KHAN BROTHER FOUNDRY

KHAN BROTHERS FOUNDRY
(STEEL FURNACES)

Existing Industrial Phase-I of RUDA Industrial Zone, Mouza Marri, Turkey Road, Mehmood Booti, Lahore-Punjab

ENVIRONMENTAL IMPACT ASSESSMENT
(EIA)

International Development Consultants (IDC)
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January, 2025

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ABBREVIATIONS

AoI	Area of Influence
CEO	Chief Executive Officer
COVID	Coronavirus Disease
EA	Environmental Approval
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
EMP	Environment Management Plan
EPA	Environmental Protection Agency
EPD	Environmental Protection Department
ERP	Emergency Response Plan
EUAD	Environment and Urban Affairs Division
FGDs	Focus Group Discussions
GIS	Geographic Information System
HSE	Health, Safety and Environment
IDC	International Development Consultants
IEE	Initial Environmental Examination
IFIs	International Financial Institutions
LAA	Land Acquisition Act
LAC	Land Acquisition Collector
MSL	Mean Sea Level
NCS	National Conservation Strategy
NEQS	National Environmental Quality Standards
NGO	Non-Governmental Organization
NOC	No Objection Certificate
OHS	Occupational Health and Safety Plan
PEPA	Pakistan Environmental Protection Act
PEPC	Pakistan Environmental Protection Council
PEQS	Punjab Environmental Quality Standards
PM	Particulate Matter
PP	Project Proponent
PPE	Personal Protective Equipment
RUDA	Ravi Urban Development Authority
TA	Technical Assistance
TDS	Total Dissolved Solid
TSS	Total Suspended Solid
UCA	Unemployment Compensation Amendments
UNESCO	United Nations Educational, Scientific and Cultural Organization
VOCs	Volatile Organic Compounds
WAPDA	Water and Power Development Authority
WHO	World Health Organization

Guidelines for the Preparation of Environmental Impact Assessment Report

Clause No.	Requirement for Preparation and Review of Environmental Reports	IEE/ EIA Report		
		Present (Tick)	Lacking	Page No. (if present)
2	Commencing Environmental Assessment	✓	-	i
2.3	Contents of Report	✓	-	ii
2.3 (A)	Executive Summary	✓	-	xv
	1. Title and location of project	✓	-	xv
	2. Name of the proponent	✓	-	xv
	3. Name of organization prepared the report	✓	-	xv
	4. A brief outline of proposal	✓	-	xv
	5. Major impacts	✓	-	xv
	6. Recommendations for mitigation measures	✓	-	xvi
	7. Proposed monitoring	✓	-	xvii
1	Introduction	✓	-	1
2.3 (B)	1. Purpose of report	✓	-	1
	2. Identification of project and proponent	✓	-	2
	3. Details of Consultant	✓	-	3
	4. Brief description of nature, size, and location of project	✓	-	3
2	Description of the project	✓	-	11
2.3 (C)	1. Type and category of project	✓	-	11
	2. Objectives of the project	✓	-	12
	3. Project Alternatives; Alternatives considered realistically (in detailed) and reason for the end of report)	✓	-	12
	4. Location and Site Layout of the project (May be annexed at the end of report)	✓	-	14
	5. Land use on the site	✓	-	14
	6. Road Access	✓	-	15
	7. Vegetation features at project site	✓	-	16
	8. Description of the project	✓	-	11
	9. Restoration and rehabilitation plans	✓	-	16
	10. Government approvals	✓	-	20
3	Environmental Baseline	✓	-	21
2.3 (D)	1. Existing environmental resources	✓	-	21
	i) Physical	✓	-	21
	ii) Ecological	✓	-	33
	iii) Social	✓	-	34
	2. Quality of life values	✓	-	35
	3. Lab reports of environmental analysis	✓	-	32, 33
4	Potential Environmental Impacts and Mitigation Measures	✓	-	39
2.3 (E)	Environmental parameters	✓	-	39
	1. Project location	✓	-	xv
	2. Design	✓	-	16
	3. During construction phase	✓	-	39
	4. During Operational phase	✓	-	43
	5. Potential Environmental Enhancement Measures	✓	-	43
5	Environmental Management and Monitoring Program	✓	-	47
	i) Institutional capacity	✓	-	54

Clause No.	Requirement for Preparation and Review of Environmental Reports	IEE/ EIA Report		
		Present (Tick)	Lacking	Page No. (if present)
2.3 (F)	ii) Training schedules	✓	-	56
	iii) Summary of Impacts and their mitigation measures	✓	-	57
	iv) Equipment maintenance details	✓	-	53
	v) Environmental budget	✓	-	58
6	Involvement of Stakeholders/ Public consultation (for EIA only)	✓	-	59
2.5	Communicate the potential impacts & concerns to assist further analysis and decision making i) Project proponent	✓	- -	59
	ii) Responsible authority	✓	-	59
	iii) Other departments and agencies	✓	-	59
	iv) Environmental practitioners and experts	✓	-	3
	v) Affected and wider community	-	-	-
2.7	Site Selection: Suitability of the site (not prohibited, environmentally sensitive, incompatible to surroundings and unsuitable)	✓	-	4
3	Assessing Impacts (for EIA only)	✓	-	40
3.2	Identification of all impacts	✓	-	40
3.3 Table 2	Methodologies for impact identifications (one/more)	✓	-	19
	• Checklists	✓	-	19
	• Matrices	✓	-	53
	• Networks	-	-	-
	• Overlays	-	-	-
	• GIS and computer expert systems	-	-	-
3.3 and 3.6	Impact analysis and prediction (one/more)	-	-	-
	• Meetings	✓	-	60
	• Workshops	-	-	-
	• Consultation/ case studies	✓	-	60
3.5	Characteristics of impacts (nature, magnitude, extent and location, timing, duration, reversibility, risk)	✓	-	40
3.10	Impact Significance: Acceptable, require mitigation or are unacceptable to the community	✓	-	40
	• Ecological importance	✓	-	34
	• Social importance	✓	-	45
	• Environmental Standards	✓	-	22
4	Mitigation and Impact Assessment	✓	-	40
4.1	Purpose of mitigation measures	✓	-	40
	1. What is the problem	✓	-	40
	2. When will problem will occur and when it should be addressed	✓	-	40
	3. Where problem should be addressed	✓	-	40
	4. How the problem should be addressed	✓	-	40
	Ways of achieving mitigation measures	✓	-	40
	• Changing in planning and design	✓	-	40
4.2	• Improved monitoring and management practices	✓	-	48
	• Compensation in money terms	-	-	-
	• Replacement, relocation and rehabilitation	✓	-	17

Clause No.	Requirement for Preparation and Review of Environmental Reports	IEE/ EIA Report		
		Present (Tick)	Lacking	Page No. (if present)
4.3	Prepare an Environmental Management Plan	✓	-	47
5	Reporting	✓	-	47
5.1	Clear reporting style supported by maps or other descriptive details	✓	-	47
5.2	Specific term of references should be present in report	✓	-	66
5.2	Appendices:	✓	-	67
	1. Glossary	✓	-	xiii
	2. List of abbreviations	✓	-	ix
	3. List of individuals and organizations consulted along with their written feedback	✓	-	59
	4. Sources of data and a full list of all reference material used	✓	-	70
	5. Terms of references of environmental reports and those given to individual specialists	-	-	-
	6. List of names, qualifications and roles of team members carrying out the EIA study	✓	-	3

GLOSSARY

Baseline Studies	Work done to collect and interpret information on the condition/trends of the existing environment.
Biodiversity	The variety of life forms, the different plants, animals and microorganisms, the genes they contain and the eco-systems they form. It is usually considered at three levels: genetic diversity, species diversity and ecosystem diversity.
Environment	Increasingly, it means the complex web of inter-relationships between abiotic and biotic components which sustain all life on earth, including the social/health aspects of human group existence. Thus, the environment can be defined as a sum total of all the living and non-living elements and their effects that influence human life. While all living or biotic elements are animals, plants, forests, fisheries, and birds, non-living or abiotic elements include water, land, sunlight, rocks, and air.
Environmental Impact Assessment	Environmental impact assessment (EIA) is a vital process used to determine the possible environmental effects of a proposed project and analyze ways to mitigate those effects.
Environmental Management	Managing the productive use of natural resources without reducing their productivity and quality.
Fauna	All of the animals found in a given area.
Flora	All of the plants found in a given area.
Impact Monitoring	Monitoring of environmental/social/health variables, which are expected to change after a project has been constructed and is operational, to test whether any observed changes are due to the project alone and not to any other external influences.
Initial Environmental Examination	Initial Environmental Examination (IEE) is a report containing a brief, preliminary evaluation of the types and magnitude of impacts/screening process that would result from the proposed project.
Mitigation	The purposeful implementation of decisions or activities that are designed to reduce the undesirable impacts of a proposed action on the affected environment.
Monitoring	Activity involving repeated observation, according to a pre-determined schedule, of one or more elements of the environment to detect their characteristics (status and trends).
Proponent	Organization (private or public sector) or individual intending to implement a development proposal.
Public involvement	A range of techniques that can be used to inform, consult or interact with stakeholders affected by a proposal.
Stakeholders	Those who may be potentially affected under the project e.g. local people (primary stakeholders), the proponent, government agencies, NGOs, donors and others referred as secondary stakeholders.

EXECUTIVE SUMMARY

Background

In Pakistan, furnaces are vital in both industrial and residential settings. In industries, they are used for melting metals, heating raw materials, and heat treatment processes. In homes and commercial buildings, furnaces provide central heating during colder months. They work by generating heat through combustion or electrical resistance, distributing it via air or water. Furnaces can run on natural gas, oil, coal, or electricity, depending on available resources. Modern furnaces are equipped with features like programmable thermostats, energy-efficient designs, and safety mechanisms. Technological advancements aim to improve energy efficiency, reduce emissions, and increase reliability.

Title and Location of the Project

The proposed project is "Khan Brothers Foundry; and located at Mouza Marri, Tehsil Shalimar and District Lahore" under vicinity of RUDA Industrial Zone (Phase-I), Lahore-Punjab, Pakistan. The location map of project site is illustrated in Figure 3.1 and Aerial view of the Project site is presented in Figure 3.2 of this report.

Project Proponent

The project proponent is named as *"Khan Brothers Foundry"* (Muhammad Nasrullah Khan, Chief Executive Officer), Mouza Marri, Turkey Road, Mehmood Booti, Tehsil Shalimar and District Lahore-Punjab.

Project Consultants

The project consultant is named as *"M/s International Development Consultants (IDC)"*, (Mr. S.A. Shahid, Study Coordinator), Suite# 3, 11-Civic Centre, C-Block, Faisal Town, Lahore-Punjab.

Brief Outline of the EIA report

The Introduction including approach & methodology adopted for the study are discussed in Section 1 and a brief discussion on the existing national policy, legal framework, laws and regulations are discussed in Section 2, while the description of the major components of project are explained in Section 3. Section 4 deals with the description of the environmental baseline. Section 5 describes the potential environmental impacts/risks and mitigation measures. Section 6 discusses the environmental management and monitoring program, while Section 7 relates with the stakeholder's consultations. The conclusions and recommendations are given in Section 8.

Potential Impacts/risks of the Project

As a result of the implementation of the proposed project, the potential impacts and risks associated with the proposed project are considered as minor/and or insignificant. These impacts are mainly anticipated during the operational stage and could include air, soil, water, and noise pollution. However, these risks are expected to have minimal effects. Air quality may be slightly impacted during both the construction and operational phases, but the overall impact is expected to be negligible/insignificant. The project area, being flat and free from crops, ensures that the local ecology will not be affected. Overall, the environmental impacts are expected to be minimal and manageable/mitigatable.

There will be no concerns or issues related to women's routine activities during the project implementation. However, local women have expressed the desire for suitable jobs to be provided to male members of their families, allowing them to participate in both the

construction and operational phases of the project. The project impact matrix indicates that the overall impact of the project is highly beneficial, with low adverse impacts or risks.

To address any unanticipated environmental and social impacts or risks, as well as other project-related concerns, appropriate mitigation measures have been proposed under the Environmental Management and Monitoring Plan (EMMP) or Environmental Management Plan (EMP). These measures are designed to minimize potential negative impacts and ensure that the project proceeds in an environmentally and socially responsible manner.

Conclusions and Recommendations

Conclusions

The Environmental Impact Assessment (EIA) study was conducted to evaluate the environmental and social impacts/risks associated with the implementation of the proposed project, “Khan Brothers Foundry”. The project is located within the jurisdiction of the Existing Industrial Phase-I of Ravi Urban Development Authority (RUDA), in Mouza Marri, Mehmood Booti, Tehsil Shalimar, District Lahore, Punjab. The study aims to identify potential environmental and social risks/ challenges and propose mitigation measures to address them during the project’s implementation.

The environmental and social impact/risk assessment for the project was conducted based on a comprehensive field survey, which included interviews, focus group discussions, physical observations/transect walks, and consultations with stakeholders. The EIA report was then prepared in compliance with both national and international guidelines, adhering to Pakistan's Environmental Laws/Act (PEPA 1997, amended in 2012) and the relevant Regulations (2022). This approach ensures that the project complies with environmental standards and incorporates the project proponent and local community input in the assessment process.

As a result of the implementation of the proposed project *(‘Khan Brothers Foundry’)*, the potential impacts and risks associated with the implementation of the proposed project were identified as minor/and or insignificant. These impacts may arise primarily during the operational stage and include air, soil, water, and noise pollution. However, the effects are expected to be minimal. Air quality may experience slight degradation during the operational phase, but the overall impact is considered insignificant. The local ecology will remain unaffected, as the project area is flat land and does not contain endangered or threatened species. According to the project impact matrix, the project is overall highly beneficial, with low adverse impacts or risks.

Recommendations

The following recommendations are forwarded:

1. The potential impacts and risks of the project will be mitigated by implementing the suggested technical and engineering best practices, as outlined in the Environmental Management Plan (EMP). These measures are designed to minimize any risk/ negative effects during the project’s implementation and operational stages, ensuring that environmental and social risks are effectively managed and controlled.
2. All parameters especially air, noise & water will need to be remained within the permissible limit of NEQS as reflected in section 4.
3. All types of storage including fuels and septic tanks for the sewerage waste should be cemented to prevent the percolation of contaminants.
4. In addition to above, there would be temporary impact of dust pollution during the project’s implementation/construction activities and operational stages, so that sprinkling of water on regular basis especially during dry climatic conditions may need to be continued.

5. On the commencement of project operation (business), the proponent will need to submit an annual report summarizing the operational performance of the project in compliance with the environmental management plan (EMP) including the measures and procedures taken to manage or mitigate the environmental impacts/risks (if any) for the project, including monitoring, reporting and auditing.

6. Periodic internal monitoring/auditing needs to be carried out to ensure proper implementation of Environmental Management and Monitoring Plan (EMMP) or Environmental Management Plan (EMP).

7. To address the unanticipated environmental and social impacts/risks as well as other project related concerns (if any), appropriate mitigations measures need to be followed as proposed in the Environmental Management Plan.

1. INTRODUCTION

1.1 Background

In Pakistan, a Furnace is a crucial piece of equipment in various industries, as well as in residential and commercial settings, primarily used for heating purposes. In industrial contexts, furnaces are utilized for melting metals, heating raw materials, or performing heat treatment processes. They are also employed in households and commercial buildings for central heating systems, ensuring comfort during colder months. The basic principle of a furnace involves generating heat through combustion or electrical resistance and distributing it throughout a space via air or water. Furnaces can operate on various fuels, including natural gas, oil, coal, or electricity, depending on the specific requirements and availability of resources. Modern furnaces are equipped with advanced features such as programmable thermostats, energy-efficient designs, and safety mechanisms to optimize performance and ensure user safety. Additionally, advancements in furnace technology focus on improving energy efficiency, reducing emissions, and enhancing overall reliability.

This report presents the main findings of the Environmental Impact Assessment (EIA) for the project "Khan Brothers Foundry" situated at Mouza Marri, Mehmood Booti, tehsil Shalimar and District Lahore. Environmental Impact Assessment (EIA) of the project has been conducted in accordance with the Punjab Environmental Protection (Amendment) Act, 2012 and EIA Regulations, 2000. The process for conducting environmental assessment and the results are described in this EIA report.

1.2 Scope of the Study

The scope of study includes the preparation of Environmental Impact Assessment (EIA) of the proposed project, "Khan Brothers Foundry" for the compliance of Section 12 of PEPA 1997 and to ensure the compliance with the Punjab Environmental Quality Standards (PEQS).

Project proponent has intention to establish the factory covering a total area of 3 kanals and 14 marla (16,650 Sq.ft). In this context, the Project proponent hired a consultant firm, i.e. *"M/s International Development Consultants (IDC)* for the preparation of Environmental Impact Assessment (EIA); Accordingly, *M/s IDC* has conducted the field survey/environmental impact assessment (physical, ecological & social), stakeholders consultations, environmental monitoring (Lab tests) etc.; and data inputting, processing and analysis; and prepared the Environmental Impact Assessment (EIA) of "Khan Brothers Foundry" in the jurisdiction of Existing Industrial Zone (Phase-I) of RUDA, Mehmood Booti, tehsil Shalimar, Lahore, Punjab.

1.3 Objectives of the EIA Study

As per Punjab Environmental Protection Act-PEPA 1997 (Amended 2012), and Punjab Environmental Protection Regulations 2022[1], the preparation of environmental impact assessment (EIA) study is mandatory to comply-with the legal requirements of Act/Laws and Regulations. The objective of conducting this EIA study is to identify the environmental impacts/risks of the project and accordingly suggest their mitigation measures. The environmental impacts include impacts regarding physical, ecological and social aspects of the project. In order to accomplish the above objective, the following aspects have been covered under the EIA report:

- Establish environmental baseline data including physical, ecological and social aspects of the project area.

[1] Punjab Environmental Protection (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2022, Environmental Protection Department, 16-Dec-2022.

- Assess the proposed activities, identify and evaluate the potential impacts; and suggest appropriate mitigation measures.
- Develop an environmental management plan (EMP) for smooth implementation of the project.
- To identify the environmental issues pertaining to the operational site.
- To evaluate the ability of the project keeping in view of social acceptance and environmental soundness.
- To provide the maximum information to the project proponent and other stakeholders about the existing environmental conditions and the implications on the operation of proposed project.
- Collection of available data, drawings/ design, documents and other relevant information about operation of the project.
- Review of applicable existing environmental legislation and Pakistan environmental quality standards (PEQS).
- Propose mitigation measures to eliminate/and or reduce the negative impacts/risks up to the acceptable level.
- Development of well-resourced environmental management and monitoring plans to identify the mitigation strategies targeted towards avoidance or minimization and remedy/treatment of the impacts/risks.

1.4 Identification of the Project & Project Proponent

1.4.1 Identification of the Project

The project site is easily accessible from Lahore Ring Road Toll Plaza (Sialkot Motorway bypass interchange 3.8 km away). Main Road and link road are available to reach at project site. In the west of proposed site, River Ravi flows. Basic necessary infrastructure like markets, roads, water, power, telephone, Internet etc. is available at the project site. The availability of good roads facilitates the transportation of raw material and furnish goods/products at economized cost. The other basic facilities are vitally important for the entire business to be started. These facilities also go in favor of the present site selection for the proposed 'Foundry' establishment.

1.4.2 Project Proponent

Mr. Muhammad Nasrullah Khan is the lead person of the subject project of 'Factory' named as Khan Brothers Foundry. The address and contact no. of the project proponent is as below:

- Muhammad Nasrullah Khan (CEO)
  Khan Brothers Foundry
  Existing Industrial Zone (Phase-I) of RUDA
  Mouza Marri, tehsil Shalimar and District Lahore-Punjab.
  Cell: +92 333 4269293

1.5 Details of Consultants

The services of Consultancy Firm named as *"M/s International Development Consultants (IDC)"* have been taken by the project proponent for the preparation of Environmental Impact Assessment (EIA) Report.

M/s IDC is a well reputed firm for providing high quality national and international services

covering the Environmental and Social (E&S Standards) to ensure the compliance of Punjab Environmental Protection Act-PEPA 1997 (Amended 2012) as well as IFIs E&S Safeguards requirements. M/s IDC is dynamic, responsive and innovative in providing the quantity, quality and cost-effective outcomes/solutions at provincial, national and international level. M/s IDC has involved an interdisciplinary team constituting the following members for the accomplishment of this study:

- Mr. Shaukat Ali Shahid (Master's in Economics), Study Coordinator
- Ms. Tahreem Nawaz, M.Phil (Environmental Sciences), Environment Specialist
- Ms. Aiman Anwar, M.Phil (Environmental Sciences), Environment Associate
- Mr. Zaffer Ali Bhatti, (Master's in Economics), Social Development Specialist
- Ms. Laiba Razzaq, (Bachelor's in Environmental Sciences), Survey Enumerator
- Mr. Shoaib Tahir, (Bachelor's in Economics), Survey Enumerator
- Mr. Mudassar-ul-Hassan, Data Manager (Data entry operator/computer application)

1.6 Brief Description of nature, size and location of Project

The Khan Brothers Foundry involves a comprehensive system of processes. It begins with the weighing bridge, ensuring accurate measurements of incoming materials. Subsequently, scrap materials are directed to the warehouse, where they are organized and stored. Finally, scrap is transported to the furnace for processing, utilizing an efficient and controlled workflow to maintain quality standards. The Khan Brothers Foundry is situated at RUDA Existing Industrial Zone (Phase-I), Mouza Marri, tehsil Shalimar and District Lahore-Punjab-Pakistan. The access to basic facilities/ infrastructure, i.e. markets, roads, water, power, telephone, Internet etc. is fully available to the project area/land parcels of 3 kanals and 14 marla (16,650 Sq.ft). The cost of the proposed project is estimated as about Pak Rupees 80 million.

1.7 Regulatory Requirements of Environmental Impact Assessment

For the sustainability of this development project, in addition to the technical and economic viability, the 'Khan Brothers Foundry' also needs to be environmentally sound and friendly. In this context, as per Government of Pakistan (PEP Act) it is an obligation for the proponent to prepare and submit an Environmental Impact Assessment (EIA) as per Punjab Environmental Protection Act, 1997 (Amended, 2012) and EPA/PEP Regulation 2022; Schedule-II B (18) Steel Furnaces for which filing of an EIA is required.

1.8 Approach & Methodology

The approach and methodology includes assessing environmental and social impacts through collecting information on physical, ecological resources and social settings in the project area.

1.8.1 Review of Project Documents

The documents available related to the study were reviewed which include: Punjab Environmental Protection (Amendment) Act 2012, EPA Regulations 2022, World Health Organization (WHO) Guidelines, Environmental Procedures & Guidelines and reports relevant to the present study. A detailed review of these documents was carried out to conceptualize the scope of work for preparing the Environmental Impact Assessment (EIA).

1.8.2 Delineation of the Study Area

To minimize the environmental and social impacts of the 'Khan Brothers Foundry' during the construction and operational stages, judicious site selection is an important factor. The land for the foundry is already owned by the proponent, 'Khan Brothers Foundry'.

1.8.3 Reconnaissance Survey of the Project Area

The reconnaissance survey for this study was conducted by an interdisciplinary team consisting of an Environmental Specialist, an Associate Environmentalist, and a Social Development Specialist. The purpose was to conceptualize the foundry, assess the potential environmental and social impacts associated with its construction and operation, and familiarize the team with the environmental setting and local conditions of the foundry site.

During the field reconnaissance, the main information regarding the topography, soils, land use, surface water, groundwater, flora, fauna, social setting, villages/ towns, in the surroundings of proposed project was examined.

1.8.4 Field Survey and Data Collection

The field surveys for data collection regarding environmental baseline and socio-economic setting of the project area were carried out from 10-30 November, 2024.

Both primary and secondary data were collected to accomplish the objectives of the study. The primary data was collected by conducting in-depth field surveys through individual interviews of local population, focus group discussions and consultations with local community, and village profiling, while secondary data was collected from the published Government documents, i.e. Economic Survey of Pakistan, District Population Census, Multiple Indicators Clusters Survey, Weather data, Government Acts, Laws and Regulations.

In addition to above, the consultative meetings were held with the representatives of all concerned Stakeholders; and Design Engineer/ Consultants as well as other concerned. Based on the environmental checklist, socioeconomic and village profile as well as format for consultations, a field surveys were carried out to collect data on the physical, biological and social environment/ impacts/risk assessment of the project area. Thus, to establish environmental baseline conditions, 10 nos. Socioeconomic interviews (households resided in the vicinity of the area of influence); impact location profiles; environmental profile and 6 nos. public consultations were carried out during the field survey.

i) Physical Environment

The physical aspects/parameters of the foundry site covered the following:

- Soils - type of soils, erosion, stability
- Land use pattern of the area including agriculture crops, barren lands, industrial and residential use
- Impact on buildings - residential, industrial, commercial, and structures of buildings
- Drainage system/ pattern
- Available energy source(s)
- Other private/ public infrastructure/ utilities like pipelines, electric poles
- Water resources available waste water, surface and groundwater
- Air quality and noise level in the project area

ii) Biological Environment

In consideration of ecological environment, the following main aspects were covered under this environmental impact assessment (EIA) study:

- Existing vegetation in the project area and its vicinity
- Trees likely to be affected due to the implementation
- Local/migratory species especially migratory birds
- Endangered species both flora and fauna
- Wildlife in the area of influence

- Forests and game reserves existing along the area of influence
- Beneficial/ medicinal plants and animals in the area of influence

iii) Social/Socioeconomic Environment

Social assessment has attempted to determine the social implications in terms of assumed positive and negative impacts/risks as a result of the implementation of the area of 'Khan Brothers Foundry'. The socioeconomic baseline data covered the following major aspects/parameters:

- Demographic profile
- Population
- Number of households
- Literacy status
- Land use
- Livelihood/ household income
- Living standard of the population
- Women issues
- Social infrastructure available

1.8.5 Stakeholders/ Public Consultations

During the detailed field survey, consultations were made with local community/ general public both men and women and other stakeholders like concerned government departments and agencies.

The basic purpose of these consultative meetings/ focus group discussions were to i) share information with stakeholders about the expected impacts of development works on the physical, biological and social/socioeconomic environment; ii) understand stakeholders' concerns regarding various aspects of the project, including the existing conditions and the potential impacts of construction related activities and operation of the 'Khan Brothers Foundry'.

1.8.6 Data Processing and Analysis

After collecting all above data from different sources including interviews, consultations, physical observations/transact walk etc.; and all collected/compiled data was inputted, processed and analyzed and derived the required tables as per tabulation plan. Accordingly, the results were presented through various tables (means, percentage, number) and graphical/ pictorial illustrations.

1.9 Structure of the Report

The executive summary of the report is presented in the beginning of the report.

The Introduction including approach & methodology adopted for the study are discussed in Section 1 and a brief discussion on the existing national policy, legal framework, laws and regulations are discussed in Section 2, while the description of the major components of project are explained in Section 3. Section 4 deals with the description of the environmental baseline. Section 5 describes the environmental impacts/risks and mitigation measures. Section 6 discusses the environmental management and monitoring program, while Section 7 relates with the participation and consultations stakeholder's. The conclusions and recommendations are given in Section 8.

2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This Section provides an overview of Policy Framework, Legislation, Acts, Laws and Guidelines relevant for preparation of EIA report of the proposed project. In this context, the Pakistan Environmental Protection Act, Laws, Regulations, Ordinances are discussed in the ensuing section of the report.

2.1 National Policy and Administration Framework

The Pakistan National Conservation Strategy (NCS), approved by the Federal Cabinet in March 1992, serves as the principal policy document on environmental issues in the country (EUAD/UCA, 1992). The NCS outlines the country's primary approach to promoting sustainable development, conserving natural resources, and improving the efficiency of resource use and management. It includes 68 specific programs across 14 core areas where policy intervention is deemed essential for preserving Pakistan's natural and physical environment. The core areas relevant to the proposed project include pollution prevention and abatement, increasing energy efficiency, conserving biodiversity, supporting forestry and plantations, and preserving cultural heritage.

The Government of Pakistan promulgated "Pakistan Environmental Protection Act (PEPA) in 1997. Two organizations, the Pakistan Environmental Protection Council (PEPC) and the Pakistan Environmental Protection Agency (Pak-EPA), are primarily responsible for administering the provisions of the Act at the federal level. As per 18th amendment and constitution of Pakistan the environmental matter are being dealt by the respective provisional government. Accordingly environmental protection department is responsible for review and approval of environmental assessment reports of projects undertaken in their respective jurisdictions. The Provisional EPA is required to ensure compliance of the National Environmental Quality Standards (NEQS) and establish monitoring and evaluation systems

2.2 Punjab Environmental Protection Act 2012 (Amended) & PEP Regulations 2022

Establishment of the (Provisional) Environmental Protection Agency:

1. The Government shall, by notification in the official Gazette, establish the Provisional Environmental Protection Agency to exercise the powers and perform the functions assigned to it under this Act, the rules and the regulations.
2. The provisional agency shall be headed by a Director General, who shall be appointed by the Government on such terms and conditions as it may determine.
3. The provisional agency shall have such administrative, technical and legal staff as the Government may specify, to be appointed in accordance with such procedures as may be prescribed.
4. The power and functions of the provisional agency shall be exercised and performed by the Director General.
5. The Director General may, by general or special order, delegate any of these powers and functions to staff appointed under sub-section.
6. For assisting the provisional agency in the discharge of its functions, the government shall establish Advisory Committees for various sectors, and appoint as members thereof eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

[2] Punjab Environmental Protection (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2022, Environmental Protection Department, 16-Dec-2022.

2.3 National Environmental Quality Standards, 2000

The NEQS 2000 specify the following standards (adapted by Punjab Province):

- Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to in land waters, sewage treatment facilities, and the sea (three separate sets of numbers).
- Allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources.
- Allowable noise levels from vehicles.

The list of waste water and ambient air quality standards is presented in Annex 2.1 and 2.2.

2.4 Punjab Environmental Quality Standards (PEQS), 2016

PEQS promulgated recently in 2016. All projects to be implemented in Punjab must conform to PEQS during all the phases i.e., construction and operation. Specified standards under PEQS are for:

- Drinking Water
- Ambient Air
- Noise
- Industrial Gaseous Emissions
- Municipal and Liquid Industrial Effluents
- Motor vehicle exhaust and noise; and
- Treatment of Liquid and Bio-medical
- Waste

2.5 Interaction with Other Agencies

It is the responsibility of the project proponent to ensure that the project complies with laws and regulations governing environmental impacts during both the construction and operational stages, and that all pre-construction requisites, such as permits and clearances, are obtained.

2.5.1 Punjab Environmental Protection Department

The Proponent is responsible for providing the complete documentation required by the Punjab Environmental Protection Department and remain committed to the approved project design. No deviation is permitted during the project implementation without the prior and explicit permission of the Punjab EPA/ EPD.

2.5.2 Provincial Departments of Forest and Wildlife

In case the implementation of the proposed project involves the clearing of vegetation and trees in project area, the project contractor will be responsible for acquiring “No Objection Certificate” from concerned provincial Department. The application for NOC will need to be endorsed by the Proponent. Where the construction is to be carried out in close proximity of protected forests and wildlife areas, the Proponent is required to coordinate with the departments to ensure that impact on vegetation and wildlife are minimized.

2.5.3 Provincial Revenue Departments

Under the National Laws, the matters relating to land use and ownership are provincial subjects, and the Revenue department of the concerned province is empowered to carry out the acquisition of private land and built-up property for public purposes, including on behalf of another provincial or federal agencies. For those purpose, the lead department must lodge an application with the concerned provincial government to depute a Land Acquisition

Collector (LAC) and revenue staff, which will be responsible for handling matters relating to land in case of any issue arises, although the project proponent presently owned the project site. Furthermore, it also requires a liaison with the provincial departments of agriculture, horticulture and forestry in case of issues associated with these departments. The concerns could be relating to the affected vegetation resources, such as trees and crops. In case of some public buildings/ infrastructure is involved, proponent will approach the building department for relocation/ assessment of compensation.

2.6 Other Relevant Acts

2.6.1 Forest Act, 1927

The Forest Act, 1927 establishes the right of the government to designate areas for reserve forest, village forest and protected forest, and may acquire such areas for prohibiting or restricting the public use of the resources or other activities.

2.6.2 Punjab Wildlife Protection Act, 1974

The Punjab Wildlife Protection Act, 1974 was passed by the provincial assembly of Punjab in 1974. This Act is applicable to the whole of the Punjab province for protection, conservation, preservation and management of Wildlife. This Act also designated areas of sanctuaries and protection of rare and endangered species.

2.6.3 Canal and Drainage Act, 1873

The Canal and Drainage Act, 1873 under Section 32 (e & f), elucidate that: unless with the permission of the Superintending Canal Officer, no person is entitled to use the water of any canal, or any work, building or land appearing to any canal, shall sell or sublet or otherwise transfer his right to such use and no right to the use of the water of a canal shall be, or be deemed to have been, acquired under the Indian Limitation Act, (XV of 1877), Part IV, nor shall '(the Provincial Government) be bound to supply any person with water except in accordance with the terms of a contract in writing.

2.6.4 Local Government Act 2001 and Amended in 2003

These ordinances, issued following the devolution process, establish regulations for land use, the conservation of natural vegetation, air, water, and land pollution, the disposal of solid waste and wastewater effluents, as well as matters related to public health and safety.

2.6.5 Land Acquisition Act, 1894

The land acquisition Act 1894 is a law for the acquisition of land and implemented to fulfill the needs of government and companies for land required by them for their projects, and secondly, to determine and pay compensation to those private persons or bodies whose land is to be acquired. The experience of the power of acquisition has been limited to a cash compensation policy purposes. The LAA is limited to a cash compensation policy for the acquisition of land and built-up property, and damage to other assets such as, crops, trees and infrastructure. The LAA does not take into account the rehabilitation and settlement of displaced population and restoration of their livelihoods. Presently, the requisite land for the foundry is already owned by the project proponent, so that no additional private or government land will need to be acquired for the project.

2.6.6 Protection of Trees and Brushwood Act, 1979

This Act prohibits cutting or lopping of trees and brushwood without permission of the concerned Forest Department as a no objection certificate needs to be acquired from Forest Department for cutting of trees.

2.6.7 The Ravi Urban Development Authority Act, 2020

The establishment of the Ravi Urban Development Authority (RUDA) Act 2020 is pivotal for planning and developing the Ravi River area, as outlined in its Master Plan, to enhance community living standards. This initiative aims to adopt a modern, integrated approach to urban and regional development, focusing on environmental excellence, quality of life improvements, and advanced facilities. A key goal includes revitalizing the Ravi River and surrounding lands into vibrant, sustainable urban spaces. Additionally, the authority will develop and implement policies for environmental enhancement, housing, industry, and infrastructure across various sectors, ensuring the area's transformation into a healthy and prosperous community.

The RUDA Act 2020 focuses on the administrative, procedural and operational activities of the Authority with certain prohibitions attached to its functions. The preamble of the RUDA Act 2020 is exhaustive in nature pointing out the entire actions in public interest for the purpose of comprehensive system of planning and development in the area specified in Master Plan of the Project so as to improve the quality of life as per legislative objectives and further to establish an integrated modern and regional development approach and a continuing process of planning and development to achieve the highest environmental standards, quality of life and modern standard facilities so as to make a healthy and prosperous community in the designated area duly determined by the Government to rehabilitate water aquifer and the dying Ravi River into fresh perennial water body with a state-of-the-art water front and urban development on reclaimed and adjoining lands. The objectives of the Act 2020 are to provide quality life along with developed infrastructure and modern standard facilities. This Act is directly related to the establishment of proposed Industrial Zone including Estate as it falls under jurisdiction of RUDA.

3. DESCRIPTION OF THE PROJECT

3.1 Type and Category of the Project

The factory owned by Khan Brothers Foundry is located in the RUDA Industrial Zone, Mouza Marri, Tehsil Shalimar, District Lahore, and Punjab. It aims to provide high-quality iron for domestic, commercial, and industrial use. The industry relies heavily on furnaces to melt and mold iron into various shapes and structures. These furnaces play a critical role in transforming raw iron into finished products, ranging from construction beams to intricate machinery parts. Through precise temperature control and advanced molding techniques, the proposed project will enable the production of iron components with the strength, durability, and shape required for diverse applications in sectors such as construction, automotive and manufacturing.

3.1.1 Requirement of EIA

The proposed Project is located in district Lahore of the Punjab Province, therefore, the Punjab Environmental Protection Act, 1997 (Amended 2012 & 2017) is the core environmental law for the proposed 'Foundry'. As per Punjab Environmental Protection Act (PEPA), EIA is mandatory for the subject project, which states that:

"No proponent of a project of public and private sector shall commence construction or operation unless he has filed an Initial Environmental Examination/Environmental Impact Assessment with the Punjab Environmental Protection Agency, as the case may be, or, where the project is likely to cause adverse environmental effects; and has obtained approval from the Provincial Agency in respect thereof".

Environment Protection Agency, Punjab (Review of EIA) Regulation 2022, Schedule-II clearly states the list of projects requiring EIA. The "Khan Brothers Foundry" is situated at Existing Industrial Zone (Phase-I) of RUDA , Mouza Marri, tehsil Shalimar, District Lahore" falls under **Schedule-II (EIA) B (18) "Steel Furnaces"** for which filing of an EIA is required by the **federal agency of review of Regulations, 2022**" and above as prescribed by the Environmental Protection Agency, Government of the Punjab, hence, project under consideration categorizes in the category of the projects requiring Environmental Impact Assessment (EIA). Therefore, to fulfill the legal requirements of Section-12 of the Punjab Environment Protection Act-2012, the Client is required to submit the consolidated EIA report in the Environmental Protection Agency, Government of the Punjab, Lahore to obtain the required Environmental Approval (EA).

The EIA report has prepared and submitted to Punjab Environmental Protection Agency incompliance with the legal requirements for Punjab Environmental Protection Act-1997 (Amended 2012 & 2017) for obtaining Environmental Approval/ NOC before starting implementation/construction activities and operation of the project (Foundry) as per Section 12 of the Act. Other relevant regulations and guidelines considered while preparation of this EIA report include:

- Policy and procedure for filing, review and environmental approval.
- Guidelines for the preparation of and review of environmental reports.
- Guidelines for public participation
- Guidelines for sensitive and critical areas.
- Detail sectorial guideless.

Various aspects like environmental, social, physical and other of the project both construction and operational phase are highlighted in the EIA report. Measures necessary to be adopted to mitigate any environmental impacts/risk on any part of the environment around were also described.

3.2 Objectives of the Foundry

The primary overall objective of the Khan Brothers Foundry is to promote factory which can be defined as that function which provides the proper space for the safe keeping of goods, provides a system to economically coordinate the necessary activities, facilities, manpower and provides for overall control of the entire operation.

- Designing, developing, and maintaining risk assessments and impact evaluations.
- Configuring automated electrical systems and processes.
- Optimizing energy efficiency through the adoption of advanced technologies.
- Integrating electrical systems and sensors with recorders, transmitters, displays, or control systems.
- Assessing the potential noise and vibration impacts associated with furnace operations.
- Ensuring instruments adhere to health, safety, and legal requirements.
- Ensuring that instruments are of high quality and meet client needs.

3.3 Analysis of Alternatives

The main objective for analysis of alternates is to consider various alternatives to make the project more environmental friendly and sustainable with respect to the location and layout of the whole project. For the selection of appropriate layout, under existing site conditions, following environmental and social precautions were considered:

- Minimum environmental adverse impacts/risks
- Minimum resettlement and land acquisition
- Cost effective solution

Three alternatives were taken into the consideration during the project preparation such as:

i). No project option
ii). Project location/ site
iii). Technology option.

3.3.1 No Project Option (Worst Case Scenario Option)

The EIA for ‘Khan Brothers Foundry’ involves implementing measures and strategies at a broader level, rather than conducting individual project assessments. It ensures management of environmental impacts/risks more effectively by integrating industry-wide measures and strategies.

The given below are the disadvantages if this Khan Brothers Foundry is not implemented:

- Limited job opportunities and economic growth for the people of the area.
- Dependence on external sources for goods and services, including electricity. This dependency can increase vulnerability to supply chain disruptions and economic fluctuations.
- Lack of infrastructure development in the areas where they operate.
- Lack of technological advancements and innovation.
- Current issue of electricity shortage of the area will remain the same.

3.3.2 Technology Option

In Pakistan, technology of ‘Khan Brothers Foundry’ involves leveraging advanced technologies and innovative solutions to minimize environmental impacts and ensure sustainable development. This approach to be implemented for the proposed industry/factory project is discussed in Table 3.1:

- Green technology adoption using energy-efficient machinery and implementing clean

production processes.
- Utilizing digital twin technology to stimulate and optimize processes.
- Integration of renewable energy sources such as solar, wind and hydropower for electricity generation.

Table 3.1: Comparison of Different Options under the Project Alternatives

Options	Positive Impacts			Adverse Impacts		
	Physical	Biological	Social	Physical	Biological	Social
No Project Option	-	-	-	-	-	-
Project Location/ Site	▸ Most suitable site as no land acquisition involved. The land is already owned by the project proponent. ▸ Easy access to all requisite inputs and raw material & facilities.	▸ No/ or Minimum impact on the flora and fauna as the project site is at plain land, free from vegetation & already owned by the Project Proponent.	▸ No/or minimal social impacts/risks as per given project site.	▸ No or minimal impact on the adjacent settlement because of pollution (if any). ▸ Scrubbers are installed to control air pollution.	▸ No adverse impact on flora and fauna as well as endangered species in the project area.	▸ No and/ or minimal impact on health and safety as there will be a limited number of workers/workforce in the industry as well as in nearby area. ▸ No or insignificant impact for a limited time of construction activities on the adjacent agricultural land.
Technology option.	▸ The project would have a good step towards providing the domestic/ commercial & industrial items	▸ There will be no impact on flora and fauna as the project site is at plain land.	▸ Employment opportunities for local population. ▸ Improvement in the economic development of the area. ▸ Infrastructure development of the area.	▸ No or insignificant impact of pollution during the limited time of constructional & operational activities. However, mitigation measures need to be adopted in this context.	▸ No such impact observed	▸ Nearby community may indicated their concerns to involve the local labour during the project construction activities. In this context, preference may needs to be given to engage local labour under the project. In addition, the PPEs may need to be provided to workforce.

3.3.3 Reasons for Selection of Foundry Site

The foundry site was selected due to the following factors:
- Located within the jurisdiction of the existing Industrial zone (Phase-I) of RUDA
- Economically and socially feasible
- Skilled & unskilled workforce is easily available
- Access to roads
- Communication facilities
- Availability of electricity and basic infrastructure
- Sewerage system
- Approved drainage system
- Less/few vegetation/plantation

3.3.4 Alternative Site Option

The foundry construction at the selected site is a well-considered and environmentally sound development proposal, offering significant benefits to all stakeholders. The availability

of land in a convenient location is crucial, alongside other important considerations for site selection, such as access roads, communication facilities, electricity, basic infrastructure, and sewerage. Additionally, a clean and environmentally sustainable setting is essential. The project will also provide increased employment opportunities and related facilities for the local community. Given the availability of these key infrastructural requirements at the selected site, it is deemed the most suitable option for the foundry compared to alternative sites.

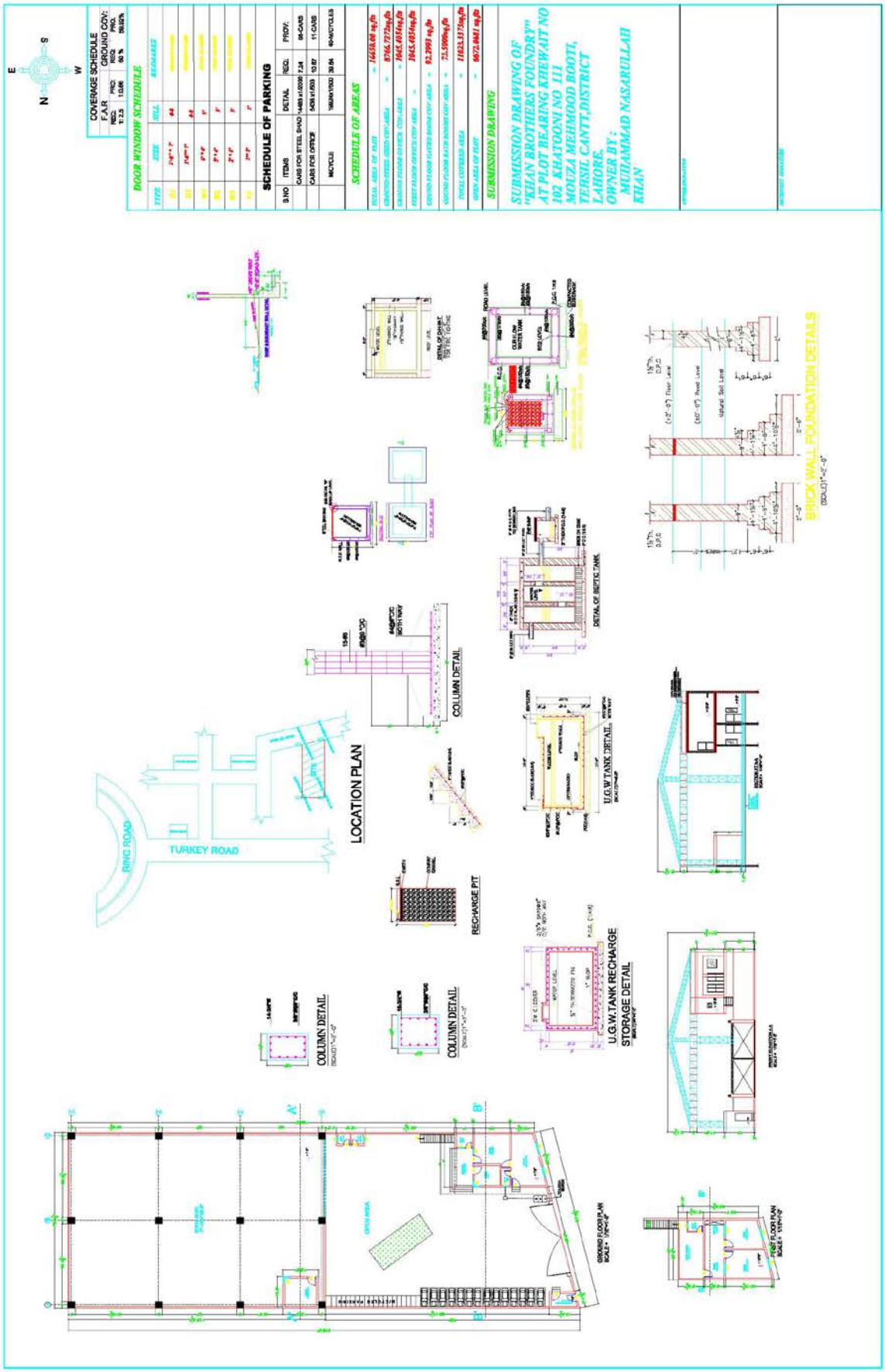
3.4 Location and Site Layout of the Foundry

The 'Khan Brothers Foundry' is located in the RUDA Industrial Zone, Mouza Marri, tehsil Shalimar, District Lahore, Punjab. The project site is easily accessible from the Lahore Ring Road Toll Plaza (Sialkot Motorway Bypass Interchange), which is 3.8 km away. To the west of the proposed site, the River Ravi flows. This information is based on preliminary design data. The layout plan is shown in Figure 3.1.

3.5 Land Use of Project Site

The existing land use of the Khan Brothers Foundry site consisting of land parcels of 3 kanals and 14 marla (16,650 Sq.ft) is presently un-cultivated and there is no any farming activity observed at the foundry site. The plot (3 kanals and 14 marla) of 'Khan Brothers Foundry' is already owned by the proponent and is presently empty, i.e. there is no any residential and commercial activity. The measurement of project land parcel is presented in Annex 3.1.

Figure 3.1: Layout Plan of Khan Brothers Foundry



3.6 Road Access

The foundry site can be accessed through the main Lahore Ring Road Toll Plaza (Sialkot Motorway Bypass Interchange), which is 3.8 km away. Both the main ring road and the link road are available for transportation during both the construction and operation phases of the Khan Brothers Foundry. The road is wide enough to prevent any congestion during construction and operational activities at the foundry. Basic infrastructure, such as markets, roads, water, power, telephone, and internet services, is available at the project site. The availability of good roads facilitates the movement of raw materials and finished products at a lower cost. The other essential facilities are crucial for the smooth operation of the business. These factors support the selection of the current site for the project. The location map is shown in **Figure 3.2**, and the aerial view of the Khan Brothers Foundry site is presented in **Figure 3.3**.

Figure 3.2: Location Map of the Khan Brothers Foundry Site

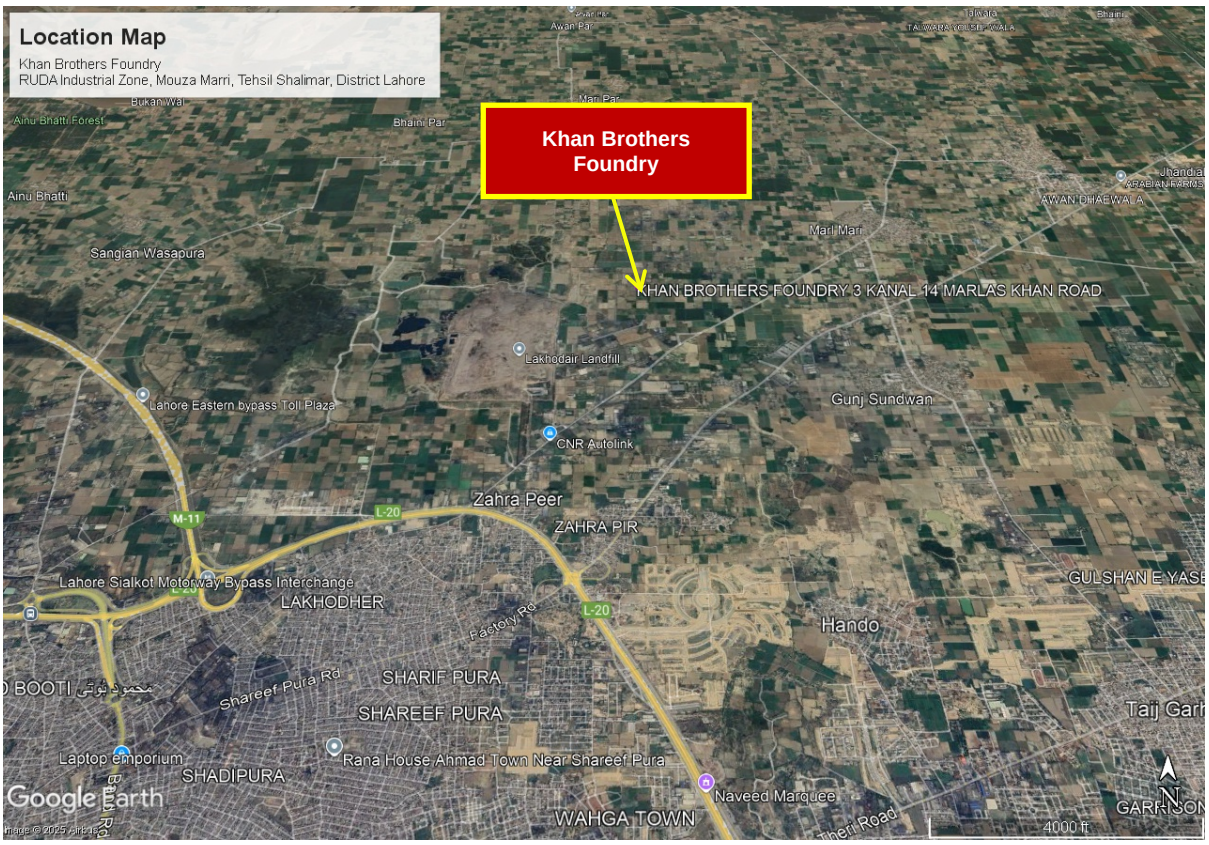


Figure 3.3: Aerial View of the Project Site

3.7 Vegetation Features at Site

The foundry site is already owned by the project proponent and is free from any vegetation cover or trees/plantations.

3.8 Restoration and Rehabilitation Plan

During the construction and operational phases of the foundry, the activities will cause disruption to the land, which will need to be restored and rehabilitated. The restoration and rehabilitation of the site will be the responsibility of both the contractor and the proponent. This may include:

- Filling of drug pits/holes.
- Disposal of all excess solid waste and empty drums to the proper designated area or site.
- Planting of trees or landscaping the area.
- Other activities as required.

3.9 General Plant Layout

The proposed project is based on an optimized arrangement of the industry/plant, buildings, and main components, with special consideration given to the natural topography, geological conditions, water sources, fuel storage, fuel transportation and handling facilities, operational requirements, maintenance, and the optimum utilization of land, etc. The final layout plan of the Khan Brothers Foundry factory/industry is presented in **Figure 3.1**.

3.10 Major Equipment's used during Construction Stage

The major equipment involved during the construction stage are a batching plant, concrete mixers, loaders, cranes, welding machines, winches, and fabrication equipment.

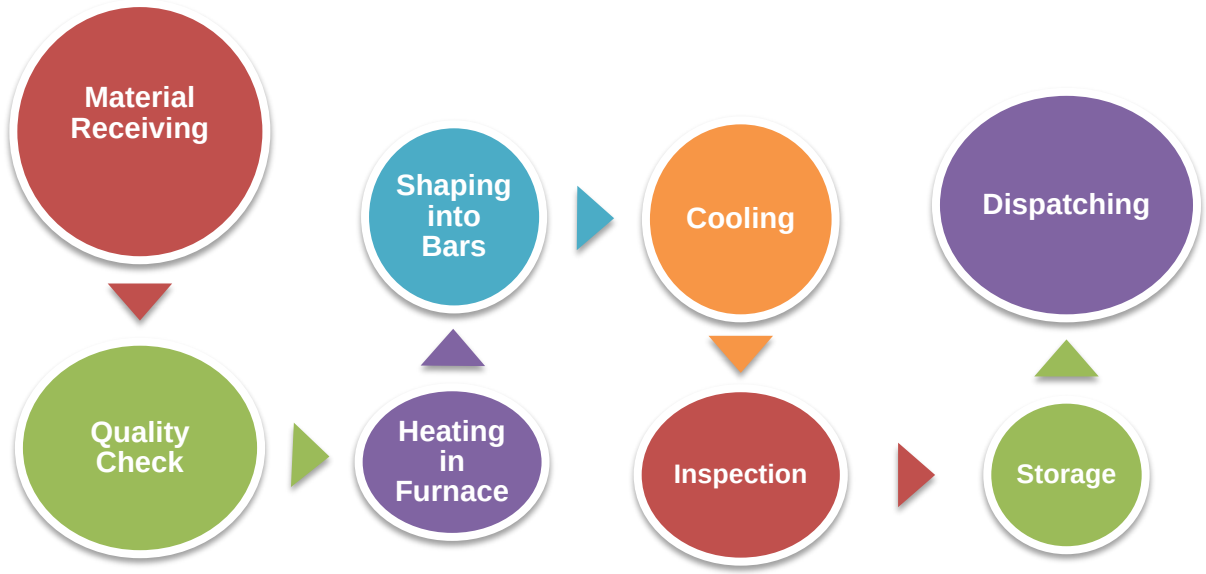
3.11 Major Equipment of the Khan Brothers Foundry

The major equipment involved in the proposed Khan Brothers Foundry are the Electric Arc Furnace (EAF), Induction Furnace, Crucible Furnace, Molds (or Dies), Ladle Refining Furnace (LF), Continuous Casting Machine, Rolling Mills, Heat Treatment Furnaces, Quenching Tanks, and Cutting and Machining Tools, while the detail description of major equipment/ items to be used in the proposed project is attached as Annex 3.2.

3.12 Raw Material

The iron industry utilizes a range of raw materials for melting iron in furnaces and shaping it with molds or dies. Scrap metal, sourced from various sources such as demolished structures and discarded appliances, serves as a primary feedstock. Additionally, iron ore, either in pellet or sintered form, and direct reduced iron (DRI) are essential inputs for iron content. Ferrous alloys, including ferroalloys like ferrochrome and ferromanganese, contribute alloying elements that enhance iron properties. Fluxes such as limestone aid in slag formation and impurity removal during iron making. Carbon additives like coal or coke adjust the carbon content, while oxygen and fuels like natural gas facilitate the melting process in furnaces. The process from the Khan Brothers Foundry is illustrated in Figure 3.4 and detailed process flow of the Khan Brothers Foundry is presented in Annex 3.3.

Figure 3.4: Process Flow Chart of the Proposed Project



3.13 Schedule of Implementation

On the environmental approval and issuance of No Objection Certificate (NOC) from Environmental Protection Department (EPD), the commencement of construction work will be initiated as the Company has submitted the Environmental Impact Assessment (EIA) report to the Punjab Environment Protection Agency (EPA). The construction activities/ civil works of the Khan Brothers Foundry have been completed.

3.14 Emissions from the Foundry

There will be no significant emissions from the construction of the Khan Brothers Foundry. However, the emissions resulting from the company's construction activities are categorized as follows:

3.14.1 Wastewater Generation

The wastewater generation is estimated to be 288 liters/day for 9 labor (approx.) for the proposed Project.

3.14.2 Solid Waste

Solid waste will primarily consist of domestic solid waste from the project. No solid waste will be generated from the industrial processes. Approximately 45 kg/day of domestic solid waste will be generated by the project. Domestic solid waste collected from the buildings will be gathered at a designated area within the site as an intermediate garbage disposal point. From this location, the waste will be collected and transported to a suitable site for final disposal. The location for final disposal will be determined in consultation with the City District Government.

Solid waste from Khan Brothers Foundry includes general waste such as paper and other domestic waste. No factory waste is generated at the site, and waste such as sheet scrap is recyclable/resalable. All types of waste must be properly disposed of at designated areas to avoid disturbance or contamination of environmental conditions.

3.14.3 Liquid Waste

Effluents from Khan Brothers Foundry include discharges, such as sanitary wastewater. The waste water of the site (if any) will be disposed-off into an already existing sewerage/dumping well (locally named as Gherki).

3.14.4 Gaseous Waste

The furnace primarily releases carbon dioxide (CO_2) emissions due to the combustion of fossil fuels. To help reduce the emissions, scrubbers are installed in the furnace, which removes pollutants from the exhaust gases.

3.14.5 Noise

In general, there will not be any noise risk, however, in case of some insignificant noise; the main source of noise could be from vehicles movement during the construction phase.

3.15 Infrastructure

3.15.1 Existing Infrastructure

Adequate infrastructure is available for the transportation of equipment, goods and services both during the construction and operation stage of the project.

3.15.2 Required Infrastructure

The infrastructure required during the construction and operation stages of the project is discussed below:

3.15.2.1 Water Supply

Water extracted from groundwater through storing in overhead tank will be used.

3.15.2.2 Sewerage System

The waste water of the proposed Khan Brothers Foundry will be disposed in owned sewerage well (gherki) already existing in the area. This sewerage well (gherki) will be used

for the disposal of Khan Brothers Foundry wastewater/effluent. The sewage from the sewerage well (gherki) is available that is 30 feet deep with 5 feet diameters.

The sewerage system of project site is meticulously integrated with the extensive network of the RUDA sewerage system, ensuring efficient waste management and environmental sustainability.

3.15.2.3 Security

There will be two security guards provided at the Khan Brothers Foundry at both day and night times. The three security guards round the clock will improve the security of the project site and also in its vicinity.

3.15.2.4 Atmospheric Emissions

The furnace and dies or molds of the proposed factory emit carbon dioxide, carbon monoxide, nitrogen oxides, etc. However, due to the installation of scrubbers, health hazards are prevented.

3.15.2.5 Electricity

An electrical facility is available at the Khan Brothers Foundry. The design criteria for the electrical works comply with the requirements of WAPDA. Maintenance is carried out by the project management team.

3.15.2.6 Telecommunication

Telephone facility will be provided by the PTCL. An underground cable will also be provided for electronic media.

3.15.2.7 Fire Protection System

An addressable fire protection system with detection, alarm annunciation, and other installations will be provided to protect against any fire hazards. Fire buckets and fire extinguishers will be placed at all sensitive locations within the proposed project.

3.15.2.8 Emergency Exit

The emergency exits are to be provided in the Khan Brothers Foundry.

3.15.2.9 Gas Facility

There is no gas facility currently available in the area of Khan Brothers Foundry, so there are no risks involved in this context.

3.15.2.10 Manpower

Several skilled, semi-skilled, and unskilled workers were engaged during the project's construction phase. During the construction phase, 10-20 workers were required, while during the operational phase, about 7-8 workers were required.

3.15.2.11 Approval of Industry Site

The required land has already acquired by the project proponent and at present, it is the property of Khan Brothers Foundry. The approval of layout plan in respect of “Khan Brothers Foundry” is located in the area of RUDA Industrial Zone, Mouza Marri, tehsil Shalimar and District Lahore and the document has already submitted to RUDA for approval.

4. ENVIRONMENTAL BASELINE

4.1 General

This section of the report covers a comprehensive description of the environmental baseline conditions of the project area and in the area of influence (AoI) with respect to the physical, ecological and social aspects. In addition to the secondary data, the field survey was carried out from 10-30 November and 10-20 December, 2024 to represent the ground reality of the project area. The environmental baseline conditions were established based on environmental and social survey; and public consultations as well as consultations with the stakeholders.

4.2 Physical Environment

The following section provides an overview of information on physical environment of the project area collected & compiled based on both primary as well as secondary sources. The major parameters covered are: Topography, Geology, Soil, Seismicity, Climate and Meteorology, Water Resources, Solid Waste, and Land Use, etc.

4.2.1 Topography

Topographically, it lies between river Satluj which flows its boundary with India and river Ravi which flows its boundary with Sheikhupura District. Lahore is located in Central Punjab which is known as heavy producer of cotton and rice. It may be divided into two parts, a low lying or riverine area along the two bordering rivers and upland, away from the rivers. The riverine area is generally inundates during monsoon season (Jun-Sep). The water level in this area is higher than that of upland area. The soil is sandy. The upland is flat plain sloping from north-west to south-west. The land use of the project/site area is uncultivated including some built-up area/structures/office etc., while outside the site area/ or in the vicinity of the project site, the land use was under agriculture, trees, built-up area and track/roads.

4.2.2 Geology

The project lies in the Lahore District, which derives itself naturally between the central up-lands and alluvial lands of Ravi, having no hills or mountains of any kind. The Ravi flows in the West of District along its boundary with Sheikhupura District. The general height of the area is from 208 to 213 meters above the sea level. The only mineral worth of any value is Kallar and Kankar.

The project area is plain land with cultivation practices. Lahore city is the capital of Punjab Province of Pakistan, covering a total area of 1,772 km^2. It has a flat surface with a variation of altitude from 208 to 213 MSL. The Lahore's unconfined aquifer is composed of unconsolidated alluvial deposits up to 400m thickness with a transmission rate of about 2,100 m^2/day and alternate layers of sand, silt, and clay formations. The groundwater is the significant source for drinking, domestic and industrial usage in the area under study. The 82 % of the groundwater aquifer of Lahore is recharged by River Ravi (the primary source), 12 % from monsoon rainfall, and 6 % from the return flows from irrigation[3].

4.2.3 Hydrology

The aquifer under Lahore area is composed of unconsolidated alluvial sediments, consisting of sand, silt and clay in different proportions. The Lahore has recently faced significant hydrological challenges, marked by record-breaking monsoon rains that led to widespread urban flooding.

[3] GIS-based Spatio-Temporal and Geo-statistical Analysis of Groundwater Parameters of Lahore Region Pakistan and their Source Characterization https://assets.researchsquare.com/files/rs431857/v1_covered.pdf?c=1631863392

The Lahore city experienced two intense spells of torrential rain accompanied by a powerful 90 km windstorm, resulting in at least 11 fatalities and extensive flooding of roads. These weather events shattered a 30-years-old rain record with 291 mm of rain recorded in a 10-hours period, inundating over 200mm in more than a dozen areas across Lahore. This situation prompted urgent actions from local departments to expedite drainage processes and caused considerable disruptions, including loss of electricity and water supply for approximately 35% of the city[4].

Groundwater is the major source of water in the project area, which is extracted with the help of hand pumps and motors. The groundwater extracted is used to fulfill various domestic, irrigation and industrial needs. The depth of groundwater table in the project area is 200-400 feet and the quality of water is good. The available minimum Sweetwater table depth is 250-300 feet.

4.2.4 Soils

The soils of Lahore have been formed by the alluvium deposited by the River Ravi during the long course of its geological history thus mostly the soils of the district are alluvial in nature. The silt and loam is in dominating proportions therefore the soil texture is silty and clayey loam. It appears that top layer in Lahore division roughly consists of fill material. The fill varies from 1 to 2.0 m depth below natural surface level and goes up to 10.0 m in case of walled city of Lahore this lies mainly in zone I. This is ascertained by the observed soil profile in several trenches excavated across the walled city area of central Lahore showing difference of existing ground levels, where there is excessive variation in the freshly deposited fill material. It shows that the top-soil in the region comprises of mainly medium dense to dense silty-sand with layers of clay/ silty-clay at various depths. This is followed by stiff lean clay (CL)/ silty-clay (CL-ML)/silt (ML). Below cohesive layer, granular silty-sand (SM)/sand with silt (SP-SM) is present in a medium dense to very dense state with fluctuation in depths, as specified in each zone. Zone II (a) and (b) show considerable uniformity in terms of stratification and mainly consists of clayey-silt/ silty-clay in top average 2 to 5 m followed by silty-sand (SM)/sand with silt (SP-SM). Whereas, zone III shows a bedding of lean clay (CL)/silty-clay (CL- ML) at a depth of 18 m overlaid by silty-sand (SM)/sand with silt (SP-SM)/silty-clay (CL-ML) and zone IV is quite similar to that of zone II but with a difference of thin layer of silty-clay(CL-ML) ranging at a depth from1.5 to 3m. Similarly, zones G-I and G-II majorly comprises of dense silty-sand with layers of clay/silty-clay and lean clay (CL) at shallow depths. The generalized soil[5] profile of the project site is attached as Annex 4.1.

4.2.5 Geography

The project area is situated in the area of Lahore-west city and is situated along the river Ravi. The geography comprises the various features relating to the land and climate of Lahore. Lying between 31°15′—31°45′ N and 74°01′—74°39′ E, Lahore is bounded on the north and west by the Sheikhupura District, on the east by Wagah, and on the south by Kasur District. It covers a total land area of 1,772 km^2. This area encompasses a mix of cultivated land, uncultivated areas, forests, and spaces not available for cultivation, highlighting the diverse geographical and environmental makeup of the district.

The project site lies along the Ravi River, which flows along its northern edge, contributing to the area's fertility and supporting agriculture. As of 2023-24, Lahore continues to expand

[4]Hydrochemistry modeling: evaluation of groundwater quality deterioration due to anthropogenic activities in Lahore, Pakistan.https://link.springer.com/article/10.1007/s10668-020-00703-3

[5]Geotechnicalcharacterizationandstatisticalevaluationofalluvialsoilsof Lahore https://www.researchgate.net/profile/Jahanzaib-Israr/publication/360159791_Geotechnical_characterization_and_statistical_evaluation_of_alluvial_soils_of_Lahore/links/632b49110a708521500f5891/Geotechnical-characterization-and-statistical-evaluation-of-alluvial-soils-of-Lahore.pdf

both horizontally and vertically, with numerous urban development projects enhancing its infrastructure and skyline. The city is known for its historical sites, including the Lahore Fort and the Shalimar Gardens, both of which are UNESCO World Heritage Sites, as well as for modern developments and commercial areas. The city is an economic hub, with a focus on manufacturing, services, and commerce. Lahore's economy benefits from its strategic location and serves as a key transit point for trade with India and other countries in the region[6].

4.2.6 Climate

The project area lies in District Lahore. This section describes the general climatic condition of project area. The data reflects various aspects of climate and weather for a specific location over a year. The average annual temperature was recorded at 24.8°C, offering a glimpse into the general climate warmth. Meanwhile, the annual average maximum temperature reached 30.7°C, indicating the peak daytime conditions, whereas the average annual minimum temperature stood at 18.4°C, highlighting the coolest nighttime temperatures experienced. Humidity, a key factor in the feel of the air and comfort levels, averaged at 61.8% over the year, suggesting a moderately humid environment. The total annual precipitation, encompassing rain or snow, was measured at 13.0 mm, essential for understanding the area's water cycle dynamics and potential agricultural productivity. Visibility, affected by various weather conditions such as fog, rain, or pollution, averaged at 3.8 km, pointing to numerous days with reduced clarity. Finally, the annual average wind speed was relatively low at 2.6 km/h, indicating a calm atmosphere with few days of significant wind.

4.2.6.1 Temperature

The months of April-September are considered as the hottest months in which the maximum temperature varies from 37°C to 45.5°C with the May as the hottest month. January is the coldest month with the minimum temperature recorded as 5.5°C. The month-wise minimum and maximum temperature is presented in Table 4.1 and graphic presentation is given in Figure 4.1.

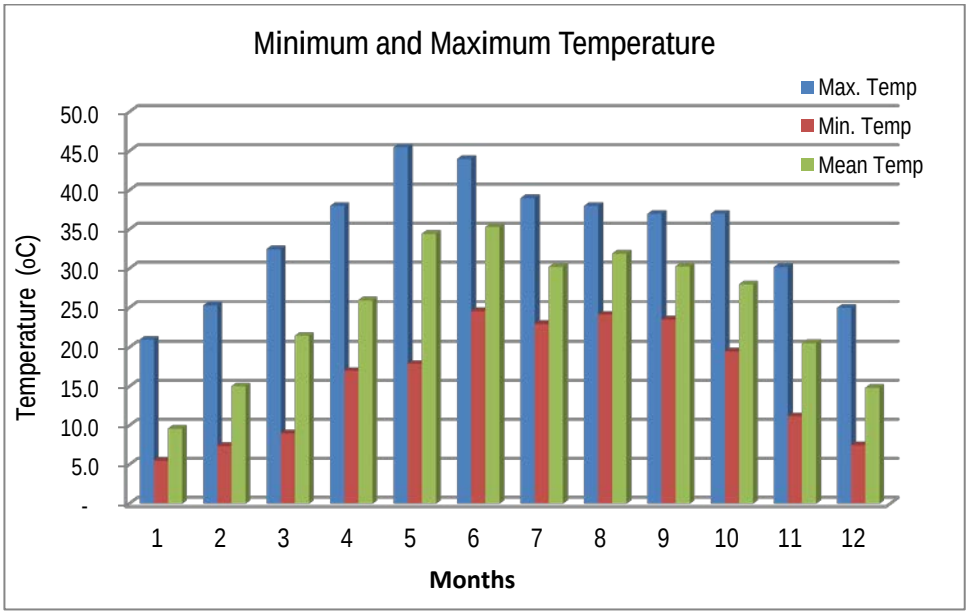
Table 4.1: Month-wise Minimum and Maximum Temperature

Years	2024										2023	
Temp. Category	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Max. Temp ^{o}C	21.0	25.3	32.5	38.0	45.5	44.0	39.0	38.0	37.0	37.0	30.2	25.0
Min. Temp ^{o}C	5.5	7.4	9.0	17.0	17.9	24.6	23.0	24.2	23.6	19.5	11.2	7.5
Mean Temp ^{o}C	9.6	15.0	21.5	26.0	34.5	35.3	30.2	31.9	30.3	28.0	20.5	14.8

Source: Historical Weather, Lahore (2023-24).

[6] Geographical Boundaries of Lahore: https://lahore.punjab.gov.pk/constituencies

Figure 4.1: Month-wise Temperature



4.2.6.2 Humidity

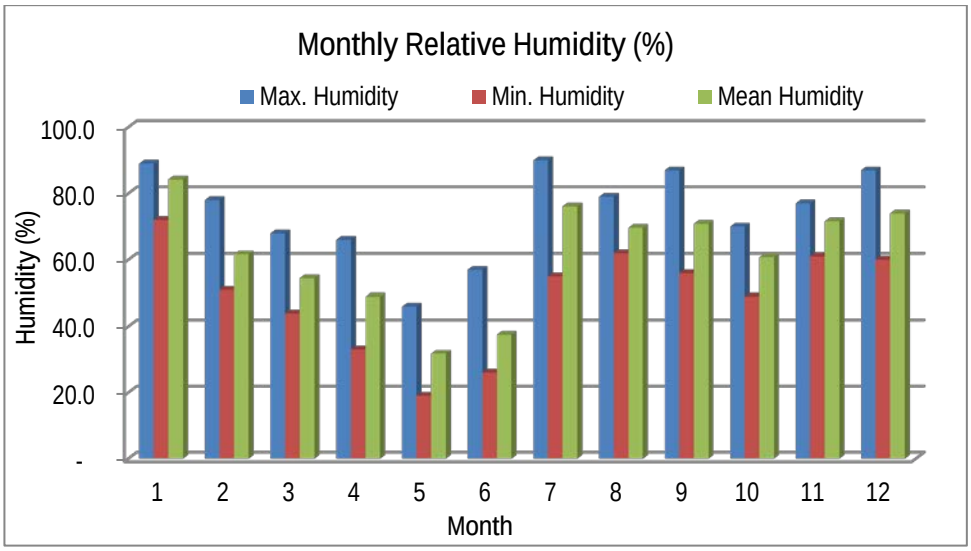
The humidity variation in the year 2024 from February to August in District Lahore ranges from 26.0% to 90.0%. The highest humidity level was observed in July i.e. 90.0% and the lowest humidity level was observed in May i.e. 19.0%. Month-wise average humidity values are shown in Table 4.2 with its graphic illustration in Figure 4.2.

Table 4.2:Month-wise Average Humidity

Humidity	2024										2023	
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
High Humidity (%)	89.0	78.0	68.0	66.0	46.0	57.0	90.0	79.0	87.0	70.0	77.0	87.0
Low Humidity (%)	72.0	51.0	44.0	33.0	19.0	26.0	55.0	62.0	56.0	49.0	61.0	60.0
Average Humidity (%)	84.3	61.7	54.5	48.9	31.8	37.5	76.1	69.6	70.9	60.8	71.6	74.0

Source: Historical Weather, Lahore (2023-2024).

Figure 4.2: Month-wise Relative Humidity



4.2.6.3 Precipitation (Rainfall)

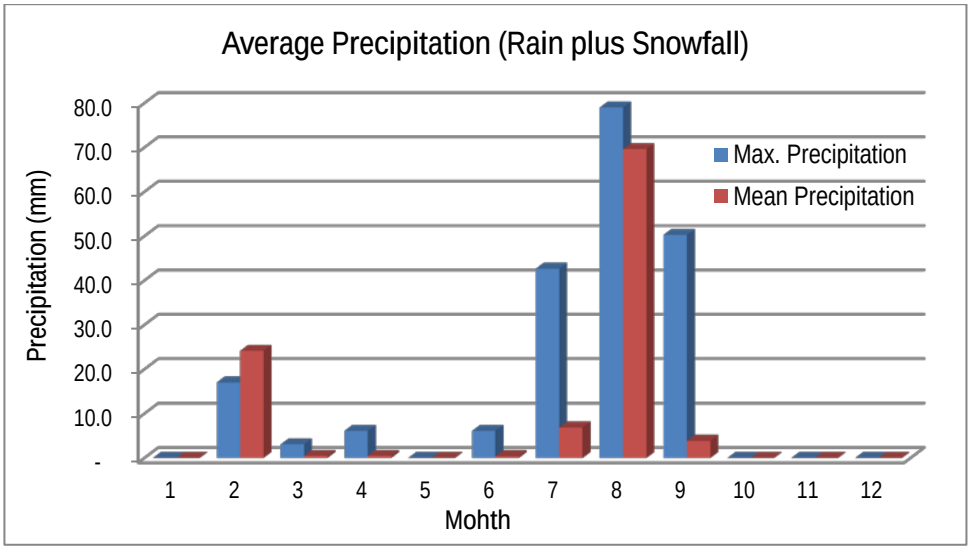
The average precipitation (rainfall) in District Lahore varies markedly. The rainfalls mainly occurred during the months of June, which is commonly known as monsoon month. Month-wise rainfall in district Lahore is given in Table 4.3 and graphic illustration is shown in Figure.4.3.

Table 4.3: Month-wise Precipitation (Rainfall and Snowfall)

Precipitation	2024										2023	
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Max. Precipitation(mm)	-	17.0	3.1	6.1	-	6.1	42.7	79.0	50.3	-	-	-
Mean Precipitation(mm)	-	24.1	0.5	0.5	-	0.4	6.9	69.6	3.9	-	-	-

Source: Historical Weather, Lahore (2023-2024).

Figure 4.3: Month-wise Distribution of Precipitation (Rainfall & Snowfall)



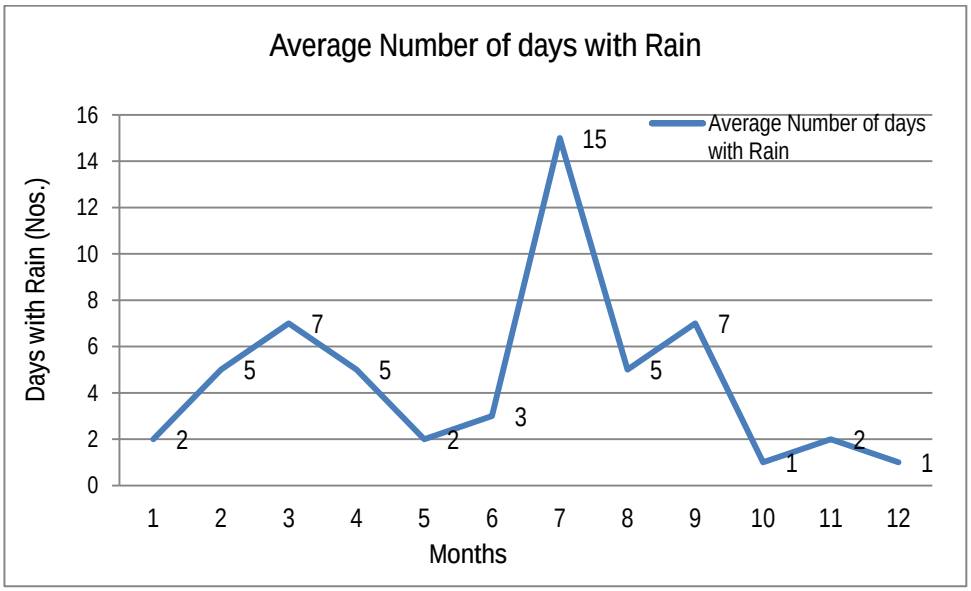
Maximum rain-falls in the month of July, which is typically a monsoon month and the minimum rain falls in month of December. Table 4.4 provides the average number of days with rain in the project area; however, Figure 4.4 shows graphical presentation of it.

Table 4.4: Month-wise Average Number of Days with Rainfall

Number of Days with Rainfall	2024										2023	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average No. of Days	2	5	7	5	2	3	15	5	7	1	2	1

Source: Historical Weather, Lahore (2023-2024).

Figure 4.4: Average Monthly Number of Days with Rainfall/Precipitation



4.2.6.4 Thunderstorms

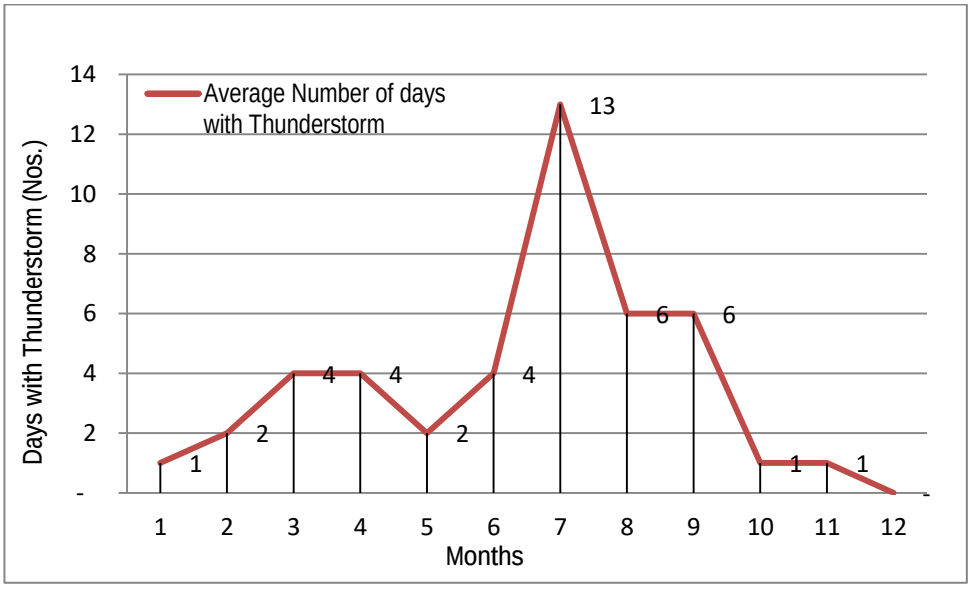
Maximum rain falls in the month of July, which is typically a monsoon month and the minimum rain falls in month of December. Table 4.5 provides the average number of days with rain in the project area; however, Figure 4.5 shows its graphical presentation.

Table 4.5: Average Number of days with Thunderstorm

Days with Thunderstorm	2024										2023	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average No. of Days	1	2	4	4	2	4	13	6	6	1	1	-

Source: Historical Weather, Lahore (2023-2024)

Figure 4.5: Average Monthly Number of days with Thunderstorm



4.2.6.5 Wind Direction

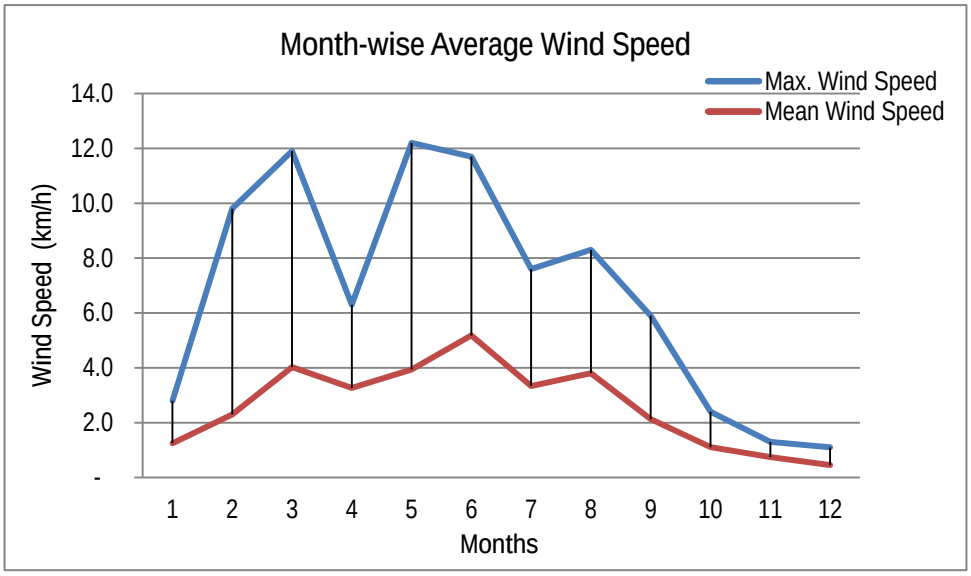
The wind direction is highly variable and is not predominantly from any single direction. The wind is least often out of the south and south west. Table 4.6 shows that wind speed is low in the months of October-January. Maximum wind speed is during summer season. Maximum wind speed is recorded in month of May i.e. 12.2 km/h and minimum is recorded in month of December i.e. 1.1km/h. The month-wise wind speed for District Lahore is indicated in Table 4.6. Graphic illustration is also shown in Figure 4.6.

Table 4.6: Month-wise Average Wind Speed

Wind Speed	2024										2023	
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Max. Wind Speed (km/h)	2.8	9.8	11.9	6.3	12.2	11.7	7.6	8.3	5.9	2.4	1.3	1.1
Mean Wind Speed (km/h)	1.3	2.3	4.0	3.3	3.9	5.2	3.3	3.8	2.1	1.1	0.7	0.5

Source: Historical Weather, Lahore (2023-2024).

Figure 4.6: Month-wise Average Wind Speed



4.2.6.6 Atmospheric Pressure

The average pressure in the Lahore district varies markedly as presented in Table 4.7. Atmospheric pressure is an indicator of weather. When a low-pressure system moves into an area, it usually leads to cloudiness, wind, and precipitation. High-pressure systems usually lead to fair, calm weather.

4.2.6.7 Atmospheric Sea Level Pressure

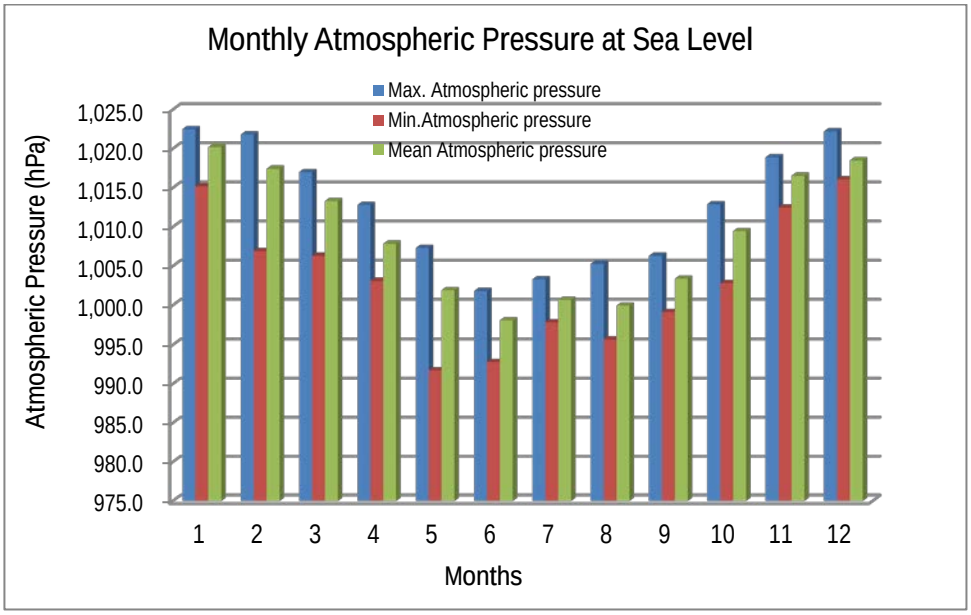
Atmospheric sea level pressure in the district Lahore as a whole remains same throughout the year, which ranges from 998.2 to 1020.2. Month-wise values of mean Sea level atmospheric pressure are depicted in Table 4.7 while the graphic presentation is given Figure 4.7.

Table 4.7: Month-wise Atmospheric Pressure at Sea Level

Atmospheric Pressure-Category	2024										2023	
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Max. Atmospheric Pressure	1,022.5	1,021.8	1,017.0	1,012.8	1,007.3	1,001.8	1,003.3	1,005.3	1,006.3	1,012.9	1,018.9	1,022.2
Min. Atmospheric Pressure	1,015.2	1,006.9	1,006.3	1,003.1	991.7	992.8	997.9	995.7	999.2	1,002.8	1,012.5	1,016.1
Mean Atmospheric Pressure	1,020.2	1,017.4	1,013.3	1,007.8	1,001.9	998.2	1,000.7	999.9	1,003.4	1,009.5	1,016.5	1,018.5

Source: Historical Weather, Lahore (2023-2024).

Figure 4.7: Month-wise Atmospheric Pressure at Sea Level



4.2.6.8 Visibility

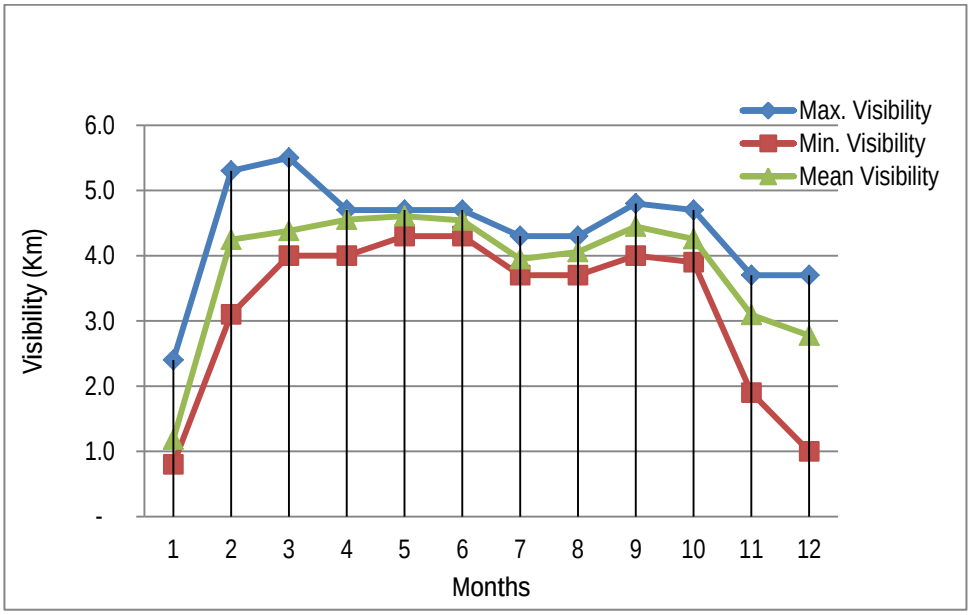
The visibility usually remains good throughout the year except for December, January and February, where it is lowest relative to other months due to thick fog. Month-wise values of mean visibility are depicted in Table 4.8, while the graphic illustration is given in Figure 4.8.

Table 4.8: Month-wise Mean Visibility

Visibility-Category	2024										2023	
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Max. Visibility (Km)	2.4	5.3	5.5	4.7	4.7	4.7	4.3	4.3	4.8	4.7	3.7	3.7
Min. Visibility(Km)	0.8	3.1	4.0	4.0	4.3	4.3	3.7	3.7	4.0	3.9	1.9	1.0
Mean Visibility(Km)	1.2	4.2	4.4	4.6	4.6	4.5	4.0	4.1	4.4	4.3	3.1	2.8

Source: Historical Weather, Lahore (2023-2024).

Figure 4.8: Month-wise Mean Visibility



4.2.7 Air Quality and Noise Level

In general, the observation regarding air quality of the project site was good because it lies away from the densely populated areas of Lahore city. However, the presence of vehicular activity on access road (Ring Road) to the 'Khan Brothers Foundry' site contributes towards gaseous emission in the study area. As the area comprises of both residential and commercial areas; the other sources of air pollution are burning of solid waste and presence of generators.

As far as noise level is concerned, during the field survey, it was observed that frequency of noise level was under control and has no impact/risk on daily routine activities of the residents. Details are given in Table 4.9 and Table 4.10.

4.2.7.1 Air Quality

Air quality is measured at 3 locations in the project area using portable $PM_{2.5}$ and $PM_{10,}$ temperature (^{o}C), average relative humidity (%) meters. These measurements were conducted at different locations. At each site, three readings were taken one from the center, two from this point in two opposite directions.

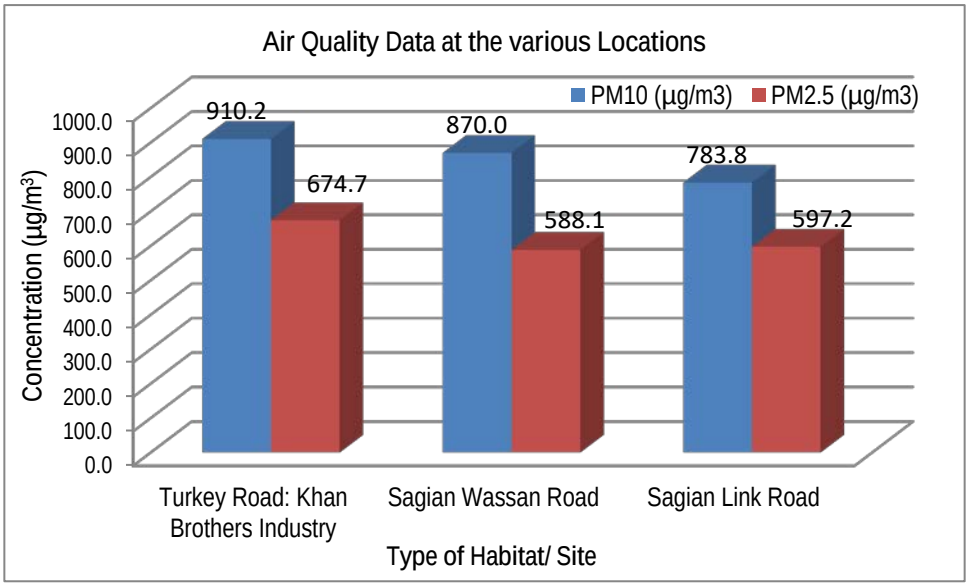
The PM2.5 concentration for Turkey Road: Khan Brothers Foundry is 674.7µg/m3, Saggian Wassan Road is 588.1µg/m3 and Saggian Link Road is 597.2µg/m3, whereas, for PM10 concentration, Turkey Road: Khan Brothers Foundry is 910.2µg/m3, Saggian Wassan Road is 870.0µg/m3 and Saggian Link Road is 783.8µg/m3 which are high from the standard value. The high levels of PM10 and PM2.5 are due to various factors, including emissions from factories, vehicle exhaust, and construction activities. Industrial processes, such as manufacturing, combustion, and chemical reactions, often release particulate matter into the air.

The values ranges from (0–50) is good and have minimal Impact, and values ranges from (51–100) is Satisfactory and it may cause minor breathing discomfort to sensitive people while values ranges from (101–200) are moderately polluted and it may cause breathing discomfort to people with lung disease such as asthma, and discomfort to people with heart disease, children and older adults, and values ranges from (201-300) are very unhealthy and values ranges from (301-500) are consider hazardous. A summary of this data is given in Table 4.9, while the graphic illustration is given in Figure 4.9 and detailed air quality results are given in Annex 4.2**.**

Table 4.9: Air Quality Data at the various locations in the Industrial area

Location	Type of Habitat/ Site	Mean Reading			
		PM_{10} ($\mu g/m^3$)	PM2.5 ($\mu g/m^3$)	Temperature (^oC)	Average relative Humidity (%)
Turkey Road: Khan Brothers Foundry	Industry Track Link Road	910.2	674.7	22.6	45.7
Saggian Wassan Road	Industry Road	870.0	588.1	24.0	44.8
Saggian Link Road	Link Road, Saggian Road	783.8	597.2	23.7	44.5

Figure 4.9: Air Quality Data at the various Locations



4.2.7.2 Noise Quality

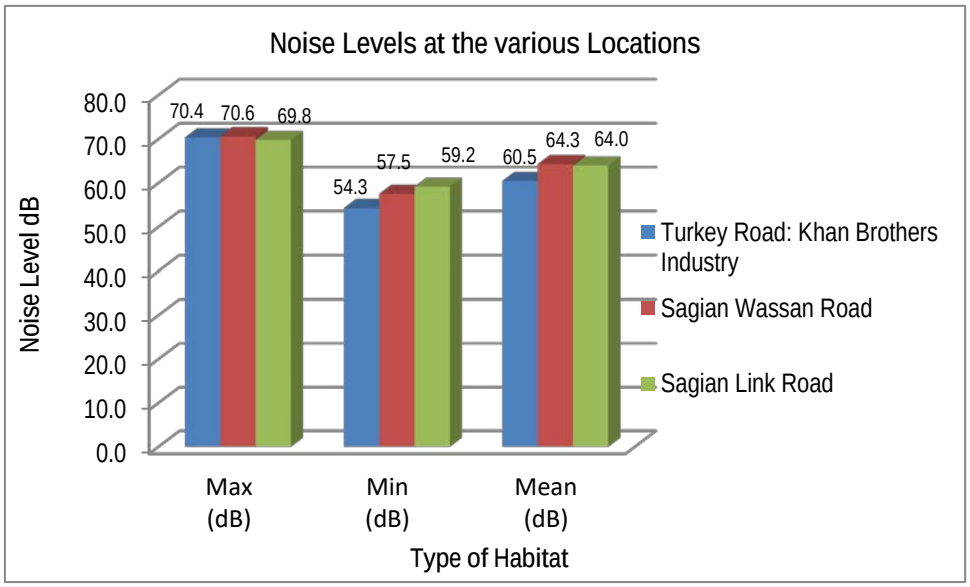
Ambient noise quality is measured at 3 locations in the project area using portable sound level meters. At each site, three readings, one at the centre of the location, and the other two on both sides of the center point were taken.

Generally, average noise levels along the entire alignment are below 70.6dBA. Average noise levels along the entire alignment are high dBA. The noise level ranges from 54.3 dBA to 70.6 dBA. The high noise values are recorded because of the industrial area. The low noise values are recorded because the transmission line passes through sparsely populated areas with low human activities. The noise level readings are given in Table 4.10, while the graphic illustration is given in Figure 4.10; and details of these results are presented in Annex 4.3.

Table 4.10: Noise Levels at the various locations in the Industrial Area

Location	Type of Habitat/ Site	Reading		
		Max (dB)	Min (dB)	Mean (dB)
Turkey Road: Khan Brothers Foundry	Industry Track Link Road	70.4	54.3	60.5
Saggian Wassan Road	Industry Road	70.6	57.5	64.3
Saggian Link Road	Link Road, Saggian Road	69.8	59.2	64.0

Figure 4.10: Noise Levels at the various Locations



4.2.8 Water Resources

The water resource in the study area includes both surface and groundwater. Based on the secondary data and the information collected during the field survey, the groundwater table depth varied from 90-100 feet. The groundwater is extracted by means of wells, hand pumps and electric motors.

The community reported that the groundwater is of good quality that is used for drinking purpose, although there is no proper sewerage system present in the project area for disposal of wastewater.

4.2.8.1 Water Quality

In the project area, the water quality at 3 locations consisting of 3 water samples, (i.e. surface water, groundwater and waste water) at Industrial Zone Phase-I of RUDA, Mouza Marri is measured during February 2025, and the results are presented in Table 4.11 and Table 4.12. Details of water quality analysis are given in Annex 4.4

4.2.8.2 Groundwater and Surface Water Quality

The water sample of Groundwater was taken from a depth of 250 to 300 feet at the project site (Khan Brothers Foundry area) located in the Industrial Zone Phase-I of RUDA. The results presented in Table 4.11 reveal that the value of pH are within the limit of 6 -10 pH; while no BOD and COD found in the analysis of water samples. Thus, it can be concluded that the quality of groundwater found adequately good and satisfactory; and within the limit of PEQS standards of EPA.

Table 4.11: Groundwater and Surface Water Quality at Project Site

Sr. No.	Parameters	Units	PEQS	Sample Groundwater At Khan Brothers, Marri, Lahore	Sample Surface water At Khan Brothers, Marri, Lahore
1	pH value at 25 °C	-	6.5 – 8.5 pH	7.42	7.3
2	Temperature	°C	23-26°	18°	12
3	Total Dissolved Solid (TDS)	mg/l	1000	295	457
4	Odor	-	Non-Objectionable	Non-Objectionable	Non-Objectionable
5	Color	-	Non-Objectionable	Non-Objectionable	Non-Objectionable
6	Chlorides	mg/l	250	14.6	29.25
7	Hardness	mg/l	500	190	440
8	Alkalinity	mg/l	NGVS	180	270
9	Sulfate	mg/l	250	130	140

10	Turbidity	NTU	<5	1.2	9
11	Conductivity	µS/cm	NGVS	403	830
12	Fluoride	mg/l	≤1.5	0.42	0.45
13	Cadmium`	mg/l	0.01	BDL	BDL
14	Iron	mg/l	0.3	BDL	0.09
15	Lead	mg/l	≤0.05	BDL	BDL
16	Acidity	mg/l	NGVS	BDL	10
17	Total Nitrogen	mg/l	NGVS	BDL	BDL
18	Total Coliforms	cfu/ 100ml	0	55	TNTC

4.2.8.3 Waste Water Quality

The wastewater quality at the drain/nullah adjacent to the proposed project site at Mouza Marri, Turkey Road, Lahore, shows several parameters exceeding the Punjab Environmental Quality Standards (PEQS). While the pH (7.02) and temperature (16°C) are within acceptable limits, Biological Oxygen Demand (BOD) (670 mg/l) and Chemical Oxygen Demand (COD) (1280 mg/l) are significantly higher than the PEQS limits. Other parameters, such as Total Suspended Solids (TSS) (1140 mg/l) and Alkalinity (530 mg/l), also exceed the standards. Chloride, Iron, Cadmium, and Lead are within permissible limits, but Cadmium slightly surpasses the threshold. Overall, while some parameters meet PEQS, the high BOD, COD, and TSS raise environmental concerns. The results of waste water sample are presented in Table 4.12 reveals that the quality of waste water is within the limit of PEQS. In case of the waste water, an adequate and appropriate mitigation measures need to be adopted for the improvement of water quality.

Table 4.12: Waste Water Quality of Proposed Project Site

Sr. No.	Parameters	Units	PEQS	**Sample** **Waste Water** At Khan Brothers, Mouza Marri, Turkey Road, Lahore
1	pH value at 25°C	-	6-9 pH	7.02
2	Temperature	°C	N. S	16
3	Biological Oxygen Demand (BOD) at 20°C	mg/l	80	670
4	Chemical Oxygen Demand (COD)	mg/L	150	1280
5	Conductivity	µS/cm	NGVS	1380
6	Total Dissolved Solid (TDS)	mg/l	3500	760
7	Alkalinity	mg/l	NGVS	530
8	Total Suspended Solid (TSS)	mg/L	200	1140
9	Hardness	mg/L	NGVS	240
10	Chloride	mg/l	1000	117
11	Iron	mg/l	8	0.66
12	Cadmium	mg/l	0.1	0.13
13	Total Nitrogen	mg/l	NGVS	-
14	Lead	mg/l	0.5	0.14

4.3 Ecological Resources

This section describes the flora and fauna in the jurisdiction of the proposed project area.

4.3.1 Flora

The vegetation of the project area shows that it is suitable for plantation of native species along the agriculture fields. Variation in diversity is caused due to climate, heterogeneity, biotic interaction and habitat. The project area is accessible to humans for a long time resulting in low diversity.

The land owners belonging to the vicinity of the proposed project site have already grown trees like *Shesham (Dalbergiasissoo), Neem (Azadirachtaindica), Kikar (Acacia Arabica), Safaida (Eucalyptus camaldulensis), Sharin (Albizzialebbek), Bohr (Ficusbengalansis), Sumbal (Bombac Cieba), Toot (Morus alba), Jaman(Syzygiumcumini),Mango (Mangifera indica), Guava (Psidiumguajava), Beri (Zizyphus jujube)*, etc. in their agricultural fields. The common/ local trees species grown in the surrounding areas of the project site are given in the Table 4.13 with their local and botanical names.

Table 4.13: List of Trees in the Surroundings of Project Site

Sr. No.	Local Name	Technical/Botanical Name
I.	**Timber/ Wood Tree**	
1	Shesham	*Dalbergia sissoo*
2	Neem	*Azadirachta indica*
4	Kikar	*Acacia Arabica*
5	Safaida	*Eucalyptus camaldulensis*
6	Sharin	*Albizia lebbec*
7	Bohr	*Ficus bengalansis*
8	Sumbal	*Bomba Ceiba*
II.	**Fruit Trees**	
1	Toot	*Morus nigra*
2	Jaman	*Syzygium cumini*
3	Mango	*Mangifera indica*
4	Guava	*Psidium guajava*
5	Beri	*Ziziphus jujuba*

4.3.2 Fauna

Most of the animal species present in the adjacent area of the project site are domestic animals, which include: cows, buffaloes, goats/ sheep and poultry which provide adequate amount of milk, meat and by-products like butter and cheese etc. Some of the animals are being used for draught power like donkeys. The main bird species present in the study area is given in below Table 4.14.

Table 4.14: List of Bird Species in the Project Area

Bird Species	Scientific Name	Status	
		Local	Migrated
- Bulbul	*Pycnonotidae*	☑	☒
- House crow	*Corvus splendens*	☑	☒
- House sparrow	*Passer domesticus*	☑	☒
- Koel	*Eudynamys scolopaceus*	☒	☑
- Mynah	*Acridotheres tristis*	☑	☒
- Parrot	*Psittacula krameri*	☑	☒
- Pigeon	*Columba livia*	☑	☒
- Quill	*Coturnix coturnix*	☒	☑

4.3.3 National Parks, Reserved Forests and Wildlife Sanctuaries

There is no national park and wildlife sanctuaries present in the project as well as adjacent to the project area, so that there will be no impact/risk on such important events as a result of project implementation.

4.3.4 Forests and Recreational Area

There is no forest (private and government) observed in the project area as well as adjacent to the project area/ area of influence, so that there is no risk on forest and recreational spots, due to the implementation of the proposed Khan Brothers Foundry.

4.3.5 Endangered Species

During the field survey, it was observed that there is no floral and faunal endangered species in the project area as well as in the area of influence.

4.4 Social and Cultural Environment

This section describes the social and cultural environment conditions belong to project area.

4.4.1 Administrative Setting

The project lies in the district Lahore, between 31°15′ - 31°45′ N and 74°01′ - 74°39′ E, with an elevation of 210 meters above sea level. The district covers an area of approximately 1,772 km^2, consisting the population of 14.407 million (March, 2024[7]). The Lahore city included 10 towns and 274 union councils.

4.4.2 Settlement Pattern

The field survey has shown that the settlement pattern of the project area and its vicinity is urban residential locality. The project site is located along the Mehmood Booti Ring Road at Turkey road village named as “Marri”, which comes under the jurisdiction of district Lahore. The predominant first language is Punjabi and Urdu. Based on interviews of all available respondents (10 Nos.) located in the vicinity of the project site, the FGDs, demographic profile and other socio-economic features were established based on the field survey and are discussed.

4.4.3 Demographic Characteristics of the Population

The field surveys (including interviews, focus group discussions and village profile) were carried out (10-30 November, 2024) to collect the data including focus group discussions (FGDs) from the nearby residential community to accomplish the baseline information, which may provide the basis for onward monitoring (if any). The demographic features include the information on household’s profile, gender composition, occupations, and literacy status of the population residing adjacent to the project area. The information relating to the demographic profile of the people in the project area are discussed below.

4.4.4 Family Size and Gender Composition

In the project area, in general, nuclear and extended families live and working individually as well as jointly for all productive resources such as land, crops, trees and cattle. The internal domestic management and arrangements are managed by the family elder/lead persons. Generally, the outside concerns/matters are managed by the lead person of household.

The results of field survey of sample households presented in Table 4.15 reveals that on overall basis, the average family size accounted for 4.8 members, out of which, the proportion of male and female estimated as 58.3 percent and 41.7 percent respectively.

Table 4.15: Average Family Size and Gender Composition

Average Family Size (No.)	Gender Composition (%)	
	Male	Female
4.8	58.3	41.7

4.4.5 Literacy Status

The field survey results summarized in Table 4.16 reveal that on the whole, the average literacy rate of sampled households estimated as 56.3 percent. The percentage of average literacy rate among male and female estimated as 69.1 and 30.9 respectively.

Table 4.16: Average Literacy Rate of the Sample Households

Overall	Average Literacy Rate (%)	
	Male	Female
56.3	69.1	30.9

[7]“Lahore”.https://worldpopulationreview.com/world-cities/lahore-population.

4.4.6 Income Analysis

The income analysis indicates the socioeconomic conditions of sample households. This section covers following aspects:

- Occupations of the sample households
- Income by source
- Household expenditure

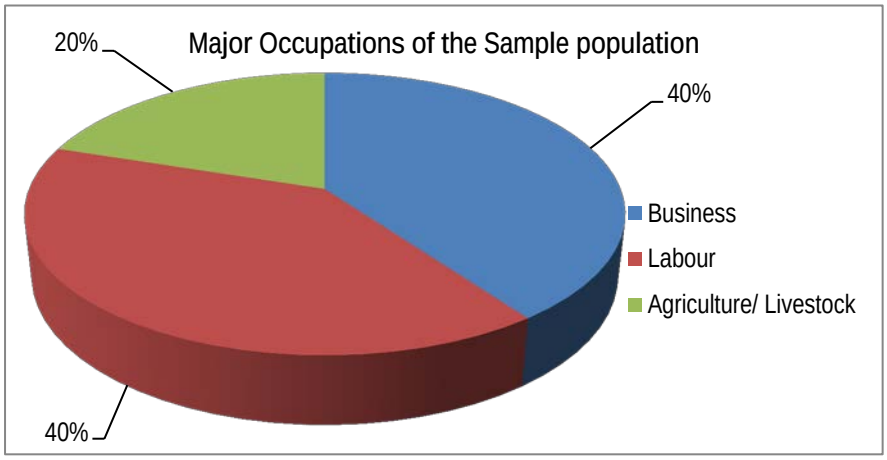
4.4.6.1 Occupations

The survey results presented in Table 4.17 reveal that almost 40% of the sample households were operated their own business, 40% were labours and remaining 20% were involved in agriculture/ livestock/dairy farming to supplement their household income. The graphic illustration is given in Figure 4.11.

Table 4.17: Major Occupations of the Sample population

Occupations of Earning Members of Sample Households (%)			
Service	Business	Labour	Agriculture/ Livestock
-	40.0	40.0	20.0

Figure 4.11: Major Occupations of Sample Population



4.4.6.2 Major Sources of Income

The assessment of annual household income is one of the important indicators to measure the household well-being/ livelihood. The survey results indicate that the major sources of income included: income from crops, livestock, private job, business, shop keeper and labour.

a) Average Income of Sample Households

The assessment of annual household income is one of the important indicators to measure the well-being/ livelihood of the household. In the field survey, the major sources of income include: income from crops, livestock, business/ shop keeper and labour.

Based on the data summarized in Table 4.18 indicates that the average annual household income computed to be Rs. 1,122,000, while it is Rs 233,750 on per capita basis.

Table 4.18: Average Annual Household Income of Sample Households

Average Household Income (Rs.)		Average Per Capita Income (Rs.)	
Annual	Monthly	Annual	Monthly
1,122,000	93,500	233,750	19,479

b) Average Household Expenditure

The annual expenditure and pattern of expenditure provides an indication for assessing standard of living of a household. The expenditure on food items include cereals, pulses, flour, sugar, cooking oil/ ghee, milk etc., while the non-food items include education, medical treatment, clothes, shoes, cosmetics, utilities and other.

Total average annual household expenditure on both food and non-food items estimated as Rs. 654,840. On the whole, the proportion of expenditure incurred in the area on food and non-food items is 51.3% and 48.7% respectively as details also given in the Table 4.19.

Table 4.19: Average Annual Expenditure on Food and Non- Food Items

Total Expenditure on Food & Non-Food Items (Rs./annum)	Food Expenditure (Rs.)	% on Food Expenditure	Non-Food Expenditure (Rs.)	% on Non-Food Expenditure
654,840	336,000	51.3	318,840	48.7

4.4.7 Housing Conditions

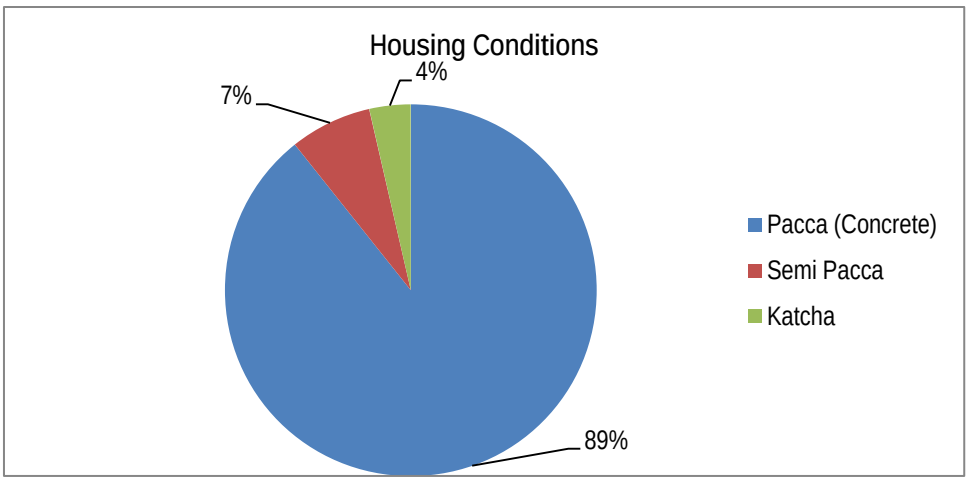
The ownership and housing conditions are also one of the important indicators for the assessment of living standard/ household well-being. It was observed, that on overall basis, a major proportion (85.0%) of sample households had their own houses, while remaining (15.0%) are on-rent basis. As far as the housing conditions are concerned, it was assessed during the field survey that a major proportion of sample households (89.3%) have their pacca (concrete) houses, 7.1% sample respondents were living semi-pacca houses, while remaining (3.6%) were living in katcha (earthen) houses.

In the project area, the public water supply facilities were limited, however, major proportion (98%) of sample households have their own hand pumps for their domestic drinking water supplies etc. Similarly, the major source of lighting is electricity, while for cooking purposes fuel wood followed by LPG were commonly used in the vicinity of the project area. Housing Conditions in the vicinity of the project site as presented in Table 4.20 and also illustrated through a bar chart in Figure 4.12.

Table 4.20: Status of Ownership and Housing Conditions

Owned Houses (%)	**Housing Conditions (%)**		
	Pacca (Concrete)	Semi Pacca	Katcha
85.0	89.3	7.1	3.6

Figure 4.12: Status of Housing Conditions of Sample Population



4.4.8 Availability of Basic Infrastructure

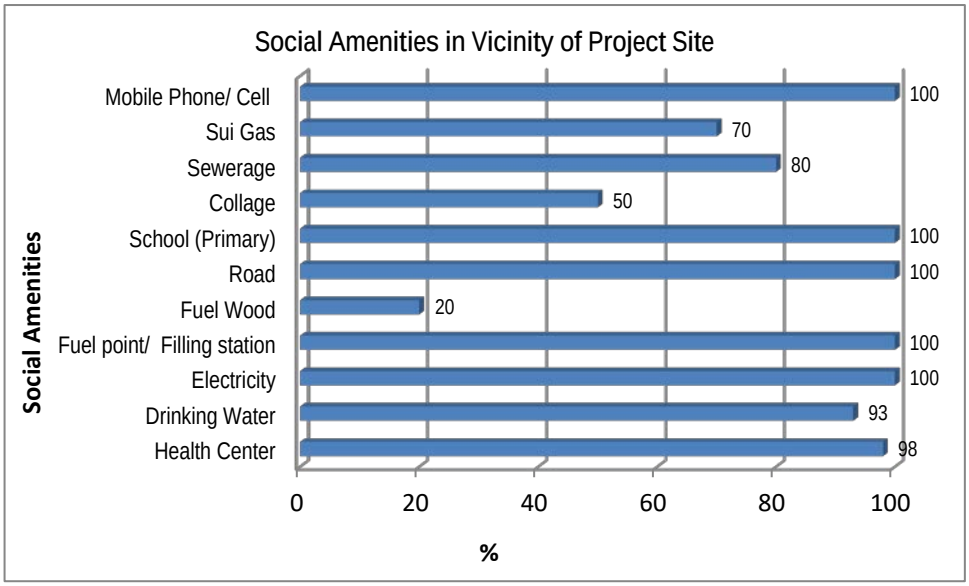
During the field survey, the availability of the social amenities/basic infrastructure to the local population was recorded. It was noted that on the whole, the facilities such as drinking water, electricity and schools (primary) were fully available in the project area as well as adjacent of the project area (i.e. within a radius of 4 sq. km). In case of health facilities, the majority of the locals are going to Mayo hospital, Kot Khawaja Saeed hospital, Shahdara Hospital, Mian Munshi Hospital etc. to avail the health facilities. Moreover the access to roads, sui-gas and sewerage system found limited in the jurisdiction of the project area.

However, in case of health facilities, sui-gas and sewerage system were limited in the area as presented in Table 4.21 and also illustrated through a bar chart in Figure 4.13.

Table 4.21: Availability of Social Amenities in Vicinity of Project Site

Health Center	Drinking Water	Electri city	Fuel point/ Filling station	Fuel Wood	Road	School (Primary)	Collage	Sewer age	Sui Gas	Mobile Phone/ Cell
(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
98	93	100	100	20	100	100	50	80	70	100

Figure 4.13: Availability of Social Amenities



4.4.9 Educational Facilities

The educational facilities in the vicinity of the project site are Primary and Middle schools for 'boys' and 'girls'. The higher secondary schools/education facilities, the locals have to go nearby areas in Lahore city. There are number of educational institutions both in public and private sectors located at nearby the project area as well as in Lahore city. The proposed project site is close to main Lahore city where almost all types of educational facilities are available. Educational facilities in the vicinity of the project site as presented in Table 4.21 and also illustrated through a bar chart in Figure 4.13.

4.4.10 Women Participation

On overall basis, of the sample households in the vicinity of the project area, one-third of the women are involved in income generation activities to enhance the household income as indicated below:

- Livestock rearing and caring activities – fodders cutting, watch & ward to animals,

milking etc.
- Poultry - feeding & health care.
- Education- tuitions at home/teaching in academy.
- Participate in social obligations/ ceremonies.
- Other Activities - washing clothes, cooking, child caring, etc.

In general, there were no women related concerns associated with the project implementation and operational phase; however, the local women indicated that their male members may be engaged in jobs during the project construction activities as well as in operation.

4.4.11 Historical and Religious Structures

There was no any cultural/historical structure found in the jurisdiction of the project area.

4.4.12 Indigenous People/ Groups

During the field survey, it was observed that there was no indigenous people/groups resided in the project area as well as in the vicinity of the project area. Thus, there will not be any impact/risk on the indigenous people/groups as a result of implementation of this project.

5. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1 General

This section identifies the potential environmental impacts/risks relating to the design, construction and operation of the project considering the physical, ecological and social domains of the environment. Accordingly, appropriate mitigation measures have been proposed in this EIA report to avoid/ or minimize the environmental impacts/ risks (if any) to make the project sustainable. Legal requirements of the PEPA and Punjab environmental quality standards (PEQS) will be ensured to comply-with. Furthermore, the compliance with the EMMP and EMP as recommended in the EIA report will also be adhered.

The component-wise impacts and their proposed mitigation measures are discussed in the section below.

5.2 Construction Stage Impacts on Physical Environment

This section explains the potential physical environmental impacts/risks (if any) and its mitigation measures to manage the impacts/risks. Although the impacts may be minor/and or temporary, even then specific mitigation measures have been proposed to avoid/ or reduce such impacts/risks.

5.2.1 Impacts on Land and Soil

The primary bio-physical impacts associated with the construction of the project are the change in land use and vegetation loss, which will cause soil erosion.

5.2.1.1 Mitigation measures

Avoid/ or minimize the disruption of soil stability as much as possible and reclaim the area through back filling, compaction and leveling at the best possible extent.

5.2.2 Impact on Air, Climate and Noise

- Dust emissions likely to occur during the excavation of the top soil.
- Use of vehicles during the construction phase can generate gaseous emission, dust and noise.
- Dispersion of particles from Stockpiles during high velocity wind.
- Noise caused by construction machinery and vehicles used for mobilization of construction equipment and workers.

5.2.2.1 Mitigation measures

- All vehicles transporting construction material will be covered with tarpaulin to avoid fugitive dust during transportation.
- Speed limits on unpaved surfaces on site to limit dust.
- Sprinkling of water to all active construction areas when necessary.
- Cover all trucks hauling soil, sand and other loose materials, soil stabilizers on all unpaved access roads and staging areas at construction sites.
- Fast growing trees will be planted around the project area to act as a wind breaker to reduce the particulate matter.
- Covering or use of wind sheets around the stockpiles to avoid air pollution through dispersion.
- Control noise through control of working hours and selection of less noisy equipment.

- Prohibit use of pressure horns.
- Provision of acoustic enclosures (hood and shrouds) on generator.
- Proper maintenance of vehicles and construction equipment.
- The construction materials will be properly maintained and barricades will be provided around the site for reducing the noise levels.
- Minimize/avoid unnecessary use of pneumatic drills and other noisy machinery.
- The personal protective equipment (PPE) will be provided to the construction workers and its usage will be made mandatory.

In addition to above, vehicles mobility/transportation may be carried out considering the routine working hours/activities of the locals/local community.

5.2.3 Impact on Water Resources

- Run-off water from construction area will disrupt water quality.
- Drainage of wastewater on ground can contaminate the soil and groundwater.
- Open sewerage water disposal on land can contaminate groundwater.

5.2.3.1 Mitigation measures

- Septic tanks will need to be constructed which will be cemented to prevent the groundwater contamination
- Proper disposal of waste material on dumping sites to avoid leachate generation and contamination of groundwater/surface water.
- The quality of water (wastewater discharged) will need to be analyzed once in three months during construction for its compliance to the disposal's standards of pollution control authorities.

5.3 Construction Related Impact on Biological Environment

The construction related impacts on biological environment including flora, fauna and wildlife of the study area and their corresponding mitigation measures are described in the following section:

5.3.1 Impact on Flora

As the project site is located at a plain land and free from any vegetation, so that there will be no/ or insignificant impact/risk on flora.

5.3.1.1 Mitigation measures

No endemic floral species exist in the site area as the project site is presently a plain non-agricultural land. A Trees Plantation Plan is attached as Annex 5.1**.** Therefore, the mitigate action (if any) may be in relation to preservation of rare floral species.

5.3.2 Impact on Fauna

In general, there will be no/ or minimal impacts/risks on fauna (animals & birds) as a result of the implementation of the project construction activities.

5.3.2.1 Mitigation measures

- Special measures need to be adopted to minimize impacts on the animals and birds in the area such as minimizing noise generation activities.
- Staff working/workers at the project site should not be allowed for any sort of hunting of birds.

- Organic waste material produced from the construction camps (if required) should properly dispose-off to avoid generation of insects, rodents and scavengers.

5.3.3 Impact on Wildlife

In general, there is no wildlife observed in the proposed project site area. However, the noise and vibrations produced during construction activities may cause wildlife (if any) to migrate out of the area.

5.3.3.1 Mitigation Measures

The noise and vibrations will need to be avoided/ or minimized by adopting the appropriate timing for carrying out such construction activities in the project area.

5.4 Construction related Social Impacts

This section describes the social impacts/risks of the project during the construction stage.

5.4.1 Impact on nearby Community Residents

In general, there will be no/ minor impacts/risks on locals/or nearby local community, as in the project area of influence, there are no/ few settlements.

5.4.1.1 Mitigation Measures

- It is preferred that the labour/unskilled as well as skilled labour may be engaged from nearby local community to avoid/ or minimize the presence of outsiders workers in project area.
- The project staff, workers/ labourers should not interfere in the local community related matters.
- A certain proportion, at-least one-third of the total unskilled labour may be employed by contractor from local community, so that their livelihood/ income could be supplemented.
- The timing of construction machinery and traffic plan will need to be adjusted in a way that it will not disturb the routine activities of the locals/local community.

5.4.2 Impact on Health of Local Community

There may be some minor impacts/risks to the ‘Health’ of locals/ local community as a result of the implementation of the project construction activities.

5.4.2.1 Mitigation Measures

- Appropriate technologies including careful designs and construction activities should be used to minimize the potential risks.
- Awareness of safety measures needs to be disseminated/disclosed
- Adoption of maximum possible measures to avoid impact on communities.
- Security fences and barriers/boundary wall around the project area should be placed to avoid any incidents/and other interruptions to nearby residents especially children.
- Proper placement of safety signs & boards should be placed/installed.

5.4.3 Impact on Health and Safety of Workers

Protection of health and safety of workers/workforce is very essential under the project. The potential impact on health and safety of the workers due to noise and air/dust (if any) may cause respiratory diseases among the workers.

5.4.3.1 Mitigation Measures

- Proper training of workers/workforce is required in the areas of health & safety, emergency rescue, first-aid etc. on the commencement of project construction activities.
- Personal protective equipment's (PPEs) like helmets, gloves, long work boots, ear muffles, masks, first aid/ medical kit and safety glasses etc. should be provided to workers/workforce and accordingly ensure to use by them during the construction work.
- Health and Safety Plan (Annex 5.2) will be implemented

5.4.4 Solid Waste Generation

During the project construction phase, different types of waste may be generated. The municipal waste may be in the form of food, cans, paper and wastewater and other. The construction waste may include excavated soil, sand, gravel, rocks, asphalt, pieces of concrete, bricks, wood, metal pieces and electrical wires. The solid wastes particularly garbage and trash may cause degradation of soil and land. Thus, the solid & liquid wastes may have the impacts/risks temporary and minor in nature.

5.4.4.1 Mitigation Measures

- Solid waste generated during construction activities and camp sites will need to dispose-off safely in demarcated waste disposal sites as per waste management plan of contractor.
- Waste disposal plan will require being reviewed/amended during the project construction phase considering climate change.
- Waste Management Plan (Annex 5.3) will be implemented to ensure safe handling, storage, collection and disposal of construction wastes and the training of employees who handle waste;

5.5 Project Operation related Impact on Physical Environment

This section explains the project operation related potential impacts/risks on the environment (physical, biological & social) and accordingly their mitigation measures to be adopted to avoid/ and or minimize those impacts to the possible extent.

5.5.1 Air Pollution

In general, no/ and or minor impact/risk on air quality. There will be pollutants such as sulfur dioxide, nitrogen oxides and particulate matter generated due to the electric furnace combustion activities involved during the operational phase of the project. Particular matter emissions can cause respiratory issues and cardiovascular problems.

5.5.1.1 Mitigation Measures

There will impact/risk on air quality, so that following mitigation measure will be required.

- Effective emission control technologies such as electrostatic precipitators (ESPs), fabric filters (baghouses), or wet scrubbers will be installing and maintain. These systems will capture particulate matter and other pollutants before they are released into the atmosphere.
- Cleaner raw materials such as higher-quality scrap metal will be used with fewer contaminants to reduce the emissions from the furnace.

- Scrap materials will be pre-treated to remove contaminants before they are fed into the furnace can help reduce emissions.
- Furnace and associated equipment will be maintained on regular basis to ensures they operate efficiently and with lower emissions

5.5.2 Noise Pollution

In general, no/ and or minor impact/risk on noise. Generally, during the operational phase of the project, noise will be generated through the electric arc as furnace operation involves the use of powerful motors and transformers. Movement of raw materials, charging of furnaces, and handling of molten metal will also produce noise.

5.5.2.1 Mitigation Measures

There will impact/risk on noise quality, so that following mitigation measure will be required.

- Machinery will be regularly maintained and lubricated to minimize noise generated by moving parts.
- Noisy activities will be scheduled during off-peak hours to minimize disturbance to nearby residents.
- Workers will be provided with earplugs or earmuffs to mitigate the impact of noise exposure on their health.
- Barriers will be installed around the furnace area to block or absorb sound waves

5.5.3 Impact on soil

In general, no/ and or minor impact/risk on soil during the operational stage of project due to the slag generated as a byproduct, which, if not properly managed, can contain heavy metals and other contaminants that may leach into the soil. Dust emissions from furnace operations can settle on the ground, potentially contaminating soil with metals and other pollutants.

5.5.3.1 Mitigation Measures

There will impact/risk on soil quality, so that following mitigation measure will be required.

- Proper disposal and recycling methods will be implemented for slag to prevent its accumulation in landfills or on-site, which can leach contaminants into the soil.
- Ventilation systems will be used to capture dust emissions from furnace operations before they settle on the ground.
- Water will be sprinkled to suppress dust on project areas

5.5.4 Impact on Water Resources

In general, no/ and or minor impact/risk on water resources/pollution due to use of water in the cooling process to maintain operational temperatures, which will result in heated water discharge into nearby water bodies, potentially altering aquatic ecosystems.

5.5.4.1 Mitigation Measures

- Measures will be implemented to reduce water consumption in cooling systems through optimization and efficiency improvements.
- Technologies will be employed such as cooling towers or heat exchangers to minimize the temperature of water discharged from the furnace, mitigating thermal pollution.

- Awareness training will need to be provided to all personnel and workforce involved during the project operation.

5.5.5 Natural and Man-Made Disasters

Natural disasters (earthquakes) and accidents such as fire, falls, slips and trips may result in injuries, financial losses and may even lead to deaths. The workers shall be trained and facilitated to cope with such disasters.

5.5.5.1 Mitigation Measures

Mitigation measures include the following:

- Emergency numbers should be clearly posted at all disposal stations; and
- Minor incidents and near misses should be reported, and preventive measures should be formulated accordingly by the Management An Emergency Response Plan (ERP) for earthquakes and manmade disasters should be developed by Khan Brothers Foundry and implemented in close consultation with the RESCUE Services and other concerned departments;
- Training of the Khan Brothers Foundry staff and employees regarding the emergency procedures and plans should be regularly conducted;

An Emergency Response Plan (ERP) is attached as Annex 5.4**.**

5.6 Project Operation related Impact on Biological Environment

5.6.1 Impact on Flora

In general, no/ and or minor impact/risk on ‘flora’ of the area as a result of operation of the project activities as furnace, will emit pollutants such as particulate matter, nitrogen oxides, sulfur oxides and volatile organic compounds (VOCs). These pollutants can settle on plant leaves, obstructing photosynthesis and leading to reduced plant growth and health. Heat produced by electric furnace can also effect plants, particularly sensitive plant species.

5.6.1.1 Mitigation Measures

There will insignificant impact/risk on the flora of the area, so that mitigation measure may be required.

- Advanced emission control systems will be installed such as electrostatic precipitators, scrubbers, or fabric filters can significantly reduce the release of particulate matter and gaseous pollutants.
- Green belts or buffer zones will be established with pollution-tolerant plant species around project areas to help in absorbing pollutants and providing a barrier to protect more sensitive vegetation.

5.6.2 Impact on Fauna

As there are no endangered species in the project area, so that no adverse impact/ and or risk on fauna is expected during the operation of the proposed project.

5.6.2.1 Mitigation Measures

Generally, no mitigation measure will be required in case of no/ or insignificant impact on the ‘fauna’.

5.7 Project Operation related to the Social Impacts/Risks

5.7.1 Impact on Health & Safety of Workers and Local Community

There will be no/ and or minimal social impacts/risks during the operation of the proposed project. However, there could be some minor risks for the workers/labour as well as local community of nearby area.

5.7.1.1 Mitigation Measures

- Proper training/education of workers/labour as well as local community of adjacent area is required in the areas of health & safety, emergency rescue, first-aid etc. on the commencement of project operation.
- Awareness of social risks safety measures will need to be disseminated/disclosed to the workers/labour as well as local community resided at nearby the factory area during the project operation.
- Safety signs and boards should be prominently displayed both inside and outside the project site.
- An Emergency Response Plan (ERP) is attached as Annex 5.4 needs to be in-place to prevent/ or minimize the impacts during emergency situations.
- Provision of Personal Protective Equipment (PPEs) to the workers.

5.8 Factory Processes Impacts/Risks (E&S)

In the proposed project (Factory), the potential impacts/risks (environmental & social) refer to the possible outcomes or hazards those could be occurred as per Khan Brothers Foundry flow chart/ processes/activities. To carry out the Khan Brothers Foundry processes and appropriate mitigation measures to avoid the E&S risks is given in Table 5.1.

Table 5.1: Industrial Processes Impacts/Risks Matrix

Sr. No.	Processes as per Khan Brothers Foundry	Mitigation Measures to avoid E&S Risks
1.	Material Receiving	- Quality and quantity needs to be checked carefully. - Raw material needs to be stored at designated area. - PPEs may be used by the workers/labour during the process of engineering activities, i.e. cutting, bending, grinding, fabrication, fitting wiring etc. In this context, an environment/health and safety person may ensure the avoidance of environmental and social risks.
2.	Quality Check	
3.	Heating in Furnace	
4.	Shaping into bars	
5.	Cooling	
6.	Inspection	
7.	Storage	
8.	Dispatching	
9.	Delivery of products	

6. ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM

6.1 General

This section provides a brief description for the management of environment and social issues of the proposed project during its construction and operation phases. It was observed in this EIA report that there are minimal environmental and social impacts/risks in the project area. Nevertheless, it is important that an environmental management plan (EMP) is pursued to protect from the environmental and social risks and compliance with EPA standards as well as safeguards requirements.

6.2 Objectives of Environmental Management (EMP)

The main objectives of the EMP are to:

- Provide the details of the Project impacts along with the proposed mitigation measures, and the corresponding implementation activities;
- To ensure that all necessary corrective actions are carried out and monitored in time to counter any adverse environmental impact under a systematic monitoring approach;
- Provide a procedure for timely action in the face of unanticipated environmental situation;
- Define the role and responsibilities of the Project Proponent and other key players in order to effectively communicate environmental and social issues among them;
- Define a monitoring mechanism, reporting frequency and identify monitoring parameters to ensure that all the mitigation measures are completely and effectively implemented;
- Design the trainings for enhancing the capacities of the Project Proponent on environmental and social management;
- Identify the resources required to implement the EMP and outline the corresponding financing arrangements; and
- Define the requirements necessary for documenting compliance with EMP and communicating it to all the concerned regulatory agencies.

6.3 Environmental Management and Monitoring Plan (EMMP)

The objective of the Environmental Management & Monitoring Plan (EMMP) is to address all the relevant major issues and provide necessary framework for the implementation of the proposed mitigation measures during the operational phase of the project. The EMMP is one of the most important outputs of the environmental assessment process. The major focus of the EMMP is to: (i) provide the details of the proposed project impacts/risks along with the proposed mitigation measures and (ii) define the responsibilities of the project proponent, contractor and other concerned/ role players; and effectively communicate environmental issues/ and or risks among them. The proper implementation of the EMMP ensures that all relevant impacts/risks of the proposed project were identified and accordingly, appropriate mitigation measures have been suggested to comply-with the NEQS. The required actions will be carried out by the concerned institutions/ or regulatory agency to accomplish the project objectives successfully. The potential impacts/risks, mitigation measures, monitoring mechanism and the roles and responsibility of concerned institutions are presented in Table 6.1.

Table 6.1: Environmental Management and Monitoring Plan

Sr. #	Potential Impacts/ Risks	Targets to be Achieved	Mitigation Measures & Monitoring	Responsibility
I.	**Construction Stage**			
1.	**Physical Environment**			
i)	**Soil and Land** - The primary bio-physical impacts associated with the construction of the project are the change in land use and vegetation loss, which may cause soil erosion.	- Prevention from disruption of soil and degradation of land (if any) of project area.	- There will not be use of any chemical (s) in the industry/factory during the construction phase. However, the disruption of soil stability will be minimized as much as possible and reclaim the area through back filling, compaction and leveling at the best possible extent.	Contractor/ Project Proponent (PP)
ii)	**Air, Climate and Noise** - Dust emissions likely to be occurred during the excavation of top soil. - Then use of vehicles during the construction phase can generate gaseous emissions, dust and noise. - Dispersion of particles from stockpiles during high velocity wind. - Noise may cause by machinery (used for construction) and vehicles used for transportation of construction equipment.	- Control of noise through fix the timing & working hours as well as selection of appropriate equipment. - Compliance with PEQS to control air pollution.	- There will be no/minor air, climate and noise issues in the industry/factory. - All vehicles transporting construction material shall be covered with Tarpaulin to avoid fugitive dust during transportation. - Speed limits on unpaved surfaces on site to minimize dust/air pollution. - Watering/sprinkling of water in all active construction areas as per requirement. - Cover all trucks hauling soil, sand and other loose materials, soil stabilizers on all unpaved access roads and staging areas at construction sites. - Fast growing trees will be planted around the project area to act as a wind breaker to reduce the particulate matter. - Covering or use of wind sheets around the stockpiles to avoid air pollution through dispersion. - Control noise through fixing of timing & working hours and use less noisy equipment. - Pressure horns may not be used. - Use of acoustic enclosures (hood and shrouds) on generator. - Proper maintenance of vehicles and construction equipment. - The construction materials will be properly maintained and barricades to be provided around the site for reducing the noise levels. - Minimize/avoid	Contractor/ Project Proponent

Sr. #	Potential Impacts/ Risks	Targets to be Achieved	Mitigation Measures & Monitoring	Responsibility
			unnecessary use of pneumatic drills and other noisy machinery. - The personal protective equipment's (PPEs) to be provided to the workforce and its usage should be mandatory.	
iii)	**Water Resources** - Run-off water from construction area will disrupt water quality. - Drainage of wastewater on ground can contaminate the soil and groundwater. - Open sewerage water disposal on land may contaminate groundwater.	- Control of groundwater/ and or surface water pollution during the construction activities (if any).	- Septic tanks will need to be constructed and cemented to prevent the groundwater contamination. - Proper disposal of waste material on dumping sites/designated area to avoid leachate generation and contamination of groundwater/ surface water. - The quality of water (waste water discharged if any) will need to be analyzed on quarterly basis.	Contractor/ Project Proponent
2.	**Biological**			
i)	**Flora** - During the pre-construction stage, the activities such as installation of construction camps, construction of temporary facilities & mobility of construction staff may damage the local vegetation/trees. - As the heavy machinery may be moved, which may require significant space due to which available vegetation (if any) may need to be removed. - This impact may be site-specific/ and or permanent; and having a medium level impacts/risks which need to be considered prior to commencement of construction works.	- Prevention from the impacts/ risks in the project area.	- The mobility of machinery/ vehicles and construction of temporary facilities should be properly planned and well designed to avoid impacts/risks (if any). - An alternate routes and access to roads may need to be designated where no/ or minimal impacts/risks are expected.	Contractor/ Project Proponent
ii)	**Fauna** - In general, there will be no/ or minimal impacts/risks on fauna (animals & birds) as a result of the implementation of the project construction activities.	- Prevention of animals to get harmed (if any) by constructional activities.	- Wildlife movements and routes must be considered during construction activities (if any) and should be avoided to the possible extent. - Special measures need to be adopted to minimize impacts on the animals and birds in the area such as minimizing noise generation activities.	Contractor/ Project Proponent

Sr. #	Potential Impacts/ Risks	Targets to be Achieved	Mitigation Measures & Monitoring	Responsibility
			- Staff working/workers at the project site should not be allowed for any sort of hunting of birds. - Organic waste material produced from the construction camps (if required) should properly dispose-off to avoid generation of insects, rodents and scavengers.	
iii)	**Wildlife** - The noise and vibrations will need to be avoided/ or minimized by adopting the appropriate timing for carrying out such construction activities in the project area.	- No wildlife exists in the proposed project area.	- In general, there is no wildlife observed in the proposed project site area. However, the noise and vibrations produced during construction activities may cause wildlife (if any) to migrate out of the area.	Contractor/ Project Proponent
3.	**Social Aspect**			
i)	**Nearby Community Residents** - The nearby community may react negatively, if their local skilled/ unskilled labour is not involved in the construction activities and all outsiders are employed.	- Providing labour to the residents of the area to raise employment.	- HSE Unit will be formed in operational phase for avoiding health and social issues. - The project staff, workers/ laborers should not interfere in the local community related matters. - A certain proportion, at-least one-third of the total unskilled labour should be employed by the contractor from local population, so that their livelihood/ income could be supplemented. - The timing of construction machinery and traffic plan will be adjusted in a way that it will not disturb the routine activities of the local residents.	Contractor/ Project Proponent
ii)	**Human Health** - The health of project staff/ workers and adjacent community may be affected if proper measures are not adopted during construction activities to avoid health hazards.	- Prevention of any possibility of work site accident impact on worker's health.	- Appropriate technologies including careful designs and construction activities should be used to minimize the potential hazards. - Security fences and barriers around the project area should be placed to avoid accidents/ and other interruptions by the nearby residents especially children. - Proper placement of safety signs and boards wherever needed.	Contractor/ Project Proponent
iii)	**Health and Safety of Workers** - Protection of health and safety of worker is very essential under	- Prevention of any possibility of work site accident impact	- HSE officers will be hiring before operational phase. - Proper training of workers on how to respond in case of any accidents or safety	Contractor/ Project Proponent

Sr. #	Potential Impacts/ Risks	Targets to be Achieved	Mitigation Measures & Monitoring	Responsibility
	the project. - The potential impact on health and safety of the workers due to noise and dust may cause respiratory diseases among the workers.	on worker's health.	emergency and approach to nearby health care/ medical unit. - Safety awareness should be provided to all staff. - Workers should also be provided with all safety necessary Personal Protective Equipment's (PPE) like helmets, gloves, long work boots, ear muffles, masks, first aid/ medical kit and safety glasses and encourage them to wear it during work for their safety and protection. - Provision of first-aid facility should be available on site to react immediately in case of any accidents.	
iv)	**Solid waste generation** - Different type of waste is likely to be generated during the construction phase of the proposed Project. The municipal waste will be in the form of food, cans, paper and wastewater from construction camps toilets and washing yards. Construction waste will include excavated soil, sand, gravel, rocks, asphalt, pieces of concrete, bricks, wood, metal pieces and electrical wires. - Insecure and unhygienic disposal of the solid wastes particularly garbage and trash may cause degradation of soil and land. Insecurely disposed off heaps of wastes containing kitchen garbage and food waste can serve as breeding grounds for the disease spreading vectors and rodents. Throwing away of solid wastes into water channels and the wastewater network can result into choking of the latter. These impacts are temporary and minor negative in nature.	- Proper & safe handling and disposal of construction related waste. - Compliance with applicable waste management rules for waste disposal. - Implementation of waste Management plan.	- Solid Waste generated during construction and camp sites will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan. - Construction workers and supervisory staff should be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste; proper labeling of containers, including the identification and quantity of the contents, hazard contact information, etc. - Waste disposal plan must be reviewed during the entire construction phase in the light of changing weather conditions - Construction waste such as waste wood can be recovered and recycled into wood for new building projects, and cement, bricks, and plaster can be crushed and reused in other construction and building projects. For detail, Waste Management Plan is Attached as Annex 5.3.	Contractor/ Project Proponent

Sr. #	Potential Impacts/ Risks	Targets to be Achieved	Mitigation Measures & Monitoring	Responsibility
II.	**Operational Stage**			
1.	**Physical Aspect**			
i)	**Air** – Pollutants will be generated during the operation phase of the project as there will be pollutants such as sulfur dioxide, nitrogen oxides and particulate matter generated due to the electric furnace combustion activities involved during the operational phase of the project.	– Compliance with prescribed PEQS to control air pollution.	- Effective emission control technologies such as electrostatic precipitators (ESPs), fabric filters (baghouses), or wet scrubbers will be installing and maintain. These systems will capture particulate matter and other pollutants before they are released into the atmosphere. - Cleaner raw materials such as higher-quality scrap metal will be used with fewer contaminants to reduce the emissions from the furnace. - Scrap materials will be pre-treated to remove contaminants before they are fed into the furnace can help reduce emissions. - Furnace and associated equipment will be maintained on regular basis to ensure they operate efficiently and with lower emissions.	Project Proponent (PP)
ii)	**Noise Pollution** – During the operation phase of the project, noise can be generated due to the electric arc as furnace operation involves the use of powerful motors and transformers. Movement of raw materials, charging of furnaces, and handling of molten metal will also produce noise.	– Control of noise through fix the timing & working hours as well as selection of appropriate equipment.	- Machinery will be regularly maintained and lubricated to minimize noise generated by moving parts. - Noisy activities will be scheduled during off-peak hours to minimize disturbance to nearby residents. - Workers will be provided with earplugs or earmuffs to mitigate the impact of noise exposure on their health. - Barriers will be installed around the furnace area to block or absorb sound waves.	Project Proponent (PP)
iii)	**Soil** – There can be impacts on soil at operational stage of project due to the slag generated as a byproduct, which, if not properly managed, can contain heavy metals and other contaminants that may leach into the soil. Dust emissions from furnace operations can settle on the ground, potentially contaminating soil with	– Prevention from disruption of soil and degradation of land (if any) of project area	- Proper disposal and recycling methods will be implemented for slag to prevent its accumulation in landfills or on-site, which can leach contaminants into the soil. - Ventilation systems will be used to capture dust emissions from furnace operations before they settle on the ground. - Water will be sprinkled to suppress dust on project areas.	Project Proponent (PP)

Sr. #	Potential Impacts/ Risks	Targets to be Achieved	Mitigation Measures & Monitoring	Responsibility
	metals and other pollutants.			
iv)	**Water Resources** – There will be no as such water pollution due to no use of water in any process of factory.	– Control of groundwater or surface water pollution from operational activities.	- Measures will be implemented to reduce water consumption in cooling systems through optimization and efficiency improvements. - Technologies will be employed such as cooling towers or heat exchangers to minimize the temperature of water discharged from the furnace, mitigating thermal pollution. - Awareness training will need to be provided to all personnel and workforce involved during the project operation.	Project Proponent (PP)
2.	- Biological aspect			
i)	**Flora and Fauna** – Impact on flora may occur as furnace, will emit pollutants which will settle on plant leaves, obstructing photosynthesis and leading to reduced plant growth and health. – Fauna.	– Prevention from the impacts/ risks in the project area	– Advanced emission control systems will be installed such as electrostatic precipitators, scrubbers, or fabric filters can significantly reduce the release of particulate matter and gaseous pollutants. – Green belts or buffer zones will be established with pollution-tolerant plant species around project areas to help in absorbing pollutants and providing a barrier to protect more sensitive vegetation. For detail, Tree Plantation Plan is Attached as Annex 5.1.	Project Proponent (PP)
3.	**Social aspect**			
i)	**Impact on local community, health and safety of workers.** - There will be no/ minor impacts/risks on locals/or nearby local community, as well as health & safety of the workers/labour during the operational activities of the project. – There could be some minor risk of staff getting injured during the operational activities of the project.	– Health and Safety of workers and nearby local community.	– Safety signs and boards should be prominently displayed both inside and outside the project site. – Training regarding safety measures should be provided to all operational staff. – Education and training regarding emergency response plan should also be provided to concerned staff. – An Emergency Response Plan (ERP) needs to be in-place to prevent/ or minimize the impacts during emergency situations.	Project Proponent (PP)

Sr. #	Potential Impacts/ Risks	Targets to be Achieved	Mitigation Measures & Monitoring	Responsibility
			– Provision of Personal Protective Equipment (PPEs) to the workers. For detail, please refer to Health, Safety and Environment (HSE) Management Plan Annex 5.2	

6.4 Equipment Maintenance Detail

The equipment maintenance will be carried out keeping in view the equipment maintenance plan as well as EMMP/EMP. Monitoring program provides the important information that allows for more effective planning and an adaptive response based on the assessment of the effectiveness of mitigation measures. The monitoring of various parameters (i.e. noise, smoke emissions and water quality) will help to determine the extent to which project construction/ operational activities (if any) will cause environmental disturbance.

6.5 Plantation of Trees

Under the project, plantation of trees to be carried out for the reduction of noise, odor and air pollution. Plantation of trees may be around the project boundary wall, road side as well as other appropriate locations inside the factory. The tentative cost for the plantation is about Rs. 0.35 Million. Detailed Tree Plantation Plan is attached as Annex 5.1.

6.6 Project Impact Evaluation Matrix

Keeping in view the type and magnitude of project impacts/risks relating to the physical, biological and social aspects of the project, an impact matrix has been developed and presented in Table 6.3.

The project impact matrix has shown that on overall basis, the project is highly beneficial with low adverse impact/risks in the project area. Accordingly, to address the environmental and social impacts/ risk, an Environmental Management and Monitoring Plan (EMMP) has been prepared and presented in Table 6.2.

Table 6.2: Project Impact Evaluation Matrix

Component	Physical Environment											Biological Environment										Social Environment										
	Soils (Erosion/stability)	Rocks	Energy/Mineral Resources	Waterlogging	Salinity	Drainage	Surface Water	Groundwater	Air Quality	Noise		Aquatic Ecosystem	Wetland Ecosystem	Trees	Endangered Species	Migratory Species	Crops	Birds and Animals	Plant Pests	Disease Vectors		Public/ Workers Health & Safety	Land Use	Flow of Road Traffic	Employment	Structures and Infrastructure	Temporary Disruption of People	Permanent Disruption of People	Cultural & Religious Values	Tourism and Recreation	Living Standards	Overall Ranking
I. Construction Phase																																
Land Acquisition	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-		-	LA	-	LA	-	LA	-	-	-	-	
Excavation/ Land Removal	LA	-	-	-	-	-	-	-	MA	MA		-	-	-	-	-	-	LA	-	-		MA	LA	LA	HB	-	-	-	-	-	-	
Construction Machinery Use	LA	-	-	-	-	-	-	-	LA	LA		-	-	-	-	-	-	LA	-	-		LA	-	LA	MB	-	LA	-	-	-	-	
Construction Camp	LA	-	-	-	-	-	-	LA	-	-		-	-	-	-	-	-	LA	-	LA		-	-	-	MB	-	LA	-	-	-	LB	
Overall	LA	-	-	-	-	-	-	-	MA	LA		-	-	-	-	-	MA	LA	-	LA		LA	LA	LA	MB	-	LA	-	-	-	-	LA
II. Operational Phase																																
Electric Arc Furnace	-	-	-	-	-	-	-	-	MA	MA		-	-	LA	LA	LA	-	LA	-	-		LA	HB	-	HB	HB	-	-	-	-	HB	
Continuous Casting Machine	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-		-	-	-	HB	HB	-	-	-	-	HB	
Overall	-	-	-	-	-	-	-	-	MA	MA		-	-	LA	LA	LA	-	LA	-	-		LA	H B	-	HB	HB	-	-	-	-	HB	HB

Note:

Non-significant/ not applicable:			
Low Adverse:	LA	Low Beneficial:	LB
Medium Adverse:	MA	Medium Beneficial:	MB
High Adverse:	HA	High Beneficial:	HB

6.7 Overlays

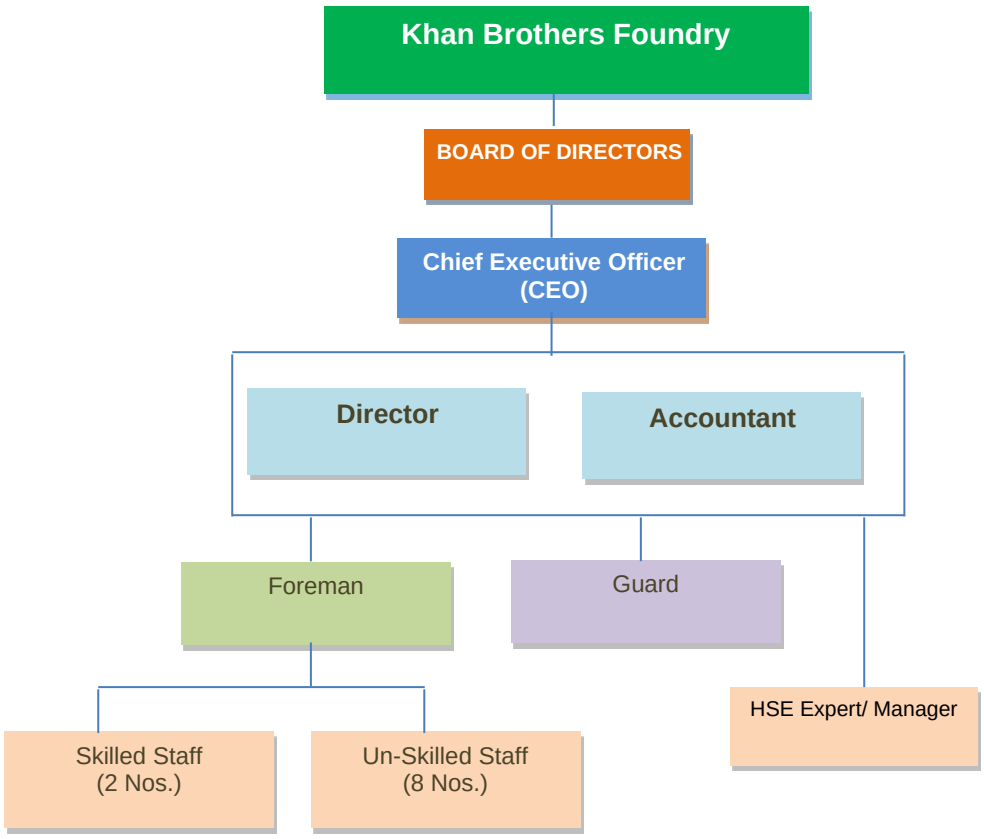
In order to identify spatial based impacts, overlays were used. An overlay is based on a set of transparent maps, each of which represents the spatial distribution of environmental characteristics. Information for an array of variables such as land use, infrastructure, vegetation etc. was collected for the standard geographical units within the project's area of influence (AoI). The characterize the Project area's land use, physical, social, ecological and other relevant parameters related to proposed intervention. The overlays maps used in this EIA study for the quantification of the land use categories referred in section 4.

6.8 Organizational Capacity & Competency

Project Proponent will be responsible for periodic environmental monitoring (quarterly/ or semi-annually) by engaging environment/ health & safety expert and also ensure the monitoring of EMP and EMMP implementation in the field during the preparation of monitoring reports and to be submitted to the Project Proponent. Moreover, the representative of the RUDA and EPA may monitor the project construction as well as operational activities at the project site.

The hierarchy and organizational chart of the project proponent (Khan Brothers Foundry) is illustrated in Figure 6.1.

Figure 6.1: Organizational Structure of the Project Proponent



6.9 Training Schedules

The training of the project staff (both skilled and unskilled) is necessary to avoid any impacts/risks on the environment both during the construction and operational stage of the project. The training will need to cover the occupational health and safety, First-Aid-Kit, personal protective equipment's (PPEs) and other potential risks mitigation measures.

An environmental and social training and technical assistance (TA) program is to be carried out before the implementation of the proposed project as it strengthens the institutional capacity required to manage the environmental and social issues. Contractor's environmental awareness and appropriate knowledge of environmental protection is critical to the successful implementation of the EMMP because without appropriate environmental awareness, knowledge, and skills required for the implementation of the mitigation measures, it would be difficult for the Contractor(s) workforce to implement effective environmental protection measures. Table 6.3 provides brief detail of the capacity building and training plan for the proposed project. The objective of the TA will be as follows:

- To help in establishment of appropriate systems;
- To train senior staff of Khan Brothers Foundry, Contractor workers and
- Khan Brothers Foundry employees, responsible for managing environment and social tasks and planning during construction and post construction phase; and
- Training courses on specialized areas such as air, water and noise pollution monitoring.

Table 6.3: Training & Capacity Building Programs

Provided by	Topics/ Contents	Trainees	Duration
Environmental Monitoring/ HSE expert	Short Seminars and Courses on: • Environmental laws and • regulations; • Environmental Sustainability; and • Environmental Management and Monitoring Plan (EMMP)	Khan Brothers Foundry Staff and Contractor Workers	1 Day
Environmental Monitoring/ HSE expert in Social Management and Monitoring, and Occupational Health and Safety	Short Seminars and Courses on: • Occupational Health and Safety Plan (OHS); • Basic First Aid; • Occupational and Community • Health and Safety Management; • Labour Accommodation; • Traffic Management; • COVID-19 Protection and Control; • Use and Importance of Personal • Protective Equipment's (PPEs); and • Fire Safety and Emergency Response Measures.	Khan Brothers Foundry Staff and Contractor Workers	1 Day
Environmental Monitoring/ HSE expert in Environmental and Social Management and Monitoring	Short Seminars and Courses on: • Environmental Management Plan (EMP); • Environment Health and Safety Management; • Occupational Health and Safety; • Basic First Aid; • Waste Management; • Fire Safety and Emergency Response Measures; • Electrical Safety; and • Use and Importance of Personal Protective Equipment's (PPEs)	Operation and Maintenance Staff of Khan Brothers Foundry	1 Day

6.10 Summary of Impacts/Risks and their Mitigation Measures

The project potential impacts/risks (significant/insignificant) were identified that may arise during the operational stage of the proposed project. Accordingly, appropriate mitigations measures were proposed under the EMMP. The potential impacts/risks could be air, soil, water and noise pollution. The air quality of the area may be affected both during the construction and operational stage of the project, although the impact/risks could be insignificant/ minor. The ecology of the area will not be affected as the project area (project corridor of impact) has a plain land and free from any crops.

There will be no concerns/issues associated with the women routine activities during the project implementation and operational phase. However, some of the local women emphasized that some suitable jobs should be provided to their male members in the project related activities, so that they could be accommodated under the project construction activities as well as during the operation of the project. The project impact matrix has shown that on overall basis, the project ranked as highly beneficial and having low adverse impact/risk.

To address the environmental and social impacts/risks as well as other project associated concerns/issues (if any), the EMP and EMMP has been developed and presented in Section 6 of the report.

6.11 Schedule of Implementation

On the issuance of no objection certificate, there will be commencement of the project construction and operational activities.

6.12 Reviewing & Reporting Procedure of EMP/EMMP

The EMP/EMMP will specify the procedures for the review and revision of the EMP/EMMP i.e. tree plantation / reforestation plan, health, safety and environment (HSE) management plan, emergency preparedness and response plan, waste management plan and drinking water supply and sanitation plan during project implementation both construction and operational phase. The site-specific EMP/EMMP will be reviewed by the Contractor to determine if an amendment or revision is warranted:

- At least once every six (6) months or on a seasonal basis;
- As a result of changes in the project or changes in the anticipated environmental effects of the project;
- After corrective actions have been taken in response to an environmental incident;
- After an adaptive management measure has been proposed
- A material revision is one which would be relevant to the question of whether an adverse environmental effect is more likely to occur, or become more adverse, and be significant;
- After a material revision of the EMP is proposed that changes a commitment such as: a reduction or increase of monitoring or reporting requirements; or making a specification less stringent or more stringent.

6.13 Management Plans

Various site-specific management plans will be prepared by Contractor as a part of EMP for the better management and implementation of EMP during all phases of the Khan Brothers Foundry. However, approval of these site-specific plans from RUDA should be sought before start of construction activities. These site-specific plans are listed below but not limited to these:

- Tree Plantation / Reforestation Plan;
- Health, Safety and Environment (HSE) Management Plan;
- Emergency Preparedness and Response Plan;

- Waste Management Plan;
- Drinking Water Supply and Sanitation Plan (Annex 5.5)
- Traffic Management Plan (Annex 5.6)

6.14 Public Disclosure

M/s Khan Brothers Foundry will disclose this EIA to all the stakeholders prior to the start of the construction. This report will be made available to the stakeholders at places as designated by the PEPA. This will ensure the locals to be aware of the Project impacts, its mitigation, responsible staff and mode of implementation.

6.15 Environmental Management and Monitoring Cost

The cost required to effectively implement the mitigation measures is important for the sustainability of the project both during the construction and operation stages. The environmental management/ monitoring cost estimated as Rs. 0.961 million is presented in Table 6.4. The cost items include periodic (semi-annual) environmental monitoring reports by an environment expert.

Table 6.4: Environmental Management and Monitoring Cost

Description	Quantity	Unit Rate (Rs.)	Cost (Rs. M.)	Remarks
Environmental Monitoring/ HSE expert	1 person	Rs. 200,000 for one report	0.400	Periodic (i.e. quarterly/semi-annual) environmental monitoring reports
Health and Safety of Workers	10 employees	Lum-sump	0.201	For 10 employees for the provision of dust masks, safety shoes, gloves, first aid box, ear plugs, safety helmets and safety jackets (Hi Vis) and provision of dust bins, warning tap, safety cones and safety sign boards.
Cost of Environmental and Social training	10 employees	Lum-sump	0.010	Short Seminars, Courses, Trainings and Lectures on Environment, Social and Occupational, Health and Safety constituents and components (Rs. 15,000/- per session twice a year during construction & operation phase)
Planation of 400 trees	400 trees	Lum-sump	0.350	Not less than 400 trees should be planted (including fruit trees) to enhance the landscape of the proposed project area.
Total			0.961	

7. PARTICIPATION AND CONSULTATIONS WITH STAKEHOLDERS

7.1 General

In accordance with the EPA and environmental guidelines, the participation and consultations were carried out with the project beneficiaries, local community/general public and other stakeholders. The outcomes of both public and stakeholders consultations are discussed in this section of the report.

Consultations were carried out keeping in view the following:

- Sharing of information with stakeholders/general public regarding the proposed project and project activities and assess expected impacts on the physical, biological and social conditions of the project area.
- Understanding the stakeholder's concerns regarding the various aspects of the project, including the project location/ site, technology, existing situation, construction activities and potential impacts of the project during construction and operational phase of the project.

7.2 Objectives of Stakeholders Consultations

The public/stakeholders play a vital role in studying stakeholders' perspectives regarding the project and henceforth the successful implementation and execution of the proposed project. Public involvement is a compulsory feature of environmental impact assessment (EIA), which leads to improve and acceptable decision-making during the project implementation. The primary objective of the stakeholders' consultations is to learn and know the apprehensions, concerns, and opinions of the key stakeholders over environmental implications of the project activities from public perception. The consultation sessions also served as a source of firsthand information about the users and the beneficiaries' expectations from the proposed project. Discussions with the stakeholders and recording their concerns at appropriate stages of the project would help to tailor the project in-line with stakeholders' aspirations and so increases the likelihood for public acceptance of the project and its subcomponents. It also helps to develop and maintain communication links between the project proponents and stakeholders, providing opportunities to the public to incorporate in project design in a positive manner. This ensures that the views and concerns of the stakeholders are incorporated into the project design and implementation with the objectives of reducing or offsetting negative impacts and enhancing benefits of the proposed project.

7.3 Responsibility for Consultations

Stakeholders' consultations for the proposed project play a crucial role in development and also assist in quantifying the role of different stakeholders involved. The stakeholders' consultations were carried out with the project beneficiaries, local community/general public and other stakeholders by project consultant during the preparation of EIA report. Thus, both primary and secondary stakeholders were considered during the process of consultations/consultation meetings. The stakeholders' feedback has been presented through the stakeholders' feedback matrix and proposed mitigation measures.

7.4 Stakeholders' Consultations Feedback

The survey team conducted four consultations/FGDs consisting of 22 participants that included 17 men and 5 women belonging to the villages/ local communities located nearby the project area.

During the consultative meetings with both primary and secondary stakeholders, the following major concerns were indicated relating to the construction and operational phase of the project:

- It is preferred that the project operations should be in accordance with beneficiaries' requirements;
- Beneficial factors and job opportunities to the local people may be considered for operational phase of the project;
- Careful materials transport need to be ensured during the operational stage of the project;
- Appropriate management of water, wastewater and solid waste during operational phases may need to be ensured;
- Precautionary measures may need to be followed in case of natural hazards (if any);
- All possible efforts may need to be made to minimize the traffic mobility/issues associated with the project related activities.

The major feedback/ concerns highlighted during the stakeholders consultations were categorized with respect to design, construction and operational phase of the project are as under:

I. Design Stage

- Project should be designed as to minimize the environmental and social impacts/risks on adjoining settlements.
- Storage of material should be carried out in the designated area to avoid any impact/risk on the surrounding community.

II. Construction Stage

- Proper covering of trucks and regular sprinkling of water on land may need to be ensured to avoid or minimize dust particulates emissions.
- It is preferred that the job opportunities should be provided to the local persons;
- Workers should be guided by contractor to control/limit their movement/mobility outside the project area.
- Provision of First-Aid-kits and PPEs to combat any emergency situation.
- Dumping of waste material at nearby/adjacent to the project site area may need to be avoided.

III. Operational Stage

- Proper and regular maintenance of machinery needs to be carried out.
- Plantation of trees should be encouraged in the available space/land of project area.
- Fuel should be stored properly to avoid any adverse environmental impacts/risks.
- It is preferred that the job opportunities (skilled & unskilled) should be provided to the local persons;
- Provision of First-Aid-Kits and fire extinguishers to combat any emergency as well as health & safety situation.

List of consultations (participants) is given in Table 7.1, while the details are given in Annex 7.1 and signed copy of the participants including women is presented in Annex 7.2. The pictorial presentation of Stakeholders' consultations events are presented in a separate section of this EIA report.

Table 7.1: List of Public Consultations

PC. No.	Date	Location/ Venue	Category of Participant	No of Participants	Name of Participants
1	7/1/2025	Lakhoder, Tehsil Cantt. District Lahore	Local Community/ beneficiary/ affected people	5	- Mr. Muhammad Shafiq S/o Mehar Jamal Din - Mr. Abdul Rasheed S/o Wahid Buksh - Mr. Kalimullah S/o Shaukat Ali - Mr Ali S/o Mushtaq Ahmad - Seith Jabbar S/o Charagh Din

2	7/1/2025	Turkey road, Tehsil Cantt. District Lahore	Local Community/ Beneficiary/ Affected people	6	- Mr. Ghulam Mustafa S/o bashir - Mr. Shafqat S/o karamat - Mr. Shahid Mehmood S/o Asghar Ali - Mr. Ijaz Ali S/o Hashmat Ali - Mr. Shabbir Ahmad S/o Muhammad Sajawal - Mr. Qurban Rasool S/o Shamas Din
3	7/1/2025	Turkey road, Tehsil Cantt. District Lahore	Local Community/ beneficiary/ affected people	6	- Mr. Nazir Ahmad S/o Lal Din - Mr. Muhammad Irfan S/o Amanat Ali - Mr. Jabbar S/o Muhammad Iqbal - Mr. Shehram Hassan S/o Nazir Ahmad - Mr. Muhammad Imran S/o Ghulam Abbas - Mr. Muhammad Nawaz S/o Mukhtar Ahmed
4	3/1/2025	Turkey road, Tehsil Cantt. District Lahore	Local Community/ beneficiary/ affected people	5	- Ms. Shehar Bano - Ms. Bushra Bibi - Ms. Batool - Ms. Asma - Ms. Muqaddas

A summary of concerns/feedback and redress strategy by the Project Proponent is presented in Table 7.2.

Table 7.2: Concerns/Feedback and Redress Strategy

Issues/ Concerns	Concerns/ Feedback	Redress Strategy by Project Proponent
Employment Opportunities	Expectations of job opportunities for the locals belonging to the nearby/or adjacent to the project area.	➢ Providing the employment opportunities in the factory will be the priority of the project proponent. ➢ In this context, skilled and or unskilled local labour/workers will be preferred to engage during the project construction and operation phase along with the required training/capacity development.
Training/capacity building	Locals/local community is keen to work for the subject industry if they will provide training and upgrading opportunities to enhance their trade or professional skills.	➢ Installation of training facilities will be carried out for workers of the company as well as up-gradation of the training skills.
Health & safety	Traffic (heavy) mobility/ transportation of material are a main concern because the road is being used by the general public/local community as well as different industries vehicles located at nearby the project area.	➢ Development of Transport Management Plan including traffic safety training. ➢ Traffic advisory signs will be installed along project site and all nearby specific areas.
Local economy and business development	Local service providers are keen to participate in providing services regarding raw material etc. to enhance the associated small businesses activities.	➢ Project proponent has already considered that materials/raw material regarding construction and plant operation activities will be purchased from the local market/ or nearby area.

Issues/ Concerns	Concerns/ Feedback	Redress Strategy by Project Proponent
Environmental Issues	Dust/air and noise pollution produced particularly during the construction activities as well as in operation due to mechanically substandard machines (if any).	➢ Dust/air and noise pollution will be fully monitored as well as controlled by following the mitigation/ precautionary measures suggested in the EMP/EMMP. ➢ Project awareness will be disseminated to the local community/ general public as well as workers/labour to mitigate/and or minimize the dust/air & noise pollution during the construction and operational phase of the project.
Water quality	Water quality and impacts from the wastewater (if any) may have significant impact in the nearby area as local community indicated their concerns.	➢ Under the proposed project, an area will be designated for waste water disposal to avoid such impacts/risks. ➢ In addition, waste water may also be disposed-off at nearby available waste water disposal station/place.

7.5 Consultative Meetings with the Officials

Consultative meetings were held with officials/ representative of different departments, agencies and civil society organization including Ravi Urban Development Authority, Environmental Protection Department, Water and Sanitation Authority and other concerned. The following major points were highlighted:

- In general, the proposed project (factory) is good step towards the development of the area including the jobs opportunities, income generation, small enterprise development and ultimately development of the area.
- Before the commencement of construction and operational activities, the project proponent may ensure to fulfill the formalities/requirements of all concerned departments/agencies including RUDA, Water and Sanitation Authority, Punjab EPA as well as others.
- The project proponent may ensure to designate an area for disposal of waste material/waste water to avoid/ and or minimize the adverse impacts/risks.
- Proper mitigation measured need to be adopted for dust/air & noise pollution generated during the project implementation as well as in operation.
- Appropriate number of trees need to be planted for creating the friendly environment.
- Health and safety of the workforce as well as local community must be ensured by managing the trainings/capacity development as well as providing the ‘First-Aid-Kits’ & ‘PPEs’ during both construction and operation phase of the project (i.e. construction and operation of the factory).

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

The Environmental Impact Assessment (EIA) study was conducted to evaluate the environmental and social impacts/risks associated with the implementation of the proposed project, “Khan Brothers Foundry”. The project is located within the jurisdiction of the Existing Industrial Phase-I of Ravi Urban Development Authority (RUDA), in Mouza Marri, Mehmood Booti, Tehsil Shalimar, District Lahore, Punjab. The study aims to identify potential environmental and social risks/ challenges and propose mitigation measures to address them during the project’s implementation.

The environmental and social impact/risk assessment for the project was conducted based on a comprehensive field survey, which included interviews, focus group discussions, transect walks, and consultations with stakeholders. The EIA report was then prepared in alignment with both national and international guidelines, adhering to Pakistan's Environmental Laws/Act (PEPA 1997, amended in 2012) and the relevant Regulations (2022). This approach ensures that the project complies with environmental standards and incorporates local community input in the assessment process.

As a result of the implementation of the proposed project, the potential impacts and risks associated with the implementation of the proposed project are identified as minor and insignificant. These impacts may arise primarily during the operational stage and include air, soil, water, and noise pollution. However, the effects are expected to be minimal. Air quality may experience slight degradation during the operational phase, but the overall impact is considered insignificant. The local ecology will remain unaffected, as the project area is flat land and does not contain endangered or threatened species. According to the project impact matrix, the project is overall highly beneficial, with low adverse impacts or risks.

8.2 Recommendations

The following recommendations are forwarded:

- The potential impacts and risks of the project will be mitigated by implementing the suggested technical and engineering best practices, as outlined in the Environmental Management Plan (EMP). These measures are designed to minimize any negative effects during the project’s implementation and operational stages, ensuring that environmental and social risks are effectively managed and controlled.
- All parameters especially noise, air, water will need to be remained within the permissible limit of NEQS as reflected in section 4.
- All types of storage including fuels and septic tanks for the sewage waste should be cemented to prevent the percolation of contaminants.
- In addition to above, there would be temporary impact of dust pollution during the project’s implementation and operational stages, so that sprinkling of water on regular basis especially during dry climatic conditions may need to be continued.
- On the commencement of project operation (business), the proponent will need to submit an annual report summarizing the operational performance of the project in compliance with the environmental management plan (EMP) including the measures and procedures taken to manage or mitigate the environmental impacts/risks (if any) for the project, including monitoring, reporting and auditing.
- Periodic internal monitoring/auditing needs to be carried out to ensure proper implementation of Environmental Management and Monitoring Plan (EMMP) or Environmental Management Plan (EMP).
- To address the unanticipated environmental and social impacts/risks as well as other project related concerns (if any), appropriate mitigations measures need to be followed as proposed in the Environmental Management Plan.

PHOTOLOG

PICTORIAL PRESENTATION OF SELECTED EVENTS

A view of Khan Brothers Foundry in the Industrial Zone of RUDA, located on Turkey Road in Lakhoder.

A view of the office of Khan Foundry in the Industrial Zone of RUDA, located on Turkey Road in Lakhoder.

A view of meeting with the proponent of Khan Brothers Foundry.

A view of the plant and scrubbers installed at Khan Brothers Foundry on Turkey Road, Lakhoder.

An exterior view of the factory laboratory at Khan Brothers Foundry.

A view of meeting with the proponent of Khan Brothers Foundry.

PICTORIAL PRESENTATION OF SELECTED EVENTS

A view of Khan Brothers Foundry in the Industrial Zone of RUDA, located on Turkey Road in Lakhoder.

A view of the scrap yard of Khan Brothers Foundry on Turkey Road, Lakhoder.

A view of the scrap yard of Khan Brothers Foundry on Turkey Road, Lakhoder.

A view of the plant and scrubbers installed at Khan Brothers Foundry on Turkey Road, Lakhoder.

An exterior view of the factory wastewater recycling plant at Khan Brothers Foundry.

A view of the operational furnace at Khan Brothers Foundry.

Pictorial Presentation of Selected Events

A view of the meeting with the local community at Turkey Road, Lakhoder.

A view of the consultation meeting with the local community at Turkey Road, Lakhoder.

A view of the agricultural land and dhaba at Turkey Road, Lakhoder.

A view of the consultation meeting with the local community adjacent to the project area at Lakhoder.

A view of the vegetation outside Khan Brothers Foundry on Turkey Road, Lakhoder.

A view of the consultation meeting with the local community adjacent to the project area at Lakhoder.

Photographs of Environmental Monitoring

A view of the lychee orchard at Turkey Road, Lakhoder.

A view of the environmental conditions adjacent to the project site on Turkey Road, Lakhoder.

A view of the environmental conditions adjacent to the project site.

Consultation meeting with the local community near the project area, Turkey Road, Lakhoder.

A view of environmental conditions adjacent to the project site.

A view of a meeting with females at Turkey Road, Lakhoder.

ANNEXES

REFERENCES

- Hydrochemistry modeling: evaluation of groundwater quality deterioration due to anthropogenic activities in Lahore, Pakistan. https://link.springer.com/article/10.1007/s10668-020-00703-3
- GIS-based Spatio-Temporal and Geostatistical Analysis of Groundwater Parameters of Lahore Region Pakistan and their Source Characterization. https://assets.researchsquare.com/files/rs431857/v1_covered.pdf?c=1631863392
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- Geographical Boundaries of Lahore https://lahore.punjab.gov.pk/constituencies
- “Lahore”.https://worldpopulationreview.com/world-cities/lahore-population
- Historical Weather for data on Humidity, Temperature, Rainfall, Visibility and Wind Direction.

Annex 2.1: Pakistan Waste water Standards

Sr. No.	Items	Standard Value
1	Temperature Difference	40°C
2	pH value (acidity/basicity)	6-10 pH
3	5- days Biochemical Oxygen Demand (BOD) at 20 c	80 mg/L
4	Chemical oxygen Demand (COD)	150 mg/L
5	Total Suspended Solids	150
6	Total Dissolve Solids	3500 mg/L
7	Grease and Oil	10mg/L
8	Phenolic Compounds (as Phenol)	0.1mg/l
9	Chlorides (as Cl)	1000 mg/L
10	Fluoride (as F)	20mg/L
11	Cyanide (as CN)	2mg/L
12	An ionic detergents	20mg/L
13	Sulphate SO4	600mg/L
14	Sulphide (S)	1.0mg/L
15	Ammonia (NH3)	40mg/L
16	Pesticides, herbicides, fungicides and insecticides	0.15mg/L
17	Cadmium	0.1mg/L
18	Chromium	1.0mg/L
19	Copper	1.0mg/L
20	Lead	0.5mg/L
21	Mercury	0.01mg/L
22	Selenium	0.5mg/L
23	Nikel	1.0mg/L
24	Silver	1.0mg/L
25	Total toxic metals	2.0mg/L
26	Zinc	5.0mg/L
27	Arsenic	1.0mg/L
28	Barium	1.5mg/L
29	Iron	2.0mg/L
30	Manganese	1.5mg/L
31	Boron	6.0mg/L
32	Chlorine	1.0mg/L

Annex 2.2: National Environmental Quality Standards for Ambient Air

Pollutants	Time-weighted average	Concentration in Ambient Air		Method of measurement
		Effective from 1st January 2009	Effective from 1st January 2012	
Sulphur Dioxide (SO_2)	Annual Average*	80 µg/m³	80 µg/m³	-Ultraviolet Fluorescence method
	24 hours**	120 µg/m³	120 µg/m³	
Oxides of Nitrogen as (NO)	Annual Average*	40 µg/m³	40 µg/m³	- Gas Phase Chemiluminescence
	24 hours**	40 µg/m³	40 µg/m³	
Oxides of Nitrogen as (NO_2)	Annual Average*	40 µg/m³	40 µg/m³	- Gas Phase Chemiluminescence
	24 hours**	80 µg/m³	80 µg/m³	
O_3	1 hour	180 µg/m³	130µg/m³	-Non dispersive UV absorption method
Suspended Particulate Matter (SPM)	Annual Average*	400µg/m³	360µg/m³	- High Volume Sampling, (Average flow rate not less than 1.1 m3/minute).
	24 hours**	550µg/m³	500µg/m³	
Respirable Particulate Matter. PM_{10}	Annual Average*	200µg/m³	120µg/m³	-β Ray absorption method
	24 hours**	250µg/m³	150µg/m³	
Respirable Particulate Matter. $PM_{2.5}$	Annual Average*	25µg/m³	15µg/m³	-β Ray absorption method
	24 hours**	40µg/m³	35µg/m³	
	1 hour	25µg/m³	15µg/m³	
Lead (Pb)	Annual Average*	1.5µg/m³	1 µg/m³	- ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	2 µg/m³	1.5µg/m³	
Carbon Monoxide (CO)	8 hours**	5 mg/m³	5 mg/m³	- Non Dispersive Infra Red (NDIR) method
	1 hour	10 mg/m³	10 mg/m³	
*Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.				
** 24 hourly /8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but not on two consecutive days.				

Annex 3.1: Land Measurement & Revenue Record of Khan Brothers Foundry

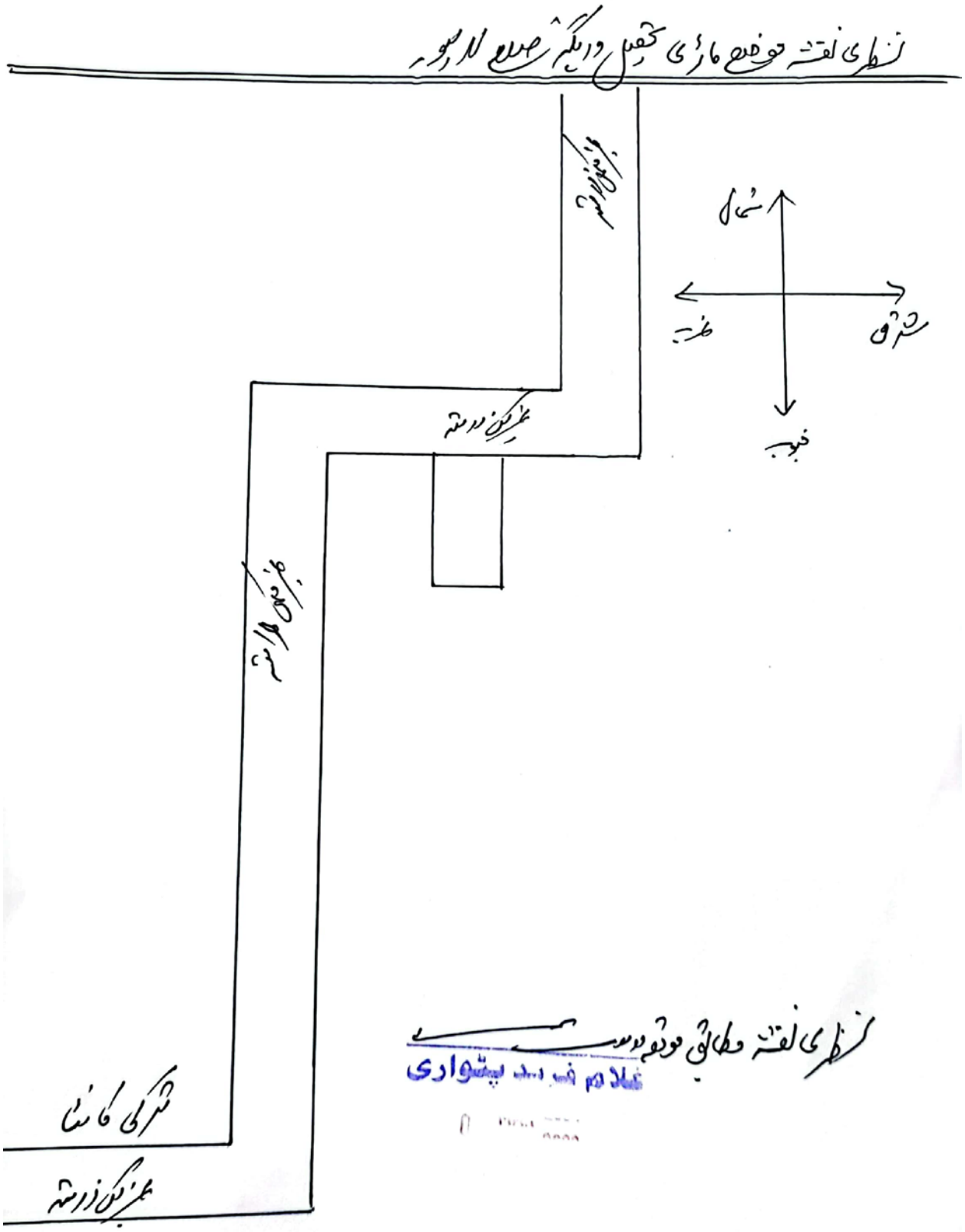
SCHEDULE OF AREAS		
TOTAL AREA OF PLOT	=	16650.00 sq.fts
GROUND STEEL SHED COV.AREA	=	8766.7272sq.fts
GROUND FLOOR OFFICE COV.AREA	=	1045.4054sq.fts
FIRST FLOOR OFFICE COV AREA	=	1045.4054sq.fts
GOUND FLOOR GAURD ROOM COV AREA	=	92.2993 sq.fts
GOUND FLOOR BATH ROOMS COV AREA	=	73.5000sq.fts
TOTAL COVERED AREA	=	11023.3373sq.fts
OPEN AREA OF PLOT	=	6672.0681 sq.fts

SUBMISSION DRAWING

SUBMISSION DRAWING OF "KHAN BROTHERS FOUNDRY" AT PLOT BEARING KHEWAIT NO 102 KHATOONI NO 111 MOUZA MEHMOOD BOOTI, TEHSIL CANTT,DISTRICT LAHORE.

OWNER BY :

MUHAMMAD NASARULLAH KHAN



نظری نقشہ مطابق موقعہ دست

خادم فرید پشاوری

S795620 1740 استمال ب

0748-24723901 **E-STAMP** PB-LHR-F008D00C7DC670C3

Non-Judicial **Rs 9,000/-**

Description	: CONVEYANCE - 23		
Seller	: FAROOQ AHMED [35201-9372311-5]		
Purchaser	: MUHAMMAD JAWAD KHAN [35201-2623982-5]		
Agent	: M USMAN [35201-2344911-1]		
Stamp Duty Paid by	: MUHAMMAD JAWAD KHAN [35201-2623982-5]		
Issue Date	: 27-Dec-2023, 12:51:22 PM		
Paid Through Challan	: 2023F7173BFF7271		
Land DC Rate	: 3,150,000 per Acre	Land Area & Classification	: 0.2313 Acre | Agricultural
Structure DC Rate	: N/A	Covered Area	: N/A
Amount in Words	: Nine Thousand Rupees Only		
DC Location	: Lahore | Shalimar | Wahga Town | Lakhodair | Maari | 1159 | Off the Road		

Please Write Below This Line

بیع نامہ (زرعی)

دستاویز بیع نامہ ایک قطعہ زرعی اراضی رقبہ تعدادی ایک کنال سترہ مرلے (1K-17M)،

واقع رقبہ حد بست موضع ماڑی تحصیل شالیمار ضلع لاہور۔ واہگہ ٹاؤن

بالعوض

مبلغ آٹھ لاکھ روپے (Rs.8,00,000/-)

کلہم زرثمن قبل ازیں ازاں مشتری وصول شد

بحق

محمد جواد خان ولد محمد عثمان خان

ساکن مکان نمبر 14، محلہ حسین روڈ، نزد رینجرز ہیڈ کوارٹر، لاہور کینٹ۔ (مشتری)

العبد

فاروق احمد۔ بائع

E-STAMP
CONTINUATION SHEET

صفحہ نمبر 2

منکہ

فاروق احمد ولد برکت علی ساکن مکان نمبر T-1647 فیز 8 ڈی ایچ اے لاہور کینٹ کا ہوں۔ جو کہ بروئے کاغذات مال نقل رجسٹر حقداران زمین سال 2012-2013ء بحوالہ انتقال نمبر 1707 بیع منظور شدہ کھیوٹ نمبر 809 کھتونی نمبر 858 سالم کھاتہ قطعات 09 رقبہ تعدادی (47K-4M) کا منتقلہ حصہ 21/944 بقدر رقبہ تعدادی ایک کنال ایک مرلہ (1K-1M)۔ و۔ کھیوٹ نمبر 159 کھتونی نمبر 169 سالم کھاتہ قطعات 04 رقبہ تعدادی (10K-4M) کا منتقلہ حصہ 16/204 بقدر رقبہ تعدادی سولہ مرلے (0K-16M) اس طرح کل رقبہ تعدادی ایک کنال سترہ مرلے (1K-17M) بمطابق فرد جاری کردہ حلقہ پٹواری رپٹ نمبر 181 مورخہ 16-12-2023 واقع رقبہ حدبست موضع ماڑی تحصیل شالیمار ضلع لاہور کا بلاشراکت غیرے مالک وقابض چلا آرہا ہوں۔ جس کے من مقرکو رہن، بیع، ہبہ وغیرہ کرنے کے مکمل اختیارات حاصل ومیسر ہیں۔ سواب من مقر نے اراضی مذکورہ معہ جملہ حق وحقوق راستہ وگزرگاہ، وٹ، بہنہ، کھال، درختاں ایستادہ ثمر وغیر ثمر، آبپاشی، کاشت، ظاہری وباطنی، اندرونی وبیرونی، داخلی وخارجی معہ حقوق ہر قسم جو بھی من مقر کو بحیثیت مالک وقابض حاصل ہیں اندریں وقت بقائمی ہوش وحواس خمسہ و درستی عقل وثبات بلاجبر واکراہ غیرے برضامندی خود بالعوض مبلغ آٹھ لاکھ روپے (Rs.8,00,000/-) نصف جنکے مبلغ چار لاکھ روپے (Rs.4,00,000/-) ہوتے ہیں بدست وحق محمد جواد خان ولد محمد عثمان خان ساکن مکان نمبر 14، محلہ حسین روڈ، نزد رینجرز ہیڈ کوارٹر، لاہور کینٹ۔ (مشتری) بیعہ قطعی وفروخت کردی ہے اور کلہم زرثمن روبرو گواہان حاشیہ ازاں مشتری وصول پالئے ہیں۔ اب کوئی دام لینا بذمہ مشتری نہ رہا ہے نہ ہی آئندہ ہوگا۔ دام دام وصول پالیا ہے اور تمام حساب بیباک ہوگیا ہے۔ اراضی مذکورہ کا قبضہ موقع پر حوالے مشتری کردیا ہے اور اپنا قبضہ ہر قسم اراضی مذکورہ سے اٹھالیا ہے۔ اب میرا یا میرے دیگر وارثان، جانشیان وبازگشت، حصہ داران، کھاتہ داران وغیرہ کا اراضی مذکورہ سے کوئی تعلق واسطہ نہ رہا ہے نہ ہی آئندہ ہوگا۔ مشتری کو اس امر کا یقین دلا دیا ہے کہ عرصہ پیشتر ازیں اراضی مذکورہ ہر قسم کے بار کفالت تنازعات، رہن، بیعہ، ہبہ، وقف، تملیک، قرقی، خوانگی تقسیم، معاہدات، مقدمات، قرضہ جات سرکاری وغیر سرکاری وغیرہ سے پاک ومبراہ ہے اور اس کے بیع کیے جانے میں کوئی قانونی امر مانع نہ ہے۔ بصورت نقص ملکیت وقبضہ جس سے مشتری کے زرثمن کو نقصان پہنچے یا قبضہ اراضی مذکورہ کا کلی یا جزوی (من مقر کی وجہ سے) مشتری کے ہاتھ سے نکل جاوے تو من مقر ذمہ دار ہوگا۔ انتقال اراضی مذکورہ کا مشتری محکمہ مال کے کاغذات میں اپنے نام کروانے کا مجاز ہوگا۔ آج کی تاریخ کے

العبد

فاروق احمد۔ بائع

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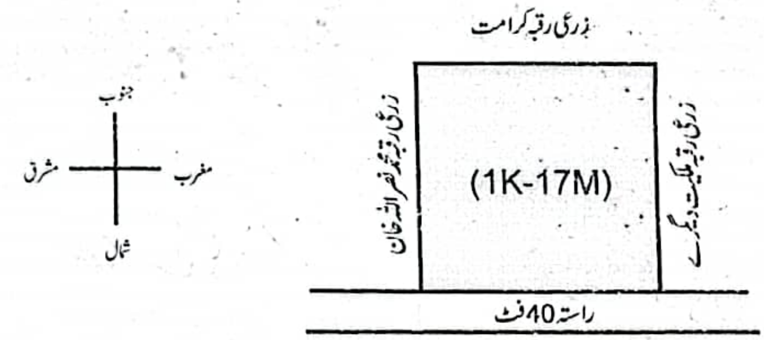
صفحہ نمبر 3

بعد مشتری اراضی مذکورہ کا مالک وقابض ہے۔ جب چاہے اور جس طرح چاہے۔ اراضی مذکورہ بالا کو اپنے عمل وتصرف واستعمال وغیرہ میں لاوے اور ہر طرح سے مستفید ہووے۔ خرچہ رجسٹری مشتری نے از خرید اسٹام تا تکمیل وتصدیق بیع نامہ از گرہ خود برداشت کیے ہیں۔ لہذا ایں بیعنامہ دائمی صورت میں بحق مشتری تحریر کر دیا ہے اور دستاویز ہذا کو پڑھ کر، سن کر، سمجھ کر، درست تسلیم کرتے ہوئے اپنے اپنے دستخط ونشان انگوٹھاجات ثبت کر دیے ہیں تا کہ سند رہے اور بوقت ضرورت کام آوے۔ المرقوم 23-12-2023

نوٹ۔ اراضی مذکورہ پر کوئی حکم امتناعی نہ ہے اور نہ ہی دستاویز ہذا رجسٹر کیے جانے میں کوئی قانونی امر مانع ہے۔



گواہ شد

گواہ شد

محمد عثمان ہاشمی ولد محمد اشفاق ہاشمی
K.B 20-K کالونی لاہور کینٹ
35201-2344911-1

ولد فاروق احمد
ساکن 371-B فیز 6 DHA
لاہور کینٹ
35201-3210319-1

العبد
فاروق احمد۔ بائع

S795618

انتقال نمبر 1745

0748-24723727

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PB-LHR-E9FCD96BB0A7462F

Non-Judicial

Rs 9,000/-

Description	: CONVEYANCE - 23		
Seller	: FAROOQ AHMED [35201-9372311-5]		
Purchaser	: MUHAMMAD NASRULLAH KHAN [35200-1410103-9]		
Agent	: M USMAN [35201-2344911-1]		
Stamp Duty Paid by	: MUHAMMAD NASRULLAH KHAN [35200-1410103-9]		
Issue Date	: 27-Dec-2023, 12:49:31 PM		
Paid Through Challan	: 20239186A86C7DDD		
Land DC Rate	: 3,150,000 per Acre	Land Area & Classification	: 0.2313 Acre | Agricultural
Structure DC Rate	: N/A	Covered Area	: N/A
Amount in Words	: Nine Thousand Rupees Only		
DC Location	: Lahore | Shalimar | Wahga Town | Lakhodair | Maari | 1159 | Off the Road		

Please Write Below This Line

صفحہ نمبر 1

بیع نامہ (زرعی)

دستاویز بیع نامہ ایک قطعہ زرعی اراضی رقبہ تعدادی ایک کنال سترہ مرلے (1K-17M)،

واقع رقبہ حد بست موضع ماڑی تحصیل شالیمار ضلع لاہور۔ واہگہ ٹاؤن

بالعوض

مبلغ آٹھ لاکھ روپے (Rs.8,00,000/-)

کلہم زرثمن قبل ازیں ازاں مشتری وصول شد

بحق

محمد نصر اللہ خان ولد محمد انصر خان

ساکن مکان نمبر 24/1، محلہ اے بلاک گلدشت ٹاؤن ضرار شہید روڈ لاہور کینٹ۔ (مشتری)

العبد

فاروق احمد۔ بائع

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صفحہ نمبر 2

منکہ

فاروق احمد ولد برکت علی ساکن مکان نمبر T-1647 فیز 8 ڈی ایچ اے لاہور کینٹ کا ہوں۔ جو کہ بروئے کاغذات مال نقل رجسٹر حقداران زمین سال 2013-2012ء بحوالہ انتقال نمبر 1707 بیچ منظور شدہ کھیوٹ نمبر 809 کھتونی نمبر 858 سالم کھاتہ قطعات 09 رقبہ تعدادی (47K-4M) کا منتقلہ حصہ 21/944 بقدر رقبہ تعدادی ایک کنال ایک مرلہ (1K-1M)۔ و۔ کھیوٹ نمبر 159 کھتونی نمبر 169 سالم کھاتہ قطعات 04 رقبہ تعدادی (10K-4M) کا منتقلہ حصہ 16/204 بقدر رقبہ تعدادی سولہ مرلے (0K-16M) اس طرح کل رقبہ تعدادی ایک کنال سترہ مرلے (1K-17M) بمطابق فرد جاری کردہ حلقہ پٹواری ریٹ نمبر 181 مورخہ 16-12-2023 واقع رقبہ حدبست موضع ماڑی تحصیل شالیمار ضلع لاہور کا بلا شراکت غیرے مالک وقابض چلا آ رہا ہوں۔ جس کے من مقر کو رہن، بیع، ہبہ وغیرہ کرنے کے مکمل اختیارات حاصل ومیسر ہیں۔ سو اب من مقر نے اراضی مذکورہ معہ جملہ حق وحقوق راستہ وگزرگاہ، وٹ، بنہ، کھال، درختاں ایستادہ ثمر وغیر ثمر، آبپاشی، کاشت، ظاہری و باطنی، اندرونی وبیرونی، داخلی وخارجی معہ حقوق ہر قسم جو بھی من مقر کو بحیثیت مالک وقابض حاصل ہیں اندریں وقت بقائمی ہوش وحواس خمسہ و درستی عقل وثبات بلا جبر واکراہ غیرے برضامندی خود بالعوض مبلغ آٹھ لاکھ روپے (Rs.8,00,000/-) نصف جسکے مبلغ چار لاکھ روپے (Rs.4,00,000/-) ہوتے ہیں بدست وبحق محمد نصر اللہ خان ولد محمد انصر خان ساکن مکان نمبر 24/1، محلہ اے بلاک گلدشت ٹاؤن ضرار شہید روڈ لاہور کینٹ۔ (مشتری) بیعہ قطعی وفروخت کردی ہے اور کلیم زرثمن روبرو گواہان حاشیہ ازاں مشتری وصول پالئے ہیں۔ اب کوئی دام لینا بذمہ مشتری نہ رہا ہے نہ ہی آئندہ ہوگا۔ دام وام وصول پالیا ہے اور تمام حساب بیباک ہوگیا ہے۔ اراضی مذکورہ کا قبضہ موقع پر حوالے مشتری کردیا ہے اور اپنا قبضہ ہر قسم اراضی مذکورہ سے اٹھالیا ہے۔ اب میرا یا میرے دیگر وارثان، جانشیان وبازگشت، حصہ داران، کھاتہ داران وغیرہ کا اراضی مذکورہ سے کوئی تعلق واسطہ نہ رہا ہے نہ ہی آئندہ ہوگا۔ مشتری کو اس امر کا یقین دلا دیا ہے کہ عرصہ پیشتر ازیں اراضی مذکورہ ہر قسم کے بار کفالت تنازعات، رہن، بیعہ، ہبہ، وقف، تملیک، قرقی، خوانگی تقسیم، معاہدات، مقدمات، قرضہ جات سرکاری وغیر سرکاری وغیرہ سے پاک ومبراہ ہے اور اس کے بیچ کیے جانے میں کوئی قانونی امر مانع نہ ہے۔ بصورت نقص ملکیت وقبضہ جس سے مشتری کے زرثمن کو نقصان پہنچے یا قبضہ اراضی مذکورہ کا کلی یا جزوی (من مقر کی وجہ سے) مشتری کے ہاتھ سے نکل جاوے تو من مقر ذمہ دار ہوگا۔ انتقال اراضی مذکورہ کا مشتری محکمہ مال کے

العبد

فاروق احمد۔ بائع

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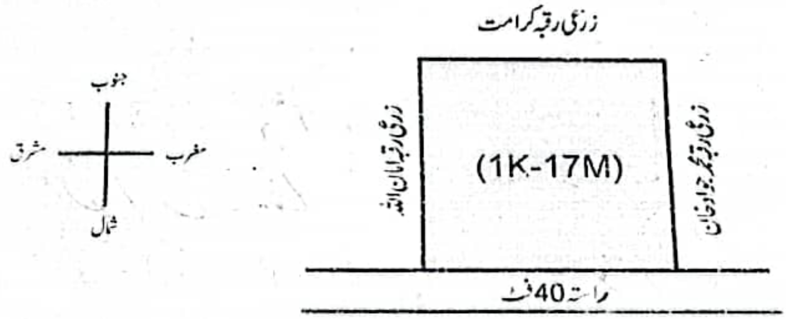
صفحہ نمبر 3

کاغذات میں اپنے نام کروانے کا مجاز ہوگا۔ آج کی تاریخ کے بعد مشتری اراضی مذکورہ کا مالک وقابض ہے۔ جب چاہے اور جس طرح چاہے۔ اراضی مذکورہ بالا کو اپنے عمل وتصرف واستعمال وغیرہ میں لاوے اور ہر طرح سے مستفید ہووے۔ خرچہ رجسٹری مشتری نے از خرید اسٹام تا تکمیل وتصدیق بیع نامہ از گرہ خود برداشت کیے ہیں۔ لہذا ایں بیعنامہ دائمی صورت میں بحق مشتری تحریر کر دیا ہے اور دستاویز ہذا کو پڑھ کر، سن کر، سمجھ کر، درست تسلیم کرتے ہوئے اپنے اپنے دستخط ونشان انگوٹھاجات ثبت کر دیے ہیں تا کہ سند رہے اور بوقت ضرورت کام آوے۔ المرقوم 23-12-2023

نوٹ۔ اراضی مذکورہ پر کوئی حکم امتناعی نہ ہے اور نہ ہی دستاویز ہذا رجسٹر کیے جانے میں کوئی قانونی امر مانع ہے۔



پاشا ایسوسی ایٹس

گواہ شد

محمد عثمان پاشا ولد محمد اشفاق شیخ
کالونی K.B 20-K لاہور کینٹ
35201-2344911-1

گواہ شد

محمد فاروق ولد فاروق احمد
سکنی 371-B فیز 6 DHA
لاہور کینٹ
35201-3210319-1

العبد

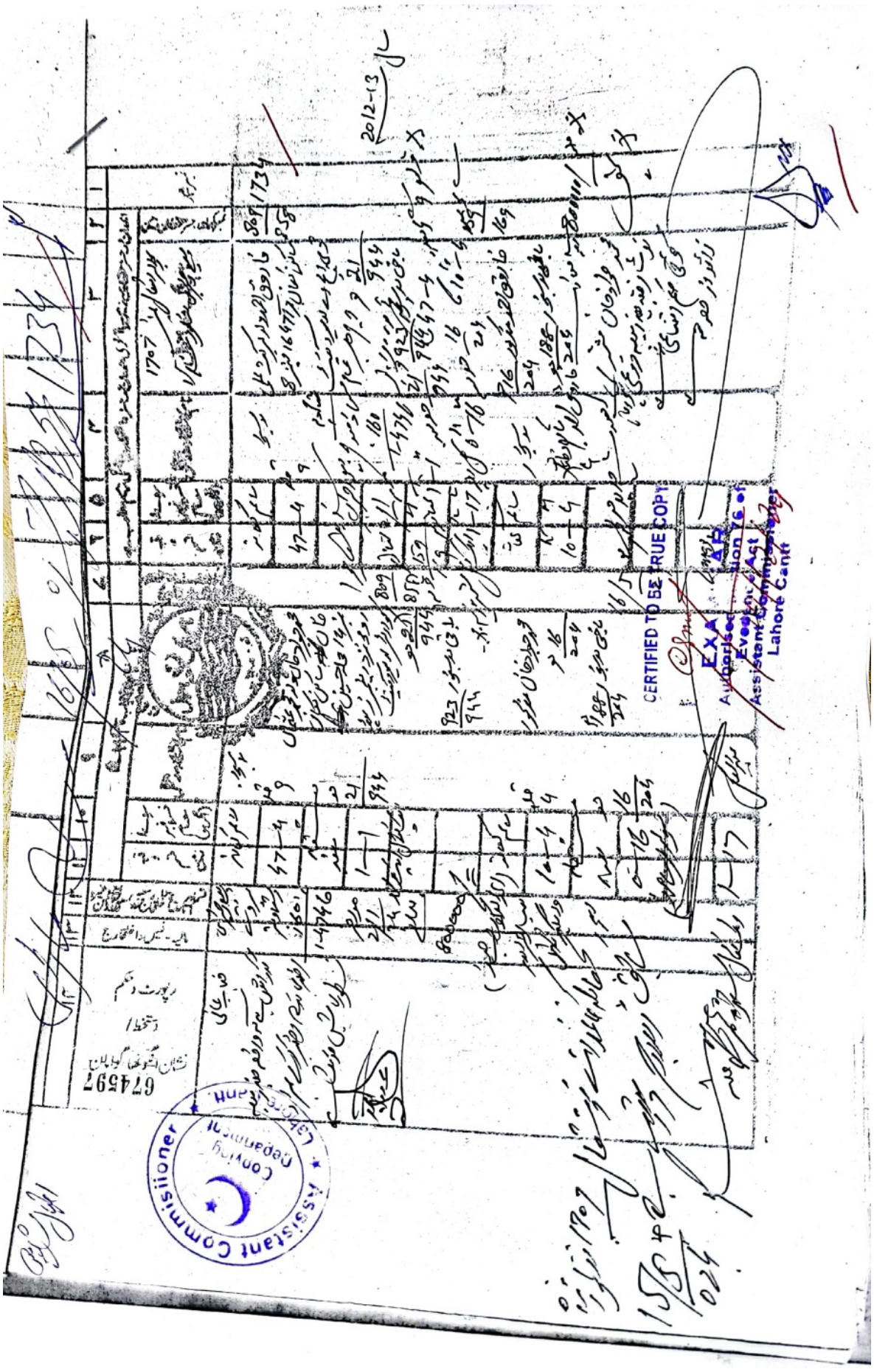
فاروق احمد۔ بائع

رجسٹر حقداران زمین (مسل میعادی)

پٹواری فارم نمبر XXXIVA

ضلع لاہور

۱۰	۹	۸	۷	۶	۵	۴	۳ (د)	۳ (ہ)	۳ (ج)	۳ (الف)	۲	۱
کیفیت معہ اسامنمبر دار (اگر کوئی ہو)	مطالبہ معہ تفصیلات مالیہ وجیوب	لگان جو کاشتکار ادا کرتا ہے	وصولی آبیاشی معہ نام چاہ وغیرہ	نمبر قطعہ زمین کھیت دار اور میزان حقوق کاشت کار و کھیوٹ مالک	نمبر خسرہ معہ نام (اگر کوئی ہو)	نام کاشتکار معہ احوال	زرعی پاس بک نمبر	مخصوص رقبہ مطابق حصہ	مشترکہ کھاتہ میں مخصوص حصہ	نوعیت ملکیت (مالک، راہن، مرتہن)	نام مالک معہ نام والد / خاوند و قوم اور سکونت	نمبر کھتونی کاشتکار	نمبر کھیوٹ مالک
											کوالورس / 1733 سنہ	858	859
							1923 / 994	1/24 حصہ			فخر نفر الدخان ولد فخر الدخان سکنہ سانگلہ ہل		
											۳(ب) قومی شناختی کارڈ نمبر		
								188 / 204	16 / 204		فخر نفر الدخان مرحوم	16P	159
											۳(ب) قومی شناختی کارڈ نمبر		
											نمبر سریل 3520 0-14105163-9		
											۳(ب) قومی شناختی کارڈ نمبر		
											فخر نفر الدخان		
											۳(ب) قومی شناختی کارڈ نمبر		


2012-13
CERTIFIED TO BE TRUE COPY
Assistant Commissioner
Lahore Cantt

The list of major equipment to be used in the proposed project is given in Annex 3.2 as below:

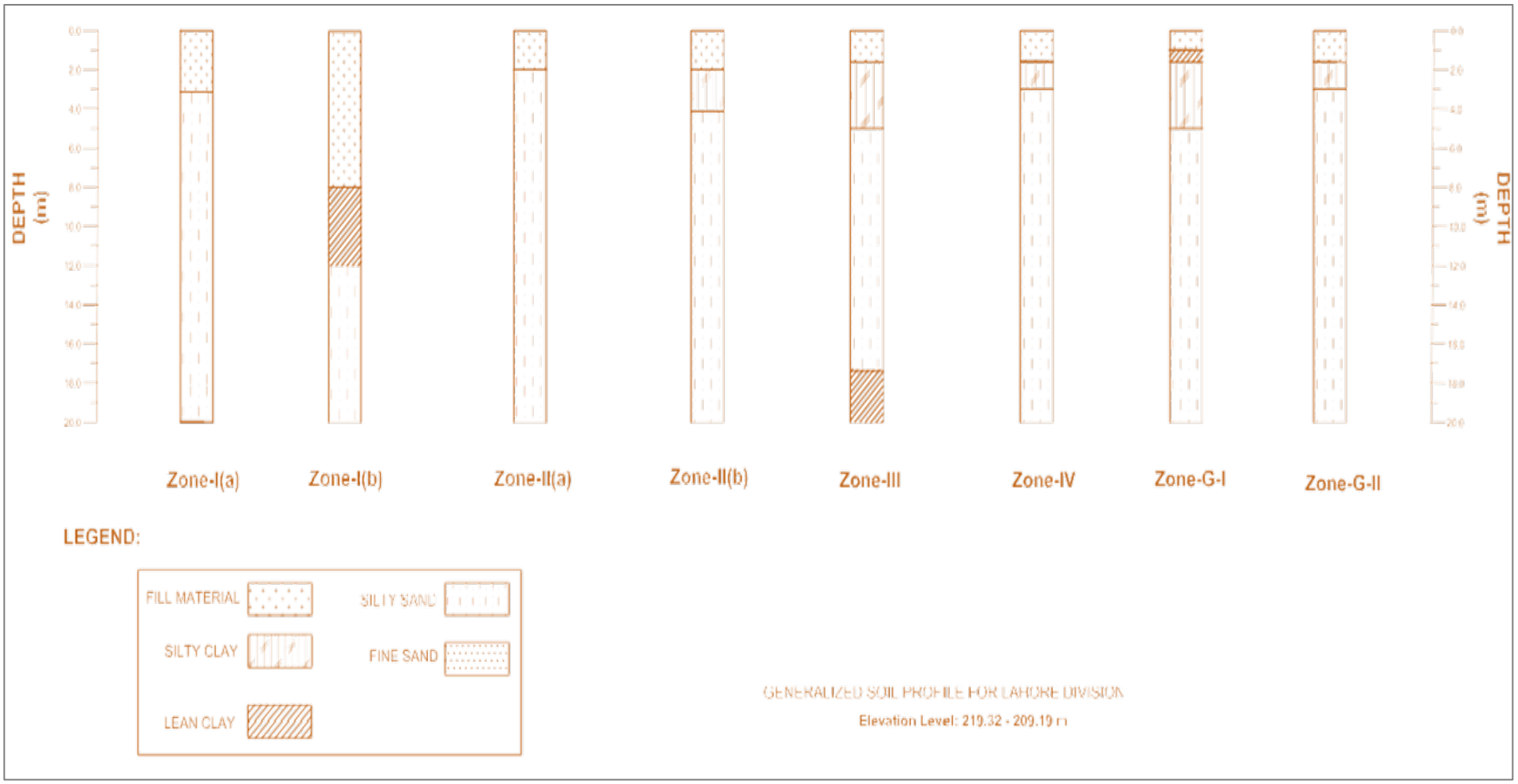
Annex 3.2: List of Equipment to be installed by Khan Brothers Foundry

Item No.	Equipment/ Items	Description
1	Electric Arc Furnace (EAF)	An electric arc furnace (EAF) heats material by means of an electric arc. Uses obsolescent scrap as the main source of material. Uses electricity as its main source of energy to melt scrap and adjust the properties in a ladle furnace.
2	Induction Furnace	In electrical furnace heat is applied by induction heating of metal. Induction furnace capacities range from less than one kilogram to one hundred tons, and are used to melt iron and steel, copper, aluminum, and precious metals.
3	Crucible Furnace	A crucible furnace is a type of foundry furnace used for melting and casting metals that have a low melting point such as brass, bronze, and aluminum. They are one of the oldest types of melting ovens and among the most commonly used furnaces in the industry.
4	Molds (or Dies)	Dies are used to shape sheet metal and other metal forms. A typical application is the making of automobile body parts. On the other hand, molds are used in injection molding such as with melted resin or casting molten metal. Image of a mold for injection molding.
5	Ladle Refining Furnace (LRF)	LRF is used to de-sulphurize steel, adjust its chemical composition and raise the temperature of molten metal besides as a buffer between the melting and casting equipment.
6	Continuous Casting Machine	Continuous casting, also called strand casting, is the process whereby molten metal is solidified into a "semifinished" billet, bloom, or slab for subsequent rolling in the finishing mills.
7	Rolling Mills	In a rolling mill, red-hot ingots of steel or other metals are passed through successive pairs of specially shaped rollers to produce flat bar, sheet. Final cold rolling may be carried out to give a better finish.
8	Heat Treatment Furnaces	Heat treatment furnaces provide a controlled environment to perform specific heat treatment processes precisely and consistently. They enable uniform heating, precise temperature control, and controlled cooling rates, ensuring that desired material properties are achieved.
9	Quenching Tanks	Quenching tanks are used for cooling the parts in water, oil or polymer after the quenching heat treatment process has ended. These are typically paired with a batch style furnace.
10	Cutting and Machining Tools	A cutting tool or cutter is typically a hardened metal tool that is used to cut, shape, and remove material from a work piece by means of machining tools.
11	Scrubber	Scrubber systems (e.g. chemical scrubbers, gas scrubbers) are a diverse group of air pollution control devices that can be used to remove some particulates and/or gases from industrial exhaust streams.
12	Wastewater Recycling Plant	The Process Water Recycling Plant is a fully automated standalone unit that enables recycling of process water by treating the water in a cost-efficient manner.

Annex 3.3: Process Flow under the Proposed Project

Sr. No.	Process Flow	Description
1	Heating in furnace	It is a crucial step in the production process. The furnace is used to heat raw materials, such as iron ore or scrap metal, to high temperatures. This heating process helps melt the materials and remove impurities, allowing the creation of molten metal that can be further processed into different steel products. It is an essential part of the steelmaking process.
2	Rolling into bars	After the steel has been heated and softened, it is passed through a series of rollers to shape it into long, cylindrical bars. This rolling process helps refine the steel's dimensions and improve its strength and structural integrity. These bars can be used in various applications, such as construction, manufacturing, or as raw material for further processing.
3	Cooling	After the steel has been heated and shaped, it undergoes a cooling process. This is done to help solidify and stabilize the steel's structure. There are different cooling methods used such as air cooling, water quenching or controlled cooling in specialized cooling chambers..
4	Inspection	This is the next step of process after cooling, it goes through an inspection process to ensure its quality and adherence to specifications. Trained inspectors examine the steel for any defects such as cracks, surface irregularities or dimensional inaccuracies. This inspection process is crucial to guarantee that the final product meets the required standards and is ready for use.
5	Storage and dispatching	Storage in the industry encompasses the systematic arrangement and preservation of raw materials, semi-finished, and finished products in warehouses or yards. This process involves organizing materials based on factors like size, type, and grade to facilitate efficient retrieval and inventory management. The delivery process involves packaging the finished steel products according to client specifications and transporting them to the designated destination. This often entails loading the materials onto trucks or trains for shipment. Quality assurance measures may include verifying the accuracy of the weight and ensuring proper documentation accompanies the shipment. Timely delivery is crucial to meeting client deadlines and maintaining positive relationships with clients.
6	Ready for delivery	After all these steps, the final product is ready to be delivered

Annex 4.1: Linear Subsurface Soil Profile of the Project Area



Annex 4.2: Air Quality Monitoring at various Locations in the Project Area

Sr. No.	Location	Coordinates		Readings (Location)	Ambient Air Quality					Remarks
		Easting	Northing		Time (AM/PM)	PM_{10} ($\mu g/m^3$)	PM2.5 ($\mu g/m^3$)	Temperature (^oC)	Average relative Humidity (%)	
1	Khan Brothers Industry	31.6334813	74.4265202	1st Reading (Centre)	1:33 PM	890.9	649	22.0	45.5	Industry Track
	Turkey Road	31.6313964	74.4260707	2nd Reading (Left)	1:38 PM	990.7	754.8	22.5	45.0	Industry Track
	Turkey Road	31.6340263	74.4296805	3rd Reading (Right)	1:46 PM	849.1	620.2	23.3	46.5	Industry Track
2	Saggian Wassan Road	31.6239331	74.3896136	1st Reading (Centre)	2:41 PM	829.9	499.9	24.0	44.4	Industry Road
	Saggian Wassan Road	31.6237223	74.3878982	2nd Reading (Left)	2:30 PM	871.9	627	24.2	44.4	Industry Road
	Saggian Wassan Road	31.6219423	74.3900636	3rd Reading (Right)	2:55 PM	908.3	637.5	23.7	45.5	Industry Road
3	Saggian Link Road	31.6222450	74.3886608	1st Reading (Centre)	3:15 PM	867.5	602.1	23.8	43.6	Link Road
	Saggian Link Road	31.6237223	74.3878982	2nd Reading (Left)	3:26 PM	714.9	640.7	24.0	44.9	Link Road Saggian Road
	Saggian Link Road	31.6220461	74.3904857	3rd Reading (Right)	3:31 PM	769	548.9	23.2	45.0	Link Road

Annex 4.3: Noise Levels Monitoring at various Locations in the Project Area

Sr. No.	Location	Coordinates		Readings	Noise Testing (dB)				Mean Reading	Max Reading	Min Reading	Remarks
		Easting	Northing	(Location)	Time (AM/PM)	Reading 1	Reading 2	Reading 3				
1	Khan Brothers Industry	31.6334813	74.4265202	1st Reading (Centre)	1:33 PM	65.8	58.3	60.1	61.4	65.8	58.3	Industry Track
	Turkey Road	31.6313964	74.4260707	2nd Reading (Left)	1:38 PM	60.2	57.2	75.3	64.2	75.3	57.2	Industry Track
	Turkey Road	31.6340263	74.4296805	3rd Reading (Right)	1:45 PM	50.4	70.0	47.4	55.9	70.0	47.4	Industry Track
2	Saggian Wassan Road	31.6237223	74.3898982	1st Reading (Centre)	2:30 PM	66.1	68.2	57.7	64.0	68.2	57.7	Industry Road
	Saggian Wassan Road	31.6239331	74.3896136	2nd Reading (Left)	2:40 PM	72.1	82.6	64.2	73.0	82.6	64.2	Industry Road
	Saggian Wassan Road	31.6219423	74.3900636	3rd Reading (Right)	2:55 PM	61.1	50.7	56.3	56.0	61.1	50.7	Industry Road
3	Saggian Link Road	31.6222450	74.3886608	1st Reading (Centre)	3:15 PM	66.4	69.9	68.4	68.2	69.9	66.4	Link Road
	Saggian Link Road	31.6237223	74.3878982	2nd Reading (Left)	3:25 PM	55.3	67.3	63.6	62.1	67.3	55.3	Link Road Saggian Road
	Saggian Link Road	31.6220461	74.3904857	3rd Reading (Right)	3:30 PM	55.9	56.8	72.2	61.6	72.2	55.9	Link Road

Annex 4.4: Water Quality Monitoring/LAB Tests of the Project Area

ENVIRONMENTAL PROTECTION AGENCY
GOVERNMENT OF THE PUNJAB
National Hockey Stadium, Gate No. 08
Gaddafi Stadium Complex, Lahore

4282 7-03-2025

Validation for Wastewater &Drinking Water

Facility /Project Name & Address Phone	Khan Brothers Foundry Lahore	**Sampling Point**	

Waste Water (**WW**) Treatment ~~facility~~
~~Primary~~ ~~Secondary~~ ~~Tertiary~~ NA

Drinking Water (**W**) Treatment Facility

Total WW collected Sample	Total Collected Drinking water samples.....		
Sample Tag for testing parameter is assigned on sample container	Yes	NO	NA
Sample is preserved properly for each testing parameter	Yes	NO	NA
Sample size is adequate for testing the target parameters	Yes	NO	NA
Wastewater Flow Measurement performed to ensure sample representativeness	Yes	NO	NA

No. of Waste Water outlets	Waste Water Flow m^3/hr from each outlet **(Optional)**	Water intake m^3/hr**(Optional)**	Water Mass balance complied during sampling **(Optional)**	Sample Type
			Yes No	Grab Composite

(Drinking water), Surface water, waste water.

Parameter	Matrix W	Matrix WW	Container	Sample Size	Preservation	Yes	NO	NA
Coliform,TotalorFecal	✓		SterileContainer	100mL	Refrigerate6C			
Coliform,TotalorFecal,ChlorinatedWater	✓		Sterile Container	100mL	0.008% Thiosulphate & cooled6C			
Color, Turbidity	✓		P,G	500mL	Cool6C			
Hardness,Total	✓		P,G	500ml	HNO3 to pH<2			
Nitrogen,Nitrate+Nitrite , Phenolic Compounds, Oil & Grease, COD, NH3			P,G	2000 mL	H2SO4 topH <2,Cool6C			
Metals,General			P,G Rinsed1.1 HNO3	500mL	HNO3 topH < 2			
Cyanide,Total	✓		P,G	500mL	NaOHtopH> 12,Cool 6C			
Pesticides,General			Glass	1Liter	Cool6C			

Field Parameters*

Field parameter		pH meter, Model Make	Measurement Method	Calibrated in Field	Measured value
pH				Yes NO	
Temp					
Cl					

*** Field testing parameters only be validated by RAs, ROs, DD (Labs)**

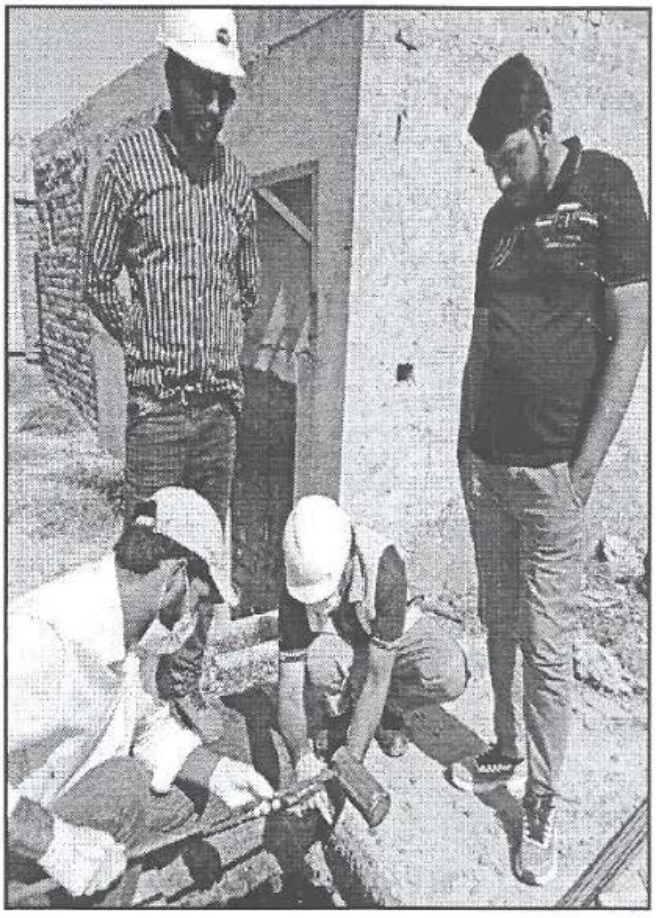
Remarks for Sample Quality (if Any):-

13-2-2025

Dated

Signature
Name of EPA Officer with office Address
Inspectors /RAs / ROs or ADs /DDs

Signature
Name of Assistant /Deputy Analyst, Analyst
with Name of Private Lab along with Address



EPA CERTIFIED

TEST REPORT OF GROUND WATER SAMPLE

Reference No. WELCOS/2025/DW/32-1 **Date**: 22 February, 2025

Industry Name	Khan Brothers Foundry		
Address	Turkey Road, Lahore		
Sample Identification	Ground Water		
Sample Collected/Provided	WELCOS Representative		
Sample Received Date	13 February, 2025	**Analysis Start Date**	13 February, 2025
Analysis Completion Date	22 February, 2025	**Grab/Composite**	Grab
Environmental Conditions	**Temperature** 25 ± 5 °C	**Humidity**	20-70% RH

Analysis Parameters

Sr.#	Parameters	Units	PEQS	Result	Test Method Used
1.	pH @25 °C	-	6.5-8.5	7.42	APHA 4500H⁺ B
2.	Temperature	°C	N.S	18	APHA-2550
3.	TDS	mg/l	< 1000	295	APHA 2540 C
4.	Odor	-	Non-Objectionable	Non-Objectionable	Sensory Method
5.	Color	-	Non-Objectionable	Non-Objectionable	Sensory Method
6.	Chloride	mg/l	< 250	14.6	APHA 4500 Cl-B
7.	Hardness	mg/l	< 500	190	APHA 2340 C
8.	Alkalinity	mg/l	NGVS	180	APHA 2320 B
9.	Sulfate	mg/l	250	130	APHA 4500 SO_4
10.	Turbidity	NTU	<5	1.2	APHA 2130 B
11.	Conductivity	µS/cm	NGVS	403	APHA 2510 B
12.	Fluoride	mg/l	≤ 1.5	0.42	APHA 4500 F D
13.	Cadmium	mg/l	0.01	BDL	APHA-3113 B, APHA-3111 B
14.	Iron	mg/l	0.3	BDL	APHA 3500 Fe-B& APHA 3111 B
15.	Lead	mg/l	≤ 0.05	BDL	APHA-3113 B, APHA-3111 B
16.	Acidity	mg/l	NGVS	BDL	APHA-2310
17.	Total Nitrogen	mg/l	NGVS	BDL	APHA-4500 N
18.	**Total Coliform**	**cfu/100ml**	**0**	**55**	**APHA 9222 B**

Statement of Conformity:

The sample found non-complies in accordance with PEQS Limits for the tested parameters.

Abbreviations:

PEQS	Punjab Environmental Quality Standers	**APHA**	American Public Health Association
NTU	Nephelometric Turbidity Unit	**BDL**	Below Detection Limit
TNTC	Too Numerous to count	**NGVS**	No guideline value set

Decision Rule:

Results ± Expanded Uncertainty within Limits: **Pass**
Results ± Expanded Uncertainty exceeds Limits: **Fail**

Terms and Conditions:

- This report should be produced as a whole and not in parts.
- Report cannot be used regarding compliance of any complaint, EPO or any other court case.
- The sample is retained for 15 days after the issuance date of report from the laboratory.
- There is no Retention time for Microbiological tested samples. In case of retesting requirement from client, sample will be collected again.
- The Ground water analysis results comply with the Pakistan Environmental Quality Standards (PEQS). These results provide a snapshot of the water sample as received and may not necessarily reflect typical or routine conditions, as variations in processes, seasonal fluctuations, or environmental factors could impact the water quality

Prepared By Reviewed By Approved By

----------Report End----------

PNAC ISO 17025 2017 ACCREDITED | EPA PUNJAB CERTIFIED | ISO 9001:2015 ISO 14001:2015 ISO 45001:2018

SERVICES WITH QUALITY

No. 21275

Water Environment Laboratories & Consultancy Services (WELCOS)
29 D, Punjab University Town II, Khayban-e-Jinnah, Lahore Pakistan.
info@welcos.com.pk
www.welcos.com.pk
0300-7222180, 042-35183916

EPA CERTIFIED

TEST REPORT OF SURFACE WATER SAMPLE

Reference No. WELCOS/2025/SW/32-2 **Date**: 22 February, 2025

Industry Name	Khan Brothers Foundry		
Address	Turkey Road, Lahore		
Sample Identification	Surface Water		
Sample Collected/Provided	WELCOS Representative		
Sample Received Date	13 February, 2025	**Analysis Start Date**	13 February, 2025
Analysis Completion Date	22 February, 2025	**Grab/Composite**	Grab
Environmental Conditions	**Temperature** 25 ± 5 °C	**Humidity**	20-70% RH

Analysis Parameters

Sr.#	Parameters	Units	PEQS	Result	Test Method Used
1.	pH @25 °C	-	6.5-8.5	7.3	APHA 4500H⁺ B
2.	Temperature	°C	N.S	12	APHA-2550
3.	TDS	mg/l	< 1000	457	APHA 2540 C
4.	Odor	-	Non-Objectionable	Non-Objectionable	Sensory Method
5.	**Color**	**-**	**Non-Objectionable**	**Objectionable**	**Sensory Method**
6.	Chloride	mg/l	< 250	29.25	APHA 4500 Cl-B
7.	Hardness	mg/l	< 500	440	APHA 2340 C
8.	Alkalinity	mg/l	NGVS	270	APHA 2320 B
9.	Sulfate	mg/l	250	140	APHA 4500 SO_4
10.	**Turbidity**	**NTU**	**<5**	**9**	**APHA 2130 B**
11.	Conductivity	µS/cm	NGVS	830	APHA 2510 B
12.	Fluoride	mg/l	≤ 1.5	0.45	APHA 4500 F D
13.	Cadmium	mg/l	0.01	BDL	APHA-3113 B, APHA-3111 B
14.	Iron	mg/l	0.3	0.09	APHA 3500 Fe-B& APHA 3111 B
15.	Lead	mg/l	≤ 0.05	BDL	APHA-3113 B, APHA-3111 B
16.	Acidity	mg/l	NGVS	10	APHA-2310
17.	Total Nitrogen	mg/l	NGVS	BDL	APHA-4500 N
18.	**Total Coliform**	**cfu/100ml**	**0**	**TNTC**	**APHA 9222 B**

Statement of Conformity:

The sample found non-complies in accordance with PEQS Limits for the tested parameters.

Abbreviations:

PEQS	Punjab Environmental Quality Standers	**APHA**	American Public Health Association
NTU	Nephelometric Turbidity Unit	**BDL**	Below Detection Limit
TNTC	Too Numerous to count	**NGVS**	No guideline value set

Results ± Expanded Uncertainty within Limits: **Pass**

Results ± Expanded Uncertainty exceeds Limits: **Fail**

Terms and Conditions:

- Analysis was conducted on the request of proponent for his own PEQS compliance.
- This report should be produced as a whole and not in parts.
- Report cannot be used regarding compliance of any complaint, EPO or any other court case.
- The sample is retained for 15 days after the issuance date of report from the laboratory.
- There is no Retention time for Microbiological tested samples. In case of retesting requirement from client, sample will be collected again.
- The Surface water analysis results comply with the Pakistan Environmental Quality Standards (PEQS). These results provide a snapshot of the water sample received period, and may not necessarily reflect typical or routine conditions, as variations in processes, seasonal fluctuations, or environmental factors could impact the water quality

Prepared By Reviewed By Approved By

----------Report End----------

PNAC ISO 17025 2017 ACCREDITED | EPA PUNJAB CERTIFIED | ISO 90012015 ISO 140012015 ISO 45001200₈

No.21274

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info@welcos.com.pk
www.welcos.com.pk
0300-7222180, 042-35183916

TEST REPORT OF WASTE WATER SAMPLE

EPA CERTIFIED

Reference No. WELCOS/2023/WW/32-2 **Date**: 22 February, 2025

Industry Name	Khan Brothers Foundry		
Address	Turkey Road, Lahore		
Sample Identification	Waste water (Drain Nullah)		
Sample Collected/Provided	WELCOS Representative		
Sample Received Date	13 February, 2025	**Analysis Start Date**	13 February, 2025
Analysis Completion Date	22 February, 2025	**Grab/Composite**	Grab
Lab Environmental Conditions	**Temperature** 25 ± 3 °C	**Humidity**	20-70% RH

Analysis Parameters

	Parameters	Units	PEQS	Result	Test Method Used
1.	pH@25°C	-	6-9	7.02	APHA 4500 H^+ B
2.	Temperature	°C	N.S	16	APHA-2550
3.	**BOD_5**	**mg/l**	**80**	**670**	**APHA-5210**
4.	**COD**	**mg/l**	**150**	**1280**	**APHA-5220**
5.	Conductivity	µS/cm	NGVS	1380	APHA 2510 B
6.	TDS	mg/l	3500	760	APHA 2540 C
7.	Alkalinity	mg/l	NGVS	530	APHA 2320 B
8.	**TSS**	**mg/l**	**200**	**1140**	**APHA 2540 D**
9.	Hardness	mg/l	NGVS	240	APHA 2340 C
10.	Chloride	mg/l	1000	117	APHA 4500 Cl^- B
11.	Iron	mg/l	8	0.66	APHA 3113 B, APHA 3111 B
12.	**Cadmium**	**mg/l**	**0.1**	**0.13**	**APHA 3113 B, APHA 3111 B**
13.	Total Nitrogen	mg/l	NGVS		APHA-4500 N
14.	Lead	mg/l	0.5	0.14	APHA 3113 B, APHA 3111 B

Statement of Conformity:

The sample non-found complies in accordance with PEQS Limits for the tested parameters.

Abbreviations:

PEQS	Punjab Environmental Quality Standards	**BDL**	Below Detectable Limit
APHA	American Public Health Association	**NGVS**	No Guide line value set

Decision Rule:

Results ± Expanded Uncertainty within Limits: **Pass**
Results ± Expanded Uncertainty exceeds Limits: **Fail**

Terms and Conditions:

- Analysis was conducted on the request of proponent for his own PEQS compliance.
- This report should be produced as a whole and not in parts.
- Report cannot be used regarding compliance of any complaint, EPO or any other court case.
- The sample is retained for 15 days after the issuance date of report from the laboratory.
- There is no Retention time for Microbiological tested samples. In case of retesting requirement from client sample will be collected again.
- The wastewater analysis results comply with the Pakistan Environmental Quality Standards (PEQS).

These results reflect the quality of the sample as received and may not represent typical or routine conditions, as variations in process, seasonal changes, or environmental factors can affect the outcomes.

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----------Report End----------

PNAC ISO 17025 2017 ACCREDITED | EPA PUNJAB CERTIFIED | ISO 90012015 ISO 140012015 ISO 45001200$_8$

No. 21273

Annex 5.1: Trees Plantation Plan

Khan Brothers Foundry is committed to implementing effective tree plantation practices to minimize environmental impacts and ensure compliance with regulatory requirements. This plan outlines measures for managing tree plantation activities during industrial operations. As part of the project, trees will be planted to reduce noise, odor, and air pollution. Tree plantation will occur around the project boundary wall, along roadways, and in other suitable locations within the proposed project area.

Additionally, there will be a need to restore and augment tree populations after project completion to enhance biodiversity and provide habitats for various species. This effort will improve the site's value for local wildlife. In accordance with EPA requirements, 3,000 trees will be planted. The estimated cost for tree plantation is estimated as Rupees three hundred fifty thousand.

Site Selection

Identify suitable locations for tree plantation based on ecological conditions, soil type, and community needs. Priority should be given to areas near water bodies, degraded lands, and regions prone to erosion.

Plantation Plan

- Divide the 3000 trees into species-specific i.e. Ornamental plants, Timber/ Wood trees and Fruit trees groups based on the site conditions.
- Plan for a mix of tree species to enhance resilience against diseases and pests.
- Calculate spacing between trees to ensure optimal growth conditions.
- Consider long-term maintenance requirements including watering, weeding, and protection from grazing animals

Implementation Strategy

- Engage local communities in the tree planting process to ensure ownership and sustainability.
- Provide training on tree planting techniques and maintenance.
- Procure saplings from local nurseries to support the local economy and ensure native species are used.

Monitoring and Evaluation

- Establish monitoring protocols to assess the survival and growth rates of planted trees.
- Conduct periodic assessments to identify any issues or threats to the plantation.
- Adjust management strategies as necessary to ensure the long-term success of the plantation.

Annex 5.2: Health and Safety Plan

To achieve excellence in Health, Safety, and Environment (HSE) and minimize risks to workers, associated personnel, assets, and the environment, this plan is designed to identify potential impacts and develop effective mechanisms for improvement. The plan aims to meet the project's requirements for enhancing HSE standards and addressing specific needs. It is applicable to all project sites and aligns with statutory requirements.

This plan is intended for the workers at the project site, ensuring their safety and well-being. A schedule for regular inspections and audits will be implemented to continuously monitor and improve HSE practices.

Roles and Responsibilities

- Designate safety officers or coordinators to oversee HSE protocols.
- Clearly define responsibilities for all employees, supervisors, and management.
- Provide training to ensure all personnel are competent and capable of performing their duties safely.

Health and Safety Procedures

- Provide Standard Operating Procedures (SOPs) for the safe operation of equipment and task performance.
- Develop an emergency response plan, including procedures for handling accidents, spills, fires, and natural disasters.
- Ensure the availability of first aid and medical services on-site at all times.

Personal Protective Equipment (PPE)

- **Heat-Resistant Clothing:** Fire-resistant suits, gloves, and aprons will be provided to protect against high temperatures and molten materials.
- **Protective Footwear:** Steel-toed boots will be provided to protect against heavy objects and molten metal.
- **Respirators and Face Shields:** Respirators and face shields will be supplied to protect workers from airborne pollutants, fumes, and molten metal splashes.
- **Hearing Protection:** Earplugs or earmuffs will be provided to protect workers from excessive noise.
- **Eye Protection:** Goggles or face shields will be used to protect against sparks, flying debris, and intense light from furnaces.
- **Gloves:** Insulated gloves will be provided to protect against heat and mechanical injuries.
- **Fall Protection:** Harnesses and safety nets will be used, where necessary, to prevent falls from elevated platforms.

Emergency Response and First Aid

- **First Aid Kits:** Easily accessible first aid kits equipped with supplies to treat minor injuries such as burns, cuts, and abrasions.
- **Emergency Evacuation Plan:** Ensure clear evacuation routes and designated assembly points in case of fire or explosion. The plan should include periodic drills and effective communication systems.

- **Fire Safety Measures:** Fire extinguishers, fire blankets, and sprinkler systems should be strategically placed near furnace operations, with workers trained in their use.
- **Burn Treatment:** Ensure that workers have immediate access to cold water or specialized burn care kits to treat injuries caused by heat or molten materials.
- **Chemical Spill Response:** Provide spill containment kits, neutralizing agents, and trained personnel to manage hazardous chemical spills.
- **Emergency Contact Numbers:** Display emergency contact information (e.g., medical facilities, fire department, safety officers) prominently in work areas.

Monitoring and Review/ Reporting

- Plan regular inspections and audits to ensure compliance with health and safety standards.
- Establish a system for reporting and investigating incidents, including near misses.
- Implement health surveillance programs for workers exposed to specific hazards.
- Maintain records of health and safety performance, training, inspections, and incidents.
- Regularly report health and safety performance to relevant stakeholders and regulatory authorities.

Community Health and Safety

- Assess the potential health and safety impacts on local communities.
- Develop a plan to engage with local communities and other stakeholders regarding health and safety concerns.

Environmental Health Considerations

- Measures will be outlined to prevent environmental pollution and minimize health risks.
- Procedures for the safe handling, storage, and disposal of waste will be implemented.

Annex 5.3: Waste Management Plan

Khan Brothers Foundry is committed to implementing effective wastewater and waste management practices to minimize environmental impact and ensure compliance with regulatory requirements. This plan outlines the measures for managing both wastewater and solid waste generated during the construction and operational phases of the project.

Wastewater Management

- Use the designated wastewater disposal site, ensuring proper containment and safeguards to prevent groundwater contamination.
- Implement measures to prevent accidental spills or leaks during wastewater disposal activities.
- Install wastewater treatment plants to recycle and treat wastewater.

Waste Management

a. Solid Waste Management

- Implement a waste segregation system to separate solid waste into recyclable and non-recyclable categories.
- Establish designated storage areas for recyclable materials and ensure proper handling and transportation to recycling facilities.

b. Domestic Waste

- Implement waste reduction measures, such as promoting the use of reusable containers and minimizing single-use plastics, to reduce domestic waste generation.
- Provide adequate waste bins and clear signage to encourage proper disposal of domestic waste by employees.
- Collaborate with local waste management authorities to ensure the proper collection and disposal of domestic waste.

Monitoring and Compliance

- Conduct regular monitoring of wastewater quality and waste generation rates to assess the effectiveness of management practices and identify areas for improvement.
- Maintain records of wastewater discharge volumes, pollutant concentrations, and waste generation rates for reporting and regulatory compliance.
- Implement corrective actions as needed to address non-compliance issues and prevent environmental harm.

Community Engagement and Communication

- Engage with local communities to raise awareness about wastewater and waste management practices and gather feedback on potential environmental concerns.
- Maintain open communication channels with stakeholders to address any wastewater or waste management-related issues and demonstrate Khan Brothers Foundry' commitment to environmental stewardship.

Review and Improvement

- Regularly review and update the Wastewater and Waste Management Plan to incorporate lessons learned from monitoring and compliance activities, technological advancements, and changes in regulatory requirements.
- Continuously seek opportunities to improve wastewater and waste management practices through innovation and the adoption of industry best practices.

Annex 5.4: Emergency Response Plan

The company's emergency response plan addresses various potential emergencies, including natural disasters, technical failures, cyber-attacks, and other incidents that could impact operations. Below is a comprehensive outline to help develop an effective plan:

Risk Assessment

- Identify potential emergencies specific to the industry (e.g., power outages, software/hardware failures, cyber-attacks).
- Evaluate the likelihood and potential impact of each risk.

Emergency Response Team

- Form an emergency response team with defined roles and responsibilities.
- Include representatives from key departments such as IT, HR, operations, security, and management.

Communication Plan

- Develop a communication strategy for notifying employees, customers, and stakeholders.
- Include alternative communication methods in case primary systems are down (e.g., SMS, social media).

Emergency Procedures

Detailed procedures for handling different types of emergencies, tailored to the risks identified earlier.

A. Fire and Explosion

- Activate Fire Alarm: Upon detection of a fire or explosion risk, immediately activate the fire alarm and alert the emergency response team.
- Evacuate Workers: Initiate evacuation of workers based on the emergency protocol, directing them to safe assembly points.
- Firefighting Equipment: Use fire extinguishers, hoses, or sprinkler systems to suppress the fire until professional fire services arrive.
- Fire Department Notification: Contact local fire departments and provide detailed information about the fire location, materials involved, and any hazards.
- Fire Safety Drills: Conduct regular fire drills to ensure all employees are familiar with emergency evacuation routes and fire response procedures.

B. Chemical Spills or Leaks

- Immediate Containment: Quickly contain spills using absorbent materials, dikes, or spill containment kits to prevent the spread of hazardous chemicals.
- Evacuate the Area: Evacuate workers from the contaminated zone and establish a safe perimeter.
- Chemical Neutralization: If applicable, use neutralizing agents or other methods to reduce the hazardous properties of the chemical spill.
- Notify Emergency Services: Contact emergency services, such as local hazardous material response teams, and provide details about the type of chemical involved.
- Decontamination: Set up decontamination stations for workers who may have been exposed to the spilled chemicals.

C. Gas Leak

- Shut Off the Source: Immediately shut off the gas supply (if safe to do so) and activate emergency shutdown procedures.
- Ventilate the Area: Use ventilation systems or open windows and doors to disperse the gas.
- Evacuate Affected Areas: Evacuate workers from the area of the leak, ensuring they move upwind from the gas source.
- Notify Authorities: Contact the gas supply company, fire department, and local authorities, providing details of the leak, its location, and potential hazards.
- Gas Detection: Use gas detection equipment to monitor air quality and confirm safe conditions before allowing personnel to return.

D. Furnace Malfunctions (Overheating, Pressure Vessel Rupture)

- Emergency Shutdown: Activate emergency shutdown procedures to safely stop furnace operations and control the situation.
- Cool Down: If overheating occurs, use cooling systems or water sprays to bring the temperature down safely.
- Monitor Pressure: Ensure pressure relief valves are functioning properly to avoid potential vessel rupture.
- Isolate Affected Area: Restrict access to areas affected by furnace malfunctions and implement appropriate containment measures.
- Notify Technical Team: Alert technical and maintenance teams to assess and repair the malfunction.

E. Electrical Failures

- Backup Power Systems: Activate backup generators or emergency power systems to restore critical operations.
- Isolate Affected Equipment: Shut down or isolate any electrical equipment that could pose a danger (e.g., sparks, overloads).
- Check for Fire Risks: Ensure no electrical fires have occurred, and monitor for overheating or arcing.
- Notify Utility Services: Contact the electricity provider or utility services to address the failure if it is external to the facility.

Data Backup and Recovery

- Implement regular data backup protocols.
- Ensure off-site or cloud-based storage for critical data.
- Develop a disaster recovery plan for IT systems and data.

Business Continuity Plan

- Identify essential functions and processes that must continue during an emergency.
- Develop contingency plans for maintaining these functions (e.g., remote work capabilities, alternative suppliers).

Facility Security

- Install and maintain security systems (e.g., surveillance cameras, access controls).
- Ensure physical security measures are in place to protect against unauthorized access and vandalism.

Health and Safety

- Ensure compliance with occupational health and safety regulations.
- Maintain first aid kits, fire extinguishers, and other emergency equipment.
- Provide training on first aid, CPR, and the use of emergency equipment.

Cyber security Measures

- Implement robust cyber security protocols (e.g., firewalls, encryption, regular software updates).
- Educate employees on cyber security best practices and phishing scams.
- Have an incident response plan for cyber-attacks.

Supply Chain Management

- Identify critical suppliers and establish alternative supply options.
- Develop protocols for managing supply chain disruptions.

Review and Improvement

- Conduct regular reviews of the emergency preparedness plan.
- Update the plan based on new risks, changes in operations, and after-action reports from drills or actual emergencies.
- Engage employees in the review process to gather feedback and improve the plan.

Documentation

- Maintain detailed documentation of the emergency preparedness plan.
- Ensure all employees have access to the plan and understand their roles and responsibilities.

Insurance

- Review and update insurance policies to ensure adequate coverage for various types of emergencies.
- Include business interruption insurance to cover potential losses during an emergency.

Training and Education

- Provide ongoing training and education for employees on emergency procedures.
- Conduct orientation sessions for new employees and regular refresher courses for all staff.

Implementation Steps

a) **Initiate Planning Process:** Form a planning committee and assign responsibilities.
b) **Conduct Risk Assessment:** Identify and evaluate risks specific to the automation industry.
c) **Develop the Plan:** Create detailed procedures and protocols for each identified risk.
d) **Communicate the Plan:** Ensure all employees and stakeholders are aware of the plan.
e) **Conduct Drills and Training:** Regularly practice emergency procedures and update training materials.
f) **Review and Update:** Continuously improve the plan based on feedback and new information.

Annex 5.5: Drinking Water Supply and Sanitation Plan

Objectives

- Ensure the continuous supply of safe and potable drinking water.
- Promote effective sanitation practices.
- Prevent waterborne diseases.
- Educate the community on water conservation and sanitation practices.
- Establish a rapid response mechanism for water supply and sanitation issues.

Water Supply Management

a) Water Sources

- Identify and secure water sources.
- Regularly monitor water quality and quantity.
- Implement measures to protect water sources from contamination.

b) Water Treatment

- Use appropriate water treatment processes (filtration, chlorination or UV treatment).
- Maintain and monitor treatment facilities regularly.
- Ensure compliance with water quality standards.

c) Water Storage

- Construct and maintain storage facilities (tanks, reservoirs).
- Ensure storage facilities are protected from contamination.
- Regularly clean and disinfect storage units.

Sanitation Management

a) Sanitation Infrastructure

- Develop and maintain sanitation facilities (toilets, septic tanks, sewage systems).
- Regularly inspect and maintain sanitation infrastructure.

b) Waste Management

- Implement proper waste collection, segregation, and disposal systems.
- Promote recycling and composting to reduce waste.
- Prevent open defecation through community education and infrastructure provision.

c) Hygiene Promotion

- Conduct regular hygiene education programs.
- Provide access to soap, clean water, and sanitation facilities.
- Collaborate with health agencies to promote public health initiatives.

Community Involvement

a) Public Awareness Campaigns

- Conduct awareness campaigns on water conservation and sanitation.
- Educate the community about the importance of protecting water sources.
- Promote participation in water and sanitation programs.

Water Conservation Strategies

a) Efficient Water Use

- Promote the use of water-saving fixtures and appliances.
- Educate the community on water-saving practices.
- Implement water metering and pricing strategies to encourage conservation.

Monitoring and Evaluation

a) Regular Assessments

- Conduct regular assessments of water quality and sanitation facilities.
- Use standardized indicators to measure progress and identify areas for improvement.
- Involve independent auditors to ensure transparency and accountability.

b) Data Management

- Maintain accurate records of water supply, usage, and quality.
- Use data to inform decision-making and policy development.
- Share information with stakeholders to promote transparency and community trust.

Annex 5.6: Traffic Management Plan

Objectives

- Ensure the safety of workers, visitors, and the surrounding community.
- Minimize traffic congestion and disruptions to the local road network.
- Comply with relevant safety and environmental regulations.
- Protect the environment by reducing emissions, dust, and noise pollution from traffic.

Traffic Flow Management

- Separate traffic flows for trucks, employees, and pedestrians.
- Clearly marked routes for delivery, service, and employee vehicles.
- Implement one-way systems for trucks to avoid congestion and ensure smooth movement.
- Define loading/unloading zones and control access to minimize interference with operational areas.

Site Layout and Access Points

- Designate access points for trucks, employees, and visitors.
- Provide separate parking areas for employees and visitors.
- Mark safe pedestrian pathways to prevent vehicle-pedestrian conflicts.
- Ensure emergency vehicle access routes remain clear at all times.

Signage and Road Markings

- Provide clear signage for traffic direction, speed limits, pedestrian crossings, and hazardous areas.
- Use road markings to delineate lanes, parking, and safety zones.

Traffic Scheduling

- Stagger delivery and shipment schedules to reduce peak-hour traffic.
- Set specific times for heavy trucks to enter or exit to minimize impact on employee traffic.

Vehicle and Parking Management

- Control vehicle types and sizes using designated routes to prevent overloading or infrastructure damage.
- Designate truck parking and waiting areas to avoid congestion at entry/exit points.

Environmental Considerations

- Implement measures to reduce emissions, dust, and noise from vehicle operations.
- Perform regular maintenance of road surfaces to minimize dust and wear.

Safety Measures

- Enforce speed limits within the facility and traffic rules.
- Install speed bumps, barriers, and employ marshals in high-traffic or hazardous areas.
- Provide driver training on safety protocols.

Monitoring and Review

- Regularly monitor traffic patterns to identify and address congestion or safety issues.
- Continuously review and update the plan based on operational changes or feedback.

Annex 7.1: Consultations with the Local Community

Pc. No.	Date	Location/ Venue	Category of Participant	No of Participants	Name of Main Participants	Contact No.	Main Concerns and Feedback
1	7/1/2025	Lakhoder, Tehsil Cantt, District Lahore	Local Community/ beneficiary/ affected people	5	- Muhammad Shafiq S/o Mehar Jamal Din - Abdul Rasheed S/o Wahid Buksh - Mr. Kalimullah S/o Shaukat Ali - Mr Ali S/o Mushtaq Ahmad - Seith Jabbar S/o Charagh Din	0307-3373884 0309-1532197 0317-4137240 0307-4076704 0307-4976704	➢ Construction of new factories will promote the employment rate. ➢ But at the same time, agricultural lands are being threatened. ➢ Pollution due to industries should be eliminated.
2	7/1/2025	Turkey road, Tehsil Cantt, District Lahore	Local Community/ Beneficiary/ Affected people	6	- Mr. Ghulam Mustafa S/o bashir - Mr. Shafqat S/o karamat - Mr. Shahid Mehmood S/o Asghar Ali - Mr. Ijaz Ali S/o Hashmat Ali - Mr. Shabbir Ahmad S/o Muhammad Sajawal - Mr. Qurban Rasool S/o Shamas Din	0343-0656712 0341-4067096 0309-7853567 0309-6428228 0309-6942533 0342-8023284	➢ Black smoke coming from industries is destroying the agricultural fields. ➢ The industrial area should have proper roads.
3	7/1/2025	Turkey road, Tehsil Cantt, District Lahore	Local Community/ beneficiary/ affected people	6	- Mr. Nazir Ahmad S/o Lal Din - Muhammad Irfan S/o Amanat Ali - Mr. Jabbar S/o Muhammad Iqbal - Mr. Shehram Hassan S/o Nazir Ahmad - Muhammad Imran S/o Ghulam Abbas - Muhammad Nawaz S/o Mukhtar Ahmed	0302-4147176 0320-8420626 0345-4630680 0309-6086061 0309-5294166 0307-4659753	➢ Due to the strictness from higher authorities, the smoke from industries is comparatively less. ➢ Due to less work, factories are being closed.
4	3/1/2025	Turkey road, Tehsil Cantt, District Lahore	Local Community/ beneficiary/ affected people	5	- Ms. Shehar Bano - Bushra Bibi - Ms. Batool - Ms. Asma - Ms. Muqaddas	0322-3645820 - - 0305-4065832 0329-4776011	➢ Black smoke from industries makes their clean cloths smeary. ➢ They are suffering from many respiratory diseases due to this. ➢ There are no job opportunities for them in factories.

Annex 7.2: Signed copy of Consultations with the Local Community & Stakeholders

Khan Brothers Foundry

STAKEHOLDER'S CONSULTATIONS

LIST OF PARTICIPANTS

ID# [2]

Date: 7 / 1 / 2025

Location/Village: Lakhoder Union Council: Lakhoder

Tehsil: Lahore Cantt. District: Lahore

Sr No.	Name & Father's Name of the Participant	Occupation	Contact No.	Signature/ Thumb Impression
1-	Muhammad Shafiq S/o Mehar Jamal Din	Business	0307-3373884	
2-	Abdul Rasheed S/o Wahid Baksh	Labor	0309-1532197	
3-	Kalimullah S/o Shaukat Ali	Farming/ Livestock	0317-4137240	
4-	Ali S/o Mushtaq Ahmed	Property State	0307-4076704	
5-	Seuth Jabbar S/o Charagh Din	Property State	0307-4076704	

Khan Brothers Foundry

STAKEHOLDER'S CONSULTATIONS

LIST OF PARTICIPANTS

ID# [3]

Date: 7 / 1 / 2025

Location/Village: Turkey Road Union Council: Lakho der

Tehsil: Lahore Cantt. District: Lahore.

Sr. No.	Name & Father's Name of the Participant	Occupation	Contact No.	Signature/ Thumb Impression
1-	Nazir Ahmed S/o Lal Din	Business	0302-4147176	
2-	Muhammad Irfan S/o Amanat Ali	Business	0320-8420626	
3-	Jabbar S/o Muhammad Iqbal	Job	0345-4630680	
4-	Shehram Hassan S/o Nazar Ahmed	Business	0309-6086061	Shahram
5-	Muhammad Imran S/o Ghulam Abbas	Labor	0309-5294166	
6-	Muhammad Nawaz S/o Mukhtar Ahmed.	Labor	0307-4659753	

Khan Brothers Foundry

STAKEHOLDER'S CONSULTATIONS

LIST OF PARTICIPANTS

ID# [4]

Date: 7 / 1 / 2025

Location/Village: Turkey Road Union Council: Lakhoder

Tehsil: Lahore Cantt District: Lahore

Sr. No	Name & Father's Name of the Participant	Occupation	Contact No.	Signature/ Thumb Impression
1-	Ghulam Mustafa S/o Bashir	Farming/ Livestock	0343-0656712	غلام مصطفیٰ
2-	Shafaqat S/o Karamat	Farming/ Livestock	0341-4067096	شفاقت
3-	Shahid Mehmood S/o Asghar Ali	Labor	0309-7853567	
4-	Ijaz Ali S/o Hashmat Ali	Labor	0309-6428228	اعجاز علی
5-	Shabir Ahmad S/o Muhammad Sajawal.	Labor	0309-6942533	
6-	Qurban Rasool S/o Shamas Din	Labor	0342-8023284	قربان رسول

Khan Brothers Foundry

STAKEHOLDER'S CONSULTATIONS

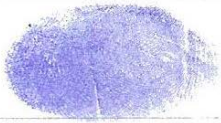
LIST OF PARTICIPANTS

ID# [1]

Date: 3 / 1 / 2025

Location/Village: Turkey road Union Council: Lakhodair

Tehsil: Lahore cantt District: Lahore

Sr.	Name & Father's Name of the Participant	Occupation	Contact No	Signature/ Thumb Impression
1	Shehar Bano.	House wife	0322-3645820	
2	Bushra Bibi	House wife		
3	Batool	House wife		
4	Asma	House wife.	0305-4065832	
5	Muqaddas	Labour	0329-4776011