



ENVIRONMENTAL IMPACT ASSESSMENT REPORT

***CONSTRUCTION OF PESTICIDES & SOIL MICRO NUTRIENTS MANUFACTURING
FACTORY BY FOUR SEASONS ENTERPRISES AT 41- INDUSTRIAL ESTATE MULTAN***



Project proponent: Muhammad Shaukat Islam

Environment Friends of Environment and Economic

**Consultant: Development (FEED), Garden Tower Plaza,
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LIST OF ABBREVIATIONS

CO₂	Carbon Dioxide
°C	Degree Celsius
dB(A)	Decibel (Unit of Noise)
IEE	Initial Environmental Examination
EMMP	Environmental Mitigation and Monitoring Plan
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EP&CC	Environmental Protection and Climate Change Department
HSE	Health, Safety & Environment
m³/h	Cubic meter per hour
NOC	No Objection Certificate
No_x	Oxides of Nitrogen
PM	Particulate Matter
PPEs	Personal Protective Equipment
PEPA 1997	Punjab Environmental Protection Act 1997
SOPs	Standard Operating Procedures
So_x	Oxides of Sulfur



EXECUTIVE SUMMARY

The name of project is “**Construction of Pesticides & Soil Micro Nutrients Manufacturing Factory by Four Seasons Enterprises at 41- Industrial Estate Multan**”. The project site is a vacant area and management of the project has planned construction of Factory after obtaining environmental approval from EPA required under section 12 of Punjab Environmental Protection Act, 1997. The salient features of the project are as under:

Sr. No	<u>Salient Features</u>	
i.	Title of Project	Construction of Pesticides & Soil Micro Nutrients Manufacturing Factory by Four Seasons Enterprises at 41 Industrial Estate Multan”
ii.	Location of Project	41- Industrial Estate Multan
iii.	Nature of Project	Pesticides & Soil Micro Nutrients Manufacturing Factory
iv.	Coordinates	Latitude:30.129740 ° Longitude:71.385828°
v.	Name of Project Proponent	Mr. Muhammad Shaukat Islam
vi.	Name of Organization/ Environment Consultant	Friends of Environment and Economic Development (FEED), Garden Tower Plaza, Barkat Market, Lahore

Brief Outline of Project

i	Area of project	16 Kanal
ii	Nature of Area	Industrial Area (Multan Industrial Estate)
iii	Quantity of Wastewater	100 Gallons per day
iv	Environmental Impacts anticipated during Construction Phase of	The anticipated environmental impacts during construction phase may include dust, noise, vehicle emissions, workers' safety and employment issues. EIA Report describes all possible



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	Project	environmental impacts and mitigation measures.
v	Environmental Impacts anticipated during Operation Phase of the Project	The project is not likely to generate adverse environmental impacts during its operational phase. The project is not likely to generate industrial waste water except small quantity of washings of Pans/ Mixers which will be handed over to EPA approved Vendor for its safe disposal through incineration.
vi	Mitigation Measures for Construction Phase and Operational Phase	The EIA Report contains the detailed mitigation measures for the construction phase and operational phase of the project.
vii	Proposed Environmental Monitoring Plan	The Environmental Monitoring Plan has been prepared and made part of EIA Report.



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CHAPTER .1

INTRODUCTION



Chapter 1: INTRODUCTION

The Project Proponent has planned a Project “**Construction of Pesticides & Soil Micro Nutrients Manufacturing Factory by Four Seasons Enterprises at 41- Industrial Estate Multan**” and this document is the Environmental Impact Assessment Report (EIA) of said Project. The main objective of the study is to keep the project in compliance with prevailing Environmental Laws, Rules, and Regulations. The report indicates potential environmental impacts of the project and suggests mitigation measures to enhance the environmental performance of the proposed project. The report is comprehensive and presents the Environmental Impacts of construction and operational phase of project along with environmental monitoring framework. The Report also describes full details of mitigation measures for both the phases of the project to keep the project in compliance with Environmental Laws and Punjab Environmental Quality Standard (PEQS).

1.1 Objectives of EIA

The main purpose of this report is to meet legal requirements prescribed in Punjab Environmental Protection Act, 1997. Section 12 of Punjab Environmental Protection Act, 1997 states as under:

"No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency an Initial Environmental Examination (IEE) and, where the project is likely to cause an adverse environmental effect, an Environmental Impact Assessment (EIA), and has obtained approval from the Provincial Agency in respect thereof"

The Punjab Environmental Protection Agency (Review of IEE and EIA Regulations, 2000) provides the details regarding categories of Projects. The project of **Construction of Pesticides & Soil Micro Nutrients Manufacturing Factory**, falls in schedule II of IEE/EIA Regulations 2022, hence this EIA report has been prepared.

The following are the main objectives of EIA Report: -

- i. To determine and document the state of the environment of the project area to establish an environment baseline for assessing the suitability of the Project site.
- ii. To identify construction and operational activities of project and assess their impacts on the environment.



- iii. To assist the proponent in planning, designing, and implementing the project in a way that eliminates or minimizes the negative impacts on the biophysical and socio- economic environment and maximizes the benefits for all parties/stakeholders.
- iv. To present an Environmental Mitigation and Monitoring Plan to smoothly implement the mitigation measures and supervise their efficiency and effectiveness.
- v. To present a Mitigation and Monitoring Plan to smoothly implement the suggested mitigation measures and supervise their efficiency and effectiveness.
- vi. To provide an opportunity for the public to understand the project and its impacts on the community and their environment in the context of sustainable development.

1.2 Brief Introduction to Environment Consultant

The project proponent has hired the services of Environmental Consultant i.e. ***Friends of Environment and Economic Development (FEED)***. A team consisting of professionals having qualifications in the field of Environmental Sciences has worked for the collection of requisite data/ information and preparation of Environmental Impact Assessment (EIA).

The Environment Consultant; ***Friends of Environment and Economic Development (FEED)*** consists of well-trained professionals who provide the following services as per Guidelines, Rules and Regulations notified by EPA Punjab:

- i. Initial Environmental Examination
- ii. Environmental Impacts Assessment
- iii. Socio-Environmental Impacts Assessment
- iv. EPA NOC for the Construction Phase of existing industrial units /new industrial units
- v. EPA NOC for the Operational Phase of industrial units
- vi. Renewal of EPA NOC after every 3-years



1.3 Contact Details of Focal Person of Environment Consultant

The contact details of Environment Consultant are in the following Table 1.

Table 1.1 Contact Details of Focal Person of Environment Consultant	
Name of Environment Consulting Firm	<i>Friends of Environment and Economic Development (FEED)</i>
Contact Person	Ms. Aqsa Tabbasam, Assistant Manager (Environment) (03237843076)
Address	Garden Tower Plaza, Barkat Market, Lahore

1.4 Details of Project Team of Environment Consultant

The following Team of qualified professionals has conducted environmental assessment and contributed for preparation of the IEE / EIA report.

Table 1.2 Details of Project Team of Environment Consultant

Sr. No	Name	Qualification	Roles
i.	Mr. Muhammad Tahir	MSc. Environmental Sciences MSc. Agricultural Engineering	<ul style="list-style-type: none"> • Team Head
ii	Ms. Aqsa Tabbasam	BS Environmental Sciences MS Textile Engineering	<ul style="list-style-type: none"> • Social Survey • Data Collection • Report Writing
iii	Mr. Mehroz Khan	BS Environmental Sciences MS Environmental Sciences	<ul style="list-style-type: none"> • Data Collection • Report Writing
Iv	Ms. Amina Ramzan	BS Environmental Sciences	<ul style="list-style-type: none"> • Social Survey • Data Collection • Report Writing



1.5 Screening and Scoping

In an Environmental Impact Assessment (EIA) screening is the initial step to determine if a project is likely to have significant environmental impacts, thus requiring a full EIA, while scoping is the subsequent process that identifies and defines the key environmental issues, alternatives, and the baseline data needed for that EIA. Screening uses criteria or project lists to decide if an EIA is mandatory, leading to outcomes ranging from no further assessment to a full EIA. Scoping then sets the boundaries and terms of reference for the EIA, involving public consultation and stakeholder input to focus the assessment on relevant concerns and ensuring an efficient and comprehensive evaluation.

Screening

Purpose: To determine if a proposed project or plan requires an Environmental Impact Assessment (EIA).

How it Works: It involves evaluating the potential magnitude and significance of a project's environmental and social impacts.

Methods: This can include using predefined lists of projects, applying specific criteria related to potential impacts, or conducting a preliminary environmental examination.

Outcome: The result of screening is a decision on whether a full EIA is necessary, or if alternative, less intensive assessments are sufficient.

Scoping

Purpose: To identify the most significant environmental issues that need to be addressed in the EIA and to define the boundaries of the assessment.

How it Works: It's a collaborative process involving the project proponent, regulatory bodies, and the public to define the scope and detail required for the Environmental Statement.

Activities: Key activities include identifying potential alternatives, establishing the environmental baseline, setting the terms of reference for the assessment, and defining the range of issues to be studied.

Output: The outcome is a scoping opinion or a similar document that guides the developer on the information that must be included in the EIA.

During this phase, all necessary information on the project has been collected and reviewed. A list of potential environmental impacts as well as social issues has been prepared. Relevant data has been collected and compiled, to develop a baseline of the project area's physical, biological, and



human environment. Field visits to the site have been also carried out. The secondary resources included reports of the studies carried out earlier, published books and data, and relevant websites have been utilized. With the help of these resources, a generic profile of the project area has been developed. During these field visits, information on environmental and social parameters has been collected. The environmental and social hot spots falling at or near the project site have been identified, and most importantly, the project's environmental effects have been ascertained.

1.6 Environmental Impacts of Project

The Team determined the potential environmental impacts of the proposed project during the study. Subsequently, the potential environmental impacts have been characterized to determine their significance. Mitigation measures have been identified to minimize the significant environmental effects. A management framework has also been developed in the form of an EMP for the implementation of the mitigation measures identified during the study.

1.7 Structure of Report

This EIA reviews information on existing environmental attributes of the project Area. All-important ecological features, air quality, noise, water quality, social and economic aspects are included. The report predicts the probable impacts on the environment due to the said project. This Environmental Impact Assessment Report (EIA) also proposes various environmental management measures. Details of all background environmental quality, environmental impacts/pollutant generating activities, pollution sources, predicted environmental quality and related aspects have been provided in this report.

The structure of this assessment report is as follows:

- i. Introduction
- ii. Legislative Framework
- iii. Screening and Scoping
- iv. Description of the Project
- v. Description of Environment
- vi. Screening of Potential Environmental Impacts and Mitigation Measures
- vii. Stakeholders Consultations
- viii. Environmental Mitigation and Monitoring Plan (EMMP)



ix. Conclusion and Recommendations



CHAPTER NO.2

LEGISLATIVE

FRAME WORK



Chapter 2: LEGISLATIVE FRAMEWORK

Pakistan is a signatory to Multilateral Environmental Agreements and different international treaties. Pakistan has a comprehensive set of environmental legislation covering multiple environmental issues facing Pakistan like pollution of freshwater bodies, gaseous emissions from Industrial Units degradation of ambient air quality, deforestation, loss of biodiversity, lack of proper waste management, and adverse impacts of climate change. The basic policy and legislative framework along with detailed rules, regulations, and guidelines required for implementing the policies and enforcement of legislation for the protection of the environment and biodiversity are in place, in Pakistan.

In Punjab, prime and the most important legal instruments to deal with the environmental matters and challenges, are Punjab Environment Protection Act 1997 and Punjab Environment Quality Standards PEQS. This act is a very comprehensive law and covers all the important aspects as explained below. Similarly, Punjab Environmental Quality Standards are also added in this chapter for ready reference.

2.1 Punjab Environmental Protection Act 1997

After the 18th Amendment in the Constitution of Pakistan, the Federal Ministry of Environment has been dissolved and the subject of Environment and Ecology was devolved to provinces of Pakistan. The province of Punjab has made its own Environment Act titled Punjab Environmental Protection Act, 1997. The Punjab Environmental Protection Act (PEPA), 1997 covers the following important topics /subjects.

- i. Establishment of the Punjab Environmental Protection Council.
- ii. Functions and Powers of the Council.
- iii. Establishment of the Provincial Environmental Protection Agency.
- iv. Functions of the Provincial Agency.
- v. Powers of the Provincial Agency.
- vi. Establishment of the Provincial Sustainable Development Fund.
- vii. Management of the Provincial Sustainable Development Fund.
- viii. Prohibition of certain discharges or emissions.
- ix. Initial environmental examination and environmental impact assessment
- x. Prohibition of import of hazardous waste.



- xi. Handling of hazardous substances.
- xii. Regulation of motor vehicles.
- xiii. Environmental Protection Order.
- xiv. Penalties.
- xv. Offences by bodies corporate.
- xvi. Offences by Government Agencies, local authorities or local councils.
- xvii. Environmental Tribunals.
- xviii. Jurisdiction and powers of Environmental Tribunals.
- xix. Appeals to the Environmental Tribunal.
- xx. Appeals from orders of the Environmental Tribunal.
- xxi. Jurisdiction of Environmental Magistrates.
- xxii. Appeals from orders of Environmental Magistrates.

2.2 Review of IEE/EIA Regulations 2022

Review of IEE/EIA Regulations provide clear mechanism for processing the NOC applications. The said regulation provides the list of projects requiring IEE through schedule I and the list of projects requiring IEE through schedule II. The said regulations further provide details regarding review fee in its schedule III. The procedure for conducting preliminary scrutiny of project documents and public hearing/ public participation have been stated in detail. In addition to above, the Regulations describes validity period of approval, mechanism regarding entry and inspection, monitoring and cancellation of approval. The Regulations further provides composition of Environmental Assessment Advisory Committee and its mandate.

Apart from the above mentioned two important Legal Instruments (i) Punjab Environmental Protection Act, 1997 (PEPA 1997) and (ii) Review of IEE/EIA Regulations 2022, there are others legal instruments on the subject of Environment and they all are applicable in the Province of Punjab. Some of them are mentioned below: -

2.3 Other Legal Instruments

- i. Punjab Clean Air Policy and Action Plan
- ii. Policy on Controlling Smog 2017
- iii. Production and Consumption of single use Plastic Products Regulations 2023
- iv. Smog Prevention and Control Rules 2023



- v. Delegation of Powers for Environmental Approvals Rules 2017
- vi. Punjab Hospital Waste Management Rules 2014



2.4 Punjab Environmental Quality Standards (PEQS)

The Govt. of Punjab has notified Punjab Environmental Quality Standards for different kinds of pollutants, as described in the following tables: -

Table 2.1 Punjab Environmental Quality Standards for Ambient Air

Sr. No	Pollutant	Time-Weighted Average	Concentration in Ambient Air	Method of Measurement
1.	Sulfur Dioxide (SO ₂)	Annual Average	80 µg/m ³	Ultraviolet Fluorescence Method
		24 hours	120 µg/m ³	
2.	Oxides of Nitrogen as (NO)	Annual Average	40 µg/m ³	Gas phase chemiluminescence
		24 hours	40 µg/m ³	
3.	Oxides of Nitrogen as (NO)	Annual Average	40 µg/m ³	Gas phase chemiluminescence
		24 hours	80 µg/m ³	
4.	Ozone (o ₃)	1 hour	130 µg/m ³	Non-Dispersive UV Absorption Method
5.	Suspended particulate matter (SPM)	Annual Average	360 µg/m ³	High volume sampling (average flow rate not less than 1.1 m ³ /min)
		24 hours	500 µg/m ³	
6.	Respirable Particulate Matter PM ₁₀	Annual Average	120 µg/m ³	Preferably β-Ray absorption method
		24 hours	150 µg/m ³	
7.	Respirable Particulate Matter PM _{2.5}	Annual Average	15 µg/m ³	Preferably β-Ray absorption method
		24 hours	35 µg/m ³	

	Pollutant	Time-weighted	Concentration	Method Of Measurement
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		Average	in Ambient AIR	
		1 hour	15 µg/m ³	
8.	Lead (Pb)	Annual Average	1 µg/m ³	Ass method after sampling using EPM2000 or equivalent Filter paper
		24 hours	1.5 µg/m ³	
9.	Carbon Monoxide (CO)	8 hours	5 µg/m ³	Non-Dispersive Infra-Red (NDIR) method
		1 hours	10 µg/m ³	

2.2 Punjab Environmental Quality Standards for Drinking Water

Sr. No.	Properties /Parameters	Standard Values	WHO Standards	Remarks
1.	All water intended for drinking (E. Coil or Thermo-tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards.
2.	Treated water entering the distribution system (E. Coil or thermo-tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards.
3.	Treated water in the distribution system (E. Coil or thermo-tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample In the case of large supplies, where sufficient samples are examined, must not be present in 95 % of the sample taken throughout any 12-month period.	Must not be detectable in any 100 ml sample In the case of large supplies, where sufficient samples are examined, must not be present in 95 % of the sample taken throughout any	Most Asian countries also follow WHO standards



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			12- month period.	
4.	Color	≤15 TCU	≤15 TCU	
5.	Taste	Non objectionable/ acceptable	Non objectionable/ acceptable	
6.	Odour	Non objectionable/ acceptable	Non objectionable/ acceptable	
7.	Turbidity	<5 NTU	<5 NTU	
8.	Total hardness as CaCO ₃	< 500 mg/l	–	
9.	TDS	< 1000	< 1000	

10.	Ph	6.5 – 8.5	6.5 – 8.5	
11.	Essential Inorganic	mg/Liter	mg/Liter	
12.	Aluminum (Al) mg/l	≤0.2	0.2	
13.	Antimony (Sb)	≤0.005 (P)	0.02	
14.	Barium (Ba)	0.7	0.7	
15.	Arsenic	≤0.05 (P)	0.01	Standard for Pakistan similar to most Asian developing countries
16.	Boron (B)	0.3	0.3	
17.	Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian developing countries
18.	Chloride (Cl)	<250	250	
19.	Chromium (Cr)	≤0.05	0.05	
20.	Copper (Cu)	2	2	
21.	Toxic Inorganic	mg/l	mg/l	
22.	Cyanide (CN)	≤0.05	0.07	Standard for Pakistan similar to most Asian developing countries



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23.	Fluoride (F)*	≤1.5	1.5	
24.	Lead (Pb)	≤0.05	0.01	Standard for Pakistan similar to most Asian developing countries
25.	Manganese (Mn)	≤0.5	0.5	
26.	Mercury (Hg)	≤0.001	0.001	
27.	Nickel (Ni)	≤0.02	0.02	
28.	Nitrate (NO ₃)	≤50	50	
29.	Nitrite (NO ₃)	≤3 (P)	3	
30.	Selenium (Se)	0.01 (P)	0.01	
31.	Residual chlorine	0.2-0.5 at consumer end 0.5-1.5 at source		
32.	Zinc (Zn)	5.0	3	The standard for Pakistan similar to most Asian developing countries

33.	Organic			
34.	Pesticides mg/l			PSQCA No. 4639 – 2004, page No. 4 Table No. 3 Serial No. 20 – 58 may be consulted
35.	Phenolic compound (as Phenols) mg/l			
36.	Poly-nuclear aromatic hydrocarbons (as PAHs) g/l		0.01 (By GC/MS method)	
37.	Alpha Emitters bq/L	0.1	0.1	
38.	Beta emitters	1	1	

*Indicates priority health-related inorganic constituents, which need regular monitoring.



*PSQCA: Pakistan Standards Quality Control Authority.

2.3 Punjab Environmental Quality Standards for Municipal and Liquid Industrial Effluents

Sr. No	Parameters	Into Inland Waters	Into Sewage Treatment
1	Temperature or Temperature Increase	≤3°C	≤3°C
2	pH value (H)	6-9	6-9
3	Biochemical Oxygen Demand (BOD) at 20 °C	80	250
4	Chemical Oxygen Demand (COD)"	150	250
5	Total suspended solids (TSS)	200	400
6	Total dissolved solids (TDS)	3500	3500
7	Grease and Oil	10	10
8	Phenolic compounds (as phenol)	0.1	0.3
9	Chloride (as Cl ⁻).	1000	1000
10	Cyanide (as CN)	1.0	1.0
11	An-ionic detergents (as MBAs) (2	20	20
12	Sulfate (SO ₄)	600	1000
13	Fluoride (as F)	10	10
14	Sulfide (S ⁻²)	1.0	1.0
15	Ammonia (NH ₃)	40	40
16	Pesticides ⁽³⁾	0.15	0.15
17	Cadmium (Cd) ⁽⁴⁾	0.1	0.1
18	Chromium (trivalent and hexavalent)	1.0	1.0



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19	Copper (Cu) ⁽⁴⁾	1.0	1.0
20	Lead (Pb) ⁽⁴⁾	0.5	0.5
21	Mercury (Hg) ⁽⁴⁾	0.01	0.01
22	Selenium (Se) ⁽⁴⁾	05	0.5
23	Nickel (Ni) ⁽⁴⁾	1.0	1.0
24	Silver (Ag) ⁽⁴⁾	1.0	1.0
25	Total Toxic metals	2.0	2.0
26	Zinc (Zn)	5.0	5.0
27	Arsenic (As) ⁽⁴⁾	1.0	10
28	Barium (Ba) ⁽⁴⁾	1.5	15
29	Iron (Fe)	8.0	8.0
30	Manganese (Mn)	1.5	1.5
31	Boron (Ba) ⁽⁴⁾	6.0	6.0
32	Chlorine (Cl ₂)	1.0	1:0

Explanation:

1. Assuming minimum dilution 1:10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Provincial Environmental Protection Agency. By 1:50 dilution means, for example that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meters of water for dilution of this effluent.
2. Methylene Blue Active Substances; assuming surfactant as biodegradable.
3. Pesticides include herbicides, fungicides and insecticides.
4. Subject to total toxic metals, discharge should not exceed level given at S.N. 25.
5. Applicable only when and where sewage treatment is operational and BOD₅-80 mg/l is achieved by the sewage treatment system.
6. The effluent should not result in temperature increase of more than 30°C at the edge of the zone where initial mixing and dilution take place in the receiving body. In case zone is not defined, use 100 meters from the point of discharge.

Note:

1. Dilution of liquid effluents to meet to the PEQS limiting value is not permissible through fresh water mixing with the effluent before discharging into the environment



2. The concentration of pollutants in water being used will be subtracted from the effluent for calculating the PEQS limits.

Table 2.4 Punjab Environmental Quality Standards for Industrial Gaseous Emissions (Mg/Nm³)

Sr. No.	Parameter	Source of Emissions	Stander
1	Smoke	Smoke opacity not exceed	40% or 2 Ringelmann Scale or equivalent Smoke number
2	Particulate matter	Boilers and furnaces	
		Oil fired	300
		Coal-fired	500
		Cement Kilns	300
		Grinding, crushing, clinkers coolers and related processes, metallurgical processes, converters, blast furnaces and cupolas	500
3	Hydrogen chloride (HCL)	Any	400
4	Chlorine	Any	150
5	Hydrogen fluoride	Any	150
6	Hydrogen Sulphide	Any	10
7	Sulphur Oxides	Sulfuric acid/Sulfonic acid plants	5000
		Other plants expect power plant operating on oil and coal	1700
8	Carbon Monoxide Parameter	Any	800
		Source of Emission	Stander
9	Lead (PB)	Any	50
10	Mercury (Hg)	Any	10
11	Cadmium (Cd)	Any	20
12	Arsenic (Ar)	Any	20
131	Copper (Cu)	Any	50
14	Antinomy (Sb)	Any	20



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15	Zinc (Zn)	Any	200
16	Oxides of Nitrogen	Nitric acid manufacturing unit	3000
		Other plants expect power operating on oil or coal	
		Gas Fired	400



Table 2.5 Punjab Environmental Quality Standards for Noise

Sr. No	Category of Area Zone	Effective from 1 st July, 2010		Effective from 1 st July, 2013	
		Limits in Db(A) Leq			
		Day Time	Night Time	Day Time	Night Time
1	Residential Area (A)	65	50	55	45
2	Commercial Area (B)	70	60	65	55
3	Industrial Area (C)	80	70	75	65/45
4	Silence Zone (D)	55	45	50	

Note

1. Day time hours; 6:00am to 10:00pm.

2. Night Time hours; 10:00 pm to 6:00 am.

3. Silence Zone: Zones which are declared as such by the competent authority. An area comprising not less than 100 meters around hospital, educational institutions and courts

4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority

dB(A) Leq: Time weighted average of the level of sound in decibel on scale A which is relatable to human hearing.



CHAPTER NO.3

SCREENING AND SCOPING



Chapter 3: SCREENING AND SCOPING

In an Environmental Impact Assessment (EIA), screening is the initial step to determine if a project is likely to have significant environmental impacts, thus requiring a full EIA, while scoping is the subsequent process that identifies and defines the key environmental issues, alternatives, and the baseline data needed for that EIA. Screening uses criteria or project lists to decide if an EIA is mandatory, leading to outcomes ranging from no further assessment to a full EIA. Scoping then sets the boundaries and terms of reference for the EIA, involving public consultation and stakeholder input to focus the assessment on relevant concerns and ensuring an efficient and comprehensive evaluation.

3.1 Objectives and Methods of Screening and Scoping

Objective and Method of Screening

Purpose: To determine if a proposed project or plan requires an Environmental Impact Assessment (EIA).

How it Works: It involves evaluating the potential magnitude and significance of a project's environmental and social impacts.

Methods: This can include using predefined lists of projects, applying specific criteria related to potential impacts, or conducting a preliminary environmental examination.

Outcome: The result of screening is a decision on whether a full EIA is necessary, or if alternative, less intensive assessments are sufficient.

Scoping

Purpose: To identify the most significant environmental issues that need to be addressed in the EIA and to define the boundaries of the assessment.

How it Works: It's a collaborative process involving the project proponent, regulatory bodies, and the public to define the scope and detail required for the Environmental Statement.



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Activities: Key activities include identifying potential alternatives, establishing the environmental baseline, setting the terms of reference for the assessment, and defining the range of issues to be studied.

Output: The outcome is a scoping opinion or a similar document that guides the developer on the information that must be included in the EIA.

This section of the study focuses on the details of project screening, scoping, and the selection of alternatives. According to Section 12 of Punjab Environment Protection Act, 1997. "No proponent of a project shall commence construction or operation unless he has filed with the Provisional Agency an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment (EIA) and has obtained from the Provisional Agency approval in respect thereof.

The IEE/EIA Regulation 2022, classifies the projects under two schedules called Schedule-I and Schedule-II. The Regulations read that a proponent of a project falling in any category specified in Schedule II shall file an EIA with the Provincial Agency and the provisions of section 12 shall apply to such project. According to the said regulations, the proposed project falls under Schedule II.

Scoping Exercise

The scoping exercise helps identify key environmental issues that should be highlighted and further investigated in the EIA. Effective scoping is essential in terms of the following: -

- i. Defining the spatial and temporal boundaries.
- ii. Consulting with stakeholders to identify a full range of concerns.
- iii. Focusing on key issues that have been characteristic of the existing environment in the baseline study.
- iv. Reviewing the types of alternatives to be considered.
- v. Making logical decisions that have been more significant and need to be prioritized in the EIA.



3.2 Alternatives

3.2.1 Environmental alternatives

The surrounding environmental conditions are congenial for the project. Both the construction as well as operation phases will not adversely affect the environment. All of the aspects will be kept strictly within the limits defined under Punjab Environmental Quality Standards (PEQS) and the project shall comply with requirements prescribed in Punjab Environmental Protection Act 1997.

3.2.2 Site alternatives

The site selected for the project is highly suitable as it is located in the Industrial Estate namely 41 Industrial Estate, Multan. 41 Industrial Estate, Multan is one of the largest and most modern industrial zones in Punjab, Pakistan. It was established under the management of the Punjab Industrial Estates Development and Management Company (PIEDMC) to promote industrial growth, attract investment, and provide organized infrastructure to entrepreneurs.



CHAPTER .4

PROJECT

DESCRIPTION



Chapter 4: PROJECT DESCRIPTION

This section of the study concentrates on details of the project and its salient features, such as location, Site layout, objectives, selection of alternatives, and magnitude of the operations. Inputs and discharges relevant to different phases of the project, such as electricity, vehicles & materials, etc. have been examined to ascertain the potential environmental impacts and to suggest necessary corrective measures required during the construction and operational phase of project to safeguard the environment.

4.1 Project Objectives

The objective of this project is Construction of Pesticides & Soil Micro Nutrients Manufacturing Factory. The Project site is at 41- Industrial Estate Multan. A Google map showing the location of the project is attached:

Table 4.1 Geographical Configuration

1.	<i>Current Position of Land on 4 Sides of Project Site</i>	
2.	North	Pak Cotton Factory
3.	South	South Asian Textile Mills
4.	East	Industrial Estate Road
5.	West	Ihsan Ilahi Factory

4.4 Road Access

The site selected for the construction of project is located in the government notified and developed Industrial Estate. The Industrial Estate Multan has very good access roads. All the roads accessing the project site are metaled. The map showing the road network of area is annexed.



4.5 Vegetation Features of the Site

Land is clear and no any plant or vegetation of ecological importance are present at the project site. The Project Proponent will develop greenery at the project site after construction work and this greenery will serve as a useful buffer zone to lessen the effects of pollution from different sources. So, the project will not cause any harm to vegetation and environment of the area.

4.6 Relocation and Rehabilitation Plans

No any kind of structural settlement exists at the site to be relocated or dismantled. The land is a vacant plot and hence, no relocation and rehabilitation are required.

4.7 Description of Project

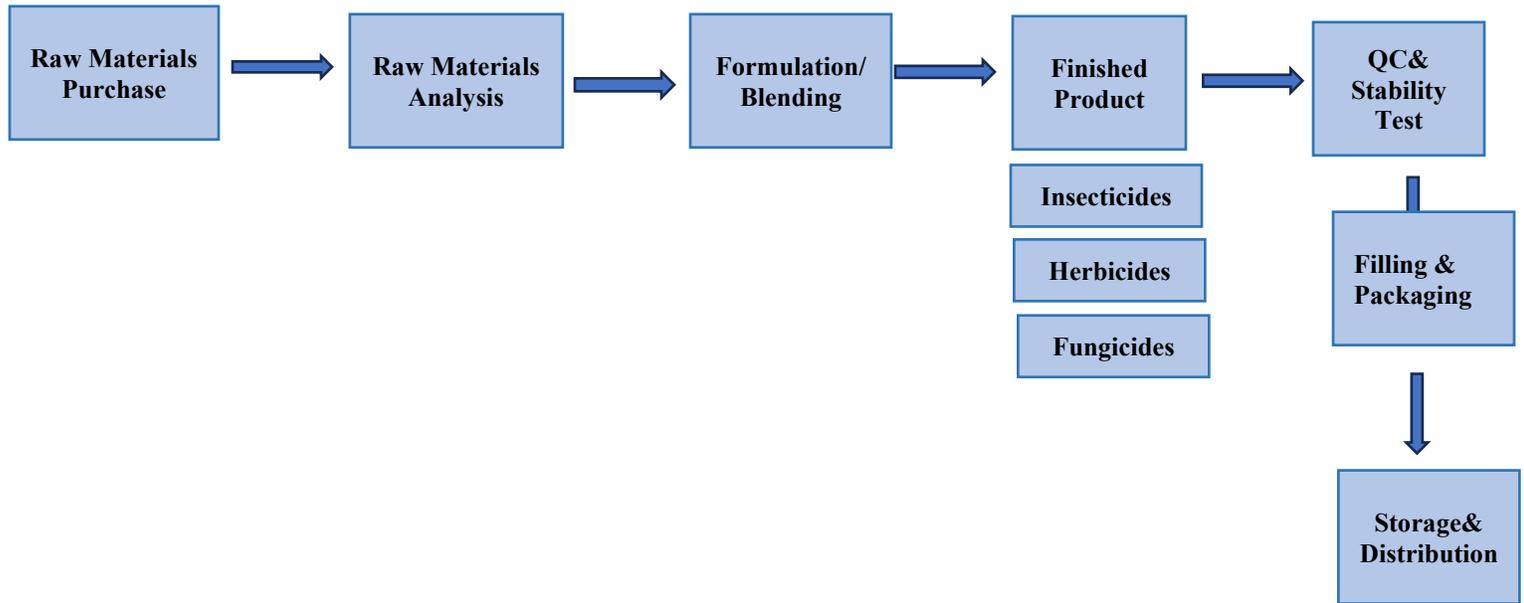
The description / salient features of the Project are as under in Table 4.2.

Table 4.2 Salient Features of Project

Sr. No	<i>Salient Features of Project</i>	
i.	Project Title	Construction of Pesticides & Soil Micro Nutrients Manufacturing Factory by Four Seasons Enterprises at 41- Industrial Estate Multan
ii.	Project Description	Manufacturing of Pesticides and Soil Micro Nutrients.
iii.	Total Area	16 Kanal
iv.	Project Cost	Rs. 160.00 million
v.	Purpose of Project	The main objective of the project is manufacturing of Pesticides & Soil Micro Nutrients for farmers of Multan Region.
vi.	List of Raw Materials	Emulsifiers, phosphoric Acid, KOH, Lignite, Xylen
vii.	List of Finished Products	Pesticides and Multi Micronutrients Solid, Potassium Humate Solid etc.
viii.	Production Capacity	7,000-9,000 Liters/Month

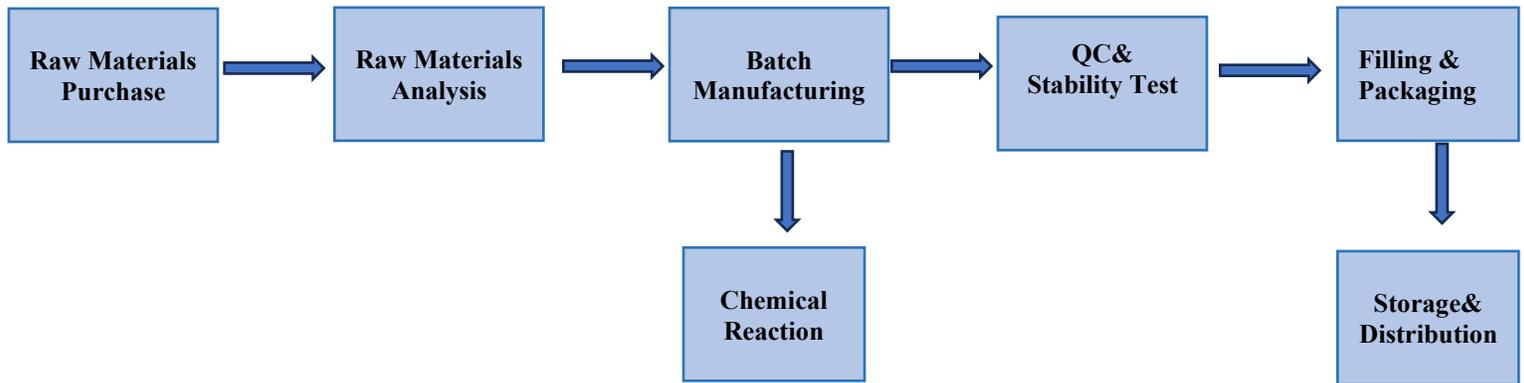


Flow Sheet Diagram (Pesticides Formulation)





Flow Sheet Diagram (Soil Micronutrients)



4.8 Schedule of Implementation

The project construction work will almost 12 months. The schedule of Construction/ Installation of machinery/ Project implementations is as under in **Table 4.3**

Table 4.3 Schedule of Implementation

Sr. No	Activities	First 4 Months	Second 4 Months	Third 4 Months
1.	Construction of Building			
2.	Installation of Machinery			
3.	Trial operation			

4.9 Water and Wastewater Details



i. Sources of water

Water requirement will be met from groundwater through installation of pump during construction phase as well as during operation phase. There is not high requirement of water during construction as well as operational phase of the project.

ii. Solid Waste

There is no likelihood of generation of significant amount of solid waste during construction and operation phase of Project. All kinds of raw materials and finished products will be handled appropriately.

iii. Restoration and Rehabilitation Plan

After completion of the construction work, all the disturbed sites will be changed into conditions as they were prior to the commencement of the project or even far better than that. For improving the environmental and aesthetic value or visual quality of the site, the proponent will carry out landscaping and tree planting within premises of factory.



CHAPTER .5

DESCRIPTION OF

ENVIRONMENT



Chapter 5: DESCRIPTION OF ENVIRONMENT

This chapter describes the baseline conditions, which cover the existing physical, ecological, and socio-economic environment of the Project Area. Information on these aspects has been derived from the desk study of available data, field visits to the project area as well as information obtained through visits to the Government departments and other relevant agencies.

5.1 Data Collection

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

Information on wildlife/fauna species (mammals, amphibians, reptiles, birds, etc.) in the assessment area is based on opportunistic observation, gathering the existing information, and consultation with local experts, community members, government, and Non-Government Organizations (NGOs).

5.2 Physical Environment

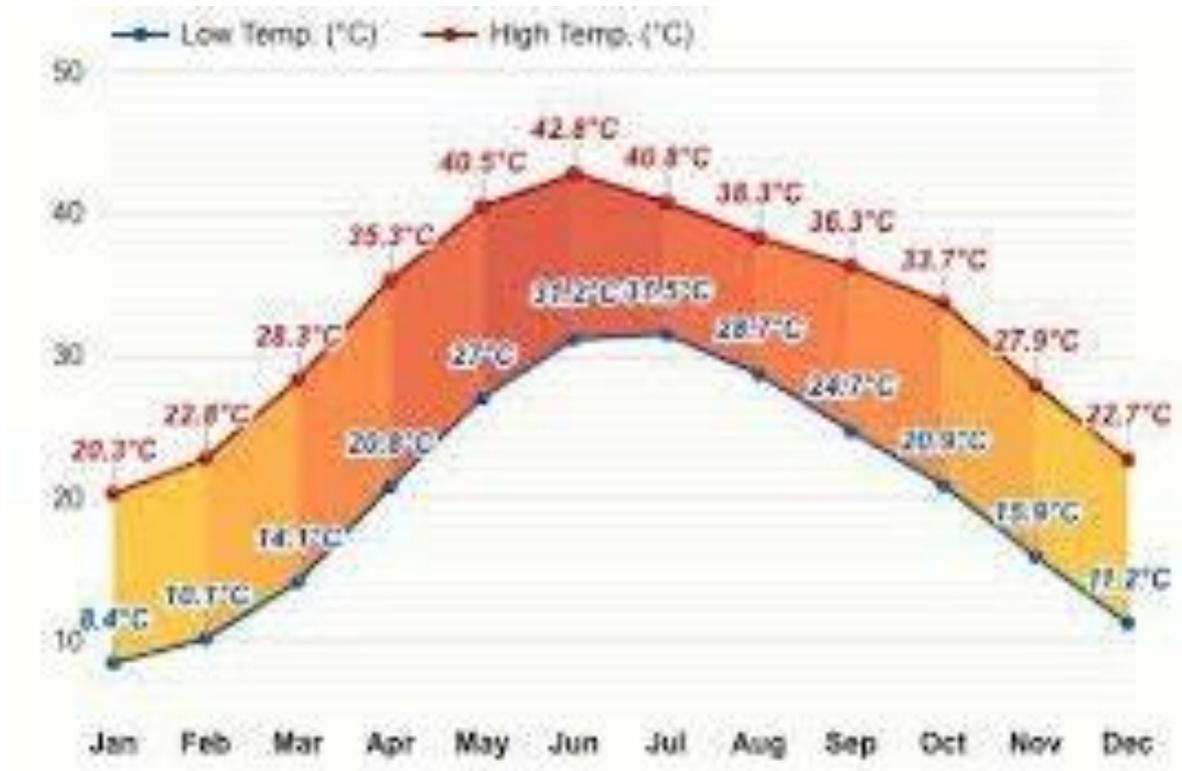
Multan, located in southern Punjab, Pakistan, covers an area of approximately 3,721 km². The district has flat terrain, with slight elevations in the northwest. The Chenab River flows near Multan, supporting agriculture and irrigation. The soil is sandy to clayey, with high fertility due to alluvial deposits. The region is rich in groundwater resources, but excessive extraction and salinity issues pose challenges.

5.3 Geography and Geology

Multan lies in the Indus River floodplain, with a hot semi-arid climate. The land is primarily flat, with some low-lying areas prone to seasonal flooding. The Chenab River and its tributaries supply irrigation water, supporting extensive agricultural activities. The geology consists of alluvial deposits from the Indus River system, with sand, silt, and clay forming the soil. Multan is located in a low-seismic zone, with minimal earthquake activity.

5.4 Temperature

Multan has an extremely hot summer and a mild winter. During May to September, temperatures can soar up to 50°C (122°F), with June being the hottest month. Winters (December to February) are mild, with temperatures dropping to around 3-5°C (37-41°F). Spring and autumn offer pleasant weather, but heatwaves and dust storms are common in the summer.



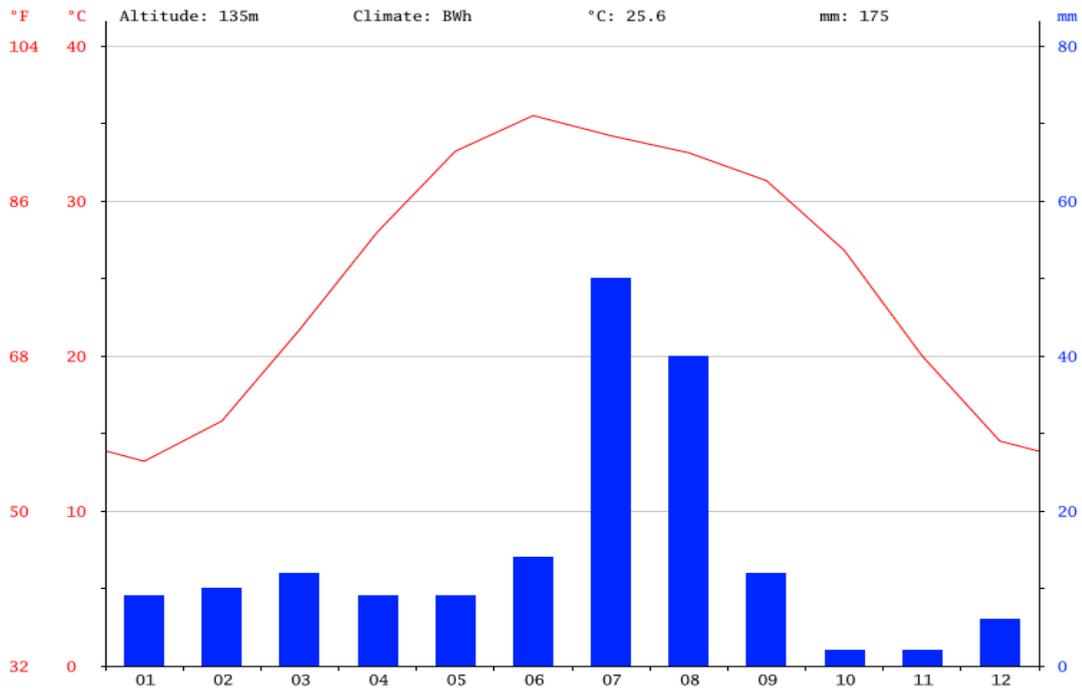
Annual Average Temperature

5.5 Rainfall

Multan receives low to moderate rainfall, averaging 127-200 mm per year. Most of the rainfall occurs during the monsoon season (July-September), while winters receive minimal precipitation. The district often experiences drought conditions due to limited rainfall and high evaporation rates. Canal irrigation plays a crucial role in supplementing water for crops.



ENVIRONMENTAL IMPACT ASSESMENT



Annual Rain Fall and Evaporation Rate (Blue bar indicates Rainfall and red line shows the evaporation rate)

5.6 Ecological Environment

Multan's environment is influenced by agriculture, rapid urbanization, and industrial activities. The natural vegetation includes thorny bushes, acacia trees, date palms, and mesquite plants, adapted to the dry climate. Wildlife species such as jackals, wild boars, foxes, and desert hares inhabit the region. Air and water pollution from industries, vehicle emissions, and waste disposal are growing concerns. Soil erosion, desertification, and deforestation are also impacting the ecological balance.



5.7 Biodiversity

5.7.1 Flora and Fauna

The flora of District Multan consists of drought-resistant and riverine plant species due to its semi-arid climate. Common tree species include Acacia (Kikar), Dalbergia Sissoo (Sheesham), Eucalyptus, and Date Palm, which thrive in the region. The Chenab River and canal areas support wetland vegetation such as Typha (cattails) and aquatic grasses. In agricultural fields, wheat, sugarcane, cotton, and mango orchards dominate the landscape, with wild shrubs and thorny bushes commonly found in uncultivated areas.



Figure 2 Flora Species of District Multan

5.7.2 Fauna

The fauna of District Multan includes a variety of mammals, birds, reptiles, and aquatic species, adapted to its semi-arid and riverine environments. Common mammals found in the region include jackals, wild boars, foxes, and desert hares. Bird species such as partridges, pigeons, kites, falcons, and egrets are commonly seen, especially near agricultural fields and water bodies. The Chenab River and canal system support fish species like rohu, catla, and tilapia, along with amphibians like frogs and turtles. Reptiles such as



snakes, monitor lizards, and geckos are also found in both urban and rural areas.



Figure 3 Different Species of Fauna of District Multan

5.8 SOCIO-ECONOMIC RESOURCES

Multan District's socio-economic resources are diverse, driven by its agricultural, industrial, and trade-based economy. Key resources include:

i. **Agriculture:**

Multan is a major agricultural center, producing wheat, sugarcane, cotton, and citrus fruits, particularly famous for its mango orchards. The Chenab River and an extensive canal system support irrigation.

ii. **Industry:**

The district has a strong industrial base, including textiles, ceramics, fertilizer production, and food processing, playing a crucial role in exports and local employment. Handicrafts like blue pottery and camel skin lamps are also significant.



iii. **Labor Force:**

A large portion of the population is engaged in agriculture, factory work, skilled crafts, and trading. Urban areas have a growing middle class, while rural areas rely heavily on agricultural labor.

iv. **Education and Health:**

Multan has several universities, colleges, and hospitals, such as Bahauddin Zakariya University (BZU) and Nishtar Medical University. However, rural areas still face challenges in access to quality education and healthcare services.

v. **Trade and Commerce:**

As a major commercial and trade hub in southern Punjab, Multan benefits from wholesale markets and strong transport links. Its proximity to major cities like Lahore and Karachi enhances trade in agriculture and manufactured goods.

5.9 Nearby Residential Areas

Multan has a mix of old and modern residential areas, catering to different income groups. Major residential areas include:

- **Cantonment Area** – A secure and well-developed locality.
- **Gulgasht Colony & Shalimar Colony** – Prime residential and commercial hubs.
- **Shah Rukn-e-Alam Colony** – A densely populated area with a mix of old and new houses.
- **Bosan Road & Vehari Road** – Growing residential and commercial zones with modern housing societies.

5.10 Social and Public Amenities Available

Multan has hospitals, educational institutions, shopping malls, parks, and public transport. Major hospitals include Nishtar Hospital, DHQ Hospital, and Multan Institute of Cardiology. Educational institutions such as Bahauddin Zakariya University (BZU) and Nishtar Medical University offer higher education. Parks like Shah Shams Park and Fort Kohna Qasim Park provide recreational spaces.

5.11 Quality of Life Values

Multan offers a moderate quality of life, with access to education, healthcare, and business opportunities. However, traffic congestion, pollution, and inadequate water supply affect daily life. Urban expansion and improved infrastructure are enhancing living conditions, but further improvements in public



services and environmental management are needed.

5.12 Occupations

The main occupations in Multan include farming, textile manufacturing, handicrafts, and trade. Many residents work in agriculture, government jobs, retail, and the transport sector. The mango and cotton industries provide seasonal employment.

5.13 Literacy Rate

Multan has a moderate literacy rate, improving due to institutions like BZU and Nishtar Medical University. While urban literacy rates are higher, rural areas struggle with access to quality education. Government programs focus on increasing literacy and technical skills.

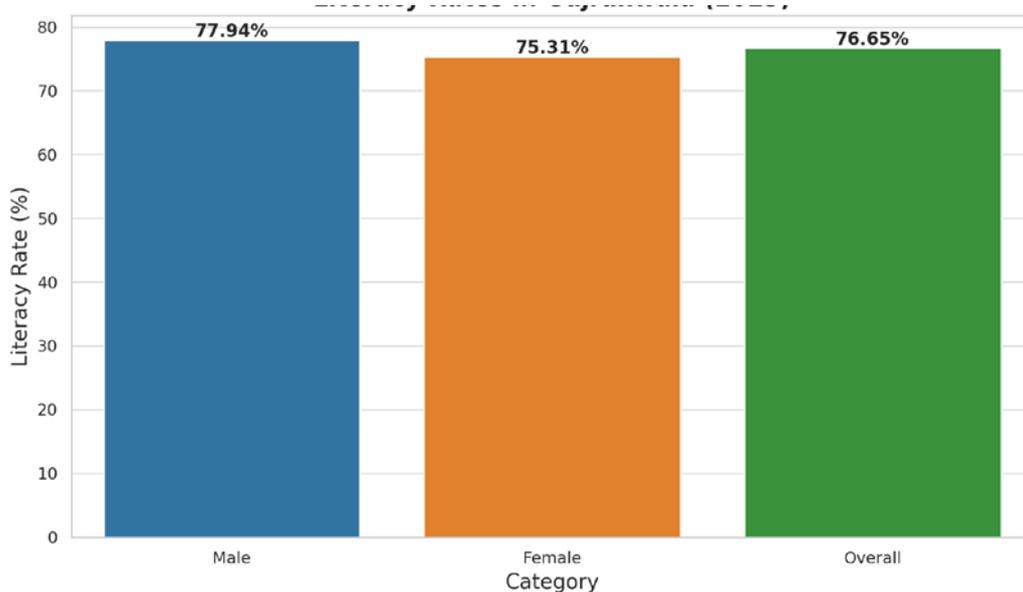


Figure 4 Literacy Rate of Multan

5.14 Industries

Multan has a diverse industrial sector, contributing significantly to the local and national economy. Major industries include textiles, fertilizers, ceramics, and food processing, with cotton ginning and mango processing being particularly important. The district is also known for its handicrafts, such as blue pottery and camel skin lamps, which have both local and international demand. Industrial zones and small manufacturing units support employment and trade, while the



export of textiles and agricultural products strengthens Multan's economic position.

5.15 Educational facilities

Multan has a well-developed educational infrastructure, offering primary to higher education through public and private institutions. It is home to prestigious universities like Bahauddin Zakariya University (BZU), Nishtar Medical University, and NFC Institute of Engineering. Several colleges and technical institutes provide vocational training and higher education opportunities. While urban areas have access to quality education, rural regions still face challenges in terms of infrastructure and educational resources. Collectively cater to a wide range of academic and professional pursuits.

5.16 Health facilities

Multan has a well-established healthcare system, with major hospitals such as Nishtar Hospital, Multan Institute of Cardiology, and DHQ Hospital, providing advanced medical care. Several private hospitals, clinics, and dispensaries cater to the growing population. Rural areas rely on Basic Health Units (BHUs) and Rural Health Centers (RHCs), but access to specialized medical services remains limited. The district also has pharmaceutical industries and medical research centers, contributing to healthcare development.

5.17 Major Parks in Multan

i. Shah Shams Park

- Location: Near Shah Shams Tabrez Shrine
- Features: Green spaces, walkways, family sitting areas
- Importance: Provides recreational space in a religious and historical part of the city.

ii. Qasim Fort Park (Qila Kohna Qasim Bagh)

- Location: Near Multan Cricket Stadium
- Features: Historical setting, gardens, panoramic views of the city
- Importance: Blends tourism with green space.

iii. Jinnah Park

- Location: Near Cantt area
- Features: Jogging tracks, children's play area, water fountains
- Importance: Popular with families for evening leisure.

iv. Chaman Zar Askari Lake Park

- Importance: Major recreational attraction.



v. Ladies and Children Park

- Location: Gulgasht Colony
- Features: Designed specifically for women and children, with dedicated play areas.
- Importance: Provides safe leisure space for families.

vi. Green Land Park

- Location: Bosan Road
- Features: Family picnic spots, rides
- Importance: Private Park popular for outings.
- Location: Cantt Area

4.17 Major Shopping Malls in Multan

i. The United Mall

- Location: Abdali Road, Cantt
- Features: Branded outlets, restaurants, children's play area, supermarket
- Importance: One of the first modern malls in Multan.

ii. Mall of Multan

- Location: Bosan Road near Bahauddin Zakariya University
- Features: Multi-level shopping, cinema, food court
- Importance: The largest and most upscale mall in Multan.

iii. Chase Up Mall

- Location: Bosan Road
- Features: Departmental store, clothing, grocery
- Importance: Budget-friendly shopping option for all demographics.

iv. City Centre Mall

- Location: Near High Court
- Features: Local and international outlets
- Importance: Mid-size mall with food and fashion brands.

v. The Centaurus Mall (Under construction / planning)



- Future development expected to boost commercial activity and urban expansion.

5.18 Major Universities in Multan

i. Bahauddin Zakariya University (BZU)

- Location: Bosan Road
- Type: Public Sector
- Programs: Undergraduate to Ph.D. in sciences, engineering, social sciences, agriculture, and management.
- Importance: Largest University in South Punjab; major research hub.

ii. Nishtar Medical University

- Location: Nishtar Road
- Type: Public Medical University
- Programs: MBBS, BDS, Nursing, Allied Health Sciences
- Importance: Oldest and most reputed medical institution in the region.

iii. Women University Multan

- Location: Mattital Road & Kutchery Campus
- Type: Public Sector (Women-only)
- Programs: Sciences, Arts, IT, Management
- Importance: Expanding access to higher education for women.

iv. Air University – Multan Campus

- Location: Khanewal Road
- Type: Public Sector (affiliated with Pakistan Air Force)
- Programs: Business Administration, IT, Engineering
- Importance: Quality education with technical focus.

v. Institute of Southern Punjab (ISP)

- Location: Gulgasht Colony
- Type: Private Sector



- Programs: Business, Education, Computer Science, Engineering
- Importance: One of the prominent private universities in South Punjab.

5.19 Colleges in Multan

i. **Government Emerson College**

- One of the oldest colleges in the region offering FA/FSc and BA/BSc programs.

ii. **Government College of Technology, Multan**

- Offers diplomas and degrees in engineering technologies and technical disciplines.

iii. **Multan Medical & Dental College**

- Private sector medical college affiliated with PMDC.

iv. **Punjab College Multan**

- A popular chain college offering intermediate and bachelor-level education.

v. **Superior College Multan**

- Private college offering business, IT, and intermediate education.



CHAPTER .6

POTENTIAL

ENVIRONMENTAL IMPACTS

AND MITIGATION MEASURES



Chapter 6: POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

Assessment of impacts depends on the nature and magnitude of the project/ activity being undertaken, as well as the type of environmental control measures that are envisaged as part of the project proposal. The potential impacts of the project have been identified and assessed based on the type and scale of the various activities associated with this project. This section discusses the project's potential environmental impacts on the area's geomorphology, soil, water resources, air, biological resources, and socioeconomic conditions and, where applicable, identifies mitigation measures that will reduce, the adverse impacts.

6.1 Identification of Potential Environmental Impacts

In the first step, potential environmental impacts of the project are identified by desktop work using checklists, professional judgment, and published literature on environmental impacts of similar projects, and standard environmental guidelines. Potential impacts are also identified through discussion with project proponent, and consultation with stakeholders and community to identify their concerns. The main aspects associated with potential environmental impacts are as follows: -

- i. Ambient Air Quality
- ii. Waste Water
- iii. Noise pollution
- iv. Ecology of the area, including flora and fauna
- v. Soil Contamination and Erosion
- vi. Air Emissions (Dust and Particulate Matter)
- vii. Solid Waste Generation

6.2 Scoping Criteria for Impacts

The potential impacts of the Project are evaluated based on the following criteria:

- Whether current baseline conditions and the anticipated changes in environmental parameters are likely to be affected by Project



- Whether any impact will violate applicable Punjab Environmental Quality Standards (PEQS).

6.3 Methodology for Impact Assessment

The impact assessment methodology defines three levels of consequences (or severity) and likelihood (chance of occurrence) i.e. Low, Moderate/Medium, or High. The significance of an impact is determined based on the level of consequence and likelihood of the impacts.

Table 6.1 Methodology for Impacts Assessment

Sr. No	Level	Severity of Impact (Results)	Likelihood
1.	High	Significant or catastrophic harm to the local and regional environment. A serious threat to the company’s reputation, profitability, and overall ability to operate.	Measurable harm to the environment. Potential impact on reputation and costs. Decreased operational efficiency
2.	Moderate	Measurable damage to the environment Potential to affect reputation/cost Reduced efficiency	Moderate likelihood of occurrence throughout the operational lifetime. Periodic or occasional aspects of the operations.
3.	Low	Negligible damage to the environment No risk to business	Unlikely to occur during lifetime of operation.

6.4 Impacts Assessment

The impacts are classified based on their spatial distribution, i.e. local when impacting an area of approximately 1 km radius from the project area, moderate spread, when impacting an area of 1 to 2 km radius, and regional beyond 2 km.

The impacts are classified as short-term, moderate-term, and long-term in terms of their existence on a temporal scale. Impacts with less than 1 year of existence as short-term term, while those with 1 to 3 years as moderate term and more than 3 years as long term.

The negative impacts are termed as adverse impacts while positive impacts as beneficial. The significance of the environmental impacts of various involved activities has been evaluated based on the following criteria.

**Table 6.2: Impacts Significance Area**

Sr. No	Impacts Significance	Criteria
1.	Long Term	When the impact is of high intensity with high spread and high duration.
2.	Moderate Term	When the impact is of moderate intensity with high moderate spread and high-moderate duration.
3.	Short Term	When the impact is of low intensity but with moderate spread and moderate duration.
4.	Insignificant	When the impact is of low intensity, low spread, and low duration.
5.	Beneficial	When the Impacts are Positive.

6.5 Environmental Mitigation Measures

Highly effective environmental management practices will be done to keep the project's surrounding environment within safe limits in terms of air and water quality. Environmental monitoring will be conducted as per requirements of environmental law and EPA directions.

6.6 Compensation in Money Terms

There is no damage to flora, fauna, or any other resource, hence compensation in money terms is not needed.

6.7 Replacement/ Relocation/ Rehabilitation

The said project is planned in a vacant area and there is no sensitive area, population, or natural resource. So, replacement, relocation, and rehabilitation are not required.

6.8 Potential Environmental Impacts associated with Project Location

- i. The proponent has selected a site for his project which exists in the vacant area.
- ii. There is no community or human settlement within the safe radius of the site.
- iii. There is no flora & fauna (particularly belonging to an endangered species) within a 2 km radius of the site.
- iv. There is a good road network in the area of the project.
- v. There is no ecologically sensitive or declared protected area (PA) like forest, fish



hatcheries, Territorial Waters, wildlife or game reserves, or any structure of socio-cultural significance (historical or archaeological site or religious structures).

It can be safely concluded that the selected site is best suited for the project, and will not pose any adverse environmental impacts.

6.9 Methodology for Impact Assessment

The environmental aspects of the project during all stages namely construction and operation have been selected from a master list of environmental items which is widely used world over for this purpose. The extent of qualitative and quantitative impacts has been described and mitigation measures have been proposed to keep them within permissible limits

6.10 Impacts due to Project Location

The project has been planned in a Govt. notified Industrial Area. The establishment of this unit is not expected to cause any negative impacts at the location of the project because all the environmental aspects shall be kept under strict control with the help of stringent mitigation measures.

6.11 Impacts associated with Construction Phase and Mitigation Measures

The Environmental and Socio-Economic Impacts associated with the construction phase of project, are the following:

- i. Air Pollution
- ii. Waste water and Solid waste
- iii. Noise pollution
- iv. Ecology of the area, including flora and fauna
- v. Air Emissions (Dust and Particulate Matter)
- vi. Solid Waste Generation

6.12 Impacts of Air Pollution

Dust emissions from land clearing, construction activities, and movement of machinery and vehicles may degrade local air quality.

Mitigation Measures:

- Water sprinkling on unpaved roads and active construction sites.



- Covering of construction material during transport and storage.
- Regular maintenance of vehicles and machinery to minimize exhaust emissions.

6.13 Impacts of Noise Pollution

Increased noise levels from construction machinery and equipment may disturb nearby residents and workers.

Mitigation Measures:

- Use of noise-suppressing equipment and proper mufflers.
- Limiting construction activities to daytime hours.
- Provision of personal protective equipment (PPE) like earplugs to workers

6.14 Impacts of Occupational Health and Safety

Workers are exposed to dust, noise, and mechanical hazards, posing health and safety risks. A comprehensive occupational health and safety plan is as under.

Mitigation Measures

- i. Adequate shuttering should be established and used for all kinds of construction activities
- ii. Comprehensive occupational health and safety plan.
- iii. Regular training programs for workers.
- iv. Provision of PPE (masks, gloves, goggles, etc.).
- v. Emergency response and first aid arrangements on-site.
- vi. Work at height should be performed only after permit to work by HSE staff who shall issue such permit to work at height after taking all appropriate measures.
- vii. Safety signage should be adequately displayed,
- viii. Clean drinking water availability should be ensured for use by all construction staff.
- ix. Emergence response plan should be made, communicated to all and maintained during all construction activities.
- x. First aid facility should be readily available for workers at the site.
- xi. Good house-keeping should be practiced to prevent the events of slips.
- xii. Personal protective equipment like helmets, masks gloves and helmets should be strictly used by the labor according to their assignments at the work site.
- xiii. Fire and any other emergency shall be managed with the help of emergency services.



- xiv. Proper fire safety arrangements will be provided at site. A part form installation of fire hydrant, smoke detectors, fire alarm, safety sign, emergency exits, trained staff from rescue 1122.
- xv. During hot season, outdoor work timing may be changed. Only indoor construction activities may be performed during sunny part of the day. In case of inevitable circumstances, workers should be given adequate breaks.
- xvi. Workers should be given proper fluids during hot season to balance electrolytes in their body.
- xvii. Painting activity should be performed with all occupational health and safety precautions.

6.15 Environmental Enhancement Measures

The following steps shall be taken for environmental enhancement:

- i. Daily sweeping and dusting/cleaning shall be ensured.
- ii. Vacuum cleaning shall be done daily where required.
- iii. The perimeter and lawns of the plot shall be vegetated with flowering plants and fruit trees for environmental enhancement
- iv. Adequate firefighting system will be established and maintained at all times according to the requirements of respective Regulatory Authority.
- v. Visual impacts of the unit and its surroundings shall be given due consideration. Visual impacts shall be improved through landscaping and tree plantation.

The potential environmental impacts of the project and respective mitigation measures are summarized below: -

6.3 Summary of Potential Environmental Impact & Mitigation Measures	
Potential Environmental Impacts	Mitigation Measures
CONSTRUCTION PHASE	
Solid Waste	
<ul style="list-style-type: none"> ● Solid waste shall be generated in the form of excavation waste, broken bricks, waste concrete material, steel trimmings, etc. 	<ul style="list-style-type: none"> ● All types of waste shall be kept segregated. The waste shall be managed regularly. ● The construction waste shall be disposed of through construction waste contractors. The recyclable part of the waste shall be sold to the recyclers.



Air Pollution	
<ul style="list-style-type: none"> • Particulate matter may arise due to excavation and movement of off-road and on-road vehicles during transport of construction materials such as sand, aggregate, etc. • Cutting, grinding and welding may cause noise pollution. • Off-road or on-road vehicles may also cause exhaust pollution. 	<ul style="list-style-type: none"> • Construction contractor shall be directed to ensure using well-conditioned and well-tuned vehicles and equipment. • Contractor will ensure Sprinkling of water on the exposed surfaces. • Contractor will Cover all trucks loaded with sand and other such lose construction materials. • Regular sweeping of roads and parking areas shall be ensured to avoid deposition of dirt /dust. • Contractor will ensure use of appropriate masks by workers to prevent entry of dust in their breathing system.
Noise Pollution	
<ul style="list-style-type: none"> • Operation of construction machinery and equipment may be a source of noise pollution. • Cutters grinders and welding activities may also cause noise. • Movement of off-road or on-road vehicles may generate noise 	<ul style="list-style-type: none"> • The Project proponent and contractor will ensure that all vehicles are well maintained. • Contractor will ensure use of ear plugs by workers to prevent entry of noise in their ears.
Occupational Health & Safety	
<ul style="list-style-type: none"> • Cutting, grinding, welding operations may operate metal dust 	<ul style="list-style-type: none"> • Contractor will ensure use of personal protective equipment by respective workers.
Socioeconomic	
<ul style="list-style-type: none"> • Disturbance of local population • Jobs for locals 	<ul style="list-style-type: none"> • The construction labor shall be advised to respect the local culture and moral values. • Locals shall be preferred for job as far as possible according to their competence/ education/ skills.



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Operational Phase	
Air Emissions	
<ul style="list-style-type: none"> • Release of chemical vapors, ammonia, or particulate matter from manufacturing, blending, drying, or packaging. • Fugitive emissions during material handling. 	<ul style="list-style-type: none"> • Install air pollution control systems (e.g., scrubbers, bag filters, cyclones, activated carbon filters). • Provide closed conveyance systems for volatile chemicals. • Regularly monitor stack emissions and ambient air quality.
Water Pollution / Effluents	
<ul style="list-style-type: none"> • Generation of contaminated process wastewater, floor washing water, and equipment cleaning water. • Possible contamination from spills and leaks. 	<ul style="list-style-type: none"> • Install and operate an Effluent Treatment Plant (ETP) with neutralization, biological treatment, and filtration OR Hand over the waste water to any EPA approved Vendor for its safe disposal through an Incinerator • Reuse treated water for gardening or floor washing. • Regularly monitor wastewater quality to meet PEQS.
Soil and Groundwater Contamination	
<ul style="list-style-type: none"> • Leakage from storage tanks, drums, or pipelines contaminating soil or groundwater. 	<ul style="list-style-type: none"> • Store chemicals on impervious surfaces with spill containment. • Conduct periodic inspection of storage tanks and pipelines. • Implement a spill management and emergency response plan.
Solid and Hazardous Waste	
<ul style="list-style-type: none"> • Generation of hazardous waste such as sludge, contaminated containers, spent solvents, and off-spec products. 	<ul style="list-style-type: none"> • Store hazardous waste in a designated, labeled, and roofed area. • Dispose of through EPA-approved hazardous waste contractors.



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<ul style="list-style-type: none"> • Packaging waste (bags, drums, etc.). 	<ul style="list-style-type: none"> • Reuse/recycle containers after decontamination. Maintain waste manifests and records.
Odor and Volatile Emissions	
<ul style="list-style-type: none"> • Unpleasant odors from chemicals, solvents, or Soil Micro Nutrients 	<ul style="list-style-type: none"> • Enclose odor-prone operations. • Use activated carbon filters and ventilation systems. • Maintain proper housekeeping and promptly clean spills.
Noise Pollution	
<ul style="list-style-type: none"> • Noise from compressors, pumps, and material handling equipment. 	<ul style="list-style-type: none"> • Install silencers and acoustic enclosures. • Maintain equipment regularly. • Develop greenbelt around facility as a noise buffer.
Occupational Health and Safety (OHS)	
<ul style="list-style-type: none"> • Risk of chemical exposure, fire, explosion, or accidents. 	<ul style="list-style-type: none"> • Provide PPE (gloves, masks, respirators, goggles). Conduct periodic safety drills and medical check-ups. • Install fire detection, suppression, and alarm systems. Implement Material Safety Data Sheets (MSDS) and chemical handling protocols.
Energy Consumption	
<ul style="list-style-type: none"> • High power usage for heating, drying, and blending operations. 	<ul style="list-style-type: none"> • Install energy-efficient motors and LED lighting. • Conduct energy audits. • Use solar power or renewable sources where possible.
Water Consumption	



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<ul style="list-style-type: none"> • High water demand for cooling, washing, and processing. 	<ul style="list-style-type: none"> • Install flow meters and leak detection systems. Recycle treated water. • Use water-efficient fixtures.
<p>Socio-Economic Impact</p>	
<ul style="list-style-type: none"> • Employment and economic benefits to local community. 	<ul style="list-style-type: none"> • Prefer hiring from local areas. • Ensure safe working conditions and fair wages. • Conduct community development and CSR activities.
<ul style="list-style-type: none"> • Ecological Impact 	
<ul style="list-style-type: none"> • Impact on nearby vegetation due to air or water pollution 	<ul style="list-style-type: none"> • Develop a thick greenbelt around plant boundary. • Continuous environmental monitoring. • Maintain buffer zones from sensitive habitats.



CHAPTER .7
STAKEHOLDERS
CONSULTATION



CHAPTER NO 7: STAKEHOLDERS CONSULTATION

Stakeholders' consultation refers to the process by which the concerns of relevant persons/ departments who have a plausible stake in the environmental impacts of the project or activity are ascertained to consider all the material concerns in the project or activity design as appropriate.

Impact assessment surveys and stakeholders' consultation sessions are held with different stakeholder's groups to take their comments/views proposals.

7.1 Objectives of Consultation

Stakeholders' consultation plays a vital role in ascertaining the impacts of the said project on stakeholders in the successful implementation and execution of the project. It provides an opportunity to exchange knowledge with the beneficiaries and affected parties. The involvement of stakeholders is essential, as it leads to better and more acceptable decision-making. The overall objective of the consultation with the stakeholders is to help verify the environmental and social issues, besides technical ones, that have been presumed to arise and to identify those that are not known or are specific to the project. Discourse from many who have thoroughly observed the site conditions in the pre-development phase goes a long way in updating knowledge and understanding.

- i. Share information with Stakeholders on said project installation and operation
- ii. Share the impacts on the physical, biological, and socioeconomic environment
- iii. Understand stakeholders concerns regarding various aspects of the project
- iv. Collect valuable suggestions from the stakeholders to improve the said project design
- v. Understand the perceptions, assess social impacts, and concern of the people/communities of the project area
- vi. Raise the awareness level and identify any issues for the implementation of the said project
- vii. Invite people to express their views about the positive/negative impacts on their lifestyles and environment
- viii. Disclose information of contact offices/officers for any complaints/queries

7.2 Advantages of Stakeholder Consultation

Stakeholder consultation during an Environmental Impact Assessment (EIA) study is a critical



component of the process. It ensures that the project is not only environmentally sustainable but also socially acceptable and legally compliant.

Here are the key advantages of stakeholder consultation during an EIA study:

(A) Improved Project Design and Planning

- Stakeholders such as local communities, NGOs, and technical experts can provide valuable local knowledge and insights about the project area.
- Their input helps in identifying potential environmental and social impacts early, allowing the project design to be modified or optimized accordingly.

(B) Enhanced Identification of Environmental and Social Issues

- Consultation helps uncover site-specific environmental risks (e.g., flood-prone areas, biodiversity concerns) that might not be evident from technical data alone.
- It ensures a more comprehensive assessment of environmental, social, and economic impacts.

(C) Strengthened Public Trust and Social Acceptance

- Involving affected communities and other stakeholders builds transparency and credibility of the EIA process.
- It promotes public confidence and cooperation, reducing chances of local opposition or protests later.

(D) Compliance with Legal and Institutional Requirements

- Many national environmental laws (including Pakistan Environmental Protection Act 1997) and international funding agencies (like World Bank, ADB, IFC) require stakeholder engagement as a mandatory step.
- Proper consultation ensures legal compliance and smoother approval of the Environmental Approval/NOC.



(E) Conflict Prevention and Risk Reduction

- Early dialogue helps to identify and resolve conflicts before they escalate.
- It minimizes the risk of delays, litigation, or reputational damage during project implementation.

(F) Promotion of Sustainable Development

- Stakeholder input ensures that social, economic, and environmental factors are balanced.
- This contributes to long-term sustainability and responsible resource management.

(G) Strengthened Decision-Making

- Consultations provide multiple perspectives and data sources for decision-makers.
- It leads to more informed, transparent, and defensible decisions about project approval or modification.

(H) Empowerment of Local Communities

- The process gives a voice to people directly or indirectly affected by the project.
- It promotes community ownership, social inclusion, and local empowerment.
- The summary of all above mentioned benefits is that stakeholder consultation during an
- EIA ensures better environmental protection, social harmony, and project success by integrating local knowledge, ensuring transparency, and building trust among all involved parties.

7.3 Identification of Stakeholders

All the people who are directly or indirectly affected or concerned with the project are the stakeholders. Besides the living population of the surrounding areas, some other stakeholders were identified and contacted. They are the key players including; shops, public and government offices, schools, hospitals, hotels, and NGOs. Not only published material and other literature was obtained but also the views and concerns of stakeholders were noted.

7.3.1 Direct Stakeholders

No disturbance in the local community is being foreseen due to the installation of the said project as the project is located in open land area. No property loss is being envisaged due to the construction of Asphalt Plant.



7.3.2 Indirect Stakeholders

The indirect impact will occur on those who are living or doing business within a Project Area of Influence (AOI). In the case of the said project, the residents around the project area will get an opportunity to be employed. So, in the early development stages and during the operational phase, people of surrounding communities will be benefited. Indirect respondents include;

- i. Government agencies responsible for dealing with the project-related activities.
- ii. Government Agencies directly or indirectly involved in the execution and monitoring of the said project.
- iii. Government departments such as TMA and the Planning & Development Department, working on other development activities are considered indirect stakeholders.

7.4 Consultation Process

Information disclosure, public consultation, and discussion regarding the various aspects of the project with the people of the area are necessary. This process is intensified during the EIA Studies. Surveys were carried out to investigate physical, biological, and socioeconomic resources falling within the immediate AOI of the project. Primary data collection included:

- i. Data collection regarding the socio-economic conditions of the study area.
- ii. Collection of information on the biological environment from the locals.

7.5 Objectives of Meetings with the Stakeholders

- i. Share information with stakeholders on the said project and expected impacts on the community in the vicinity of the project.
- ii. Understand stakeholders' concerns regarding various aspects of the project, including existing conditions, and the likely impacts of construction and operation activities.
- iii. Provide an opportunity to the public to influence the project design positively.
- iv. Obtain local and traditional knowledge, before decision making.
- v. Increase public confidence in the proponent, reviewers, and decision-makers.
- vi. Reduce conflict through the early identification of controversial issues, and work through them to find acceptable solutions.
- vii. Dissemination of information through discussions, education, and liaison with stakeholders.
- viii. Documentation of information narrated by the stakeholders and mitigation measures proposed by the stakeholders.
- ix. Incorporation of public concerns and their solutions in the EIA; and eliciting their comments and feedback.
- x. Create a sense of ownership of the project proposal in the minds of the stakeholders.



7.6 Consultation with Local Community

The response of various stakeholders in the population of the study area was ascertained by conducting a sample survey, through specially formatted questionnaires. Questions posed to the public were related to the creation of possible impacts, adverse impacts, and beneficial impacts, including; employment opportunities, income generation activities, change in living standards, and provision of the amenity. The various rounds of public meetings and consultations were arranged in the project and study area.

7.7 Summary of Views, Concerns, and Suggestions

The summary of socioeconomic concerns and problems highlighted by different persons have been mentioned here:

- i. No any tree located inside the project area or in the surrounding area should be removed.
- ii. The project will become a source of income for locals to earn their livelihood easily and honorably.
- iii. Employment opportunities should be provided to the locals.
- iv. Water sprinkling should be done regularly during the construction phase to avoid dust emissions.
- v. Good relations with the local communities should be promoted by encouraging the Contractor to provide opportunities to the locals against skilled and unskilled positions.
- vi. The contractor should prefer hiring local labor from adjacent nearby villages.
- vii. Indigenous trees around the facility should be planted to control air pollution and improve the aesthetic conditions of the area.



CHAPTER. 8
ENVIRONMENT
MANAGEMENT &
MONITORING PLAN



CHAPTER 8: ENVIRONMENT MANAGEMENT & MONITORING PLAN

This chapter provides the Environmental Management and Monitoring Plan (EMMP) of the project for its construction and operation phases to keep its environment benign and to ensure compliance of Punjab Environmental Quality Standard (PEQS). This section underline the monitoring framework for both construction and operational phases to check compliance of Monitoring Plan and to take timely actions for correction.

8.1 Introduction

The Environmental Management and Monitoring Plan (EMMP) aims to ensure that all potential adverse environmental impacts arising during the construction and operational phases of the Pesticides and Fertilizers Manufacturing Factory are properly managed, mitigated, and monitored.

8.2 Objectives of the EMMP

- To minimize environmental degradation during construction and operation.
- To ensure compliance with environmental laws and regulations.
- To monitor environmental parameters and identify any non-compliance early.
- To promote safe and sustainable industrial practices.
- To enhance worker safety and community well-being.

8.3 Components of Environmental Management and Monitoring Plan

The EMMP consists of the following:

- i. Environmental Management Plan
- ii. Environmental Monitoring Plan
- iii. Communication and Documentation
- iv. Institutional Capacity
- v. Environmental Training



8.4 Environmental Management Plan and Monitoring Plan

Table 8.1 Construction Phase						
Sr. No	Environmental Aspect	Potential Impact	Mitigation Measures	Monitoring Parameter	Frequency	Responsibility
	Air Quality	Dust and emissions from excavation, vehicles, and machinery.	Water sprinkling on dusty roads. Cover trucks transporting materials. Maintain construction equipment. Restrict vehicle idling.	Dust levels (PM ₁₀ , PM _{2.5})	Quarterly	HSE Officer
	Noise	Noise from machinery and vehicles disturbing nearby areas.	Use low-noise equipment. Operate machinery only during daytime. Provide PPE to workers.	Noise levels (dB(A))	-do-	-do-
	Water Pollution	Runoff with sediment, cement slurry, and oils contaminating water bodies.	Construct silt traps. Store fuels on impervious surfaces. Dispose of wastewater properly.	pH, TSS, Oil & Grease	-do-	-do-
	Soil Quality	Contamination from fuel spills or improper waste disposal.	Designate refuelling areas. Collect and dispose of contaminated soil. Avoid open dumping.	Visual inspection for spills	-do-	-do-
	Solid Waste	Debris, packaging waste, and scrap materials.	Segregate and reuse waste. Authorized disposal of non-recyclables.	Waste records and visual checks	-do-	-do-
	Occupational Health & Safety	Worker accidents, dust inhalation, or	Provide PPE. Safety training and signage. Emergency first-aid	Safety incidents records	-do-	-do-



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		injuries.	station.			
	Ecology/ Vegetation	Clearing of trees and loss of vegetation.	Limit clearing. Replant native species after construction.	Number of trees replanted	-do-	-do-

Table 8.2 Operational Phase

Sr. No	Environmental Aspect	Potential Impact	Mitigation Measures	Monitoring Parameter	Frequency	Responsibility
i.	Air Emissions	Emission of chemical vapors, particulate matter, and gases.	Install scrubbers, bag filters, activated carbon units. Maintain all stacks and process equipment. Regular air monitoring.	PM ₁₀ , SO ₂ , NO _x , VOCs	Quarterly	Environmental Officer
ii.	Effluent Wastewater	Discharge of contaminated water from process and washing.	Operate Effluent Treatment Plant (ETP). Reuse treated water. Comply with PEQS limits.	pH, COD, BOD, TDS, Oil & Grease	-do-	-do-
iii.	Soil & Groundwater	Leakage or spills from chemical storage tanks.	Store chemicals on impervious floor. Provide spill containment and absorbents. Regular inspection of storage area. Provide spill containment and absorbents. - Regular inspection of storage area.	Visual checks, soil sampling near tanks	-do-	-do-
iv.	Solid & Hazardous Waste	Generation of sludge, used drums, spent solvents, and packaging waste.	Segregate and label hazardous waste. Dispose through EPA-approved contractor. Maintain waste inventory.	Waste records, manifests	-do-	-do-
v.	Noise Pollution	Noise from pumps, compressors, and	- Enclose noisy units. - Maintain equipment.	Noise levels (dB(A))	-do-	-do-



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		transport.	- Greenbelt as buffer zone.			
vi.	Odor Emissions	Odor from chemical reactions or storage areas.	Maintain proper ventilation. Use activated carbon filters. Regular cleaning and maintenance.	Odor intensity (qualitative)	-do	-do
vii.	Occupational Health & Safety	Exposure to chemicals, fire, explosion, or accidents.	Provide PPE. Conduct safety drills and training. Implement MSDS for all chemicals. Install fire alarms and extinguishers.	Accident records / PPE availability	-do-	-do-
viii.	Energy Consumption	High electricity uses for production.	Use energy-efficient motors and LED lighting. Regular energy audits. Explore renewable sources.	Energy consumption logs	-do-	Electrical Engineer
ix.	Water Consumption	Excess use of fresh water in processes.	Recycle treated water. Install flow meters and leak detectors.	Water use records	-do-	Plant Manager
x.	Socio-Economic Benefits	Employment generation and local development.	Prefer local hiring. Conduct community engagement and CSR activities.	Number of local workers employed	-do-	HR Department

8.6 Supervision & Monitoring

The Environmental Manager will be responsible for all environmental issues and the implementation of EMMP.

8.7 Communications & Documentation

An effective mechanism will be developed to store and communicate environmental information to the responsible persons.

8.8 Environmental Training

Environmental Training will help to ensure that the requirements of the EIA and EMMP are clearly understood and followed by all project personnel in the course of construction and



operational phase of project.

Table 8.3 Training Schedule

Target Personal	Topic	Schedule
Selected management staff	HSE Management	Quarterly
All personnel of project	Fire Fighting	-do-

Table 8.4 Annual Environmental Budget

Sr. No	Components	Estimated Cost
1	Environmental Monitoring	Rs. 5,00,000/-
2	Training of staff	Rs. 200,000/-
3	Land preparation and Tree Plantation	Rs. 300,000/-
4	Watering and maintenance of trees/landscape	Rs. 2,00,000/-
Total Rs.12,00,000/-		



CHAPTER.9
CONCLUSION AND
RECOMMENDATION



Chapter 9: CONCLUSION & RECOMMENDATIONS

9.1 Conclusion:

The EIA findings showed that the project design is the most suitable based on the current best practices and the available technology. The project is feasible and desirable from the perspective of environmental and social-economic evaluation undertaken in this study. The overall benefits of the proposed development are far higher than the potential cost of the marginal negative environmental changes which are likely to occur. The proposed project is desirable because it will improve the socio-economic status of the people in the area. It will create employment and deliver a wide range of other socioeconomic benefits.

The baseline environmental assessment of the proposed project site indicate that the site selected for the project does not contain any sensitive area. The EIA establishes that the proposed project design is far more suitable than the No project option.

The project proponent shall shoulder the responsibility of environmental protection and safety of workers. It will also fulfill the requirements of Regulatory Authority i.e. E P A . Employment opportunities shall be provided to skilled, unskilled, and high qualified persons.

Based on an overall assessment of the environmental impacts of the project, it is concluded that the project is not likely to cause any significant adverse impacts on the social, physical, and biological environment of the area.

9.2 Recommendations

Following are recommendations to make this project more environment friendly.

- i. Implementation of EMP must be given priority.
- ii. Proper PPEs including gloves should be provided to workers during Construction and Operational phase of project.
- iii. Installation of fire extinguishers in the premises and their regular maintenance must be ensured.
- iv. Equipment maintenance and efficiency must be checked regularly.
- v. No compromise on public health and the environment should be allowed during Construction and Operational phase of project.
- vi. A proper tree plantation plan should be developed to support the environment and air quality of the area.



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- vii. Waste storage bins should be installed at different points for proper waste collection and disposal.
- viii. Smoking should be avoided within the premises of the project site and near chemicals/fuel storage areas.
- ix. The Security Guards shall be trained to provide necessary support in case of any emergency situations.
- x. The fire alarms should be installed to signal the evacuation.
- xi. Proper, communication systems in an effective manner shall be made with hospitals, emergency services, and police for urgent support.

In view of the findings of the IEE / EIA, the proposed project is considered an environmentally safe project.



GLOSSARY

- i. **Biodiversity:** The variety of all life forms on earth – different plants, animals, microorganisms, their genes, and the ecosystems they form.
- ii. **Carbon Footprint:** The total amount of greenhouse gases emitted directly or indirectly by human activities, usually measured in carbon dioxide equivalents (CO₂e).
- iii. **Climate Change:** A long-term change in the average weather patterns of the Earth, primarily caused by increased levels of greenhouse gases.
- iv. **Conservation:** The sustainable use and management of natural resources to prevent exploitation, degradation, and destruction.
- v. **Deforestation:** The clearing or thinning of forests by humans, often for agriculture, logging, or development.
- vi. **Ecosystem:** A community of living organisms interacting with their physical environment (e.g., forest, desert, coral reef).
- vii. **Emissions:** Substances released into the air, especially harmful gases such as CO₂, methane, and nitrogen oxides from industrial and vehicular sources.
- viii. **Endangered Species:** Species that are at risk of extinction due to loss of habitat, environmental changes, or human activities.
- ix. **Environmental Impact Assessment (EIA):** A process to evaluate the environmental effects of a proposed project or development.
- x. **Fossil Fuels:** Natural resources like coal, oil, and natural gas formed from ancient organic matter, which release greenhouse gases when burned.
- xi. **Global Warming:** An increase in Earth's average surface temperature due to the buildup of greenhouse gases in the atmosphere.
- xii. **Green Energy / Renewable Energy:** Energy sources that are naturally replenished, like solar, wind, hydro, and geothermal power.
- xiii. **Greenhouse Gases (GHGs):** Gases that trap heat in the atmosphere, including carbon dioxide, methane, nitrous oxide, and fluorinated gases.
- xiv. **Habitat Loss:** Destruction or alteration of the natural environment where wildlife lives, often due to human activity.
- xv. **Pollution:** Contamination of air, water, or soil by harmful substances or waste.



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- xvi. **Recycling:** The process of converting waste materials into new products to reduce resource consumption and pollution.
- xvii. **Renewable Resources:** Resources that can be replenished naturally over time, such as sunlight, wind, and biomass.
- xviii. **Sustainability:** Meeting the needs of the present without compromising the ability of future generations to meet their own needs.
- xix. **Urbanization:** The process of increasing population in cities and towns, often leading to environmental stress and loss of natural spaces.
- xx. **Zero Waste:** A philosophy that encourages the redesign of resource life cycles so that all products are reused, and no trash is sent to landfills or incinerators.
- xxi. Environmental Protection & Industrial Pollution Control
- xxii. **Afforestation / Reforestation:** Planting trees to create forests (afforestation) or restore degraded forest lands (reforestation), used as a pollution mitigation measure and carbon sink.
- xxiii. **Air Pollution Control Devices:** Equipment used to reduce or remove pollutants from industrial exhaust gases. Examples include electrostatic precipitators, baghouse filters, and scrubbers.
- xxiv. **Ambient Air Quality Standards (AAQS):** Limits set for the concentration of pollutants in outdoor air to protect human health and the environment. Enforced by national or regional regulatory bodies.
- xxv. **Best Available Techniques (BAT):** The most effective and advanced stage in industrial technology and methods used to limit emissions and impacts on the environment.
- xxvi. **Bio-remediation:** The use of microorganisms or plants to detoxify and restore polluted industrial sites (soil and water).
- xxvii. **Continuous Emission Monitoring System (CEMS):** An automated system that provides real-time data on the pollutants released from an industrial source, helping ensure regulatory compliance.
- xxviii. **Effluent:** Liquid waste or sewage discharged from an industrial facility into the environment, often treated before disposal.
- xxix. **Effluent Treatment Plant (ETP):** A facility to treat industrial wastewater and remove harmful contaminants before it's discharged into water bodies or reused.



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- xxx. **Environmental Compliance:** The act of adhering to environmental laws, regulations, standards, and permits applicable to an industrial operation.
- xxx.i. **Environmental Management System (EMS):** A framework that helps an organization achieve its environmental goals through consistent control of its operations, often ISO 14001 certified.
- xxx.ii. **Hazardous Waste:** Waste materials from industrial processes that are dangerous to health or the environment and require special handling and disposal.
- xxx.iii. **Noise Pollution:** Unwanted or harmful industrial sound that disrupts the surrounding environment or human well-being, controlled through barriers, enclosures, or silencers.
- xxx.iv. **Particulate Matter (PM):** Fine dust or tiny particles released from industries that can cause respiratory and cardiovascular problems; controlled using filters and scrubbers.
- xxx.v. **Pollution Control Board (PCB):** Statutory authorities (like State Pollution Control Boards or CPCB in India) responsible for monitoring and enforcing environmental regulations in industries.
- xxx.vi. **Resource Recovery:** The process of reclaiming usable substances or energy from industrial waste streams, such as waste-to-energy or metal recovery from slag.
- xxx.vii. **Scrubber:** A device used in industries to remove particulates and/or gases (e.g., SO₂) from industrial exhaust using water or chemical solutions.
- xxx.viii. **Solid Waste Management:** Systematic control of the collection, treatment, and disposal of industrial solid waste, including recycling and landfilling.
- xxx.ix. **Stack Emissions:** Pollutants released into the atmosphere through chimneys or stacks of industrial plants; subject to regular monitoring and standards.
- xl. **Sustainable Industrial Practices:** Approaches that reduce environmental impact by using energy-efficient processes, clean technology, waste reduction, and closed-loop systems.
- xli. **Water Pollution Control:** Measures taken to prevent or reduce contamination of water bodies from industrial discharges, including effluent treatment and zero liquid discharge (ZLD) systems.
- xlii. **Zero Liquid Discharge (ZLD):** A wastewater treatment approach in which all industrial wastewater is purified and reused, eliminating any discharge into the Environment.