3A APPAREL

Installation of Effluent Treatment Plant

22-KM, OFF FEROZPUR ROAD, ROHI NALA, NEAR ALLAH HOO BRIDGE, GAJU MATTA, LAHORE

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

Project Consultant

SCM INTERNATIONAL

Address: Site no. 45, Civic Center,
West Canal Road,
Guttwala, Faisalabad

Tell #: 041-2430766

EXECUTIVE SUMMARY

I. Title and Location of The Project

Title: 3A Apparel (Installation of Effluent Treatment plant)
Address: 22-KM, off Ferozpur Road, Rohi Nala, Near, Allah Hoo Bridge, Gaju Matt, Lahore .

II. Name of the Proponent

Name: Mr. Amer Azeem (Proponent)
Address: House No. 33-B, model Town Lahore

III. Name of The Organization Preparing Report

SCM international

Office Address: Site no. 45, Civic Center, West Canal Road, Guttwala, Faisalabad
Email: info@scminternational.org

IV. A Brief Outline Of The Project

M/S **Alliance Textile** is one of the leading, renowned and recognized Group in textile industry intends to instal Effluent Treatment Plant having capacity 16 m^3/hour. The project in its vicinity has infrastructure like roads, transport, electricity, telephone, land and even the environment is of ideal condition for distribution center.

To fulfill the legal requirements of the Punjab Environmental Protection Act (amended act 2012), section 12, this Environmental Impact Assessment (EIA) report is being submitted to the Environmental Protection Agency (EPA), Government of the Punjab to obtain the No Objection Certificate (NOC)/Environmental Approval (EA).

V. The Major Impacts

Construction phase

- Combustion products, welding aerosols and other harmful substances emitted into ambient air
- Dust Emissions
- Foul odor emission
- Noise Propagation in the Air
- Impact on integrity and stability of soil

Operational phase

- Foul odor emission
- Noise Propagation in the Air – Exploitation of electric engines
- Contamination of water and related water bodies with suspended particles and organic substances
- Risks related to health and safety of population

VI. Recommendations For Mitigation Measures

Construction Phase

- Water sprinkling would be ensured to minimize the dust arising during the construction phase.
- The provision of face mask and goggles also reduce the impact
- Proper shift hours for the labors will be scheduled to avoid any health risk.
- Provision and accessibility of ear plugs or ear muffs to all workers and visitors to avoid sound volume
- Proper solid waste management would be ensured and if any waste is found, it would be recycled and any other waste would be sold to the contractor

Operational Phase

- Plant trees in landscaping areas to prevent odor dispersion.
- Ensure that all treatment processes, equipment and pipeline work well. Regularly carry out equipment maintenance.
- Using noise-insulation materials during installation of pumping station;
- Arrangement of pumps on vibro-isolating platform, for that thick rubber sheets can be used;
- Installation of auxiliary pump, vacuum pump, generator in avoid downtime
- Solid waste, sludge from suction pump will be clarified, settled and stored in settling tanks. Sludge will be compressed and stabilized so that it causes no odor, is stored and transported to treatment plant.

VII. Proposed Monitoring

The monitoring program is designed to ensure that the requirements of the environmental approval awarded by the EPA are met. Monitoring Program (MP) provides important information that allows for more effective planning and an adaptive response based on the assessment of the effectiveness of mitigation measures. The monitoring of various parameters will help to determine the extent to which project operation activities will cause environmental disturbance.

Construction phase

Table A:1-1 Proposed Monitoring During Construction Phase

Environmental Component	Key Indicators
Qualitative air quality	Micro-climate, dust, noise, vibration
Construction waste quality	pH, DO, TSS, COD, BOD5, NH4+, Cl-, NO3, NO2-, PO43- , surfactant, oil, Coliform
Hazardous materials and waste	Oil, petrol, grease, alum, Chlorine, soda
Community & worker safety	Frequency of injuries

Operational phase

Table A:1-2 Proposed Monitoring During Operation Phase

Environmental Component	Key Indicators
Quality of air and noise environment	Temperature, moisture, wind, total suspended particles, NO_2, SO_2, CO, noise

Stack Emission Monitoring	PM_{10}, SO_X, NO_X, CO CO_2 from stack of Engines, generaotors and Machinery operating in facility
Wastewater quality	Color, pH, BOD_5, COD, SS, Fe, mineral oil and fat, sulfur, ammonium, total N, total P, Coliform
Monitor in case of incidents	In case of actual or suspected incidents at wastewater treatment plants, environmental monitoring shall conduct immediately and is similar to a periodic environment monitoring. In addition, the daily operation staff will regularly check wastewater collection, operation of pumping station to detect and timely handle incidents of congestion and pipe damage.

CONTENTS

1 INTRODUCTION 1
1.1. PURPOSE OF REPORT 1
1.2. IDENTIFICATION OF PROJECT & PROPONENT 1
1.3. DETAILS OF CONSULTANT 2
1.4. BRIEF DESCRIPTION OF NATURE, SIZE AND LOCATION OF PROJECT 2
2 SCREENING OF PROJECT 4
3 SCOPING 5
3.1 SPATIAL AND TEMPORAL BOUNDARIES OF ENVIRONMENTAL ASSESSMENT 5
3.2 IMPORTANT ISSUES AND CONCERNS RAISED DURING CONSULTATION 5
3.3 SIGNIFICANT IMPACTS AND FACTORS TO BE DETERMINED 5
4 CONSIDERATION OF ALTERNATIVES 7
4.1 SITE ALTERNATIVES, THEIR SELECTION AND REJECTION CRITERIA 7
4.2 DESIGN / TECHNOLOGY ALTERNATIVES, THEIR SELECTION AND REJECTION CRITERIA 7
4.3 Environmental Alternatives, Their Selection And Rejection Crieteria 8
4.4 Economic Alternatives, Their Selection And Rejection 9
5 DESCRIPTION OF PROJECT 10
5.1 OBJECTIVES OF PROJECT 10
5.2 LOCATION AND SITE LAYOUT OF THE PROJECT 10
5.3 LAND USE ON SITE 12
5.4 ROAD ACCESS 12
5.5 VEGETATION FEATURES OF THE SITE 12
5.6 COST AND MAGNITUDE OF OPERATION 12
5.7 SCHEDULE OF IMPLEMENTATION 12
5.8 DESCRIPTION OF THE PROJECT 13
5.8.1 Utilities During Construction Work 13
5.9 OPERATION PHASE 13
5.9.1 Effluect Treatment Plant 13
5.10 RESTORATION/REHABILITATION AT THE END OF PROJECT LIFE 16
6 DESCRIPTION OF ENVIRONMENT 17
6.1 PHYSICAL ENVIRONMENT 17
6.1.1 Topography 17
6.1.2 Soil 19
6.1.3 Climate and Meteorology 20
6.1.4 Surface Water & Ground Water 22
6.1.5 Seismology 25
6.1.6 Flooding 25
6.1.7 Water Logging and Salinity 25
6.2 ECOLOGICAL RESOURCES 25
6.2.1 Marine and Aquatic Ecology 25
6.2.2 Flora 26
6.2.3 Fauna 26
6.2.4 Endangered Species 26
6.3 SOCIOECONOMIC ENVIRONMENT 26
6.3.1 General 26

6.3.2 Political and Administrative Setup 26
6.3.3 Economy and Industrial Activities 26
6.4 QUALITY OF LIFE 27
6.4.1 Demographic Characteristics of the Project Area 27
6.4.2 Rural and Urban Distributions 27
6.4.3 Religion 27
6.4.4 Ethnic Structure 28
6.4.5 Mother Tongue 28
6.4.6 Institutions 28
6.4.7 Transportation 28
6.4.8 Health Facilities 29
6.4.9 Architecture Style 29
6.5 ENVIRONMENTAL MONITORING DATA 30
6.5.1 Air Quality 30
6.5.2 Noise 30
6.5.3 Water Quality 31
7 IMPACT ASSESSMENT 33
7.1 PROBLEM AND ITS OCCURRENCE 33
7.2 CHARACTERISTICS OF IMPACTS (NATURE, MAGNITUDE, EXTENT AND LOCATION, TIMING, DURATION, REVERSIBILITY, RISK) 36
8 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES 44
8.1 ENVIRONMENTAL PROBLEMS DUE TO INSTALLATION AT PRESENT LOCATION OF PROJECT 44
8.2 PROJECT DESIGN RELATED ENVIRONMENTAL PROBLEMS 44
8.3 ENVIRONMENTAL PROBLEMS ASSOCIATED WITH CONSTRUCTION 44
8.4 ENVIRONMENTAL PROBLEMS RESULTING FROM PROJECT OPERATION 45
8.5 POTENTIAL ENVIRONMENTAL ENHANCEMENT MEASURES 47
8.5.1 Solid Waste & Sludge Management 47
8.5.2 Health and Safety 48
9 ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM 49
9.1 DESCRIPTION OF PROPOSED MITIGATION ACTIONS 49
9.1.1 Level Of Treatment Provided To Sewage Produced 49
9.1.2 Effluent Quality And Maintenance Of Effluent Quality 49
9.1.3 Sludge Management 49
9.1.4 Odour 49
9.2 SCHEDULE FOR IMPLEMENTATION AND ENVIRONMENT BUDGET 50
9.2.1 Schedule for Implementation 50
9.2.2 Environmental Budget 50
9.3 ENVIRONMENTAL MANAGEMENT TEAM ALONG WITH THEIR ROLES AND RESPONSIBILITIES 51
9.4 ENVIRONMENTAL MANAGEMENT PLAN 51
9.5 PROPOSED MONITORING PROGRAM TO ASSESS PERFORMANCE OR OUTPUT OF EMP 57
9.6 PROPOSED EMP REPORTING AND REVIEWING PROCEDURES 59
9.6.1 Reporting 59
9.6.2 Review and Update 59

9.7 ANY TRAINING NEED TO REQUIRE TO ENSURE IMPLEMENTATION OF EMP AND MONITORING PLANS 60
10 STAKEHOLDERS CONSULTATION 61
10.1 STAKEHOLDER CONSULTATION 61
10.2 PROPONENT ENVIRONMENT MANAGEMENT TEAM 61
10.3 The Responsible Authority 62
10.4 Other Departments and Agencies 62
10.5 Environmental Practitioners and Experts 62
10.6 Affected and Wider Community 62
Glossary 63
References 67
Terms of References 70

List of Figures

Figure 1-1:Location of Project Site (Google Earth Map) 3
Figure 5-1:Project Site Location Map 11
Figure 6-1: Map of District Lahore 18
Figure 6-2: Soil map of Punjab 19
Figure 6-3: Groundwater Contours Of Lahore 24
Figure 6-4: Educational Institutes in Lahore 28
Figure 6-5: Hospitals in Lahore 29
Figure 6-6: Architecture Style of Lahore 30

List Of Tables

Table A:1-1 Proposed Monitoring During Construction Phase ii
Table A:1-2 Proposed Monitoring During Operation Phase ii
Table 4-1 Technology Alternatives and Their Selection Rejection 7
Table 6-1: Meteorological and Climatic Features 20
Table 6-2: Average Monthly Temperature, Precipitation and Relative Humidity (2018) 20
Table 6-3: Rainfall Data of the Area 21
Table 6-4 : Ambient Air Monitoring Data 30
Table 6-5: Laboratory Analysis Report of Ground Water Sample 31
Table 7-1 Anticipated Impacts of Proposed Project 34
Table 7-2 Characteristics of Impacts during Plant Construction 37
Table 7-3 Characteristics of Impacts during Plant Operations 41
Table 8-1 Environmental Problems during Construction Phase of Project 44
Table 8-2 Environmental Problems during Operational Phase of Project 45
Table 9-1: Environment Management Cost 50
Table 9-2: Members of Environmental Management Team 51
Table 10-1: Stakeholders and their Roles 61

1 INTRODUCTION

1.1. PURPOSE OF REPORT

According to the Punjab Environmental Protection Act Section 12 - Initial Environmental Examination, and Environmental Impact Assessment:

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

It is this legal requirement from the Government of Punjab that this Environmental Impact Assessment (EIA) report has been prepared to get Environmental Approval (EA) from the Environmental Protection Agency, Government of Punjab.

This report provides detailed information and facts of project; including especially among others environmental, economic, social, etc., enabling its assessment and justification that the project will meet the requirements of environmentally sustainable practices; both during installation and regular operation stages, the Punjab Environment Quality Standards and the rules and the regulations thereof. The other relevant regulations and guidelines considered while preparing this EIA report include:

- Policy and procedures for filing, review and approval of environmental assessments.
- Guidelines for the preparation and review of environmental reports.
- Guidelines for public participation.
- Guidelines for sensitive and critical areas.
- Detailed sectoral guidelines

Different environmental aspects like social, physical biological etc and other related features of the project both during installation and its regular occupancy are highlighted in this EIA report. Measures necessary to be adopted to mitigate any environmental impacts on any part of the environment around are also described. All the important information is also provided as described under the format used to help decision makers, EPA Punjab in the present case, before issuing the desired Environmental Approval (EA).

1.2. IDENTIFICATION OF PROJECT & PROPONENT

Project name: 3A Apparel (Installation of Effluent Treatment plant)

Project Location: 22-KM, off Ferozpur Road, Rohi Nala, Near, Allah HooBridge, Gaju Matt, Lahore.

Name of Proponent: Mr. Amer Azeem (Proponent)

Address: House No. 33-B, model Town Lahore

1.3. DETAILS OF CONSULTANT

SCM international

Office Address: Site No. 45, Civic Center, West Canal Road, Guttwala, Faisalabad
Email: info@scminternational.org

1.4. BRIEF DESCRIPTION OF NATURE, SIZE AND LOCATION OF PROJECT

Proposed project is the Installtion of Effluent Treatment Plant (ETP) to achieve PEQS Environmental Standards by proposing Physiochemical and Activated Sludge Process.

Total Area of Plot: 4500 Sqft.

ETP Plant capacity: 16m^3/hr (384 m^3/day)

Location: 22-KM, off Ferozpur Road, Rohi Nala, Near, Allah HooBridge, Gaju Matt, Lahore

Google Earth Map of location is given below:

.



Figure 1-1:Location of Project Site (Google Earth Map)

2 SCREENING OF PROJECT

According to the Punjab Environmental Protection Agency (review of IEE and EIA) regulations, 2016: **Section - 4** Projects requiring an EIA

> **"A proponent of a project falling in any of the categories listed in Schedule II shall file an EIA with the Agency, and the provisions of Section 12 shall apply to such project."**

In accordance with the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000, SRO # 339 (1)/2000 the project for Waste Disposal (Construction of ETP) falls in Schedule –II, **Section – G, Sub Section-2 "Waste disposal processing facilities for domestic or industrial wastes, with annual capacity more than 10,000 cubic meters"** for which Environmental Impact Assessment (EIA) report is required for Environmental Approval.

Therefore, to fulfill the legal requirements of the Section-12 of the Punjab Environment Protection Act (amended 2012) the client is required to submit the EIA report in the Environmental Protection Agency, Government of the Punjab, Lahore to obtain the required Environmental Approval (EA).

3 SCOPING

3.1 SPATIAL AND TEMPORAL BOUNDARIES OF ENVIRONMENTAL ASSESSMENT

Spatial boundaries for project related to the environmental effects and cumulative effects for Valued Environmental Components. It depends on the Project Development Area and Local and Regional Assessment Area.

The proposed project has already existed in the place where all facilities are available. The Google coordinates of the project are as followings:

- 31°23'13.2"N
- 74°20'56.6"E

Temporal boundaries based on timings and duration of project activity that will happen during construction and operational phase. Construction will be done in an environmental friendly manner that will not harm any existing boundaries and surroundings of project area. Ladders, walkways, safety grills, staircases and platforms will be constructed. In addition one lockable room near the plant site will be allocating for keeping tools and tackles along with security arrangements. While during operational phase all the environmental sensitive parameters like Emissions from Machinery, Noise Pollution, Workers Health & Safety Chemical managemnt, Workers trainings & quality test and flow measurement of ETP will be done to achieve Punjab Environmental Quality Standards (PEQS) by proposing Physiochemical and Activated Sludge Process. Untreated and treated effluent testing will be conduct to achieve and compare the targets. Safety roads, access roads / approaches will be maintained. Maximum plantation will be done.

3.2 IMPORTANT ISSUES AND CONCERNS RAISED DURING CONSULTATION

The regular survey and background studies were conducted to identify the stakeholders. As the project site situated in planned Industrial Estate & No Residential or Sensitive area near the project site however People from surrounding industries was gathered which are likely to be affected, focus group meetings were conducted by the representatives. They were all briefed about the project whereabouts in the nontechnical and understandable way. Certain suggestions about the project that is included and raised by the people were filed and recorded.

The consultation with the government officials, welfare organizations was conducted in the formal way which includes the technical approaches to the project and the verdict of the affected or local community was also kept in view.

3.3 SIGNIFICANT IMPACTS AND FACTORS TO BE DETERMINED

Following impacts are considered to be significant and proper mitigation and maintenance plan of these are made

- Increase risk of air and smell pollution
- Noise propagation within the work zone
- Chemical Hazards
- Stack Emissions from generators / machinery
- Impacts on workers during ETP Operations
- Incidents of equipments

- Impact on quality of water body
- Solid waste & Sludge

4 CONSIDERATION OF ALTERNATIVES

4.1 SITE ALTERNATIVES, THEIR SELECTION AND REJECTION CRITERIA

Proposed project is the Construction of Effluent Treatment Plant (ETP) at 22-KM, off Ferozpur Road, Rohi Nala, Near, Allah HooBridge, Gaju Matt, Lahore. The land is already owned by the project proponent and considered suitable both in terms of environment and physical constraints. As this project is going to be construct in well developed industrial area, having all facilities like roads, electricty water and wastewater drainage system. construction of ETP that will treat the water released from unit to achieve PEQS Environmental Standard to maintain the quality of wastewater released from outlet of processing area. The project site area is 4500 Sqft has been allocate that would also reduce the transportation cost for waste water transfer and treatment.

- **No Project Option:**

No Project Option is not a good option for the project that woulld help to compete the demand of fabric & construction of water treatment as ETP helps to purify wastewater generated from industry. The treatment process results in reusable clean water, saves money as well as water and planet.

- **A New Site or Third Party Services:**

By keeping the economical and feasible factor in mind selected site is all mean suitable because from production out channel wastewater will be introduced in ETP Inlet through channels where it will be treated and then drain out from ETP outlet. If new site or third party services will be taken than the cost of project will enhance and environmental impacts from wastewater will boost up.

4.2 DESIGN / TECHNOLOGY ALTERNATIVES, THEIR SELECTION AND REJECTION CRITERIA

Relatively simple wastewater treatment technologies can be designed to provide low cost sanitation and environmental protection while providing additional benefits from the reuse of water. Different methods are used to treat wastewater but ETP is selected for the wastewater treatment generate by textile unit. Other type of methods their advantages and disadvantages are given below in table:

Table 4-1 Technology Alternatives and Their Selection Rejection

Treatment Type	Advantages	Disadvantages
Aquatic Systems		
Stabilization Lagoons	• Low capital cost • Low operation and maintenance costs • Low technical manpower requirement	• Requires a large area of land • May produce undesirable odors

Treatment Type	Advantages	Disadvantages
Aerated Lagoons	• Requires relatively little land area • Produces few undesirable odors	• Requires mechanical devices to aerate the basins • Produces effluents with a high suspended solids concentration
Terrestrial Systems		
Septic Tanks	• Can be used by individual households • Easy to operate and maintain • Can be built in rural areas	• Provides a low treatment efficiency • Must be pumped occasionally • Requires a landfill for periodic disposal of sludge and septage
Constructed Wetlands	• Removes up to 70% of solids and bacteria • Minimal capital cost • Low operation and maintenance requirements and costs	• Remains largely experimental • Requires periodic removal of excess plant material • Best used in areas where suitable native plants are available
Mechanical Systems		
Filtration Systems	• Minimal land requirements; can be used for household-scale treatment • Relatively low cost • Easy to operate	• Requires mechanical devices
Vertical Biological Reactors	• Highly efficient treatment method • Requires little land area • Applicable to small communities for local-scale treatment and to big cities for regional-scale treatment	• High cost • Complex technology • Requires technically skilled manpower for operation and maintenance • Needs spare-parts-availability • Has a high energy requirement
Activated Sludge	• Highly efficient treatment method • Requires little land area • Applicable to small communities for local-scale treatment and to big cities for regional-scale treatment	• High cost • Requires sludge disposal area (sludge is usually land-spread) • Requires technically skilled manpower for operation and maintenance.

4.3 Environmental Alternatives, Their Selection And Rejection Crieteria

The major aim of wastewater treatment is to remove as much of the suspended solids as possible before the remaining water, called effluent, is discharged back to the environment. As solid material decays, it uses up oxygen, which is needed by the plants and animals living in the water. The wastewater treatment process does not only produce clean reusable water, but also has the potential to produce various other benefits. It has the potential to reduce a waste production, to produce energy through methane harvesting, and the potential to produce natural fertilizer from the waste collected through the process. Below is a more detailed explanation of the benefits of wastewater treatment:

i- **Waste Reduction**

Through the treatment of wastewater, the amount of waste that is usually released into the environment is reduced thus improving environment's health. By doing so, in turn reduces the health risks associated with environmental pollution, and reduces the water loss induced through water pollution. Wastewater treatment also reduces the amount of money spent by a management on environmental rehabilitation projects required to battle pollution.

ii- **Sludge usage for Energy Production**

The dried ETP sludge mixed with coal is used as a suplementry energy resource in Thermic Fluid Haeter TFH/ boiler which will conserve the natural resource i-e coal or other conventional fuels

In summary, the combination of these benefits along with water production makes wastewater treatment a sustainable short and long-term solution to the world's water crisis, which will only increase as the world population increases. This will cause the production of large amounts of fresh usable water, thus helping battle water scarcity.

4.4 Economic Alternatives, Their Selection And Rejection

Managing wastewater is obviously linked to the management of the entire water cycle. Inadequate wastewater management pollutes water bodies that are also important sources for drinking water, fisheries and other services. Therefore, the discharge of wastewater, without or with inadequate treatment, involves significant costs, including environmental and social ones.

Wastewater management and treatment involves significant benefits (avoided costs). Therefore, the cost of no action may be interpreted as benefits not achieved due to the discharge of the wastewater with no or inadequate treatment. In other words, if untreated or inadequately treated wastewater is discharged directly into the environment, costs are generated or potential benefits are lost. The potential benefits associated with improving wastewater management can be grouped into two general categories: market and non-market benefits. Most environmental and health benefits have significant value, but — unlike most benefits from productivity — cannot be valued in monetary units as market prices do not exist. Market benefits are easily identifiable and quantifiable, while non-market benefits are difficult to measure and require specific economic valuation methods. Where these benefits cannot be valued in monetary units because the techniques are in infancy, they will be reported per se into the analysis; no effort will be made to conflate non-monetary units onto monetary values.

5 DESCRIPTION OF PROJECT

5.1 OBJECTIVES OF PROJECT

The objective of the project is to fullfill the demand of fabric by applying best management practices and to make the project environment friendly istallation of Effluent treatment plant. industrial waste water treatment is to extract pollutants, remove toxicants, neutralize coarse particles, and kill pathogens so that quality of discharged water is improved to reach the permissible level of water to be discharged into water bodies. This project is based on to attain Punjab Environmental Quality Standards by proposing Physicochemical and Activated Sludge Process. Treatment of water thus aims at reduction of BOD, COD, eutrophication etc. of receiving water bodies and prevention of bio-magnification of toxic substances in food chain. The major aim of wastewater treatment is to remove as much of the suspended solids as possible before the remaining water, called effluent, is discharged back to the environment. As solid material decays, it uses up oxygen, which is needed by the plants and animals living in the water.

"Primary Treatment" removes about **60 percent** of suspended solids from wastewater. This treatment also involves aerating (stirring up) the wastewater, to put oxygen back in. "**Secondary Treatment" removes** more than **90 percent** of suspended solids.

5.2 LOCATION AND SITE LAYOUT OF THE PROJECT

Selected site for Installation of Effluent Treatment Plant (ETP) is situated at 22-KM, off Ferozpur Road, Rohi Nala, Near, Allah Hoo Bridge, Gaju Matt, Lahore. Google Coordinates of site are 31°23'13.2"N 74°20'56.6"E

.

Google Map and Site Layout of the project site is given below in Figure - 5.1



Figure 5-1:Project Site Location Map

5.3 LAND USE ON SITE

Selected site for Installation of Effluent Treatment Plant (ETP) is situated at 22-KM, off Ferozpur Road, Rohi Nala, Near, Allah HooBridge, Gaju Matt, Lahore.. Land is already owned by project proponent and nature of area is industrial in nature. Currently the selected site is open plot no construction activty start.

5.4 ROAD ACCESS

Site is easily assessable through Rohi Nala Road .;

5.5 VEGETATION FEATURES OF THE SITE

There are no vegetative features found on selected site however after the completion of construction activity tree plantation will be done to combat global warming by absorbing carbon dioxide, removing and storing carbon while releasing oxygen back into the air.

5.6 COST AND MAGNITUDE OF OPERATION

The project cost has been estimated about PKR 40 million combinations of civil work, Mechanical work, Electrical work, Installation work and environmental budget. The quantities have been worked out from the design drawings and project feasibility. The rates for cost estimates are based on construction work, contractor cost, and cost of the raw materials with 10% escalation for the year 2022. The activities to be carried out within a period of one to two years from the starting date.

5.7 SCHEDULE OF IMPLEMENTATION

It is planned that the following schedule of project implementation will be adhered to, this is subject to the conditions that everything goes according to planning and no serious bottlenecks are encountered. The implementation stages of the project activity include:

1st Stage:

The stage –1 comprises the onsite contouring studies and soil investigations.

2nd Stage:

The stage –2 comprises the following task:

i- Laying of foundations excavation and commencement of erection work.

ii- Start of civil, electrical and mechanical work.

iii- Development of basic infrastructure.

iv- Fitting of instrumentation.

3rd Stage:

The stage –3 comprises the following task:

i. Equipment erection completion.

ii. Completion of the basic infrastructures water supply system, electricity supply etc.

4th Stage:

The last stage will be Commencement of regular operation.

5.8 DESCRIPTION OF THE PROJECT

5.8.1 Utilities During Construction Work

- **Electricity**

Approximately 30 KvA/ day electricity will be consumed in different construction activities

- **Work force**

A total of 50 employees will be employed during construction work

5.9 OPERATION PHASE

5.9.1 Effluect Treatment Plant

5.9.1.1 Civil work

Local company provides the outline drawings of the following civil works associated with wastewater treatment plant. The structural design and civil works execution shall the responsibility of Alliance Textile. Following drawings and data for structural design are given:

- Process and Instrumentation Diagram (P&ID)
- Hydraulic Flow Diagram (HFD)
- Equipment Layout Drawing
- Section Drawings
- Foundation Drawing & Loading Data

5.9.1.2 Process description

- **Screen chamber:**

The untreated effluent is discharge to screen chamber. The screen chamber is provided to sieve out any large suspended particulate. Any suspected oil or floated particle will float on the surface of water and discharge into equalization tank through puddle pipe. To compensate the PH acid closing system has been provided. Acid is dosed into screen chamber while pH is measured in the riser tube at low pH the dosing pump will stop ad at high pH it will start.

- **Equalization tank/collection cum equalization tank**

Untreated screened effluent is received in collection cum equalization tank to even out fluctuations in flow and composition and improve the performance of the downstream processes (due to constant solid loadings). Air header has been provided at the bottom of equalization tank to facilitate homogenization/mixing process.

- **Effluent transfer pumps**

The equalized effluent from collection cum equalization tank is then pumped by means of Effluent transfer pumps to flash mixer cum reaction channel for chemical treatment. Prior effluent enters into flash channel effluent flow is measured and totalized by a flow meter installed at the discharge of transfer pumps.

- **Aeration tank**

Effluent from the primary clarifier then comes to the aeration tank by gravity for biochemical degradation of dissolved organic contaminants by diffused aeration system comprise on diffusers and air blower etc. Here in, bacteria and other microorganisms consume organic matter in efficient as food. In order to make up any deficiency in the essential nutrients, nitrogen and phosphorous in the form of urea and DAP respectively is added in aeration tank. A DO meter is installed here in aeration tank to measure the value of dissolved oxygen. When the reading on Do meter is more than or equal to 2ppm, then one blower can be shut off to fulfill the requirements.

- **Sludge holding tank**

Sludge from the secondary clarifier is collected in bio-sludge collection tank and sludge from primary clarifier is collected in chemical sludge collection tank from where it is pumped to sludge handing system.

The sludge however, would need to be dewatered in order to reduce its volume and render it suitable for transportation for disposal or land application.

- **Sludge drying beds**

THE collected sludge from sludge codling tank is pumped to sludge drying beds. In sludge drying bed sludge is dried under ambient condition. Filtrate is transferred to equalization tank for further treatment.

- **Air supply system**

Air blowers are installed in a room near the Aeration Tank. These Air blowers are operated as per air requirements in aeration tank and equalization tank according to effluent characteristics. These air blowers are operated duty &standby mode. MCC of the plant is also located in the corner room.

5.9.1.3 Equipment specifications

- **Screen chamber**

No Of Units	1 NOS
Material Of Construction	RCC
Dimensions	8*2.5FT

- **Collection cum equalization tank**

No Of Units

Material Of Construction	RCC
Dimensions	10 FT *10.3 FT
Volume	45000 LTS.

- **Sludge holding tank**

No Of Units	
Material Of Construction	RCC
Dimensions	7FT*4FT*6FT

- **Aeration Tank**

No Of Units	01
Mateerial Of Construction	RCC
Dimensions	W 21.3 FT ×L32FT×SWD19FT
Volume	360m^3

- **Bar screen**

Quantity	01Nos
Material	MS
Make	WAETZ ASIA

- **Air header**

Quantity	01 NOs
Material of construction	GI
Make	WAETZ ASIA

- **Air distributor**

Quantity	03 Nos
Material Of Construction	PVC
Make	WAETZ ASIA

- **Valve**

Quantity	03 LOT
Make	Dae - Jung KOREA
Type	VALVE

- **Effluent transfer pumps**

Quantity	02 NO
Type	Centrifugal
Capacity	25M3/hr
Model No	Sewatec 150-315 G
Material Construction	Cast Iron
HEAD	25m
RPM	1465/4P
MAKE	KSB

- **Flocculent Dosing Tank**

Quantity	01 No
Material Of Construction	HDPE

- **Flocculent dosing pump**

Quantity	03 No
Capacity	60 lit/hr
Type	AIR NUMATIC
Make	IMPORTED
Model No.	IMPORTED
Pressure	06 BAR
Type	AIR PNEUMATICS

5.9.1.4 Chemical required

Description	Effluent flow m^3/hr	Kg/m^3	Kgs/day	Kgs/month
Sulphuric acid	25	0.02	6	156
Cationic Polymer	25	0.05	15	390
Anionic polymer	25	0.03	9	234
POLYELECTROLYE	25	0.15	45	1170
PAC Liquid	25	0.08	24	624
Coagulant	25	0.2	60	1560

Effluent treatment plant layout attached with annexure

5.10 RESTORATION/REHABILITATION AT THE END OF PROJECT LIFE

There will be no any matter of rehabilitation as the proposed site is already owned by the project proponent. There will not be any let regarding safety factors as applicable from time to time for such structures on all accounts. During entire construction period, necessary precautions will be taken to ensure that no damage is done to the basic infrastructures like sewer system, power transmission lines roads, private or public property and daily human life as well. Safety measures will be adopted to avoid any harm to humans, property around, or the environment in the project area. Dust to be generated will be minimized by constant sprinkling of water. 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. The land, if and where pitted will be adequately leveled. On the whole, the project site and the area in its near vicinity will be made neat and clean

6 DESCRIPTION OF ENVIRONMENT

This chapter defines the prevailing environmental and socio-economic settings within the proposed project area, and details the importance of these resources. The project area in this document is defined as the area where the project related activities to be carried out which include the proposed project site and surroundings, and the area that can interact with the project's positive and negative externalities in the long run. The environmental impact of any activity or process will be assessed on the basis of a deviation from the baseline or normal situation. Followings are the main components of the baseline:

- Physical Environment
- Biological Environment
- Socioeconomic Environment

The description provided in this section is based on followings:

- Desktop study and literature review
- Baseline data gathered from field activities
- Baseline data from relevant departments
- Government released publications such as Provincial and Federal census reports.
- Meetings and data collection from the proponent.

The main components of environment as mentioned above is broadly covers following environmental features:

- Surface water resources
- Ground water quality
- Ambient Air quality
- Soil Characteristic
- Noise
- Flora and Fauna
- Local communities and their concerns

6.1 PHYSICAL ENVIRONMENT

6.1.1 Topography

The topography of the project area is flat. The General height of the area is approximately 220 meters above the Mean Sea Level (MSL). The district Lahore is divided into two parts. The low lying alluvial soil is along the Ravi River and the upland in the east. Upland is a plain slope from north-east to south-west. The lowlands are generally inundated during the monsoon season by Ravi River, flowing in the west of district along its boundary with district Sheikhupura. Figure 4.1 represents the topography of the area.

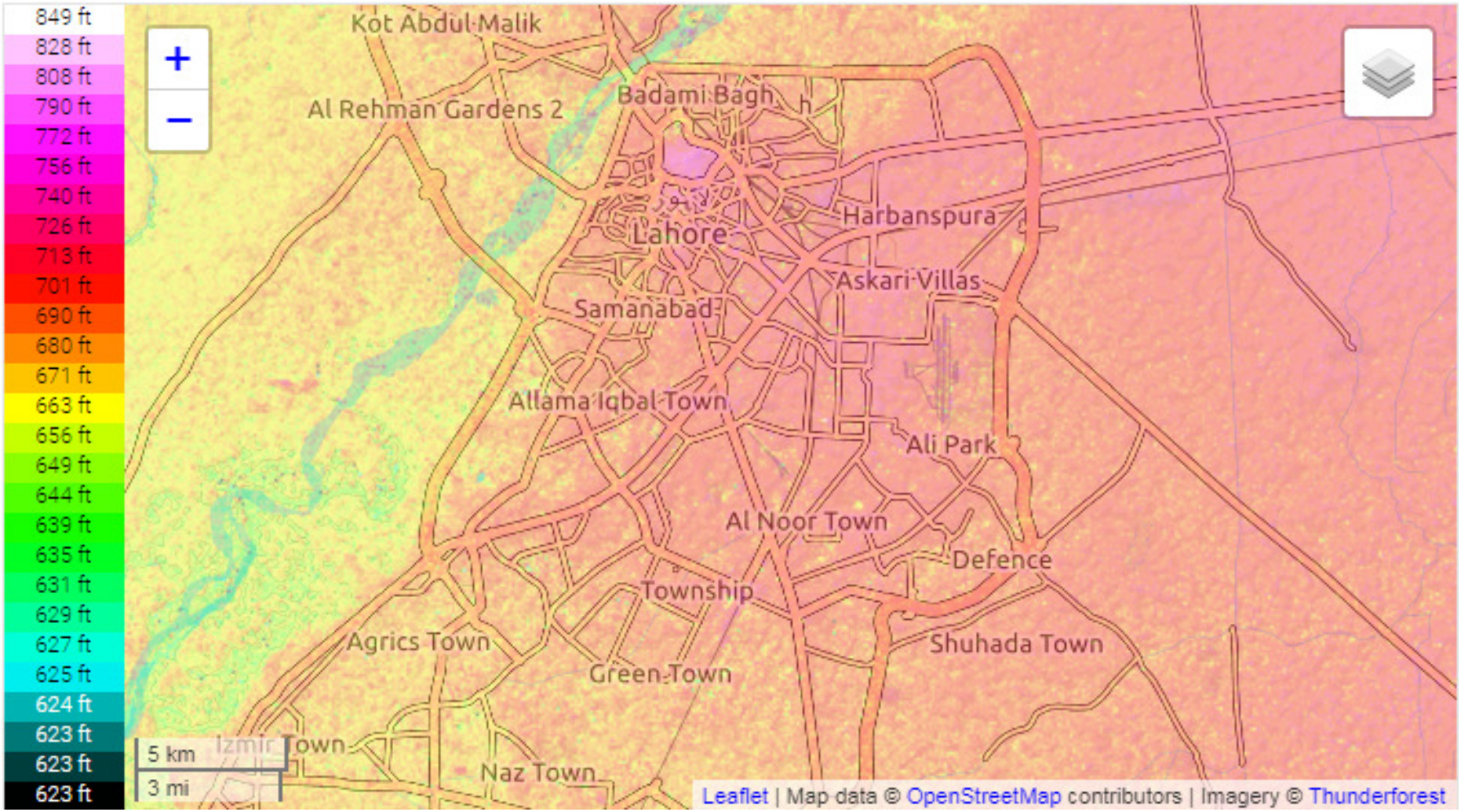


Figure 6-1: Map of District Lahore

6.1.2 Soil

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

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

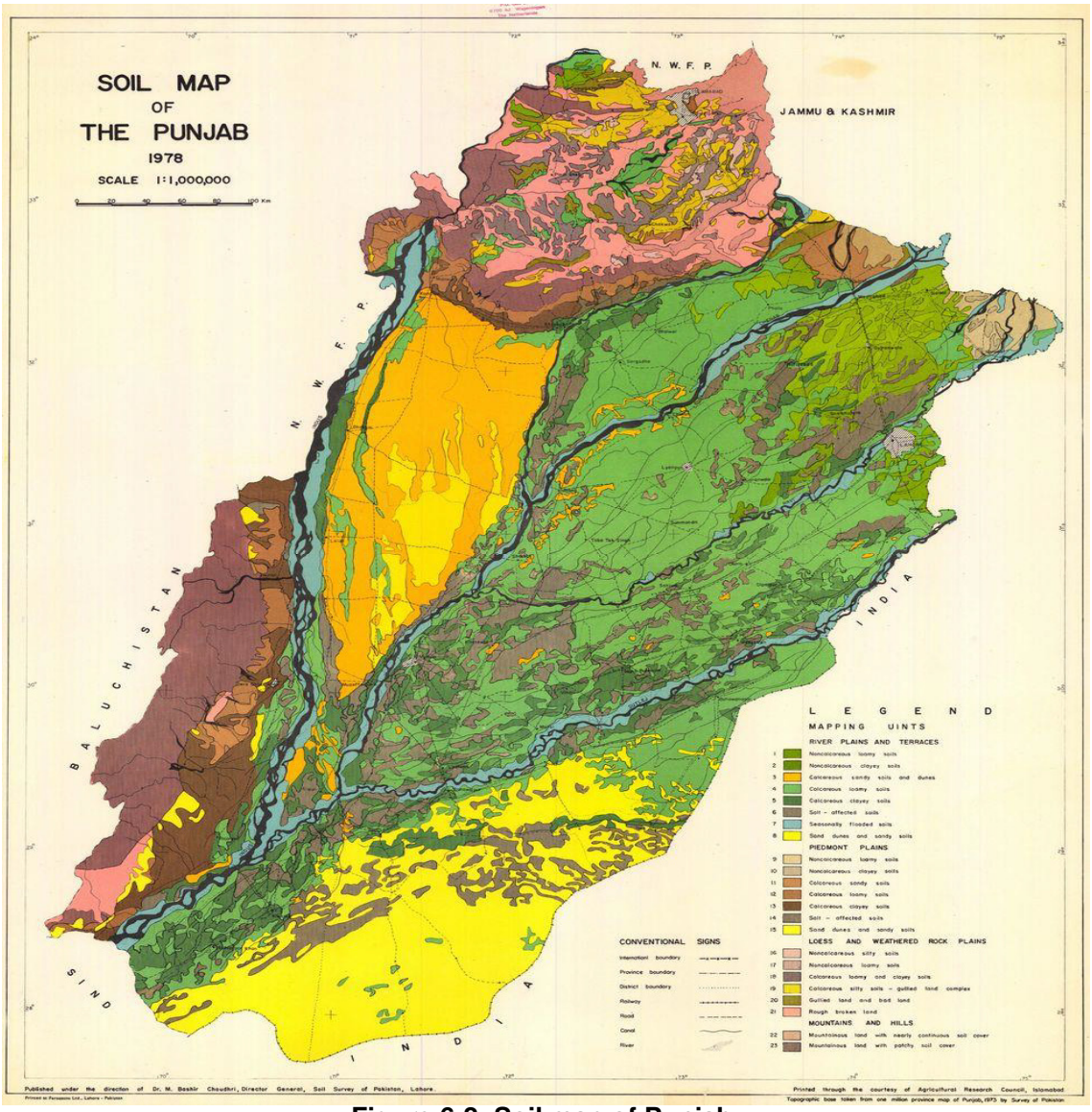


Figure 6-2: Soil map of Punjab

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

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

6.1.3 Climate and Meteorology

Seasonal climatic conditions must be considered for the design and execution of Project. The climate including air, temperature, precipitation, humidity, and evaporation is an influencing factor, affecting the construction of the plant and other engineering structures. However, to determine the overall effect of the climatic stresses, daily and seasonal temperature changes, site altitude, direct solar radiation, and precipitation must be considered. The Project Area has extreme climate: it has hot summer and cold winters. The summer starts from April and lasts till September. May, June, and July are the hottest months. The mean maximum and minimum temperature ranges from 40.4 ºC and 27.3 ºC respectively for these months.

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

Table 6-1: Meteorological and Climatic Features

Classification of Climate	Tropical (hot/humid)
Predominant Wind Direction	East/Northeast
Wind intensity	Weak to moderate
Average annual precipitation	>650 mm
Rainy season	July to September
Dry season	October to June
Average annual temperature	19-20 °C
Average summer temperature	36-38 °C
Average winter temperature	6.5-10.5 °C

Table 6-2: Average Monthly Temperature, Precipitation and Relative Humidity (2018)

Month	Mean Temperature		Precipitation (mm)	Average Relative Humidity (%)
	Maximum	Minimum		
January	18	8	100	72
February	24	11	31	60
March	28	15	39	54
April	37	22	62	40
May	39	26	50	37
June	37	26	176	54

July	36	27	200	68
August	35	27	184	69
September	35	25	50	63
October	34	22	0	56
November	24	13	19	72
December	22	9	31	63
Annual	30.8	17.8	666	70.34

Table 6-3: Rainfall Data of the Area

Month	**Precipitation (Millimeters)**
January	23
February	28.6
March	41.2
April	19.7
May	22.4
June	36.3
July	202.1
August	163.9
September	61.1
October	12.4
November	4.2
December	13.9
Annual	628.7

Based on climatic elements, five seasons are recognized

Pre-monsoon Season

Pre-monsoon refers to the period from April to June prior to the setting in of the monsoon. This is the hottest and the driest season, with persistent dry and hot winds. Daytime temperature rises to 40.40 C. The flows in the river begin to rise simultaneously due to snow-melt water in the high mountains. The water table falls to the maximum depth

Monsoon Season

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

level. The groundwater level is improved toward the end of the season in September and October.

Post-monsoon Season

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

Winter Season

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

Spring Season

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

6.1.4 Surface Water & Ground Water

Surface Water

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

Groundwater

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

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

According to Master Plan-2030 for the city of Lahore, the mean average decline in groundwater is about 2.03 feet per year. The water table contour map for the Year-2000 is

exhibited in Exhibit-4.14. It is noted from the exhibit that groundwater is at a greater depths in the central part of the city where abstraction is more than the re-charge and close to surface waters i.e. Ravi River and Canal, the situation is in the reverse order.

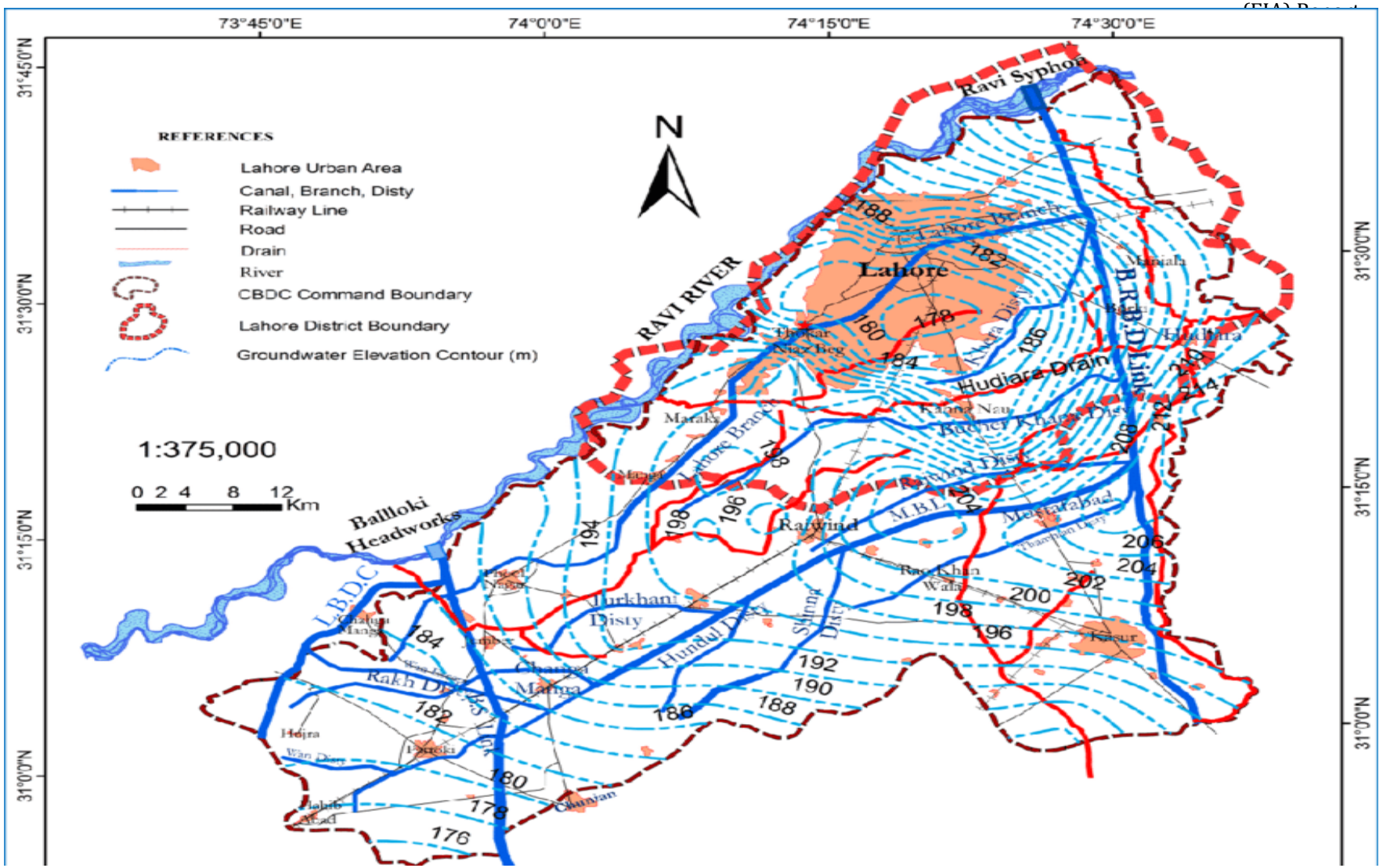


Figure 6-3: Groundwater Contours Of Lahore

6.1.5 Seismology

Pakistan Building Code distributes the country into 4-zones, fig. The project site falls in Moderate damage Zone, as such structural design of buildings and others will follow the applicable criteria for the zone.

Seismic details are a very important consideration for any planning activity. As it directly lays impact on the construction of the site.

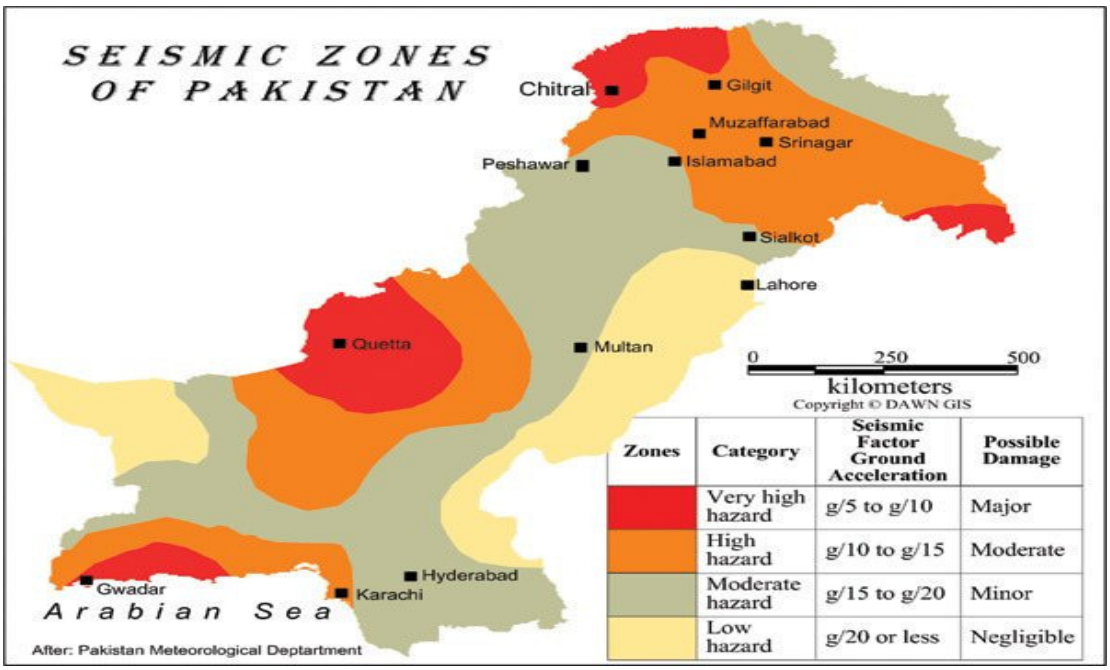


Fig-3.4: Seismic Zoning Map of Pakistan

6.1.6 Flooding

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

6.1.7 Water Logging and Salinity

There are no signs of water logging in the project site

6.2 ECOLOGICAL RESOURCES

6.2.1 Marine and Aquatic Ecology

This is not applicable to the Project area.

6.2.2 Flora

The diversity and distribution of plant species within the Lahore District depend upon the availability of water and the underlying geology. There are significant numbers of trees in Green Belts en-route.

6.2.3 Fauna

Common birds found in the area are crows and sparrows. Chirping birds are having their nests at the well-grown trees that are providing a natural habitat for the birds. Some squirrels, parrot, rats, weaver, sparrows are also found in the area.

Different species of reptile and amphibians such as lizards and frogs are also found. Various bird species known to occur in the area include myna, bulbul, crow and sparrow.

6.2.4 Endangered Species

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

6.3 SOCIOECONOMIC ENVIRONMENT

6.3.1 General

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

6.3.2 Political and Administrative Setup

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

6.3.3 Economy and Industrial Activities

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

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

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

Lahore has offices of several Pakistani government corporations including the Water and Power Development Authority (WAPDA) and Water and Sewage Authority (WASA). Food and restaurant businesses remain open all night. Lahore is the second largest financial hub of Pakistan and has industrial areas including Kot Lakhpat and the new Sundar Industrial Estate (near Raiwand). Lahore's economic base is broad and varied.

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

6.4 QUALITY OF LIFE

6.4.1 Demographic Characteristics of the Project Area

The total population of Lahore District was 6,318,745 as enumerated in March 1998 with an intercensal percentage increase of 78.3 since March 1981 when it was 3,544,942 souls. The average annual growth rate of population in the district during intercensal period 1981-1998 was 3.5 percent. The total area of the district is 1772 square kilometers, which gives population density of 3,566 persons per square kilometer as against 2000 persons observed in 1981 indicating a fast growth rate of the district. The table gives population, its intercensal increase and average annual growth rate since 1951 of Lahore district.

6.4.2 Rural and Urban Distributions

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

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

6.4.3 Religion

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

6.4.4 Ethnic Structure

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

6.4.5 Mother Tongue

The mother tongue refers to the language used for communication between parents and their children in any household. Punjabi is the predominant language being spoken by the majority (86.2 percent) of the population of the district followed by Urdu, Pushto, and Siraiki being spoken by 10.2, 1.9, and 0.4 percent. Sindhi is spoken by 0.1 percent.

6.4.6 Institutions

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



Figure 6-4: Educational Institutes in Lahore

6.4.7 Transportation

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

6.4.8 Health Facilities

Ample medical and health facilities are available in the Lahore Metropolitan Corporation area and its suburbs. Shaukat Khanam Hospital is the latest addition to the medical care facilities in Lahore for the most dangerous disease in the country. i.e. Cancer. There are also other hospitals of voluntary organizations which provide health coverage to the general public. Among the prominent hospitals are General Hospital, Lady Willington Hospital, Mayo Hospital, Fatima Jinnah Hospital, The Children Hospital, Services Hospital, and Ganga Ram Hospital etc. Besides, a number of private medical practitioners, Hakims, and homeopathic doctors are also practicing in the city. Services Hospital is the nearest health care facility that is present in the vicinity of the project.



Figure 6-5: Hospitals in Lahore

6.4.9 Architecture Style

Lahore, Pakistan architecture refers to the various structures built during different time periods. Walled city is famous for its gates and architecture. Mostly there are three types of old buildings in Lahore. Victorian Architecture: When British conquered sub continent they made these buildings during the period 1857 -1947 keeping in mind the climate conditions. Mughal Architecture: By an architectural point of view, therefore, Lahore is essentially a Mughal city, Made by Mughal emperors during the period of 1504 -1857. Minarets are attached to buildings. Cylindrical construction with internal staircases and balconies leading to the conical roof. All buildings are symmetrical creating a mirror-like effect. British Architecture: Under British rule (1849–1947), colonial architecture in Lahore combined Mughal, Gothic and Victorian styles. Under British rule, Sir Ganga Ram(sometimes referred to as the father of modern Lahore) designed and built the General Post Office, Lahore Museum, Aitchison College, Mayo School of Arts (now the NCA), Ganga Ram Hospital, Lady Mclagan Girls High School, the chemistry department of the Government College University, the Albert Victor wing of Mayo Hospital, Sir Ganga Ram High School (now Lahore College for Women) the Hailey College of Commerce etc. In modern Lahore, Pakistan; the traditions of architecture have been changing. The dome, minaret, the arch, the intricate mirror work and the extravagant use of ornaments which were features of the Mughal style, have now gone out of fashion. Changing patterns of economy, industrialization and increase in population have contributed a great deal in revolutionizing the entire basis of architectural forms.

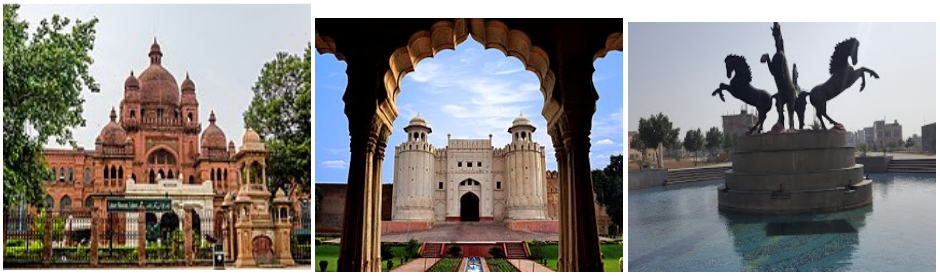


Figure 6-6: Architecture Style of Lahore

6.5 ENVIRONMENTAL MONITORING DATA

6.5.1 Air Quality

Motor vehicle emissions are composed of the by-products that come out of the exhaust systems or other emissions such as gasoline evaporation. These emissions contribute to air pollution and are a major ingredient in the creation of smog in some large cities. A study by MIT indicates that 53,000 early deaths occur per year in the United States alone because of vehicle emissions

The main source of air pollution in the Project area is traffic congestion that occurs off and on in the Project Area. Traffic load has increased manifold due to the rapid growth of the City. Ambient air is being polluted due to the emission of fuel gases like Carbon Monoxide (CO), Nitrogen Oxide (NOx) and Sulphur Oxide (SOx) due to the vehicle exhaust. Untreated fuel from rickshaws also contains trace amount of Lead (Pb) in it.

Table 6-4 : Ambient Air Monitoring Data

Reference Point	**SO_2 ($\mu g/m^3$)**	**NO_2 ($\mu g/m^3$)**	**CO (mg/m^3)**
Main Road	60	55	1.23
North Side of the Project	62	57	1.15
South Side of the Project	59	54	1.12
East Side of the Project	61.6	53.7	1.20
PEQS Limiting Values	**120.0**	**80.0**	**5.00**

Level of Emission is increasing over the period, implies with without project, the vehicles' speed is reducing and these are producing more emissions; and

Cars and Pick-ups are more producers of carbon monoxide whereas Rickshaws and Motorcycles produce more hydrocarbons and heavier traffic produces more nitrogen oxides.

6.5.2 Noise

The project area falls under an urban environment and presently, the noise level is within the permissible limits of 85 db.

6.5.3 Water Quality

Water quality refers to the chemical, physical, biological, and radiological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose. It is commonly compared with a set of standards against which compliance can be assessed. The water resource in the study area includes groundwater. The secondary data and the information collected during the field survey, the groundwater table depth varied from site to site. The groundwater is extracted by means of wells, hand pumps, and electric motors.

Table 6-5: Laboratory Analysis Report of Ground Water Sample

Sr. No.	Parameters	Units	PEQS	Results	Remarks
1.	pH	–	6.5–8.5	7.9	In–Compliance
2.	Taste & Odor	–	Non Objectionable	Non Objectionable	
3.	Color	TCU	<15	2	
4.	Turbidity	NTU	<5	1.5	
5.	Total Coliform	Number/100 mL	0 Number/100 mL	0	
6.	E–Coli	Number / 100 mL	0 Number / 100 mL	0	
7.	Total Dissolved Solids (TDS)	mg/L	<1000	515	
8.	Total Hardness	mg/L	<500	287	
9.	Nitrate	mg/L	≤50	2.1	
10.	Nitrite	mg/L	≤3	0.007	
11.	Ammonia	mg/L	–	N.D	
12.	Arsenic	mg/L	<0.05	N.D.	
13.	Antimony	mg/L	<0.005	N.D.	
14.	Barium	mg/L	0.7	N.D.	
15.	Chloride	mg/L	250	115	
16.	Fluoride	mg/L	<1.5	0.3	
17.	Aluminum	mg/L	≤0.2	N.D.	
18.	Manganese	mg/L	≤0.5	N.D.	
19.	Mercury	mg/L	0.001	N.D.	
20.	Iodine	mg/L	–	0.023	
21.	Zinc	mg/L	5	0.16	

Sr. No.	Parameters	Units	PEQS	Results	Remarks
22.	Boron	mg/L	0.3	N.D.	
23.	Chromium	mg/L	≤0.05	N.D.	
24.	Selenium	mg/L	≤0.5	N.D.	

7 IMPACT ASSESSMENT

7.1 PROBLEM AND ITS OCCURRENCE

On the basis of the findings of the EIA, it is concluded that the project will not pose any adverse impact on the local population and the environment. A proper management plan shall be prepared in case of any accident like;

- Any health hazard to workers/other persons during construction or operation phase.
- Electric shocks from machinery
- Odour emissions to the environment.
- Inappropriate handling of chemicals
- Inappropriate waste sludge handling.

As mention above that the project will not pose any adverse impacts to the environment. An assessment of impact during construction and operation phase is given in Table-7.1, which indicates the impact and their magnitude.

Table 7-1 Anticipated Impacts of Proposed Project

Components	Elements	Impacting Actions											
		During Project					After Completion						
		Relocation	Demolition	Construction	Wildlife Habitat	Air Quality	Residential Building	Commercial Building	Recreation	Conservation	Water Body	Odour Problems	Solid Waste
Biophysical	Soil and geology	✓	✓	✓	-	✓	✓	-	-	✓	✓	-	-
	Hydrology	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	-
	Flora		-	✓	✓	✓	✓	-	✓	-	-	✓	✓
	Fauna		-	✓	✓	✓	✓	-	✓	-	-	✓	✓
	Air quality		-	✓	✓	✓	✓	-	-	-	-	✓	✓
	Land use	✓	-	✓	✓	✓	✓	-	-	-	-	-	-
	Roads		-	-	✓	-	✓	✓	-	-	-	-	-
	Public transport	-	-	✓	-	-	-	✓	-	-	-	-	-
	Resource Consumption	✓	-	✓	✓	-	-	✓	-		-	-	✓
	Open space	-	-	-	-	-	-	-	-	-	-	-	-
Socio-Economic	Demand for ancillary services	-	-	✓	✓	-	-	-	-	-	-	-	✓
	Health and Safety	-	-	✓	✓	-	-	-	-	-	✓	-	✓
	Industry	-	-	-	✓	-	-	-	-	-	-	✓	-
	Commercial	-	-	-	-	-	-	✓	-	-	-	-	-
	Tourism	✓	-	-	-	-	-	✓	-	-	-	-	-
	Infrastructure	-	-	-	-	✓	-	-	-	-	-	-	-
	Landscape	-	-	-	-	-	-	-	-	✓	-	-	-
Cultural	Historic Structures	✓	-	✓	-	✓	✓	-	-	-	✓	-	✓

Components	Elements	Impacting Actions											
		During Project					After Completion						
		Relocation	Demolition	Construction	Wildlife Habitat	Air Quality	Residential Building	Commercial Building	Recreation	Conservation	Water Body	Odour Problems	Solid Waste
	Ethnic groups	-	-	✓	✓	✓	✓	-	-	-	✓	-	✓

7.2 CHARACTERISTICS OF IMPACTS (NATURE, MAGNITUDE, EXTENT AND LOCATION, TIMING, DURATION, REVERSIBILITY, RISK)

The detailed characteristics of impacts during construction and operation phase of project is shown below

Table 7-2 Characteristics of Impacts during Plant Construction

Parameter	Description Of Impacts And Impact Sources	Impact Receptors	Impact Assessment					
			Nature	Probability of Influence	Influence Area	Duration	Reversibility	Residual Impact
Construction Phase								
Ambient Air Quality	**Combustion products, welding aerosols and other harmful substances emitted into ambient air** – Combustion products sources - activities requiring construction and special machinery. These include earth works, transportation of building materials, construction/arrangement of infrastructural units, diesel generators, etc. – Welding aerosols source - Installation of metal structures. – Other sources of harmful substances - Gaseous emissions of chemical substances (fuel - lubricants, fuel tanks, etc.).	Residents of nearby settlements, staff, biological environment	Direct, Negative	Medium Risk	Construction site and adjacent areas	Medium term (Depends on the duration of construction works)	Reversible	**Low**, Taking into account the mitigation measures - **very low**
	Dust Emissions – Source – earth works, transportation, storage and usage of bulk		Direct, Negative	High risk	Construction site and adjacent areas	Medium Term	Reversible	**Medium or low**, Taking into accounts

Parameter	Description Of Impacts And Impact Sources	Impact Receptors	Impact Assessment					
			Nature	Probability of Influence	Influence Area	Duration	Reversibility	Residual Impact
Construction Phase								
	construction materials, movement of equipment and vehicles, and others.							the mitigation measures - **Very low.**
	Foul odor emission – Source - painting works.		Direct, Negative	High risk	Construction site and adjacent areas	Short Term		Very low
Noise impact	**Noise Propagation in the Air** – Noise propagation from construction equipment and construction operations; – Noise caused by construction/installation works; – Noise caused by vehicles.	Population, project stuff, animals inhabiting in adjacent areas	Direct, negative	Adjacent to the populated area – medium risk. Area of activities – high risk.	About 0.35 km radius adjacent to construction site and construction camp.	Medium term (depending on the duration of the construction works)	Reversible	**Low or Medium**. Taking into account the mitigation measures - **low or very low**
Water	Changes in groundwater debit	Population, animals, surface waters with a hydraulic connection	Indirect	Low risk	Construction camps and construction sites	≈1 year	Reversible	Very low, or impact is not expected

Parameter	Description Of Impacts And Impact Sources	Impact Receptors	Impact Assessment					
			Nature	Probability of Influence	Influence Area	Duration	Reversibility	Residual Impact
Construction Phase								
Soil	**Impact on integrity and stability of soil**. Lose of topsoil – Vehicle and construction equipment movement; – Earth works, arrangement of access roads and various facilities; – Waste management	Vegetation, animals, population	Direct, Negative	Medium risk, taking into account mitigation measures – low risk	Construction camp, construction sites and corridors of roads for vehicles	Medium or long term	Reversible. In exceptional cases - irreversible	**Low** - taking into account mitigation measures – **very low**
	Soil contamination – Spillage of oil or other chemical substances, pollution by waste.	Vegetation, surface and ground waters, population	Direct (in case of siltation with sediment contaminated water – indirect). Negative	Medium risk	Construction camp, construction sites and corridors of roads for vehicles	Medium-term (Limited to the duration of the construction phase)	Reversible	**Medium**, taking into account mitigation measures – **very low**.

Parameter	Description Of Impacts And Impact Sources	Impact Receptors	Impact Assessment					
			Nature	Probability of Influence	Influence Area	Duration	Reversibility	Residual Impact
Construction Phase								
Biological Environment	**Vegetation destruction / damage**. Habitat loss / fragmentation. – Direct impact: o Vegetation removal from the area; o Damage of vegetation caused by violating traffic routes. – Indirect impact: o Water pollution; o Soil contamination and erosion.	Area selected for the construction of the treatment plant, wildlife, population	Direct and indirect, negative	Medium risk	Direct impact area – construction camp and construction site – Indirect impact area – areas adjacent to the construction camp and construction site.	Medium term. Permanent on the construction site	Reversible. On construction site - irreversible	**Low**. Considering mitigation measures – **Very Low**.
Socio-Economic	**Restriction of access to resources**: – Impact on land owners - implementation of any type of activity on their lands, or damage of their property; – Limited use of water resources, etc.	Local population	Direct, negative	Low risk	Area adjacent to the treatment plant	Duration is limited by the construction phase	Reversible	**Low**

Table 7-3 Characteristics of Impacts during Plant Operations

Parameter	Description Of Impacts And Impact Sources	Impact Receptors	Impact Assessment					
			Nature	Probability Of Influence	Influence Area	Duration	Reversibility	Residual Impact
Operation Phase:								
Ambient Air Quality	**Foul odor emission** - Degradation process of organic matter in treatment plant.	Population, technical staff, biological environment	Direct, Negative	Low Risk	Construction site and adjacent areas	Short term	Reversible	**Very low**
Noise Impact	**Noise Propagation in the Air** – Exploitation of electric engines; – During the maintenance / repair works - used vehicles and spec. technology by vehicles.	Population, project stuff, animals inhabiting in adjacent areas	Direct, negative	Low Risk	They are adjacent to the treatment plant	Long term	Reversible	**Very low**

Parameter	Description Of Impacts And Impact Sources	Impact Receptors	Impact Assessment					
			Nature	Probability Of Influence	Influence Area	Duration	Reversibility	Residual Impact
Operation Phase:								
Water	**Contamination of water** and related water bodies with suspended particles and organic substances – Source of contamination – wastewater discharged into the river from treatment plan	Population, animals, surface	Indirect	Low Risk	Project area and surrounding	Short term	Reversible	**Low and very low**
Soil	Soil contamination – Spillage of oil or other chemical substances, pollution by waste	Vegetation, surface and ground waters, population	Direct, Negative	Low Risk	Areas adjacent to the treatment facility	Long Term	Reversible.	**Low** or **very Low**
Biological Environment	Impact on fauna, including: – Noise and odor propagation; – Contamination of water; – Lightening; – Visual impact, etc.	Area selected for the construction of the treatment plant, wildlife, population	Direct and indirect, negative	Medium Risk	Areas adjacent to the project area	Long Term.	Mostly reversible	**Very Low**.

Parameter	Description Of Impacts And Impact Sources	Impact Receptors	Impact Assessment					
			Nature	Probability Of Influence	Influence Area	Duration	Reversibility	Residual Impact
Operation Phase:								
Socio-Economic	Risks related to health and safety of population: – Indirect - spread of unpleasant odor; In case of maintenance works atmospheric emissions, increased acoustic background, water and soil pollution	Plant staff and local population	Direct, negative	Low Risk	Area adjacent to the treatment plant	Long Term	Irreversible	**Very Low**
	Employment – Creation of jobs;	Employment of local population	Direct positive	High Probability	Nearby Area	Long Term	-	**Low**
	Improvement of local wastewater infrastructure (positive impact)	Local population	Direct positive	High Probability	Nearby Area	Long Term	-	**High**

8 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

8.1 ENVIRONMENTAL PROBLEMS DUE TO INSTALLATION AT PRESENT LOCATION OF PROJECT

Environmental problems related to location of the project are mostly in the areas of physical setting, socioeconomic setting, ecological setting and special areas. Field survey revealed that the impacts of the project due to its location are mostly insignificant in nature.

8.2 PROJECT DESIGN RELATED ENVIRONMENTAL PROBLEMS

The design of Effluent Treatment Plant has sought to minimize any environmental potential impacts by ensuring that the project shall in according to the environmental standards. Local aesthetic value is another issue to be considered during project design.

8.3 ENVIRONMENTAL PROBLEMS ASSOCIATED WITH CONSTRUCTION

The construction will also sometimes go round the clock, therefore, during all construction activities the followings will be the major pollutants/wastes or project related pollution aspects:

Table 8-1 Environmental Problems during Construction Phase of Project

Sr no	Project activity & its impact	Mitigation measures
Construction Phase		
1	**Air quality**	• Proper ventilation and exhaust system for air passages in all subjected buildings. • Water sprinkling would be ensured to minimize the dust arising during the construction phase. • The provision of face mask and goggles also reduce the impact • Daily maintenance of transport vehicles are required to control air emissions.
2	**Soil contamination**	• Vehicles would be properly maintained and the construction material would be used for the filling purpose. However in case of spillage, spill kits would be used.
3	**Biological aspect**	• Minimize trees cutting (if any) and clearing of vegetation

Sr no	Project activity & its impact	Mitigation measures
Construction Phase		
		• Plan and implement afforestation measures • Report incidents and any significant problems with animals and birds to the appropriate authorities
4	**Noise and vibration**	• Proper shift hours for the labors will be scheduled to avoid any health risk. • Provision and accessibility of ear plugs or ear muffs to all workers and visitors to avoid sound volume
5	**Social aspect**	• Noise has been monitored to carry out and duly monitored regularly to comply with statutory requirements
6	**Solid waste**	• Proper solid waste management would be ensured and if any waste is found, it would be recycled and any other waste would be sold to the contractor.

8.4 ENVIRONMENTAL PROBLEMS RESULTING FROM PROJECT OPERATION

Environmental problems relating to operation phase are insignificant, which are given in Table

Table 8-2 Environmental Problems during Operational Phase of Project

Sr no	Project activity & its impact	Mitigation measures
Operational Phase		
1.	Increase risk of air and smell pollution due to operation of wastewater treatment system	• Design and install ventilation system • Plant trees in landscaping areas to prevent odor dispersion. • Ensure that all treatment processes, equipment and pipeline work well. Regularly carry out equipment maintenance.

Sr no	Project activity & its impact	Mitigation measures
Operational Phase		
		• Air pollutants caused by sludge and sewage will be purified
2.	Noise propagation within the work zone. Impact on other receptors: on operation phase propagation of noise produced by the working of electric motors.	• Use best management practices and proper maintenance of machinery. • Installation of high quality pumping stations on treatment plant site; • Using noise-insulation materials during installation of pumping station; • Arrangement of pumps on vibro-isolating platform, for that thick rubber sheets can be used; • Place pumps in closed containers, special shells. E. Frequent shift of workers, working with noisy devices.
3.	Incidents of equipment (Machinery, electricity Shocks, pipeline, tanks) in Textile & wastewater treatment plants resulting in spills of oil, chemical and untreated sewage	• Provision of adequate budget for operation and annual maintenance to ensure all equipment to be in good order. • Install auxiliary pump, vacuum pump, generator in avoid downtime. • All staff will be trained on operation of wastewater treatment system. • Regularly recheck accident management and emergency check plan. Develop prevention plan of environmental incidents (spill of oil, chemical) for approval by authorities.
4.	Impacts on quality of receiving water body	• Regularly supervise quality of treated water of two plants to meet required standards (PEQS on industrial wastewater, column a: water into receiving unit for domestic use) • Install emergency response system to promptly inform people using downstream

Sr no	Project activity & its impact	Mitigation measures
Operational Phase		
		water
5.	Solid waste and sludge	• Operating unit will develop sludge management plan • Regularly check, monitor and analyze treated sludge quality. If any treated sludge fails to meet PEQS limit, it will be transported and treated by specializing unit in hazardous waste treatment and transport. • Sludge will be delivered in appropriate time of lowest traffic level. It will be contained in closed tanks on specializing vehicles to minimize odor and dust during transport. • Solid waste, sludge from suction pump will be clarified, settled and stored in settling tanks. Sludge will be compressed and stabilized so that it causes no odor, is stored and transported to treatment plant. • Waste is separately stored in tanks and daily treated by environmental service company

8.5 POTENTIAL ENVIRONMENTAL ENHANCEMENT MEASURES

As described above the worth mentioning waste will be effluent and solid waste in the plant in the form of ashes. In order to enhance environment the following measures will be adopted:

8.5.1 Solid Waste & Sludge Management

Solid wastes are likely to consist of organic cake from drying beds. The proponent will address all waste in the following ways:

- Dewatered sludge from the treatment plant, to be placed at sanitary landfill on the contractual basis.
- Solid domestic waste shall be transported to final disposal site by special vehicles to avoid pollution of environment

- Proper solid waste receptacles and storage containers will be provided
- Appropriate PPE will be provided, and usage at all times ensured, to the workers handling hazardous substances.
- An inventory register will be kept and updated as appropriate.

8.5.2 Health and Safety

- PPEs will be provided at all stages of project cycle to all workers and it will be ensured they use them at all time.
- A policy on health and safety at the workplace will be developed.
- All the employees shall be trained on safety and health.
- A health and safety audit will be conducted annually as required by the occupational health and safety department.

9 ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM

9.1 DESCRIPTION OF PROPOSED MITIGATION ACTIONS

9.1.1 Level Of Treatment Provided To Sewage Produced

Large amount of wastewater will be generated from textile industry for which the ETP has been provided. It will be able to receive and treat all the sewage described above before disposal, with secondary treatment removing more than 90% of organic loadings and tertiary treatment bringing the BOD concentrations below PEQS.

9.1.2 Effluent Quality And Maintenance Of Effluent Quality

The use of natural means to treat the sewage is strongly recommended in keeping with earlier comments. The combination of the sewage lagoons and the aeration will provide effluent of a high quality. Through the monitoring of this development a further design strategy can be implemented in the second phase of the plant to ensure that the BOD level is further reduced. As effluent quality is good it will also be considered for use as irrigation, especially if used in the normal flood method within the cane producing areas.

9.1.3 Sludge Management

Scum develops on the top of lagoons and requires management to reduce accumulation. Scum accumulation can create three main problems: It accumulates in specific areas induced by the wind and direction of flow through the plant and eventually affects the design flow regime. It produces odours because it accumulates and becomes anoxic.

The radial design of the system will reduce the effects of accumulated scum. The shape is intended to have the ponds aligned with the wind so that the scum will not accumulate because the flow is in opposition to the wind and the accumulation areas are in the acute angular corners out of which the sewage is discharged. The sewage flow will therefore push the scum out of these areas and reduce accumulation. Once the ponds are emptied, sludge at the bottom of the ponds will be allowed to drain and dry. As the dry sludge at the bottom will be stabilized, it could be gathered by mechanical means and removed

9.1.4 Odour

In order to avoid odour problems that may occur in these systems re-circulation of plant effluent to system inlet is added at a minimum rate, thereby reducing the load on the plant inlet and primary pond.

Another potential source of odour is scum which has already been discussed above. If the ponds are overloaded it will result in odour problems because the treatment capacity will be exceeded.

If for process reasons or others, scum does accumulate at a particular time, scum removal systems will be in place including: High-pressure water spray to break up the scum so that it will settle. Boats and rakes to allow staff to break up the scum or remove it from the pond

Finally, preliminary treatment (screening) was added (also existing grit channels will remain) and pumping station, thereby reducing one of the sources of odours.

9.2 SCHEDULE FOR IMPLEMENTATION AND ENVIRONMENT BUDGET

9.2.1 Schedule for Implementation

It is planned that the following schedule of project implementation will be adhered to, this is subject to the conditions that everything goes according to planning and no serious bottlenecks are encountered. The implementation stages of the project activity include:

1st Stage: The stage –1 comprises the onsite contouring studies and soil investigations.

2nd Stage: The stage –2 comprises the following task.

i- Laying of foundations excavation and commencement of erection work.

ii- Start of civil, electrical and mechanical work.

iii- Development of basic infrastructure.

iv- Fitting of instrumentation.

3rd Stage: The stage –3 comprises the following task.

i. Equipment erection completion.

ii. Completion of the basic infrastructures water supply system, electricity supply etc.

4th Stage: The last stage will be Commencement of regular operation.

9.2.2 Environmental Budget

The total cost for the environmental management is estimated as 4.6 million Pak Rupees both during construction and its regular operation. The estimations are as followings;

Table 9-1: Environment Management Cost

Environmental Component	Quantity	Amount PKR
(i) Tree Plantation	7000	2 Million.
(ii) Health and Safety Measures and Provision of PPEs	L.S.	0.6 Million
(iii) Air and Water Quality & Noise Monitoring	L.S.	1 Million
(iv) Environmental Trainings	L.S	1 Million
Total Environmental Management and Monitoring Cost		4.6 Million

9.3 ENVIRONMENTAL MANAGEMENT TEAM ALONG WITH THEIR ROLES AND RESPONSIBILITIES

In light of ETP Management shall consist of the following members from the industry.

List of members that shall part of environmental management team as mentioned in table below

Table 9-2: Members of Environmental Management Team

Environmental Management Team		
a)	Project Manager.	Supervisor.
b)	Heads of all departments	Member
c)	Health and Safety Officer	Member
d)	Water Treatment Plant Engineer	Member
e)	Head of the sanitation staff.	Member
f)	Other Industry members as the Superintendent may designate.	Member

9.4 ENVIRONMENTAL MANAGEMENT PLAN

Environmental monitoring plan, developed for treatment facility construction and operation project aims at solving following problems:

- Monitoring of compliance with environmental legislation during construction and operation processes;
- Ensuring controllability of risks and environmental impacts;
- Provision of stakeholders with relevant environmental information;
- Confirmation of mitigation measures' implementation, determination of their efficiency and their adjustment whenever necessary;
- Permanent environmental control throughout the project implementation period (construction works and operation).

Table 9-3 Environmental Management Plan during Construction Phase of Project

Sr No	Project Activity & Its Impact	Targets To Be Achieved	Mitigation Measures	Responsibility	
				Implementation	Monitoring
Construction Phase					
1	**Air Quality**	Compliance with prescribed PEQS of ambient air.	• Proper ventilation and exhaust system for air passages in all subjected buildings. • Water sprinkling would be ensured to minimize the dust arising during the construction phase. • The provision of face mask and goggles also reduce the impact • Daily maintenance of transport vehicles are required to control air emissions.	Safety health & environment (SH &E) officer	• HSE manager • Proponent
2	**Soil Contaminatio n**	Avoid soil contamination during construction facility	• Vehicles would be properly • Maintained and the construction • Material would be used for the • Filling purpose. However in case of spillage, spill kits would be used.	Safety health & environment (SH &E) officer	• HSE manager • Proponent
3	**Biological Aspect**	The flora and fauna will not be harmed with the proposed project.	• Minimize trees cutting (if any) and clearing of vegetation • Plan and implement afforestation measures • Report incidents and any significant problems with animals and birds to the appropriate authorities	Safety health & environment (SH &E) officer	• HSE manager • Proponent

Sr No	Project Activity & Its Impact	Targets To Be Achieved	Mitigation Measures	Responsibility	
				Implementation	Monitoring
Construction Phase					
4	**Noise And Vibration**	Compliance with Punjab environment standards of noise	• Proper shift hours for the labors will be scheduled to avoid any health risk. • Provision and accessibility of ear plugs or ear muffs to all workers and visitors to avoid sound volume	Safety health & environment (SH &E) officer	• HSE manager • Proponent
5	**Social Aspect**	Residents and employees would not be greatly affected.	• Noise has been monitored to carry out and duly monitored regularly to comply with statutory requirements	Safety health & environment (SH &E) officer	• HSE manager • Proponent
6	**Solid Waste**	Solid waste management practices	• Proper solid waste management would be ensured and if any waste is found, it would be recycled and any other waste would be sold to the contractor.	Safety health & environment (SH &E) officer	• HSE manager • Proponent

Table 9-3 Environmental Management Plan during Operation Phase of Project

Sr No	Project Activity & Its Impact	Targets To Be Achieved	Mitigation Measures	Responsibility	
				Implementation	Monitoring
Operation Phase					
1.	Increase risk of air and smell pollution due to operation of textile machinery & wastewater treatment system	Comply with PEQS	• Design and install ventilation system • Plant trees in landscaping areas to prevent odor dispersion. • Ensure that all treatment processes, equipment and pipeline work well. Regularly carry out equipment maintenance. • Air pollutants caused by sludge and sewage will be purified **Significance of residual impact : " very low"**	Operating units of textile & wastewater treatment plant	Plant operators
2.	Noise propagation within the work zone. Impact on other receptors: on operation phase propagation of noise produced by the working of electric motors.	Minimize noise propagation. Reduce environmental impact, such as: • impact on human health; •animal disturbance and migration.	• Proper maintenace of machinery • Installation of high quality pumping stations on treatment plant site; • Using noise-insulation materials during installation of pumping station; • Arrangement of pumps on vibro-isolating platform, for that thick rubber sheets can be used; • Place pumps in closed containers, special shells. E. Frequent shift of workers, working with noisy devices. **Significance of residual impact : " very low"**	Operating units of textile & wastewater treatment plant	Plant operator

Sr No	Project Activity & Its Impact	Targets To Be Achieved	Mitigation Measures	Responsibility	
				Implementation	Monitoring
Operation Phase					
3.	Incidents of equipments in Textile & wastewater treatment plants resulting in spills of oil, chemical and untreated sewage	Reduce the spillage of any hazardous material	• Provision of adequate budget for operation and annual maintenance to ensure all equipment to be in good order. • Install auxiliary pump, vacuum pump, generator in avoid downtime. • All staff will be trained on operation of wastewater treatment system. • Regularly recheck accident management and emergency check plan. Develop prevention plan of environmental incidents (spill of oil, chemical) for approval by authorities. **Significance of residual impact : " very low"**	Operating unit of wastewater treatment plant	Plant operator
4.	Impacts on quality of receiving water body	Effluent does not affect the nearby water bodies	• Regularly supervise quality of treated water of two plants to meet required standards (PEQS on industrial wastewater, column a: water into receiving unit for domestic use) • Install emergency response system to promptly inform people using downstream water **Significance of residual impact : " very low"**	Operating unit of wastewater treatment plant	Plant operator

Sr No	Project Activity & Its Impact	Targets To Be Achieved	Mitigation Measures	Responsibility	
				Implementation	Monitoring
Operation Phase					
5.	Solid waste and sludge	Proper management of sludge generated from the WWTP to avoid any nuisance conditions	• Operating unit will develop sludge management plan • Regularly check, monitor and analyze treated sludge quality. If any treated sludge fails to meet PEQS limit, it will be transported and treated by specializing unit in hazardous waste treatment and transport. • Sludge will be delivered in appropriate time of lowest traffic level. It will be contained in closed tanks on specializing vehicles to minimize odor and dust during transport. • Solid waste, sludge from suction pump will be clarified, settled and stored in settling tanks. Sludge will be compressed and stabilized so that it causes no odor, is stored and transported to treatment plant. • Waste is separately stored in tanks and daily treated by environmental service company **Significance of residual impact : " very low"**	Operating unit of wastewater treatment plant	Plant operator

9.5 PROPOSED MONITORING PROGRAM TO ASSESS PERFORMANCE OR OUTPUT OF EMP

Table 0-5: Environmental Monitoring Plan

Environmental Component	Key Indicators	Performance Objectives	Data Sources
Pre-Construction			
Public consultation and information disclosure	Affected communities and stakeholders	Meeting with stakeholders during the EIA & stakeholders summoned for following meetings & introduction about grievance redress mechanism	Meeting minutes and list of participants
Plant Operator training	Training courses and schedule	Before pre-construction, needed training courses will be prepared and developed.	Contents of training courses, participants and schedule.
Surface water quality	pH, BOD5, COD, DO, TSS, ammonium, nitrate, Pb, Fe, As, grease, coliform	Record basic conditions under the monitoring plan	Survey
Construction-Phase			
All construction sites	Habitat, precious or endangered species if any	Habitat, precious or endangered species if not being changed and affected	Monitored by plant operator
Qualitative air quality	Micro-climate, dust, noise, vibration	Not exceeding the base in preconstruction phase	Monitoring reports of plant operator & contractor
Construction waste quality	pH, DO, TSS, COD, BOD5, NH4+, Cl-, NO3, NO2-, PO43- , surfactant, oil, Coliform	Strictly comply with procedure and regulation on collection and storage of construction wastes	Monitoring reports of plant operator & contractor
Hazardous materials and waste	Oil, petrol, grease, alum, Chlorine, soda	Strictly comply with procedure and regulation on collection and storage of wastes from	Monitoring reports of plant operator & contractor

Environmental Component	Key Indicators	Performance Objectives	Data Sources
		construction site and worker camps	
Community & worker safety	Frequency of injuries	Comply with regulations/policies on health and work accident to avoid accidents	Reports of the contractor
Cultural assets	Damages or complaints	No culturally valuable assets, excavated relics affected in any forms	Public input, reports of contractor, reports of plant operator
Transport	Interruption frequency and traffic congestion	Interruption, suspension or bypasses are absolutely managed	Public input, reports of contractor, reports of plant operator
Operation of Effluent Treatment Plant			
Quality of air and noise environment	Temperature, moisture, wind, total suspended particles, NO2, SO2, CO, noise	Comply with regulations/policies on air and noise environment of PEQS	Periodic environmental monitoring report of operating unit
Wastewater quality	Color, pH, BOD5, COD, SS, Fe, mineral oil and fat, sulfur, ammonium, total N, total P, Coliform	Comply with regulations/policies of PEQS	Periodic environmental monitoring report of operating unit
Monitor in case of incidents	In case of actual or suspected incidents in any department of textile and wastewater treatment plant, environmental monitoring shall be conducted immediately and is similar to a periodic environment monitoring. In addition, the daily operation staff will regularly check wastewater collection, operation of pumping station to	Comply with PEQS Respond to environmental incidents arisen, minimize adverse impacts on the environment	Environmental incident response report of operating unit of wastewater treatment plants.

Environmental Component	Key Indicators	Performance Objectives	Data Sources
	detect and timely handle incidents of congestion and pipe damage.		

9.6 PROPOSED EMP REPORTING AND REVIEWING PROCEDURES

This section will specify institutional responsibilities for contractors, Borrower, local authorities, and EPA, with the roles that prepare, submit, receive, review, and approve the reports. An implementation schedule detailing the timing, frequency and duration of mitigation measures, monitoring, and reporting of the progress will be prepared, showing phasing and coordination with procedures in the project operations manual and loan agreement. Recipients of such reports will include those with responsibility for ensuring timely implementation of mitigation measures and for undertaking remedial actions. In addition, the structure, content and timing of reporting will be specified to facilitate supervision, review and approval (if necessary) by EPA.

The implementation of the EMP will be the prime responsibility of the project proponents who designate responsibilities and obligations to their selected contractors and staff. Monitoring, documentation and reporting the compliance components of the EMP will be the responsibility of proponent.

9.6.1 Reporting

The relevant reporting structure will be included in site environmental training and induction and will be clearly displayed, along with contact names and numbers. In the event of an incident that causes, or is likely to cause, environmental harm, as defined in the EP Act, immediate action will be taken to minimize the effects of the incident. As soon as is reasonably practicable, the details of the incident and corrective actions taken will be reported to Plant Operator.

9.6.2 Review and Update

The EMP is intended to be dynamic and will be reviewed as often as necessary in accordance with changes to:

- Selected technologies or equipment
- Operational activities
- The legislative environment and/or approval conditions
- Improvements in best practice environmental management
- Corrective actions implemented as a result of complaints, incidents or non-conformance situations
- Audit Report recommendations.

9.7 ANY TRAINING NEED TO REQUIRE TO ENSURE IMPLEMENTATION OF EMP AND MONITORING PLANS

All staff and contractors will receive induction training about the general requirements of the EP Act and their specific duties and responsibilities associated with the operation of the Unit and with the EMP. At a minimum, the environmental component of the induction will address the following:

- 'General environmental duty' and 'duty to notify environmental harm'
- Specific environmental risks identified for the Project
- Requirements of the EMP
- Emergency contact information. In addition, relevant environmental issues will be reinforced at regular opportunities.

10 STAKEHOLDERS CONSULTATION

10.1 STAKEHOLDER CONSULTATION

The following chapter includes the detailed information of the process and parties that depicts the involvement and consultation of the important stakeholders that is conducted by the SMC International Consultant. The consultation is carried out to resolve any kind of issues that involved and can be potentially affected by the proposed project. The activity plays an important role in the decision making and the keeps in view the concerns of stakeholders. The parties that are involved in the process are as follows:

Table 10-1: Stakeholders and their Roles

Stakeholders	Roles
Proponent/Responsible Authority	The discussion with the proponent proposed the mitigation measures and alternatives to control any disparity in the project.
Environmental Expert	The consultant' team surveys the project site to gather relevant information and to record the local community stance and behaviors regarding the project. And also the evaluation of socio-economic impacts of the project has been done.
Government Departments	The consulted government department includes Environmental protection agency, Waste Management Company, Faisalabad Industrial Estate management & Development Company and site surroundings. The departments overviewed the proposed projects and its socio-economic impacts.
Local affected communities	The surveys determined the extent of community that could be affected and their verdict about the proposed project.

10.2 PROPONENT ENVIRONMENT MANAGEMENT TEAM

3A Apparel management will hire staff for operation phase of project. While Environment Management Team includes the following members for smooth operation of project

- Project Manager
- Site Supervisor
- Waste Handling Officer
- SH & E Officer
- Emergency Respondent
- ETP Plant operator

The above all members will be hired after the completion of construction activities.

10.3 The Responsible Authority

Area Manager of project will be responsible authority to take all measures prior to start the project and during operation

10.4 Other Departments and Agencies

For the impact analysis detailed with the management, local community, educational institutes, health institutes, hospitals and NGOs have been shared. All details were discussed related to implementation of the project. Scoping sessions, focused group discussion and way side consultations were held with the relevant stakeholders in the area.

10.5 Environmental Practitioners and Experts

Team of consultant visited the project site, had discussion with stakeholders and consulted with the local people of nearby and other villages to evaluate the project socio-economic impacts. People of the area belong to different professions like mostly belong to employment, own businesses, some in abroad, teaching, in agriculture etc. women were also consulted for their point of view regarding the betterment of the area by this project, some of them communicated but according to social value of the area they mostly hesitate to communicate comfortably and get pictured. People provide the massive information about the project and have positive remarks regarding the project development.

10.6 Affected and Wider Community

There is no affected community present in the area of the proposed project because the project site is situated within the planned industrial Estate and there is no effected or wider community within 2 km radius of project site, however consultant's team has consulted with the inhabitants or neighboring areas. The remarks of people are positive regarding the project and people foresee positive impacts like employment opportunities, business, development of the area etc.

Glossary

Air Blowers	For gadgets and electronics that have delicate parts that cannot be cleaned with a cloth, this is when you need air blowers to remove dust with its continuous air pressure.
Air Diffusers	An air diffuser or membrane diffuser is an aeration device typically in the shape of a disc, tube or plate, which is used to transfer air and with that oxygen into the sewage or industrial wastewater. Oxygen is required by microorganisms/bacteria residents in the water to break down the pollutants.
Air Quality	Measurement of the pollutants in the air; a description of healthiness and safety of the atmosphere.
Anionic Polymer	Anionic polymerization is a typical ionic polymerization, which proceeds with the growing chain end carrying negative charge and counter cation.
Anoxic	Anoxic waters are areas of sea water, fresh water, or groundwater that are depleted of dissolved oxygen and are a more severe condition of hypoxia.
Compensation	Includes cash payment, deferred payment, a bond, an insurance policy, stipend, payment in kind, rendition of services, grant of privileges and disturbance money, entitlement to special treatment by government and semi government entities, grant of alternative land, grant of import licenses and business, trade and commercial facilities in addition to the rehabilitation and resettlement of an affected person.
Coordinates Contaminate	Each of a group of numbers used to indicate the position of a point, line, or plane to make impure, pollute.
Dissolved Air Flotation (DAF)	Dissolved air flotation is a water treatment process that clarifies wastewaters by the removal of suspended matter such as oil or solids. The removal is achieved by dissolving air in the water or wastewater under pressure and then releasing the air at atmospheric pressure in a flotation tank basin.
Do Meter	Dissolved oxygen (DO) meters are used to measure the amount of dissolved oxygen in a liquid. Oxygen makes its way into water through a variety of processes, including aeration, as a byproduct of photosynthesis, and from surrounding air.
Effluent Treatment Plant	Effluent treatment plant cleans industrial effluents, contaminated water from rivers and lakes, and so on just in order to reuse the water for additional purposes. It is mostly used in industries such as pharmaceuticals, textiles, tanneries, and chemicals where there is a chance of extreme water contamination.
Environmental Management	Attempt to control human impact on and interaction with the environment in order to preserve natural resources.

Evaluation	The making of a judgment about the amount, number, or value of something; assessment.
Geology	A science that studies rocks, layers of soil, etc., in order to learn about the history of the earth and its life.
Ground Water	Aquifers currently being used as a source of drinking water or those capable of supplying a public water system. They have a total dissolved solid content of 10,000 milligrams per liter or less, and are not "exempted aquifers."
Hazardous	Substance or material, which could adversely affect the safety of the public, handlers or carriers during transportation.
Lamella Clarifier	A lamella clarifier or inclined plate settler (IPS) is a type of settler designed to remove Particulates from liquids. They are often employed in primary water treatment in place of conventional settling tanks. They are used in Industrial water treatment. Unlike conventional clarifiers they use a series of inclined plates. These inclined plates provide a large effective settling area for a small footprint. The inlet stream is stilled upon entry into the clarifier. Solid particles begin to settle on the plates and begin to accumulate in collection hoppers at the bottom of the clarifier unit. The sludge is drawn off at the bottom of the hoppers and the clarified liquid exits the unit at the top over a weir
Land Acquisition	The process whereby a person is compelled by a public agency to cede all or part of the land a person owns or possesses, to the ownership and possession of that agency, for public purpose in return for compensation.
Multi Grade Filter	Multigrade filter is a depth filter that makes use of coarse and fine media mixed together in a fixed proportion. This arrangement produces a filter bed with adequate pore dimensions for retaining both large and small suspended particles.
Neutralization Tank	Neutralization tanks are used to alter the pH level of corrosive waste drainage—by dilution or chemical neutralization. A range of smaller point-of-use or larger centralized tanks are available.
Occupational Health	Maintenance of the highest degree of physical, mental and social well-being of workers in all occupations by preventing departures from health, controlling risks and the adaptation of work to people, and people to their jobs.
Primary Clarifier	A circular tank in which wastewater is held for a period of time to allow heavier solids to settle to the bottom as sludge and lighter materials to float to the water surface as scum.
Project Area	The area specified by the funding and/or implementing agency according to the official gazette notification and includes the areas within the administrative limits of the federal or a provincial government.
Proponent	A person who advocates a theory, proposal, or course of action.
Rehabilitation	Include all compensatory measures to re-establish; at least lost incomes, livelihoods, living and social systems. It does not include the payment of

	compensation for required assets.
Scope	The extent of the area or subject matter that something deals with or to which it is relevant.
Scum	A layer of dirt or froth on the surface of a liquid.
Sludge	Sludge is semi-solid slurry that can be produced from a range of industrial processes, from water treatment, wastewater treatment or on-site sanitation systems.
Sludge Drying Bed	Sludge drying bed (SDB) is the most widely used method for sludge dewatering. Sludge drying involves natural ways of drying to mechanical ways of removing water content. Requires stabilized sludge to prevent nuisance and odors.
Sludge Pit	During biological wastewater treatment processing, the precipitate, which mostly consists of sludge, is formed. Sludge pits are used to store this product.
Social Environment	It includes the culture that the individual was educated or lives in, and the people and institutions with whom they interact.
Stakeholders	Include affected persons and communities, proponents, private and public businesses, NGOS, host communities and EPA.
Supernatant	Denoting the liquid lying above a solid residue after crystallization, precipitation, centrifugation, or other process.
Topography	Details of the surface features of land. It includes the mountains, hills, creeks, and other bumps and lumps on a particular hunk of earth.

List of Abbreviations

BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
EA	Environmental Approval
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency – Punjab
ETP	Effluent Treatment Plant
HFD	Hydraulic Flow Diagram
LAA	Land Acquisition Act
MSW	Municipal Solid Wastes
NGOs	Non–Government Organizations
NOC	No Objection Certificate
O&M	Operation and Maintenance
OHS	Occupational Health and Safety
DAF	Dissolve Air Flotation
P & ID	Process and Instrumentation Diagram
PEQS	Punjab Environment Quality Standards
PEPA	Punjab Environment Protection Agency
PKR	Pak Rupees
RAS	Returned Activated Sludge
SPM	Suspended Particulate Matter
VOC	Volatile Organic Compounds

References

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

a. Information and data provided by project proponents;
b. Project Pre-feasibility Study Report;
c. Technical Design Data related to the project.
d. Information gathered through discussions with the project related persons of the project proponent;
e. Information collected from the Technical documents of various suppliers of machinery/equipment.
f. Punjab Environment Quality Standards for Ambient Air November 2010;
g. Punjab Environment Quality Standards Noise Levels November 2010;
h. Punjab Environment Quality Standards for Drinking Water November 2010;
i. Pakistan Environmental Protection Act, 1997;
j. The Punjab Environmental Protection (Amendment) Act 2011 covers aspects related to:
    - The protection, conservation, rehabilitation and improvement of the environment and the prevention, control of pollution and promotion of sustainable development;
    - Establishing complete regulatory and monitoring bodies, policies, rules, regulations and Punjab environmental quality standards; and
    - To ensure enforcement, the act establishes regulating bodies i.e. Punjab Environmental Protection Council (PEPC) and responsible bodies i.e. Punjab Environmental Protection Agency (Punjab EPA) at Provincial level.
k. Environment related Laws in Pakistan and the Province of Punjab;
l. Government of Pakistan, Pakistan Environmental Protection Agency, Policy and Procedures for Filing, Review and Approval of Environmental Assessment, 2000;
m. Google earth, maps.
n. Guidelines for Public Consultations - These guidelines cover:
    - Consultation, involvement and participation of Stakeholders
    - Techniques for public consultation (principles, levels of involvements, tools, building trust)
    - Effective public consultation (planning, stages of EIA where consultation is appropriate)

- Consensus building and dispute resolution.

o. workplace safety and health act 2011

p. Land Acquisition Act (LAA) of 1894

q. The forest Act 1927

r. Pakistan Penal Code, 1860

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gg. workplace safety and health act 2011

hh. Land Acquisition Act (LAA) of 1894

ii. The forest Act 1927

jj. Pakistan Penal Code, 1860

Terms of References

1. The Consultant is required to carry out an Environment Assessment Study of the Project as required under section 12 of Punjab Environmental Protection Act 1997 (amended 2012).

2. The Study will be comprehensive and shall cover all aspects which are envisaged under the relevant national and provincials laws & regulations including but not limited to:

    - Identification and recommendation for suitable solution/treatment/mitigation measures of emissions and effluents such as waste water and sludge etc in accordance with Punjab Environmental Quality Standards (PEQS).
    - Identification and recommendation for suitable solution/treatment/mitigation measures of solvents, oils (tar), hazardous waste, organic compounds, steam, flue gases, particulate matter and chemical compounds harmful for the environment and other substances leading to air, noise, water and soil pollution in accordance with PEQS.

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