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EIA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

M/S. SANGHA CHEMICALS COMPANY

**“CONSTRUCTION OF SULFURIC ACID PLANT BY
M/S SANGHA CHEMICALS COMPANY OVER AN
AREA OF 151.59 ACRES, NEAR DHAMAN,
DISTRICT KHUSHAB”**

**HTES-EIA-SAP-KHB-14323
2023**

HI-TECH ENVIRONMENTAL SERVICES (PVT.) LTD.



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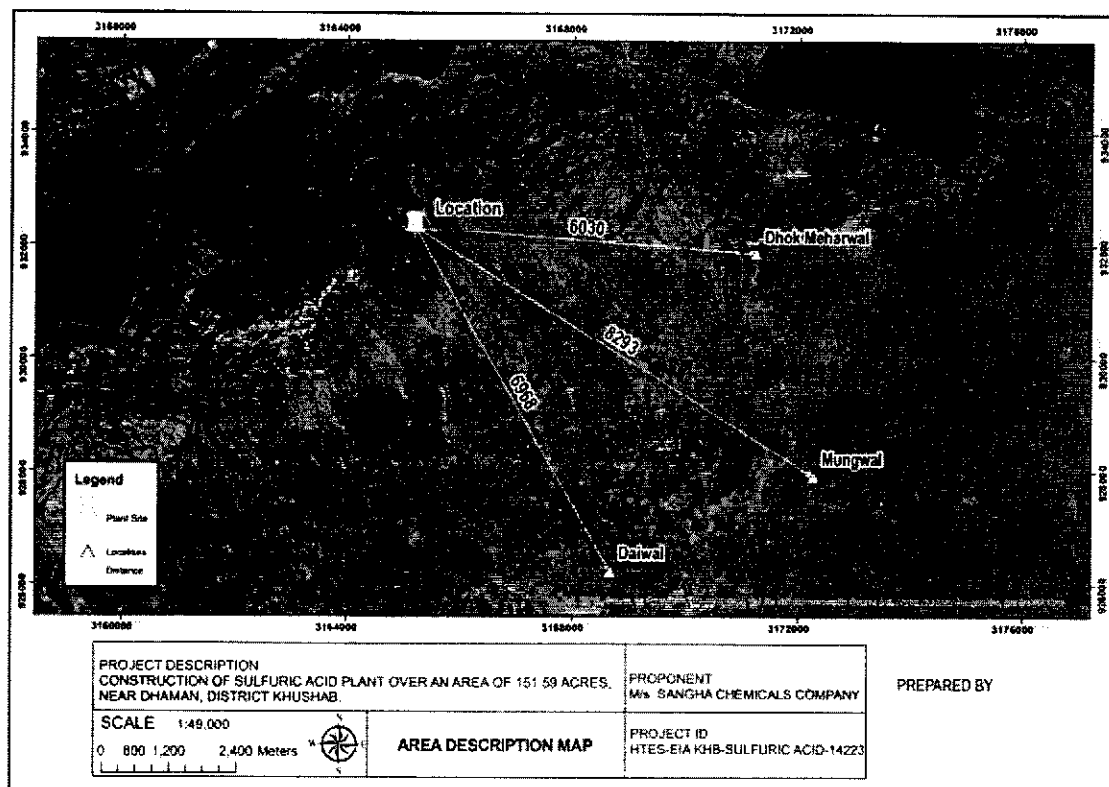
EXECUTIVE SUMMARY

Title and Location of the Project

M/s Sangha Chemicals intends to Construct a Sulphuric Acid plant under the title of "M/S Sangha chemicals Company, near Dhaman, District Khushab.

As per Punjab Environmental Protection Act 1997 (amended 2012) and Initial Environmental Examination (IEE) & Environmental Impact Assessment (EIA) Regulations, 2000 the said project falls in the **Under Clue 7 of Category-B (Construction of Sulphuric Acid plant with total cost of Rs.80 million and above) of Schedule II**

The plant is located near Limited near Shah Bahoot Off Lilah Interchange, Link Road, Daiwal, District Khushab .The google earth map showing the boundary of the lease is shown in Figure below. A more detailed colored google earth image is presented in **Annexure III** on A3 size.





Name of the Proponent

M/s Malik Ghulam Rasool Sangha. is the proponent of the proposed project that is Construction of Sulphuric Acid Plant. The contact details of the representative is as shown below:

Company Name	M/s Sangha Chemicals Company
Address	Purana Lari Adda, District Khushab.
Representative	Mr. Malik Ghulam Rasool Sangha

Name of Organization Preparing the Report

Hi-Tech Environmental Services (Pvt.) Ltd. is a business entity managed by geoscientists. The company has the expertise of highly diversified experience and as such the business company with the sole proprietorship has a wide range service area as follows:

- a) Economic Geology
- b) Determination of geological exploratory techniques.
- c) Mine design
- d) Selection of mine machinery and equipment.
- e) Mine development & management.
- f) Preparation of feasibility reports, IEE report, EIA reports, Development Schemes & Prospecting Scheme.
- g) Preparation of reports on HRD /Mines Rescue & Recovery.
- h) Assessment of Impact of Mining on environment and mitigating measures.
- i) Mine surveying & interpretation of boundary disputes.
- j) Legal opinion on mine regulatory regime.
- k) Energy fuels and selection of choice fuels for specific energy
- l) Expertise in coal and rock salt mining.
- m) Drilling and blasting for underground and surface mining techniques.
- n) Safety measures for mines operation.
- o) Specific alloys and their significance in the use of mine machinery.
- p) Any kind of consultancy relating to manufacturing, marketing and service areas.



Contact Details	
Consultant Company	Hi-Tech Environmental Services
Address	26 B Zahoor Elahi Road, Gulberg II, Lahore
Representative	Advocate Chaudhry Awais Ahmed
Contact	(+92) 3219443210
e-Mail	consultantshtma@gmail.com info@hitechma.com

Brief Outline of the proposal

As per Punjab Environmental Protection Act 1997 (amended 2012) and Initial Environmental Examination (IEE) & Environmental Impact Assessment (EIA) Regulations, 2000 the said project falls under Clue 7 of Category-B (Construction of Sulphuric Acid plant with total cost of Rs.80 million and above) of the projects mentioned in Schedule II.

The current project is about Construction of Sulphuric acid. Site selected for proposed project is located within the existing premises of M/s Sangha Chemicals Ltd and under the ownership of company. The capacity of said plant is 50 tons per day. The estimated project cost is **PKR 80 million approx.** the breakdown of the project cost and detail process of the proposed project is given in Chapter 04 of this EIA Report.

- **Objectives of the Project**

Objectives of the construction of the subject project are:

- To establish and increase the business for the proponent.
- To contribute to the national economy of the country.
- Compensate to help poverty by providing more employment.
- To meet the increasing demand of the agriculture sector.

- **Project Cost**

The estimated project cost is PKR 80 million approx. the breakdown of the project cost and detail process of the proposed project is given in Chapter 04 of this EIA Report.

Impacts and Recommended Mitigation Measures

In order to identify all the impacts associated with the Construction and operational activities of the project with potential to cause adverse environmental impacts, a thorough review has been conducted, although there is negligible chance of any adverse impact occurrence on the surrounding environment. However, in case of impact arises from the



project activity possible necessary measures will be adopted to control the same. Overall the proposed project has positive environmental & social impacts. The said project may have some adverse environmental impacts during Construction phase of minor magnitude which will be controlled through mitigation measures proposed in Environmental Management and Monitoring Plan (EMMP).

Moreover, no removal of the vegetation will be carried out on-site. Moreover, it is envisaged that, there will be no adverse environmental impacts is being anticipated during the operation of said project.

Proposed Impacts and their Mitigation Measures

Environmental Aspects	Impacts and Mitigation Measures	
	Impacts	Mitigation Measures
Economy Improvement	During construction Phase, through the use of locally available materials including cement, building blocks, metals, concrete, electrical cables, etc. The project continues towards the growth of economy by contributing to the gross domestic product.	• No mitigation required.
Employment Opportunities	• With the implementation of the project, there are employment opportunities for casual workers from the local community. The exact number of workers to be hired will depend on the magnitude of construction activities. • Unskilled workers also gain some skills that will help them in the future.	• No mitigation measures required.



Relocation of Utilities	The construction of the project will not relocate the existing public utilities. Hence, no rehabilitation or site restoration will be required.	• No mitigation measures required.
Noise Pollution	The construction works, delivering building materials by heavy trucks and the use of machines and equipment such as concrete mixers will contribute to high level of noise within the construction site and the surrounding area.	• Regular maintenance of the electric parts will be carried out • Unnecessary blowing of horns will be strictly prohibited. • Workers will be provided with personal protective equipment in areas of high noise levels.
Dust Emissions	Particulate matter emitted during construction activities and gaseous emissions from site generators and transportation vehicles can result in deterioration of ambient air quality in the vicinity of the project site, and be a nuisance to the surrounding workers.	Sprinkling of water on dusty tracks and surfaces is recommended; Vehicle speed restrictions should be applied in the project area; Raw materials should be transported in covered trucks;
Solid-waste Management	Improper waste management may generate health and aesthetic issues	Proper solid waste management plan should be devised and implemented; Constructional waste should be utilized for road filling and maintenance. Domestic waste should be disposed of properly, handed over to contractors, placed in bins.



1 INTRODUCTION

Purpose of the Report

This report has been prepared to conform to the requirements of the Punjab Environmental Protection (Amendment) Act 2012 (PEPA), which states that:

"No proponent of a 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."

It is of utter importance to examine the environmental impacts, both beneficial and adverse, of the proposed project, and to recommend and propose mitigating measures to prevent, minimize or mitigate such impacts. The EIA study of the proposed project is necessary to assess the environmental consequences of the extraction at the proposed sites and to suggest appropriate, practical and site-specific mitigation as well as enhancement measures.

This EIA Report provides relevant information, as required under the officially approved format, to facilitate the decision makers i.e., EPA Punjab for the issuance of Environmental Approval/NOC.

The objectives of EIA study are to:

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



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

This EIA Study presents the Environmental Impact Assessment (EIA) for this proposed Sulphuric Acid Plant. For this purpose, the proponent has engaged environmental consultants, M/s Hi-Tech Environmental Services (Pvt.) Ltd.

This EIA Report provides relevant information, as required under the officially approved format, to facilitate the decision makers i.e. EPA Punjab for the issuance of Environmental Approval/NOC.

Identification of the Project and Proponent

1.1.1 Details of the Project

M/s Malik Ghulam Rasool Sangha intends to Construct a Sulphuric Acid Plant under the title of "Construction of Sulphuric Acid Plant by M/S Sangha Chemicals Company, near Dhaman, District Khushab Details of the Proponent are as follows

Table 1-1 Details of the Proponent

Company Name	M/s Sangha chemicals
Address	Purana Lari Adda, District Khushab.
Representative	Mr. Malik Ghulam Rasool Sangha

Details of Consultant

Hi-Tech Environmental Services (Pvt.) Ltd. is a business entity managed by geoscientists and environmental experts. The company has the expertise of highly diversified experience and has completed a total of more than 500 environmental studies across Punjab. The consultant has a range of expertise available in following areas:

- a) Economic Geology
- b) Determination of geological exploratory techniques and mine design
- c) Preparation of feasibility reports, IEE report, EIA reports, Development Schemes & Prospecting Scheme.
- d) Preparation of Environment Management Plans
- e) Preparation of reports on HRD /Mines Rescue & Recovery.
- f) Assessment of Impact of mining on environment and mitigating measures.
- g) Mine surveying & interpretation of boundary disputes.
- h) Legal opinion on mine regulatory regime.
- i) Energy fuels and selection of choice fuels for specific energy



- j) Drilling and blasting for underground and surface mining techniques.
- k) Safety measures for mines operation.

Table 1-2 Details of the Consultant

Contact Details	
Consultant Company	Hi-Tech Environmental Services (Pvt.) Ltd.
Address	26 B Zahoor Elahi Road, Gulberg II, Lahore
Representative	Chaudhry Awais Ahmed Director Operations and Legal
Contact	(+92) 3219443210
e-Mail	consultantshtma@gmail.com info@hitechma.com

The team carrying out the research project is presented in the Table 1-3.

Table 1-3 Team Carrying Out the Study

Sr.	Name	Qualifications & Brief Experience	Roles Assigned
1	Aeerena Naqshedil Khan	Environmental Scientist M.s Environmental Science	• Preparation of Environmental Management Plan (EMP) • Preparation of Environmental Monitoring Plan (EMP) • Author of EIA Report
2	M. Hamza Tariq	B.s Hon. Environmental Science	• Author of EIA Report • Development of Maps
3	Maryam Nazir	Mining Engineer and GIS Management B.Sc. Mining Engineering	• Development of Maps
4	Ch. Awais Ahmad	LLM (London)	• Site Visits • Legal Reviews • Coordination with Locals
5	Engr. Harris Naeem	B.Sc. Mining Engineering	• Mining Techniques

Brief Description of the Project

The proposed project is the "Construction of Sulphuric Acid plant" having capacity of 50 tons /day. The proposed project site is within the existing facility of M/s Sangha Chemicals Company, near Dhaman, District Khushab. The estimated cost of the proposed project is PKR 80 million approx. Google Earth Map showing the project location is attached below as Figure-1.

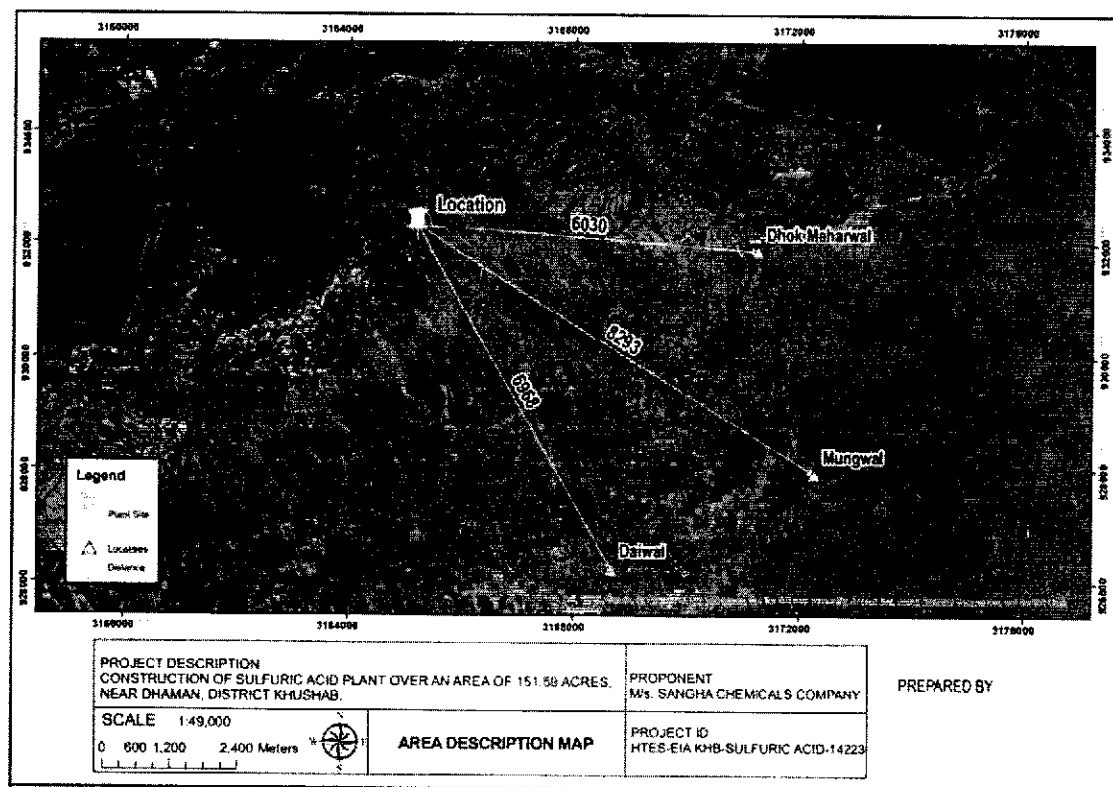


Figure 1-1 the location of Project Showing Sulphuric acid Plant Applied for Areas



2 SCREENING AND SCOPING

Details of Consultant

Hi-Tech Environmental Services (Pvt.) Ltd. is a business entity managed by geoscientists and environmental experts. The company has the expertise of highly diversified experience and has completed a total of more than 150 environmental studies across Punjab. The consultant has a range of expertise available in following areas:

- l) Economic Geology
- m) Determination of geological exploratory techniques and mine design
- n) Preparation of feasibility reports, IEE report, EIA reports, Development Schemes & Prospecting Scheme.
- o) Preparation of Environment Management Plans
- p) Preparation of reports on HRD /Mines Rescue & Recovery.
- q) Assessment of Impact of mining on environment and mitigating measures.
- r) Mine surveying & interpretation of boundary disputes.
- s) Legal opinion on mine regulatory regime.
- t) Energy fuels and selection of choice fuels for specific energy
- u) Drilling and blasting for underground and surface mining techniques.
- v) Safety measures for mines operation.

Table 2-1 Details of the Consultant

Contact Details	
Consultant Company	Hi-Tech Environmental Services (Pvt.) Ltd.
Address	26-B, Zahoor Elahi Road, .
Representative	Advocate Chaudhry Awais Ahmed
Contact	(+92) 3219443210
e-Mail	consultantshtma@gmail.com info@hitechma.com

The team carrying out the research project is presented in the Table 2-2.



Table 2-2 Team Carrying Out the Study

Sr.	Name	Qualifications & Brief Experience	Roles Assigned
1.	M. Hamza Tariq	Environmental Scientist B.S Hon. Environmental Science	• Preparation of Environmental Management Plan (EMP) • Preparation of Environmental Monitoring Plan (EMP) • Author of EIA Report
3.	Maryam Nazir	Mining Engineer and GIS Expert B.Sc. Mining Engineering	• Development of Maps
3.	Ch. Awais Ahmad	LLM (London)	• Site Visits • Legal Reviews • Coordination with Locals
4.	Engr. Harris Naeem	B.Sc. Mining Engineering	• Mining Techniques

Screening

Section 12 of Punjab Environmental Protection Act (PEPA), 1997 (Amended 2012) states:

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

As per Review of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Regulations, 2000 made under Section 12 of Punjab Environmental Protection Act, 1997 (Amended 2012), current project (sulphuric acid plant) falls under Schedule II (List of projects requiring EIA).

Scoping

2.1.1 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 2-3 kilometers from population centers and all the parameters are within PEQS. No environmental sensitive area is present that could be impacted due to the current project.

2.1.2 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 trees around the facility should be planted to control air pollution.

2.1.3 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

Site Alternatives, their Selection and Rejection Criteria

For Construction of Sulphuric acid plant besides the economic viability; environmental sustainability and social soundness of the proposed project has also been considered while analyzing different alternatives. The site selected for current project is present within the existing facility of M/s Sangha Chemicals Company. Moreover, the basic infrastructure facilities, i.e. metalled road network, proximity to electric transmission system, manpower, project economic viability with reference to specific site, land use policies, further expansion possibilities, and etc. are favorable on proposed site.

From the standpoint of environmental sustainability, the site selection is based on numerous factors including proximity from source of wastewater, at a safe distance from residential & protected areas. Two sites were considered but one is closer to the designated colony for people, because it was not possible to maintain the safe distance there, therefore this site was cancelled later on. The other site has almost no residential houses in its premises and is also in close proximity of existing unit, no land use change is being foreseen due to implementation of said project & site is already under the ownership of the Proponent. The site is suitable for implementation of said project owing to the following characteristics:

- Transportation infrastructure (road network) is available
- Safe distance from sensitive receptors (residential area & protected area)
- The selected site is under the ownership of the proponent.
- No land use change is being foreseen due to implementation of said project

Design/technology alternatives, their selection and rejection criteria

The proposed development will be constructed using modern, locally and internationally accepted technology and materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors. The concrete pillars and walls will be made using locally sourced stones, cement, sand (washed and clean), metal bars and fittings that meet the quality standards requirements. There are two basic technologies which can be used for the production of sulphuric acid, The comparison of them is given below:



Table 3-1 Technology Comparison

Comparison of MBBR and ASP		
Single Contact Single Absorption	Double Contact Double Absorption	Remarks
1. Flexibility in Operation		
Single Contact single Absorption is not flexible enough to handle shock loads thus making it less efficient.	Double Contact Double Absorption can handle shock loads more efficiently, thus providing a clear effluent on a consistent basis	Due to the huge variations in flow and characteristics, flexibility of operation is of paramount importance.
2. Removal Efficiency		
Single Contact Single Absorption efficiency is good but it requires uniform characteristics of influent	Double Contact Double Absorption is equally efficient in terms of removal efficiency	Both technologies are good, in terms of efficiency.
3. Area Footprint		
Single Contact Single Absorption requires less area in terms of tank volume as compared to ASP	Double Contact Double Absorption requires larger area but have very small footprint as compared to other technologies	Double Contact Double Absorption is considerably more efficient than Single cell
4. Chemicals requirement		
It requires additional chemicals for its operation	Double Contact Double Absorption does not require additional Chemicals.	Double contact is more efficient than single contact in terms of chemical use

Both technologies are equally efficient and have their own advantages, disadvantages and are being used worldwide. Single Contact Single Absorption is a promising technology for achieving the production of sulphuric acid, relatively easy to operate & maintain, durable & renowned technology worldwide and also can handle shock loads efficiently. Trained personnel / operators in operational phase are required to operate the plant and for maintaining the process sustainable. Proper supervision must be ensured for keeping the food to microorganism ratio maintained, recycling of activated sludge and aeration requirement to make it successful.



Environmental Alternatives, their selection and rejection criteria

The said project is being proposed for the construction of Sulphuric acid plant. Sustainable manufacturing of Sulfuric Acid is deeply co-related with economically-sound processes that minimize negative environmental impacts and are highly energy efficient. Sustainable manufacturing of Sulfuric Acid also leads to greater manufacturing safety standards thereby enhancing compliance standards. Furthermore, environmental impacts must also be considered, E.g., if the excess heat and superheated water used in Frisch process is discharged into the environment, it can cause thermal pollution due to its intense heat therefore it is recycled. As well as this, SO₂ produced during smelting is sent to chemical plants to be used in the Contact process over being released into the atmosphere. Correspondingly, the extraction of large amounts of Sulphur during mining results in the formation of large underground caverns which can possibly collapse upon themselves resulting in land subsidence. While Sulphur itself is non-toxic and odorless, it easily oxidizes to Sulphur Dioxide and reduces to Hydrogen Sulfide, both are dangerous air pollutants even at low concentrations; care must be taken to avoid these reactions.

Economic Alternatives, their selection and rejection criteria

The technology selected for installation of above stated project is costly than a few available alternatives but less costly as compared to majority of the other available treatment technologies but it is most efficient and convenient to use.



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.

Objectives of the Project

The overall aim of proposed project is to reduce the pollution load and protect the environment by adopting water conservation measures. After treatment water can be reused in process, horticultural activities and water sprinkling at un-paved roads. Moreover, Project objectives are as follows;

Objectives of the construction of the subject project are:

- To establish and increase the business for the proponent.
- To contribute to the national economy of the country.
- Compensate to help poverty by providing more employment.
- To meet the increasing demand of the agriculture sector

Location and Site Layout of the Project

To define the boundaries of the EIA study, location and site layout map is prepared The plant is located near Dhaman, District Khushab. The estimated cost of the proposed project is PKR 80 million. The google earth map showing the boundary of the lease is shown in Figure below. A more detailed colored google earth image is presented in **Annexure III** on A3 size.

The proposed plant site boundary primarily falls within mainly inhabited and presently unused area. The coordinates of the Plant area are given in Table No. 4-1.

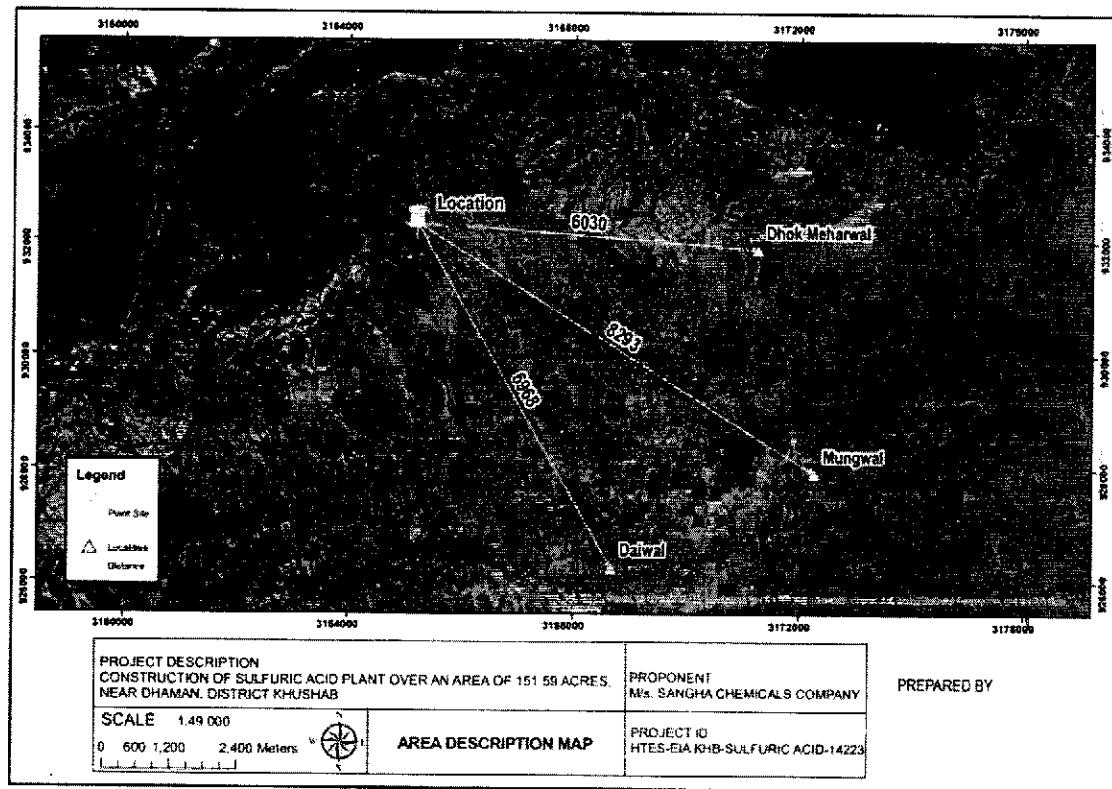


Figure 4-1 Area of Proposed Plant



The distances of major locations from project site are shown in Table.

Table 4-1 Distance of the Important Areas from the Project Site

Location	Approximate Distance (KM)
POPULATION CENTERS	
Dhaman	5.29
Pail	6.86
Dheri Aja	6.36
Arara	12.38
Katha Masral	10.31
Malwal	14.82
INDUSTRIAL PROJECTS	
Sohni Industries Pvt. Ltd.	30.02
Qaisar Salt Industries	More than 40
WATER BODIES	
Jahlar Lake	40.07
Khabakki Lake	26.11
FOREST AREAS	
Kotukka Reserved Forest	19.98
Khabbakki Reserved Forest	24.46
Mardwal Forest	34.48

Land Use on the Site

The proposed site is open land and present within the premises of M/s Sangha Chemicals Company.

Road Access

The preferred site is near Chakwal Road, District Khushab Punjab. This site is accessible through Chakwal Road.

Vegetation Features of the Site

The topography of the project area is flat and it is barren open land with few herbs & shrubs species that will be removed for installation of proposed project. Moreover, tree plantation will be done along boundary after completion of construction. The flora in project area includes; Desi Kikar, Neem, Shaisham, berry and wild grasses.

For the construction of said project site will be cleared and it will be re-vegetated after proposed plant Construction. Plantation will be done in all open spaces and surroundings of project site



Cost and the Magnitude of Operation

The cost of the proposed Sulphuric acid plant is PKR 80 Million approximately and the break-down of the cost is given below in Schedule of Implementation Table.

Table 4-2 Cost Breakup

Sr.	Description	Amount
1	Office and Labor Shed	1,000,000
2	Access road	1,000,000
3	Plant Development	30,000,000
4	Machinery & Equipment	20,000,000
5	Land Infrastructure	10,000,000
Total Development Cost		80,000,000

The magnitude of operation includes:

- Detailed site survey, planning and demarcation of the various regions in the project area.
- Site suitability assessment.
- Process, electrical and civil designing.
- Purchase and delivery of equipment.
- Civil construction.
- Mechanical and electrical erection.
- Testing and commissioning.
- Plantation of various ecologically important species on the designated green space.

4.1.1 Schedule of Implementation

The tentative project implementation schedule is 06 months.

Description of the Project

M/s Sangha Chemicals Company intends to Construct Sulphuric Acid Plant under the title of "Construction of Sulphuric acid Plant by M/s Sangha Chemicals Company, near Dhaman, District Khushab.". The main goal of proposed project is the production of sulphuric acid and create employment opportunities and stabilize the economy.

Process Flow Chart

The process flow chart explains the production of sulfuric acid in a sulphuric acid plant is shown in figure 4-2. More detailed layout map is attached as **ANNEXURE-VIII**.

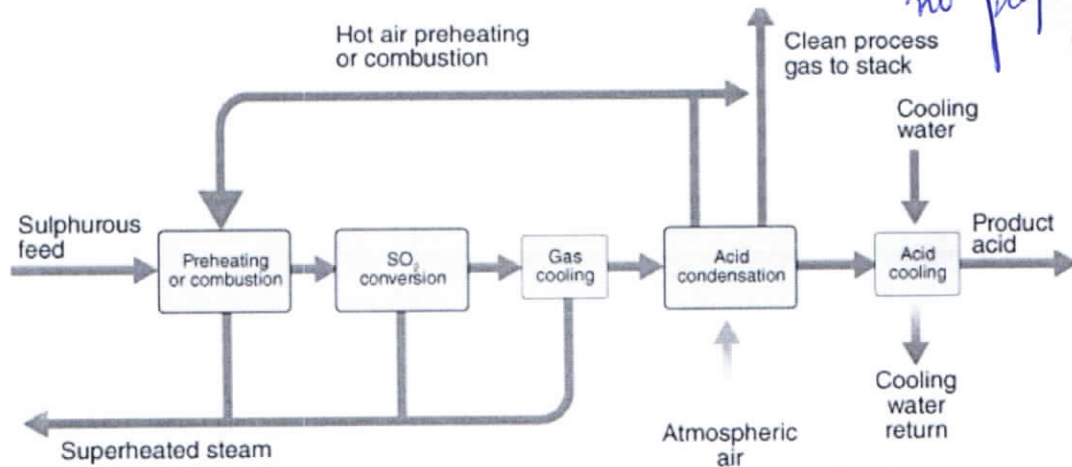


Figure 4-2 Process Flow Diagram

Technology

The following technology is selected based upon following factors:

4.1.2 Designing Parameter

The said treatment plant is designed for the treatment of wastewater generated from: boiler house, process house & mill house at the rate of 2400 m³/day based on various parameters given in Table

Table 4-3 Designing Parameters

Sr.#	Parameters	Concentration
1	Sulphuric acid Production	50 m3 per day
2	Dry Air input	7725.3 MW/K
3	Molten Sulphur Input	749.7 MW/K
4	Furnace Output	7871.8 MW/K

Components of Sulphuric Acid Plant

Following are the components of the Sulphuric Acid Plant:

4.1.3 Gas Cleaning

Waste gases from the metallurgical processes must be treated to reduce the Sulphur dioxide emissions to the atmosphere. To achieve this the Sulphur dioxide in the gas is converted to Sulphur trioxide for the production of sulphuric acid in the sulphuric acid plant. The metallurgical off-gases must be cleaned prior to entering the contact section of the acid plant to enable the plant to produce a product acid of acceptable quality for use and sale. Clean gas is also required for the proper operation of the plant.



- Prevent plugging of catalyst and subsequent increase in pressure drop
- Prevent poisoning of the catalyst
- Prevent corrosion of acid plant equipment

4.1.4 Quench System

The function of the Quench System is to:

- Adiabatic saturation and cooling of the incoming gas
- Partial cleaning of the gas
- Provide residence for the condensation of metallic vapors and growth of the particles to facilitate their subsequent removal in downstream equipment
- Reduce gas temperature sufficiently such that materials of construction can be changed to Fiberglass Reinforced Plastics (FRP) and thermoplastics

4.1.5 Gas Scrubbing

Many devices are available for scrubbing and cleaning the gas. The choice will depend on the amount and nature of the impurities.

- Fixed or variable throat venturi scrubber
 - Radial flow scrubber • Peabody scrubber
 - Packed tower
 - Dyn Wave reverse jet scrubber
- Many devices are available for scrubbing and cleaning the gas. The choice will depend on the amount and nature of the impurities.

4.1.6 Gas Cooling

Purpose:

Cool the process gas to condense sufficient moisture from the gas to meet the plant water balance.

Plant Water Balance:

The amount of SO₂ and water entering the sulphuric acid plant will be in the correct proportions or balance in order to produce sulphuric acid of the desired concentration.

4.1.7 Wet Electrostatic Precipitators

To produce a clean gas that will be fed to the acid plant for the production of sulphuric acid.

- Removing dust



- Removing condensed metal fumes
- Removing acid mist precipitators are the final line of defense against admission of impurities to the acid plant and must always be kept operating at peak efficiency.

4.1.8 Blowers

The acid plant blower will compress the gas to a sufficient pressure to overcome the pressure drop through the plant. The blower will also draw the gas through the upstream gas cleaning system in a metallurgical acid plant. Most acid plant blowers will be single stage centrifugal machines driven by electric motors or steam turbines.

4.1.9 Converters

The purpose of the converter is to:

- Contain and support the catalyst which is used to speed up the reaction whereby sulphur dioxide and oxygen are combined to form sulphur trioxide and heat. The catalyst is generally divided into three to five separate layers or beds.
- Minimize heat loss to maintain an essentially adiabatic reaction.
- Provide for the uniform flow of process gas to and from the catalyst beds.

4.1.10 Heat Exchangers

Heat Exchangers The function of a gas-to-gas heat exchanger is to cool/heat the process gas to achieve the desired temperature for maintaining the process conditions. The heat exchangers are required to operate over a wide range of conditions so they are equipped with gas bypasses to enable the process temperature to be controlled.

4.1.11 Towers

The drying acid will absorb the water vapor remaining in the gas after it leaves the Gas Cleaning Section of the plant. Drying of the gas is necessary:

- To avoid corrosion caused by wet SO₂ gas before the converter and by wet SO₃ after conversion,
- To avoid loss of production due to the formation of acid mist in the absorption tower,
- To keep a clear stack,
- To avoid acid condensation during shut-downs and thus protect the catalyst from degradation. The absorber acid absorbs the SO₃ formed in the converter. Absorption of SO₃ from the gas is necessary to:
- Remove all SO₃ and acid mist from the gas stream before it exits the tower.



- Produce 98.5% acid in the absorption tower

Supplies

Following supplies will be utilized for the installation and operation of instant project:

4.1.12 Manpower (Direct & Indirect)

During construction phase 15-20 workers will be involved. During the operation phase of the project, the total manpower requirement is estimated to be 10 people comprising administrative, technical, and non-technical persons. These include engineers, chemists, computer operators and environmentalist etc. All recruited staff will be given appropriate training in order to educate them on the specific job tasks to be performed; safety procedures and monitoring parameters.

4.1.13 Emergency Response System

The system covers the emergency response system in case of inefficient working of treatment plant and any mechanical fault. Emergency response team will be designated the relevant tasks and trained them how to respond in this situation.

i. Electricity

The main source of electricity will be Generator and Solar Panel.

ii. Wastewater Management

For the proposed project, waste water lagoons will be constructed for waste water storage and evaporation.

iii. Noise

Sulphuric acid plant may generate significant noise but to control that noise proper mitigation measures will be adopted. Proper lubrication of machinery will be done and PPE's will be provided to workers. Residential areas are at safe distance from project site. Moreover, regular monitoring will be conducted to comply with PEQS.

Restoration and Rehabilitation Plan

After completion of construction site will be restored and leveling. Leftover construction material will be removed from site and it will be reused in other construction activities. Renovation/repairing of parts will be done whenever required however, at the expiration of the useful life of the project; adequate arrangements will be made to remove all movable assets. The materials capable of recycling/reuse will be either sold in the market or to be reused for other suitable purposes.



While dismantling all Government rules and regulations as applicable to such activities will be strictly adhered to. Safety measures as desired under the code of demolition will be adopted to avoid any harm to humans, property around, or the environment in the project area. Generated dust will be minimized by sprinkling water on regular basis. After completion; all construction matrix, debris and garbage will be removed off immediately from the site within the minimum possible time under safe conditions. Any minor spillover of these materials will be cleared adequately.



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

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.

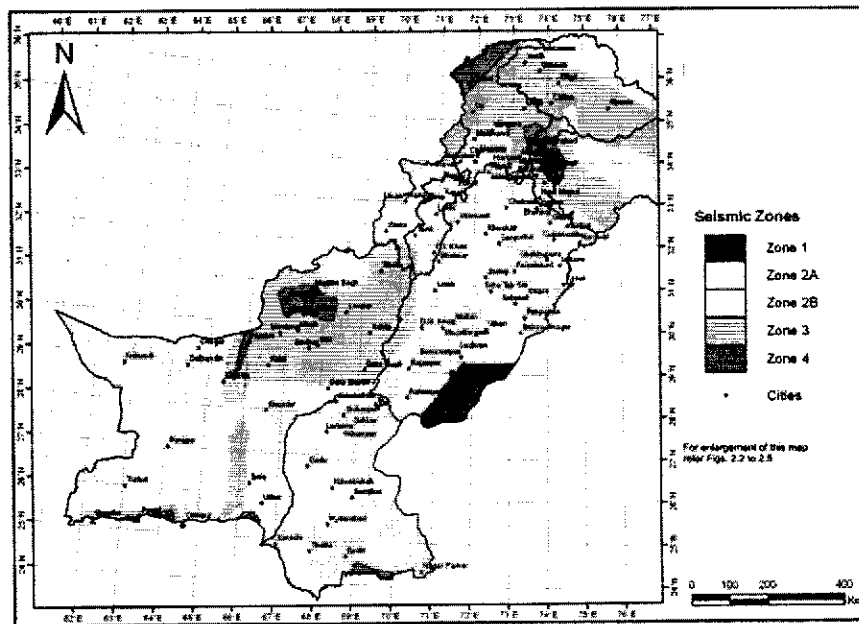


Figure 5-1: Seismic Zoning Map of Pakistan

5.1.4 Climate

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.

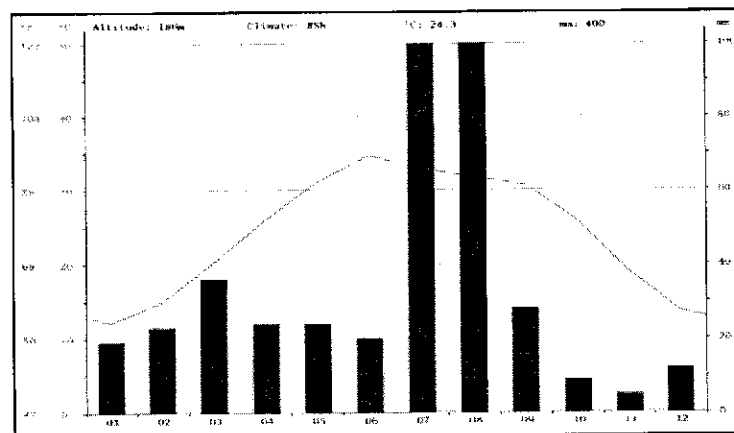


Figure 5-2: Climate of Khushab

5.1.5 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

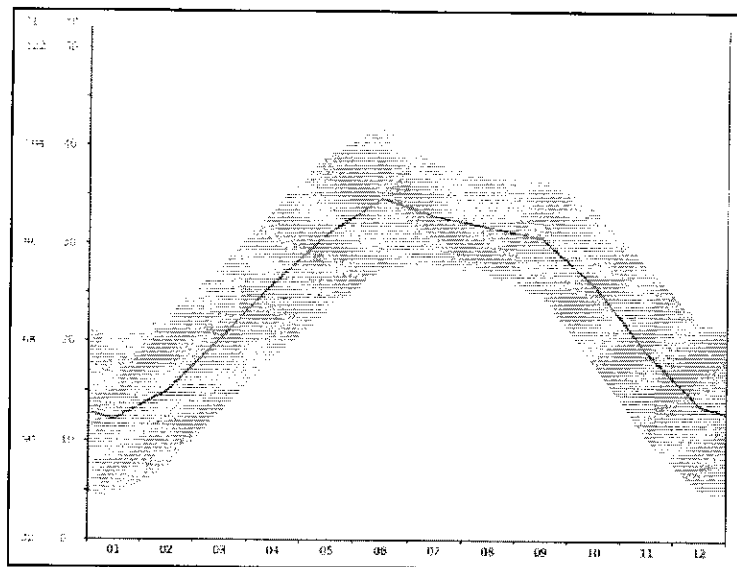


Figure 5-3: Average Temperature in Khushab

5.1.6 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.

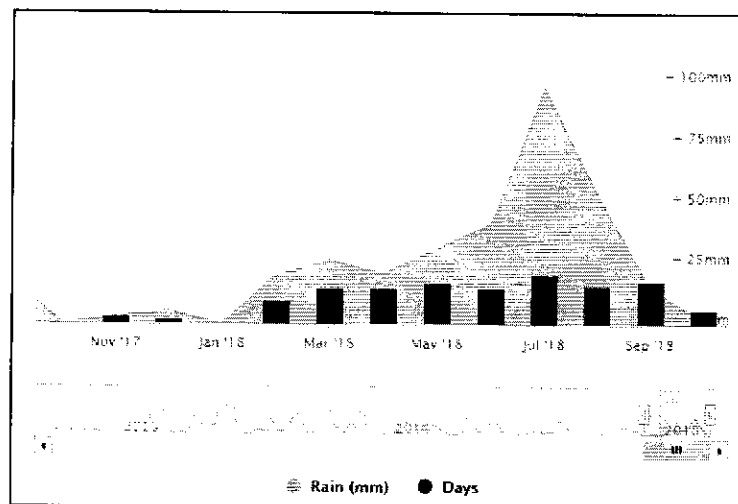


Figure 5-4: Average Rainfall Amount (mm) and Rainy Days in Khushab



5.1.7 Humidity

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%.

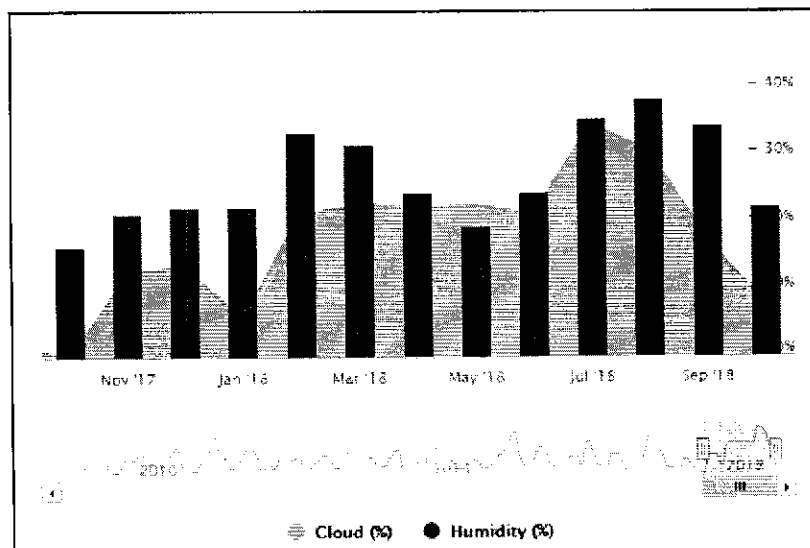


Figure 5-5: Average Percentages of Humidity in Khushab

5.1.8 Water Resources

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 vicinity 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.

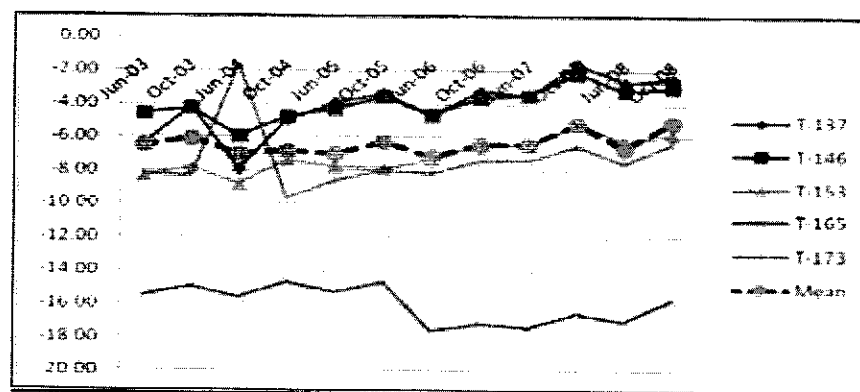


Figure 5-6: Khushab District – Water Table Trends (Feet below GLS)

Perusal of the above figure indicates that:

- 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 inhabiting in the project area that are included in RED Data Book of IUCN.

5.2.4 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 5-1: Summary 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%

5.3 Quality of Life Values

5.3.1 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.

5.3.2 Indigenous People

People inhabiting 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.

5.3.3 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 inhabiting here except a few families of Ahl-e-tasheh and Ahl-e-Hadees.

5.3.4 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:

5.3.5 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.

5.3.6 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 its 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.



5.3.7 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.

5.3.8 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.

5.3.9 Archeological and Cultural Sites

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

5.4 Lab Reports of Environmental Analysis

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 VII.**

5.5 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 IMPACT ASSESSMENT

This section discusses the potential environmental impact of proposed project, methodologies for impact identifications and characteristics of impacts including nature, magnitude, extent and location, timing, duration, reversibility, risk. The assessment carried out in this Section is based on potential impacts on overall environmental receptors within the project area.

Methodologies for Impact Identification

The potential impacts due to Construction of sulphuric acid plant are mostly beneficial. During construction phase, adverse environmental & social impacts are depending on the resources and receptors involved along with other parameters such as; geographical scope (magnitude and extent), temporal scope (duration) and reversibility. Moreover, the project is expected to result in negative impacts of short-term duration and transient in nature. Having identified and characterized the potential significant impacts during design, construction and operation phase of project an Environmental Impact Severity Matrix & checklist to summarize all the identified impacts as mentioned below in tables.

Table 6-1 Impact Significant Criteria

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



Table 6-2 Impact Matrix Checklist for Construction Phase

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



Table 6-3 Impact Matrix Checklist for Operational Phase

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

Characteristics of Impacts

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



Table 6-4 Impacts Characteristics

Sr.#		Environmental Component	Impact Characteristics													
			Duration		Location		Frequency		Extent		Significance				Reversibility	
			Long	Short	Direct	Indirect	Cont.	Intermittent	Wide	Local	Large	Moderate	Minor	Rev.	Irrev.	
Beneficial Impacts																
1		Employment Opportunity	☑		☑			☑				☑		☑		
2		Solid Waste Management	☑		☑			☑				☑		☑		
3		Land Value	☑			☑		☑					☑		☑	
4		Tree Plantation	☑		☑			☑				☑			☑	
5		Wastewater		☑	☑			☑		☑			☑			
Adverse Impacts																
1		Solid Waste	•		•			•				•		•		
2		Health and Safety		•		•			•				•		•	
3		Physical Hazards		•	•				•				•		•	
4		Security Risks		•		•			•			•		•		



7 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

General

This chapter identifies the potential impacts (positive and adverse) on the physical, biological and socio-economic environment of project area due to proposed project. It also identifies measures that will help to mitigate the adverse environmental and social impacts (if any) and it will enhance positive impacts of the project. Impacts are assessed by analyzing their magnitude and sensitivity, which is a legal requirement.

Project location:

The proposed project is the Construction of Sulphuric acid plant having capacity **50 m³/day** located at near Dhaman, District Khushab, Punjab. There is no human settlement, heritage building, social structure, grassland or preserved area in the project vicinity that could be damaged, dislocated or dismantled due to the project activity in the proposed area. The proposed project site is undisputed open land located within existing facility of M/s Sangha Chemicals So, no other site alternative has been considered in this regard.

7.1.1 Nature of Impact

The nature of the proposed impact will be direct, Long-term.

7.1.2 Mitigation Measures

There are no any serious impacts occur because selected site is in close proximity of existing unit and is already under the ownership of the Proponent. But for the minor impacts there are following steps that may adopted to control noise and dust problems at the 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/PM₁₀.
- Maintain appropriate buffers between the site and receptors if practical.
- Use of PPEs (face masks etc.) will be ensured by the workers and staff.

Anticipated Environmental Impacts Related to Project Design

The said Sulphuric acid plant is designed with latest technologies to reduce the maximum impacts. However, in pre-construction phase a management system should be provided so anticipated impacts can be reduced. Design of the proposed plant will adhere to all



standard technical requirements in order to avoid adverse impacts on socio-environmental aspect.

Following are the major Environmental impacts due to the development related to the design:

- Structural stability of the proposed project.
- Soil structure and soil bearing capacity
- Road infrastructure design
- Emergency exit in the proposed project
- Firefighting system
- Wastewater disposal system design
- Rain water harvesting capacity of the drainage system
- Electricity hazards

7.1.3 Nature of Impact

The nature of the proposed impact will be direct, long term.

7.1.4 Mitigation Measures

Following are the mitigation measures and recommendations to minimize the anticipated impacts:

- Emergency exist points should be marked within the project building.
- Firefighting system should be designed for the emergency situations.
- Geo-technical investigation of the project site should be conducted.
- Electricity system should be designed safe and sound.
- Electricity wires should be covered by thick plastic/electricity resistant covers.

Impacts and Mitigation Measures during Construction Phase

The main contractor for the construction of aforementioned project will be expert in similar construction developments. It is expected that a maximum of 15-20 workers will be hired and it is planned that they will use existing building for domestic activities. The construction activities will include:

- Site leveling
- Utilities and services connections to site
- Foundation excavations and installation of concrete footings
- Erection of treatment plant



- Installation of equipment and machinery
- Commissioning.

7.1.5 Impacts of Dust and Exhaust Emissions

Air quality is expected to deteriorate locally mainly due to fugitive dust emission and exhaust gaseous emission from vehicular movement. This will cause short-term but moderate impacts on local environment. Soil erosion may occur in small area and they will be prone to wind erosion. Air pollutants such as; NO_x, SO_x and CO emissions maybe generated from the working of the construction machinery on-site which includes; hauling vehicles, loaders, trucks, mixers, etc. This machinery will generate, smoke and other potential pollutants in the air. This impact is considered to be negative of minor magnitude. The effect due to construction is however, of temporary nature and will have no permanent impact on environment.

7.1.6 Nature of Impact

The nature of the proposed impact will be direct, medium, long-term and hence significant.

7.1.7 Mitigation Measures

Dust control measures are need to be taken to control the same; as the area is located in semi-arid zone having dry soil conditions and it is vulnerable to spread during high winds. Following mitigation measures will be adopted to mitigate the anticipated impact:

- Ensure that the trucks carrying the raw-material should be covered with sheets to reduce fugitive dust emissions.
- Water spraying/sprinkling should be done on the regular basis
- Ensure that all equipment and vehicles, used during the construction phase, are properly tuned and maintained in good working condition, in order to minimize the exhaust emissions and it will be regulated by the concerned authority.
- Ensure that high quality fuel having low sulfur contents will be used in the vehicles engaged in the construction activity.
- Ensure that dust emission generated due to vehicular movement is minimized by restricted speed limit and vehicular movement impacts which will be minimized through good traffic management at site.
- Ensure that dust emission during the construction phase will be minimized by implementing best management practices



7.1.8 Soil Erosion and Contamination

On-site disposal of solid waste and leakage from construction machinery/vehicles can cause soil contamination. Improper disposal of domestic wastewater may contaminate the soil which would result in groundwater contamination.

7.1.9 Nature of Impact

The nature of the impact will be Long-term and significant.

7.1.10 Mitigation Measures

The following practices will be adopted to minimize the risk of soil contamination:

- Removal of the tree will be avoided up to the extent possible. In case of unavoidable circumstances, the exposed soil will be re-vegetated quickly and compensatory plantation (five trees for each one removed) will be carried out as soon as possible.
- Maintenance and washing of vehicles and equipment should be carried out at designated areas.
- Regular inspections should be carried out to detect leakages in construction vehicles and equipment.
- It is mandatory to instruct and train workforce in the storage and handling of materials that can potentially cause soil contamination.
- Solid waste bins should be installed at strategic positions.
- Proper segregation of solid waste should be done. Solid waste generated during construction will be properly and safely disposed of as per practices of area.
- Segregated organic waste may be converted into compost which will be utilized for on-site horticultural activities.

7.1.11 Noise Pollution

The use of heavy equipment during site clearance and construction works will inevitably generate noise, which may create a nuisance in the vicinity. The aforesaid impact is considered to be negative as it will not last for an extended time period and thus this aspect can be considered to have a very low significance.

7.1.12 Nature of Impact

Nature of impact will be low, short-term, temporary and significant

7.1.13 Mitigation

Following mitigation measures should be adopted:



- Warning signs should be posted within the vicinity of the impact and all personnel shall be provided with personal protective equipment. For example, workers operating equipment that generates noise should be equipped with the appropriate noise protection gear.
- Construction activities that will generate disturbing sounds should be restricted to day time.
- Proper tuning of the vehicles should be done on the regular basis, so that the noise level will be reduced up to the acceptable limits.
- Noise related activities should be done speedily and completed as soon as practically possible.
- Construction activity should be confined to the small reserved area.
- 20 km/hr. speed limit should be maintained.

7.1.14 Impacts on Ground Water Quality

The construction activities will be associated with mechanical fabrication, assembly and erection of the Sulphuric Acid plant. If it is deemed necessary for the proposed treatment plant to have deep foundations due to poor soil strata qualities, deep excavations might be required. The main negative impact associated with deep excavations will be the pollution of ground water.

7.1.15 Nature of Impact

The nature of the impact will be high, short-term, temporary and significant.

7.1.16 Mitigation

Following mitigation measures will be adopted:

- Adopt proper excavation measures.
- Monitoring should be carried out throughout the constructional activity to check the ground water quality.

7.1.17 Occupational Safety

During the construction phase, heavy machinery will be deployed on-site. Heavy machines make a lot of noise, may generate carbon dioxide emissions, generate dust and may cause accidents among operators, if not handled properly. This is likely to have negative impact on health of the workers. To limit the risk of accidents, safety procedures will be put in place and enforced by the foreman to ensure that vehicles and machinery only drive in designated places by authorized personnel.



7.1.18 Nature of Impact

The nature of the impact will be high, short-term, temporary and in-significant.

7.1.19 Mitigation

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

- Make sure all the workers wear Personal Protective Equipment (PPEs) while working. The PPEs will include; helmets, safety shoes, mask, ear-plugs/ear muffs, etc.
- Wearing of the PPEs should be enforced strictly by the contractor.
- Regular checking and maintenance of the machines should be done in order to maintain working machinery and to avoid accidents
- Noise related activities should be done during the day hours and make sure the workers wear the ear-plugs/muffs.
- Generated dust can be controlled effectively by water sprinkling.
- No machinery will be left unattended, particularly in the running condition.
- Nighttime driving of project vehicles will be limited.
- The Contractor will ensure that construction labor is trained in safety procedures for all relevant aspects of construction.
- Management will make regular checks that the contractor is following safe practices

The safety of the public at all stages of the construction will be ensured by provision of safety measures such as use of sign boards, barriers and flags

7.1.20 Socioeconomic Impacts

In project area, no significant changes are envisaged in the traditional life style and occupation of the local people in residing in the nearby communities. The local people are rather benefited due to the provision of job opportunities. No impact is envisaged due to the influx of the workers as the local will be preferred and hired for working.

7.1.21 Nature of impact

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

7.1.22 Mitigation

Following mitigation measures will be adopted to reduce the socio-economic impact on the community:



- Good relations with the local communities will be promoted by encouraging Contractor to provide opportunities for skilled and un-skilled employment to the locals as well as on-job training.
- Contractor will restrict his permanent staff to mix with the locals to avoid any social problems.
- The contractor should prefer hiring local labor from adjacent community
- The contractor will keep the copy of National Identity Card (CNIC) of his employees and will warn the workers not to involve in any anti-social activities otherwise they may face dire consequences.
- At the time of hiring the Contractor has to ensure that the workers should be of good repute.
- First aid kits having all the necessary first aid stuff will be available at the site.
- Routine medical check-ups of all the field staff including unskilled labor needs to be conducted by qualified physician and surgeon.
- Training of workers should be carried out for operating various constructional machinery, safety procedures should be adopted, environmental awareness should be carried out, equip all workers with safety boots, helmets, gloves, protective masks and monitoring of their proper and sustained usage will be carried out. In case of accidents, contractor will provide free medical treatment to the community

Impacts and Mitigation Measures during Operational Phase

The following section describes the potential impacts which are associated with the proposed treatment plant during the operational phase.

7.1.23 Noise

Noise pollution is not expected to occur at all during the operational phase. The mechanical and electrical components of the proposed technology work within the permissible noise limit levels. Moreover, even if the noise level exceeds the allowable levels during unexpected conditions, this will have no significant impact since the nearby residential areas are found at the safe distance from the treatment plant.

7.1.24 Nature of impact

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

7.1.25 Mitigations

In general, the following methods will be adopted to control the noise pollution from the proposed unit:



- Personal protective equipment like ear plugs and ear muffs should be provided to employees working in the noise prone areas.
- Time to time oiling and servicing of machineries should be done.
- The plant will ensure the ambient noise levels standards set by PEQS.
- A thick greenbelt will be developed all around the plant which will be act as noise barrier.

7.1.26 Ambient Air Quality

Air pollution is quite likely to occur during construction phase. This is due traffic and other equipment using fossil fuels that release hydrocarbons and other gases including carbon dioxide, nitrous oxides, Sulphur oxides, and particulate matters which may pollute the air. Likewise, activities like land clearing, vehicle movement, excavations for buildings foundations, construction drive ways and landscaping may generate dust especially during the dry season.

Other sources of air pollution will occur due to decomposition and/or burning of the cleared vegetation and dust from gravel drive ways. The level of air pollution originating from the above-mentioned sources are expected to be low, localized and short term. No serious impacts are expected on people and the environment as whole.

7.1.27 Nature of impact

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

7.1.28 Mitigations

No mitigation measure will be required as the project is designed to keep the ambient air quality of the area intact.

In general, the following methods will be adopted to control the air pollution from the proposed unit:

- An appropriate action plan should be devised to deal with blockages or leaks as quickly as possible.
- It must be ensured that appropriate spares, in terms of fittings and other mechanical components are available at all times.
- Regular maintenance should be carried out.
- Tankers should be well equipped with efficient extraction capacity such that the
- Different types of trees should be planted in the vicinity of the treatment plant. They will act as buffer zones



7.1.29 Possible Emergencies and Plant Failure

Operational difficulties may be experienced at plant start-up or during periods when equipment malfunctions. For this purpose, vendor will train the team.

7.1.30 Nature of impact

The nature of the proposed impact will be direct, medium, long-term and hence significant.

7.1.31 Mitigations

- Equipment should be kept in good operating conditions to prevent equipment failure.
- Training programme for plant operation and maintenance activities should be included as part of the project's technical assistance programme.

7.1.32 Emergency Response

Emergency response preparedness committee will be formulated consisted of heads of all the departments. Project Manager will be the head of the team who will chair incident control headquarters. In the case of emergency, the first aid box will be provided. Incidents and accidents may take place unexpectedly during project operations no matter how effective, strong and efficient the mitigation measures for all adverse impacts; especially the safety issues may be adopted. These may include; accident and natural disasters.

7.1.33 Nature of Impact

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

7.1.34 Mitigation

- Workers should be given adequate training of handling machinery.
- Emergency call service must be made available.
- The drills to check the response of the workers against any emergency situation will be carried out Safety and hazards signs will be displayed with the facility to avoid any unfortunate incident.
- Only authorized persons will be allowed for the handling of the chemicals.

Potential Environmental Enhancement Measures

7.1.35 Enhancement in opportunities for employment

During proposed construction, the employment opportunity will be enhanced. Workers will be hired from local community, include; skilled and un-skilled workers. During construction phase 20-50 workers will be hired and in operational phase only 10 workers will be employed as the process employed will be fully automated. It will include technical staff only. Locals will also have the opportunity to diversify their income by



being employed during various project phases. Hence, there will be an increased employment opportunity for the local people which will have a positive impact on the socio-economic status of the area.

7.1.36 . Water Quality Enhancement

With the avenue of the Sulphuric acid plant, the effluent will be safe prior to being released in the water bodies or reuse, hence contributing to the protection of the environment.

7.1.37 Environment Friendly Project

The technology which has been proposed to be used for aforesaid project is one of the most sustainable and environmentally friendly system with an efficient operational efficiency and less prone to malfunctioning.

7.1.38 Tree Plantation

At the end of the installation phase, landscape of the area will be enhanced by planting native and ornamental plants at the designated green areas. This will enhance the aesthetic beauty of the area.



8 ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

General

This chapter summarizes the various mitigation measures as outlined previously in this EIA Report that will be implemented during the construction, operational and decommissioning stages of project. It does not discuss further the mitigation measures which have been adopted within the design and planning of the project, as these are comprehensively covered in previous section of this EIA Report. Outline and key features of the EMMP for operations phase of the aforesaid project is presented in the sub-sections below. As per the environmental legislation in Pakistan, the compliance status of the conditions mentioned in the construction should be submitted along with other documents to the environmental protection agency to obtain confirmation for compliance and Environmental Approval for project operation. Even after implementation of the suggested mitigation measures, the impact may remain significant, and requires regular environmental monitoring.

Objectives

An Environmental Monitoring Plan (EMP) was outlined alongside Environmental Management Plan to ensure all the corrective actions to counter adverse impacts which gives a detailed EMMP. The EMMP will serve as a principal execution module of the project that would not only mitigate adverse environmental impacts during the installation and the operational phase of the project but also ensures that environmental standards and good in-housekeeping are being practiced. Continuous environmental monitoring is exercised to ensure that preventive measures are in place and effective to sustain environmental integrity. The key objectives of EMMP are:

- To outline functions and responsibilities of persons associated with the commencement of the proposed project
- To state and implement standards and guidelines which are required under environmental legislations particular in context to the proposed project commencement
- To facilitate the implementation of the mitigation measures by providing the technical details of each Project's impact and proposing implementation schedule of the proposed mitigation measures



- Define a monitoring mechanism and identify monitoring parameters to ensure that all proposed mitigation measures are completely and effectively implemented
- Identify the resources required to implement the EMMP and outline corresponding financing arrangements

Proposed Mitigation Actions and Monitoring Program

It lists all the mitigation measures identified in the EIA and the associated environmental or social aspect in line during construction and operational phase with the administrative framework involving all the responsible implementing authorities who are required to take the planned actions/measures and monitor it accordingly. It enhances project benefits by reducing its impacts and making it environmentally friendly. The environmental management and monitoring plan are given below in **Table**.



Table 8-1 environmental management and monitoring plan

Project Activities	Type of Impact	Potential Impacts on Environment	Extent /Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
PRE-CONSTRUCTION						
Land acquirement and land use	Physical, Social and Aesthetical	Positive use of land but proper planning will be required	More/ Adjacent area	- Site is located within the existing facility of M/s Sangha Chemicals and under their possession - Land will be improved from open land to Sulphuric acid Plant	Contractor	Proponent* Proponent may give responsibility to concerned departments
			Less / Adjacent area	Local people will be hired for less technical work or non-skilled work		Proponent*
CONSTRUCTION						
Civil works	Physical, Social, Biological Aesthetical	Dust, Noise & Vibration, Employment, Health & Safety of Workers	More/ Adjacent area	- Water sprinkling will be done to reduce dust emissions. - Noise control measures will be implemented	Contractor	Proponent*