ENVIRONMENTAL IMPACT ASSESSMENT

(EIA REPORT)

ESTABLISHMENT OF A TEXTILE FABRIC MANUFACTURING UNIT

BY

M/S KHIZRA FABRICS (PRIVATE) LIMITED

1 KM CLUB ROAD INDUSTRIAL DRAIN,
KHURRIANWALA, TEHSIL JARANWALA,
DISTRICT FAISALABAD, PUNJAB



PREPARED BY

ZOOM CONSULTANCY & SERVICES

77 UG Eden Height, Gulberg, Lahore

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LIST OF ABBREVIATIONS

Abbreviation	Description
BOD	Biochemical Oxygen Demand
BOD_5	Five-Day Biochemical Oxygen Demand
CBM	Cubic Metre
COD	Chemical Oxygen Demand
CUIN	Corporate Unique Identification Number
dB(A)	A-Weighted Decibel
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPD	Environment Protection Department, Government of the Punjab
ETP	Effluent Treatment Plant
FESCO	Faisalabad Electric Supply Company
HSE	Health, Safety and Environment
IEE	Initial Environmental Examination
kVA	Kilovolt-Ampere
kW	Kilowatt
kWh	Kilowatt-Hour
m^3/day	Cubic Metres per Day
mg/L	Milligrams per Litre
MSDS	Material Safety Data Sheet
MT	Metric Tonne
NEQS	National Environmental Quality Standards

NOC	No Objection Certificate
NO_x	Nitrogen Oxides
NTN	National Tax Number
O&G	Oil and Grease
OHS	Occupational Health and Safety
PEPA 1997	Punjab Environmental Protection Act, 1997
PEQS	Punjab Environmental Quality Standards
pH	Measure of Acidity or Alkalinity
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter with an Aerodynamic Diameter of 2.5 Micrometres or Less
PM_{10}	Particulate Matter with an Aerodynamic Diameter of 10 Micrometres or Less
PPE	Personal Protective Equipment
SDS	Safety Data Sheet
SECP	Securities and Exchange Commission of Pakistan
SOP	Standard Operating Procedure
SO_2	Sulfur Dioxide
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
VOCs	Volatile Organic Compounds
WASA	Water and Sanitation Agency
WWTP	Wastewater Treatment Plant
ZCS	Zoom Consultancy & Services

EXECUTIVE SUMMARY

1. Introduction

This Executive Summary presents the project description, principal environmental considerations, mitigation measures, and environmental management and monitoring arrangements for the Environmental Impact Assessment (EIA) of the project titled "Establishment of Textile Fabric Manufacturing & Dyeing Unit by M/s Khizra Fabrics (Pvt) Ltd." The project is located at 1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad, Punjab.

M/S Khizra Fabrics (Private) Limited is registered under SECP Corporate Unique Identification Number 0158706 and National Tax Number 8395749. The project proponent is Mr. Habib Ahmed Anjum, Chief Executive. The development occupies 36 Kanal 3 Marla, with a stated approximate area of 164,167 square feet, at Chak No. 194/RB, Tehsil Jaranwala, District Faisalabad. The estimated project cost is PKR 450 million, and the project is expected to provide direct employment to approximately 55 workers and staff.

The project comprises textile fabric manufacturing and processing, including weaving, dyeing, bleaching, printing, and finishing. The production capacity of 75,000,000 metres per month, equivalent to 900,000,000 metres per annum.

The principal environmental concerns relate to wastewater from wet-processing operations, consumption of water and energy, chemical handling, machinery noise, textile waste, and occupational health and safety. An on-site Effluent Treatment Plant (ETP) forms part of the project's wastewater-management arrangement, with treatment before discharge into the adjacent industrial drain.

The project under Schedule II, Category B—Manufacturing and Processing, of the Punjab Environmental Protection Agency (Review of IEE and EIA) Regulations, 2022. The EIA addresses the project lifecycle, potential environmental and social impacts, mitigation measures, and environmental management and monitoring arrangements for regulatory review by EPA Punjab.

2. Salient Features of the Project

Parameter	**Detail**
Project title	Establishment of Textile Fabric Manufacturing & Dyeing Unit by M/s Khizra Fabrics (Pvt) Ltd
Company	M/S Khizra Fabrics (Private) Limited
Proponent	Mr. Habib Ahmed Anjum, Chief Executive
Proponent's address	House No. P-70, Kohinoor City, Jaranwala Road, Faisalabad
Contact number	+92 305 3066579
Email	ansarhabib7860@gmail.com
Project address	1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad
Land identification	Khewat No. 57; Khatooni Nos. 106–107; Khasra Nos. 42/21/1, 87/2, 87/3, 87/8, and 87/9; Chak No. 194/RB
GPS coordinates	31°27'01.4"N 73°02'52.4"E
Nature of project	Establishment of a textile fabric manufacturing and dyeing unit, with associated bleaching, printing, and finishing operations
Declared monthly capacity	75,000,000 metres per month, equivalent to 750 lakh metres per month

Declared annual capacity	900,000,000 metres per annum
Estimated project cost	PKR 450 million
Total land area	36 Kanal 3 Marla; approximately 164,167 square feet
Workforce	Approximately 55 workers and staff
Alternative site	None identified
SECP CUIN	0158706
NTN	8395749
Assessment category recorded in Schedule IV	Schedule II, Category B—Manufacturing and Processing
Environmental assessment	Environmental Impact Assessment

Parameter	**Detail**
Principal manufacturing operations	Weaving, bleaching, dyeing, printing, and finishing
Main process inputs	Yarn/fabric, water, dyes, and processing auxiliaries, according to the production requirements
Electricity	Industrial electricity connection
Water source	WASA Faisalabad industrial groundwater/aquifer arrangement
WASA account	Industry East Sub-Division, Account No. 105501152
Principal industrial wastewater source	Wet dyeing and finishing operations

Wastewater-management arrangement	On-site ETP before discharge into the adjacent industrial drain
Potential solid-waste streams	Textile offcuts, rejected fabric, packaging, chemical containers, and ETP sludge
Report-preparing organization	Zoom Consultancy & Services, Lahore
Consultant's address	77 UG, Eden Height, Gulberg, Lahore

Process inputs and potential waste streams reflect the listed textile operations and the environmental considerations associated with textile processing.

3. Project Objectives

The project aims to establish a textile manufacturing and processing facility that supplies processed and finished fabrics while controlling its environmental and occupational health impacts. Its principal objectives are:

- To establish and operate a textile fabric manufacturing, weaving, dyeing, and finishing unit at the identified site in Khurrianwala, Faisalabad.
- To support the company's registered principal business activity under SECP Code 131300, relating to finishing of textiles within the textile manufacturing sector.
- To meet demand for processed and finished fabrics in domestic and international markets.
- To achieve the production capacity declared in the project application.
- To generate direct employment for approximately 55 workers and staff.
- To provide an on-site ETP for wastewater generated by wet-processing activities.

- To address the environmental approval and compliance requirements identified in Schedule IV, including the Punjab Environmental Quality Standards (PEQS).

Resource conservation, safe chemical handling, waste minimization, machinery safety, and pollution control are integral environmental management objectives for the project.

4. Purpose of the EIA Report

The EIA Report has been prepared for submission to the Environmental Protection Agency, Punjab, in connection with the environmental approval requirements under Section 12 of the Punjab Environmental Protection Act, 1997, as amended, and the applicable review regulations.

The report provides a framework to:

- Describe the project location, land requirement, production activities, utilities, and wastewater-management arrangements.
- Establish the physical, ecological, and socioeconomic setting of the project area.
- Assess potential impacts during establishment, commissioning, operation, maintenance, and eventual closure.
- Identify measures to prevent or reduce adverse effects on water, air, soil, workers, and neighbouring receptors.
- Define environmental management responsibilities and monitoring arrangements.
- Support EPA Punjab's review of the project and implementation of the resulting approval conditions.

5. Major Environmental Impacts and Recommended Mitigation Measures

The main environmental concern for the project is wastewater from dyeing and associated wet processing. Unlike a dry manufacturing operation, textile wet processing can generate effluent containing organic pollutants, colour, suspended solids, dissolved salts, and residual processing chemicals. Other important concerns include water and energy demand, machinery noise, chemical exposure, waste handling, and fire and mechanical hazards. Their significance depends on the actual equipment, chemical inventory, operating conditions, and effectiveness of pollution-control systems.

Environmental Aspect	**Potential Impact**	**Recommended Mitigation Measure**
Site preparation and installation	Dust, construction noise, debris, and temporary access disturbance	Control dust, cover loose materials, maintain equipment, segregate debris, and organize vehicle movement
Dyeing, bleaching, and wet finishing	Coloured effluent; organic pollution; variable pH; suspended and dissolved solids; residual chemicals	Collect process wastewater through dedicated drains; provide appropriate ETP treatment; prevent untreated bypasses; monitor treated discharge
Process-water demand	Increased demand on the water source and avoidable resource consumption	Meter consumption, maintain a water balance, repair leaks, optimize washing and rinsing, and assess suitable treated-water reuse

Chemical storage and dosing	Spills, worker exposure, incompatible reactions, and contamination of drains or soil	Use labelled containers, compatible storage, secondary containment, Safety Data Sheets, controlled dosing, and spill-response equipment
Weaving and fabric handling	Fibre dust, lint accumulation, machinery noise, and entanglement hazards	Provide housekeeping, ventilation or extraction as required, machine guarding, preventive maintenance, and safe operating procedures
Drying and thermal operations	Heat exposure and potential combustion or process emissions	Maintain thermal equipment, provide suitable ventilation, and control emissions according to the installed equipment and fuel
Machinery noise	Worker exposure and possible disturbance beyond the site boundary	Maintain equipment, isolate vibration, apply acoustic controls where necessary, and provide hearing protection
Textile and packaging waste	Accumulation, littering, obstruction, and additional fire load	Segregate waste at source, store in designated areas, recover recyclable materials, and maintain disposal records
ETP sludge and chemical containers	Contamination from unsuitable handling or disposal	Characterize relevant waste, use protected storage, prevent leakage, and arrange disposal or recovery appropriate to its classification

Occupational health and safety	Chemical burns, machinery injuries, electrical hazards, heat stress, and manual-handling injuries	Provide task-specific PPE, guarding, safe isolation procedures, training, first aid, and incident reporting
Fire and emergency events	Injury, property damage, smoke, and interruption of operations	Maintain clear exits, suitable firefighting equipment, safe storage separation, emergency procedures, and regular drills
Transport and dispatch	Vehicle conflicts, road-safety risks, and loading-related disturbance	Designate loading areas, control vehicle speeds, schedule deliveries, and keep access routes clear

These measures reflect the environmental and safety controls relevant to textile manufacturing and general industrial operations. Their design and application must correspond to the project's actual process and risk profile.

6. Environmental Management and Monitoring Plan

The Environmental Management Plan covers establishment, commissioning, operation, maintenance, and closure. Overall accountability rests with project management. A designated environmental/HSE focal person will coordinate implementation, inspections, monitoring, training, waste records, corrective actions, and regulatory communication.

The monitoring programme below provides the proposed management commitments for the project. Frequencies are project recommendations and remain subject to EPA Punjab's approval conditions; they are not presented as statutory minimum intervals.

Monitoring Area	**Key Parameters / Records**	**Proposed Frequency**
Process-water consumption	Meter readings, consumption, leaks, and water balance	Daily recording; monthly review
ETP operation	Flow, operational pH, dosing, equipment condition, and sludge generation	Daily during wet-processing operation
Treated industrial effluent	pH, temperature, BOD_5, COD, TSS, TDS, colour, oil and grease; additional parameters according to chemical use	Monthly during initial operation; subsequently according to performance and approval conditions
Water-source quality	pH, TDS, hardness, chlorides, and parameters relevant to the intended use	Annually; additional testing where concerns arise
Ambient air	Relevant particulate and gaseous pollutants based on identified sources	Six-monthly or as required by EPA Punjab
Combustion emissions, where applicable	Applicable parameters for installed thermal equipment and fuel	Initially after commissioning; thereafter according to approval conditions

Workplace and boundary noise	Representative workplace noise and daytime/night-time boundary levels, as applicable	Quarterly and after significant equipment changes
Fibre dust and ventilation	Lint accumulation, extraction condition, and ventilation effectiveness	Monthly inspections; exposure testing where indicated
Solid waste and recycling	Quantities, segregation, storage, recovery, and disposal records	Monthly review
ETP sludge and chemical containers	Quantities, storage condition, classification, and transfer records	Monthly and at each transfer
Chemical storage	Labelling, compatibility, containment, SDS availability, and spill readiness	Weekly inspections
Occupational health and safety	PPE, guarding, electrical safety, incidents, near misses, and training	Daily supervision; monthly documented review
Fire and emergency preparedness	Extinguishers, exits, emergency arrangements, and drill records	Monthly inspections; drills twice yearly
Energy consumption	Electricity and gas consumption; operating efficiency	Monthly review
Community complaints	Complaints, investigations, response, and corrective-action closure	Continuous recording; monthly review

EMP implementation	Monitoring results, non-compliances, and corrective actions	Quarterly management review

Effluent parameters are selected to address textile wet-processing risks. Compliance evaluation will use the applicable PEQS and discharge conditions, with additional testing determined by the actual chemical inventory and wastewater characteristics.

The company will maintain laboratory reports, ETP operating logs, water and energy records, chemical inventories, waste-transfer documentation, inspection checklists, training records, incident registers, and emergency-drill records. Identified non-compliances will require documented corrective actions and follow-up verification.

7. Conclusion

The project comprises the establishment of a textile fabric manufacturing and dyeing unit at 1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad. It has a declared investment of PKR 450 million, occupies 36 Kanal 3 Marla, and is expected to provide employment for approximately 55 workers and staff. An on-site ETP is included in the stated wastewater-management arrangement.

The principal environmental management priorities are effective treatment of wet-processing wastewater, efficient water and energy use, safe chemical handling, control of noise and fibre dust, responsible waste management, and protection of workers from machinery, chemical, electrical, heat, and fire hazards. These priorities are consistent with the environmental and safety risks associated with textile manufacturing.

The project's environmental acceptability depends on effective implementation of the mitigation measures, reliable ETP performance, compliance with applicable PEQS and approval conditions, and sustained monitoring. This summary does not assert demonstrated compliance or insignificant residual impacts in the absence of the supporting baseline and performance results.

Environmental approval is therefore recommended for consideration by the competent authority subject to satisfactory review of the EIA and project particulars, fulfilment of applicable statutory requirements, and enforceable implementation of the Environmental Management and Monitoring Plan.

CHAPTER 1

INTRODUCTION

1.1 Project Background

M/S Khizra Fabrics (Private) Limited proposes the project titled "Establishment of Textile Fabric Manufacturing & Dyeing Unit by M/s Khizra Fabrics (Pvt) Ltd." The project is located at 1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad, Punjab, at coordinates 31°29′52.8″ N, 73°16′21.0″ E.

The project comprises textile manufacturing and processing activities, including weaving, bleaching, dyeing, printing, and finishing. It occupies 36 Kanal 3 Marla, with an estimated investment of PKR 450 million. The installed production capacity is 75,000,000 metres per month, equivalent to 900,000,000 metres annually. Approximately 55 workers and staff are associated with the project.

The company is registered with the Securities and Exchange Commission of Pakistan under Corporate Unique Identification Number 0158706 and holds National Tax Number 8395749. The project aims to supply processed and finished fabrics to domestic and international markets while incorporating environmental protection and occupational safety into its operations.

1.2 Project Proponent

The project proponent is M/S Khizra Fabrics (Private) Limited, represented by Mr. Habib Ahmed Anjum, Chief Executive.

Particular	**Detail**
Company	M/S Khizra Fabrics (Private) Limited
Chief Executive	Mr. Habib Ahmed Anjum
Correspondence address	House No. P-70, Kohinoor City, Jaranwala Road, Faisalabad
Contact number	+92 305 3066579
Email	ansarhabib7860@gmail.com
Project location	1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad

The proponent is responsible for providing accurate project information, obtaining applicable permissions, implementing environmental safeguards, and ensuring compliance with environmental approval conditions.

1.3 Environmental Consultant

The Environmental Impact Assessment has been prepared by Zoom Consultancy & Services, Lahore, with its office at 77 UG, Eden Height, Gulberg, Lahore.

The consultant's scope includes preparation of the project description, assessment of environmental and social impacts, identification of mitigation measures, and development of the Environmental Management and Monitoring Programme. The consultant also supports the proponent in presenting environmental information for regulatory review.

1.4 Purpose of the EIA

The **Environmental Impact Assessment** examines the potential environmental and social consequences of the project and establishes measures to prevent, minimize, and manage adverse impacts throughout its lifecycle.

The principal objectives of the assessment are to:

- Describe the project location, activities, production processes, utilities, and treatment arrangements.
- Characterize the physical, ecological, and socioeconomic environment.
- Identify potential impacts during construction, installation, commissioning, operation, maintenance, and closure.
- Assess risks associated with wastewater, chemicals, emissions, noise, waste, and occupational hazards.
- Evaluate practicable alternatives and pollution-control measures.
- Define environmental responsibilities, monitoring requirements, training, and reporting procedures.
- Support informed regulatory decision-making and stakeholder participation.

1.5 Regulatory Basis

The project is identified under Schedule II, Category B (Manufacturing and Processing), of the Punjab Environmental Protection (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2022.

The EIA is prepared for submission to the Environmental Protection Agency, Punjab, in connection with the environmental approval requirements under Section 12 of the Punjab Environmental Protection Act, 1997, as amended. Project implementation and operation are subject to applicable permissions, Punjab Environmental Quality Standards, and conditions imposed by the competent authority.

1.6 Scope and Approach of the Assessment

The assessment considers the project premises, neighbouring receptors, access routes, water resources, and the receiving industrial drain. It addresses both routine activities and abnormal events, including chemical spills, fire, equipment failure, and interruption of wastewater treatment.

The assessment approach combines review of project information, consideration of environmental conditions, qualitative impact identification, evaluation of mitigation options, and development of management and monitoring arrangements. Checklists, activity–receptor matrices, and cause–effect pathways provide the framework for identifying potential impacts.

Particular attention is given to wet-processing wastewater. An on-site Effluent Treatment Plant forms part of the project's wastewater-management arrangement, with treatment before discharge into the adjacent industrial drain. Other priorities include water conservation, safe chemical storage, control of noise and fibre dust, waste segregation, and worker protection.

Assessment findings distinguish documented project particulars from information requiring supporting measurements or records. Environmental compliance and the effectiveness of controls are determined through representative monitoring and operational verification.

1.7 Organization of the Report

The EIA report is organized as follows:

Chapter	Subject
1	Introduction
2	Screening, Scoping and Consideration of Alternatives
3	Description of the Project
4	Description of the Environment
5	Impact Assessment
6	Screening of Potential Environmental Impacts and Mitigation Measures
7	Environmental Management and Monitoring Programme
8	Stakeholder Consultation
9	Conclusion and Recommendations

Together, these chapters establish the project's environmental assessment framework and the measures required for responsible implementation and operation.

CHAPTER 2

SCREENING, SCOPING AND CONSIDERATION OF ALTERNATIVES

2.1 Screening

The project, "Establishment of Textile Fabric Manufacturing & Dyeing Unit by M/s Khizra Fabrics (Pvt) Ltd," comprises textile manufacturing and wet-processing activities at 1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad.

The project is identified under Schedule II, Category B—Manufacturing and Processing, of the Punjab Environmental Protection (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2022. Accordingly, an **EIA** is required for submission to the Environmental Protection Agency, Punjab. The assessment addresses wastewater generation, chemical handling, resource consumption, emissions, noise, waste management, and occupational safety.

2.2 Scoping

2.2.1 Spatial and Temporal Boundaries of Environmental Assessment

Spatial Boundaries

The assessment covers the project premises, comprising 36 Kanal 3 Marla, and the surrounding area potentially affected by project activities. Particular attention is given to:

- Production areas, chemical storage, utilities, and the Effluent Treatment Plant.
- The adjacent industrial drain and the potential influence of treated effluent discharge.

- Nearby industrial units, settlements, and other sensitive receptors.
- Access roads used for raw-material deliveries and finished-product dispatch.
- Water resources potentially affected by consumption, leakage, or accidental contamination.

The project boundary and adjacent drain form the principal assessment area, while impacts extending beyond the premises are considered according to their pathways and affected receptors.

Temporal Boundaries

The assessment covers site preparation and installation, commissioning, routine operation, maintenance, and eventual closure. It considers temporary impacts associated with establishment, continuing operational impacts, and abnormal events such as chemical spills, fire, equipment failure, and interruption of effluent treatment.

2.2.2 Important Issues and Concerns Raised During Consultation

Consultation findings must distinguish documented stakeholder statements from issues identified through technical assessment. The supplied project information does not contain consultation minutes or attributed stakeholder comments; therefore, no specific concern is presented here as a confirmed consultation finding.

The principal issues relevant to stakeholder consultation are:

- Treatment of dyeing and finishing wastewater before discharge into the industrial drain.
- Protection of local water resources and efficient water consumption.
- Machinery noise, air emissions, and possible odour.
- Safe handling of dyes, chemicals, textile waste, and treatment sludge.
- Traffic safety, employment opportunities, and worker protection.

- Emergency preparedness and arrangements for receiving community complaints.

These issues define the consultation scope for the textile project; recorded responses and commitments belong in the stakeholder consultation chapter.

2.2.3 Significant Impacts and Factors to Be Determined

Assessment Aspect	**Significant Impact / Factor**
Wastewater	Effluent quantity and characteristics, ETP capacity and performance, discharge quality, and effects on the receiving drain
Water resources	Supply arrangement, consumption, water balance, conservation, and contamination risks
Air quality	Fibre dust, process vapours, and emissions from installed combustion equipment, where applicable
Noise	Workplace exposure and noise at the boundary and nearby receptors
Waste	Quantities, segregation, recycling, sludge characteristics, and disposal arrangements
Chemical safety	Chemical inventory, storage compatibility, containment, dosing, and spill response
Occupational safety	Machinery, electrical, chemical, heat, and fire hazards
Community and traffic	Access conditions, vehicle movement, neighbouring receptors, and complaint management

Cumulative effects	Interaction of project discharges and emissions with other sources in the surrounding industrial area

Impact significance is evaluated using magnitude, duration, frequency, reversibility, receptor sensitivity, and the effectiveness of mitigation. Wastewater receives particular attention because wet textile processing can generate colour, organic pollutants, dissolved salts, and residual chemicals.

2.3 Consideration of Alternatives

The alternatives assessment compares the selected project approach with practicable options. No alternative site is identified in the project application; consequently, the assessment does not claim that specific alternative plots were surveyed or rejected.

2.3.1 Site Alternatives: Selection and Rejection Criteria

The selected location is at Khurrianwala, Faisalabad, on the identified project land. Site suitability depends on lawful land use, adequate space, access, utilities, receptor sensitivity, drainage, and the ability to install and operate pollution-control infrastructure. The nearby industrial drain provides an identified discharge route but does not justify untreated discharge.

Alternative locations would be less suitable where they involve incompatible land use, proximity to sensitive receptors, inadequate utilities, restricted access, flood exposure, or insufficient space for safe operations and effluent treatment. The selected site remains subject to these environmental and planning considerations.

2.3.2 Design/Technology Alternatives: Selection and Rejection Criteria

The preferred approach combines suitable production machinery with controlled chemical dosing, efficient washing and rinsing, appropriate ventilation, and an ETP matched to the wastewater characteristics. Technology selection considers product quality, water and energy efficiency, worker safety, maintainability, and reliable pollution control.

Water-intensive processing, uncontrolled chemical addition, inadequate extraction, and treatment systems unable to manage the anticipated effluent are unsuitable. A specific ETP technology cannot be selected solely from the project title; it requires wastewater flow and quality data.

2.3.3 Environmental Alternatives: Selection and Rejection Criteria

The preferred environmental approach prioritizes pollution prevention, followed by recovery, reuse, treatment, and controlled disposal. It includes segregated drainage, water conservation, suitable treated-water reuse, safe chemical storage, textile-waste recovery, and protected sludge handling.

Untreated effluent discharge, open waste dumping, uncontrolled burning, and uncontained chemical storage are rejected because they do not provide adequate protection of water, soil, air, or human health. Reuse is appropriate only where treated-water quality is compatible with the intended use.

2.3.4 Economic Alternatives: Selection and Rejection Criteria

The project has an estimated investment of PKR 450 million and an anticipated workforce of approximately 55 workers and staff. Economic comparison considers capital expenditure together

with operating costs, resource consumption, treatment requirements, maintenance, and waste-management costs.

The preferred option balances production requirements with reliable environmental controls and efficient resource use. Lower-cost options that depend on inadequate treatment or unsafe operation are not acceptable substitutes for compliance.

The no-project alternative would avoid the additional environmental loads associated with the development but would also forgo its anticipated production and employment benefits. Proceeding with the project is therefore assessed against the requirement to implement effective mitigation, operate the ETP reliably, and meet applicable environmental approval conditions.

CHAPTER 3

DESCRIPTION OF THE PROJECT

3.1 Type and Category of Project

The project titled "Establishment of Textile Fabric Manufacturing & Dyeing Unit by M/s Khizra Fabrics (Pvt) Ltd" comprises textile manufacturing and processing activities, including weaving, bleaching, dyeing, printing, and finishing.

The project is identified under Schedule II, Category B—Manufacturing and Processing, of the Punjab Environmental Protection (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2022. An **EIA** has been prepared for submission to EPA Punjab. The company is registered under SECP CUIN 0158706 and NTN 8395749.

3.2 Objectives of the Project

The principal objectives are:

- To establish a textile fabric manufacturing and dyeing facility in Khurrianwala, District Faisalabad.
- To supply processed and finished fabrics to domestic and international markets.
- To undertake the company's registered textile manufacturing and finishing activities.
- To achieve the installed production capacity of 75,000,000 metres per month.
- To generate employment for approximately 55 workers and staff.
- To treat industrial wastewater through an on-site Effluent Treatment Plant.
- To implement environmental management measures consistent with applicable requirements and approval conditions.

3.3 Location and Site Layout

The project is located at 1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad, Punjab.

Particular	**Detail**
Latitude	31°29′52.8″ N
Longitude	73°16′21.0″ E
Total land area	36 Kanal 3 Marla
Approximate area stated in the project application	164,167 square feet
Khewat number	57
Khatooni numbers	106–107
Khasra numbers	42/21/1, 87/2, 87/3, 87/8, and 87/9
Revenue estate	Chak No. 194/RB
Administrative location	Tehsil Jaranwala, District Faisalabad

The coordinates are provided by the proponent; the land particulars are recorded in the project application.

The functional layout accommodates production, raw-material storage, finished-product storage, chemical handling, utilities, wastewater treatment, administration, and internal movement. Separation of chemical storage, production activities, and waste-handling areas is an important layout consideration. Access to emergency exits, firefighting equipment, and the ETP must remain unobstructed.



Figure 1: Google map of project site

3.3.1 Google Earth Location Reference

The project location is referenced at 31°29′52.8″ N, 73°16′21.0″ E for the Google Earth location map. The map forms the spatial reference for the project boundary, access road, adjacent industrial drain, and surrounding receptors. The project application identifies a Google Earth/scale map among its accompanying documents.

3.4 Site Alternatives and Selection Criteria

No alternative site is identified in the project application. The selected site is the project land at Khurrianwala, Faisalabad.

Site assessment considers land-use compatibility, access, utility availability, space for treatment infrastructure, drainage, and proximity to sensitive receptors. Locations with incompatible land

use, inadequate access, insufficient treatment space, or unacceptable environmental risks would be unsuitable.

The adjacent industrial drain is the identified receiving route for treated effluent. Its proximity does not remove the requirement for treatment and compliant discharge.

3.5 Design and Technology Alternatives

Technology selection is based on production requirements, product quality, resource efficiency, operational reliability, maintenance, worker safety, and pollution control.

The preferred approach incorporates:

- Suitable weaving and fabric-processing machinery.
- Controlled chemical preparation and dosing.
- Efficient washing and rinsing practices.
- Ventilation and extraction suited to dust, vapour, and heat sources.
- Wastewater collection and treatment matched to the actual effluent load.
- Preventive maintenance and safe operating procedures.

Water-intensive operations, uncontrolled dosing, inadequate ventilation, and wastewater-treatment systems unsuitable for the expected effluent are not acceptable alternatives. Specific treatment equipment and sizing depend on wastewater characterization and the site water balance.

3.6 Process, Raw-Material and Product Alternatives

Process alternatives include different bleaching, dyeing, printing, and finishing routes according to fabric specifications. Selection considers colour fastness, finish quality, compatibility with the fabric, chemical consumption, water demand, and effluent characteristics.

Raw-material and chemical alternatives favour consistent-quality inputs and, where technically feasible, lower-hazard chemicals that meet product requirements. Unlabelled chemicals, incompatible formulations, and unnecessarily hazardous substitutes are unsuitable.

Product selection follows market requirements and the capability of the installed machinery. The principal output is processed and finished textile fabric; separate capacities for different fabric types are not specified in the available project particulars.

3.7 Land Use on the Site

The project occupies 36 Kanal 3 Marla for textile manufacturing and associated infrastructure. Operational land use comprises production, storage, utilities, administration, wastewater treatment, and internal circulation. Separate covered-area and open-area figures are not specified in the supplied project particulars.

3.8 Road Access

Access is associated with the project's location at 1 Km. Club Road Industrial Drain, Khurrianwala. The access arrangement serves material deliveries, workforce movement, product dispatch, and emergency response.

Vehicle management includes designated loading areas, controlled speeds, clear pedestrian routes, and unobstructed emergency access. Road width, entrance dimensions, and vehicle frequency require site-specific records and are not quantified here.

3.9 Vegetation and Tree Plantation

Landscaping and plantation are incorporated as environmental management measures in suitable unbuilt areas. Plantation must avoid interference with utility lines, drains, production access, and emergency routes.

The project information does not provide an existing tree inventory or a plantation count. Accordingly, no tree-removal or existing-vegetation quantity is assigned in this chapter.

3.10 Cost and Magnitude of Operation

Parameter	**Detail**
Estimated project cost	PKR 450 million
Installed monthly capacity	75,000,000 metres
Annual capacity	900,000,000 metres
Workforce	Approximately 55 workers and staff
Land requirement	36 Kanal 3 Marla
Principal activities	Textile manufacturing, weaving, dyeing, bleaching, printing, and finishing

3.11 Schedule of Implementation

The implementation sequence comprises:

Stage	**Principal Activities**
Regulatory preparation	Environmental review and applicable permissions
Site preparation	Preparation of production, storage, utility, and treatment areas
Installation	Installation of machinery, electrical systems, utilities, and wastewater infrastructure
Commissioning	Equipment testing, safety checks, staff training, and ETP commissioning
Operation	Production with routine environmental monitoring and preventive maintenance
Closure	Safe shutdown, removal of materials and wastes, and site rehabilitation

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3.12 Manufacturing Process

3.12.1 Process Flow

The process sequence below represents the textile activities identified for the project. Fabric batches follow the processing route required by their specifications; bleaching, dyeing, and printing are not necessarily consecutive steps for every product.

Receipt and storage of yarn / fabric

↓

Yarn preparation and weaving, where applicable

↓

Greige fabric inspection

↓

Fabric preparation and bleaching, as required

↓

Dyeing and/or printing, according to product specification

↓

Washing and rinsing, where required

↓

Drying and finishing

↓

Final inspection and packing

↓

Storage and dispatch

Wet-process wastewater

↓

Collection and on-site ETP treatment

↓

Treated discharge to the adjacent industrial drain

The project application identifies weaving, bleaching, dyeing, printing, and finishing, together with an on-site ETP for wet-processing wastewater. It also contains the term "pinning"; no separate spinning operation is assumed from that wording.

3.12.2 Details of Operations

Operation	**Description**
Material receipt	Receipt, inspection, and storage of production inputs
Weaving	Interlacing yarn to produce fabric, where undertaken on-site
Fabric preparation	Preparation of fabric for the required wet-processing route
Bleaching	Treatment to achieve the required whiteness and preparation quality
Dyeing	Application of colour according to product specifications
Printing	Application of patterns or localized colour
Washing and rinsing	Removal of residual processing chemicals and unfixed colour
Drying and finishing	Achievement of the required moisture condition, dimensions, appearance, and handle
Inspection and packing	Quality checking, packing, and preparation for dispatch

The precise route varies by fabric type and customer specification. Wet-processing controls must account for the chemicals and wastewater generated by each route.

3.12.3 Raw Materials: Sources and Quantities

Input	Purpose	Source / Quantity
Yarn and/or greige fabric	Textile production and processing	Supplier-based procurement; quantities not specified
Dyes and pigments	Colouring and printing	Suitable commercial suppliers; quantities depend on production recipes
Bleaching and processing chemicals	Fabric preparation and wet processing	Supplier-based procurement; quantities not specified
Finishing auxiliaries	Required fabric properties	Selected according to product specifications
Packaging materials	Protection and dispatch	Commercial suppliers; quantities depend on output
Water	Wet processing and domestic use	WASA-related arrangement described in Section 3.13

3.12.4 Collection, Storage and Transport

Materials are received through controlled unloading and transferred to designated storage areas. Yarn, fabric, and packaging require dry storage and separation from ignition sources. Chemicals require identification, compatible segregation, suitable containment, and accessible Safety Data Sheets.

Internal handling must prevent spills, damaged containers, blocked aisles, and unsafe manual lifting. Chemical movement requires appropriate containers, trained personnel, and spill-response arrangements.

3.12.5 Operational Equipment and Machinery

The functional equipment groups comprise weaving machinery, wet-processing equipment, printing equipment, drying and finishing equipment, pumps and dosing systems, and ETP equipment. The exact machine types, quantities, rated capacities, and thermal arrangements are not specified in the supplied project particulars and are not assigned here.

3.12.6 Products and By-Products

The principal products are manufactured, dyed, printed, and finished textile fabrics. The installed capacity is 75,000,000 metres per month, equivalent to 900,000,000 metres annually. Potential residual materials include textile offcuts, rejected fabric, packaging, chemical containers, and treatment sludge. These require waste-management arrangements rather than being automatically classified as saleable by-products.

3.13 Water Usage and Source

The water arrangement is identified as WASA Faisalabad industrial groundwater/aquifer supply, Industry East Sub-Division, Account No. 105501152. Water serves wet processing, washing, cleaning, and domestic requirements. Consumption monitoring must distinguish process use, domestic use, reuse, and losses to support an operational water balance and appropriate ETP sizing.

3.14 Wastewater Generation and Disposal

Industrial wastewater arises principally from dyeing, bleaching, washing, printing-related cleaning, and wet finishing. Its characteristics can include variable pH, colour, BOD, COD,

suspended solids, dissolved salts, and residual chemicals. The actual pollutant profile depends on the processing recipes.

The on-site ETP before discharge into the adjacent industrial drain. Daily wastewater volume, laboratory characteristics, ETP design capacity, and domestic sewage arrangements are not specified in the supplied particulars.

Process drainage must prevent untreated bypasses, while ETP operation and treated discharge require monitoring against the applicable PEQS and approval conditions.

3.15 Air Emissions and Control Measures

Potential sources include fibre dust and lint, chemical vapours, drying and finishing emissions, and combustion equipment where installed.

Control measures include suitable ventilation and local extraction, controlled chemical handling, good housekeeping, preventive maintenance, and emission controls matched to the equipment and fuel. Boiler, generator, stack, and fuel specifications are not assumed in the absence of equipment records.

3.16 Solid Waste Generation and Disposal

Potential wastes include textile scraps, rejected material, packaging, chemical containers, domestic waste, and ETP sludge. Quantities are not specified.

Management comprises source segregation, recovery of suitable recyclable material, designated storage, and documented transfer. Sludge and contaminated containers require characterization and handling appropriate to their hazards; uncontrolled dumping and burning are excluded.

3.17 Operational Hours

The project application identifies approximately 55 workers and staff but does not specify operating hours, shift arrangements, or annual working days. No continuous-operation schedule is assumed. Staffing, supervision, and environmental control must cover all operating shifts.

3.18 Energy Requirements and Sources

The project is served by an industrial electricity connection and gas supply. Sanctioned electrical load, electricity consumption, gas demand, and standby-generation capacity are not specified. LPG storage or use is not identified.

Energy management includes metering, efficient operation, preventive maintenance, and assessment of heat recovery and other feasible conservation measures.

3.19 Fuel Storage and Handling

Gas supply is identified, but bulk liquid-fuel storage is not established in the available particulars. No diesel tank or LPG installation is therefore assumed.

Where fuel systems are installed, their management requires suitable isolation, leak prevention, ignition control, signage, inspection, and emergency procedures appropriate to the fuel and equipment.

3.20 Emergency Response and Safety Features

The safety programme addresses fire, chemical spills, electrical incidents, machinery injuries, and treatment-system failure. It includes:

- Clear emergency exits and assembly arrangements.
- Suitable firefighting equipment and inspections.
- Machine guarding and safe isolation procedures.
- Task-specific PPE and chemical-handling training.
- Spill kits, first aid, and incident reporting.
- Emergency drills and defined response responsibilities.
- Controlled interruption of wet processing where treatment failure would cause untreated discharge.

These are management requirements; the chapter does not assert an installed hydrant network or other unverified safety infrastructure.

3.21 Restoration and Rehabilitation

Closure management comprises safe isolation and removal of equipment, controlled removal of chemicals and wastes, cleaning of process and storage areas, and management of ETP contents.

Any suspected contamination requires assessment and appropriate remediation. Buildings and land must be left safe for the approved subsequent use, with closure records documenting material transfers and rehabilitation actions.

3.22 Green and Sustainable Features

3.22.1 Rainwater Harvesting

Rainwater harvesting is a sustainability option for suitable roof areas. Implementation depends on collection area, rainfall, storage, water quality, and intended non-potable use. It must remain separate from contaminated process drainage.

3.22.2 Renewable Energy

Rooftop solar generation is an option for reducing grid-electricity demand, subject to structural suitability, usable roof area, electrical design, and applicable permissions. No installed solar capacity is specified.

3.22.3 Tree Plantation

Plantation is proposed in suitable perimeter and open areas using locally appropriate species. Maintenance includes watering, protection, replacement, and survival monitoring without obstructing utilities or emergency access.

3.22.4 Resource Efficiency

Additional measures comprise water-use monitoring, optimized rinsing, suitable treated-water reuse, efficient lighting and motors, preventive maintenance, and recovery of recyclable textile waste. Water and energy efficiency are particularly relevant to textile wet processing.

CHAPTER 4

DESCRIPTION OF THE ENVIRONMENT

4.1 Introduction

This chapter describes the physical, ecological, and socioeconomic setting of the project titled "Establishment of Textile Fabric Manufacturing & Dyeing Unit by M/s Khizra Fabrics (Pvt) Ltd." The project is located at 1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad, at coordinates 31°29′52.8″ N, 73°16′21.0″ E.

The environmental setting is described using project particulars and relevant regional information. District-level statistics and published studies provide context but do not replace site-specific observations or laboratory measurements. The baseline therefore distinguishes established regional conditions from site particulars for which supporting records are not available.

4.2 Baseline Physical Environment

4.2.1 Location, Land Use and Physical Structures

The project occupies 36 Kanal 3 Marla at Chak No. 194/RB, Tehsil Jaranwala, District Faisalabad. The site is designated in the project application for textile manufacturing and associated utilities, storage, and wastewater-treatment infrastructure. The application identifies an adjacent industrial drain as the receiving route for treated effluent.

Khurrianwala is a textile-industrial locality. Published research identifies industrial activities and wastewater drainage as important influences on the environmental conditions of the area. Exact

adjoining land uses, building types, and distances to residential or institutional receptors cannot be established from regional studies alone.

The principal receptors requiring consideration are neighbouring premises, workers, road users, nearby residents, and water resources potentially affected by discharge or leakage.

4.2.2 Topography, Geology and Soil

Faisalabad lies within the plains of Punjab. Regional soils comprise alluvial deposits mixed with loess and have calcareous characteristics. These conditions provide the geographical context for the project, but they do not establish the site's foundation-bearing capacity, groundwater depth, or soil contamination status.

Site-specific soil testing and geotechnical investigation are necessary to determine engineering properties relevant to buildings, machinery foundations, tanks, and the ETP. No borehole logs, bearing-capacity results, or site soil-analysis reports are available in the supplied material.

4.2.3 Climate and Meteorology

Faisalabad has a semi-arid climate characterized by very hot summers and comparatively cool winters. Rainfall occurs principally during the summer monsoon and, to a lesser extent, through winter weather systems. A regional water-resources assessment reports average annual rainfall of approximately 350–400 mm.

These conditions influence water demand, heat exposure, dust generation, stormwater drainage, and pollutant dispersion. Site-specific wind direction, wind speed, temperature, and humidity records are not provided; consequently, no prevailing wind direction is assigned to the project.

4.2.4 Water Resources and Groundwater

Groundwater is an important water resource in Faisalabad, serving domestic and industrial requirements. Regional assessments identify pressures associated with abstraction and water-quality deterioration.

The project's water arrangement is recorded under WASA Faisalabad, Industry East Sub-Division, Account No. 105501152, in the industrial groundwater/aquifer category. This account information does not establish the chemical or microbiological quality of the water used at the facility.

Research in the Khurrianwala industrial vicinity has reported groundwater salinity and water-quality concerns. These findings support careful protection and testing of the project's water source but cannot be assigned as measured conditions at the project coordinates.

4.2.5 Surface Water and Receiving Drain

The adjacent industrial drain is the proposed receiving route for effluent after treatment in the on-site ETP.

Its baseline quality is important because existing pollution may influence the assessment of cumulative impacts. The supplied material does not establish the drain's flow, seasonal variation, upstream quality, downstream quality, or exact connection to the wider drainage network. It is therefore not identified here as a particular named drain solely on the basis of studies elsewhere in Khurrianwala.

4.2.6 Ambient Air Quality and Noise

Relevant potential sources of existing air pollution include industrial activities, traffic, combustion equipment, and dust-generating movement. Industrial machinery and road traffic are also relevant potential noise sources. Their contribution at the site requires measurement rather than inference from the industrial setting.

No site-specific ambient air or noise results are available in the supplied material. Existing pollutant concentrations and noise levels are therefore not classified as compliant or non-compliant.

4.3 Baseline Ecological Environment

4.3.1 Flora and Vegetation

The wider Faisalabad–Khurrianwala landscape includes agricultural and industrial land uses. Published research identifies wheat, rice, cotton, sugarcane, and maize among crops cultivated in the surrounding area. These are regional agricultural features, not a vegetation inventory of the project premises.

No site-specific inventory of trees, shrubs, grasses, or other vegetation is provided. Accordingly, the chapter does not assign species, tree counts, or vegetation-clearance quantities to the site.

4.3.2 Fauna

No documented site fauna survey is available. The presence or absence of particular birds, mammals, reptiles, amphibians, or protected species cannot therefore be confirmed.

The ecological assessment must distinguish observations within the premises from wildlife reported in the broader district. Any habitat affected by site works, drainage, or accidental discharge requires consideration according to its actual ecological characteristics.

4.3.3 Sensitive Habitats and Protected Areas

The supplied information does not include a mapped assessment of protected areas, wetlands, reserved forests, or other ecologically sensitive locations around the project. It therefore does not support a definitive statement that such receptors are absent.

The adjoining drain remains an environmental receptor even where its surroundings are industrial. Prevention of untreated discharge, chemical leakage, and waste disposal into drainage channels is relevant to protecting downstream environmental conditions.

4.4 Baseline Socioeconomic Environment

4.4.1 Population and Gender Profile

According to the Pakistan Bureau of Statistics, Faisalabad District had a population of 9,075,819 in the 2023 Census. The district-level demographic profile is as follows:

Indicator	**Faisalabad District**
Total population	9,075,819
Male population	4,731,224
Female population	4,343,633
Transgender population	962
Urban population share	48.40%
Average household size	6.5 persons

These figures describe the district and must not be interpreted as the population of Khurrianwala or the project's immediate area of influence. Settlement-level population and gender information are not included in the supplied project material.

4.4.2 Livelihoods and Income

Textile manufacturing, associated services, trade, transport, and agriculture are relevant livelihood sectors in the wider area. Regional studies describe Khurrianwala's textile-industrial activity and surrounding agricultural production.

The project anticipates direct employment for approximately 55 workers and staff.

No household-income survey, wage profile, poverty assessment, or gender-disaggregated employment survey is available. Numerical income levels and claims about local household prosperity are therefore not assigned.

4.4.3 Settlements, Services and Community Receptors

Neighbouring residents, commercial premises, workers, and road users are the principal socioeconomic groups potentially affected by project activities. Schools, healthcare facilities, places of worship, and other sensitive community facilities require consideration where present within the area of influence.

The supplied information does not provide their names, distances, or service capacities. Similarly, land ownership particulars do not independently establish whether informal occupation, livelihood dependence, or displacement concerns are absent.

4.4.4 Community Health and Safety

The principal community considerations are treated-effluent discharge, water-resource protection, traffic movement, noise, air emissions, and emergency incidents. These pathways are relevant to textile facilities and require assessment against actual receptor locations and exposure conditions.

4.5 Environmental Analyses and Laboratory Reports

The analytical components relevant to the baseline are summarized below.

Component	**Relevant Analysis**	**Purpose**
Ambient air	$PM_{2.5}$, PM_{10} and relevant gaseous pollutants according to identified sources	Establish existing air quality
Noise	Representative daytime/night-time boundary levels and workplace measurements	Establish existing noise exposure

Water source	pH, electrical conductivity, TDS, hardness, major ions, and relevant contaminants; microbiological testing for drinking-water use	Establish suitability for intended use
Receiving drain	Flow observations, pH, temperature, BOD_5, COD, TSS, TDS, colour, oil and grease, and additional parameters where indicated	Establish receiving-water conditions and cumulative-impact context
Soil	Relevant physical properties and contamination parameters based on site history	Assess soil condition and contamination risks
Geotechnical investigation	Soil profile, groundwater observations, bearing capacity, and settlement characteristics	Support safe structural and foundation design

Textile wastewater characterization should reflect the actual dyes and chemicals used. Applicable PEQS provide the basis for assessing industrial discharge, while drinking-water results require comparison with the appropriate drinking-water criteria rather than effluent limits.

A laboratory compliance statement must be supported by identifiable samples, sampling locations, dates, methods, and analytical results. Regional literature is not a substitute for these records.

4.6 Suitability of the Site

The site is identified for textile development in Khurrianwala, with industrial electricity, gas, a WASA-related water arrangement, and provision for an on-site ETP. These features are relevant to operational suitability.

Environmental suitability also depends on the following:

Suitability Criterion	**Assessment Basis**
Lawful and compatible land use	Applicable land-use and development permissions
Absence of prohibition	Relevant restrictions and authority records
Sensitive receptors	Mapped settlements, institutions, habitats, and protected areas
Physical suitability	Geotechnical conditions, drainage, and flood exposure
Utility adequacy	Confirmed supply arrangements and resource demand
Effluent management	Appropriate treatment capacity, lawful discharge route, and monitoring
Access and emergency response	Safe entry, internal circulation, and emergency access
Compatibility with surroundings	Control of noise, emissions, traffic, and cumulative impacts

An industrial location alone does not establish that the site is unrestricted, environmentally insensitive, or fully compatible with all adjoining uses. The available information supports its identification as the proposed textile site, but not an unconditional finding of environmental suitability.

4.7 Summary of Environmental Setting

The project lies within the Khurrianwala textile-industrial locality of Faisalabad District. Regional conditions indicate a semi-arid climate, alluvial soils, reliance on groundwater, and water-quality

concerns associated with industrial development. These conditions make wastewater treatment, water conservation, chemical containment, and cumulative-impact assessment particularly important.

Site-specific laboratory results, ecological observations, receptor mapping, and geotechnical records are essential to complete the baseline assessment and substantiate conclusions on compliance and site suitability.

CHAPTER 5

IMPACT ASSESSMENT

5.1 Introduction

This chapter identifies and evaluates the potential environmental and social impacts of the project titled "Establishment of Textile Fabric Manufacturing & Dyeing Unit by M/s Khizra Fabrics (Pvt) Ltd," located at 1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad.

The assessment covers establishment, commissioning, operation, maintenance, and eventual closure. It considers routine activities and abnormal events, including chemical spills, fire, equipment failure, and interruption of wastewater treatment. Particular attention is given to wet-processing wastewater, resource consumption, chemical handling, machinery noise, waste generation, and worker safety, which are important concerns in textile manufacturing.

5.2 Methodologies for Impact Identification

The assessment adopts a qualitative approach combining checklists, an activity–receptor matrix, and cause–effect networks. These methods identify interactions between project activities and environmental resources without assigning unsupported numerical scores.

5.2.1 Checklist Method

A checklist provides systematic coverage of the following environmental and social components:

- Land, soil, and drainage.

- Water consumption and water quality.
- Ambient air and workplace air quality.
- Noise and vibration.
- Vegetation and ecological receptors.
- Solid waste and treatment sludge.
- Occupational health and safety.
- Community safety, traffic, and livelihoods.

Each component is examined across the project lifecycle to identify adverse and beneficial effects, affected receptors, and relevant controls. Checklists support comprehensive identification, while matrices help organize interactions between multiple activities and receptors.

5.2.2 Activity–Receptor Matrix

The matrix relates project activities to the environmental and social components they may affect.

Project Activity	**Principal Receptors**	**Potential Interaction**
Site preparation and equipment installation	Air, soil, workers, neighbouring premises	Dust, noise, debris, and installation hazards
Weaving and fabric handling	Workers, workplace air, nearby receptors	Fibre dust, noise, and machinery hazards
Bleaching, dyeing, printing, and washing	Water resources, receiving drain, workers	Effluent generation, chemical exposure, and resource demand
Drying, finishing, and utility operation	Air, workers, nearby receptors	Heat, process vapours, and combustion emissions where applicable

Chemical storage and transfer	Soil, drains, workers	Spills, leakage, incompatible storage, and exposure
ETP operation	Receiving drain, soil, workers	Reduced effluent pollution; sludge generation and maintenance risks
Waste storage and removal	Soil, drainage, workers	Contamination, litter, handling risks, and recycling opportunities
Material deliveries and dispatch	Road users, workers, nearby premises	Traffic conflicts, noise, and loading hazards
Closure and dismantling	Soil, workers, waste handlers	Residual chemicals, demolition waste, and dismantling risks

The matrix identifies potential interactions; it is not a record of measured impacts or proof that every interaction will occur. Textile-related pathways include liquid effluents, dust, chemical exposure, machinery hazards, and noise.

5.2.3 Cause–Effect Networks

Cause–effect networks trace the links between an activity, a release or exposure pathway, and an affected receptor. Principal pathways include:

- Wet processing → wastewater generation → inadequate treatment or bypass → receiving-drain deterioration.
- Chemical handling → spill → entry into drains or unprotected ground → water or soil contamination.
- Machinery operation → sustained noise → worker exposure → potential hearing damage.
- Waste accumulation → increased combustible material → fire → injury and smoke.

- Production demand → water and energy consumption → increased pressure on resources.

These pathways help identify indirect effects and the points at which prevention, containment, treatment, or exposure controls are needed.

5.3 Characteristics and Significance of Impacts

Impact significance depends on the magnitude of change and the sensitivity of the affected receptor. Magnitude is evaluated through the scale, extent, duration, frequency, and reversibility of the effect. A small change affecting a sensitive receptor may require greater attention than a similar change within a controlled industrial area.

5.3.1 Assessment Criteria

Characteristic	**Basis of Evaluation**
Nature	Adverse or beneficial; direct, indirect, or cumulative
Magnitude	Intensity of change, pollutant load, resource demand, or severity of harm
Extent and location	Confined to equipment or the site, affecting neighbouring receptors, or extending downstream
Timing	Establishment, commissioning, operation, maintenance, or closure; routine or accidental
Duration	Short-term, recurring, long-term, or permanent
Reversibility	Recoverable after the activity stops, recoverable through intervention, or potentially irreversible
Risk	Likelihood of an event combined with the severity of its consequences
Receptor sensitivity	Vulnerability of workers, residents, water resources, habitats, and other affected receptors

5.3.2 Significance Categories

The assessment uses the following qualitative categories:

- Low: Limited effects that are generally localized and readily controlled.
- Moderate: Effects requiring specific mitigation, operational management, and monitoring.
- High: Effects with potential for serious injury, substantial contamination, or prolonged harm, requiring priority prevention and control.

Significance is considered before mitigation and again after controls are implemented. Residual significance cannot be confirmed solely from the presence of equipment; it depends on effective operation and supporting monitoring results.

5.4 Assessment of Potential Impacts

The ratings below are qualitative priorities for management under uncontrolled or inadequately controlled conditions. They are not measured site outcomes.

Impact	**Nature and Potential Magnitude**	**Extent and Location**	**Timing and Duration**	**Reversibility**	**Management Priority**
Installation dust, noise, and debris	Adverse; low to moderate	Site and immediate surroundings	Temporary during establishment	Generally reversible	Moderate
Wet-processing wastewater	Adverse; potentially high if untreated	ETP, receiving drain, and potentially downstream receptors	Recurring throughout wet-processing operation	Variable; persistent contamination may require intervention	High

Water consumption	Adverse resource pressure; magnitude depends on demand and source capacity	Site and supplying water resource	Long-term during operation	Partly reversible through reduced demand	Moderate to high
Fibre dust and process vapours	Adverse; exposure-dependent	Production areas; possible off-site influence	Recurring during relevant operations	Variable; chronic health effects may persist	Moderate to high
Combustion emissions, where applicable	Adverse; dependent on equipment, fuel, and controls	Source and surrounding air	During equipment operation	Air-quality effects generally reduce when emissions stop	Moderate
Machinery noise	Adverse; potentially high occupational exposure	Production areas and possibly boundary receptors	Repeated during operation	Noise stops with the source; hearing damage may be irreversible	High for exposed workers
Chemical spills and leakage	Adverse; potentially high	Storage, handling areas, soil, and drains	Accidental; consequences may persist	Depends on chemical, quantity, and response	High
Textile waste and packaging	Adverse if unmanaged; beneficial recovery potential	Storage and disposal areas	Recurring during operation	Generally manageable through removal and recovery	Moderate
ETP sludge and contaminated containers	Adverse; dependent on composition and disposal	Storage, transport, and disposal locations	Recurring and during removal	Variable	Moderate to high
Machinery, electrical, and thermal hazards	Adverse; potentially severe	Production and maintenance areas	Routine exposure and accidental events	Serious injury may be irreversible	High

Fire	Adverse; potentially severe	Site and possibly adjacent premises	Accidental; immediate and longer-term consequences	Injury and property loss may be irreversible	High
Traffic and loading	Adverse; localized disturbance and accident risk	Entrance, access road, and loading areas	Intermittent during deliveries and dispatch	Disturbance reversible; injury may not be	Moderate
Employment and procurement	Beneficial	Workforce and local supply chain	During establishment and operation	Benefits depend on continuing activity	Positive
Closure and dismantling	Adverse; moderate to high if poorly managed	Site and waste-transfer routes	Temporary during closure	Generally recoverable except serious injury or contamination	Moderate to high

The identified hazards are consistent with textile-sector risks involving wet processing, chemical agents, dust, noise, mechanical equipment, and waste handling. Actual magnitude requires process-specific information and exposure or environmental measurements.

5.5 Principal Impact Pathways

5.5.1 Water Quality and Resource Use

Wastewater is a priority because bleaching, dyeing, printing, and associated washing can introduce organic pollutants, colour, salts, and residual chemicals into the receiving environment. ETP failure, overloading, or bypass can increase the pollution load entering the drain.

The assessment therefore focuses on wastewater quantity and quality, treatment capacity, operational reliability, discharge conditions, and the existing condition of the receiving drain.

Water-use significance depends on consumption, source availability, and conservation performance.

5.5.2 Air Quality, Noise and Worker Exposure

Fibre dust, process vapours, heat, and machinery noise principally affect workers close to the source. Off-site effects depend on ventilation, release conditions, operating hours, and receptor distance. Occupational exposure can remain significant even where boundary conditions are acceptable.

Priority controls include suitable extraction and ventilation, preventive maintenance, noise reduction, exposure management, and task-specific protective equipment.

5.5.3 Soil, Waste and Accidental Releases

Chemical leakage, contaminated containers, and unsuitable sludge storage can create soil and drainage contamination pathways. These impacts are preventable through compatible storage, containment, segregation, and documented waste transfer. Their consequences depend on material properties and the effectiveness of response measures.

5.5.4 Cumulative Impacts

The cumulative assessment considers the project’s contribution alongside other industrial and traffic sources. Relevant concerns include combined effluent loads, water abstraction, air emissions, and traffic.

Existing pollution does not justify additional uncontrolled releases. The project's incremental contribution must be evaluated using the receiving environment's condition and the performance of project controls.

5.6 Residual Impacts and Assessment Limitations

Mitigation aims to reduce the likelihood, magnitude, and duration of adverse effects. Priority measures include effective ETP operation, chemical containment, machinery safety, noise control, appropriate ventilation, waste management, and emergency preparedness.

Residual impacts require verification through effluent testing, air and noise monitoring where relevant, inspections, operating records, and incident review. Missing baseline measurements, wastewater-flow data, chemical inventories, or equipment specifications limit the precision of the assessment; numerical predictions and final residual ratings are not assigned without those inputs.

5.7 Conclusion

The principal impact priorities are wet-processing wastewater, chemical releases, occupational exposure, machinery noise, fire, and safe waste management. Temporary installation effects are generally more readily controlled, while operational and accidental impacts require sustained preventive measures.

The Environmental Management Plan must translate these priorities into assigned responsibilities, operating controls, monitoring, and corrective action. Environmental performance will depend on implementation and verified results, rather than on the proposed controls alone.

CHAPTER 6

SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1 Introduction

This chapter presents the potential environmental impacts and corresponding mitigation measures for the project titled "Establishment of Textile Fabric Manufacturing & Dyeing Unit by M/s Khizra Fabrics (Pvt) Ltd," located at 1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad.

Screening covers project location, design, construction and installation, and operation. Environmental enhancement measures are also identified. The controls follow the **mitigation hierarchy**: prevent impacts where possible, minimize unavoidable effects, treat or manage residual releases, and restore affected areas where necessary.

The principal operational concerns are wet-processing wastewater, chemical handling, water and energy consumption, machinery noise, fibre dust, waste generation, and occupational safety. These concerns are characteristic of textile manufacturing and processing.

6.2 Project Location: Impacts and Mitigation Measures

Location-related screening considers the compatibility of the project with surrounding land uses, access conditions, drainage, water resources, and sensitive receptors. The identified discharge arrangement comprises on-site treatment before release into the adjacent industrial drain.

Environmental Aspect	**Potential Impact**	**Mitigation Measures**
Compatibility with surroundings	Noise, emissions, traffic, or accidental releases affecting neighbouring premises	Maintain operations within the project boundary; position pollution sources away from sensitive receptors where practicable; control releases and address complaints
Receiving industrial drain	Additional pollutant load and downstream deterioration if treatment is inadequate	Discharge only treated effluent meeting applicable requirements; prevent bypasses; provide an accessible sampling point and monitor treatment performance
Water resources	Increased demand and contamination from leakage or spills	Meter consumption, maintain a water balance, conserve water, and prevent contamination through sealed process areas and containment
Site drainage	Waterlogging and movement of contaminated runoff beyond the site	Separate clean stormwater from process drainage; maintain drainage capacity; prevent chemical and waste storage in drainage paths
Road access	Conflicts between trucks, pedestrians, and other road users	Designate loading areas, control vehicle speeds, manage delivery timing, and maintain clear emergency access

Vegetation and open areas	Unnecessary vegetation removal or damage during site works	Confine disturbance to required areas; protect retained vegetation; establish plantation in suitable open spaces

Effluent management must account for both the project's discharge quality and the condition of the receiving environment.

6.3 Project Design: Impacts and Mitigation Measures

Environmental controls must be integrated into the facility layout, production systems, utilities, and treatment infrastructure. Design-stage prevention reduces dependence on corrective action during operation.

Design Component	**Potential Impact from Inadequate Design**	**Mitigation Measures**
Production layout	Congestion, unsafe material movement, and restricted emergency access	Separate production, storage, utilities, and waste areas; provide safe aisles, exits, and maintenance access
Wet-processing drainage	Leakage, mixing of wastewater with stormwater, and uncontrolled discharge	Provide chemically suitable collection drains and inspection points; segregate process effluent from clean runoff
ETP	Overloading, treatment failure, and non-compliant discharge	Size treatment for verified wastewater flows and pollutant loads; provide operational

		monitoring, maintenance access, and contingency arrangements
Chemical storage	Spills, incompatible reactions, and worker exposure	Provide compatible segregation, secondary containment, suitable ventilation, labelled storage, and spill-response access
Ventilation and extraction	Accumulation of lint, vapours, and heat	Install general ventilation and local extraction suited to identified sources; discharge extracted air safely
Machinery and noise	Excessive exposure, vibration, and injury	Select suitable equipment; provide guarding, vibration isolation, maintenance clearances, and noise controls where required
Electrical and gas systems	Fire, shock, leakage, and ignition hazards	Use appropriately designed installations, isolation devices, earthing, leak controls, and inspection arrangements
Waste storage	Leakage, odour, litter, and additional fire load	Provide designated storage with segregation, suitable surfaces, weather protection, and safe collection access
Fire and emergency arrangements	Delayed evacuation and ineffective response	Provide clear exits, suitable firefighting equipment, alarms where required, emergency lighting, and assembly arrangements

Treatment technology must be selected according to actual wastewater characteristics rather than assumed from production capacity alone. Chemical containment, ventilation, machinery safety, and emergency access are likewise process-specific design requirements.

6.4 Construction and Installation Phase

Construction-phase measures apply to civil works, equipment installation, utility connections, and commissioning. Impacts are generally temporary, but accidents and uncontrolled releases can cause lasting harm.

Activity / Aspect	**Potential Impact**	**Mitigation Measures**
Earthworks and material handling	Dust affecting workers and nearby premises	Use controlled water application where appropriate; cover loose materials and loads; limit vehicle speed; prevent dusty stockpiles
Construction equipment	Exhaust emissions and noise	Maintain equipment, avoid unnecessary idling, and schedule high-noise work to reduce disturbance
Excavation and drainage works	Erosion, sediment runoff, and falls	Protect excavations, manage runoff, stabilize exposed areas, and provide barriers and safe access
Cement and concrete handling	Alkaline washwater and blocked drains	Use designated contained washout areas; prevent washwater entry into stormwater drains or the industrial drain

Material and fuel storage	Soil contamination and fire risk	Store materials safely; provide containment for liquids; control ignition sources and keep spill materials available
Construction waste	Litter, obstruction, and unsuitable disposal	Segregate debris, recover recyclable materials, and use lawful disposal arrangements; prohibit open burning
Worker welfare	Unsanitary conditions and domestic wastewater releases	Provide drinking water, toilets, washing facilities, and controlled sewage management
Machinery installation and lifting	Crushing, dropped loads, and injury	Use competent operators, inspected lifting equipment, exclusion zones, and planned lifting procedures
Electrical work, welding, and work at height	Shock, burns, fire, and falls	Apply isolation and permit procedures; provide fall protection, PPE, and fire precautions
Deliveries and vehicle movement	Road conflicts and pedestrian injury	Use designated routes, banksmen where needed, controlled unloading, and unobstructed access
Commissioning	Leaks, unsafe operation, and untreated trial effluent	Test safeguards and drainage; train operators; commission treatment before pollutant-generating trial operations

Contractors must comply with site environmental and safety requirements. Construction controls require supervision, inspection, and prompt correction of unsafe or polluting practices.

6.5 Operational Phase

6.5.1 Wastewater and Water Resources

Wet processing is a priority because bleaching, dyeing, printing, and washing can generate coloured effluent containing organic pollutants, salts, suspended solids, and residual chemicals.

Potential Impact	**Mitigation Measures**
Pollution of the receiving drain	Collect industrial wastewater and treat it through the ETP before discharge; monitor relevant parameters against applicable PEQS and approval conditions
Variable flow or pollutant loading	Maintain process records, control chemical dosing, and provide equalization or other suitable treatment arrangements according to the design
Untreated discharge during failure	Prevent bypasses; maintain pumps and treatment equipment; provide contingency holding or suspend affected wet-processing activities when effective treatment is unavailable
Excessive water use	Meter use, repair leaks, optimize rinsing, and assess compatible reuse of treated water
Mixing of sewage, stormwater, and process wastewater	Maintain clearly defined drainage routes and provide treatment appropriate to each wastewater stream

Dilution is not a substitute for treatment. Reuse must be based on the quality requirements of its intended application.

6.5.2 Air Emissions, Noise and Heat

Source / Aspect	Potential Impact	Mitigation Measures
Fibre dust and lint	Respiratory exposure and combustible accumulation	Provide extraction where needed; use suitable cleaning methods; prevent lint buildup on machinery and electrical equipment
Chemical vapours and process emissions	Worker exposure, odour, and possible off-site effects	Control preparation and dosing; provide suitable local extraction and ventilation; select lower-hazard alternatives where technically feasible
Combustion equipment, where installed	Particulate and gaseous emissions	Maintain equipment, use appropriate fuel, and provide emission controls and discharge arrangements suited to the source
Looms, pumps, compressors, and other machinery	Noise exposure and vibration	Maintain and isolate equipment; use acoustic controls where necessary; monitor exposure and provide hearing protection
Drying and thermal operations	Heat stress and burns	Insulate exposed hot surfaces where practicable; provide ventilation, drinking water, safe access, and appropriate work arrangements

Controls must correspond to actual equipment and exposure conditions; unverified boilers, generators, or emission-control systems are not assumed to be installed.

6.5.3 Chemicals and Solid Waste

Potential Impact	Mitigation Measures
Chemical spills and incompatible storage	Maintain an inventory and Safety Data Sheets; segregate incompatible materials; use labelled containers, containment, and trained handlers
Contamination from textile and packaging waste	Segregate at source; recover suitable recyclables; prevent litter and uncontrolled accumulation
Unsafe handling of ETP sludge	Determine relevant characteristics; dewater and store appropriately; prevent leakage; use disposal arrangements suited to its classification
Contaminated chemical containers	Keep separate from general waste; prevent unauthorized reuse; arrange appropriate return, recovery, or disposal
Fire from accumulated combustible waste	Maintain housekeeping, limit accumulation, control ignition sources, and remove waste regularly

Waste quantities, storage conditions, and transfers must be recorded to support traceability and corrective action.

6.5.4 Occupational and Community Safety

The principal safety risks include moving machinery, electrical systems, chemicals, hot surfaces, lifting, manual handling, and fire.

Mitigation measures comprise:

- Machine guarding and safe isolation before maintenance.

- Task-specific procedures, training, and PPE.
- Controlled chemical handling and accessible emergency washing arrangements where required.
- Inspections of electrical and gas systems.
- Safe lifting and material-handling practices.
- First aid, incident reporting, and investigation.
- Emergency evacuation procedures and regular drills.
- Clear separation of pedestrians and vehicles.
- A documented mechanism for receiving and resolving community complaints.

Major accidents require prevention even where their probability is low, because consequences can include severe injury, contamination, or off-site effects.

6.6 Potential Environmental Enhancement Measures

Enhancement measures improve environmental performance beyond basic impact control. Their adoption remains subject to technical feasibility and safe integration with the facility.

Enhancement Measure	**Environmental Benefit**	**Implementation Approach**
Water conservation	Reduced abstraction and wastewater volume	Meter individual uses, identify losses, optimize washing, and review consumption per unit of production
Treated-water reuse	Reduced freshwater demand	Assess treatment quality and reuse only in compatible applications

Energy efficiency	Reduced energy consumption and associated emissions	Use efficient motors and lighting, maintain equipment, and evaluate heat recovery
Solar power	Reduced dependence on grid electricity	Assess structural capacity, roof availability, electrical safety, and applicable permissions
Rainwater harvesting	Supplementary non-potable supply	Collect from suitable clean surfaces; provide controlled storage and keep separate from contaminated drainage
Tree plantation	Improved landscaping and shade	Plant locally suitable species in appropriate spaces; maintain survival without obstructing utilities or emergency routes
Textile-waste recovery	Reduced disposal demand	Segregate recoverable offcuts, rejected fabric, and packaging and maintain recovery records
Improved chemical management	Lower exposure and pollution potential	Review recipes, optimize dosing, and assess safer compatible substitutes
Worker and community engagement	Earlier identification of concerns	Maintain training, reporting channels, complaint records, and management follow-up

Water efficiency, energy conservation, chemical optimization, and waste recovery are particularly relevant to textile manufacturing. Solar power, harvesting, and plantation are identified here as enhancement options, not as confirmed installed systems.

6.7 Implementation and Verification

Project management is responsible for providing resources and ensuring implementation. Contractors implement construction controls, production and maintenance teams manage operational safeguards, and the environmental/HSE focal person coordinates inspections, monitoring, records, and corrective actions.

Verification includes:

- ETP operating records and effluent test results.
- Air and noise measurements where relevant.
- Water and energy consumption records.
- Chemical and waste inventories.
- Equipment inspections and preventive maintenance.
- Safety training, incident reports, and emergency-drill records.
- Community complaints and corrective-action closure.

Residual impacts must be evaluated against this evidence. Provision of controls alone does not establish satisfactory performance; effective operation and sustained compliance are essential.

CHAPTER 7

ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAMME

7.1 Introduction

This chapter establishes the environmental management and monitoring arrangements for "Establishment of Textile Fabric Manufacturing & Dyeing Unit by M/s Khizra Fabrics (Pvt) Ltd," located at 1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad.

The **Environmental Management Plan** defines mitigation actions, implementation schedules, responsibilities, budget provisions, monitoring requirements, reporting procedures, and training needs. It covers construction and installation, commissioning, operation, maintenance, and closure.

The programme focuses on wastewater treatment, chemical safety, water and energy conservation, air emissions, noise, waste management, and occupational and community safety. Its technical approach follows the environmental, occupational, and community-risk considerations applicable to textile manufacturing.

7.2 Proposed Mitigation Actions and Implementation Schedule

The following measures form the project's environmental management commitments. Their implementation must be coordinated with the activities generating the corresponding impacts.

Environmental Aspect	Proposed Mitigation Actions	Implementation Schedule	Responsible Position	Verification
Construction dust and noise	Cover loose materials; control dust without excessive water use; maintain equipment; manage noisy works and vehicle speeds	Throughout construction and installation	Contractor / Site Supervisor	Site inspections and complaint records
Construction runoff and waste	Contain concrete washwater; prevent sediment entry into drains; segregate debris and arrange appropriate removal	Before relevant works and throughout construction	Contractor / HSE Officer	Drainage inspections and disposal records
Industrial wastewater	Collect wet-processing effluent through dedicated drains; operate the on-site ETP; prevent untreated discharge and bypasses	Before wet-processing trials and throughout operation	Production Manager / ETP Supervisor	ETP logs and treated-effluent results
Treatment-system failure	Isolate the discharge; retain wastewater only within available safe capacity; stop	Immediately upon failure	ETP Supervisor / Production Manager	Incident record and verified restoration

	affected processing if effective treatment cannot be maintained			
Water consumption	Meter supply and major uses; maintain a water balance; repair leaks; optimize washing and rinsing	From commissioning; monthly review	Utilities Supervisor	Consumption records and conservation actions
Air emissions and ventilation	Control lint and dust; maintain suitable ventilation and extraction; inspect combustion sources where installed	Before operation and through routine maintenance	Maintenance Manager / HSE Officer	Inspection records and relevant monitoring
Noise and vibration	Maintain machinery; provide vibration isolation and acoustic controls where required; manage exposure and hearing protection	During installation and operation	Maintenance Manager / HSE Officer	Noise measurements and control inspections
Chemical storage and handling	Maintain labels and SDS; segregate incompatible chemicals; provide containment, spill kits, and controlled dosing	Before chemical receipt; ongoing	Chemical Store In-charge	Inventory and weekly inspection records
Solid waste and ETP sludge	Segregate waste; characterize potentially	From commissioning	HSE Officer / ETP Supervisor	Waste register and transfer records

	hazardous materials; provide protected storage and documented transfer	and throughout operation		
Occupational safety	Provide guarding, safe isolation, task-specific PPE, first aid, and work-permit procedures	Before work starts; continuous supervision	Department Supervisors / HSE Officer	Inspection and incident records
Fire and emergency preparedness	Maintain clear exits, suitable firefighting arrangements, emergency contacts, and evacuation procedures	Before occupancy; ongoing	HSE Officer / Maintenance Manager	Equipment inspections and drill reports
Traffic and community concerns	Manage loading, vehicle speeds, pedestrian movement, and complaints	During construction and operation	Administration / Security	Access inspections and complaint closure
Closure and rehabilitation	Remove chemicals and wastes safely; clean equipment and affected areas; assess suspected contamination	Before and during closure	Plant Manager / HSE Officer	Closure inspection and transfer documentation

The wastewater arrangement comprises an on-site ETP before discharge into the adjacent industrial drain. Treatment must be operational before wet-processing activities generate discharge.

7.3 Implementation Schedule and Environmental Budget

7.3.1 Implementation Schedule

Project Stage	Required Environmental Actions
Before construction	Assign responsibilities, brief contractors, establish waste and drainage controls, and arrange worker welfare
During construction and installation	Conduct inspections, manage dust and runoff, enforce safe work procedures, and maintain records
Before commissioning	Complete drainage and treatment arrangements, inspect chemical storage and safety systems, train operators, and establish monitoring points
During commissioning	Verify equipment safeguards and ETP performance; investigate deficiencies before routine operation
During operation	Implement daily controls, scheduled sampling, preventive maintenance, training, and management review
Before closure	Prepare shutdown, waste-removal, contamination-assessment, and rehabilitation arrangements

The schedule is linked to project milestones rather than unconfirmed calendar dates. Essential controls must be available before the associated activity commences.

7.3.2 Environmental Budget

The following amounts are proposed annual planning allowances for recurring environmental management.

Component	**Proposed Annual Allowance (PKR)**
Effluent, water-source, and receiving-drain testing	600,000
Air, source-emission, and noise monitoring	400,000
PPE replacement and safety consumables	350,000
Training, emergency drills, and awareness	200,000
Waste characterization and documented transfer support	300,000
Spill-control supplies and inspection materials	150,000
Plantation maintenance and replacement	150,000
EMP documentation, review, and audit support	250,000
Subtotal	2,400,000
Contingency: 10%	240,000
Total proposed annual allowance	2,640,000

Separate allocations are required for:

- ETP installation, staffing, chemicals, electricity, repairs, and sludge handling.
- Ventilation, extraction, and noise-control equipment.
- Drainage improvements and chemical containment.
- Fire protection and emergency infrastructure.
- Any approved solar or rainwater-harvesting installation.

These costs depend on equipment specifications, treatment loads, and procurement quotations. They are excluded from the recurring allowance above and must be approved before the relevant

works or operations. Management will review expenditure quarterly and increase allocations where required to maintain effective controls.

7.4 Environmental Management Team and Responsibilities

The following structure assigns accountability by name or position. Positions represent required functions and do not imply that appointments have already been made.

Name / Position	**Roles and Responsibilities**
Mr. Habib Ahmed Anjum, Chief Executive	Overall accountability; approval of resources; review of major incidents, compliance status, and unresolved corrective actions
Plant / Production Manager	Integrate EMP requirements into production; control process changes; suspend activities when essential environmental safeguards fail
Environmental/HSE Officer	Coordinate inspections, monitoring, training, reporting, complaint investigation, and corrective-action tracking
ETP Supervisor / Operator	Operate treatment systems; record flow and operating conditions; manage dosing and sludge; report failures immediately
Maintenance Manager	Maintain machinery, pumps, drains, ventilation, electrical and gas systems, and safety equipment
Chemical Store In-charge	Maintain inventories, SDS, compatible storage, containment, and controlled receipt and issue

Administration / Security Supervisor	Manage traffic, visitors, emergency access, complaint receipt, and record support
Contractor / Site Supervisor	Implement construction controls, supervise workers, and maintain housekeeping and waste records
Qualified Laboratory / Specialist	Undertake competent sampling, analysis, instrument checks, and specialist assessments as required

Mr. Habib Ahmed Anjum is the project's identified Chief Executive.

7.5 Proposed Environmental Monitoring Programme

Monitoring evaluates both implementation of controls and their environmental outcomes. The following frequencies are proposed project commitments; EPA Punjab's approval conditions and directions take precedence.

Monitoring Area	**Parameters / Location**	**Proposed Frequency**	**Responsibility**
Water consumption	Supply, process, domestic, and reuse records	Daily recording; monthly balance	Utilities Supervisor
ETP operation	Flow, pH, dosing, equipment condition, and treatment-specific indicators	Each operating shift	ETP Operator
Treated effluent	Final outlet before mixing: pH, temperature, BOD_5, COD, TSS, TDS, colour, oil and	Monthly initially; review against	HSE Officer / Laboratory

	grease; additional parameters according to chemical use	performance and approval conditions	
ETP influent	Flow and representative pollutant characteristics	At commissioning and after significant process or load changes	ETP Supervisor / Laboratory
Receiving drain	Representative upstream and downstream quality and flow observations	Baseline and six-monthly, where safe and representative sampling is feasible	HSE Officer / Laboratory
Water-source quality	Parameters relevant to intended use; drinking-water and microbiological testing where consumed	Annually and after suspected contamination	HSE Officer / Laboratory
Ambient air	Source-relevant pollutants at representative boundary or receptor locations	Six-monthly where indicated by source assessment or approval conditions	HSE Officer / Laboratory
Combustion emissions, where applicable	Parameters relevant to installed equipment and fuel	At commissioning and annually, or as directed	Maintenance Manager / Laboratory

Noise	Representative workplace and boundary measurements during relevant operating periods	Quarterly and after significant equipment changes	HSE Officer / Specialist
Chemicals	Labels, containment, compatibility, leakage, and spill readiness	Weekly	Store In-charge
Waste and sludge	Quantities, storage condition, classification, and transfers	Weekly inspection; monthly summary	HSE Officer
Safety and fire systems	Guarding, PPE, exits, electrical condition, firefighting equipment, and incidents	Daily supervision; monthly documented inspection	HSE Officer / Supervisors
Energy use	Electricity and gas consumption	Monthly	Utilities Supervisor
Plantation	Survival, watering, and replacement	Quarterly	Administration
Community complaints	Investigation, response, and closure	Continuous recording; monthly review	Administration / HSE Officer

7.5.1 Monitoring Quality and Performance Assessment

Sampling records will identify the location, date, operating conditions, method, preservation, and laboratory details. Instruments must be maintained and calibrated, and samples must represent actual operating conditions.

Results will be compared with the applicable PEQS for the relevant medium and discharge category. Drinking-water criteria must not be substituted with industrial effluent limits. Punjab's standards distinguish industrial effluent, drinking water, ambient air, noise, and industrial gaseous emissions.

Performance indicators include:

- No untreated industrial wastewater release.
- Compliance with applicable discharge and emission requirements.
- Functional environmental controls and completed maintenance.
- Documented waste transfers.
- Timely corrective-action closure.
- Water and energy consumption trends per unit of production.
- Completion of training and emergency drills.

Receiving-drain results require interpretation alongside upstream conditions; they cannot automatically be attributed solely to the project.

7.6 EMP Reporting and Reviewing Procedures

7.6.1 Routine Reporting

Report / Record	Main Content	Reporting Arrangement
Daily operating records	ETP conditions, water use, abnormal events, and immediate actions	Operators to relevant supervisors
Monthly environmental report	Test results, waste records, incidents, complaints, training, and corrective actions	HSE Officer to Plant Manager
Quarterly management review	Compliance trends, recurring failures, resource use, expenditure, and control adequacy	Plant Manager to Chief Executive
Regulatory reports	Information required by approval conditions and official directions	Authorized management representative to EPA Punjab

7.6.2 Non-Compliance and Incident Reporting

An exceedance, spill, untreated discharge, or serious control failure triggers:

1. Immediate protection of people and containment of the release.
2. Suspension of the affected activity where necessary.
3. Notification to the responsible manager and HSE Officer.
4. Investigation and assignment of corrective actions.
5. Follow-up testing or inspection.
6. Documented closure after effectiveness is verified.

Major incidents will be escalated to the Chief Executive. Regulatory notifications will follow applicable requirements and approval conditions.

7.6.3 Review and Document Control

The EMP will be reviewed annually and after significant changes in machinery, chemicals, production, wastewater loads, legislation, or approval conditions. Major incidents and repeated failures also trigger review.

Laboratory reports, operating logs, inspection records, waste receipts, training records, complaints, and incident investigations will be maintained in an indexed system. Revised procedures will be communicated to affected personnel, and superseded versions withdrawn from operational use.

7.7 Training Requirements

Training Topic	**Personnel**	**Schedule**
EMP induction and reporting	Employees and contractors	Before starting work; annual refresher
Chemical hazards, SDS, storage, and spills	Store staff, wet-processing operators, and maintenance personnel	Before assignment; six-monthly refresher
ETP operation and failure response	ETP operators and relevant production staff	Before commissioning; after changes or incidents
Machinery safety and isolation	Operators and maintenance staff	Before assignment; annual refresher
PPE, dust, noise, and heat protection	Relevant production personnel	Induction and periodic toolbox talks
Fire and evacuation	All personnel and response team	Induction; drills twice yearly

First aid	Designated first-aiders	Initial competent training and appropriate refresher
Waste segregation and sludge handling	Operators, cleaners, and waste handlers	Induction; annual refresher
Traffic and safe unloading	Security, drivers, and loading personnel	Before assignment; periodic refresher

Training records will include the topic, trainer, participants, date, and assessment of understanding. Practical demonstrations will verify competence in chemical spills, ETP failure response, machinery isolation, and evacuation.

7.8 Implementation Commitment

Project management will provide the personnel, equipment, funds, and supervision necessary to implement this programme. Monitoring findings will guide maintenance, operational changes, training, and investment in improved controls.

The EMP's effectiveness will be determined by verified performance and timely corrective action not merely by the availability of written procedures or installed equipment.

CHAPTER 8

STAKEHOLDER CONSULTATION

8.1 Introduction

Stakeholder consultation provides a means of communicating project information, identifying concerns, and incorporating relevant feedback into environmental assessment and decision-making for "Establishment of Textile Fabric Manufacturing & Dyeing Unit by M/s Khizra Fabrics (Pvt) Ltd."

The project is located at 1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad. Consultation focuses on wastewater treatment and discharge, water consumption, chemical handling, emissions, noise, waste management, worker safety, and effects on neighbouring communities.

This chapter establishes the consultation arrangements and responsibilities. No meeting dates, attendance records, stakeholder statements, or expressions of support are attributed without supporting documentation.

8.2 Objectives of Consultation

The objectives are to:

- Explain the project activities, potential impacts, and proposed environmental controls.
- Obtain local information relevant to environmental conditions and sensitive receptors.
- Identify concerns of workers, neighbouring premises, and the wider community.
- Seek regulatory and technical input on mitigation and monitoring.

- Incorporate relevant feedback into project design and the Environmental Management Plan.
- Establish accessible arrangements for complaints and continuing communication.

Project-level engagement complements, but does not replace, the public participation process administered by EPA Punjab for an EIA. The review regulations provide for public notice, access to the assessment, a public hearing, and consideration of comments before a decision.

8.3 Stakeholder Identification and Consultation Arrangements

8.3.1 Proponent's Environmental Management Team

Internal consultation involves the Chief Executive, Plant/Production Manager, Environmental/HSE Officer, ETP Supervisor, Maintenance Manager, Chemical Store In-charge, and relevant supervisors.

The principal matters for discussion are:

- Feasibility of mitigation measures within production operations.
- ETP capacity, operation, maintenance, and failure response.
- Chemical storage, dosing, and spill prevention.
- Environmental staffing, budget, and monitoring responsibilities.
- Worker protection, emergency response, and training.
- Corrective-action reporting and management review.

Internal meetings must translate assessment recommendations into assigned responsibilities, operating procedures, and resource allocations. Mr. Habib Ahmed Anjum, Chief Executive, provides overall management accountability.

8.3.2 Responsible Authority

EPA Punjab is the responsible environmental review authority. Communication with the authority covers the EIA, project impacts, treatment arrangements, monitoring programme, and compliance commitments.

The proponent will provide the information required for review, respond to observations, and participate in the statutory public hearing. EPA Punjab's EIA functions include assessment review, public hearings, environmental approvals, and monitoring of approval conditions.

The proponent's presentation must clearly explain the nature of the project, adverse environmental effects, and proposed preventive, mitigatory, or compensatory measures. Public and agency comments are considered through the regulatory review process.

8.3.3 Other Departments and Agencies

Engagement with other bodies is undertaken according to their jurisdiction and the project's actual service and permission requirements.

Department	**Relevant Consultation Matters**
WASA Faisalabad	Water arrangement, consumption, wastewater connection or discharge requirements, and protection of water infrastructure
Relevant local government / planning authority	Land-use compatibility, building permissions, drainage, and access

Electricity and gas service providers	Supply capacity, installation safety, and emergency isolation
Labour and occupational safety authorities	Worker welfare, workplace safety, and applicable employment requirements
Rescue 1122 / relevant emergency service	Emergency access, fire preparedness, response coordination, and evacuation
Authority responsible for the receiving drain	Discharge authorization, drainage capacity, maintenance access, and relevant restrictions
Wildlife, forest, or other specialist department, where applicable	Sensitive habitats, protected resources, and any identified jurisdictional concern

Listing these bodies identifies relevant engagement channels; it does not imply that consultations, permissions, or endorsements have already been obtained. The EIA regulations allow the Agency to seek comments from concerned government agencies and local authorities.

8.3.4 Environmental Practitioners and Experts

Technical consultation involves the environmental consultant and specialists appropriate to the identified risks, including wastewater-treatment, laboratory, occupational safety, and engineering professionals.

Zoom Consultancy & Services, Lahore, is the report-preparing organization. Its role includes coordinating assessment information and incorporating relevant technical recommendations.

Technical review focuses on:

- Wastewater flow and pollutant characteristics.
- Suitability and reliability of the ETP.
- Representative sampling and monitoring locations.
- Chemical compatibility and containment.
- Ventilation, noise control, and worker exposure.
- Emergency arrangements and residual risks.

Expert recommendations must be recorded with their technical basis and the resulting project action. They do not constitute regulatory approval.

8.3.5 Affected and Wider Community

Community engagement includes nearby residents, adjoining industrial and commercial premises, workers, road users, local representatives, and other persons potentially affected by project activities.

Consultation must provide opportunities for women, vulnerable persons, and people unable to attend formal meetings to communicate concerns. Information should be explained in accessible language, using Urdu or Punjabi where appropriate.

Relevant discussion topics include:

- Wastewater discharge and the condition of the industrial drain.
- Water availability and protection from contamination.
- Noise, odour, dust, and other emissions.
- Truck movement and road safety.
- Waste storage and removal.

- Employment-related enquiries.
- Emergency communication and complaint handling.

Local meetings, individual interviews, written submissions, and designated contact arrangements provide complementary channels for participation.

8.4 Information Disclosure and Consultation Methods

The information communicated to stakeholders comprises:

1. Project title, location, and principal activities.
2. Production processes and utility requirements.
3. Potential environmental and safety impacts.
4. Proposed treatment and mitigation measures.
5. Monitoring arrangements and management responsibilities.
6. Channels for comments and complaints.

Consultation methods include internal meetings, departmental correspondence, expert review, community discussions, and participation in the EPA-administered public hearing.

Descriptions of benefits must remain balanced with explanations of adverse impacts and control requirements. Consultation must not be presented as evidence of acceptance merely because no objection was recorded.

8.5 Recording Concerns and Incorporating Feedback

A consultation register will document:

Record Component	**Required Information**
Stakeholder identification	Name or organization, stakeholder category, and contact details where voluntarily provided
Consultation details	Date, location, method, and participants
Information disclosed	Project activities, impacts, and mitigation explained
Concern or recommendation	Accurate summary of the stakeholder's statement
Project response	Explanation, proposed action, or reason an action is not adopted
Responsibility and timeframe	Assigned position and completion target
Follow-up	Evidence of action and communication of the outcome

Personal information must be handled appropriately. Attendance signatures or photographs do not substitute for a record of the issues discussed.

Feedback is reviewed against its relevance, technical implications, and potential to improve environmental protection. Accepted actions are incorporated into the project layout, operating procedures, monitoring programme, or EMP. Unresolved concerns are retained for management and regulatory consideration rather than omitted.

8.6 Grievance Redress Mechanism

The project will maintain a documented mechanism for environmental and community complaints.

8.6.1 Complaint Channels

Complaints may be submitted through the site office, designated environmental/HSE contact, telephone, or email. Available channels must be communicated locally. Anonymous complaints will also be assessed where sufficient information is provided.

8.6.2 Response Procedure

Step	**Procedure**	**Proposed Service Target**
Registration	Record the complaint and assign a reference number	On receipt
Acknowledgement	Confirm receipt where contact information is available	Within two working days
Assessment	Determine urgency, investigate, and identify responsibility	Within seven working days
Action	Implement correction or communicate a justified action plan	Normally within fifteen working days
Closure	Verify the response and record feedback from the complainant where possible	Following completion

These are project service targets, not statutory deadlines. Urgent threats to health, safety, or the environment require immediate action.

Unresolved complaints are escalated to the Plant Manager and then the Chief Executive. The mechanism does not restrict a complainant's right to approach EPA Punjab or another competent authority.

8.7 Responsibilities and Continuing Engagement

Responsible Position	**Consultation Responsibility**
Chief Executive	Approve commitments and resolve major or unresolved concerns
Environmental/HSE Officer	Coordinate engagement, maintain registers, investigate environmental complaints, and track actions
Plant Manager	Implement operational changes arising from consultation
Administration / Security	Receive enquiries, direct complainants, and support communication
Environmental Consultant	Support technical disclosure and interpretation of assessment findings
Department Supervisors	Communicate relevant commitments to workers and implement assigned actions

Engagement will continue during construction, commissioning, and operation. Significant changes affecting emissions, discharge, traffic, or emergency risks require renewed communication with relevant stakeholders. Complaint trends and outstanding commitments will be included in monthly reporting and quarterly management review.

8.8 Conclusion

Stakeholder consultation links environmental assessment with practical concerns, local knowledge, and regulatory decision-making. Its effectiveness depends on accurate disclosure, accessible participation, documented responses, and implementation of commitments.

For this project, particular attention is required for wastewater treatment, receiving-drain conditions, water use, chemical safety, noise, traffic, and emergency preparedness. Findings must be supported by consultation records; stakeholder acceptance and completed engagement are not assumed in their absence.

CHAPTER 9

CONCLUSION AND RECOMMENDATIONS

9.1 Conclusion

The Environmental Impact Assessment addresses the establishment of the project titled "Establishment of Textile Fabric Manufacturing & Dyeing Unit by M/s Khizra Fabrics (Pvt) Ltd," located at 1 Km. Club Road Industrial Drain, Khurrianwala, Tehsil Jaranwala, District Faisalabad, at coordinates 31°29′52.8″ N, 73°16′21.0″ E.

The project occupies 36 Kanal 3 Marla and involves an estimated investment of PKR 450 million. It comprises textile manufacturing and processing activities, including weaving, bleaching, dyeing, printing, and finishing, with an installed capacity of 75,000,000 metres per month, equivalent to 900,000,000 metres annually. The assessment identifies wastewater from wet processing as the principal environmental concern. Other important considerations include water and energy consumption, chemical storage and handling, fibre dust, process emissions, machinery noise, textile waste, treatment sludge, and occupational hazards. Construction and installation may also generate temporary dust, noise, debris, and traffic disturbance.

The project includes an on-site Effluent Treatment Plant for treatment of industrial wastewater before discharge into the adjacent industrial drain. Effective treatment requires appropriate design, trained operators, reliable maintenance, and representative monitoring. Provision of a treatment plant alone is insufficient to establish environmental performance; discharge quality must be verified under actual operating conditions.

The identified impacts can be addressed through integrated pollution prevention, treatment, safe operating practices, and management oversight. However, their residual significance depends on the effectiveness of these controls and the sensitivity of affected receptors. In particular, ETP failure, uncontrolled chemical releases, unsafe waste handling, and fire may result in consequences extending beyond routine operational disturbance.

The Environmental Management and Monitoring Programme establishes responsibilities, implementation schedules, training, reporting, and corrective-action arrangements. Its effectiveness depends on adequate resources and its incorporation into daily production and maintenance activities.

The project offers potential benefits through employment, textile production, and associated procurement and services. These benefits do not remove the requirement to protect workers, neighbouring communities, water resources, and the receiving environment.

The project may be considered environmentally acceptable subject to satisfactory regulatory review, substantiation of the assessment findings, implementation of the proposed controls, and compliance with applicable approval conditions. Unconditional conclusions regarding baseline compliance, absence of sensitive receptors, or insignificant residual impacts are not supported without the corresponding site records and monitoring evidence.

9.2 Recommendations

9.2.1 Environmental Approval and Management Accountability

The proponent shall obtain the applicable environmental approval and other permissions before undertaking activities for which authorization is required. Approval conditions shall be communicated to production, maintenance, administration, and contractor personnel.

The Chief Executive shall retain overall accountability, supported by a designated Environmental/HSE Officer and clearly assigned departmental responsibilities. Environmental controls, monitoring, and corrective actions shall receive adequate financial and operational support.

9.2.2 Wastewater Treatment and Discharge

The ETP shall be designed and operated according to the actual wastewater flow, variability, chemical composition, and pollutant load. The process water balance and treatment requirements shall be reconciled with machinery capacity and operating arrangements.

The following measures are essential:

- Commission treatment before wet-processing trials generate wastewater.
- Maintain dedicated process drains and prevent untreated bypasses.
- Provide representative sampling access at the final treated outlet.
- Record operating conditions, dosing, maintenance, and sludge generation.
- Stop affected wet-processing activities where effective treatment cannot be maintained and safe holding capacity is unavailable.
- Assess discharge against applicable standards and approval conditions.

Dilution shall not be used to achieve apparent compliance. Monitoring parameters and frequency shall reflect the actual process and discharge characteristics.

9.2.3 Water Conservation and Resource Efficiency

Water consumption shall be metered and reviewed through an operational water balance. Leakage control, optimized rinsing, appropriate chemical dosing, and reduction of avoidable washing shall be incorporated into production practices.

Treated-water reuse may be adopted where its quality is compatible with the intended application. Reuse shall not create product-quality problems, worker exposure, or secondary contamination. Energy conservation measures shall include preventive maintenance, efficient equipment operation, and evaluation of feasible heat recovery.

9.2.4 Chemical Safety and Waste Management

The facility shall maintain a current chemical inventory and accessible Safety Data Sheets. Storage arrangements shall provide compatible segregation, clear labelling, secondary containment, and suitable spill-response equipment.

Textile scraps, packaging, general waste, contaminated containers, and ETP sludge shall be segregated. Potentially hazardous materials shall be characterized where necessary and transferred through arrangements appropriate to their classification. Waste quantities and transfers shall be documented.

Uncontrolled dumping, burning, discharge into drains, and unauthorized reuse of contaminated containers shall be prohibited.

9.2.5 Air Quality and Noise Control

Ventilation and extraction shall correspond to the actual sources of fibre dust, vapours, and heat. Lint accumulation shall be controlled through suitable housekeeping, particularly around electrical equipment and ignition sources.

Combustion equipment, where installed, shall be maintained and assessed according to its fuel and emission characteristics. Noise controls shall prioritize maintenance, vibration isolation, and engineering measures, supported by hearing protection and exposure monitoring where required.

9.2.6 Occupational Safety and Emergency Preparedness

The facility shall implement machine guarding, safe isolation, electrical inspections, task-specific PPE, first aid, and procedures for hazardous work.

Emergency arrangements shall address fire, chemical spills, serious injury, gas or fuel leakage where applicable, and treatment-system failure. Exits and emergency access shall remain clear. Personnel shall receive practical training, and drill findings shall result in documented improvements.

9.2.7 Monitoring, Documentation and Corrective Action

Monitoring shall verify treatment performance, relevant air and noise conditions, water quality, waste handling, and occupational safeguards. Laboratory and field records shall identify sampling locations, operating conditions, methods, and quality-control information.

Results shall be reviewed promptly. Exceedances and failures shall trigger investigation, corrective action, follow-up verification, and regulatory notification where required. Monitoring requires management oversight and representative sampling; results must guide operational decisions rather than remain solely as records.

9.2.8 Community Engagement and Environmental Enhancement

The proponent shall maintain accessible complaint channels and communicate responses to affected stakeholders. Concerns involving wastewater, noise, traffic, odour, or emergency risks shall be investigated and tracked to closure.

Suitable plantation, textile-waste recovery, solar generation, and rainwater harvesting may be implemented following feasibility assessment. These measures supplement essential pollution controls and shall not be treated as substitutes for compliant treatment or safe operation.

9.3 Overall Recommendation

Environmental approval is recommended for consideration by EPA Punjab, subject to satisfactory review of the EIA, verification of essential project and baseline information, fulfilment of applicable statutory requirements, and enforceable implementation of the Environmental Management and Monitoring Programme.

The central condition is **effective implementation**: reliable wastewater treatment, prevention of uncontrolled releases, protection of workers and communities, and timely correction of deficiencies throughout the project lifecycle.