc. Religion plays an important role in the social structure of the society. Sunni Muslims are primarily inhibiting here except a few families of Ahl-e-tasheh and Ahl-e-Hadees.

5.4.4. Social Infrastructure and Facilities

Overall the social and physical infrastructure is not up to the mark in the project area. However, the project area is better as compared to the other rural areas of the province. A brief account of the education, health, infrastructure and markets of the area is as follows:

5.4.5. Health facilities

Basic Health Unit, Dispensaries and Private clinics exist in the surrounding villages of the project area. People also access to private hospitals in city and sometimes to nearby private dispensaries. Fever, malaria and chest congestion, Hepatitis-C were reported as the common diseases of the project area. In the project area, health conditions are much developed.

5.4.6. Economy of the Area

Most people of the district prefer to join armed forces like Pakistan Army, Pakistan Navy and Pakistan Air Force. Khushab has the highest proportion of it population serving in the Armed forces of Pakistan. A handsome percentage of the population is employed in the mining, industrial and trading sector with a very small fraction employed in technical fields like health, education, banking and engineering.

Khushab is generating a large number of employment opportunities for its locals and outsiders. Industrial areas are using manpower, while nearby towns are providing business opportunities to the residents. In this semi urban area, people are involved in daily wages jobs, while some are involved in small business. They normally travel to adjacent areas for work. Some work in the industrial area and in the surrounding universities and colleges. People are also involved in agriculture. Area having access to irrigation water is another source of income.

Similarly, livestock is a secondary source of income. It is safe to assume that livestock farming is practiced uniformly in both types of areas. Economy of the project area is dependent primarily on two occupations i.e., agriculture (maximum) and livestock (limited extent), while some locals are also involved in manual labor.

5.4.7. Agriculture

Farming is the main occupation of the people of Khushab. The total cultivated area is 467703 hectares. The main crops of the district are Gram, Wheat, Rice, and Sugar Cane.

5.4.8. Livestock

The rich hilly prairies and grazing lands of Khushab provide a very good environment for sheep and cattle rearing. The majority of the farmers maintain their own sheep and goat herds and cattle. The bulk of the Livestock in the district is consequently being reared in the informal sector based on traditional methods. However, a number of poultry and cattle farms have been established in the private sector, which utilize modern technology of breeding and rearing and are commercially oriented.

5.4.9. Archeological and Cultural Sites

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

5.5. Environmental Baseline Monitoring

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

- Ambient air quality
- Noise levels and
- Drinking Water quality

The lab reports of environmental analysis of the above mentioned parameters are attached in ***Annexure VIII***.

5.6. Suitability of the Site

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

6. ENVIRONMENTAL IMPACTS ASSESSMENT

This section provides the analysis of the potential impacts during different stages of the proposed project on the physical, biological and socio-economic environment of the project area.

6.1. What is the Problem?

The problem is the environmental impacts resulting from project activities related to Installation of Vertical Lime Kiln for the calcination of Limestone in District Khushab. The project is based on the environmental impacts resulting from project operations on each environmental setting including physical, ecological and socio-economic environment.

6.1. When Problem Will Occur and When It Should Be Addressed?

The impacts may occur during different stages of the project activity. The impacts should be addressed at every stage of project operations. The environmental impacts should be addressed at installation and operational stage of project activities.

6.2. Where Problem should be addressed?

The problem as mentioned above should be addressed at project location where project activities are being carried out. All the impacts resulting from project location should be addressed, if any.

6.3. How the Problem should be addressed?

The problem should be addressed using specified criteria and methods as specified in Guidelines/Checklist. The impacts should be addressed using one or more methods as specified in the Checklist provided by EPA, Punjab.

6.4. Ways of Achieving Mitigation Measures

6.5.1. Changing in Planning and Design

The mitigation measures as specified in the EIA Report will be achieved by the implementation of Environmental Management and Monitoring Plan. Any significant changing in planning and design or EMMP will be made based on requirements in future. It may be communicated to EPA, Punjab in case of significant changes.

6.5.2. Improved Monitoring and Management Practices

Improved monitoring and management practices will be adopted to ensure the implementation of mitigation measures as suggested in the EIA Report. Improved monitoring and management practices may include the followings:

- Monitoring of all management measures as suggested in EMMP.
- Monitoring of Environmental parameters as suggested by EPA, Punjab.
- Monitoring of worker's health and safety.
- Monitoring of implementation of potential environmental enhancement measures.

6.5.3. Compensation in Money Terms

Compensation in terms of money is only required in case of any relocation or replacement of community/settlement due to project activities.

6.5. Impacts on Physical Environment

This section provides the potential adverse impacts of the proposed Project on physical environmental resources of the area (land, water and air), the notable impacts discussed below.

6.6.1. Impacts on Land Resources

This section explains how the proposed project will affect the land use, soil erosion and contamination, and describes mitigation measures to manage these impacts

6.6.2. Land Productivity and Use

Following are the major impact on land productivity and use.

- Most significant impact will be the conversion of some agricultural land into industrial land.
- Due to proposed project construction and operation, other industrial activities may start in the vicinity of area, where at present there is no such type of activity. This may cause negative impact on the existing environment;
- Borrow pits and other landscape depressions if left open, may prove hazardous to human beings, livestock and wildlife;
- Open pits containing water are potential sources of mosquito breeding if left stagnant, and can create health problems;
- Surface run-off from the impervious surface of the proposed carriageway can further aggravate the flooding of embankment sides during the operation stage;
- Induction of infrastructural development works may change the local drainage pattern of the area. This can cause pounding in the vicinity of the project area in rainy season, which ultimately affect the current use of land patterns.

Construction activity may cause dust and smoke emission may be injurious to the residents of adjacent settlements

6.6.3. Soil Erosion and Land Sliding

Soil erosion may occur in the workshop areas as a result of improper runoff drawn from the equipment washing-yards and improper management of construction activities. Due to development of proposed area. Velocity of runoff will be increased which will ultimately enhance the soil erosion. Once the proposed and existing roads (after rehabilitation) return to normal operation, it will be subject to a natural depreciation as high embankments become increasingly prone to soil erosion.

6.6.4. Soil Contamination

Soil project area may get contaminated due to the following reasons

- A farce quantity of solid waste will be generated by the Project during construction stage. If this solid waste was not properly disposed of, it will contaminate the soil resources especially during monsoon season.
- Some chemicals used in laying of water supply pipe joints, sheathing on electric wires and cables are hazardous and toxic in nature. All the carbon based compounds are toxic to varying degrees. Hydrocarbon group of chemicals are toxic and fuel, petrol, diesel and all the lubricants are too toxic in nature. In case proper care is not taken for handling, storing and transportation of these toxic substances may cause damage to the health of the workers as well as their spills will contaminate the soil.

6.6.5.Mitigation Measures

The mitigation measures, which will be carried out in design stage, construction as operation stages for land resources are as under:

6.6.6. Land Productivity and Use

The following practices will be adopted to minimize the damages to land productivity and use:

- Damage to the land due to implementation of the Project will be a permanent loss and it is expected that due to increase income of the local people and availability of more job resources due to the Project, yield of adjoining agricultural land will be increased which will compensate to this loss up to Greater extent.
- The expected mushroom industrial growth around the area should be properly controlled by formulating and enforcing tho law.
- As far as possible, waste/barren land and natural areas with a high elevation
- will be used for borrow material and setting up project facilities.
- Where the use of adjacent agricultural land is unavoidable for borrow of earth material, the top 30 cm of the plough layer will be stripped and stockpiled for redressing the land after the required borrow material has been removed.
- The excavation of earth fill will be limited to an approximate depth of 50 cm. This practice will be applied uniformly across the entire extent of the farmland unit acquired for borrowing earth material.
- Where deep ditching is to be carried out, the top lm layer of the ditching area will be stripped and stockpiled. The ditch will initially be filled with scrap material from construction and then levelled with the stockpiled topsoil to make it even with the rest of the area. It shall be ensured that the scarp does not contain any material, which may produce leachates or contaminate the soil.

- Ditches or borrow pits that cannot be fully rehabilitated will be landscaped/converted into fishponds to minimize erosion and to avoid creating hazards for people and livestock.
- The Project works have been designed in line with natural drainage to ensure that local drainage pattern should not be disturbed,
- Side drains will be constructed to prevent flooding on the carriageways. In development areas, side drains will be constructed along the road sides; in open areas, a drain will be constructed along the embankment.
- Proper storage place of each type of material to be used during the construction to avoid any hindrance to natural slope. Contractor will be made responsible for the clearing of left over material at the site. In this regard prior to the start of work, contractor should submit the site restoration plan. Site restoration plan should be as pragmatic as possible.

6.6.7. Soil Erosion and Land Sliding

- Good engineering practices will help control soil erosion both at construction sites and in peripheral areas, particularly in borrow areas and along transportation tracks. These will include the following measures:
- Low road embankments will be protected from erosion by planting indigenous grasses and low height trees that can flourish under project site conditions

6.6. Impacts on Biological Environment

The biological environment manly includes flora and fauna. Impact on flora and fauna and corresponding mitigation measures are described in the following paragraphs;

6.7.1. Impacts on Flora

Following impacts will be on the flora of the area;

6.7.2. Trees to be planted

There is no proper tree growth at the project site as the area is water logged. However, some subsistence farming and self-grown dwarfed trees are there on the edges. Cutting of these trees will not have any significance impact. The proponent will plant 25000 trees to be grown at the project site and 15% of the scheme will be kept green which include parks and green corridors. These trees will be planted in green corridors to act as buffers along roads. As these scattered trees are small in number, their replacement will be made good by planting new trees on both sides of the main, lateral and minor roads.

Keeping in view the saline and water logged conditions in the project area a number of trees might be planted as a part of the project on the boundary of proposed area. Saline areas, which are lying unutilized by the communities, could be rehabilitated following proper soil amendments, preparation and choice of suitable species.

Trees showing successful growth include the following

- Shesham
- Eucalyptus
- Guava

Main species proposed in the project area:

- Conocarpus eractus (buttonwood),
- Dalbergia sissoo (shisham),
- Tamarix aphylla (Athel tree),
- Morus alba (Mulberry),

To facilitate the widening and expansion of plantation there will be need of growing more trees at the boundary of project site along the sides of pedestrian corridors inside the parks of three different community cores. For each tree to be cut, two trees to be planted to conserve the biodiversity.

The selected area has scattered shrubs and no significant impacts are envisaged dur, to removal of shrubs.

6.7.3. Impacts on Fauna

Following are the specific classes of fauna which are expected to be affected due to the project implementation.

6.7.4. Mammals and Reptiles

During the construction phase, there will be negative impacts on the mammals and reptiles of the area. Mammals, such as squirrel, jackal etc. will avoid these areas for fear of being hunted. Same will be the case with reptiles; some reptiles might be killed during the digging and dragging operations.

6.7.5. Birds

Birds will try to find shelter and food somewhere else and will tend to move away from the Project site for fear of being hunted/trapped.

6.7.6. Mitigation Measures

The following mitigation measures will be adopted to alleviate the adverse impacts on the vegetation growth of the area.

- A tree plantation program will be incorporated into the detailed design not only to compensate the loss of trees but also to enhance the aesthetic view as well as to reduce the air and noise problems.

- Existing access tracks will be used for borrow of construction material and new paths will be constructed only in case when no existing path is available to avoid damage to the existing trees and bushes.
- While making paths for carriage of construction materials to the site care will be taken that minimum land is utilized and minimum area is disturbed. Cutting of trees should be avoided by making diversions.
- The camps and workshop facilities will be established on barren land; however, if such type of land is not available, it will be ensured that minimum clearing of the vegetation occurs and minimum damage to trees and undergrowth is ensured.
- The Contractor's staff and labour will be strictly directed not to damage any vegetation such as trees or bushes in the nearby areas.
- Contractor will provide the fuel wood/gas cylinders at the camps for cooking purposes and cutting the trees/bushes for fuel will not be allowed.

The following mitigation measures will be adopted to reduce the impacts of project and protect fauna.

6.7.7. Mammals and Reptiles

Mammals and reptiles will be protected by following practices:

- Hunting and harassing of wild animals shall be strictly prohibited and Contractors will warn their labor.
- Lights used in the camps, during construction activities will be kept to the minimum requirement. In the wildlife sensitive areas, upward scattering lights will preferably be used.
- Vehicle speed will be controlled to avoid incidental mortality of small mammals and reptiles.
- Periphery of the camps will be fenced and gated to check the entrance of the wildlife into the construction camps. Camp wastes harmful to wildlife should be properly disposed of/dumped.

6.7.8. Impacts on socioeconomic and cultural Environment

The section describes the impact of the proposed project on local communities, construction workers, indigenous and vulnerable people as well as on structures or sites of cultural and religious significance.

6.7.9. Impacts on Local Communities/ Workforce

The area surrounding communities will be affected during the construction and operation phases as follows:

- During the construction phase the general mobility of the local residents and their

livestock in and around the project area is likely to be hindered.

- Community will have to face the noise and dust problems during the construction phase and air and noise omissions during operation stage.
- Induction of outside workers in the Contractor labor may cause cultural Issues with the local community.

6.7.10. Generation of income

Local people will find business activities duo to Implementation of the Project particularly persons settled In the vicinity of project area, Approximately hundreds of thousands Jobs will be generated by the implementation of project which subsequently enhance the living standards of community.

6.7.11. Gender issues

As the project area lies close to the rural areas and rural community, women activities In the field may become affected due to the construction activities. The rural women normally use the open field latrines and their privacy may suffer due to the project activities,

The Induction of outside labor may create social and gender issues due to the unawareness by them of local customs and norms. It will also cause hindrance to the mobility of local women.

6.7.12. Indigenous, Vulnerable and Women Headed Households

During the social field survey of the project, no Indigenous group of people was identified. So, no Impact on the Indigenous people is envisaged due to the Implementation of the project.

Income of vulnerable people i.e. squatters settled on Government land may be affected due to the implementation of the Project, like relocation of their infrastructure, loss of land, crops, trees, etc. The owners of the affected structures identified during the field visits are also falling below the poverty line. No women headed household was identified during the social survey of the Project.

6.7.13. Mitigation Measures

- The Project will plan to prioritize the recruitment of people living, or originating from, the project affected communities during Project operation. Irrespective of origin, the Project is designed to accommodate all construction and operation workers within a camp inside the Project location. Coordinate recruitment efforts related to non-skilled labor, including for non-skilled labor positions
- required by contractors.
- Local recruitment commitment will be clearly defined and extended to the employees of contractors and to the construction phase of the Project and the geographic scope of local recruitment will be based on prioritization by proximity to the Project.
- The commitments will be articulated as a clearly defined policy supported by

procedures and quantified targets. To specifically help reduce significant potential social and demographic impacts for more vulnerable or marginalized sectors of the host communities, the Project employment opportunities for women and senior citizens will be promoted wherever feasible and culturally appropriate.

- The vulnerable people of the communities located in the vicinity of the project will be given priority in provision of jobs, donations and scholarships. Through its CSR activities, a special focus will keep on the vulnerable people and their socioeconomic status will be regularly monitored.
- A grievance redress mechanism will be especially designed for the vulnerable people of the community. Their complaints will be addressed on priority basis and a liaison officer will be designated to accommodate them and address them grievances.
- Feedback consultations will be held with the vulnerable people to record the efficiency and effectiveness with which their complaints are addressed. Their views and feedback will be registered and if required, improvements in the
- grievance redress mechanism will be made.
- The Project labor will be sensitized on local cultural and social values as part of the induction program who originates from other parts of the country or from abroad.

6.7. Methodology for Impacts Identification

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

6.8. Impacts Analysis and Prediction

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

6.9. Characterization of Impacts

Impacts were characterized based on the following parameters:

Nature	Duration
Magnitude	Spatial Boundaries
Extent	Reversibility

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

Table 6-1 Characterization of Impacts

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

6.10. Impact's Significance

After the evaluation of all the potential impacts, the impacts significance is to be given using Impact matrix. The impacts significance of Physical importance, Ecological importance, Social importance is given using the matrix approach. The impacts significance is given based on the characterization of impacts. From the Table 6-2 which is showing the characterization of each impact, the following significance is given to each physical, biological and socio-economic impact.

Table 6-2 Significance of Environmental Impacts

Environmental Parameter	Significance
Water Resources	None
Land Resources	None
Air Quality	Require mitigation

Noise	Require mitigation
Solid waste	Require mitigation
Wastewater	None
Flora & Fauna	Acceptable
Community Amenity	Acceptable
Afforestation	Acceptable
Local Economy, Community Development and Employment	Acceptable
Health & Safety	Require mitigation

7. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

7.1. Project location:

The project would pose aesthetic and noise impacts on the nearby areas. Dust would however have impacts on the areas bit far away. There is no water body found near the vicnity of the project site. Hence, there will be no impact on water quality due to project activities. The mitigation measures for dust and noise problems are discussed below.

7.2. Mitigation Measures

Following are the steps that may be adopted to control noise and dust problems at site.

- Use of PPEs (noise suppression equipment-ear mufflers etc.) will be ensured by the workers where noise levels are higher than 85 (dBA).
- Project activities will be ensured at daytime when background noise levels are high.
- Vehicles speed limit will be maintained to avoid excessive vibrations.
- Regular maintenance of machinery will be ensured.
- Controlled water sprinkling will be ensured to reduce dust/PM_{10}.
- Maintain appropriate buffers between the site and receptors if practical.
- Use of PPEs (face masks etc.) will be ensured by the workers and staff.

7.3. Anticipated Environmental Impacts Related to Project Design

The project may have high blowing off rates and dust emissions. Better design can resist such impacts. Thus, barriers shall be developed by extensive vegetation and trees on the boundaries of the project.

7.4. Environmental Impacts during Installation Stage

The summary of the positive and the negative impacts observed on the environment by the cement production on the project area has been summarized in Table 7-1. The impacts have been given magnitude based on the scaling given below.

Scale Range	**0 to 5**
Major Impact	5
Moderate	4
Intermediate	3
Minor	2
Low	1
No Impact	0

(+) sign is used for positive impacts and (-) sign for negative impacts. The mitigation measures will be explained after a short while.

Table 7-1 Identification of Impacts during Installation Stage of the Project

Sr. No.	Component	Environmental Issue	Impacts	
			Positive	Negative
1	**Physical Environment**			
	Water	Channel Water Quality		0
		Channel Water Discharge.		0
		Groundwater Quality		0
		Groundwater Level		0
		Surface Run-Off		0
		Flooding		0
		Drainage		0
	Land	Soil Salinity		0
		Soil Erosion		0
		Land Utility / Productivity	+3	
	Solid Waste	Land Pollution Breeding of flies and rodents Odor		0
	Climate	Micro-climate changes.		0
	Atmosphere	Dust		-3
		Noise		-2
	Sub-Total		**+3**	**-5**
2	**Biological Environment**			
	Flora	Forests /Trees	+2	
		Other Terrestrial Vegetation		0
	Fauna	Mammal Communities /Habitat		0
		Reptile Communities /Habitat		0
	Sub-Total		**+2**	**0**
3	**Socio-economic Environment**			
	Social	Population	+1	
		Land Ownership	+1	
		Land Lease	+2	

		Worker's Health and Safety		-2
		Security		0
		Social Cohesion/ Attitude	+1	
		Food/ Nutrition	+1	
		Health		0
		Education	+1	
	Economic	Income Levels	+1	
		Employment	+2	
		Land Value	+2	
	Institutional	Institutional Activities/Effectiveness	+2	
	Human Use	Cultivation	+1	
		Livestock	+1	
		Afforestation	+2	
		Infrastructure		0
		Domestic Water Supply		0
		Community Development	+2	
	Resettlement	Land		0
		Dislocation of Population		0
		Loss of Property		0
		Loss of Infrastructure		0
		Resettlement of Affected		0
Sub-Total			**+20**	**-2**
Grand Total			**+25**	**-7**

The potential environmental impacts resulting during installation phase of the project and their possible mitigation measures are given in Table 7-2.

Table 7-2 Environmental and Social Impacts of the Proposed Project

Subject Area		Potential Impacts During Construction	Potential Impacts During Operation	Mitigation
Physical Environment	**Air Quality**	• Dust from construction activities. • Traffic-related air quality impacts.	• Effects of stacks emissions on ambient air quality. • Traffic-related air quality impacts. • Green House Gas emissions	• Watering of the material stockpiles, access roads and bare soils on an as required basis to minimize dust. • Increase the watering frequency during periods of high risk (e.g. high winds). • Stored materials such as gravel and sand should be covered and confined • Vehicles with appropriate exhaust systems will be used. • Maintenance of all vehicles on regular basis. • Establish and implement vehicle speed limits to minimize dust generation • Cover haul vehicles transporting dusty materials (cement, borrow) moving outside the construction site • Use of specified haulage routes and reduce vehicle speed where required.
	Water Resources	• Control and management of site drainage. • Wastewater discharge, Sewage disposal and foul drainage • Effects on groundwater quality.	• Water requirements for operation • Discharge of process and wastewater.	• Stockpiles of potential water pollutants (i.e. oils, construction materials, fuel, etc.) shall be placed so as to minimize the potential of contaminants to enter local watercourses or storm-water drainage.
			• Operation of drainage systems on site.	• Preparation of Emergency Spills Contingency Plan. • Storm-water runoff from all fuel and oil storage areas, workshop, and vehicle parking areas is to be

			• Discharge of storm water, sewage and drainage	directed into an oil and water separator before being discharged to any watercourse
	Soils, Geology and Topography	• Effects on soils and topographic features. • Soil contamination	• Soil contamination during construction phase	• Ensure the topography of the final surface of all raised lands are favorable to enhance natural draining of rainwater / flood water • Restore the natural landscape of the construction sites after completion of work
	Land Use, Landscape and Visual Issues	• Impacts on existing land use on site. • Impacts on existing land use in the surrounding area. • Effects of construction • activities on landscape character. • Visual impact of construction activities.	• Impacts on existing land use on site. • Impacts on existing land use in the surrounding area. • Effects on landscape character. • Visual impact of operating facilities.	• Stop work and inform the site manager Immediately if, during construction, an archaeological or burial site is discovered. • It is an offence to restart work in the vicinity of the site until approval to continue is awarded by the plant management. • Resolve landscape change issue in consultation with local leaders and supervision consultants.
Ecological Environment	**Flora**	Loss of natural vegetation and crops	• Impacts on flora due to altered drainage and runoff patterns	• Removal of trees should be limited to the development footprint • Construction activities shall reduce the loss or disturbance of vegetation • Use clear areas to avoid cutting of trees • A procedure shall be prepared to manage vegetation removal, clearance and reuse • Inform the plant management before clearing trees

	Fauna	• Losses of habitat or species due to land lake. • Disturbance or damage to adjacent habitat of species	• Disturbance or damage to adjacent habitat • Effects on birds migration routes	• Project should ensure the safety of various animals at construction and operation camp area.
	Economy Related Impacts	• Impacts on local skilled and un-skilled labor and • businesses.	• Impacts on local labor and businesses	• The increased government revenue could be used to meet objective by improving infrastructure and services in areas local to the project.
	Social Settings and Services Related Impacts	• Demographic changes due to influx of people. • Pressure on existing infrastructure, utilities and services.	• Small scale demographic and cultural changes.	• Safe, reliable water supply, Sufficient housing for all. • Treatment facilities for sewerage of toilet and domestic wastes • In-house-community entertainment facilities.

	Public Health Related Impacts	• Traffic congestions and disruption to road users • Health impacts due to • construction related dust and • air emissions and • wastewater/effluents release • Traffic-related air quality. • Traffic-related noise	• Health impacts due to air emissions and noise and effluents released. • Traffic-related air quality impacts. • Traffic-related noise impacts.	• Implement proper safety standards. • Provide personal protection equipment (PPE) for staff, such as safety shoes, helmets, masks, gloves, protective clothing, goggles, full—face eye shields, and ear protection. • Maintain the PPE under a regular checking and replacement program. • Provide safe and healthy work environment to workers, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas.
	Occupational Health safety	• Accidents. Effects on health of workforce. S at work.	• Accidents. • Effects on health of workforce. • Safety at work.	• A traffic management plan will be developed by the construction contractor to prevent incidents of accidents which may occur due to transportation of machinery and equipment to the project site. • Undertake a full project community risk assessment followed by the development of a community emergency preparedness and response plan appropriate to its findings
	National and Regional Impacts	• Human resources developmer • Economic development at regional and national level	• Industrial development in Punjab and Pakistan • National and regional (Punjab) power cities • Impacts on regional and national air quality	• The increased government revenue could be used to me development objective by improving infrastructure a services in areas local to the project

	Global impacts	• Purchase of equipment and machinery from global marke • Hiring the international contractors and consultants	• Green-house gas emission and climate change • Impacts on global air quality and global warming	• Maintenance of all construction machinery on regular basis • Use of machinery with appropriate exhaust system • In order to control the particle emission all stages filtering system, duct collectors or humidification or other techniques(as applicable) to the concrete batching and mixing plant will be provided.

8. ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

8.1. Introduction

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

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

8.2. Objectives

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

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

- Defining roles and responsibilities of the project Proponent for the implementation of EMMP and identifying areas where these roles and responsibilities can be shared with other parties involved in the execution and monitoring of the project.
- Outlining mitigation measures required for avoiding or minimizing potential impacts assessed in the EIA report.
- Developing a monitoring mechanism and identifying requisite monitoring parameters to confirm effectiveness of the mitigation measures recommended in the EIA report.
- Defining the requirements for communication, documentation, training, monitoring, management, and implementation of the mitigation measures.

8.3. Implementation of EMMP

The implementation of EMMP should be carefully coordinated with the design and operational program of the project. This will ensure the implementation of relevant mitigation measures at the appropriate project stages. It will also ensure that adequate resources are properly allocated to achieve the desired results. This EMMP has been prepared to satisfy the requirement of "IEE and EIA Regulations, 2022".

8.4. Management Approach and Responsibilities

- The organizational roles of the key players are;

- The Proponent will undertake overall responsibility for compliance with the EMMP. The Proponent will carry out regular monitoring to ensure that the contractors are effectively implementing their environmental and social requirements.
- Construction Contractor/s: The contractor/s will implement the majority of environmental and social mitigation and monitoring measures as required by their contract. The construction contractor/s is subject to certain liabilities under the environmental laws of the country, and under their contracts with the project Proponent

The separate responsibilities of the Proponent and the contractor are:

8.4.1. Primary Responsibilities:

- Proponent will coordinate with the concerned government departments and
- Respective highest-ranking officers of Proponent and the construction contractor will assume the primary responsibilities for environmental performance of the proposed Project.

8.4.2. Project Management and Quality Control:

- Proponent representative will be responsible for the overall environmental soundness of all field operations; and
- The construction contractor's Site Manager will be responsible for carrying out the construction activities in an environmentally sound manner

Specific roles and responsibilities for monitoring are provided in Table 8-1.

Table 8-1 Roles and Responsibilities for Environmental Monitoring

Aspect	Project Proponent	Contractor	Relevant Documentation
Contracting	Ensuring that monitoring and mitigation requirements are included in the contract between the Proponent and the construction contractor/s.	Understanding the requirements and estimating the required resources	Contract between the proponent and the construction contractor/s.
Monitoring Plan	Ensuring finalization of Monitoring Plan before commencement of project construction.	Prepare a Construction Management Plan.	Finalized Monitoring Plan and Construction Management Plan.
Resources	Ensuring availability of resources required for environmental monitoring.	Ensuring availability Of resources Required for environmental management and monitoring	Project budgets
Environmental Staff	Designating an Environmental Manager for the Proposed Project	Designating an Environmental Manager for they Proposed Project (may be combined with health and safety)	Job Description
Monitoring Surveys and Inspections	Undertaking regular inspections Contactor's environmental performance and carrying out further measurements when necessary.	Undertaking regular inspections Contactor's environmental performance and carrying out Survey	Inspections and Survey Reports
Environmental Audit	Conducting periodic Audits of the construction site.	Conducting periodic internal audits.	Audit reports

Reporting	Ensuring that periodic environmental monitoring reports are received from the construction contractor/s	Producing environmental monitoring periodically distributing among the Proponent 's management and appropriate staff members.	Environmental Monitoring Reports.
Corrective Actions	Verifying that activities carried out comply with the EIA/EMMP and identifying corrective actions if needed	Carrying out corrective actions as required.	Corrective actions record.
Maintenance of Records	Maintaining monitoring data and recording all incidents of environmental significance and related corrective measures.	Maintaining monitoring data and recording all Incident of environmental significance and related corrective measures	Environmental Database

8.5. Mitigation Plan

The Mitigation Plan is a key component of the EMMP. The Mitigation Plan lists all of the mitigation measures identified in the EIA. Based on the EIA for the proposed Project, the mitigation measures for the construction phase are provided in Table 8-2 and for the operational / maintenance phase in Table 8-3.

Table 8-2 Mitigation Plan for Design & Construction Phase

Sr. No	Environmental or Social Aspects	Measure	Responsibility
1.	**Design Stage Environmental Aspects**	• Choice of appropriate land i.e. not major agriculture land • Choice of environmental friendly technologies • Provision of combined effluent treatment plant • Provision of treatment facilities like recovery and recycling units etc. • Proper sewerage and solid waste management system provision • Adequate roads, sewerage, drainage, electricity etc. in the design • Proper raising of road level to mitigate flood disaster	Proponent & Design Consultant
2.	**Construction Noise Control Plan**	Periodic noise level surveys will be conducted for construction equipment's, operational machinery and vehicles.	Construction Contractor
		All high noise generating activities will be planned during the day time	Construction Contractor
		Use of horns will be banned and construction traffic will be kept to a minimum during night time	Construction Contractor
3.	**Ambient Air Dust Control Plan**	Frequency of sprinkling will be kept such that the dust remains under control.	Construction Contractor
		Water will be sprinkled on all open surfaces to control emission of dust	Construction Contractor
		Dust Emission from aggregate storage stockpiles and soil piles will be reduced by keeping the material moist by sprinkling of water at appropriate frequency or erecting windshield walls around the piles or covering the pile to reduce dust emission.	Construction Contractor

4.	**Soil Erosion**	Construction site will be appropriately marked	Construction Contractor
		The machinery movement will be restricted only to the construction area	
		Measures for soil erosion control (e.g. silt fences, rip rap) will be carried out where necessary during construction	
		The construction sites will be restored as close as possible to their natural (pre-project) conditions after completion of construction activities. For this purpose, a Site Restoration Plan will be prepared that may include the following: Removal of remains, extra construction material, equipment parts cable, or timber Disposal of extra soil Filling of all trenches and pits Repair to damaged or blocked drainage Soil erosion control measures where necessary	
5.	**Water Management**	Potable Water Supply: The provision of drinkable water and safe drinking utensils at various points on the site.	Construction Contractor
		Water Conservation: a) To create awareness and boost the construction workforce to use water carefully and there is no water wastage. b) Negotiate the use of water for any purpose with the appropriate authorities and obtain written approval. c) The contractor will not collect/make use of water from any other source than those designated to them as suitable for use	
6.	**Waste Water Management**	The Contractor will submit a site design of wastewater management system as part of the environmental management plan for prior approval	Construction Contractor
		Water discharged from the works including effluent from sewage treatment, wash water and storm-water from workshops and refueling areas, as well as all runoff from areas with pollution potential will comply with Provincial effluent standards.	
		Plan the layout of batching areas, wash areas, and workshops with the following rules in mind: Improve the layout to lessen disturbance to the environment and to neighbors Concrete slabs need slope towards a conservancy tank so that run-off water can be collected. These tanks must be emptied, at least once in a week or when they are 60% full.	
7.	**Solid Waste Management**	Construction wastes on site must be reused or recycled when possible.	Construction Contractor
		The Contractor must familiarize themselves with the definitions of waste and the Construction handling,	

		storage and transport as suggested in the applicable environmental Contractor legislation	
		On site Integrated waste management will be carried out by applying, in preference Construction order of waste avoidance, reuse, recycling and disposal.	
		Burning of waste material will not be allowed except under special conditions and with Construction earlier approval of the Site Manager.	
		The appropriate facilities must be provided and maintained for waste collection (e.g. Construction bins) at specific locations around the site camp such as the office, garage, parking, Contractor housing facilities and locations where food is consumed.	
		Any spills will be rendered harmless and arrangements made for appropriate collection and disposal including cleaning materials, absorbents and contaminated soils	
		To ensure that spill kits are available on site to clean the leaks and spills.	
		To obtain storage and disposal permits / approvals necessary and comply with the conditions attached.	
8.	**Storage and Handling of Hazardous Substances**	To ensure that only nominated areas are used for the handling/storage of construction materials.	Construction Contractor
		The Contractor will be accountable for the training and education of all staff on site who must be handling the material about its proper use, handling and disposal as well as spill response.	
		A contingency procedure will be developed for dealing of spills	
		Hazardous chemicals used in construction must be kept in secondary containers. The relevant Material Safety Data Sheets (MSDS) must be provided on site.	
		Appropriate and approved facilities for the storage and recycling of used oil and contaminated hydrocarbons must be provided.	

Table 8-3Mitigation Plan for Operation Phase

Sr. No.	Environmental or Social Aspects	Measure	Responsibility
1.	**Air Pollution Management**	The project must be designed so as to Proponent ambient air quality will fall within the levels acceptable for regulatory bodies (i.e. within PEQS and where PEQS are not provided NEQS, international standards must be complied with).	Proponent
		The project must be provided with the appropriate NOx control equipment to minimize the production of NOx.	Proponent
		Dust control mechanisms must be utilized including the following: Electrostatic Precipitators will be installed in the units where necessary for the control of Dust.	Proponent's Environment Manager

2.	**Ground Water Management**	Inspection of Ground water quality must be carried out periodically to check any adverse effect on ground water quality.	Proponent's Environment Manager
		All chemical usage areas and zone areas must be cemented.	
3.	**Waste Water Management**	The Waste Water Treatment Plant must be installed for wastewater treatment.	Proponent's Environment Manager
		Water discharged from the works including wash water, effluents from sewage treatment and storm-water from workshops and refueling areas, and areas of run off with potential of pollution will comply with Punjab Environmental Quality Standards.	
		On regular basis chemical analysis of crops cultivated on treated wastewater will be done once in every crop season to ensure there will be no contamination of food from treated wastewater	
4.	**Operational Noise Control**	Permissible limits, final design of project ensure the level of noise from the operation must be within the level suggested by the manufacturers	Proponent's Environment Manager
		Noise from activities at the zone site during the operation must be within acceptable limits (according to the standards discussed previously), taking into consideration that maintenance activities nay be required at the outside of working hours, for example, in the case of emergencies.	
5.	**Fauna and Flora**	Implementation of Site restoration plan and area ecology up-gradation plan.	Proponent's Environment Manager
		Use of indigenous plants in the premises and provision of green belt in the project boundaries. Fragrance producing trees plantation to evade odor issue (if any).	
		The worker may not harm/kill any wildlife during the operation and maintenance.	
6.	**Solid Waste Management**	Solid wastes generated in project must be reused or recycled up to maximum extent.	Proponent's Environment Manager
		Integrated waste management will be done by applying in preference order of, waste avoidance, reuse, recycling and disposal.	
		The appropriate facilities must be provided and maintained for waste collection (e.g. Bins, containers) at specified areas within project boundary	
		Sorting of waste will be carried out at source (i.e. the separation of glass, tins, paper etc.). Recycled waste of this sort will be collected by a local licensed contractor.	
		These waste bins must be provided with lids and an external closing system to prevent fillings from blowing out, and must be scavenger proof to prevent animals appealed to waste.	
7.	**Storage and Handling of Hazardous Substances**	Any spills will be rendered harmless and arrangements made for appropriate collection and disposal including cleaning materials, absorbents and contaminated soil.	Proponent's OHS Manager
		The OHS Manager will also be accountable for the necessary training, awareness and education of all staff regarding the safe handling and disposal as well as spill response.	

		An emergency procedure for the control of spills must be formulated	
		Hazardous chemicals must be stored in designated containers made up of appropriate material, clearly marked and labelled with appropriate safety sign. The relevant Material Safety Data Sheets (MSDS) must be provided on site.	
8.	**Occupational Health & Safety Management**	A Health and Safety Management Plan will be established to ensure worker safety.	Proponent's OHS Manager
		OHS manager must adhere to the guidelines of the appropriate health and safety legislation & standards.	
		Communication of suitable and obligatory safety measures relating work procedure/instruction of site to all aspects of the operation to workers.	
		The use of PPEs on operation of is mandatory for all personnel while entering in the operational areas of the project.	
		Specific firefighting system must be installed to deal with fire hazard and equipment's must be positioned on sites easily accessible and visible.	
		Speed limits must be followed in all areas of the proposed project including public roads and private property to avoid potential hazard of accident.	
9.	**Hindrance in aviation traffic**	Same of Environmental Management Plan as suggested for construction phase of the project.	

8.6. Waste Management

The Construction contractor/s will be responsible for preparing a waste management A summary is provided in Table 8-4.

Table 8-4Waste Management Plan Summary

No.	Material Waste	Final Disposal Method	Associated Risk	Recommended Procedure
1.	Iron	• Material returned • To store as un-useable • Scrap Store • Recycling	Equipment and parts may be contaminated with oil or other liquids. This may pose hazards during recycling and/or melting,	Separate contaminated parts and ensure disposal contractor cleans and removes contaminations before recycling equipment.
2.	Copper	• Recycling • Scrap Store	Copper wires and tubes may be covered with insulation and may pose hazard if melted	Separate insulated copper from rest and ensure disposal contractor removes it before recycling.
3	Wood, Cotton, Plastic, Waste and Packing Materials	• Recycling • Landfill	Burning of wood, paper, plastic and other materials may cause air pollution Littering due to improper disposal	Ensure waste contractor disposes all non—recyclable plastic wastes and other non—recyclable materials at land disposal.

4.	Electronics	• Material returned to store as un-useable	Some electronic equipment may contain toxic materials and pose a health risk if opened or dismantled.	Ensure contractor disposes equipment properly and equipment is opened only under guidance of qualified professional.
5.	Insulation	Material Re-used Landfill	Burning may cause air pollution. Littering due to improper disposal	Ensure contractor disposes insulation properly at landfill site.
6.	Oil	Recycling Contractors	May cause contamination of soil or waterways	Ensure properly certified recycling contractors are used.
7.	Concrete	Landfill or reuse for filling	None	Ensure safe storage till Disposal

8.7. Monitoring Plan

Environmental monitoring is a vital component of an EMMP. It is the mechanism through which the effectiveness of the EMMP is evaluated. Furthermore, the feedback provided by environmental monitoring is instrumental in identifying any problems and planning corrective actions.

8.7.1. Objective of Monitoring

The main objectives of environmental monitoring during the construction phase of the proposed Project will be to:

- To provide a mechanism to determine whether the project construction contractor/s and the Proponent are carrying out the project in conformity with the EIA and EMMP;
- To identify areas where the impacts of the proposed project are exceeding the criteria of significance and, therefore, require corrective actions.
- To document the actual impacts if the proposed project on physical, biological, and socio-economic/ cultural receptors, quantitatively where possible, in order to design better and more effective mitigation measures; and;
- To provide data for preparing the monitoring report to be submitted to the Punjab-EPA in accordance with the provincial and national legal requirement.

8.7.2. Performance Indicators

Environmental parameters that may be qualitatively and quantitatively measured and compared are selected as 'performance indicators' and recommended for monitoring. These performance indicators will be monitored to ensure compliance with the national or other applicable standards and comparison with the baseline conditions established. A summary of performance indicators, and their applicable standards to ensure compliance, include:

- **Construction Phase:**
    1. Noise levels: PEQS
    2. Wastewater quality: PEQS

- **Operation Phase:**
    1. Ambient air quality (NO2, SO2, PM10 and PM2 5): PEQS
    2. Noise levels: PEQS
    3. Wastewater quality: PEQS

8.8. Environmental Records

The following environmental records will be maintained:

- Periodic inspection reports of Contractor's Environmental Officer;
- Incident record of all moderate and major spills. The record will include:
    - Location of spill;
    - Estimated quantity;
    - Spilled material;
    - Restoration measures;
    - Photographs;
    - Description of any damage to vegetation, water resource;
    - Corrective measures taken, if any; and,
    - Corrective measures taken, if any.
- Waste Tracking Register that will records of all waste generated during the construction and operations: period. This will include quantities of waste disposed, recycled, or reused;
- Survey reports, in particular, the following:
    - Soil erosion: Baseline survey, including photographs (or video), will be conducted to document pre-construction condition of the construction site,
    - Vehicle and equipment noise; and,
    - Ambient noise survey reports.

8.9. Environmental Training

Environmental training will help to ensure that the requirements of the EIA and EMMP are clearly understood and followed by all project personnel in the course of the project. The contractor will be primarily responsible for providing training to all project personnel. An environmental and social training program is provided in Table 8.5. This training program will be finalized before the commencement of the proposed Project.

Table 8-5 Framework for the Environmental and Social Training Program

Types of Training	Training Description	Training By	Personnel to be Trained	Period	Duration
Occupational Health and Safety	Training should be provided to aware staff to conform to safety	External Sources	OHS Manager	Before starting of project activities	Full day (8 hours session)
Occupational Health and Safety	Health, safety and hygiene proper usage of personnel protective equipment precautions to be taken for working in confined areas.	OHS Manager	Workers Staff	Before starting of project activities During Project activities	Full day (8 hours session)

Health, Safety and Environmental Auditing	Procedures to carry out Health, Safety and Environmental Audits Reporting requirements	External Sources	Staff responsible for inspection/ audits	Before starting of project activities	Full day (8 hours session)
Waste Disposal and Handling	Segregation, identification of hazardous waste, use of PPEs, waste handling	External Sources	Relevant workers Relevant Staff	Before starting of project activities	Full day (8 hours session)
Social & Environmental Laws & Regulations, norms, procedures and guidelines of Government	Environmental standards and their compliance Govt. regulations	External Sources	OHS staff managers & supervisor	Before starting of project activities	Full day (8 hours session)
Implementation of environmental management and monitoring plan	Concepts of environmental management and monitoring plan	External Sources	OHS staff managers & supervisor	Once in 3 months during the entire construction period.	Full day (8 hours session)

8.10. Construction and Operation Management Plan

The construction contractor will develop a specific construction management plan (CMP) based on the CMP included in Table 8-6. The CMP will be submitted to proponent for approval. The CMP will clearly identify all areas that will be utilized during construction for various purposes, including:

- Areas used for camp;
- Storage areas for raw material and equipment;
- Waste yard;
- Location of any potentially hazardous material such as oil;
- Parking area; and loading or unloading of Material

Table 8-6 Impacts and Mitigation Measures during Construction & Operation Phase

Subject Area		Potential Impacts During Construction	Potential Impacts During Operation	Mitigation
Physical Environment	**Air Quality**	• Dust from construction activities. • Traffic-related air quality impacts.	• Effects of stacks emissions on ambient air quality. • Traffic-related air quality impacts. • Green House Gas emissions	• Watering of the material stockpiles, access roads and bare soils on an as required basis to minimize dust. • Increase the watering frequency during periods of high risk (e.g. high winds). • Stored materials such as gravel and sand should be covered and confined • Vehicles with appropriate exhaust systems will be used. • Maintenance of all vehicles on regular basis. • Establish and implement vehicle speed limits to minimize dust generation • Cover haul vehicles transporting dusty materials (cement, borrow) moving outside the construction site • Use of specified haulage routes and reduce vehicle speed where required. • Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM10. • Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin.

	Water Resources	• Control and management of site drainage. • Wastewater discharge, Sewage disposal and foul drainage • Effects on groundwater quality.	• Water requirements for operation • Discharge of process and wastewater. • Operation of drainage systems on site. • Discharge of storm water, sewage and drainage	• Stockpiles of potential water pollutants (i.e. oils, construction materials, fuel, etc.) shall be placed so as to minimize the potential of contaminants to enter local watercourses or storm-water drainage. • Preparation of Emergency Spills Contingency Plan. • Storm-water runoff from all fuel and oil storage areas, workshop, and vehicle parking areas is to be directed into an oil and water separator before being discharged to any watercourse. • Rainwater harvesting should be done on the roof top • The water conservation will also be adopted in industries.
	Soils, Geology and Topography	• Effects on soils and topographic features. • Soil contamination	• Soil contamination during construction phase	• Ensure the topography of the final surface of all raised lands are favorable to enhance natural draining of rainwater / flood water • Restore the natural landscape of the construction sites after completion of work
	Land Use, Landscape and Visual Issues	• Impacts on existing land use on site. • Impacts on existing land use in the surrounding area. • Effects of construction • activities on landscape character. • Visual impact of construction activities.	• Impacts on existing land use on site. • Impacts on existing land use in the surrounding area. • Effects on landscape character. • Visual impact of operating facilities.	• Stop work and inform the site manager Immediately if, during construction, an archaeological or burial site is discovered. • It is an offence to restart work in the vicinity of the site until approval to continue is awarded by the plant management. • Resolve landscape change issue in consultation with local leaders and supervision consultants.

Ecological Environment	**Flora**	Loss of natural vegetation and crops	• Impacts on flora due to altered drainage and runoff patterns	• Removal of trees should be limited to the development footprint • Construction activities shall reduce the loss or disturbance of vegetation • Use clear areas to avoid cutting of trees • A procedure shall be prepared to manage vegetation removal, clearance and reuse • Inform the plant management before clearing trees
	Fauna	• Losses of habitat or species due to land lake. • Disturbance or damage to adjacent habitat of species	• Disturbance or damage to adjacent habitat • Effects on birds migration routes	• Project should ensure the safety of various animals at construction and operation camp area.
	Economy Related Impacts	• Impacts on local skilled and un-skilled labor and • businesses.	• Impacts on local labor and businesses	• The increased government revenue could be used to meet objective by improving infrastructure and services in areas local to the project.

	Social Settings and Services Related Impacts	• Demographic changes due to influx of people. • Pressure on existing infrastructure, utilities and services.	• Small scale demographic and cultural changes.	• Safe, reliable water supply, Sufficient housing for all. • Treatment facilities for sewerage of toilet and domestic wastes • In-house-community entertainment facilities.
	Public Health Related Impacts	• Traffic congestions and disruption to road users • Health impacts due to • construction related dust and • air emissions and • wastewater/effluents release • Traffic-related air quality. • Traffic-related noise	• Health impacts due to air emissions and noise and effluents released. • Traffic-related air quality impacts. • Traffic-related noise impacts.	• Implement proper safety standards. • Provide personal protection equipment (PPE) for staff, such as safety shoes, helmets, masks, gloves, protective clothing, goggles, full—face eye shields, and ear protection. • Maintain the PPE under a regular checking and replacement program. • Provide safe and healthy work environment to workers, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas.
	Occupational Health safety	• Accidents. Effects on health of workforce. Safety at work.	• Accidents. • Effects on health of workforce. • Safety at work.	• A traffic management plan will be developed by the construction contractor to prevent incidents of accidents which may occur due to transportation of machinery and equipment to the project site. • Undertake a full project community risk assessment followed by the development of a community emergency preparedness and response plan appropriate to its findings

	National and Regional Impacts	• Human resources developmer • Economic development at regional and national level	• Industrial development in Punjab and Pakistan • National and regional (Punjab) power cities • Impacts on regional and national air quality	• The increased government revenue could be used to me development objective by improving infrastructure a services in areas local to the project
	Global impacts	Purchase of equipment and machinery from global marke • Hiring the international contractors and consultants	• Green-house gas emission and climate change • Impacts on global air quality and global warming	• Maintenance of all construction machinery on regular basis • Use of machinery with appropriate exhaust system • In order to control the particle emission all stages filtering system, duct collectors or humidification or other techniques(as applicable) to the concrete batching and mixing plant will be provided.

8.11. Environment Management Team

Following functionaries will be involved in the implementation of EMMP:

- The project Proponent as owners of the EMMP.
- Project contractor(s) as executors of the EMMP during installation and operational phase of the project.

Operational & Maintenance (O&M) and the Health, Safety and Environment team of the project as an executor of the EMMP during the installation and operational phase of the project.

Table 8-7 List of Individuals and their Responsibilities

Sr.	Designation	Responsibilities
1	Sr. Manager HSE	HSE Supervision
2	Manager HSE	Ensure EMP implementation
3	Assistant Manager	Operational management and control
4	Dy. Manager	Supervision and monitoring

9. INVOLVEMENT OF STAKEHOLDER'S / PUBLIC CONSULTATION

9.1. Introduction

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

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

9.2. Principles of stakeholders Consultation

For this EIA, the stakeholder's consultation activities were executed based on the following principles:

- Transparency;
- Openness;
- Accessibility; and,
- Inclusion.

9.3. Benefits and Objectives of Stakeholder's Consultation

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

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

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

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

9.4. Identification and Classification of Stakeholders

During the field survey, significant efforts were made to identify the possible categories of stakeholders and their stakes. Identification of stakeholders is important for the sustainability of a developmental project and helps to evaluate and envisage the role of stakeholders. The influence or impact of the project on stakeholders can be elaborated in the form of a matrix and the mitigation measures are proposed accordingly. All the stakeholders had different types of stakes according to their professions.

9.5. Methodology for Consultation

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

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

9.6. Key Consulted Stakeholders

The stakeholders consulted in this case are public as well as environmental experts and individuals working in profession of environment.

9.6.1. Responsible Authority

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

9.6.2. Other departments and agencies

For the impact analysis detailed meetings of local community, education institutes, health institutes, hospital and NGOs were held with the management. Issues were discussed that may affect the environment and also the implementation of proposed project. All possible mitigation measures were considered and incorporated in the Environmental Management Plan. Scoping sessions, focused group discussion and way side consultations were held with the relevant stakeholders in the area. The purpose of such consultations is to obtain the feedback from the relevant persons.

9.6.3. Environmental Practitioners and Experts Team

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

9.6.4. Affected & Wider Community

There is no affected community present in the radius of our study area.

9.6.5. Summary of Concerns of Consulted Stakeholders

The summary of stakes of consulted stakeholders is given below.

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

10. CONCLUSIONS AND RECOMMENDATIONS

The establishment of this vertical lime kiln plant is expected to significantly contribute to the national economy and meet the growing industrial demand for quicklime. By purchasing limestone from the open market, the project will support the regional economy, reduce transportation costs, and generate local employment opportunities. This industrial development is a valuable step towards better resource utilization and fostering economic growth in the area.

While the project offers substantial benefits, it is important to acknowledge the potential for adverse environmental impacts during all phases. The majority of these impacts, particularly during construction, are temporary. However, with the proactive adoption of suitable mitigation and remedial measures outlined in this EIA Report, these potential impacts can be effectively avoided or minimized.

Recommendations

Based on the findings of this EIA study, the following recommendations should be adopted:

- **Implementation of Mitigation Measures:** All mitigation and remedial measures proposed in this report must be strictly implemented to prevent and minimize potential environmental impacts.
- **Adherence to EMMP:** The Environmental Management and Monitoring Plan (EMMP) must be fully implemented and enforced throughout all three project phases. This plan should be made a binding part of all contractor documents to ensure proper execution.
- **Personnel Training:** Mandatory training programs should be arranged for all working personnel and contractors before construction begins. This training will ensure they are fully aware of their onsite responsibilities regarding all environmental and social issues.
- **Tree Plantation:** A comprehensive tree plantation plan should be developed and followed to enhance local green cover and biodiversity.

APPENDICES

Appendices-I: Glossary

Act means the Pakistan Environmental Protection Act, 1997.

Contaminationis introduction of impurities in the environment.

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

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

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

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

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

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

Regulations means the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environment Impact Assessment Regulations, 2022.

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

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

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

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

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

LIME KILN: A lime kiln is a type of oven used to create lime by burning limestone or other calcium carbonate materials at high temperatures. This process, called calcination, decomposes the calcium carbonate into quicklime (calcium oxide) and carbon dioxide. Quicklime is then used

in various applications like construction (mortar, plaster), agriculture (soil amendment), and industrial processes.

Appendices-II: List of Abbreviations

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

Appendices-III: Environmental Map

Appendices-IV: References

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- The Pakistan National Conservation Strategy, Environment and Urban Affairs 'Division (Presently-Ministry of Environment, Urban Affairs and Wild Life), Government of

Pakistan, Islamabad.

- Punjab Environmental Quality Standards for Drinking Water.
- PunjabEnvironmentalQualityStandardsforMotorVehicleExhaustandNoise.
- Punjab Environmental Quality Standards for Ambient Air.
- STANDARD HANDBOOK OF ENVIRONMENTAL ENGINEERING, BY Robert A.Corbitt, 1989, McGraw-HILL, INC.; New York, USA.
- Topographical Maps of Punjab.
- Punjab Environmental Quality Standards for Noise.
- The Canal and Drainage Act, 1873.
- The Punjab Plantation and Maintenance of Trees Act, 1974.
- The Punjab Wildlife (Protection, Preservation, Conservation and Management) Act and Rules, 1974.
- Information and data provided by the project proponent.
- Technical design data related to the project.
- Information gathered through discussions with the project related persons of the project proponent.
- 29.“Guidelines for Self-Monitoring and Reporting by the Industry (SMART),” Final Report, March 1998, approved by PEPC, August 1999
- https://mnm.punjab.gov.pk/important_minerals_occurring_in_punjab#14
- https://en.wikipedia.org/wiki/Marl

Appendices-V: Terms of Reference of Environmental Reports

TERMS OF REFERENCE FOR EIA REPORT

The agreement hereinafter called Agreement, is made between HTMA (Pvt.) Ltd. (Consultancy Firm/Consultant) and Sangha Premier Chemical Industries Pvt. Ltd (Propone) to prepare and carry out follow up of Environmental Study Report for obtaining Environmental approval under Section 12 of Punjab Environment Protection Act 1997 (Amended 2017) for proposed project of "**INSTALLATION OF VERTICAL LIME KILN FOR THE CALCNATION OF LIMESTONE NEAR KATHA MASRAL, DISTRICT KHUSHHAB"**.

The client has requested the consultancy firm to provide consultancy service to prepare and follow up of EIA Report and so that client may obtain Environmental Approval from EPA, Punjab under the Section 12 of PEPA 1997 (As Amended 2017) so mutually agreed terms and conditions are as under:

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

- The client shall provide assistance and access to the information contained in the feasibility study, layout plan and other project relevant documents as and when required by the consultancy firm/consultant for performance of his obligations.
- The client shall provide all available data, maps, reports, etc. about the project including but not limited to layout plan of the project. Client will provide Lab Test Reports from EPA certified lab including noise level monitoring, wastewater analysis and air emissions report or any report/document/information demanded by the EPA.
- The client will provide to the consultancy firm with the letter of introduction and authorization and other documents as may be needed to enable consultancy firm consultant to perform the service.
- Responsible to pay all the dues of the consultants as per the agreed terms and conditions.
- The consultancy firm/consultant shall carry out the services in accordance with the provisions of the agreement including:
- Shall follow up the EIA/EIA Report and other file required with due diligence necessary/required for obtaining its approval from EPA Punjab under the statutory requirements of PEPA 1997 (amended in 2017).
- Shall give the consultancy for the preparation of the detailed Environmental Management & Monitoring Plan for enhancing the environmental conditions during installation and operational phases such as mitigation measures for wastewater, solid waste, air emissions, plantation, management of surface runoff, mitigation of socially adverse impact, if any.
- Will evaluate all the activities during the installation and operational phases and recommend suggestions/actions to comply with PEQS.
- Will follow up the EIA/EIA Report and file documents considering information/documents

provided by the client.

- Shall examine the entire activities and list of the details of activities likely to cause adverse impacts during and after installation phase.
- Shall suggest mitigation measures for all such activities which may cause adverse impacts.

For and Behalf of	For and Behalf of
HTMA Pvt. Ltd	Sangha Premier Chemical Industries Pvt. Ltd. (Proponent)

Appendices-VI: Consultant Team

HTMA (Pvt.) Ltd. is a business entity manned by geoscientist, environmentalist, Technological & mineral clustering experts, surveyors and IT experts. The company has a wide range of experience in mining, regulatory regime, drafting of technical agreements, service agreements, management of mining, teaching & training, planning and development, IEE and EIA reports, preparation of feasibility reports and their implementation.

The Consultants preparing this report are specialists in the fields of geology, geological mapping, exploration, Mineral Resource estimation and classification, open pit mining, geotechnical and environmental field. Some of the listed areas highlight the chapters of services:

- Economic Geology
- Determination of geological exploratory techniques
- Mine design
- Selection of mine machinery and equipment
- Mine Development
- Mine Management
- Rescue and Recovery services
- Mine surveying & interpretation of boundary disputes
- Minerals processing
- Preparation of feasibility reports
- SWOT Analysis
- Establishment of Mining Villages and Mineral Cities
- Environmental Impact Assessment and Rehabilitation Studies
- Human resource development
- Legal opinion on mine regulatory regime
- Energy fuels and their selection on techno economic parameters
- Special focus on coal and rock salt mining
- Drilling and blasting for underground and surface mining techniques
- Safety measures for mines operation
- Consultancy relating to manufacturing, marketing & service areas

The contact information of the consultant is presented in Table.

Company	HTMA (Pvt.) Ltd.
Address	81-A Bridge Colony, Lahore Cantt
Representative	Engr. Harris Naeem
Designation	Director Operations
Contact	0304 0444440
e-Mail	**harris.naeem@hitechma.com**
Website	**www.hitechma.com**

Appendices-VII: Lab Reports

Appendices-VIII: Plantation Estimates

The development of green belts serves not only as foreground and background landscape features, resulting in harmonization by amalgamating the physical structures of the project site with the surrounding environment, but also functions as a pollution sink.

- **Objectives**

It is necessary to develop green belt in and around the project site with suitable plant species to achieve following objectives:

- To combat the air pollution effectively.
- To improve the quality of local as well as regional air.
- To avoid problems of soil erosion, noise and dust etc.

There will be no tree cutting at site due to project operations. Hence, there will be no disturbance to vegetation. In addition, the proponent will do plantation as a potential environmental enhancement measure.

Following plantation plan will be followed during project's lifecycle.

Item	Description
Spacing between two plants	2.0m×2.0m
Total plantation duration	Till Project Tenure
Total no. of samplings planted	100/- No.s.
Species of plants may be planted	Ornamental Plants/Indigenous Species

Noted that the plantation will start from first year and will only be carried out till project period subjected to the agreement between proponent and consultant and consent of the landowner.

- **Criteria for Selection of Plants Species**

The plant species will be planted based on their ease of availability in the local market and their suitability of growth in the project area. Mostly indigenous species will be preferred.