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EXECUTIVE SUMMARY

1. Title and Location of Project

This executive summary presents an overview of the main findings of the Environmental Impact Assessment (EIA) Report for ***Installation of Wastewater Treatment Plant by M/s Shakarganj Limited*** at Toba Tek Sigh Road, Jhang, Punjab. Coordinates of the site are **Latitude 31°14'02" North and Longitude 72°20'23" East**. The main goal of proposed project is to ensure **Zero liquid discharge** of industrial wastewater into the environment that will achieve by treating wastewater using ASP technology then recovery and reuse of this treated effluent in the sugar industry for processing.

2. Name of the Proponent

Proponent Details

Name	Muhammad Pervez Akhtar
Designation	<i>Senior Executive Vice President</i>
Address	Toba Tek Sigh Road, Jhang, Punjab
Contact no.	Contact# (047)-111-111-765
Email	Email: www.shakarganj.com.pk

3. Name of Organization preparing the report

M/s Ecogreen Company (Pvt) Limited has been engaged for conducting EIA Study of the above stated project. The main objectives of the said project are to establish baseline environmental conditions, identify potential environmental impacts and to suggest suitable mitigation measures accordingly.

4. A brief outline of the proposal (type, process, technology and land requirement)

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 **Category-F (Water supply schemes and treatment plants with total cost of Rs.25 million and above)** of the projects mentioned in **Schedule II**.

The current project is about installation of wastewater treatment plant for treating wastewater generated from sugar mill before its recovery and reuse. Site selected for proposed project is present within the premises of Shakarganj Limited and under the ownership of company. It is an Environmentally Friendly operation of sugar industry through which pollution load on water resources will decrease through zero liquid discharge and quality of wastewater will improve.

The estimated project cost is **PKR 76Million approx.** the breakdown of the project cost and detail process of the proposed project is given in **Chapter 05** of this EIA Report.

5. Impacts and Recommended Mitigation Measures

In order to identify all the impacts associated with the installation of WWTP and operational activities with potential to cause adverse environmental impacts, a thorough review has been conducted. Although, there is no chances of any adverse impact's 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 installation 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.	<ul style="list-style-type: none"> No mitigation measures required.
Employment Opportunities	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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.
Sludge Management	From the ETP, sludge will be generated which will be dried before its final disposal. The foul smell will be generated during the drying process	<ul style="list-style-type: none"> Proper sludge disposal measures such as from existing established methods



	which may cause nuisance from surrounding community.	<p>and standards should be adopted.</p> <ul style="list-style-type: none"> • Aerobic decomposition will be carried out which will prevent production of H₂S gas. • To control foul smell, thin layering (2-3 cm) for sludge will be dried this will promote aerobic condition. • During drying sludge aeration can be done regularly to control foul smell. • Trees will be planted along the project area boundary to mitigate odor. • After secondary treatment sulfur compounds will be reduced significantly. This will reduce the smell. • Establishing and enforcing environmental, safety and health procedures for the construction and operation of the sludge facilities. • Regularly updating of the plan to reflect upon the current situation at the treatment plant, its characteristics and revised disposal strategies. • Ensuring that the disposal of sludge is in accordance with the local standards prescribed by the Environment Protection Act.
Odor	<p>The treatment technology adopted has been designed to prevent the production of any foul gases (i.e. hydrogen sulfide) due to the chemical and biological reactions taking place. Thus, there will be no significant generation of odor. Odor problems will mainly arise from the sludge hauling process, blocking of</p>	<ul style="list-style-type: none"> • 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



	<p>pipes, malfunctioning of the pumping stations and leakage of pipes.</p>	<p>available at all times.</p> <ul style="list-style-type: none"> • Regular maintenance should be carried out. • Tankers should be well equipped with efficient extraction capacity such that the sludge hauling process should be done as quickly as possible. • Dewatering of sludge should be done • The sludge hauling process should not be carried out during peak hours, week days and on windy days. • Different types of trees should be planted in the vicinity of the treatment plant. They will act as buffer zones.
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6. Proposed Monitoring

During construction & operation, monitoring will be carried out to check compliance of PEQS. Moreover, periodic monitoring should also be carried out regarding wastewater & worker safety etc. A detailed site monitoring plan has been developed and given in **Chapter-09** of this EIA Report.

CHAPTER 1: INTRODUCTION

1.1 Purpose of Report

As per Punjab Environmental Protection Act, 1997 (Amended 2012) and the IEE/EIA Regulations, 2000 it is mandatory for the proponent of any development project to obtain Environmental Approval before commencing construction from EPA Punjab by filing an IEE or EIA as the case may be, before the Agency. This EIA Study presents the Environmental Impact Assessment (EIA) for this proposed wastewater treatment plant. For this purpose, the proponent has engaged environmental consultants, **M/s Ecogreen Company (Pvt) Limited**. The purpose of this study is to identify the environmental baseline i.e. physical, biological and socio-economic/cultural conditions and assess all possible impacts arising during the construction and operation phase of the project with the aim to find out appropriate measures for their mitigation, to either eliminate those impacts or to bring them to acceptable level and formulate Environmental Management and Monitoring Plan (EMMP) for implementation of the project in environment-friendly manner.

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 main objectives of this EIA Study are:

- 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.

1.2 Identification of Project& Proponent

1.2.1 The Project

This EIA study is for ***“Installation of Wastewater Treatment Plant”*** by M/s Shakarganj Limited at Toba Tek Singh Road, Jhang, Punjab. For this purpose, ASP technology will be employed.

1.2.2 The Proponent

The details of the proponent of said project are given below in **Table-1**.

Table 1: Details of the Proponent

Proponent Details	
Name	Muhammad Pervez Akhtar
Designation	<i>Senior Executive Vice President</i>
Company	M/s Shakarganj Limited

1.3 Details of Consultant

The proponent of said project engaged M/s Ecogreen Company (Pvt) Limited to carry out the environmental impact assessment study of aforesaid project in accordance with EPA guidelines. For this purpose, the company engaged the group of professional which comprises of Environmental Scientists and Environmental Engineers. The details of the consultant are given below in **Table-2**.

Table 2: Consultant Details

Consultant Details	
Consultant	M/s Ecogreen Company (Pvt) Limited
Address	2-A, Commercial Zone, Near Gate#1, Canal View Society, Lahore
Contact No.	042-35294297
Focal Person	
Name	Zahra Anwar
Designation	<i>Environment Officer</i>
Contact No.	0320-0800221

To prepare an EIA Report of the respective project the company engaged the following experts. The details of the experts are given below in **Table-3**.

Table 3: List of Experts

Sr. #	Name	Qualification
Team Leader		
i.	Ms. Zahra Anwar	M.Phil. Environmental Sciences
Environmental Scientist		
ii.	Ms. Leenah Maqbool	Ph.D. (Scholar) Environmental Sciences
iii.	Ms. Foqia Khalid	Ph.D. (Scholar) Environmental Sciences
iv.	Mr. Danial Zaib	BS Environmental Sciences
v.	Mr. Adnan Naeem	MS Environmental Sciences & M.Sc. Analytical Chemistry
Environmental Engineer		
vi.	Engr. Muhammad Ali	M.Sc.(Scholar) Environmental Engineering
vii.	Engr. Talha Ikram	M.Sc.(Scholar) Environmental Engineering
viii.	Engr. M. Usman	B.Sc. Environmental Engineering
ix.	Engr. Noor Fatima	B.Sc. Environmental Engineering
x.	Engr. Arooj Fatima	B.Sc. Environmental Engineering

1.4 Project Nature, Size and Location

The proposed project is the “**Installation of Wastewater Treatment Plant**” having treatment capacity of 1680m³/day. The proposed project site is undisputed open land within the existing facility of M/s Shakarganj Ltd. at Toba Tek Sigh Road, Jhang, Punjab. Wastewater generated from the operation of sugar mill will be treated in proposed treatment plant. The estimated cost of the proposed project is **PKR 76Million approx**. The geographical location of the project is **Latitude 31°14'02"North** and **Longitude 72°20'23"East**. Google Earth Map showing the project location is attached below as **Figure-1**.



Figure 1: Proposed location of WWTP

CHAPTER 2: SCREENING

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

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

According to Review of IEE and EIA Regulations, 2000; the proposed project (Installation of Wastewater Treatment Plant) falls under **Schedule II, Category F** i.e., *Water supply schemes and treatment plants with total cost of Rs.25 million and above*. Thus, an EIA Report is being prepared for duly submission in EPA, Punjab.

CHAPTER 3: SCOPING

3.1 Spatial and Temporal Boundaries of Environmental Assessment

Project site is open land and present within the premises of M/s Shakarganj Ltd. and under the ownership of company. That open land will be utilized for construction of Wastewater Treatment Plant to treat wastewater generated from Shakarganj Sugar Mill. Within 1-km aerial distance of project site various residential and industrial facilities are existing but due to installation of current project sanitary condition of area will be improved, pollution load will be decreased, water quality will be improved, pollutants & toxicants will be eliminated that enable wastewater to reuse for horticultural and sprinkling on unpaved roads after treatment. A little bit odor issue could rose that will be controlled by adopting proper mitigation measures. Moreover, residential areas are present at safe distance from project site so they would not impact due to odor problem.

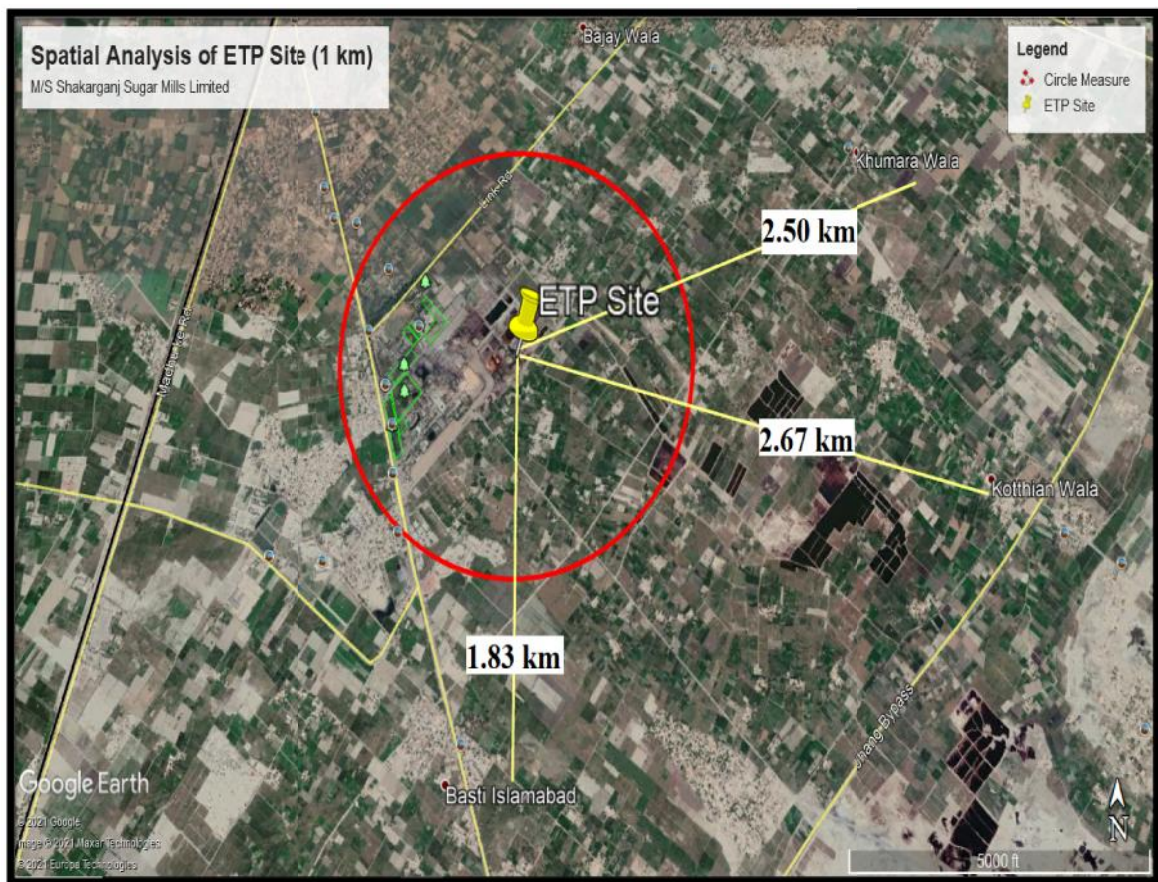


Figure 2: Receptors within 1-Km

3.2 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. Stakeholder Consultation it is mentioned in detail in **Chapter 10**.

During survey following concerns of the local community, Government Departments and Environmental Practitioners and experts were noted:

- Nuisance must be controlled.
- Latest/State of the art technology must be adopted.
- Locals should be preferred for the job opportunities.
- Monitoring should be done regularly to check efficiency of treatment plant and to comply with PEQS.

- 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.
- Plantation of indigenous species must be carried out at extensive scale.
- Proper disposal of sludge should be practiced.
- Removal of shrubs and bushes should be avoided to the extent possible.

3.3 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.
- Job opportunities for locals.
- 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.

CHAPTER 4: CONSIDERATION OF ALTERNATIVES

4.1 Site Alternatives, their selection and rejection criteria

For installation of wastewater treatment plant it is important that industry or source of wastewater generation, and the drain must be as close as possible for safe discharge. The site selected for current project is present within the existing facility of M/s Shakarganj Limited. 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 have 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:

- Selected site is located in close proximity of existing sugar industry
- 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.

4.2 Design/technology alternatives, their selection and rejection criteria

The wastewater is characterized as highly polluted in terms of COD, BOD, TSS, oil and grease. The primary treatment of the wastewater reduces these parameters but it cannot be reuse directly. For the treatment of the wastewater generated, number of the biological treatment processes are available in the market for the treatment of sugar industry wastewater. After acquiring different proposals from renowned national and international vendors, different technologies came into consideration that includes activated sludge process (ASP), rotating biological contactor (RBC), Aerated Lagoons (AL), up-flow anaerobic sludge bed reactor (UASB), Membrane Biological Bio Reactor (MBBR). ASP and MBBR are the most widely recommended technologies for the treatment of wastewater having similar characteristics to sugar industry. After careful engineering sense of expertise and considering different factors like removal efficiency, capital cost, operational and maintenance cost, area footprint, sustainability and international practices and vast research and reference on the subject, ASP is recommended as the most efficient and economical solution for the treatment of sugar industry waste water. Detailed comparison of the abovementioned two competitor technologies is given below in **Table-4**.

Table 4: Technology Comparison between MBBR and ASP

Comparison of MBBR and ASP		
MBBR	ASP	Remarks
1. Flexibility in Operation		
MBBR is not flexible	ASP can handle shock loads more	Due to the huge variations in

enough to handle shock loads thus making it less efficient.	efficiently, thus providing a clear effluent on a consistent basis	flow and characteristics, flexibility of operation is of paramount importance.
2. Removal Efficiency		
MBBR efficiency is good but it requires uniform characteristics of influent	ASP is equally efficient in terms of removal efficiency	Both technologies are good, in terms of efficiency.
3. Area Footprint		
MBBR requires less area in terms of tank volume as compared to ASP	ASP requires larger area as compared to MBBR but have very small footprint as compared to other technologies	Ample and is available for installation of WWTP, therefore land requirement is least significant constraint.
4. Chemicals requirement		
It requires additional chemicals for its operation	ASP recycled the portion of the activated sludge to maintain the Food to Microorganism ratio (0.25-0.5/day) to ensure the faster degradation.	---
5. Membrane Fouling		
Their compact designs can increase membrane fouling rates	There are no membranes involved.	As MBBRs are sensitive to low Hydraulic Retention Time.
6. Fine Screening		
It requires very finer screening to work.	ASP can work efficiently with fine to medium screening chambers.	Fine Screening requires more cost and screenings needs to be replaced more frequently.
7. Peak Flows		
MBBR technology can collapse during peak flows.	Peak flows are well addressed in ASP	ASP can sustain peak flows for longer period of time as well.
8. Insects and Mosquitoes		
Working with bio-film attracts sewage flies, mosquitoes and red worms creating nuisance.	There are very few odors or pests involved, which makes hygienic, safe, and convenient operation easy.	---
9. Cost Analysis		

Capital cost as well as operation and maintenance cost of MBBR is high.	They are equally costly in terms of cost as compared to MBBR.	---
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Both technologies are equally efficient and have their own advantages, disadvantages and are being used worldwide. ASP is a promising technology for achieving the PEQS of industrial effluents, 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 measure the Sludge Volume Index (SVI) for maintaining the sludge recirculation, keeping the process sustainable and to comply with PEQS. Proper supervision must be ensured for keeping the food to microorganism ratio maintained, recycling of activated sludge and aeration requirement to make it successful.

4.3 Environmental Alternatives, their selection and rejection criteria

The said project is being proposed to treat generated wastewater and to ensure **Zero liquid discharge** of industrial wastewater into the environment. This treated effluent will recover and reuse for industrial processes hence, no environmental alternatives are being considered. After proposed treatment of wastewater, the quantity of wastewater generated from said facility will be reused significantly thus improving environment's health. By doing so, the health risks associated with environmental pollution will be reduced. Moreover, the collected sludge can be used as fertilizer in nearby agricultural fields after dewatering from sludge drying beds.

Furthermore, the water conservation measures will be adopted i.e. the treated water will be used on-site for horticultural activities, it can be recycle and rain water harvesting pond may be constructed to harvest rainwater. Moreover, indigenous & fast growing trees will be planted along the boundary wall of ETP and sugar mill.

A lot of technologies aerobic as well as anaerobic were considered and studied in detail while selecting the final technology. It is found that the technologies like Aerated lagoons can take up much larger area thus making the capital cost very high and greater nuisance for nearby areas, as there may be odor and insects which cause nuisance in the area, if aeration requirement is not maintained properly. Similarly, anaerobic technologies like up-flow anaerobic sludge blanket reactor (UASB) also came into consideration. But after the comparison, in the aerobic technologies, ASP is recommended and proposed for approval being the most efficient, flexible and cost effective alternative. The selection criteria are discussed below in **Table-5**.

Table 5: Proposed Environmental Alternatives

Environmental Alternatives Parameters		
Anaerobic	Aerobic (ASP)	Remarks
1. Formation of Gases		
During anaerobic process, the bulk of organic matter is converted to CO ₂ , H ₂ O, CH ₄ , H ₂ S. The end-products are odorous due to the formation	ASP is an aerobic process that produce CO ₂ and H ₂ O but does not create any harmful gases like CH ₄ and H ₂ S	The end-products of anaerobic process are odorous due to the formation of H ₂ S.

of H ₂ S.		
2. Land Requirement		
These technologies require very large area to operate	The area footprint of ASP is very small.	More the area, more nuisance for people.
3. Start-up Period		
It has larger startup period ranging from weeks to months.	Aerobic technologies require less start-up period to operate efficiently.	More startup period, the longer the run, again a nuisance for the people.
4. Reaction Speed		
The reaction speed of the anaerobic process is too low.	Aerobic technologies work faster to convert organic matter into cell mass.	The reaction rate is generally higher for aerobic technologies
5. Biomass Production		
The biomass solids produced are low.	More sludge is produced in aerobic technologies.	Proper sludge handling facility is proposed on site to dry the sludge generated to convert it to sludge cakes, so that it can be used as a bio-fertilizer in the cropped area of the mill.
6. Removal efficiency		
The removal efficiency of anaerobic technologies is less, thus inhibiting their use.	Due to the higher removal efficiencies, aerobic processes are in use more frequently.	More efficiency can make the impacts low on the environment

If the sludge produced is managed properly and the aeration requirements are met, the ASP has far more than environmental benefits as compared to other technologies

4.4 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.

CHAPTER 5: DESCRIPTION OF THE PROJECT

General

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 (freshwater, electricity & materials, etc.) have also been examined as a response to possible environmental concerns.

5.1 Project Objectives

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;

- To treat wastewater and comply with PEQS.
- To make water able to reuse after treatment.
- To adopt water conservation measures.
- To improve and protect the surrounding environment.

5.2 Location and Site layout of Project

The location of the said project is M/s Shakarganj Limited at Toba Tek Sigh Road, Jhang, Punjab. The coordinates of the site are **Latitude 31°14'02" North and Longitude 72°20'23" East**. The site layout map of WWTP is attached herewith as Annex. However, the Google Earth Map showing the project location and its distance from nearby sensitive receptors is attached below as **Figure-3**.

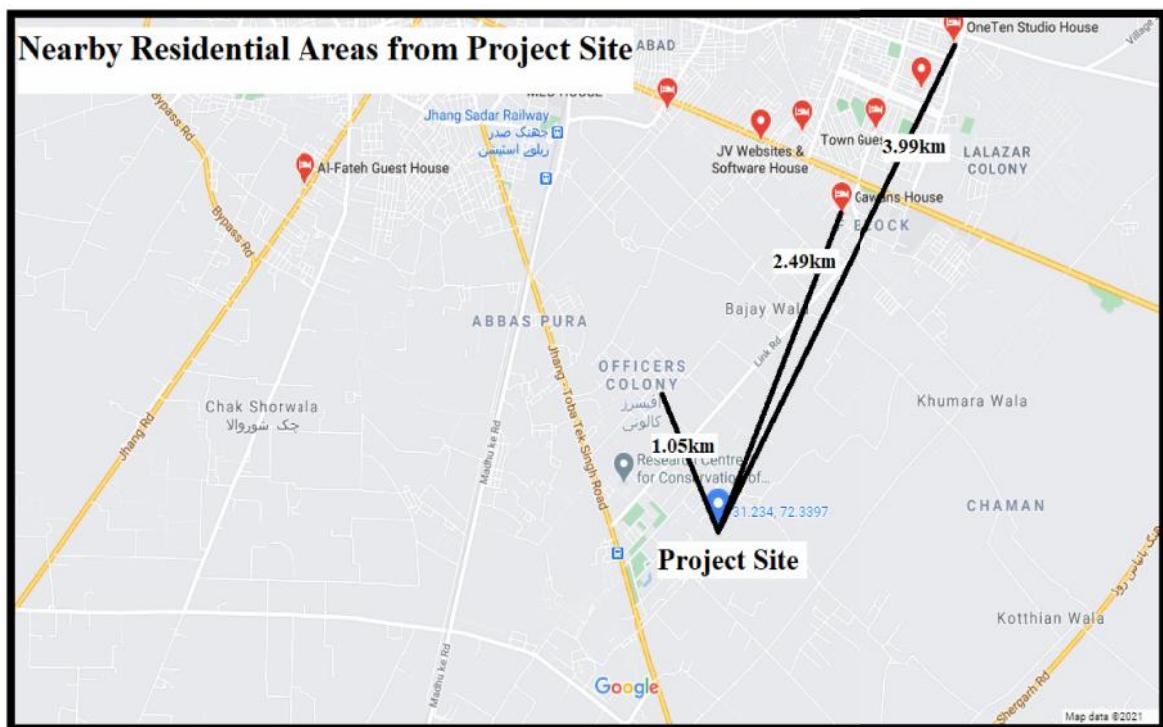


Figure 3: Distance of proposed site from nearby residential areas

5.3 Land Use On-Site

The proposed site is open land and present within the premises of M/s Shakarganj Limited. Pictorial evidence is given below as **Figure-4**.



Figure 4: Site Selected for Installation of WWTP

5.4 Road Access

The site is approachable via Jhang-Toba Tek Singh Road and Jhang Bypass Road as show below in **Figure-5**.



Figure 5: Road Access Map

5.5 Vegetation Features

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, Native Kikar, Safeeda, 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 installation. Plantation will be done in all open spaces and surroundings of project site.



Figure 6: Vegetation on Project Site

5.6 Cost and Magnitude of Operation

The cost of the proposed WWTP is **PKR 76 Million approx.** and the break-down of the cost is given below in **Table-6**.

Table 6: Cost Breakdown

Activities	Cost (PKR)
Civil Works	43Million
WWTP Machinery & installation	33Million
Total	76Million

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.

5.7 Schedule of Implementation

The technology adopted for the installation of WWTP is ASP it is latest and most effective in treating the wastewater. The tentative project implementation schedule is 6 months.

5.8 Description of Project

The said project is the installation of wastewater treatment plant for treating the wastewater generated from production of sugar at Shakarganj Limited. The technology proposed for the treatment is Activated Sludge Process (ASP) because it is most recommended, efficient and economical technology. The treatment capacity of said plant will be 1680 m³/day. Its description is given below.

5.8.1 Process Flow

The first step in the treatment of effluent is screening, equalization, clarification, chlorination etc. The process of treatment is given below in **Table-7**.



Table7: Process Flow Diagram

5.8.2 Technology

The following technology is selected based upon following factors:

a. Designing Parameters

The said treatment plant is designed for the treatment of wastewater generated from: boiler house, process house & mill house at the rate of 1680m³/day based on various parameters given in **Table-8**.

Table 8: Designing Parameters

Sr.#	Parameters	Units	Concentration
Water Flow			
1	Design Flow	m ³ /day	1680
2	Avg. Design Flow		1700
3	Peak Flow (assumed)		1750
4	Peak Flow Duration (assumed)		1750
Characteristics of Wastewater			
1	BOD	mg/l	1500
2	COD	mg/l	3500
3	TSS	mg/l	400
4	Oil and Grease	mg/l	10
5	pH	---	5-8
6	Temperature	°C	28

5.8.3 Components of Wastewater Treatment Plant

Following are the components of the WWTP:

a. Screening

Screening is the first process at wastewater treatment plants (WWTPs). Screening removes objects such as rags, paper, plastics, and metals to prevent damage and clogging of downstream equipment, piping, and appurtenances. Some modern wastewater treatment plants use both coarse screens and fine screens.

b. Equalization Tank / Equalization Basin

Providing consistent flow and loading to a biological process is important to maintain optimal treatment. Equalization (EQ) Basins are designed to provide consistent influent flow to downstream processes by removing high flow fluctuations. Due to the additional retention time, aeration and mixing is required in equalization basins to prevent the raw wastewater from becoming septic and to maintain solids in suspension.

The uniform concentration of treated effluents can be achieved to meet the enforced effluents standards. Moreover, it provides a point of recycling concentrated streams from sludge drying beds, etc.

c. Neutralization Tank

Neutralization of wastewater is a critical step in most sugar industrial wastewater treatment processes. There are a multitude of regulatory requirements both Federal and Provincial

regarding wastewater discharge requirements. Users should consult their local agencies for specific requirements as they can vary by region. Any company that discharges effluent into sewer systems, lakes, streams are required to neutralize this effluent before allowing it to be discharged. Non-compliance could result in fines and other consequences. In many instances, recording the pH of the discharge is also required.

Components of a pH Adjustment/Neutralization System

A basic pH adjustment / neutralization system consists of six basic components:

- Instrumentation for monitoring, controlling, and recording
- pH electrodes and/or ORP sensors and associated mounting hardware
- Effluent holding tank
- Level control
- Chemical pumps and reagent storage tanks
- Mixers/agitators

In this system, effluent flows into the holding tank where a pH sensor (also known as pH electrode or pH probe) senses the pH of the solution. The sensor provides input to the pH controller device which operates chemical pump(s) to inject acid or caustic as required to neutralize the effluent. The mixer serves to evenly distribute the neutralizing chemicals throughout the holding tank to ensure complete neutralization.

d. Flash Tank

Wessel flash tanks are manufactured to ASME Section VIII, Div. 1 standards. Designed to **125 psi**. The function of a flash tank is to allow high-pressure condensate to flash and a reduced pressure steam. This reduced pressure steam is then used to supply heat to a “low” pressure supply main. It can also be used to reduce and cool to low-pressure steam before re-introducing it to the boiler or condensate receiver, or discharge directly from the system. The vessels are available in standard volumes from 13 to 180 gallons. Spurge and drop-leg designs are also available to meet any design condition.

e. Dissolved Air Flotation

Dissolved Air Flotation (DAF) is an efficient flotation method for water clarification. The term refers to the method of producing flotation by dissolving air in the water under pressure and then releasing the pressure. When the pressure is released the solution becomes supersaturated with air as millions of small bubbles form. These bubbles attach to any particles in the water causing their density to become less than that of water. The particles then rapidly float to the surface for collection and removal, leaving the clarified water behind.

f. Primary Clarification

Primary clarification is the physical treatment process of removing solids before biological treatment. It is the most cost effective way to remove these solids after basic screening. Process water enters the clarifier tank and floatable solids (scum) are removed from the surface by skimmers while settle able solids (sludge) are collected on the bottom by a rake and removed via a sludge removal system. Effluent destined for biological treatment leaves the clarifier over a weir. The expected range for percent removal in a primary clarifier is **90%-95%** settle able solids, **40%-60%** suspended solids, and **25%-50%** total BOD5.

g. Oxidation pond

Oxidation ponds, also called lagoons or stabilization ponds are large, shallow ponds designed to treat wastewater through the interaction of sunlight, bacteria, and algae. Algae grow using energy from the sun and carbon dioxide and inorganic compounds released by bacteria in water. During the process of photosynthesis, the algae release oxygen needed by aerobic bacteria. Mechanical aerators are sometimes installed to supply yet more oxygen, thereby reducing the required size of the pond. Sludge deposits in the pond must eventually be removed by dredging. Algae remaining in the pond effluent can be removed by filtration or by a combination of chemical treatment and settling.

h. Final Clarifiers

Final clarifiers providing enough detention time at average daily flow, settle out the *Activated Sludge* and other heavy solids by gravity, while floatable are removed by skimming. A major portion of the activated sludge is returned to the plant flow upstream of the aeration basins. The activated sludge is returned to the plant flow in order to maintain a high concentration of bacteria and microorganisms within the process. The excess portion of activated sludge, known as waste activated sludge, is pumped to a point upstream of the primary clarifiers where it is co-mingled with the raw wastewater and settles with the primary clarifier sludge.

i. Sludge Holding Tank

A sludge holding tank has been offered where primary sludge and Waste activated sludge will be held and transfer in sludge dewatering system after dewatering sludge shift for disposal and water again transfer into equalization tank, it also reduce the odor problem before transferring the raw sludge to a sludge dewatering system.

5.8.4 Supplies

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

a. Manpower (Direct & Indirect)

During construction phase 20-50 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.

b. 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 WAPDA and self-owned power house of 14MW.

ii. Wastewater Management

The proposed project is the treatment of the wastewater generated from sugar industry. The treatment capacity of proposed WWTP is 1680m³ per day.

iii. Noise

Wastewater Treatment 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.

5.8.5 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.

CHAPTER 6: DESCRIPTION OF ENVIRONMENT

This section describes the baseline conditions, which shows the clear-cut picture of existing environmental resources; physical, ecological, and socio-economic environment of the Project Area. Information on these aspects has been derived from field visits to the project area as well as information obtained through visits to the Government departments and other relevant agencies.

The primary data was collected by surveying the project area and its nearby vicinity. The secondary data regarding physical parameters (topography, geology, seismology, hydrology and climatology) was obtained by visiting relevant departments and their official websites. The biological parameters (flora and fauna) were also studied in the project area. The vegetation of project area was studied by preparing a floristic list based on visual observation. The species were recorded with reference to their historical existence in the project area.

Information on wildlife fauna species (mammals, amphibians, reptiles, birds, etc.) in the assessment area was compiled based on opportunistic observation, gathering the existing information and consultation with local experts, community members and government departments. The socio-economic aspects were studied and analyzed by conducting detailed socio-economic surveys.

6.1 Baseline Physical Environment

In this section, physical resources such as; topography, soil, climate, surface as well as ground water resources and its quality, ambient air quality and geology of not only the project site but also the city as a whole to assess whether the project under assessment can or does have any impacts on any of these parameters. The description of physical environment of the project site is present in the following sub sections.

6.1.1 Topography & Geology

Jhang is situated at the East bank of Chenab, between longitude 72.311760 East and latitude 31.278046 North. The city covers an area of approximately 28.27 km², while the district covers approximately 6,166 km². Jhang district has been endowed by nature with a rich soil, aided by an efficient irrigation system. The topography of the selected project site is plain. Coordinates of the site are **Latitude 31°14'02" North** and **Longitude 72°20'23" East**.

6.1.2 Seismicity

According to Seismic Zoning of Pakistan, the project area lies in Zone 2A of Modified Mercalli (M.M.) scale and represents minor damage in the past due to the Earthquake. Distant earthquakes may cause damage to structures with fundamental period greater than 1.0 second, corresponds to intensity V and VI of the M.M scale (National Disaster Management Authority). The seismic zoning of Pakistan is given below in Figure 7 below:

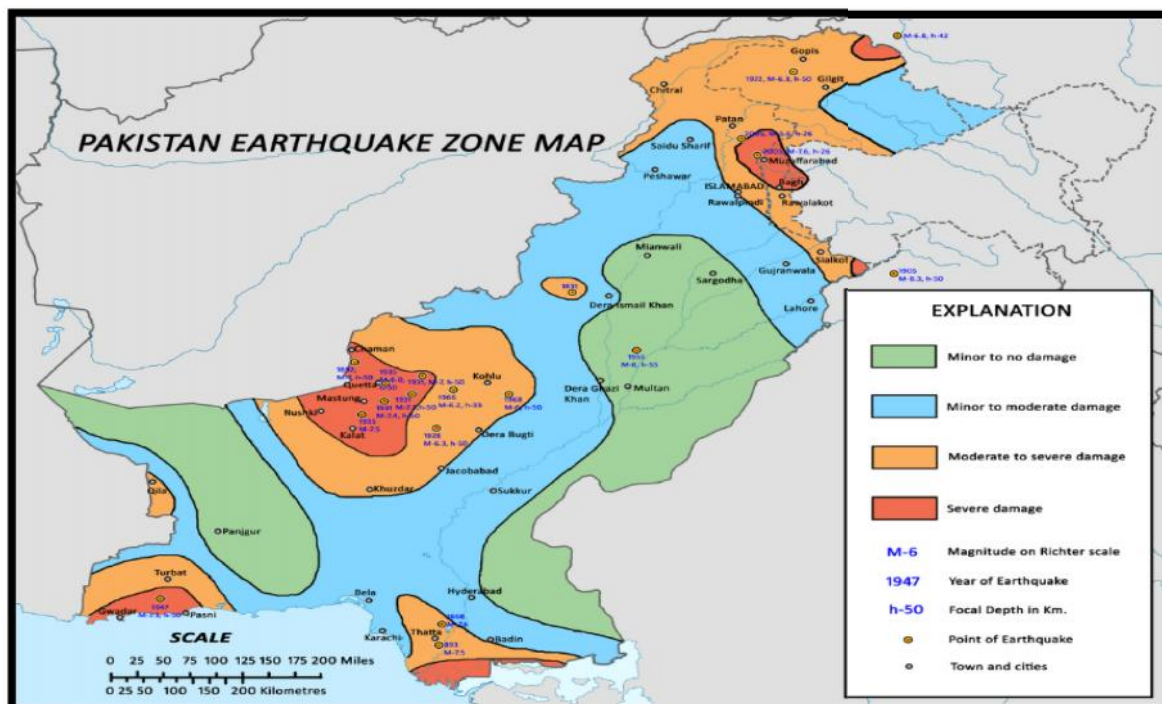


Figure 7: Seismic Zoning of Pakistan

6.1.3 Climate

The climate of the district is hot and dry during summer and cold and dry during winter. During site visit 18°C was measured during day time and 11°C during night. The bulk of monsoon precipitation occurs in July and August, with monthly averages of 75.0 mm and 69.0 mm respectively. Minimum rainfall occurs in the month of November which is 3.0 mm” (PMD).¹

6.1.4 Ambient Air Quality

The primary air pollutants are; carbon monoxide (CO), oxides of nitrogen (NO_x), sulphur dioxide (SO₂), and particulate matter (PM). In order to determine the air quality of the area, environmental monitoring was carried out by ESPAK being EPA certified Laboratory and having the requisite air sampling device and expertise for collection of samples. To determine the air quality of the area ambient air monitoring was carried out and the results obtained are mentioned below in **Table-9**.

Table 9: Air Quality Monitoring Results

Sr.#	Monitoring Source	CO (1 Hr)	NO	NO ₂	SO ₂	O ₃ (1 Hr)	PM _{2.5}	PM ₁₀
	PEQs	mg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³

¹<http://hikersbay.com/climate-conditions/pakistan/jhangsadr/>

		10	40	80	120	130	35	150
1	Midpoint	0.9	13.2	24.7	20.5	3.8	32.3	145

6.1.5 Noise

Noise level measurements had been carried out within the selected site. This analysis showed that values are much below the limit prescribed under the Punjab Environmental Quality Standards (PEQS).

Table 10: Ambient Noise Monitoring Results

Sr.#	Monitoring source	Unit	PEQs	Conc.
1	Midpoint	dB (A) Leq	75	52

6.1.6 Hydrology

Groundwater quality results of project area are given below in **Table-11**.

Table 11: Ground water Analysis Results

Sr.#	Parameters	Unit	WHO Guidelines	Conc.	Method
1	pH value	---	6.5-8.5	7.5	pH meter
2	TDS	mg/l	<1000	1224	Evaporation
3	Taste		Not objectionable	Not Acceptable	Taste Panel
4	Odor	TON	Not objectionable	Acceptable	Dilution
5	Color	ptcu	≤15	Nil	Spectrophotometer
6	Total Hardness as CaCO ₃	mg/l	<500.0	294	Digital Titrator
7	Turbidity	ntu	<5	43.5	Turbidity Meter

6.2 BASELINE BIOLOGICAL ENVIRONMENT

In sub-sections below biological features are discussed below:

6.2.1 Flora

In Jhang the green zones are very less, native species are present but in a scarce condition. The ornamental plants and tree had been planted at the boundaries of the various residential societies present in vicinity of project area. The detail of the tree species present in the study area is given in **Table-12**.²

Table 12: Vegetation features near project site

Sr.#	Local Name	Biological Name
1	Beri	<i>Zizyphusjajaba</i>
2	Van	<i>Salvadoraabeoides</i>

²https://www.punjab.gov.pk/jhang_climate_general_soil_condition

3	Kikar	<i>Acacia arbica</i>
4	Jand trees	<i>Prosopis spicigera</i>
5	Shisham	<i>Dalbergia sissoo</i>
6	Aak	<i>Calotropoishamiltonit</i>
7	Karir	<i>Capparis aphylla</i>

6.2.2 Fauna

During site visit no such fauna was noticed that could be impacted due to installation of aforementioned project as it is present within the existing facility of Shakarganj Sugar Mill. Within 5-km from project site dogs, cats, cows, sparrows and crows were noticed.

6.2.3 Archaeological Sites or Wetlands

It is envisaged that no building of archaeological, cultural and historical importance is expected to be damaged due to the installation of said project at the selected site. Moreover, there is no wetland or surface water body reported to be affected due to the installation of the aforesaid project.

6.2.4 Endangered Species

There is no floral or faunal species inhabiting in the project area that are included in the Red Data Book of IUCN.

6.3 BASELINE SOCIOECONOMIC ENVIRONMENT

Socio-economic environment is represented by the human and economic development and quality of life values. For the study of socio-economic environment of the project area, field surveys were conducted and interviews were held with the various stakeholders. The socioeconomic conditions of the project area are as follow:

6.3.1 Industries

Above said project is going to install within the premises of M/s Shakarganj Limited to treat wastewater generated from process of sugar manufacturing. Project site is also surrounded by various other industries as shown below in **Figure-8**.

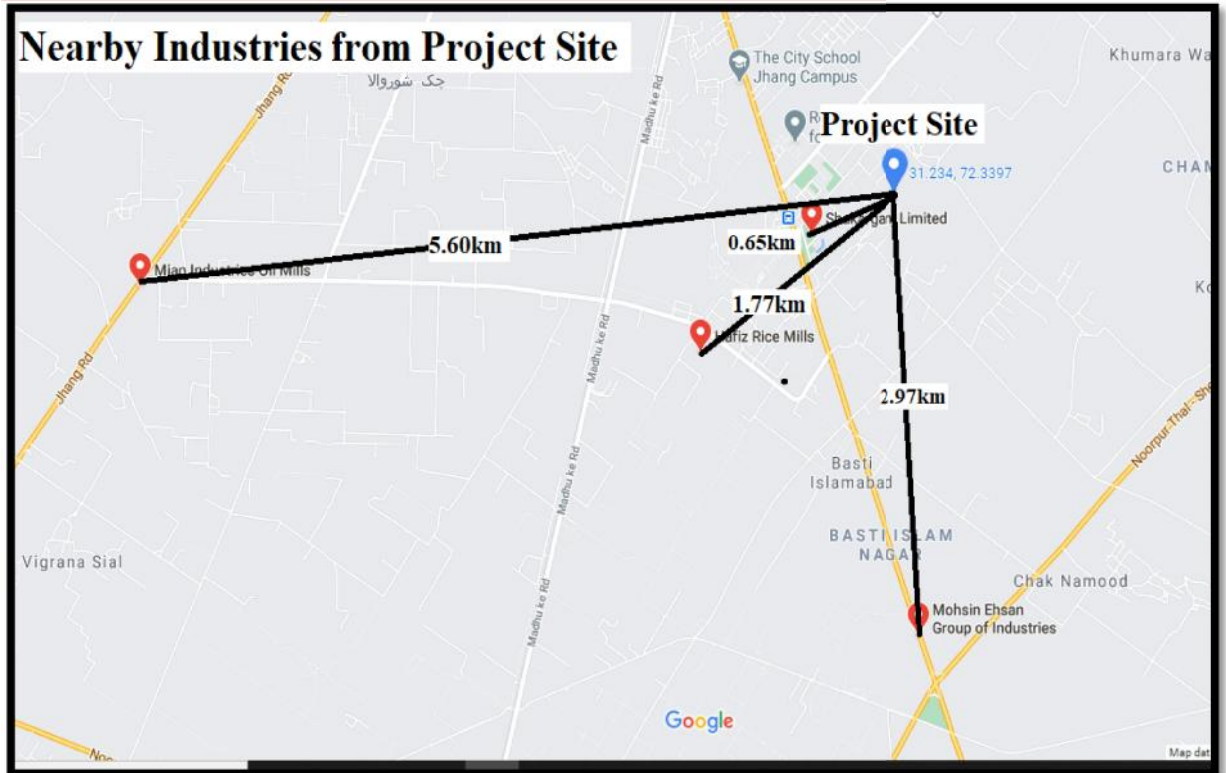


Figure 8: Nearby Industries

6.3.2 Health Facilities

Healthcare services are provided to the citizens by both public and private sector hospitals. The nearest health facilities to the project site are Iqbal Memorial Hospital, Ali Ahmed Khan Hospital, Shifa Medical Centre and Faisal Mighiana Memorial Hospital.

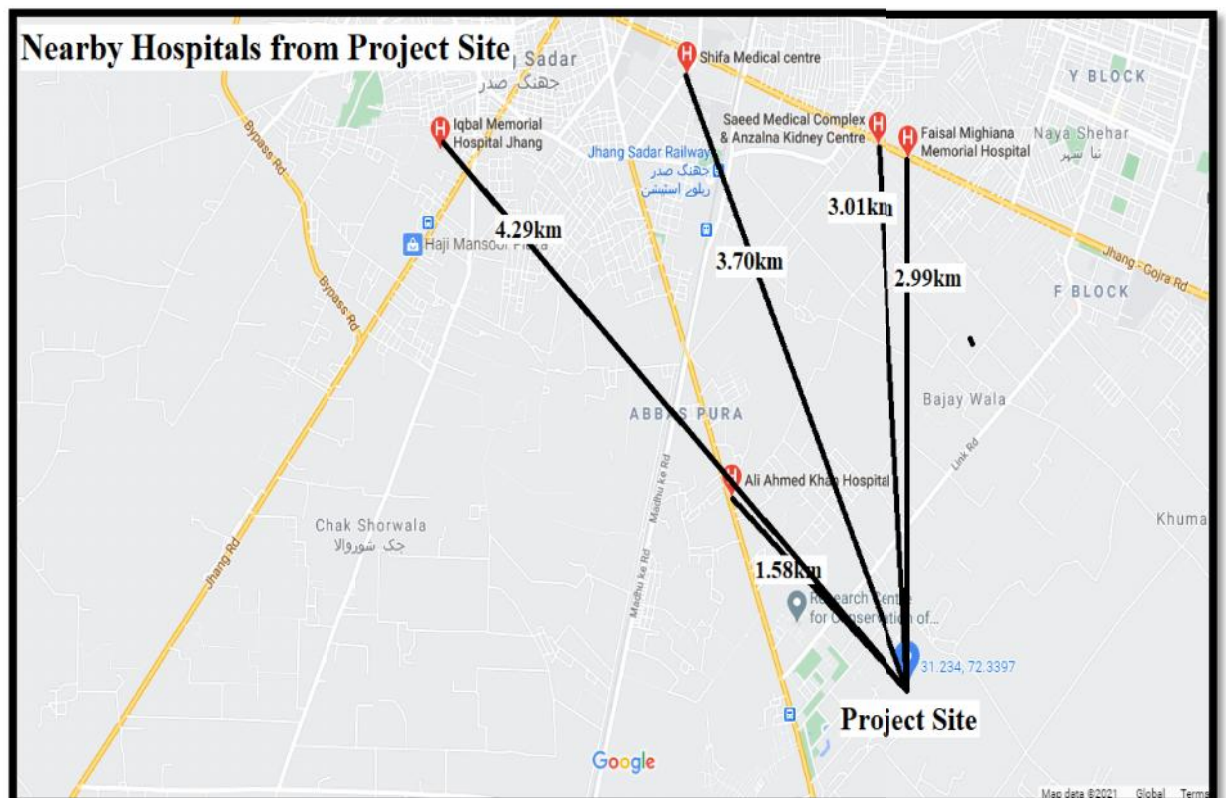


Figure 9: Nearby Hospitals

6.3.3 Educational Facilities

Education up to higher secondary is present in project area. Schools present in project area are shown below in **Figure-10**.

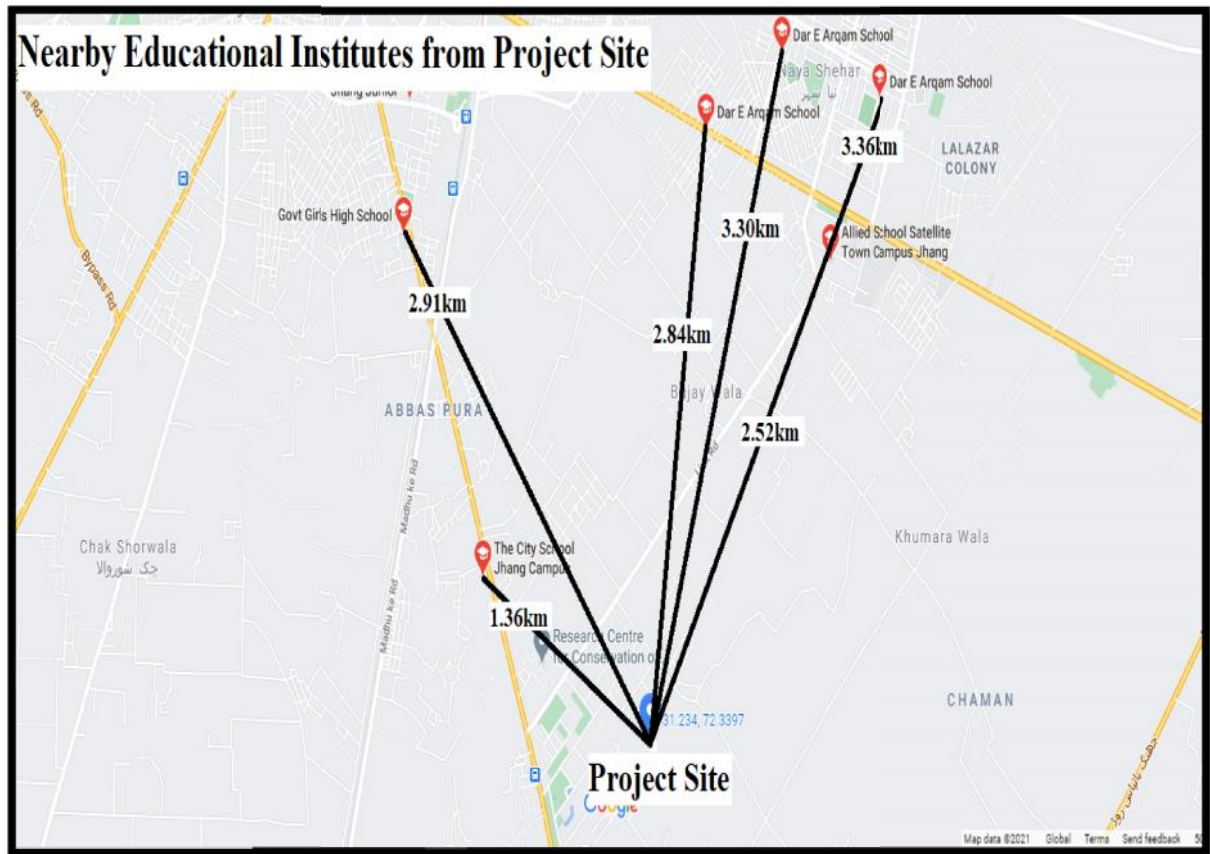


Figure 10: Nearby Educational Institutes

6.4 LAB REPORTS OF ENVIRONMENTAL ANALYSIS

Testing of different parameters was carried out from EPA certified laboratory i.e. ESPAK to check the quality of different environmental parameters. The copies of lab reports of these parameters (ambient air analysis, ground water quality analysis and noise) are annexed.

6.5 SUITABILITY OF THE SITE

As the project site is present within the existing facility of M/s Shakarganj Limited and under the ownership of proponent. The proposed treatment plant is going to install to treat wastewater generated from sugar industry. The site does not fall in environmental sensitive area and all commodities are at a suitable distance from project site as they will not be impacted by the construction and operational activities even locals will get more benefits and job opportunities. No replacement, relocation and rehabilitation are required for the development of proposed project.

CHAPTER 7: 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.

7.1 Methodologies for Impact Identification

The potential impacts due to installation of effluent treatment 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. It is anticipated that this project will have maximum positive impacts as it is environmentally friendly project to reduce pollution load. 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 13: Impact Significance 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 duration
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 duration
Short Term	When the impact is of low intensity but with moderate spread and moderate duration or of moderate intensity
Insignificant	When the impact is of low intensity, low spread and low duration
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 14: 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	Adverse	Insignificant	No Impact	Short Term	Moderate	Long Term
Physical Parameters													
Air Quality		✓		✓									
Noise		✓			✓								
Water Quality		✓			✓								
Biological Parameters													
Land Environment													
Flora													
Fauna													
Physical Parameters													
Local Economy	✓												
Social Impacts	✓												
Health & Safety	✓												

Signature



Table 15: 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													

Signature

7.2 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-16**.

Table 16: 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		•		•		•		•		•		•	

CHAPTER 8: SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND 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.

8.1 Project Location

The proposed project is the installation of effluent treatment plant having capacity **1680m³/day** located at Toba Tek Sigh Road, Jhang, 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 Shakarganj Limited. So, no other site alternative has been considered in this regard. Wastewater generated from the operation of sugar mill will be treated in proposed treatment plant.

Nature of Impact

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

Mitigation Measures

No mitigation measure will be adopted as the selected site is in close proximity of existing unit and is already under the ownership of the Proponent.

8.2 Design

The said treatment plant is designed according to flow rate of wastewater generated from sugar manufacturing. 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.

Nature of Impact

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

Mitigation Measures

No mitigation measure will be required as state of the art technology is being adopted for the installation of WWTP.

8.3 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 20-50 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

8.3.1 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.

Nature of Impact

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

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.

8.3.2 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.

Nature of Impact

The nature of the impact will be short-term and insignificant.

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 un-avoidable 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.

8.3.3 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.

Nature of Impact

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

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.

8.3.4 Impacts on Ground Water Quality

The construction activities will be associated with mechanical fabrication, assembly and erection of the wastewater treatment 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.

Nature of Impact

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

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.

8.3.5 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.

Nature of Impact

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

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.

8.3.6 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.

Nature of impact

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

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.

8.4 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.

8.4.1 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.

Nature of impact

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

Mitigations

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

- Personal protective equipments 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.

8.4.2 Ambient Air Quality

No air pollution problems are expected to be associated with the operation of the said wastewater treatment plant.

Nature of impact

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

Mitigations

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

8.4.3 Odor

The treatment technology adopted has been designed to prevent the production of any foul gases (i.e. hydrogen sulfide) due to the chemical and biological reactions taking place. Thus, there will be no significant generation of odor. Odor problems will mainly arise from the sludge hauling process, blocking of pipes, malfunctioning of the pumping stations and leakage of pipes.

Nature of impact

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

Mitigations

In general the following methods will be adopted to control the odor 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 sludge hauling process should be done as quickly as possible.
- Dewatering of sludge should be done
- The sludge hauling process should not be carried out during peak hours, week days and on windy days.
- Different types of trees should be planted in the vicinity of the treatment plant. They will act as buffer zones.

8.4.4 Sludge Disposal

The sludge produced by the wastewater treatment plant will be air dried on-site in sludge drying beds before being moved to a sludge stockpile area using tractor trolley. The foul smell generated from drying bed may cause nuisances for general public. Sludge generated by the sewage treatment processes may have beneficial effects for the crop plantations around the site. Hence, no significant adverse impacts are expected.

Nature of impact

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

Mitigations

Following mitigation measures will be adopted:

- Proper sludge disposal measures such as from existing established methods and standards should be adopted.
- Aerobic decomposition will be carried out which will prevent production of H₂S gas.
- To control foul smell, thin layering (2-3 cm) for sludge will be dried this will promote aerobic condition.
- During drying sludge aeration can be done regularly to control foul smell.
- Trees will be planted along the project area boundary to mitigate odor.

- After secondary treatment sulfur compounds will be reduced significantly. This will reduce the smell.
- Establishing and enforcing environmental, safety and health procedures for the construction and operation of the sludge facilities.
- Regularly updating of the plan to reflect upon the current situation at the treatment plant, its characteristics and revised disposal strategies.
- Ensuring that the disposal of sludge is in accordance with the local standards prescribed by the Environment Protection Act.

8.4.5 Mosquitoes and other Nuisances

Flies and mosquitoes can breed in the tanks and sludge lagoons during the operation of plant.

Nature of impact

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

Mitigations

Following mitigation measures will be adopted:

- All water accumulation within the treatment units should be fully drained as quickly as possible to put an end to the production of the vector itself.
- Under drains and other water pipes should be regularly inspected and cleaned.
- Maintenance activities should be regularly conducted.
- The sludge must be covered with thin-pored veils. The latter will allow the transmission of sunlight and at the same time prevent the entry of mosquitoes.
- Fumigation should regularly be carried out within the vicinity of the treatment plant.

8.4.6 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.

Nature of impact

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

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.

8.4.7 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.

Nature of Impact

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

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.

8.5 Potential Environmental Enhancement Measures**i. 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.

ii. Water Quality Enhancement

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

iii. Environment Friendly Project

Wastewater Treatment Plant will have positive environmental impacts and is expected to significantly reduce a source of chronic water pollution. The ASP technology which has been proposed to be used for aforesaid project is one of the most sustainable and environmental friendly system with an efficient operational efficiency and less prone to malfunctioning.

iv. Recycling/Reuse of Treated Wastewater

Wastewater treatment plant will contribute in saving water resources as effluent water from the treatment plant will be used for various purposes i.e. agricultural use, fire services use, washing of vehicles and many others.

v. 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.

CHAPTER 9: ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

9.1 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.

9.2 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

9.3 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-17**.

Table 17: Environmental Management 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	<ul style="list-style-type: none">Site is located within the existing facility of M/s Shakarganj Ltd. and under their possessionLand will be improved from open land to wastewater treatment plant	Contractor	Proponent* Proponent may give responsibility to concerned departments
Use of local manpower	Social	Employment Generation	Less / Adjacent area	<ul style="list-style-type: none">Local people will be hired for less technical work or non-skilled work	Contractor	Proponent*
CONSTRUCTION						
Civil works	Physical, Social, Biological Aesthetical	Dust, Noise & Vibration, Employment, Health & Safety of Workers	More/ Adjacent area	<ul style="list-style-type: none">Water sprinkling will be done to reduce dust emissions.Noise control measures will be implementedUse of water only from designated wells.	Contractor	Proponent*



Movement and fueling of vehicles	Physical & Aesthetical	Noise, dust	Moderate/ at the site	<ul style="list-style-type: none"> Periodic maintenance and inspection of vehicles Vehicles with leaks will not be operated. All vehicles carrying raw material and equipment's of WWTP will be maintained in good working condition 	Contractor	Proponent*
Transportation of construction material	Bio-physical	Dust and Particulate, Noise Generation, Safety and Health Effects	Moderate/ Adjacent area	<ul style="list-style-type: none"> Excessive use of horns will be avoided PPE's will be provided to workers Covering of transporting material trucks Nighttime driving of project vehicles will be limited where possible Noise will be monitored through Digital Sound Meter 	Contractor	Proponent*
OPERATION PHASE						
Processing of WWTP	Bio-physical, aesthetical	Odor, site safety, noise and health impacts	Moderate/ Local	<ul style="list-style-type: none"> Proper operation of 3 months and training to ETP operation 	HSE Manager	Proponent*

Signature



				<p>team will be ensured by vendor.</p> <ul style="list-style-type: none"> • Complete manual of operation with complete details to run ETP will be provided by vendor to the ETP operation team. • Proper treatment of wastewater must be ensure before its final disposal/reuse • Regular monitoring must be conducted to check compliance of PEQS • Environmental Manager must be designated to monitor the efficiency and working of treatment plant • Health and safety of workers must be considered while testing. • PPE's must be provided to workers and proper signs must be displayed in local language for guidance of workers and visitors • Assembly point must be made and training of workers must be done on regular interval 		
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Signature



				<ul style="list-style-type: none"> • Technical person must be available at site in case of any mechanical fault 		
Handling of sludge	Biophysical	Odor, Health and Safety	Moderate/ Local	<ul style="list-style-type: none"> • Sludge drying beds will ensure digestion of bio-solids to minimize the moisture content and volume. • Sludge cakes will be sold used in agricultural fields and the excessive will be dispose off properly by contractor. • Along boundary and at designated green areas tree plantation must be done 	Contractor	ETP Operation Manager

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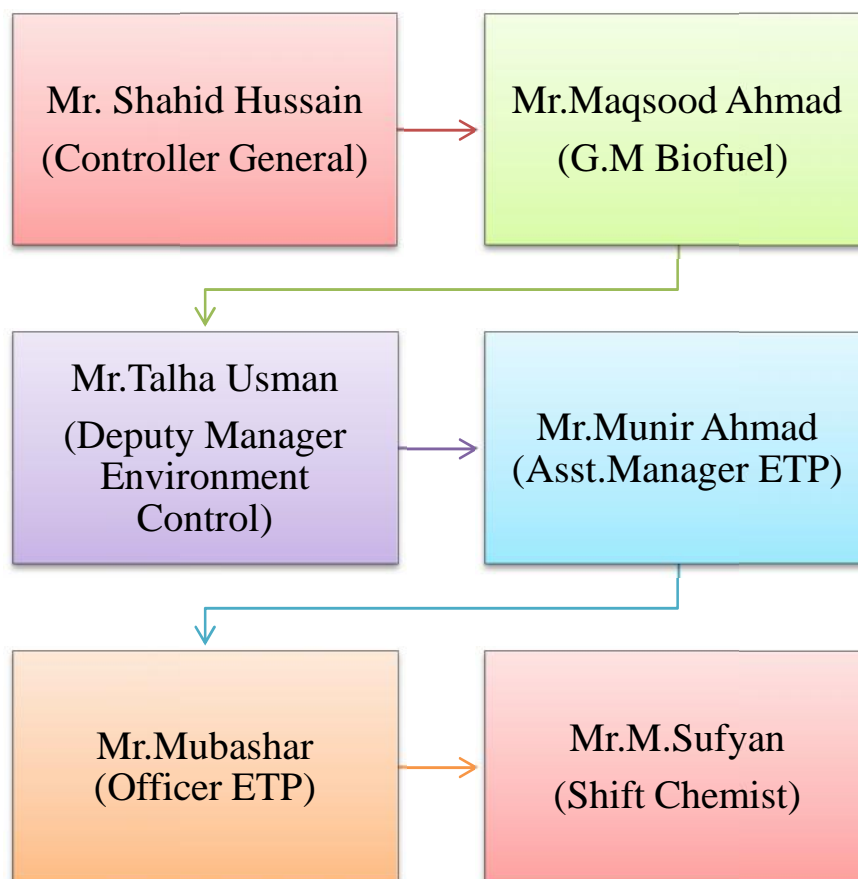
9.4 Schedule for Implementation and Environmental Budget

This project will be completed in 06 months after getting Environmental Approval. The total cost of the project is **PKR 76 Million approx.** which includes; the cost of civil work, purchase of machinery and its installation, implementation of mitigation measures, site rehabilitation, etc. The said project is to protect environment that could be damaged from disposal of untreated wastewater so no separate environmental budget is allocated.

9.5 Environmental Management Team

The primary responsibility for implementing different aspects of the EMP within the company lies with the concerned departments of M/s Shakarganj Limited. Following are the designated roles and responsibilities of the employees involved in the monitoring and management of the adverse impacts;

Table 18: Environmental Management Team



9.6 Proposed Monitoring program

Environmental monitoring is a vital component of the Environmental Management Plan. It is the mechanism through which the effectiveness of the EMP in protecting the environment is measured. The feedback provided by the environmental monitoring is instrumental in identifying any problem or lapse in the system under implementation and planning corrective actions. For domestic activities already constructed facilities will be used. Solid waste disposal will be according to standard practices of area. It should be noted that it is difficult to outline a formal monitoring protocol for specific environmental parameters and key impacts until detailed project design have been completed. A formal monitoring protocol will be included within the revised EMP once the detailed project design has been completed.

Table 19: Proposed Monitoring Program

Components	Parameter to be Monitored	Measurement	Frequency	Location	Responsibility
Land Resource	Soil quality	Visual Monitoring and soil analysis	Daily	On-site	Project Manager
Noise Levels	Noise level on the site and adjacent area on dB(A) scale	Noise level reading will be Taken	Regularly	At least four locations on the unit boundary	HSE Officer
Workers safety	Injuries and accidents	Recording injuries	Daily	Onsite	HSE Officer
Wastewater	Wastewater parameters	Readings will be taken	Monthly	On site	Environmental manager, HSE Officer
Ecological Resource	Flora & Fauna of the area	Observation by conducting surveys	During Baseline Survey, once in a year and after the completion of the Project	Around project site	Project Manager/Environmental manager

9.7 Proposed EMP reporting and reviewing procedures

- During construction, EMP reporting and reviewing will be done by the contractor/HSE department. Regular monitoring will be done and reports will be submitted in EPA as per condition of Environmental Approval of construction phase.
- Monitoring reports will be reviewed by EMP team and HSE department of M/s Shakarganj Limited and then will be shared with EPA.
- Photographic records will also be maintained
- Recorded data will be reviewed by supervisory contractor/proponent so that it can be further improved if required.

9.8 Environmental Training

M/s Shakarganj Limited has special department of Training & Development that will ensure in-house training for the project staff, labor and the supervisory staff through the provision of one day basic training and one day advanced training, covering environmental and social aspects of the projects in general and implementation requirements will emphasis on the development project in general, on the roles & responsibilities of the staff and the labor while executing the environmental monitoring plan in particular. The training protocols will include the following aspects:

- Procedures for monitoring the air quality parameters and measures to be adopted for avoiding/minimizing air pollution, particularly from the transportation of raw material and final goods.
- Staff training on environmental monitoring and reporting.
- Safety measures against hazards for workforce and the local communities arising from the construction and installation activities.
- Use of safety gadgets by the workforce.

CHAPTER 10: STAKEHOLDERS CONSULTATION

General

Public consultation refers to the process by which the concerns of local affected persons and others who have plausible stake in impacts assessment of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. According to the IEE and EIA Review Regulations, 2000 public consultation is mandatory for any socio-environmental study. For this purpose, assessment survey and public consultation sessions held with different stakeholder groups that may be impacted. The consultation process was carried out in accordance with the guidelines laid by EPA, Punjab. The objectives of this process were to:

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

This report includes all the comments, which were taken into account in preparing the definitive development concept for the installation of the purposed WWT plant. Public consultation performas are annex

Consultation Mechanism

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

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

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

This section involves communication of possible impacts and concerns with

- ✓ Proponents Environmental Management Team
- ✓ The responsible authority
- ✓ Other departments and agencies
- ✓ Environmental Practitioners and experts
- ✓ Affected and wider community

10.1 Proponents Environmental Management Team

Consultation regarding Installation of Wastewater Treatment Plant (WWTP) by M/s Shakarganj Limited was done with Proponent's Environmental management Team and anticipated impacts were discussed. Concerns of locals, Environmental Practitioners & experts and Government departments were discussed and asked to consider them while construction of above-said project. Locals will be preferred for employment after providing proper training. Mitigations measures mentioned in EMP will be truly implemented.

10.2 The responsible authority

Overall responsibility for implementation of EMP will be that of project proponent. He will appoint an HSE/Project Manager of relevant qualification. HSE/Project Manager will act as Environmental Manager and will manage the all HSE condition at the PEQS.

10.3 Other Departments and Agencies

Different Government departments were consulted regarding Installation of Wastewater Treatment Plant (WWTP) by M/s Shakarganj Ltd. to treat wastewater generated from sugar manufacturing.

10.3.1 Consultation with Government Departments

Various government departments were consulted by the socio-environmental team of the consultants and concerned details about the project were noted down through personal interviews, group meetings, etc., in their offices.

10.4 Environmental Practitioners and experts

Consultation with Environmental Practitioners and experts was done and following comments and suggestions were observed.

Table 20: Consultation with Environmental Practitioners and Experts

Sr. No.	Name	Qualification	Comments/Suggestions
1.	Ms. Areej Tahir	Ph.D. (scholar) Environmental Sciences	Following comments are summarized: <ul style="list-style-type: none"> • WWTP of latest technology must be installed with maximum efficiency • Regular monitoring should be conducted
2.	Ms. Leenah Maqbool	Ph.D. (scholar) Environmental Sciences	She said that current project must be installed as : <ul style="list-style-type: none"> • it will improve sanitary conditions of the area • it is an environmentally friendly operation of sugar industry

3.	Mr. Danial Zaib	BS Environmental Sciences	He said that: <ul style="list-style-type: none"> Locals should be preferred for employment In case of outsider's residence must be provided Proper mitigation measures must be adopted while construction and operation of this project
4.	Ms. Zahra Anwar	M.Phil. Environmental Sciences	She said that: <ul style="list-style-type: none"> In case of removal of vegetation, trees must be planted after construction at designated green areas More water conservation strategies must be adopted Solid waste must be collected and disposed off properly
5.	Engr. Noor Fatima	B.Sc. Environmental Engineer	She suggested to install WWTP of adequate capacity <ul style="list-style-type: none"> to treat wastewater from sugar processing before discharge/reuse Proper leveling and commissioning must be done after completion of construction Environmental manager must be specified to check compliance.

10.5 Affected and Wider Community

Social survey was conducted to consult with local community. Their concerns were noticed and discussed with proponent and their team. Majority was in favor of project their details are given below in **Table-21**.

Table 21: Community Survey

Sr.#	Respondents	CNIC/Contact Nos.	Concerns
1	M. Hafeez	0334-7611210	During the survey in the study area following concerns of the local community were noted: <ul style="list-style-type: none"> Wastewater should be properly treated prior to final disposal in nearby drain. 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
2	Riaz Hussain	0343-7925022	
3	Amjad Hussain	0349-0687956	
4	M. Israr	0340-3214877	
5	Essar ul Huq	33202-53396901	
6	Ghulam Mujtaba	0315-7477807	
7	Ghulam Abbas	0333-6723446	
8	M. Mubashir	0333-6751401	

	Nadeem		<p>designed and enforced with true spirit.</p> <ul style="list-style-type: none"> • Health of the workers should be ensured. • Plantation should be carried out at extensive scale. • Construction activity should be carried out during day hours. • Noisy activities should be confined. • Workers should be hired from local community. • PPE's must be provided to workers • Proper disposal of solid waste should be practiced. • Indigenous trees around the facility should be planted to control air pollution. • Sufaida can be planted in the project area as the area is known to be affected by the logging and salinity. • Removal of shrubs and bushes should be avoided to the extent possible.
9	Ahmed Ali	0346-7247118	
10	Abid Hussain	0342-7649894	
11	M. Hassan	33100-7069780-7	
12	Hajhat Ali	35403-1152260-1	
13	Iftikhar Ashraf	33100-0960726-9	
14	Jalal Raiz	35404-0851938-1	
15	M. Tayyab	33102-94494070-1	
16	M. Qasim	33103-5708449-5	