ETIHAD ALLOY MILL (STEEL PRODUCTION UNIT) EXTENSION

MAUZA KARAMABAD, MAIN KLP ROAD, TEHSIL & DISTRICT RAHIM YAR KHAN PUNJAB, PAKISTAN

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)
(Revised Report)



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EXECUTIVE SUMMERY

Introduction:

Pakistan's steel production growth is the world's fastest, its relatively small steel production volume of 5 million tons ranks it 28th in the world. Pakistan Steel Mills is one of the enormous and gigantically expanded industrial complex in the country. Pakistan steel industry ramped up its output from 2.9 million tons in 2015 to 3.6 million tons in 2016. M/S Etihad Alloys Private Limited has proposed the new project regarding steel production by using scrap as a raw material. The project proponents have decided to add a rerolling unit adjacent to the existing steel mill already under construction. The following table presents salient features of the proposed extension project.

Salient Features of Project:

Sr. No.	Feature	Description
1)	Title of Project	Etihad Alloy Mill (Steel Production Unit) Extension
2)	Project Location	Mauza Karamabad, Main KLP Road, Tehsil & District Rahim Yar Khan, Punjab, Pakistan.
3)	Project Proponent	Mr. Zahid Jamil Official Address - 178 C&D, Upper Mall Scheme, Lahore. Phone - 042-35751865-6 Mobile - 0321-8242076 Fax - 042-3571867 Email - Zahid@tapl.com.pk
4)	Project Contact Person	Mr. Saqib Riaz Chief Financial Officer 178 - C&D, Upper Mall Scheme, Lahore 0321-9663896
5)	Project Categorization	The project envisages with the installation of Re-rolling Steel Mill. The project falls under the category B (17) of Schedule II of Punjab Environment Protection Agency's (Review of EIA & EIA) Regulations, 2022. Therefore, to fulfill the legal requirement of the section-12 of the Punjab Environmental Protection Act, 1997(amended 2012), the proponent is required to submit the EIA report in the Environment Protection Agency, Government of the Punjab, Lahore to obtain the required Environmental Approval (EA).

OFFICE OF ASSISTANT DIRECTOR
ENVIRONMENTAL PROTECTION AGENCY PUNJAB
GIRLS DEGREE COLLEGE ROAD, RAHIM YAR KHAN

To,
The Assistant Director (EIA),
EPA, Govt. of Punjab, Lahore.

Dated: 31/05/2021

No.11884/AD/EPA/RYK

Subject: **SITE INSPECTION/SITE SUITABILITY REPORT OF PROPOSED PROJECT "M/S ETIHAD ALLOYS (PVT.) LIMITED, (STEEL PRODUCTION), KARAMABAD, TEHSIL & DISTRICT RAHIM YAR KHAN**

Refer to the letter No. AD(EIA)EPA/F-128(EIA)/2021/1344, Dated; 19-04-2021 subject cited above.

The site inspection report of M/S Etihad Alloys (Pvt.) Ltd (Steel Production), Karamabad Tehsil & District Rahim Yar Khan is submitted and recommended after fulfills all legal formalities please.

31/5/21

Assistant Director
Environment Protection Agency
Rahim Yar Khan

CC

- Mr. Zahid Jameel S/O Muhammad Jameel R/O H.No. 4, Bawa Park, Upper Mall, Lahore

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Subject: **SITE INSPECTION/SITE SUITABILITY REPORT OF PROPOSED PROJECT "M/S ETIHAD ALLOYS (PVT.) LIMITED, (STEEL PRODUCTION), KARAMABAD, TEHSIL & DISTRICT RAHIM YAR KHAN**

A letter vide No. AD(EIA)EPA/F-128(EIA)/2021/1344, Dated; 19-04-2021 was received from the office of AD(EIA), EPA Lahore, regarding issuance of environmental approval U/S 12 for the subject project. The site visit was conducted by the undersigned along with Assistant Director Environment, Rahim Yar Khan on 25-05-2021. The detailed inspection report is as under:

1.	**Name of project**	**Etihad Alloys (Pvt.) Ltd (Steel Production), Karamabad Tehsil & District Rahim Yar Khan**
2.	**Address of project**	Karamabad Tehsil & District Rahim Yar Khan
3.	**Name & address of proponent**	Mr. Zahid Jameel S/O Muhammad Jameel. R/o H.No. 4, Bawa Park, Upper Mall, Lahore.
4.	**Nature of project**	Steel Mill. Category II C (2) of Schedule- II of IEE & EIA Regulations, 2000.
5.	**Date of site inspection**	25-05-2021
6.	**Total area of project**	33.5 Acre
7.	**Location of project with GPS coordinates**	28.56782 N, 70.32465 E Proposed site of project is located Karamaabad, Rahim Yar Khan.
8.	**Status of area**	The project is located in agricultural area.
9.	**Land used in surrounding of the project** **North, South: East, West**	East = Agriculture Land West = Etihad Sugar Mill of owner North = Etihad Sugar Mill of owner South = Agriculture Land
10.	**Project cost**	Capital cost of the project is 250 million as per EIA report.
11.	**Raw material**	Iron scrap
12.	**Product**	Steel billets
13.	**By-product**	N/A
14.	**Type of waste**	The solid waste will be generated during the work like slag, sludge, dusts, mill scale etc. This waste would be temporarily stored for its reuse in future.
15.	**Description of proposed project**	Proposed Project is the establishment of steel mill. Total capacity 240,000 tons per billets per annum.
16.	**Nearby emergency services i.e. Hospital, police Station, fire bridge, Rescue**	Sheikh Zayed Hospital, Police Station Iqbal Abad, Rescue-1122
17.	**Current status of project**	Currently the site is proposed.

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18.	**Assessed Environmental issues.**	**Wastewater:** No wastewater treatment plant will be installed as no significant amount of wastewater will be generated. The domestic wastewater generated will be treated in septic tanks and will be discharged into the nearby nullah. **Solid Waste:** The proposed steel plant would generate solid wastes like slag, sludge, dusts mill scale etc. this waste would be temporarily stored for its reuse in future.
19.	**Human settlement**	Project is located in agricultural area and there are no human settlements present in surroundings of proposed site.
20.	**Conclusion**	The site is suitable for the project under consideration subject to mitigation measures mentioned in the EIA Report.
21.	**Project recommendation**	1. The adverse environmental impacts can be reduced significantly by adopting best management and monitoring practices as well as by implementation EMMP with true spirit 2. Proper PPEs including aprons, rubber gloves and shoes should be provided to workers 3. No compromise on public health and environment should be allowed 4. Waste minimization practices should be introduced to workers by conducting lectures on spot to aware the workers about the long-term benefits of the same in lieu of surrounding environment 5. A proper tree plantation plan should also be developed in order to make the process environment friendly 6. Small domestic waste storage bins should be placed at different locations for proper collection and disposal of the solid waste 7. It is recommended that the Proponent should obtain an Environmental Approval (NOC) from the Punjab-EPA before proceeding further.

(Khalid Mehmood)
Inspector, EPA, R.Y.Khan

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OFFICE OF ASSISTANT DIRECTOR
ENVIRONMENTAL PROTECTION AGENCY PUNJAB
GIRLS DEGREE COLLEGE ROAD, RAHIM YAR KHAN

To,

The Assistant Director (EIA),
EPA, Govt. of Punjab, Lahore.

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Assistant Director
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may arise due to construction, can be grouped as follows:

(i) Atmospheric emissions and air quality, (ii) Noise generation, (iii) Water pollution and wastewater disposal, and (iv) Health and safety. However, the magnitude of these impacts shall be very low and insignificant.

Environmental Management and Monitoring Plan

Potential Impacts	Mitigation Measures
For Construction Phase	
1. Loss of Vegetation Cover/Biodiversity	
Construction activity will involve excavation and removal of top soil. This may also lead to clearing of land for construction purpose which ultimately would mean that the respective area will be cleared of any sort of flora/fauna.	The proposed site has been selected after careful consideration of the land use, presence of biodiversity and other environmental parameters. Currently, there are no trees on the said location rather it is a vacant plot devoid of flora and or fauna. But to ensure aesthetic value, the proponent will plant trees once the construction phase is complete.
2. Gaseous Emissions	
Gaseous emissions include SO_x, NO_x, CO_2, lead and CO during construction phase. These gases are ozone depleting agents. Besides, they also pose threat to human health.	EURO II quality fuel shall be used in the machinery and generator/s to avoid emission of lead. Vehicles and machineries with good conditions which fall on thequality standards shall be used to control the exhaust emissions. Stacks with scrubbers shall be provided to reduce emissions from the generator/s.

3. Dust Emissions	
Generation of dust and particulate matters is an issue that could arise due to construction activities.	The construction materials e.g. soil, clay would be covered appropriately. Instead of open and dry dumping, sprinkling of water in a quantity that reduces the chances of dust generation would be done. The workers would be provided safety gloves, masks and ear buds and wherever necessary goggles to avoid health complications.
4. Noise Generation	
Noise emissions due to transportation, movement of heavy materials, excavation, generators may create health nuisance for the workers and local community.	The working hours shall be limited to 08 in the morning till 05 in the evening to avoid noise during night shift. Vehicle maintenance would be ensuredso that emissions of any sort, be it gaseous emissions or noise generation, would be controlled. The workers will be provided with ear plugs and other personal safety equipment to avoid invoking of any health issues.
5. Solid Waste Generation	
Unplanned dumping of solid waste generation during construction phase can lead to blockage of roads, waterways and also create unaesthetic sight of the proposed location.	During construction phase, about 1-2% construction materials including concrete waste, wood, steel, packaging plastics, etc., could be dispersed. There shall not be any significant solid waste from proposed project processes and operations. Solid waste generation quantity during construction phase shall be reused in construction activities rather than dumping. The solid waste during construction phase will consist most of soil, packaging materials, iron rods and food leftovers. The organic

	portion of solid waste shall be collected by sanitary workers of that area.
6. Wastewater Generation	
Unplanned wastewater disposal may contaminate the surface water channels, surface soil and depending upon the quantity of wastewater generated, it has a potential to contaminate the ground water aquifers.	Wastewater generation during construction phase shall be reused again for material making for construction phase and sprinkling of dust on soil. A Septic tank unit shall be constructed for onsite sewage treatment prior to discharge into nearby Nala.
7. Accidental Spills	
Accidental spills of oil, fuel and lubricants can cause surface water contamination and surface soil contamination. It may also lead to fire hazards depending upon the quantity and nature of spills.	Accidental spills shall be avoided by providing spill kits at different places and also ensuring the safe transportation of different raw material that may be in liquid state.
8.Equipment Breakdown/Accidents	
Accidents and/or emergency breakdown of the equipment/machineries/vehicles involved may create environmental, health and safety hazards.	This situation can be avoided by regular maintenance of the vehicles for quality assurance. Besides, equipment will be checked prior to operation to avoid accidents and human health danger due to such accidents.
9. Soil Erosion	
Loss of vegetation cover and trees may lead to soil erosion hence resulting in dust emission and loss of fertile land cover.	The construction activities shall be planned in a way that reduces the chances of vegetation cover loss and itsconsequent soil erosion issues. Soil erosions are due to wind and water. The proposed project is planned for construction during the coming months after Environmental Approval, which are dry and sunny. Hence, the probability of soil erosion due to natural factor will be negligible to none.

10. Social Impacts	
Problems regarding privacy of local community may arise due to invasion of construction workers.	Improper social behaviors e.g., staring and teasing shall be discouraged and any such incident will be reported to the site in-charge, proponents directly. Workers will be hired from the local community to avoid social issues.
11. Training and Awareness	
Unskilled workers may create issues in attaining the overall health environment and safety policy.	Regular onsite and offsite training of the workers shall be conducted. Impromptu meetings and discussions with the site in-charge and daily wages workers will be done to resolve any issues that may create health safety and environmental problems during construction phase.
For Operation Phase	
1. Solid Waste Management	
Improper and unplanned solid waste dumping can cause environment, health and safety issues. It also can potentially deteriorate the living quality of the residents besides reducing the aestheticquality of the steel mill.	Only 0.2-0.3% i.e. 4000 Kg/day industrial waste shall be produced during operation phase including slag, sludge, dusts, mill scale, etc. The scrap from workshop and wear and tear of equipment shall be 4-5 Kg per day. As far as domestic waste is concerned, about 25 Kg/day of domestic waste in the shape of kitchen waste and 2 Kg/day of institutional waste in the form of paper waste shall be produced. At the site, only solid waste will be domestic like paper, polythene

	bags, etc. which will be collected by sanitary workers of that area.
2. Wastewater Disposal	
Wastewater generated due to domestic/commercial activities will result in the spread of vector borne diseases like dengue, malaria, as well as spread the nuisance of foul smell.	To tackle wastewater, wastewater treatment plant/ septic tank will be constructed. The wastewater will be of domestic nature and of cleaning type, etc.
3. Energy Conservation	
Excessive use of energy will exert more pressure on the already dwindling energy resources of the city/country.	The workers/employees will be encouraged to follow energy conservation strategies developed during operational phase. Machineries and equipment will be kept in good maintained shape to avoid extra fuel consumption. As the power source shall be inhouse through self-generation, therefore, no pressure shall be exerted on existing national grid.
4. Noise Generation	
Noise emissions due to traffic and any activities will create issues to the residents.	There will be no such activity that may create excessive noise. There will be small machinery that creates less noise (within the standards) during working hours.
5. Emergency/Fire Hazards	
Emergencies e.g. fire incidents may lead to environmental, health and safety issues to the local residents.	Emergency exits have already been planned. Firefighting equipment will be provided and adequate trainings will be provided to tackle any situation of fire hazards. Call points at suitable locations will be installed. Moreover, there is not any

	residential settlement or village near the project site which could be harmed from such hazard.
6. Training of Staff	
Unskilled personnel will not be able to tackle environmental, health and safety related situations which may further aggravate any such issues and cause loss of human life and property.	Regular training of the staff will be conducted. Proper monitoring and reporting mechanism will be developed where the team will be responsible to communicate/report any illegal or hazardous situation to the team leader.
6. Groundwater Consumption	
The groundwater will be used for domestic purpose at said project. Water storage will also be required for emergency response in case of a fire. Prolonged water consumption may in the long run lower/deplete the underground water table. This will be a permanent and moderate negative impact.	An effective 'Water Conservation Plan' will be developed and for domestic purpose water will be gained from ground water. Following operational measures will be adopted for water conservation: • It will be made sure that all faucets, circulating pumps, etc. do not leak and are in good repair; • Any leaking or dripping faucet, pump or toilet will be reported immediately; • All the utility bills will be kept in a safe place to track the consumption of water; and purchase and use of water-saving equipment will be practiced; • An effective residents' training program will be implemented about water conservation

To oversee the environmental performance of the project through its lifecycle enforcing the PEQS, an Environmental Monitoring Program should be formulated which ensures effective surveillance of the environmental parameters at various stages of the project development and compliances with PEQS and legal obligations.

Environmental Management Plan and Proposed Monitoring:

Environmental impact of a project is worked out using various factors and parameters, so that an Environmental Management Plan can be evolved to take mitigation measures, wherever these might be considered necessary in order of appropriateness of elimination, reduction and compensation as the goals. The development of the EMP is to make some person responsible for implementing the mitigation measures as identified so that smooth implementation of the mitigation measures can be assured. Monitoring plans have also been included to ensure the compliance of the EMP by contractors and other responsible authorities.

Monitoring at the proposed site should be conducted for:

- Air Environment (Meteorology, Ambient Air Quality, Noise Levels, Emissions, Traffic Pattern, etc.)
- Water Environment (Quality, and Quantity of all potential water/water sources)
- Ecological Environment (Terrestrial and Aquatic Flora & Fauna)
- Socio-Economic Environment (Demographic profile, Occupational Structure, Educational Status, Literacy Status, etc.)

Conclusion and Recommendations:

The Environmental Impact Assessment contains description of the project, description of the environmental baseline, potential environmental impacts and suggested mitigation measures. An implementation mechanism for mitigation measures in the form of an Environmental Management Plan is included in the study. While the objectives of this study have been to describe the project and its environmental impact, it also identifies adverse environmental factors associated with the project. Appropriate mitigation measures as explained in the environmental study should reduce, if not eliminate, these impacts so that these are within acceptable limits. It is further concluded that all potential environmental concerns associated with the project have been adequately addressed, and no further study is required in this context.

Based on the study conducted for Environmental Impact Assessment (EIA) of the project, the following recommendations are made:

- Plantation as far as permissible and within the scope of the project be carried out.
- Sustainable development approach through conservation of natural environment be followed.

- Environmental aspects of the project should be well taken care through implementation of the Environmental Management Plan as recommended in this report.
- The project management may adopt "cleaner and greener environment" as its motto and this will make the project more environment friendly.

On the basis of the findings of EIA, it is recommended that the project will not pose any adverse impact on the local population and the environment. Therefore, it is recommended that the competent authority may please issue Environmental Approval for the construction and operation of this project.

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Glossary

- Ambient: relating to the immediate surroundings of something
- Baseline: conditions prevailing at the time of study or before initiation of any project
- Discharge: spilling, leaking, pumping, depositing, seeping, releasing, flowing out, pouring, emitting, emptying or dumping, etc.
- Effluent: any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapor
- Environment: air, water and land; all layers of the atmosphere; all organic and inorganic matter and living organisms; the ecosystem and ecological relationships; buildings, structures, roads, facilities and works; all social and economic conditions affecting community life; and the inter-relationships between any of the factors mentioned
- Environment budget: monitory assets reserved for environmental activity
- Environmental Impact Assessment: an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, migratory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed
- Fauna: animal life occurring in particular region or time
- Flora: plant life occurring in particular region or time
- Initial Environmental Examination: a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an environmental effect for requiring preparation of an environmental impact assessment
- National Environmental Quality Standards: the permissible standards for emission of air pollutants and noise and for discharge of effluents and waste
- Nuisance: a person, thing or circumstances causing inconvenience or annoyance.
- pH: negative log of hydrogen concentration:
- Proponent: the person who intends to carry-out a proposed project.

- Sustainability: such developments that meet the needs of the presentgeneration without compromising the ability of future generations to meet their needs
- Waste: any material, substance, or by-product eliminated or discarded as no longeruseful or required after the completion of a process

List of Abbreviations

BOD	Biochemical Oxygen Demand
C&I P	Commerce and Investment
COD	Chemical Oxygen Demand
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMP	Environmental Mitigation & Monitoring Plan
EPA	Environmental Protection Agency
EPD	Environmental Protection Department
EPO	Environmental Protection Ordinance
GOP	Government of Pakistan
GOP	
HSE	Health, Safety & Environment
HC	Horticulture Committee
IEE	Initial Environmental Examination
Kmp/h	Kilo Meter Per Hour
Km	Kilo Meter
NEQS	National Environmental Quality Standards
NOC	No Objection Certificate
NWFP	North West Frontier Province
OSHA	Occupation Health and Safety
PEPA -97	Pakistan Environmental Protection Act, 1997
PCGIP	Punjab Cities of Governance ImprovementProject
PM	Particulate Matters

PEPO-83	Pakistan Environmental Protection Ordinance, 1983
TDS	Total Dissolved Solids
TMA	Tehsil Municipal Administration
UC	Union Council
WAPDA	Water and Power Development Authority
WHO	World Health Organization
CO_2	Carbon dioxide
°C	Degree Celsius
M/s	Messer

CHAPTER-1
INTRODUCTION

1.1 Background

Pakistan's steel production growth is the world's fastest, its relatively small steel production volume of 5 million tons ranks it 28th in the world. Pakistan Steel Mills is one of the enormous and gigantically expanded industrial complex in the country. Pakistan steel industry ramped up its output from 2.9 million tons in 2015 to 3.6 million tons in 2016. M/S Etihad Alloys Private Limited has proposed the new project regarding steel production by using scrap as a raw material. The project proponents have decided to add a rerolling unit adjacent to the existing steel mill already under construction.

i) Project Title

Etihad Alloy Mill (Steel Production Unit) Extension

ii) Project Location

Mauza Karamabad, Main KLP Road, Tehsil & District Rahim Yar Khan, Punjab, Pakistan

1.2 Purpose of the Report

Environmental Impact Assessment (EIA) report is being submitted to the Environmental Protection Agency (EPA), Government of the Punjab, Lahore with the legal requirements for Punjab Environmental Protection Act-1997 (amended 2012), Section-12 for obtaining the Environmental Approval (EA) before starting the construction activity at the proposed project site. The other relevant regulations and guidelines considered while preparing this EIA report includes i

- Policy and procedures for filling, review and approval of environmental approvals
- Guidelines for the preparation and review of environmental reports
- Guidelines for public participation
- Guidelines for sensitive and critical areas

Different environmental aspects like social, physical, biological, etc. and other related features of the project are highlighted in this EIA report. Measures necessary to be adopted to mitigate any impacts on any part of

the environment around are also described. All other important information is also provided as described under the format used to help decision makers, EPA Punjab in the present case, before issuing the desired Environmental Approval.

1.3 Details of the Proponent

i) Chief Executive Officer

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Phone - 042-35751865-6
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ii) Contact Person

Mr. Saqib Riaz
Designation – Chief Financial Officer
Official Address- 178 - C&D, Upper Mall Scheme, Lahore
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1.4 Details of Environmental Consultant

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Suite No.4,2nd Floor ,Link Arcade Model Town Link Road Lahore
Phone: +92 300-8417566 Fax: +92 42 3585-5508
Email:ectech_ectech@yahoo.com

The following table presents a list of team members at senior level:

Table 1.1: List of Team Members

Name	Qualification	Experience (Years)	Areas of Expertise	Position in EIA Team
1. Muhammad Anees	L.L.B	30	Legal & Sociology	Project Manager/Sociologist
2. Muhammad Azeem	M.Sc. Chemistry	19	-IEE/EIA/ESIA/EMP -Audits -Sampling, Analysis & Monitoring, -Environmental Modeling -Public Consultations -Ecology	Chief Environmentalist
3. Tahir ul Amin	BS Computational Physics	7	-Environmental Monitoring -IEE/EIA/ESIA/EMP	Senior Environmentalist
4. Saad Malik	BS Chemistry	5>	Environmental Monitoring	Monitoring Engineer

1.5 Brief Description of Nature, Size, and Location of the Project

M/s Etihad Alloys Private Limited has proposed a project of re-rolling steel mill as extension in their existing steel mill unit under construction at Karamabad, Rahim Yar Khan. The project comprises an area of 9 acres and capacity about 500,000 tons per annum initially which will be extended to 10,00,000 tons/annum later on. Steel bars including fabrication and related steel works would be the end product of the process by using billets. The land selected for the construction and installation of the machinery is most feasible.

Total cost of the project is PKR 6036 Million. Around 4-5 MW electricity will be used as source of energy, directed from Etihad power plant. While water usage during the operational phase will be around 20 gallons per capita per day. The ground water will be used through electric motors. There shall be no process wastewater to be discharged during construction or operation phase. However, effluents from equipment cooling and equipment and floor washing shall be recycled and used onsite

for plantation, etc. any minor effluents shall be directed if so necessary to the proposed combined effluent treatment plant to be constructed for existing alloy unit already under construction and proposed adjacent Etihad power generation plant. The drawing of said wastewater treatment plant is attached as **annexure-III.** Similarly, septic tanks will be installed to treat the sewage generated during construction and operation phases before domestically disposing of in nearby nullah.

Special mitigatory measures would be adopted for solid waste disposal. Solid waste may include waste/unused construction materials, which should be disposed of properly. Solid waste produced will be collected by vehicles to dispose of at a particular site from where it will be reused. Waste segregation units will be provided at site. Recyclable items will be provided to recycling contractor.

1.6 Objectives of the Report

Objectives to conduct EIA are as follows:

- A legal binding in accordance to Punjab Environmental Protection Act, 1997.
- To identify the potential environmental issues pertaining to the proposed site.
- To evaluate the ability of the site in view of social acceptance and Environmental soundness.
- To provide the maximum information to the proponent and other stakeholders about the existing environmental conditions and the implications of the proposed project.
- Collection of available data, reports, drawings and other relevant information about area of proposed project.
- Review of applicable existing environmental legislation and Punjab Environmental Quality Standards (PEQS).
- Propose mitigation measures to eliminate or to reduce the negative impact to an acceptable level.
- Development of well-resourced environmental management and monitoring plans to identify mitigation strategies targeted towards avoidance, minimization and rehabilitation of the impacts.

1.7 The Report Structure

This EIA document is structured as follow:

Chapter-1 Introduction: Containing general information about the project and process of carrying out the study.

Chapter-2 Environmental Policy, Legal and Administrative Framework: Describes the policies, laws and regulations governing this EIA.

Chapter-3 The Project Description: Describes an overall detail of the works to bedone.

Chapter-4 The Description of the Environment: Gives information on Physical, biological and social conditions collected through survey of the Project area.

Chapter-5 Environmental Impacts Due to Project & Mitigation Measures: Identifies various environmental impacts and their preventive actions.

Chapter-6 Environmental Management Plan (EMP): Contains comprehensive prescriptions regarding environmental impacts and their mitigation measures.

Chapter-7 Stakeholders Consultations: Explains the process of public consultation and disclosure of the project to related stakeholders.

Chapter-8 Conclusions and Recommendations: Concludes the EIA report with some practical recommendations.

CHAPTER-2
POLICY, LEGAL AND A DMINISTRATIVE FRAMEWORK

2.1 Introduction

This section provides an overview of the policy framework and legislation that applies to the proposed project. This project is expected to comply with all the legislation related to environment in Pakistan, and to obtain all the regulatory clearances required. After the approval of 18th amendment, powers have been delegated to the provincial Environmental Protection Agencies/Departments (EPAs/EPDs.)

2.2 Institutional Setup

2.2.1Punjab Environmental Protection Council

The Punjab Environment Protection Council (PEPC) is the apex decision- making body of the province. It has been developed under the provision of PEPA 1997 (amended). It is headed by Chief Minister of Punjab.

2.2.2 Environmental Protection Agency, Punjab

The Punjab Environmental Protection Agency has been established under the provisions of the Punjab Environmental Protection Act, 1997 headed by the Director General. It has been given jurisdiction for review, approval and monitoring of environmental assessment projects. As regards the proposed projects, the EPA Punjab will be responsible for review of the EIA Report, issuing a `No objection Certificate (NOC) and an overall/broad based monitoring of the proposed project during execution and operational activities to ensure compliance with the Environmental Management Plan (EMP).

2.3 Relevant Legal and Policy Framework

The applicable laws for the environmental study of the proposed project are briefly given below. The proponent of the proposed project will abide by the applicable laws and regulations. A number of laws have been promulgated by the Government of the Pakistan (GOP) to deal with the environmental and social aspects related to the implementation of various development projects in the country. In 1983, the GOP issued an Environmental Protection Ordinance (EPO) that has now been repealed by the

PEPA, 1997, through an Act of Parliament. Under the Act, it is mandatory to carry out an IEE/EIA for all development projects.

The Pak EPA has also framed guidelines for preparation of EIA of projects in various developmental sectors, According to PEPA 1997; the National Environmental Quality Standards (NEQS) were established for discharge of effluents and emission of gasses from various Municipal and Industrial sources. The latest revision of NEQS as PEQS was carried out in year 2016. Provincial Environment Protection Departments are also working on the formulation and enforcement of environmental statutes and by- laws. The GOP has issued several policies, guidelines and adopted measures for streamlining the environmental assessment including the transportation sector. Though, the need for environmental screening and assessment has received some weightage during the recent past, strict implementation of the PEQS is still a dream to be realized. The applicable laws for the environmental study of the Proposed Project are briefly described below:

2.3.1 Pakistan Environmental Protection Ordinance (PEPO), 1983

In 1983, the Government of Pakistan issued Environmental Protection Ordinance (PEPO). It was the first legislation promulgated for the protection of environment. The promulgation of this ordinance was followed, in 1984 by the establishment of the Pakistan Environment Protection Agency, the primary government institution dealing with the environmental issues.

2.3.2 National Conservation Strategy (NCS), 1992

The Pakistan National Conservation Strategy (NCS) is the principal policy document for environment issues in the country that was approved by the federal cabinet in March, 1992. The NCS works on a ten-year planning and implementation cycle. It deals with fourteen (14) core areas, which are stated hereunder:

1) Maintaining soils in crop land;
2) Increasing irrigation efficiency;
3) Protecting water sheds;
4) Supporting forestry and plantations;
5) Restoring rangelands and improving livestock;
6) Protecting water bodies and sustaining fisheries;
7) Conserving biodiversity;

8) Increasing energy efficiency;
9) Developing and deploying material and energy renewable;
10) Preventing / abating pollution;
11) Managing urban wastes;
12) Supporting institutions for common resources;
13) Integrating population and environmental programs;
14) Preserving the cultural heritage

Based on the NCS, policies are being framed for institutional strengthening and human resource development for environmental protection, especially at the local and provincial level.

The NCS is a policy document that deals with the core environmental issues in Pakistan at macro level and recommends an action plan to address these issues. Project specified mitigation prescriptions cannot be expected in NCS document, however, the principles of environment protection, conservation and management provided in the NCS document have to be used as guidelines during the planning and execution of projects.

As a signatory to the Convention on Biological Diversity in 1992, it was also felt necessary for Pakistan to develop a national strategy for the conservation of biodiversity. Accordingly, the Government of Pakistan constituted a Biodiversity Working Group, under the auspices of the Ministry of Environment, to develop a Biodiversity Action Plan (BAP) for the country, which was completed after an extensive consultative process. The plan, which has been designed to complement the NCS and the proposed provincial conservation strategies, identifies the causes of biodiversity loss in Pakistan and suggests a series of proposals for action to conserve biodiversity in the country. PEPC has approved the action plan and steering committees at federal and provincial levels have been formed to implement it.

BAP recognizes that at project level Environmental Impact Assessment (EIA) is used as a tool to identify environmental impacts of a proposed project and to plan for reducing adverse impacts. BAP further stipulates that an EIA should be initiated to attain early stage in project development cycle and that public participation in review of potential effects is important.

2.3.3 Punjab Environmental Protection Act, 1997 (Amended 2012)

A comprehensive legislation was evolved over-time to prepare and implement national environmental policies. It is entitled as "the Punjab Environmental Protection Act, 1997 (Amended 2012)". The PEPA

1997 was enacted repealing PEPO 1983. The PEPA 1997 provides the framework for implementation of National Conservation Strategy, protection and conservation of species, wildlife habitats and biodiversity, conservation of renewable resources, establishment of Environmental Tribunals, appointment of Environmental Magistrates, Initial Environmental Examinations (IEE), Environmental Impact Assessment (EIA) and promotion of public education and awareness of environmental issues through mass media.

The Punjab Environmental Protection Act (PEPA), 1997 (Amended 2012) is the basic legislative tool empowering the Government of Punjab to frame regulations for the protection of the environment. The Act is applicable to a broad range of issues and extends to air, water, soil, marine and noise pollution, as well as to the handling of hazardous wastes. Penalties have been prescribed for those contravening the provisions of the Act.

Some portions from the Act are reproduced below for reference purposes.

Section 11(1) states that "Subject to the provisions of this Act and the rules and regulations made there under, no person shall discharge or emit, or allow the discharge or emission of, any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the "Punjab Environmental Quality Standards". The Punjab Environmental Protection Agency, the body mainly responsible for enforcing the PEPA, 1997 amended (2012), has published Punjab Environmental Quality Standards (PEQS) time and again.

Section 12(1) requires that "No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency an Environmental Impact Assessment (EIA) or, where the project is likely to cause an adverse environmental effect, an Environmental Impact Assessment (EIA), and has obtained from the provincial agency approval in respect thereof".

2.3.4 Punjab Environmental Quality Standards (PEQS), 2016

In order to control the Environmental Pollution, the Government of Punjab has laid down Punjab Environmental Quality Standards (PEQS), 2016 for municipal and industrial liquid effluents, industrial gaseous emissions, motor vehicle exhaust and noise. The PEQS were first promulgated in 1993 and have been amended in 1995, 2000 and 2016. The standards specify the following:

- Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters and the sewage treatment facilities

- Maximum allowable concentration of pollutants (33 parameters) in drinking water
- Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources
- Maximum allowable concentration of pollutants (6 parameters) in gaseous emissions from vehicle exhausts and noise emission from vehicles
- Maximum allowable concentration of pollutants (9 parameters) in ambient air
- Maximum allowable concentration of ambient noise

2.3.5 National Environmental Policy, 2005

Govt. of Pakistan has notified National Environmental Policy, 2005 for different projects/aspects in which guidelines/priorities have been given to undertake/commence the projects having significant environmental impacts. The National Environmental Policy (2005) provides a framework for addressing the environmental issues (particularly pollution of fresh water bodies and coastal waters, air pollution, lack of proper waste management. deforestation, loss of bio diversity, desertification, etc.) confronting Pakistan. It recognizes the goals and objectives of the Pakistan National Conservation Strategy (PNCS. 1992), National Environmental Action Plans, and other existing environment related national policies, strategies, and action plans.

It also provides broad guidelines to the federal government, provincial governments, formally federally/provincially administrated territories and local governments to address their environmental concerns and to ensure effective management of their environmental resources.

2.3.6 Review of EIA/EIA Regulations, 2022

The Govt. of Pakistan has issued Review of the Environmental Impact Assessment (EIA) and Initial Environmental Examination Regulations 2022, to review the Initial Environmental Examination (IEE) / Environment Impact Assessment (EIA) reports. Categorization of the projects for EIA and EIA is one of the main components of the Regulations. Projects have been classified on the basis of expected degree of adverse environmental impacts.

Salient features of the regulations are listed below:

- Categories of projects requiring IEE and EIA are issued through two schedules attached with the regulations.

- A fee depending upon the category of the project has been imposed for the review of IEE and EIA projects.
- The submittal is to be accompanied by an application in prescribed format included as Schedule IV of the Regulation.
- The EPA is required to issue conformation of compliance within 15 days ofreceipt of request and complete documentation.
- The IEE/ EIA approval will be valid for three years from date of accord.

2.3.7 Guidelines for the Preparation and Review of Environmental Reports

The Govt. of Pakistan has also framed guidelines for the preparation of environmental reports of projects in various developmental sectors.

2.3.8 Punjab Local Government Act (amended), 2022

Schedules 4 and 8 of the Act contain provisions pertaining to environmental pollution. Notwithstanding any specific provisions, every local government may perform functions conferred by or under the Punjab Local Government Act, 2022 and in performance of such functions may exercise such powers, which are necessary and appropriate. Under the ordinance, the local councils are authorized to restrict projects causing pollution to air, water or land. They may also initiate schemes for improving the environment.

2.3.9 Pakistan Penal Code, 1860

It defines the penalties for violations concerning pollution of air, water bodies and land. Sections 272 and 273 of this Act deals with the adulteration of food or drink. Noise pollution has been covered in section 268, which defines and recognizes noise as a public nuisance. "A person is guilty of a public nuisance who does any act or is guilty of an illegal omission which causes any common injury, danger of annoyance to the public or the people in general, who dwell or occupy property in the vicinity,or which must necessarily cause injury, obstruction, danger or annoyance to persons who may have occasion to use any public right".

2.3.10 The Land Acquisition Act, 1894

The land Acquisition Act (1894) deals with the acquisition of private properties for public purposes. There are 55 sections in this Act mainly dealing with area notification, surveys, acquisition, compensation, apportionment awards, disputes resolution, penalties and exemptions.
Although quite old, this Act laid out the legal basis for any property affected by a project and for compensating the affected owners of the land.

2.3.11 Antiquities Act, 1975

The Antiquities Act, 1975, protects the country's national and cultural heritage. The said Act defines 'antiquities' as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The said Act was formulated to protect such antiquities from destruction, theft, negligence, unlawful excavation, trade and export. The said Act retrains any proponents from undertaking any activity within sixty-one meters or two hundred feet of a protected . There is no such site close to the proposed project and thus no provisions of the said Act are attracted to project activities.

2.3.12 Punjab Wildlife (Protection, Preservation, Conservation and Management) Act, 1974

This Act was enacted in 1974 and is amended time and again for regulation of activities relating to protection, conservation and management of wildlife in the province. Enabling rules were notified in the same year to enforce the Act.

2.3.13 Punjab Plantation and Maintenance of Trees Act, 1974

The provincial government enacted this law in 1974 to regulate tree plantation and enforce measures for protection of tree plantations in the province.

2.3.14 Cutting of Trees (Prohibition) Act, 1975

This Act prohibits cutting or chopping of trees without permission of the Forest Department. The Act presents fine or imprisonment or both, for illegal cutting of trees but has not mentioned any

compensatory afforestation. However, it's a common practice to plant 7-10 trees for compensation of 1 tree to be rooted up.

2.3.15 Protection of Trees and Brushwood Act, 1949

The protection of trees and brushwood Act, 1949 prohibits cutting or chopping of trees and brushwood without prior permission from the relevant government agency.

2.3.16 The Factories Act, 1934

The clauses relevant to the project are those that concern the health, safety and welfare of workers, disposal of solid waste and effluent and damage to private and public property. The factories Act also provides regulations for handling and disposal of toxic and hazardous materials. Given that construction activity is classified as 'industry', these regulations will be applicable to the project contractors.

2.3.17 Labour Laws

Construction and operational activities during the course of construction may affect occupational health of workers. Employers are required to abide by labor laws in respect of their own employees and to ensure that contractors also follow the relevant labor laws and rules relating to safety of workforce and creating a healthy work environment. The proponents shall ensure that the labor force engaged at the project site is not exposed to any danger by monitoring the contractor's work frequently.

2.3.18 Punjab Special Premises (Preservation) Ordinance, 1985

The Government of the Punjab enforced this ordinance in 1985 to ensure that special premises, such as buildings, monuments, and shrines of national, religious or socio- cultural significance are not threatened by any activity. There are no such special premises close to the project site.

CHAPTER 3
DESCRIPTION OF THE PROJECT

3.1 General

This section deals with project components. It describes the category of the project, cost & magnitude of the project, operation equipment, etc. The information presented in this section is based on project site survey.

3.2 Type and Category

The project envisages with the installation of Re-rolling Steel Mill. The project falls under the category B (17) of Schedule II of Punjab Environment Protection Agency's (Review of IEE & EIA) Regulations, 2022. Therefore, to fulfill the legal requirement of the section-12 of the Punjab Environmental Protection Act, 1997(amended 2012), the proponent is required to submit an EIA report in the Environment Protection Agency, Government of the Punjab, Lahore to obtain the required Environmental Approval (EA).

3.3 Objectives of the Project

The overall objective of this EIA is to carry out a detailed environmental assessment of the project area, to assess impacts caused by the different activities of the proposed proect and to address measures to mitigate adverse environmental impacts arising from the execution of the proposed project.

The specific objectives of the EIA Study are as follows:

- To determine pre-project state of affairs and to assess post-project conditions if they have changed for better or worse
- Documentation of all the resources likely to be affected due to the implementation of the proposed project
- To provide maximum information to the proponent and other stakeholders about the existing environmental conditions and the implications of the proposed project
- Allow the Planners to minimize potential impacts of the proposed project on different environmental conditions such as physical environment, biological environment and socio-economic environment
- To facilitate decision makers to take informed decisions.

3.4 Alternatives Considered and Reasons for their Rejection

The installation of re-rolling steel mill has commercial values. To fulfill the commercial aspects of the project under reference of this EIA report, it has to be sited at the place having commercial processing activities. It shall also meet the legal requirement of the Punjab Environment Protection Act, 1997(amendment 2012). Availability of the unit at the best convenient place is equally important among other considerations for the site selection. Availability of the access roads, communication facilities, electricity, basic infrastructure, etc. is yet the other necessary requirement.

Keeping these requirements and their feasibility, other basic infrastructural requirements are also available at the selected site. Project will also facilitate the people of the area with increasing the opportunity of employment and other related facilities. As the proposed steel mill extension unit will operate on power produced by proposed Etihad Power Plant that is inturn going to be established to utilize bagasse as fuel from adjacent Etihad Sugar Mills, therefore, following alternative site or project or process was considered as alternative for this purposeful project.

3.4.1. No Project Alternative

No project option mean that the project is necessary and there is no other option. "M/s Etihad Alloys Private Limited has proposed a project of re-rolling steel mill as extension in their existing steel mill unit under construction at Karamabad, Rahim Yar Khan. As the project site is already owned by the proponent so there is no other option for the project.

3.4.2. Technology Alternative

Conventional Rolling Mill Technology

Description: One alternative is to use conventional rolling mill technology for the alloy mill project. This involves the use of traditional rolling processes and equipment commonly employed in the metal industry.

Reasons for Rejection:

1. Outdated Technology: Conventional rolling mills may be considered outdated compared to more advanced technologies available today. They might lack the efficiency, precision, and automation features provided by modern alternatives.

2. Higher Operational Costs: Conventional rolling mills may have higher operational costs due to increased manual labor requirements and lower energy efficiency compared to newer technologies.

3. Environmental Impact: Older technologies might have a higher environmental impact due to higher energy consumption and potential waste generation. This could pose challenges in meeting modern environmental regulations and sustainability goals.

Continuous Casting Technology

Description: Another alternative is to implement continuous casting technology for the alloy mill project. Continuous casting involves the continuous solidification of molten metal into semi-finished products.

Reasons for Rejection:

1. Initial Capital Investment: Continuous casting technology often requires a significant upfront investment in specialized equipment. The high initial capital cost might be a deterrent, especially if there are budget constraints for the project.

2. Limited Product Range: Continuous casting may be more suitable for certain types of products, limiting the range of alloys that can be produced. If the project requires a diverse product portfolio, continuous casting may not be the most versatile option.

3. Technical Expertise: Implementing continuous casting technology requires specialized knowledge and expertise. If the project team lacks the required skills or if there's a shortage of skilled professionals in the region, it could be a barrier to choosing this alternative.

3.4.3. Site Alternative

Site alternative was not considered as the Project of M/s Etihad Alloys Private Limited has proposed a project of re-rolling steel mill as extension in their existing steel mill unit under construction at Karamabad, Rahim Yar Khan is already owned by the proponent.

3.4.4. Electricity Alternatives

Total electricity required for operation is 4-5 MW. The source of electricity shall be self-generation thermal power plant. As the proposed steel mill extension unit will operate on power produced by proposed Etihad Power Plant that is in turn going to be established to utilize bagasse as fuel from adjacent Etihad Sugar Mills.

3.4.5. Water Alternatives

Water is necessary to carry out daily routine work and some water is also necessary during development and operation. For this purpose, around 20 gallons per capita per day water will be required

3.5 Location of the Project

The proposed site for Etihad Alloy Mill (Steel Production Unit) Extension is situated at Mauza Karamabad, Tehsil & District Rahim Yar Khan. The coordinates of the proposed site are 28°34'5.77"N 70°19'21.37"E. A copy of the Aks-e-Shajra is attached as Annexure-I.

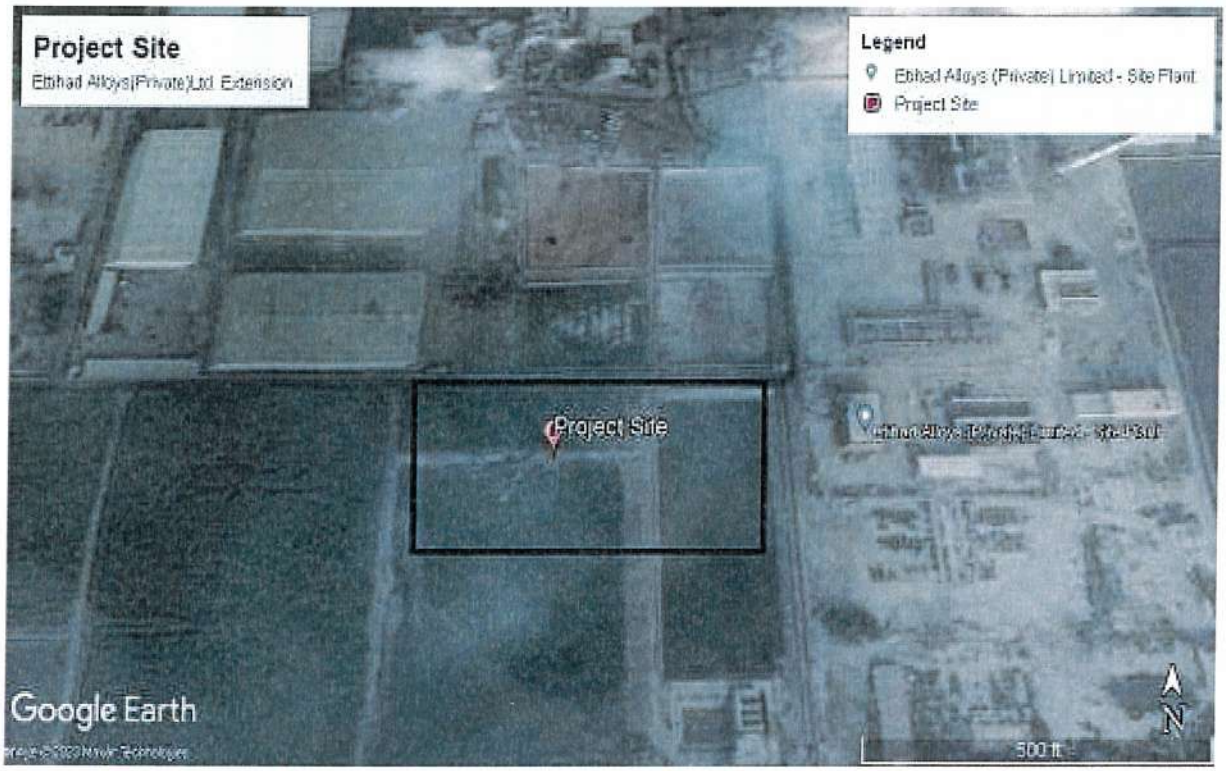


Figure 3.1: Google Earth Map Showing Project Location

3.6 Land use

The prosed land or the construction of steel mills extension is currently empty. Topographical map of the project site attached as Annexure-II

3.7 Vegetation Features of the Site

Currently, there is no vegetation at proposed project site. Tree species found in the around the project site in nearby area include Shisham (Dalbergia sisoo), Alustonia,Neem (Azaddrachta Indica), Keekar (Acacia nilotica), Bottle palm and Rubber plant (Ficus elastica). Similarly, no fruit trees are found at the project site except those planted in nearby villages such as Mango (Mangifera indica anacardiaceae), Guava (Psidium guajava) and Jaman (Syzyziam jambulenum). The installation of

the machine unit will involve no cutting of trees as there is no such vegetation on the proposed land. Rather, trees will be planted by the proponent, in the vicinity of the project.

3.8 Cost and Magnitude of Operation

The proposed project namely Etihad Alloy Mill (Steel Production Unit) Extension shall be a steel mill meant for the production of steel bars using inhouse steel billets produced from proposed existing alloy mill portion that has already obtained approval from EPA, Punjab. The extended unit shall run by involving the processes & operations like i) Hot Rolling, ii) Cooling, iii) Cutting & iv) Inspection and Storage. The project's focus would be on customers from domestic market on preference. Total production capacity of the proposed project shall be 5,00,000 tons/anum. The project shall operate on 24 hour basis while its total cost shall be Rs. 6036 million.

3.9 Schedule of Implementation

Geotechnical investigations of the project site support for the construction of proposed extension or rerolling mills project (Annexure-III). No construction work has been initiated so far as the company is waiting for the Environmental Approval from the Department. After the approval, the project construction work would be carried out within 6-8 months.

Sr. #	Activities	2.5 Months			2.5 Months			2.5 Months			2.5 Months		
		4W	4W	2W	4W	4W	2W	4W	4W	2W	4W	4W	2W
1	Detailed Designing												
2	Mobilization of Contractors												
3	Lean Development Period												
4	Peak installation Period												
5	Plantation at Site												
6	Commissioning												
W=Weeks													

Table 3.1: Plant Construction Schedule

3.10 Description of the Project:

Following step by step procedure will led to the end product:

1. Hot Rolling
2. Cooling
3. Cutting
4. Inspection
5. Storage

Steel rolling consists of passing the material, termed as rolling stock, between two rolls driven at the same peripheral speed in opposite directions (i.e. one clockwise and the second anti-clockwise) and so spaced that the distance between them is somewhat lesser than the thickness of the section entering them. In these conditions, the rolls grip the material and deliver it reduced in thickness, increased in length and probably somewhat increased in width. This is one of the most widely used processes among all the metal working processes because of its higher productivity and lower operating cost. Rolling is able to produce a product which is having constant cross section throughout its length. Many shapes and sections are possible to roll by the steel rolling process.

Steel sections shall be rolled in several passes, whose number is determined by the ratio of initial input material and final cross section of finished product. The cross section area would be reduced in each pass and form and the size of the stock shall gradually approach to the desired profile.

Hot Rolling shall be carried out at elevated temperature above the re-crystallization temperature. During this phase, the coarse-grained, brittle, and porous structure of the continuously cast steel is broken down into a wrought structure having finer grain size and improved properties.

The proposed rerolling mill shall comprise of equipment for reheating, rolling and cooling. The primary objectives of the rolling stage are to reduce the cross section of the incoming stock and to produce the planned section profile, mechanical properties and microstructure of the product.

Major parameters in the three stages of mill processing shall be as follows.

Reheating – The input material i.e. billets shall be heated in the reheating furnace to the rolling temperature. The important parameters are heating rate, time of heating and temperature of reheating.

Rolling – The important parameters for rolling in the roughing, intermediate and finishing group of stands in the rolling mill shall be temperature, percentage of reduction in area, inter-pass time and strain rate.

Cooling – The major parameters after finish rolling during cooling of the rolled product shall start temperature, cooling rate and the final temperature.

When manufacturing long products, a series of rolling stands in tandem shall be used to obtain high production rates. The stands shall be grouped into roughing, intermediate and finishing stages. Since cross-sectional area is reduced progressively at each set of rolls, the stock moves at different speeds at each stage of the rolling mill.

The final dimensional quality of the rolled product shall be determined by the rolling stands within the finishing mill. The dimensional accuracy in the final product depends on many factors including the initial stock dimensions, roll pass sequence, temperature, microstructure, roll surface quality, roll and stand stiffness and the stock/roll friction condition.

With regards to the steel material, the development of the microstructure during rolling shall be complex and involves static and dynamic re-crystallization of Austenite. From a practical point of view, the austenite grain size distribution in the rolled product shall be of paramount importance in controlling mechanical properties. In the roughing and intermediate stages of the rolling mill, the stock is moving slowly between the stands, such that the material has a chance to 'normalize' itself as a result of recovery and re-crystallization. During the finishing rolling stage, the stock is traveling at a high speed between closely spaced stands and consequently, and does not have adequate time to normalize. This lack of normalization can have a significant effect on the final microstructure and mechanical properties of the rolled product.

Since the chemical composition is fixed for specific steel grades, the requirements for a particular product that can be controlled in the rolling mill shall consist of geometry, mechanical properties and microstructure. The product characteristics which shall be controlled are the geometric shape and tolerance. These are determined from the section profile of the finished product. Mechanical properties include yield and ultimate tensile strengths, % reduction in area (ductility) and hardness. Microstructure characteristics include grain size, grain distribution, phase composition and phase distribution.

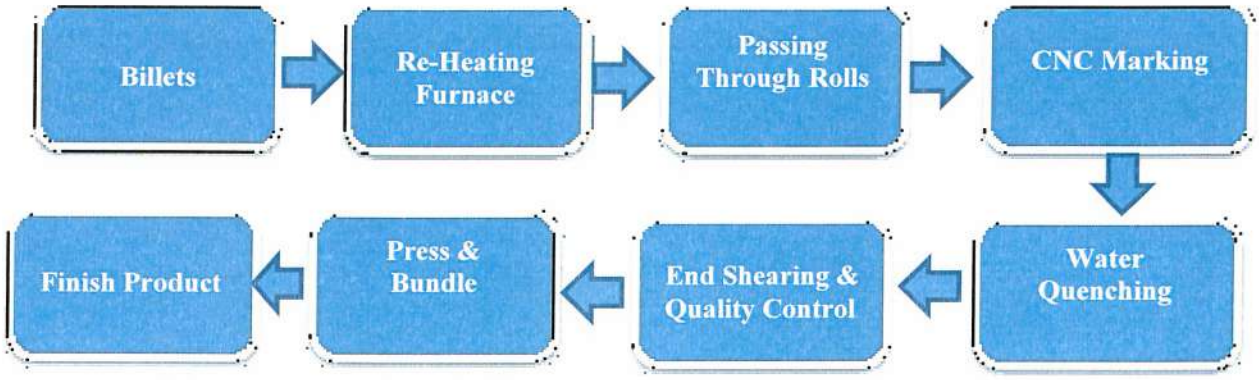


Figure 3.2: Process Flow Diagram

The Project layout plan is attached as Annexure-IV.

3.10.1 Raw Materials & Products

The raw material will be in the form of billets. Approximate yield will be 85% - 95% steel bars, etc. after known/unknown losses.

3.10.2 Energy Requirement

Total electricity required for operation is 4-5 MW. The source of electricity shall be self-generation thermal power plant.

3.10.3 Water Requirement

Water will be required around 20 gallons per capita per day.

3.10.4 Man Power Requirement

Around 90 workers will be employed during operation of the project.

3.10.5 Solid Waste

During construction phase, special mitigatory measures would be adopted for solid waste disposal. Solid waste may include waste/unused construction materials, which should be disposed of properly. Solid waste produced will be collected by vehicles to dispose of at a particular site from where it will be reused. Waste segregation units will be provided at site. Recyclable items will be provided to recycling contractor. Same measures shall be taken for such waste produced during operation phase too. Additionally, the proposed steel plant would generate solid wastes like slag, sludge, dusts, millscale, etc. This waste would be temporarily stored for its reuse in future.

3.10.6 Wastewater Treatment

There shall be no process wastewater to be discharged during construction or operation phase. However, effluents from equipment cooling and equipment and floor washing shall be recycled and

used onsite for plantation, etc. any minor effluents shall be directed if so necessary to the proposed combined effluent treatment plant to be constructed for existing alloy unit already under construction and proposed adjacent Etihad power generation plant. The drawing of said wastewater treatment plant is attached as annexure-III. Similarly, septic tanks will be installed to treat the sewage generated during construction and operation phases before domestically disposing of in nearby Nullah.

3.10.7 Septic Tank

Septic tanks are suitable for conditions where the wastewater can drain away and be absorbed into the soil without contaminating ground water where it is extracted. A septic tank takes raw sewage in, allows the solids to settle (sludge) and allows the remaining liquid to flow into the surrounding soil by means of a soak away. Scum on the surface is also prevented from leaving the tank. Microorganisms in the anaerobic environment in the tank digest the sludge and scum. The system consists of several stages, supply to the tank, the tank itself and the soak field. Septic tanks take sewage (grey water - washing and black water - sewage from latrines) but not rainwater. Sludge volume is reduced by microbial action but still needs periodic emptying. Retention time of septic tank will be 2 -3 days for this unit. Drawing of septic tank is shown below:

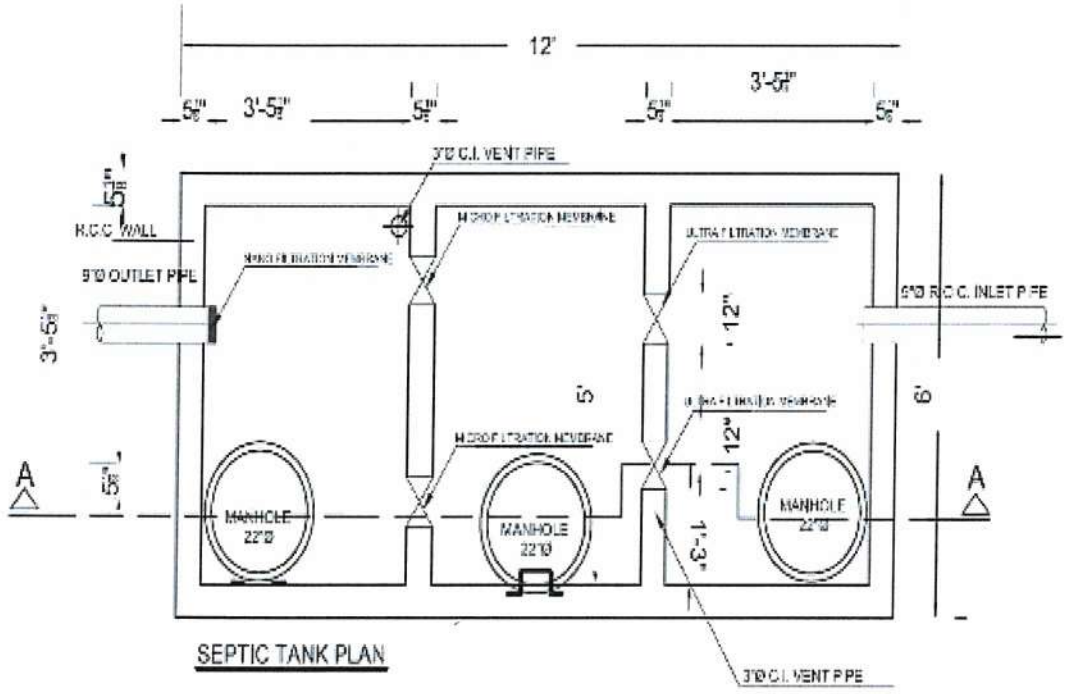


Figure 3.3: Septic Tank Drawing

3.11 Restoration and Rehabilitation Plans

There will be no any matter of rehabilitation as the proposed site is owned by the project proponent. However, at the end of the life of the project, it will be dully dismantled with special precautions to avoid/minimize pollution and at the same time taking all safety precautions to protect human life and property around the project tsite. Debris or any other wastes resulting from demolishing will be disposed of in environmentally sustainable fashion. The material capable of recycling/reuse will be either sold in the market or be re-used for other suitable purposes. While dismantling, all government rules and regulations as applicable to such activities will be strictly adhered to. During entire construction period, necessary precautions will be taken to ensure that no damage is done to the basic infrastructure like sewerage systems, power transmission lines, road, private or public property and daily human life.

Safety measures as desired under the code of demolition will be adopted to avoid any harm to human, property around, or the environment in the project area. After completion; all construction matrix, debris and garbage will be removed off immediately from site within the minimum possible time under safe conditions. Any minor spillover of these materials will be cleared adequately, the land, if and where pitted will be adequately leveled. On the hole, the project site and the area in its near vicinity will be made neat and clean.

3.12 Government Approval by Project

Etihad Alloys Private Limited was incorporated as company in Securities and Exchange Commission of Pakistan (SECP) on 16 March, 2021 (Annexure-V) while it was registered in Federal Board of Revenue (FBR) on 26 March, 2021. A copy of the FBR registration certificate is hereinafter provided as Annexure-VI. Similarly, the company is a member of Lahore Chamber of Commerce and Industry (LCCI), Lahore. A copy of the latest certificate issued by the chamber is given as Annexure-VII. The proponent has applied for electricity connection and a copy of the demand notice issued in this regard is appended as Annexure-VIII. M/s EA through company CEO have also submitted an application in the office of District Planning Officer, District Council Rahim Yar Khan on April 17, 2023 for the conversion of agricultural area of 9 acres to industrial use. A copy of the application received in the said office is attached as Annexure-IX.

CHAPTER 4
DESCRIPTION OF ENVIRONMENT

4.1 Data Collection

The primary data was collected by surveying the project area and its nearby vicinity. The secondary data regarding physical parameters (topography, geology, seismology,hydrology and climatology) was obtained by visiting relevant departments and their official websites. The biological parameters (flora and fauna) were also studied in the project and study area. The vegetation of the area was studied by preparing a floristic list based on visual observation. The species were recorded with reference to their historical existence in the project influenced area. Information on wildlife fauna species (mammals, amphibians, reptiles, birds, etc.) in the assessment area was compiled based on opportunistic observation, gathering the existing information and consultation with local experts, community members, government and Non-Government Organizations (NGOs). The socio-economic aspects were studied and analyzed by conducting detailed village profile and household surveys.

4.2 Physical Environment

This part examines the physical resources such as topography, soil, climate, surface and ground water resources and quality, ambient air quality and geology of not only the Project site but also the district as a whole to assess whether the project under assessment can or does have any impacts on any of these parameters. The description of physical environment of Rahim Yar Khan and the project site is presented in the following sub sections.

4.2.1 Geological Formation

The district lies between 27°40'-29°16' north latitudes and 60°45'-70°01' east longitudes. The riverine area of the district lies close to eastern bank of the river Indus and Panjnad. The Rahim Yar Khan District is bounded on the north by Muzaffargarh District, on the east by Bahawalpur District, on the south by Jaisalmer district (India) and Ghotki District of Sindh province, and on the west by Rajanpur District.

This district is divided into three main physical features: (a) Riverside area, b) canal- irrigated area and (c) desert area which is called Cholistan. The Riverside area of the district lies close on the southern side of the Indus river mainly falling in the river bed. The canal-irrigated area lies on the south and is

separated by main Minchan Bund. The approximate height of the irrigated area is 150 to 200 meters (490 to 655 ft.) above sea level. The third part of the area, called Cholistan, lies in the south of the irrigated tract up to the Indo-Pak border. The surface of the desert consists of a succession of sand dunes rising at places to a height of 150 meters (492 ft.) and covered with the vegetation peculiar to sandy tracts.

4.2.2 Soils

The project site comprises mainly silty eroded loess and shallow residual soils with some gullied land. Deposits of Lacustrine clay are found near the project site. The features of soil were almost similar in clay loam soil collected from two sites. The soils of the project area consist of loess, old alluvial deposits, and recent stream valley deposits. The soils consist of mainly medium textured with considerable percentage of clayey material. Most of the soils are deep, except those formed in situ from underlying rocks. The soils, like in the entire country are sodic in nature.

4.2.3 Seismicity

Seismic Zoning Map of Pakistan showing Proposed Project site area is presented as Figure-4.1 indicating zones according to the Building Code of Pakistan- 2007. The proposed project area falls in Seismic Zone 2B according to the Seismic Zoning Map of Pakistan.

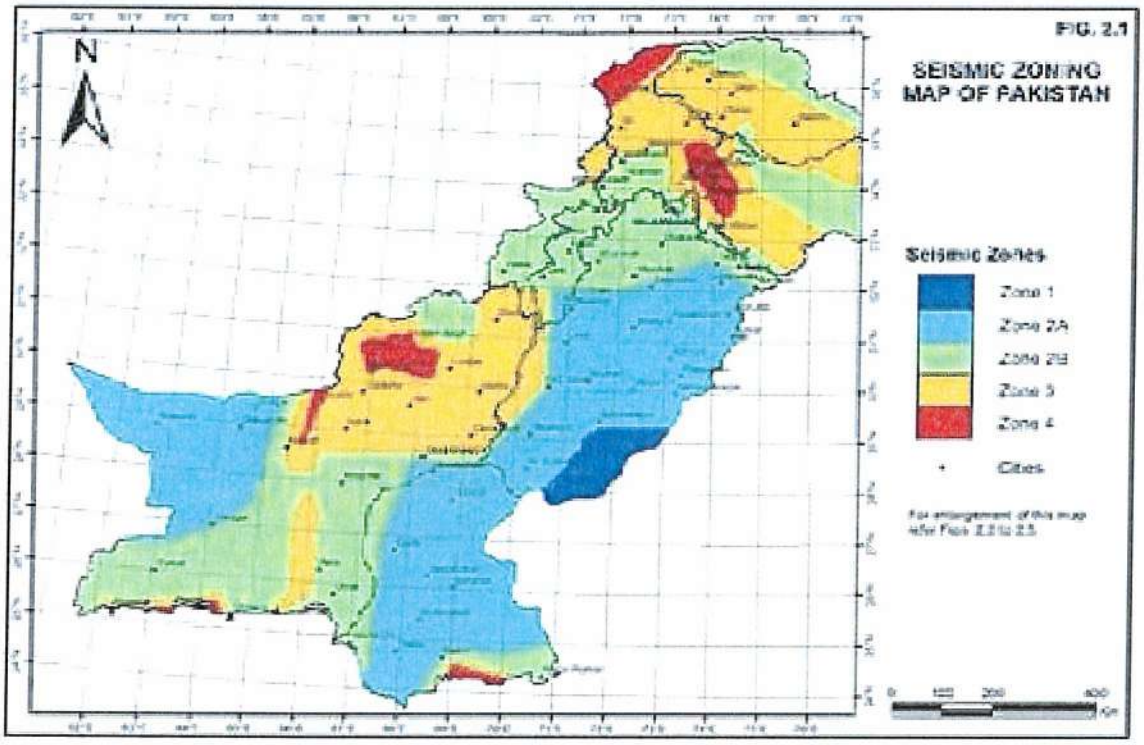


Figure 4.1: Map of Pakistan

4.2.4 Climate

The climate here is "desert." During the year, there is virtually no rainfall in Rahim Yar Khan. This climate is considered to be BWh according to the Köppen-Geiger climate classification. In Rahim Yar Khan, the average annual temperature is 26.2 °C. Precipitation here averages 101 mm.

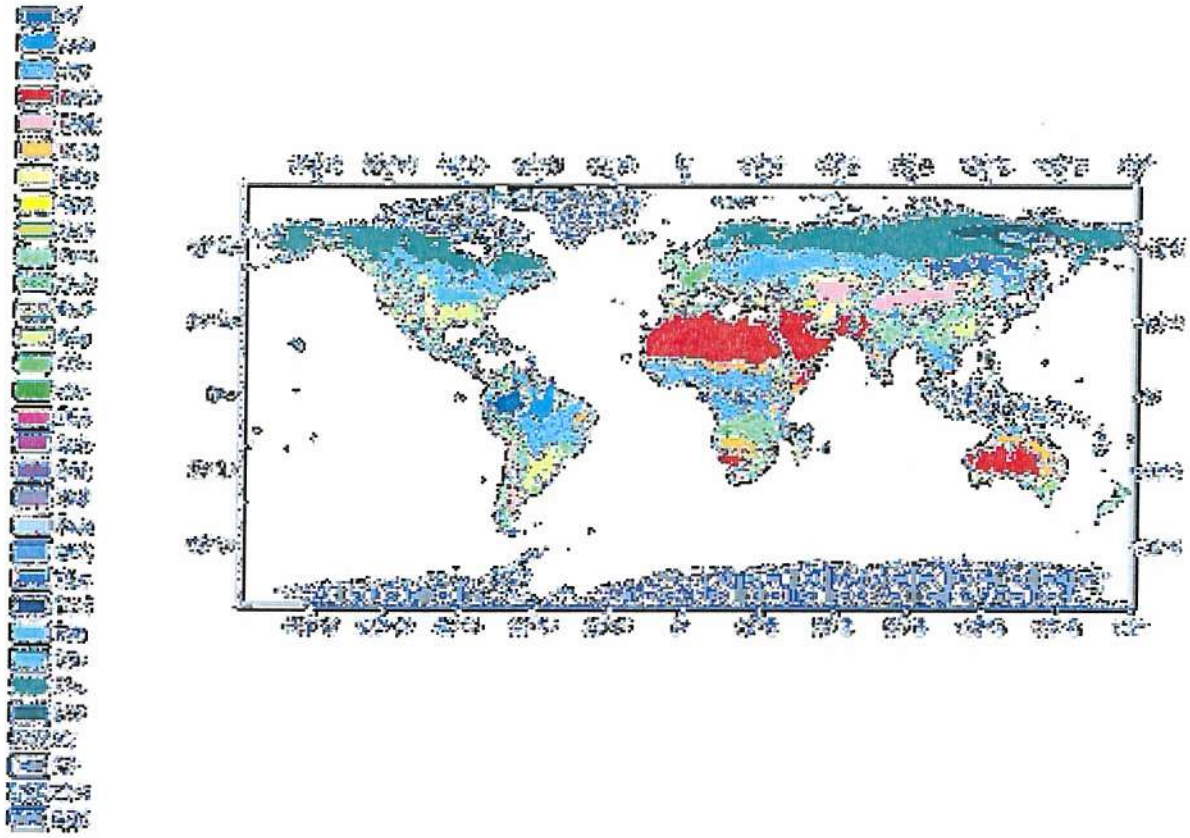


Figure 4.2: Koppen Gieger Climate Classification Map

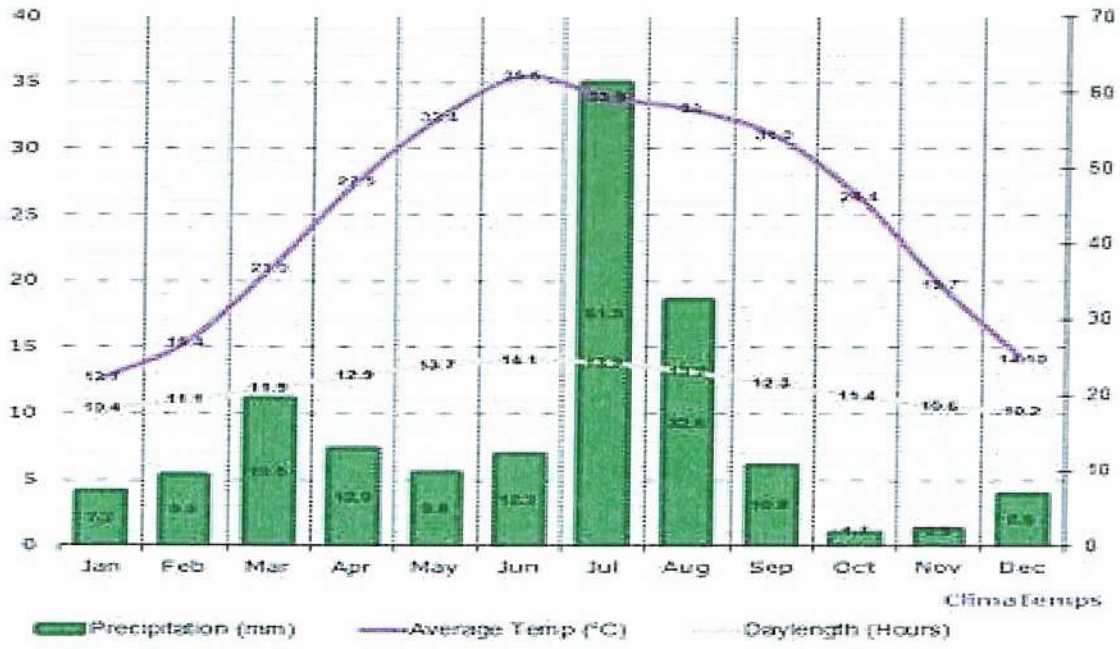


Figure 4.3: Climate of Area

4.2.5 Rainfall

In Rahim Yar Khan, the average annual temperature is 26.2 °C. Precipitation here averages 101 mm.

4.2.6 Hydrological s t u d y

Hydrological study of the project influenced area indicated that the sub-surface litho-logy comprises of clay/shale, silty-sandy clay, sandstone, limestone, gravel, cobble, pebble and minor boulder and their admixture. Different tributaries exist in the area, which recharge the aquifer on regular basis. Generally, the aquifer exists in the sub-surface sandwiched by thick clay/shale band. There are a number of tube wells installed by the agriculturists in the vicinity of the project area. All these tube wells have been functioning over a long period. During site survey, special investigations were carried out to ascertain likely shortage/draw down of the water in the tube wells. It was revealed that there was no depletion or dearth of water in these tube wells. One water sample from the tube well outside the boundary of the project site was drawn and tested for various parameters. The laboratory test results show no contamination of the water. The absence of any contamination indicates purity of water.

4.2.7 Ground Water

There is neither any canal nor river in the area around project site. Underground water and rain water are the sources of irrigation. Underground water is used for potable purpose by the people of the area. Underground water is available in ample amount. Public Health Department, Government of the Punjab has installed many tube wells in the project study area. These tube wells supply potable water to the residents of the area.

The ground water recharge is mainly derived from the seepage of unlined canals, water courses and from irrigation practices. Recharge directly from rainfall is small. Also, some recharge takes place from ponds, water supply and sewerage systems. Ground water/seepage water is the source of potable water in the area. Mostly, depth of water table varies between 60 to 200 feet. The hand pumps in the nearby localities are installed at 80-200 ft. depth, motor pumps between 80-450 ft. and tube wells are installed around 200-400 ft. The water is mostly brackish with TDS values often between 1000-3500 ppm



Figure 4.4: Ground water Sampling From Project Site

The analysis results regarding various physical, chemical and biological parameters are given in the Annexure-X while interpretation of data with the PEQS is given hereinafter. It is clear from

laboratory analysis results that all testing parameters regarding drinking water quality are in compliance of PEQS limiting values. Thus, water can be used on site for potable purposes.

4.2.8 Surface Water/Wet Lands

No surface water body/wet lands is present near the proposed site while river Indus is flowing miles away from the project site.

4.2.9 Wastewater

There is wastewater drain (Nala) flowing on the rare side of the project site. It is used as main drainage channel for industrial and local community wastewater. Industrial and sewerage waters are being collectively drained out in this nala passing at a small distance, therefore, detailed monitoring of effluent drain along with wastewater sampling was done here in upstream to establish baseline conditions. The wastewater is ultimately discharged into the river. The test results show that certain important parameters are in violation of PEQS. This presents that discharge of untreated wastewater of industries and communities into the nalah not being properly treated before their discharge into the drain are the cause of high levels of pollutants.



Figure 4.5: Wastewater Sampling near Project Site-Upstream

4.2.10 Air and Emission Resources

The ambient conditions regarding air resources, noise levels and traffic concentrations around the project site as monitored during baseline studies are given hereunder:

4.2.10.1 Ambient Air Quality

The proposed project site is located in moderately open and clean atmosphere in the outskirts of Rahim Yar Khan city and is mostly surrounded by agriculture lands and rural settlements along with Industrial units. In the proposed project area, Particulate Matter (SPM & PM_{10}), Smoke, Hydrocarbons (HCs), Oxides of Nitrogen (NO_x), Sulphur Dioxide (SO_2) and Carbon Monoxide (CO) are the key air pollutants. The currently operating industrial units of Etihad Group such as EAPL (Parent Unit of proposed project), Etihad Sugar Mills, Etihad Power Plant, traffic on internal roads of units, nearby main road, passage ways to villages as well as gaseous emissions from other scattered kiln units, are the main sources of air pollutants including NO_x, SO_2, CO, PM, HCs, smoke, etc. Further, hot and dry conditions during summer season change the air quality by increasing particulate matter due to drying of road pavements and open soil.

Ambient air quality results obtained through monitoring carried out for criteria pollutants i.e. CO, NO_2, SO_2 and PM at the project site between May 24 & 25, 2023 have been used as baseline data for the purpose of this EIA report. The monitoring results are presented as Annexure-X. The air quality around the proposed project site is comparatively better as against if the unit would be installed in any area where industrial, commercial and transportation sources were haphazardly situated.



Figure 4.6: Ambient Air Monitoring at Project Site

4.2.10.2 Ambient Noise

In the study area, operations of industrial units of different kinds, traffic flows on roads and commercial activities going on there along with other anthropogenic activities are the major sources of noise. Noise level monitoring was carried out at project and its surrounding areas. The monitoring was carried out in all types of prevailing zones including Industrial, residential, commercial and silence in addition to the baseline monitoring carried out at the project site and for traffic noise. Monitoring results so obtained at the project site have been presented in Annexure-IX for analysis.



Figure 4.7: Ambient Noise Level Monitoring at Project site

The baseline monitored data show that measured noise level values are currently in compliance of PEQS set for industrial areas.

4.2.11Traffic Count Data

The traffic count data of the nearby passing KLP road was also collected according to the format as provided by the guidelines of EPA. The counting was done for 3 hours on May 27, 2023.

Table 4.1: Traffic Count Data around the Site

Sr. No.	Vehicle Type	8:00 am-9:00 am	11:00 pm-12:00 pm	5:00 pm-6:00 pm
1.	Large Vehicles (Trucks, Buses, Tractor Trolleys, Mini buses)	36	27	57
2.	Medium Sized Vehicles (Suzuki Pickups, Cars, Jeeps, Taxies)	60	39	62
3.	Small Vehicles (Rickshaws, Motorcycles, Scooters)	69	48	44
4.	Slow Vehicles (Animal-Driven Carts, Tongas)	21	15	25
5.	Others (Bicycles)	41	34	13

4.3 Biological Environment

Mainly a country's wilderness areas and scenic landscapes with their associated flora and fauna form its natural capital. Both collectively and within each level, the range or variety of the resources is referred to as the "Biological Diversity". The contribution of the "Natural capital" is recognized at three distinct levels including genera, species and community-habitat and ecosystem. Pakistan comprises of a total of nine major ecological zones and the term has relevance for each of Pakistan's administrative units—district, province, and particularly country. The greater the number of genera, species and habitats and ecosystems present within this project area, the greater is the biodiversity. It is in this background that the biodiversity of the area is discussed below: Rahim Yar Khan is enhanced with the presence of natural flora and fauna; although with the growing population and development activities, the presence of some has been some what affected. There are however no significant or well-shaped trees and shrubs on the project site. There are some trees only along the main roads.

4.3.1 Flora and Fauna

The flora of the district characterizes two major ecological divisions, northern and southern. The botanical life found in the northern half is like that of the rest of the irrigated tracts at central Punjab. The arid land, referred to as the Cholistan desert, has a lot of wildlife including wild cats, the Chinkara, a variety of pigs, jackals, foxes, badgers, porcupines, squirrels, gerbils, wild rats, poisonous snakes, hog deer, blue bulls and many more.



Plate 1: Plants around the project Site



Plate 2: Agriculture Fields in Study Area



Plate 3: Birds' Species Found In Nearby Area



Plate 4: Pictorial view of (Kikar) Accacia arabica

4.4 Socioeconomic Assessment

Socioeconomic assessment determines the quality and standard of living of a project site. The field survey including interviews were carried out to collect the socioeconomic data from the project affected people as well as general population to complete the baseline information, which will in turn provide the basis for subsequent monitoring and evaluation studies.

4.4.1 Health Facilities

The medical facilities are available within city as few very good hospitals are situated in Rahim Yar Khan city like Al-shifa Clinic, Abdullah Neuro Surgeon Clinic etc. In Rahim Yar Khan city, whole area near hospitals is full of clinics and medical stores thus providing excellent medical services to the people of area.

4.4.2 Educational Facilities

Sheikh Zayd Medical College is named after the Late Ruler of United Arab Emirates His Highness Sheikh Zayd Bin Sultan Al Nahyan. Establishment of Sheikh Zayd Medical College in RYK has put the city on International map. The College is accredited by Pakistan Medical and Dental Council. It was earlier based on Self Finance Education.

The Board of Directors includes personnel linked to the Royal Family of Abu Dhabi, United Arab Emirates. Also, there is sub-campus of Islamic University Bahawalpur, Khawaja Farid Post-Graduate Government College, Government Women Degree College, Nicaas College, Punjab College, Superior College, Sheikh Zayed Public College and School, Army Public School, Beacon House School System, the Educators School, Ranger Public School, City School and many other good institutions.

4.4.3 Transportation

Rahim Yar Khan is one of the modern district headquarter cities in Punjab. Although the city seems a far-off place to those living in Lahore, Karachi or Islamabad, but the city has very good civic facilities. Today Rahim Yar Khan city is the District Headquarter. It is linked by air the other parts of the country. It is situated on the main Railway line and national highway linking Karachi, Lahore & Peshawar. Now Daewoo also links Rahim Yar Khan to other cities.

4.4.4 Power Sources and Transmission

Electricity services are provided by Multan Electric Power Company (MEPCO) to the area and it shall

provide same services to the proposed project as it is the only authority which deals with the electric power sources and their availability to the expected area.

4.4.5 Industries

Rahim Yar Khan is also an industrial center many important industries are based inRahim Yar Khan. This city is known as one of the largest producers of cotton Agriculture is the Occupation of 65% People Living in Rahim Yar Khan. Well known Lever Brothers Ltd. (Now Called Unilever) has one of its main factories in Rahim Yar Khan, producing Dalda, Planta, Sunflower Oil, famous brands like Lux-Rexona and Detergents like Surf-Excel etc. Similarly, a very large Ahmad Oriental Textile, Ahmad Fine Textile, Ahmad Oil & Ghee mills, Poultry feed mills like Himalia feeds, Coca-Cola Factory, Haleeb Foods Limited, Vita Bread Limited, Marble Factories, Ginning Factories, Flour mills provide an industrial base. Etihad Sugar Mills is the new addition in the industrial base of Tehsil Rahim Yar Khan.

4.4.6 Infrastructure

The project site is situated at Karamabad, Rahim Yar Khan and provides round the clock transport access. All the other villages in the area are connected with roads. The buses, motorcycle rickshaws, motorcycles, vans and pickups provide very convenient mode of transportation throughout the area. All villages in the area have electricity provided by WAPDA along with telephone and natural gas facilities. Rahim Yar Khan has well developed drainage system which fulfills the requirements of the town in rainy season as well as in dry weather. The proposed project site will also be provided with the modern facilities like electricity by WAPDA, natural gas by Sui Northern Gas Pipelines Limited (SNGPL), phone facilities by Pakistan Telecommunication Company Limited (PTCL) and very well-designed drainage system along with a septic tank for primary treatment of sanitary water before throwing it to public sewerage. No surface water is available to the area and only source of water to the area is groundwater, which is extracted by means of motor turbines, tube wells and hand pumps.

4.4.7 Gender Analysis

The section describes the importance of role of women in the project area. Responsibilities of women in the area belongs to their household activities like cooking the daily meal, dishwashing, feeding and milking the cattle, cloths washing, bringing up the children as well as working in the fields. In the area, awareness regarding formal education is prescient and approximately every child in the area especially girls are getting education from the educational institutions. This is also because govt. of Punjab has made formal education totally free and also provides free of cost course

books to the students till their matriculation. Majority of the working-class women are teachers in govt. school as well as in private institutions while remaining are doctors and nurses in the hospitals. The female population is found to be 48% of the total population of Rahim Yar Khan district. Violence against women is very less reported and tries to be sorted out domestically by the help of elders of the village.

4.4.9 Agriculture

The average rainfall of the area varies from 20 to 40 inches and the main crop in district Rahim Yar Khan is Wheat.

4.4.10 Aesthetic Values

Like the general trend among the citizens of area, most of the people have low awareness about environment. Even then, some people take cleanliness and neatness of the environment lightly. Some people throw municipal solid wastes (MSWs) on the streets. Sense of personal responsibility to keep the environment clean as good citizens is even now lacking among a few people.

CHAPTER 5

SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1 Environmental Impacts due to Project and Mitigation Measures

This section identifies the potential impacts related with design, construction and operation of project on the physical, ecological and socio-economic domains of the environment. Accordingly, mitigation measures have also been proposed to manage the environment and for sustainable development. Strict environmental management will be observed during the project operation phase. Legal requirements of the PEPA and PEQS Pakistan will be rating standard for the activities. The project proponent is filling with the EPA Punjab, written affidavit and undertaking on judicial papers, that project throughout life will operate under environmental orders. The project activities will neither adversely affect the population nor the environment around the project site.

Evaluation of the anticipated impacts from the project activity and their mitigation measures are described below:

5.2 Environmental Screening of the Proposed Project

For the proposed project, an Environmental Screening matrix was developed as part of the present EIA study focusing on the potential Environmental impacts of the project during construction and operation phases. The matrix examines the interaction of project activities with various components of the Environment. The impacts are broadly classified as physical, biological and social, and then each of these broad categories further divided into different aspects. The potential impacts thus predicted are characterized as follows:

- High Negative (adverse) Impact,
- Low Negative Impact,
- Insignificant Impact,
- High Positive (beneficial) Impact,
- Low Positive Impact, and No Impact.

The negative impacts predicted in this manner are the "unmitigated" impacts. Appropriate mitigation measures have been recommended as part of this EIA. The occurrence and severity of

the potentially adverse impacts will be reduced as a consequence of the incorporation of these mitigation measures into the project design/management.

5.3 Objectives

Objectives of screening out of all possible impacts and then providing their mitigation measures are:

- To find different alternatives and ways of carrying out the project activities.
- To enhance the Environmental and Social benefits of proposal.
- To avoid, minimize and remediate adverse impacts.

5.4 Environmental Impact Characterization

During Environmental Impact Assessment (EIA), the predicted impacts were characterized. Various aspects of the impact characterization include:

1. Nature (direct/indirect)
2. Duration of Impact (short term, medium term, long term)
3. Geographical Extent (local/regional)
4. Timing (project phase)
5. Reversibility of Impact (reversible/irreversible)
6. Likelihood of the Impact (certain/likely/unlikely/rare)
7. Impact Consequence Severity (severe/moderate and mild)
8. Significance of Impact (High/Medium/Low)

Subsequent to the characterization, appropriate mitigation measures were identified in order to minimize if not completely eliminated the adverse impact associated with project activities; finally, residual impacts were identified.

The impact characterization of the predicted impacts, mitigation measures and residual impacts are discussed below.

5.5 Environmental Problems due to Project Location and Mitigation Measures

The potential impacts assessed due to project location are change in land use pattern, pressure on the existing natural resources, natural hazards like floods, earth quake, changes in the socio-cultural patterns of the local community, local community displacement issues, and obstruction of accessibility to the community already residing in the locality.

A detailed explanation of each potential impact is given hereunder in tabulated form:

Table 5.1: Environmental Problems/Mitigation Measures Due to Project Location

Potential Impacts	Mitigation Measures
1.Change in Land Use Pattern	
Any new intervention has its first and foremost impact of changing the land use pattern of the area. The impact of this nature is irreversible therefore site selection needs to have careful consideration of the impacts that may arise due to the changes in land use patterns.	Prior to selection of site, the project proponent has had careful consideration of site alternatives and hence due to current land use nature, price, and comparatively less environmental impacts the site was selected out of the four alternatives. Another factor adding to the feasibility of the proposed site was that it involved no displacement of local community, inside the existing industrial hub and less energy consumption for transportation.
2. Pressure of Resources	
Yet another impact to be considered prior to site identification is the availability of already existing resources e.g., water, gas, electricity, etc. any new intervention can exert pressure and marginalize the existing community. This could eventually create a sense of deprivation among the already existing community and may eventually result in social unrest.	Considering this very important factor, the site identification was done after evaluating the extent of provision of resources. The water requirements, energy requirement, social services (identified in the previous chapters) were done and based on the availability of resources to meet the present and future demand, the mentioned site was identified.

3. Natural Hazards	
It is very important to assess the extent of damage or any natural hazard e.g. earthquake, floods, landslides may cause.	The proposed site identified within environmentally /geologically safe and does not fall in any of the earthquake zones.
4. Displacement of Local Community	
Displacement of local community can tend to create social issues and aggravate negative feelings from the existing population towards the project.	The proposed project is planned on a site which has already been acquired by the proponents after going through its socio-culture, environmental and economic considerations. There is not going to be displaced any local community or whatsoever.
5. Accessibility Issues to the Local Community	
Another important impact considered was obstruction or changes in the patterns of transportation and increase travel time/distance for the local community.	The proposed project site is a vacant plot and does not involve damage to any roads. Nature, size and scope of work also limit the extent of activities during construction as well as operational phases.
6. Presence of Sensitive Areas	
Development interventions can degrade the quality and life expectancy of ecologically, socially and historicallysensitive areas.	There are not sensitive areas of any nature be it ecological, social orhistorical in the proposed area
7. Availability of Existing Infrastructure and Services	
Unavailability of infrastructure can render the entire project void and impractical due to absence of important community infrastructure.	The proposed project is well connected to the rest of the city through major asphalt roads. Commercial buildings, housing societies, hospitals, clinic and transport facilities available hence making the location ideal for the said purpose

5.6 Environmental Problems due to Project Design and Mitigation Measures

Environmental issues may also arise during project design phase which may cause potential threats to the overall project life if not considered timely. The potential problems associated with project design phase are identified in the Table 5.2 hereunder:

Table 5.2: Environmental Problems/Mitigation Measures Due to Project Design

Potential Impacts	Mitigation Measures
1. Increased Energy Consumption	
The design of building plays a vital role in determining the energy demand. Unplanned design may lead to overall rise in energy demand.	The design of the project is in such way that it allows adequate energy consumption and natural ventilating process to eliminate the factor of suffocations.
2. Traffic Congestion	
Unplanned traffic management and traffic infrastructure development maylead to traffic related issues such as accidents and traffic congestion.	The project has included traffic management as integral part of its overalldesign. The project construction activities are planned within the project area. Transportation of heavy construction materials will be done during less traffic hours.
3. Fire Exits/Emergency Evacuation Plan	
Emergency evacuation plans are necessary as fire issues may arise due to electric short circuit, gas leakages etc.	The project proposes Emergency Evacuation Plans in events of fire hazards. Quality of wiring work and gas lines will be ensured through installation of good quality wiring during construction and proper monitoring during operational phase. The site will be equipped with proper firefighting materials to ensure increased safety.
4. Accessibility to Public Utility/Service	
Inaccessibility to public utilities will render the project uninhabitable.	Resolving the issues of accessibility to public utilities / services will be resolved through proper design planning of infrastructure.

5. Careful Planning of Greenbelts/Horticulture Plan	
Unavailability of green belts would create aesthetic nuisance.	The design of proposed project involves establishment of green belts and develop aesthetically crafted lawns around the project building to increase its aesthetic value.
6. Underground Sewer/Drinking Water Lines	
Wires and pipelines lay open and above surface may consequently give rise to leakages, contamination and short circuits in the lines.	There will be no any such issue because water will be gained from underground sources.

5.7 Environmental Problems due to Project Construction and Mitigation Measures

The land is owned by the proponent. Construction work will be started after obtaining approval from EPA. Following are some potential impacts and their mitigation measures for construction phase.

Table 5.3: Environmental Impacts/Mitigation Measures due to Project Construction

Potential Impacts	Mitigation Measures
1. Loss of Vegetation Cover/Biodiversity	
Construction activity will involve excavation and removal of top soil. This may also lead to clearing of land for construction purpose which ultimately would mean that the respective area will be cleared of any sort of flora/fauna.	The proposed site has been selected after careful consideration of theland use, presence of biodiversity and other environmental parameters. Currently, there are no trees on the said location rather it is a vacant plot devoid of flora and or fauna. But to ensure aesthetic value, the proponent will plant trees once the construction phase is complete.

2. Gaseous Emissions	
Gaseous emissions include SO_x, NO_x, CO_2, lead and CO during construction phase. These gases are ozone depleting agents. Besides, they also pose threat to human health.	EURO II quality fuel shall be used in the machinery and generator/s to avoid emission of lead. Vehicles and machineries with good conditions which fall on the quality standards shall be used to control the exhaust emissions. Stacks with scrubbers shall be provided to reduce emissions from the generator/s.
3. Dust Emissions	
Generation of dust and particulate matters is an issue that could arise due to construction activities.	The construction materials e.g. soil, clay would be covered appropriately. Instead of open and dry dumping, sprinkling of water in a quantity that reduces the chances of dust generation would be done. The workers would be provided safety gloves, masks and ear buds and wherever necessary goggles to avoid health complications.
4. Noise Generation	
Noise emissions due to transportation, movement of heavy materials, excavation, generators may create health nuisance for the workers and local community.	The working hours shall be limited to 08 in the morning till 05 in the evening to avoid noise during night shift. Vehicle maintenance would be ensured so that emissions of any sort, be it gaseous emissions or noise generation, would be controlled. The workers will be provided with ear plugs and other personal safety equipment to avoid invoking of any health issues.

5. Solid Waste Generation	
Unplanned dumping of solid waste generation during construction phase can lead to blockage of roads, waterways and also create unaesthetic sight of the proposed location.	During construction phase, about 1-2% construction materials including concrete waste, wood, steel, packaging plastics, etc., could be dispersed. There shall not be any significant solid waste from proposed project processes and operations. Solid waste generation quantity during construction phase shall be reused in construction activities rather than dumping. The solid waste during construction phase will consist most of soil, packaging materials, iron rods and food leftovers. The organic portion of solid waste shall be collected by sanitary workers of that area.
6. Wastewater Generation	
Unplanned wastewater disposal may contaminate the surface water channels, surface soil and depending upon the quantity of wastewater generated, it has a potential to contaminate the ground water aquifers.	Wastewater generation during construction phase shall be reused again for material making for construction phase and sprinkling of dust on soil. A Septic tank unit shall be constructed for onsite sewage treatment prior to discharge into nearby Nala.
7. Accidental Spills	
Accidental spills of oil, fuel and lubricants can cause surface water contamination and surface soil contamination. It may also lead to fire hazards depending upon the quantity and nature of spills.	Accidental spills shall be avoided by providing spill kits at different places and also ensuring the safe transportation of different raw material that may be in liquid state.

8.Equipment Breakdown/Accidents	
Accidents and/or emergency breakdown of the equipment/machineries/vehicles involved may create environmental, health and safety hazards.	This situation can be avoided by regular maintenance of the vehicles for quality assurance. Besides, equipment will be checked prior to operation to avoid accidents and human health danger due to such accidents.
9. Soil Erosion	
Loss of vegetation cover and trees may lead to soil erosion hence resulting in dust emission and loss of fertile land cover.	The construction activities shall be planned in a way that reduces the chances of vegetation cover loss and its consequent soil erosion issues. Soil erosions are due to wind and water. The proposed project is planned for construction during the coming months after Environmental Approval, which are dry and sunny. Hence, the probability of soil erosion due to natural factor will be negligible to none.
10. Social Impacts	
Problems regarding privacy of local community may arise due to invasion of construction workers.	Improper social behaviors e.g., staring and teasing shall be discouraged and any such incident will be reported to the site in-charge, proponents directly. Workers will be hired from the local community to avoid social issues.
11. Training and Awareness	
Unskilled workers may create issues in attaining the overall health environment and safety policy.	Regular onsite and offsite training of the workers shall be conducted. Impromptu meetings and discussions with the site in-charge and daily wages workers will be done to resolve any issues that may create health safety and environmental problems during construction phase.

5.8 Environmental Problems due to Project Operation and Mitigation Measures

Table 5.4 provides a detailed overview of the environmental aspects and subsequent environmental impacts that may arise during project operational phase. Appropriate mitigation measures are also proposed for the remedy of any such potential impacts.

Table 5.4: Environmental Problems/Mitigation Measures Due to Operational Phase

Potential Impacts	Mitigation Measures
1. Solid Waste Management	
Improper and unplanned solid waste dumping can cause environment, health and safety issues. It also can potentially deteriorate the living quality of the residents besides reducing the aesthetic quality of the steel mill.	Only 0.2-0.3% i.e. 4000 Kg/day industrial waste shall be produced during operation phase including slag, sludge, dusts, mill scale, etc. The scrap from workshop and wear and tear of equipment shall be 4-5 Kg per day. As far as domestic waste is concerned, about 25 Kg/day of domestic waste in the shape of kitchen waste and 2 Kg/day of institutional waste in the form of paper waste shall be produced. At the site, only solid waste will be domestic like paper, polythene bags, etc. which will be collected by sanitary workers of that area.
2. Wastewater Disposal	
Wastewater generated due to domestic/commercial activities will result in the spread of vector borne diseases like dengue, malaria, as well as spread the nuisance of foul smell.	To tackle wastewater, septic tank will be constructed. The wastewater will be of domestic nature and of cleaning type, etc.
3. Energy Conservation	
Excessive use of energy will exert more pressure on the already dwindling energy resources of the city/country.	The workers/employees will be encouraged to follow energy conservation strategies developed during operational phase. Machineries and equipment will be kept in good maintained shape to avoid extra fuel consumption. As the power source shall be in

	house through self-generation, therefore, no pressure shall be exerted on existing national grid.
4. Noise Generation	
Noise emissions due to traffic and any activities will create issues to the residents.	There will be no such activity that may create excessive noise. There will be small machinery that creates less noise (within the standards) during working hours.
5. Emergency/Fire Hazards	
Emergencies e.g. fire incidents may lead to environmental, health and safety issues to the local residents.	Emergency exits have already been planned. Firefighting equipment will be provided and adequate trainings will be provided to tackle any situation of fire hazards. Call points at suitable locations will be installed. Moreover, there is not any residential settlement or village near the project site which could be harmed from such hazard.
6. Training of Staff	
Unskilled personnel will not be able to tackle environmental, health and safety related situations which may further aggravate any such issues and cause loss of human life and property.	Regular training of the staff will be conducted. Proper monitoring and reporting mechanism will be developed where the team will be responsible to communicate/report any illegal or hazardous situation to the team leader.

6. Groundwater Consumption	
The groundwater will be used for domestic purpose at said project. Water storage will also be required for emergency response in case of a fire. Prolonged water consumption may in the long run lower/deplete the underground water table. This will be a permanent and moderate negative impact.	An effective 'Water Conservation Plan'will be developed and for domestic purpose water will be gained from ground water. Following operational measures will be adopted for water conservation: • It will be made sure that all faucets, circulating pumps, etc. do not leak and are in good repair; • Any leaking or dripping faucet, pump or toilet will be reported immediately; • All the utility bills will be kept in a safe place to track the consumption of water; and purchase and use of water-saving equipment will be practiced; • An effective residents' training program will be implemented about water conservation

5.9 Potential Environmental Enhancement Measures

The proposed project has a number of positive impacts, which include:

- No residential and commercial structures will be affected.
- The project will help in economy growth of Pakistan.
- The land use will be done in a way that it will not create any threat to the privacy of adjoining buildings.
- It will increase the employment ratio of the area.

5.10 Impact Identification with Checklist

The method of checklist has the advantage of being simple to understand and use good for site selection and priority setting but has the disadvantage of not to distinguish between direct and indirect impacts and they do not link actions and impacts.

CHAPTER 6

ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM

6.1 General

This section provides brief description of environmental issues, mitigation measures to eliminate and reduce environmental and social impacts to an acceptable level. Institutional arrangements for the implementation of the mitigation measures are also provided.

6.2 Objectives of EMP

The objectives of EMP are:

- To outline functions and responsibilities of responsible persons.
- To state standards and guidelines, which are required to be achieved in term of environmental legislation.
- To outline mitigation measures and environmental specifications which are required to be implementation for all phases of the project.
- To prevent long term or permanent environmental degradation.
- To identify training requirement at various levels.

6.3 Regulatory requirements and applicable standards

The main law and legislation concerned with the environment is Punjab Environmental Protection Act (PEPA) 1997 (Amended 2012). This Act is a fairly comprehensive legislation and provides for protection, conservation, rehabilitation and improvement of the environment.
The salient features of the law are:

- No proponent of a project shall commence construction or operation unless he has filed with the Government Agency designated by Federal EPA or Provincial EPAs an IEE/EIA, and has obtained NOC.
- Establishment and Formation of the Pakistan Environmental Protection Council (PEPC).
- Powers and Functions of the Federal and Provincial Environmental Protection Agencies.
- Prohibition of certain discharges or emissions.
- PEQS for wastewater, air emissions and noise.

- Empowers Government to issue notices and to enforce them for the protection of the environment.

The proposed project related environmental laws/guidelines are as follows:

- Punjab Environmental Protection Agency Regulations, 2022 for Review of IEE and EIA
- Pakistan Environmental Impact Assessment Procedures
- Guidelines for Public Consultation
- PEQS
- Sectoral Guidelines for Environmental Reports, Major Roads, October 1997

6.4 Mitigation management matrix (MMM)

This matrix identifies the environmental impacts of multipurpose project during the construction and operation stages and establishes the linkages between the environmental and social impacts, mitigation strategy and the agencies responsible for execution. The MMM presented in Table 6.1 identifies the following:

- The mitigation measures recommended in EIA.
- The person/organization directly responsible for adhering to or executing the required mitigation measures.
- The person/organization responsible for ensuring and monitoring adherence to the mitigation measures.
- The parameters which will be monitored to ensure compliance with the mitigation measures.
- The timing at which the mitigation or monitoring has to be carried out.

Table 6-1: Mitigation management matrix

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
Construction phase					
Physical Environment					
1	• Soil erosion may take place in the project as a result of excavation. • Soil contamination may take place due to the generated solid waste at project site.	• Good engineering practices should be adopted by Contractors, which will help to control soil erosion at the construction sites. • Soil contamination can be curtailed by reducing the oil spill from generator and other machinery at project construction areas, proper solid waste management. • The Contractor is required to impart proper training to his workforce in the storage and handling of obnoxious materials, like	Contractor	SS and HSE Etihad Alloys	• Equipment maintenance. • Placement of solid waste storage containers at project site. • Collection and disposal by contractor

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
		oil, diesel and petrol that can potentially cause soil contamination.			
2	Generation of noise and exhaust emission due to construction activities like transportation of machinery excavation, foundation, clearing, leveling, assimilation of plant	• Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM_{10}. • Water Sprinkling on roads • Equipment and vehicles should be well maintained to minimize particulate emissions. • Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin.	Contractor	SS and HSE Etihad Alloys	• Maintenance of Vehicles • Water Sprinkling • Filled Vehicles covered with tarpaulin
Ecological Environment					
1	None of trees will be affected with the implementation of the	In order to enhance the environmental measures of the site the significant amount	Contractor	SS and HSE Etihad Alloys	• Plantation of trees,

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
	project.	of indigenous trees will be planted.			
Social Environment					
1	People will face the noise and dust problems during the construction phase.	• Effective construction controls may be made by the Contractor to avoid inconvenience to the population due to noise, smoke and fugitive dust. • Temporarily, the Contractor should select specific timings for heavy machinery operation so as to cause least disturbance to the population considering their peak movement hours.	Contractor	SS and HSE Etihad Alloys	• Sprinkling of water in dust affected areas as per schedule • Timing of vehicle movement to be noted.
2	• Construction activities, particularly transportation of machinery,	• Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place.			

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
	excavation and movement of haul trucks and machinery may prove dangerous for safety of the workers as well as for the locals.	• Training of workers in the construction safety procedures, environmental awareness, equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.	Contractor	SS and HSE Etihad Alloys	Instruct Staff of the Contractor to strictly follow the HSE policies of the company
Operational phase					
Physical Environment					
1	Daily municipal solid waste generation during operational phase will be of Office waste, kitchen waste etc. If not managed properly then it will create Soil and water pollution.	Solid waste will be collected in separate bins and disposed off through a contractor	Etihad Alloys	EPA	Regular monitoring of solid waste
2	Stack emission. If not managed properly then	Proper tuning and maintenance of	Etihad Alloys	EPA	Monthly monitoring of air emissions

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
	it will create the air pollution	generators and adjusting Air to fuel ratio to control pollution.			
3	Daily wastewater generated during the operational stage that If not managed properly will create the land and water pollution.	Wastewater is treated through the septic tank/WWTP. After that, this water will be discharged in to drain.	Etihad Alloys	EPA	Monthly analysis of wastewater after passing through Septic tank
4	There will a sludge generation from a septic tank during operational phase if not managed properly then it will create soil and water pollution.	The sludge will be collected and will be disposed off by contractor	Etihad Alloys	EPA	Regular Monitoring of Sludge
5	Workers working on plant may face HSE hazards like fumes, noise, vibration and generation of dust and particulate matter due to operations of plant.	• Use local exhaust ventilation systems • Provide workers with appropriate personal protective equipment	Etihad Alloys	Etihad Alloys	Regular Monitoring/Audits/inspections

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
		(PPE), such as dust masks, respirators, earing protection (e.g., earplugs or earmuffs) and anti-vibration gloves and tools. • Conduct regular air quality, noise and vibration related monitoring to ensure compliance with occupational exposure limits • Train workers on safe operating practices			

6.6 Institutional Capacity of the Unit

The organizational structure for the Environment Management Plan is outlined below:

6.6.1 Primary Responsibilities

The primary responsibility for implementing EMP within the unit lies under owner's responsibility.

6.6.2 Operation Management & Control

Conducting the operational activities in environmentally sound manner will be the responsibility of the concerned Manager for which he will be trained.

6.6.3 Supervision & Monitoring

Senior Supervisor will be responsible for all environmental issues and for the implementation of EMP.

6.6.4 Communications and Documentation

An effective mechanism to store and communicate environmental information during the project is an essential requirement of an EMP.

6.6.5 Meetings

Two kinds of environmental meetings will take place during the project

- Kick-off meetings
- Weekly meetings

The purpose of the kick-off meeting will be to present the EMP to project staff and discuss its implementation and to discuss any event of environmental significance that has happened in the under-discussion industry or a similar industrial unit to investigate its route causes and develop its solutions.

The purpose of the weekly meetings will be to discuss the conduct of the operation and environmental issues and their management. The proceedings of the meeting will be recorded in the form of weekly environment.

6.6.6 Changes-Record Register

A change-record register will be maintained at the site, in order to document any changes in project design. These changes will be handled through the change management mechanism.

6.7 Staff and Training

6.7.1 Environmental Committee and its Responsibilities

The management will form up an environmental committee (EC), which will be responsible for the environmental management and supervisory affairs during the operational phase of the project. The responsibilities of the environmental committee(EC) are as follows:

- To ensure implementation of all the proposed mitigation measures during and after the operational phase of the project.
- To organize routine monitoring of motor vehicle emissions, air quality, noise and vibration; etc. In case, the noise levels exceed the acceptable levels, a penalty or ban must be enforced.
- To develop operational guidelines and implementation schedule.
- Receiving complaints from residents and institutions and assisting the local environmental authority including liaison with Punjab EPA.
- To ensure that the proposed project is implemented in an environmentally friendly manner, causing least harm to the existing environment including flora and fauna, sites of religious and cultural significance, etc.

6.7.2 Technical Training Programs:

In order to raise the level of professional and managerial staff, they need to upgrade their knowledge in the related areas. The Environmental committee would play a key role in this respect and arrange the trainings. A training program is proposed to train the staff who will be involved in the operational phase.

6.7.3 Environmental Technical Assistance and Training Plan

An environmental and social training and Technical Assistance (TA) program will be carried out to implement the EMP, as well as to facilitate the improved environmental management of future

projects by increasing the environmental and social awareness of staff in general. The objective of the TA will be to help establish appropriate systems, and to train senior staff responsible for managing environment, operations, and planning, who can then impart training at a broader level within and outside the project site (i.e., the training of trainers). The TA consultant will organize training courses for the staff, train the staff in specialized areas such as air and noise pollution monitoring; develop environment operation manuals in consultation with the EPA.

6.7.4 Environmental Training schedule

Environmental training will help to ensure that the requirements of the EIA and EMP are clearly understood and followed by all project personnel in the course of the project.

The primary responsibility for providing training to all the project personnel will be TO formulate indicative environmental training program, which will be finalized before the commencement of the project. The ECTECH will train the project proponent's staff and other staff engaged for the project. Training will cover all staff levels, ranging from the management and supervisory to the skilled and unskilled categories. The scope of the training will cover the requirements of the EIA and the EMP, with special emphasis on sensitizing the project staff to environmental, ethnic, and social context of the area.

Table 6.2: Environmental Training Schedule

Staff	Trainer	Contents	Schedule
Selected management and staff from the project Proponents	ECTECH	• Environmental sensitivity of project area • Key findings of the EIA mitigation measures • EMP • Social and cultural Values of area	Prior to the start to the project activities
All Employees	ECTECH	• Environmental sensitivity of project area • Mitigation measures contingency plan • Community issues • Social and cultural values	Prior to the startof the Project activities

Drivers	ECTECH	• Road safety • Defensive driving	Before and during the project activities.

6.8 Summary of Impacts and their Mitigation Measures

Table 6.3: Environmental Management and Monitoring Plan

Potential Impacts	Mitigation Measures
For Construction Phase	
1. Loss of Vegetation Cover/Biodiversity	
Construction activity will involve excavation and removal of top soil. This may also lead to clearing of land for construction purpose which ultimately would mean that the respective area will be cleared of any sort of flora/fauna.	The proposed site has been selected after careful consideration of the land use, presence of biodiversity and other environmental parameters. Currently, there are no trees on the said location rather it is a vacant plot devoid of flora and or fauna. But to ensure aesthetic value, the proponent will plant trees once the construction phase is complete.
2. Gaseous Emissions	
Gaseous emissions include SO_x, NO_x, CO_2, lead and CO during construction phase. These gases are ozone depleting agents. Besides, they also pose threat to human health.	EURO II quality fuel shall be used in the machinery and generator/s to avoid emission of lead. Vehicles and machineries with good conditions which fall on the quality standards shall be used to control the exhaust emissions. Stacks with scrubbers shall be provided to reduce emissions from the generator/s.
3. Dust Emissions	
Generation of dust and particulate matters is an issue that could arise due to construction activities.	The construction materials e.g. soil, clay would be covered appropriately. Instead of open and dry dumping, sprinkling of water in a quantity that reduces the chances of dust generation would be done.

	The workers would be provided safety gloves, masks and ear buds and wherever necessary goggles to avoid health complications.
4. Noise Generation	
Noise emissions due to transportation, movement of heavy materials, excavation, generators may create health nuisance for the workers and local community.	The working hours shall be limited to 08 in the morning till 05 in the evening to avoid noise during night shift. Vehicle maintenance would be ensuredso that emissions of any sort, be it gaseous emissions or noise generation, would be controlled. The workers will be provided with ear plugs and other personal safety equipment to avoid invoking of any health issues.
5. Solid Waste Generation	
Unplanned dumping of solid waste generation during construction phase can lead to blockage of roads, waterways and also create unaesthetic sight of the proposed location.	Solid waste generation quantity during construction phase shall be reused in construction activities rather than dumping. The solid waste during construction phase will consist most of soil, packaging materials, iron rods and food leftovers. The organic portion of solid waste shall be collected by sanitary workers ofthat area.
6. Wastewater Generation	
Unplanned wastewater disposal may contaminate the surface water channels, surface soil and depending upon the quantity of wastewater generated, it has a potential to contaminate the ground water aquifers.	Wastewater generation during construction phase shall be reused again for material making for construction phase and sprinkling of dust on soil. A Septic tank unit shall be constructed for onsite sewage treatment prior to discharge into nearby Nala.

7. Accidental Spills	
Accidental spills of oil, fuel and lubricants can cause surface water contamination and surface soil contamination. It may also lead to fire hazards depending upon the quantity and nature of spills.	Accidental spills shall be avoided by providing spill kits at different places and also ensuring the safe transportation of different raw material that may be in liquid state.
8.Equipment Breakdown/Accidents	
Accidents and/or emergency breakdown of the equipment/machineries/vehicles involved may create environmental, health and safety hazards.	This situation can be avoided by regular maintenance of the vehicles for quality assurance. Besides, equipment will be checked prior to operation to avoid accidents and human health danger due to such accidents.
9. Soil Erosion	
Loss of vegetation cover and trees may lead to soil erosion hence resulting in dust emission and loss of fertile land cover.	The construction activities shall be planned in a way that reduces the chances of vegetation cover loss and itsconsequent soil erosion issues. Soil erosions are due to wind and water. The proposed project is planned for construction during the coming months after Environmental Approval, which are dry and sunny. Hence, the probability of soil erosion due to natural factor will be negligible to none.
10. Social Impacts	
Problems regarding privacy of local community may arise due to invasion of construction workers.	Improper social behaviors e.g., staring and teasing shall be discouraged and any such incident will be reported to the site in-charge, proponents directly. Workers will be hired from the local community to avoid social issues.

11. Training and Awareness	
Unskilled workers may create issues in attaining the overall health environment and safety policy.	Regular onsite and offsite training of the workers shall be conducted. Impromptu meetings and discussions with the site in-charge and daily wages workers will be done to resolve any issues that may create health safety and environmental problems during construction phase.
For Operation Phase	
1. Solid Waste Management	
Improper and unplanned solid waste dumping can cause environment, health and safety issues. It also can potentially deteriorate the living quality of the residents besides reducing the aestheticquality of the steel mill.	At the site, only solid waste will be domestic like paper, polythene bags, etc. which will be collected by sanitary workers of that area.
2. Wastewater Disposal	
Wastewater generated due to domestic/commercial activities will result in the spread of vector borne diseases like dengue, malaria, as well as spread the nuisance of foul smell.	To tackle wastewater, septic tank will be constructed. The wastewater will be of domestic nature and of cleaning type, etc.
3. Energy Conservation	
Excessive use of energy will exert more pressure on the already dwindling energy resources of the city/country.	The workers/employees will be encouraged to follow energy conservation strategies developed during operational phase. Machineries and equipment will be kept in good maintained shape to avoid extra fuel consumption. As the power source shall be in house through self-generation, therefore, no pressure shall be exerted on existing national grid.

4. Noise Generation	
Noise emissions due to traffic and anyactivities will create issues to the residents.	There will be no such activity that may create excessive noise. There will be small machinery that creates less noise (within the standards) during working hours.
5. Emergency/Fire Hazards	
Emergencies e.g. fire incidents may leadto environmental, health and safety issues to the local residents.	Emergency exits have already been planned. Firefighting equipment will be provided and adequate trainings will be provided to tackle any situation of fire hazards. Callpoints at suitable locations will be installed. Moreover, there is not any residential settlement or village near the project site which could be harmed from such hazard.
6. Training of Staff	
Unskilled personnel will not be able to tackle environmental, health and safetyrelated situations which may further aggravate any such issues and cause loss of human life and property.	Regular training of the staff will be conducted. Proper monitoring and reporting mechanism will be developed where the team will be responsible to communicate/report any illegal or hazardous situation to the team leader.

6. Groundwater Consumption	
The groundwater will be used for domestic purpose at said project. Water storage will also be required for emergency response in case of a fire. Prolonged water consumption may in the long run lower/deplete the underground water table. This will be a permanent and moderate negative impact.	An effective 'Water Conservation Plan' will be developed and for domestic purpose water will be gained from ground water. Following operational measures will be adopted for water conservation: • It will be made sure that all faucets, circulating pumps, etc. do not leak and are in good repair; • Any leaking or dripping faucet, pump or toilet will be reported immediately; • All the utility bills will be kept in a safe place to track the consumption of water; and purchase and use of water-saving equipment will be practiced; • An effective residents' training program will be implemented about water conservation

Persons involved during constructional and operational phase must be aware of following responsibilities and equipment, maintenance details:

Table 6.3: List of persons involved during implementation of EMP

Sr. No.	Description	Responsibility	Who will be involved	Outcomes
1	Air Quality	Administration	All employees	• Better understanding of the health impacts associated with air pollution • Develop a monitoring and reporting system for air pollution • Third party involvement especially EPA approved labs will be decided under potentially harmful circumstances
2	Solid Waste	Administration	Staff	• The staff will be trained to follow the principles of recycling, reuse, reduce andwwill be taught to follow solid waste segregation at source.

				• Improved understating regarding health impacts associated with unplanned waste management • A monitoring and reporting system that would enable the supervisor to keep control of all unnecessary scattering
3	Wastewater	Administration	Employees but specific attention to the staff	• Improved understanding of the conservation techniques • Quality assurance through lab analysis if need be found • Overflow control in the drains through continuous cleaning
4	Noise	Administration	All employee	• Monitoring and reporting system for noise related issues if detected

				• Appropriate measures would be identified and implemented • Guidance to the employee on adopting good practices for noise and any other practice that otherwise could lead to environmental nuisance.
5	Firefighting	Administration	All employee	• Improved understanding of keeping a tab on all potential threats that could lead to fire hazards • Understanding on how to use the firefighting equipment • Understanding regarding emergency exits and use of fire point.
6	Landscaping	Administration	Staff	• Improved efforts for maintaining the green belts and tree plantations
7	Accidental Spills	Administration	All staff	• Improved understanding regarding how to react during minor and major spills according to the measures identified

6.6 Emergency Preparedness Plan

In order to cope with emergency due to major fire hazards, a proper fire escape plan has been designed. A proper **emergency escape** is present in the building along with **fire extinguishers**

at each floor.

Fire Alarm and detection System

Fire alarm system is also installed. The occupants/security guards who detect the firemust inform the others in the shortest possible time. They may operate fire alarms, shout and use telephone (line and cellular).

The system comprises the following.

- Smoke detector
- Call points
- Control panel in security room
- Fire signs
- Calling the Fire Brigades

The contacts (telephones, call and fax numbers) of local fire brigades will be boldly written at prominent place and on the notice boards so that any person may call them for immediate assistance

Medical Aid

- Information be immediately passed to the nearby medical hospitals and centers for recovery of the wounded persons. Also, first aid boxes should be kept in the factory area.

6.7 Equipment Maintenance Detail

All the machinery and other equipment at work place will be properly tuned, oiled and monitored after a specific interval of time to ensure the efficiency of equipment.

6.8 Environmental Budget

The total cost of the project is Rs. 6036 Millions, which includes 1,080,000 Pak Rupees for the environmental management. The estimations are as followings:

6.9 Environmental Management Cost

The following table depicts environmental monitoring and management cost for operation phase.

Table 6.4: Environmental Management Cost (Per Year)

Environmental Component	Quantity	Amount (PKR)
Tree Plantation	2000	85,0000
Health & Safety measures and provision of PPE's	L.S.	425,000
Air, Water Quality & noise Monitoring	L.S.	230,000
Environmental Trainings	L.S.	340,000
Total Environmental Management and Monitoring Cost.		1,080,000

CHAPTER 7
STAKEHOLDER CONSULTATION

7.1 General

This section deals with the public concerns about the said project. Stakeholders' involvement especially the local population is an important feature of the environmental assessment and can lead to a better and more acceptable decision making regarding the project design and its implementation. It gives the feeling of an ownership to the local population.

Keeping in view the requirement of 'Review of IEE/EIA Regulations 2022' the consultations were carried out with the stakeholders/public. The outcomes of the public consultations are discussed in this section of the report.

7.2 Objectives

The objectives of stakeholder consultation were to contribute openness, transparency and dialogue. The concerned stakeholder groups were identified to include in the assessment process. The objectives of stakeholders' engagement include:

- Informing the stakeholders about the proposed project;
- Providing an opportunity to those who remained unable to present their views and values, therefore, allowing more sensitive consideration of mitigation measures and trade-offs;
- Providing those involved with planning the proposal with an opportunity to ensure that the benefits of the proposal are maximized and that no major impacts have been overlooked;
- Providing an opportunity for the public to influence the project design in a positive manner;
- Increasing public confidence in front of proponent, reviewers and decisionmakers;
- Providing better transparency and accountability in decision making;
- Reducing conflict through the early identification of contentious issues and working through these to find acceptable solutions;
- Creating a sense of ownership of the proposal in the minds of the stakeholders;and
- Developing proposals which are truly sustainable.

7.3 Stakeholder's identification

There are two types of stakeholders, i.e.

a. Primary Stakeholders
b. Secondary Stakeholders

7.3.1 Primary Stakeholders

The primary stakeholders are the initial stakeholders, such as affected persons, general public and women residing in the project area. Accordingly, the consultations / focus group discussions were made with all primary stakeholders for sharing of information about the proposed project and expected impacts and understanding about the concerns by category of stakeholders.

7.3.2 Secondary Stakeholders

The secondary stakeholders are the representatives of Government Departments/Agencies involved in the planning, design, implementation and operation of the project, including various government departments such as District Administration.

7.3.3 Stakeholder Engagements Planning

A two fold stakeholder engagement is planned and carried out for the proposed project as follows:

(a)Stakeholder Consultation during the Preparation of EIA Report

The consultation with the primary and secondary stakeholders has been conducted initially during the preparation of the EIA report, details of which have been givenin the subsequent paragraph at 10.4.

(b)Stakeholder Consultation / Public Hearing during the Approval of the Project

The proponent is bound to complete as a regulatory obligation by the Environment Protection Agency (EPA), Punjab to conduct such Consultative Event known as "Public Hearing" under Section 12(4) of Punjab Environment Protection Act, 2012. This process shall be carried out during the review of the project to get the Environmental approval from the EPA, Punjab, Pakistan.

During this process, following activities shall be carried out.

i. The proponent shall cause to be published, in any English or Urdu national newspaper, a public notice mentioning therein the type of project, its exact location,

ii. The public notice issued shall fix a date, time and place for public hearing of any comments on the project or its EIA. The date fixed for public hearing shall not be earlier than 07 days from the date of publication of the notice.

iii. The EPA shall also ensure the circulation of the EIA to the concerned Government Agencies and solicit their comments thereon.

iv. All comments received by the EPA from the public or any Government Agency shall be collated, tabulated and duly considered by it before its decision for approval.

7.4 Stakeholder Consultation Process

The overall strategy for stakeholder's consultation is as follows:

Table 7.1: Process of Stakeholder Consultation

Stakeholders	Purpose of Consultation	Methodology	Stage
Primary Stakeholder	• Information gathering and data collection	- Focus group Discussions	- Baseline Study Impact Assessment
	- Information sharing about the project - Opinion seeking (concerns and expectations)	- Household surveys - Formal and informal community meetings	

Secondary Stakeholder	▪ Participation in the development process ▪ Information gathering ▪ Authentication and validation of the development processes ▪ Verification of the record	▪ One on one meetings ▪ In-depth interviews	▪ During the EIA preparation ▪ On need basis during the project implementation

Stakeholder consultation for this project was planned during the preparation of EIA report. In first step, during the scoping, which has already taken place, consisted of meetings with individuals, groups, relevant organizations and government departments, which are in some way linked to the project and therefore considered stakeholders. The meetings were conducted to inform stakeholders about the project and how it may affect their lives/activities, and to record their concerns, whether real or perceived. Through the use of various tools, the study team tried to involve the stakeholders in active decision-making. The results of this exercise are described below, where mitigation measures have been developed addressing the pertinent stakeholder concerns.

7.5 Primary Stakeholders' Consultation

Apart from gathering of quantitative data through household survey of the area of influence of the project and survey of local community to share the information about the project and record their concerns/ feedback associated with this project. In this context, nearest community shared their view point regarding the assessment especially procedure for entering their concerns, employment opportunities, and implementation of the project. A list of public consultations is presented in the belowTable - 7.2.

7.5.1 Topics for Discussion

The topics discussed in the consultations were:

- Employment and livelihoods of communities
- Gender and women issues
- Contractor's camp and access
- Environmental issues during construction and operation of project

7.6 Company Responsibility for Employment

All possible impacts and mitigation measures related to the project were discussed with the proponent and management. They assured to take all suggested mitigation measures to control any discrepancy arose by the project and to make the project environment friendly.

7.7 The Responsible Authority

Etihad Alloys Private Limited shall be the responsible authority to take all measures prior to start the project and during operation phase.

7.8 Other Departments and Agencies

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

7.9 Environmental Practitioners and Experts

Team of ECTECH visited the project site, had discussion with stakeholders and consulted with the local people of nearby and other villages to evaluate the project socio-economic impacts. People of the area belong to different professions like mostly belong to labourers, farmers, employment and to some extent to own businesses. People provide the massive information about the project and have positive remarks regarding the project development.

7.10 Community Concerns

7.10.1 Project Approval

The community consultations demonstrated that goodwill towards the project proponents indeed exists; approval for project activities by the communities was evident. The consultations were considered a good gesture and appreciated, especially by the men and women. This project will provide employments to the local as well as non-local poor community in its construction as well as operational stages.

7.10.2 Resettlement/ Relocation

The proposed site comprises a plot already owned by proponents of the project. Therefore, there shall be no issue regarding resettlements.

7.10.3 Local Employment

Communities in the project area emphasized that local poor segment should be given priority when employing people for various project-related works and activities according to their skills.

7.10.4 Interaction with Local Community

Non-local work force coming in the project area that will not be aware of the local customs and norms, may result in conflicts with the local community, keeping in mind the sensitive law and order situation and culture of the area.

7.10.5 Meetings with Secondary Stakeholders

The secondary stakeholders were consulted on different occasions during the preparation of EIA to seek their inputs, feedback and opinion on the design and scope of the project. The stakeholders supported the proposed project provided that environmental and other project related issues are addressed through mitigation measures and best management practices.

7.10.6 Identification of Stakeholders

During the course of identification of primary, secondary and tertiary stakeholders, it was expected/predicted that following stakeholders including people, government departments and non-government organizations may be affected positively or negatively, directly or indirectly with the development of proposed project:

- Project Affected Persons
- General Public residing in the Project Influenced Area
- Schools & Colleges
- Madrassas
- Local Administration–District and Tehsil Administration of Rahim Yar Khan
- Agriculture Office, Rahim Yar Khan
- District Office Irrigation, Rahim Yar Khan
- Tehsil Office Agriculture, Rahim Yar Khan
- Education Office, Rahim Yar Khan
- Wildlife Office, Rahim Yar Khan
- Livestock Office, Rahim Yar Khan
- Environmental Protection Agency, Rahim Yar Khan
- Non-Governmental Organizations

7.10.7 Study Approach and Methodology

Following methodology and approach were used for the present study:

7.10.7.1 Study Area

The area around EAPL as a whole was the part of our study boundaries but specifically, it included 9 major localities namely Basti Qadirabad, Basti Jam Dilawar, Mudh Haider, Basti Kumb Chachran, Basti Bassa, Basti Haji M. Ramzan Sappal, Basti Ismail, Basti Ghulam Nabi, Blaki wali, Basti,Jam Nibhao and their subdivisions or extensions situated around the project site. These localities are situated in various union councils of Tehsil Rahim Yar Khan.

7.10.7.2 Universe

Universe of the project study area included the entire adult male population living around the project site in above mentioned localities.

7.10.7.3 Data Processing

Statistical and computer applications were used to codify, organize and tabulate data collected from various sources. During processing of the data, only relevant and valid information were included for empirical analysis to establish the realities of the community and its people.

7.10.7.4 Sample Size

The distribution of sample for both farm and non-farm houses from each of the nine localities has been shown below in Table 7.2

Table 7.2: Numbers of Respondents from Each Locality

Sr. No.	Locality/Settlement	Union Council	No. of Respondents
1.	Basti Qadirabad	Blaqiwali , Kot Mehdi Shah	03
2.	Basti Jam Dilawar+ Mudh Haider	Blaqiwali	18
3.	Basti Kumb Chachran-Mauza Bhutta Kot	Murtaazabad	12
4.	Basti Bassa –Mauza Karamabad	Blaqiwali	08
5.	Basti Haji M. Ramzan Sappal-Mauza Abdullah Pur	Blaqiwali	06
6.	Basti Ismail-Mauza Abdullah Pur	Blaqiwali	10
7.	Basti Ghulam Nabi- Mauza Karamabad	Blaqiwali	04
8.	Blaqiwali- Mauza Karamabad	Blaqiwali	04
9.	Basti Jam Nibhao- Mauza Abdullah Pur	Blaqiwali	05

7.10.8 Data Sources and Collection Methodology

A qualitative and semi-quantitative methodology was adopted to conduct this study. The study included the collection of both primary and secondary data through following steps:

7.10.8.1 Scoping Sessions

A structured moderator guideline was formed to steer the discussions. Focus groups were organized in each locality of the study area. Detailed group discussions were organized; these were held in the open spaces, drawing rooms and along roadsides. The target respondents including local authorities, government officers and public representatives were interviewed. Prior to consultation, the stakeholders were informed about the date, venue and time of consultation through personal contacts. During the discussion, the relevant responses, opinions, beliefs and attitudes were observed and recorded.

7.10.8.2 Focus Group Discussions

A semi-structured interview schedule was used as a tool for data collection. To get the information and feedback about the Project and its potential impacts, Focus Group Discussions (FGDs) were held during the scoping sessions. Before FGDs initiation and open discussions to some particular issues, a briefing about the Project was given to the participants, which helped them to foresee the impacts. Personal observations were also included in the methodology in order to collect relevant information about locality and people of the community.

7.10.8.3 Wayside Consultations

Along with scoping sessions and FGDs, wayside consultations were carried out with different representatives of the community who have or may have any kind of indirect impact by the Project. These stakeholders included individuals, comprising of pedestrians, drivers, passengers, vendors, shopkeepers, local inhabitants, officials, representatives of NGOs, teachers, students, etc. The basic purpose of such type of consultations was not only to get the feedback about the Project potential impacts and community perceptions but also to disseminate the information of the Project to maximum number of people/communities.

7.10.8.4 Secondary Data

Secondary data was also used to collect important information regarding localities, the people and the project. For this purpose, published data provided by the relevant sources or departments as well as filed investigations already carried out by this consultant were used.

A list of persons from general public consulted during SS, FGD and WSC is presented in Table 7.3.

Table 7.3: Locality Wise List of Respondents Interviewed

Sr. No.	Date	Venue	Union Council	No. of Participants	Name of Main Participants
1.	25/05/2023	Basti Qadirabad	Blaqiwali	03	Abdul Nabi S/o Qadir Bakhsh chachar (0300673991), Qadir bakhsh S/o Pehlwan Chahchar, Ejaz Ahmad S/o Qadir Bakhsh chachar
2.	25/05/2023	Basti Jam Dilawar+ Mudh Haider	Blaqiwali	18	Munir Ahmad S/o Rais Ghazi (03073636866), Haji Nazeer Ahmad S/o Sardar Ahmad, Rais Shahbaz S/o Rais Nazir, Tanvir Ahmad S/o Munir Ahmad, Imtiaz Hussain S/o M. Shafi, Mubashir Ahmad S/o Ghulam Haider, Ghulam Abbas S/o Haji Allah Dita
3.	25/05/2023	Basti Kumb Chachran	Murtaazabad	12	Shuakat Ali S/o Abdul Aziz (03016783316), M. Asad S/o Abdul Hafeez, Ghulam Nazir S/o Rais Allah Ditta, Abdul Hafiz S/o Abid Hussain, Abdul Razzaq S/o Shabbir Ahmad, M. Wasim S/o Imam Bukhsh, Junaid Iqbal S/o M. Iqbal
4.	25/05/2023	Basti Bassa – Mauza Karamabad	Blaqiwali	8	Ch. Ashraf S/o M. Hussain –Ex Councilor (03027803417), M. Mushtaq S/o Sardar Muhammad, M. Sadiq Ayaz S/o Nazir Ahmad, M. Waqar Ali S/o Liaquat Ali, Qasim Ali S/o M. Asghar, Liaquat Ali S/o Feroz Din, M. Hafeez S/o Sardar

					Muhammad, Zeeshan Ali S/o M. Ramzan
5.	25/05/2023	Basti Haji M. Ramzan Sippal- Mauza Abdullah Pur	Blaqiwali	06	M. Hamza Jameel Sippal S/o H.M. Jameel (03007012898), Jam M. Awais S/o Jam Saif ul Rehman, Waqa Ali, S/o Manzoor Ahmad, Nazik Ali S/o Ghulam Qasim, M. Ilyas S/o Manzoor Ahmad, Jam Saif ul Rehman S/o Allah Diwaya 03006704425
6.	26/05/2023	Basti Ismail- Mauza Abdullah Pur	Blaqiwali	10	M Ashfaq S/o Fateh Muhammad (03083769556), M. Abrar S/o M. Safdar, M. Ikram S/o M. Akhtar, M. Azad S/o Fateh Muhammad, Noman Safdar S/o M. Safdar, M. Asif S/o M. Shafi, M. Khalid S/o M. Siddique, Dr. Nawaz S/o Fateh Muhammad, Sharafat Ali S/o M. Azam
7.	26/05/2023	Basti Ghulam Nabi- Mauza Karamabad	Blaqiwali	04	Ghulam Nazik S/o Jam Allah Bchaya (03047293458),Haji Baksh Ali S/o Jam Paru, M/ Asif S/o M/ Muslim, Jam Safdar S/o Jam Kabeer
8.	26/05/2023	Blaqiwali- Mauza Karamabad, Kala Dhora	Blaqiwali	04	M. Dilshad S/o Gulsher Pahor (03003837592), M.Hanif S/o Ghulam Farid, Nadeem Ahmad S/o Habib Ahmad, Abdul Wahab S/o Jam Jumma
9.	26/05/2023	Basti Jam Nibhao- Mauza Abdullah Pur	Blaqiwali	05	M. Sadiq S/o Abdul Majeed Sappal, Asghar Ali S/o M. Boota, M. Hanif S/o Deen Muhammad, Abdul Haleem S/o Ghulam Hussain, M. Akmal S/o Ghulam Sarwar













Plate-a-z: Some Glimpses of Public Consultation

7.11 Outcomes of consultations

The outcomes of the primary and secondary consultation are precisely briefed as below:

- All actions associated with the project should be taken through properconsultations.
- There should be a continuous community consultation program throughout the project implementation period.
- There should be employment opportunities for skilled and unskilled people, preference should be given to the local communities.
- To include local people wherever possible in jobs during the construction of project. Thus, income generating activity of the area should be enhanced.
- Reduce the chances of environmental effects like noise/ vibration and dust emissions caused to the nearby community.

Overall, the project is good for the surrounding residents in specific and the country in general. They have no serious concerns with the project because this project will increase the employment and enhance the luxury lifestyle with affordable cost.

CHAPTER 8
CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion and Recommendations

The Environmental Impact Assessment contains description of the project, description of the environmental baseline, potential environmental impacts and suggested mitigation measures. An implementation mechanism for mitigation measures in the form of an Environmental Management Plan is included in the study. While the objectives of this study have been to describe the project and its environmental impact, it also identifies adverse environmental factors associated with the project. Appropriate mitigation measures as explained in the environmental study should reduce, if not eliminate, these impacts so that these are within acceptable limits. It is further concluded that all potential environmental concerns associated with the project have been adequately addressed, and no further study is required in this context.

Based on the study conducted for Environmental Impact Assessment (EIA) of the project, the following recommendations are made:

- Plantation as far as permissible and within the scope of the project be carried out.
- Sustainable development approach through conservation of natural environment be followed.
- Environmental aspects of the project should be well taken care through implementation of the Environmental Management Plan as recommended in this report.
- The project management may adopt "cleaner and greener environment" as its motto and this will make the project more environment friendly.

On the basis of the findings of EIA, it is recommended that the project will not pose any adverse impact on the local population and the environment. Therefore, it is recommended that the competent authority may please issue Environmental Approval for the construction and operation of this project.

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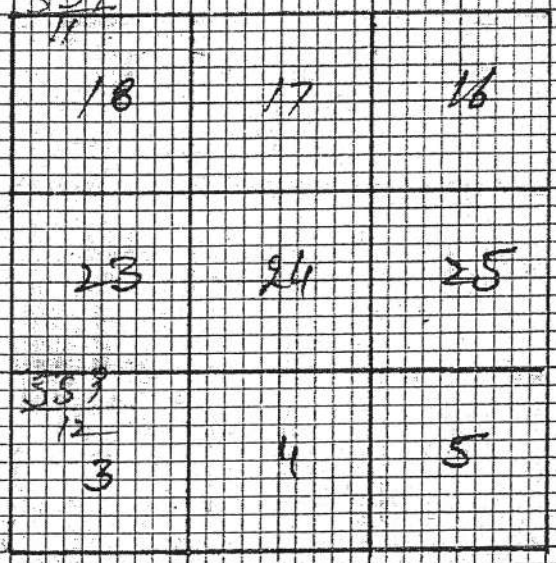
Regulations

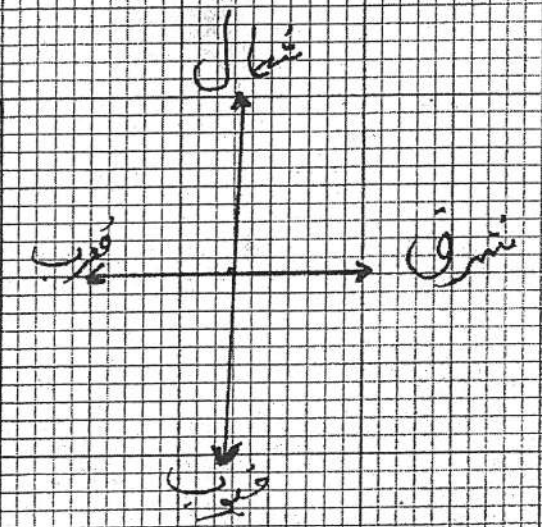
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ANNEXURES

Annexure-I

AKS-E-SHAJRA

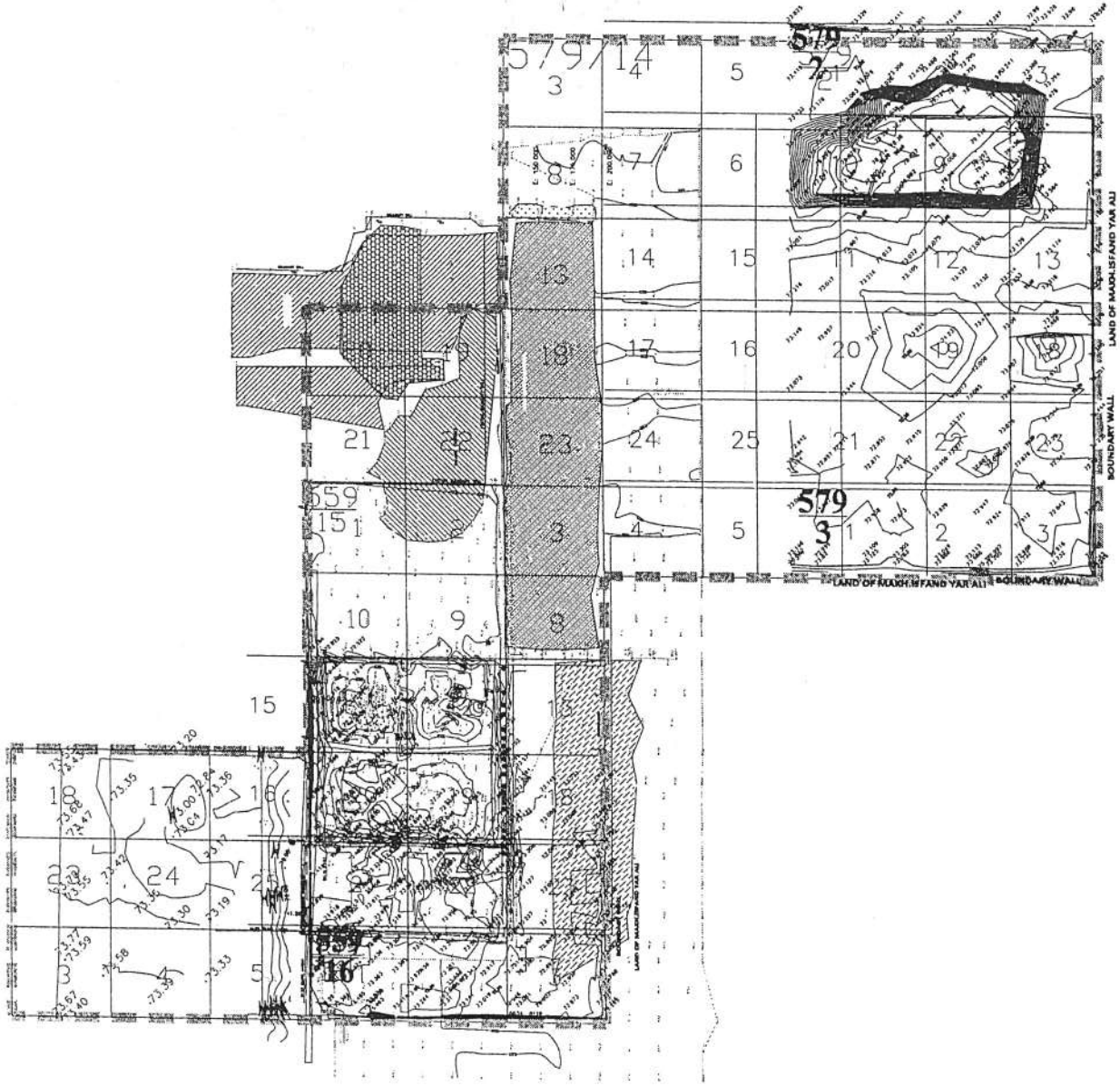

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شمال
مشرق
مغرب
جنوب

Annexure-II

Topographical Survey Map

Appendix - 16.3.23



PLANI NORTH
TRUE NORTH (N.T.S. NOTE-2)
PREVAILING WIND

Notes & Abbreviations:

Legend:

- Boundary of SESESZ:
- Exiting Water Course Katcha
- Exiting Rough Road
- Exiting Cultivated Switchyard
- Exiting Tree
- Exiting Electric Pole
- Exiting Baggase Storage's
- Exiting Soiling Limit
- Exiting Substation Building

Summary:

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
1	28-12-2022	ISSUED FOR APPROVAL	MJ	SAQ	SAQ

TITLE:	Topographical Survey Map
DRAWN:	MJ
CHECKED:	SAQ
DEVELOPER:	ETIHAD Alloys Pvt Ltd.
APPROVED:	SAQ
MAIN CONSULTANT:	ENGCON
DATE:	27-03-2022
ENGG CONSULTANT:	ENGCON

ETIHAD ALLOYS (PVT) LTD.
HEAD OFFICE: 4- Bawa Park Upper Mall Lahore.

Sheet Size: A1	Scale: 1:250
Dwg No.:EAPL-30- TP-6-DR-03	Rev: 1

Annexure-III

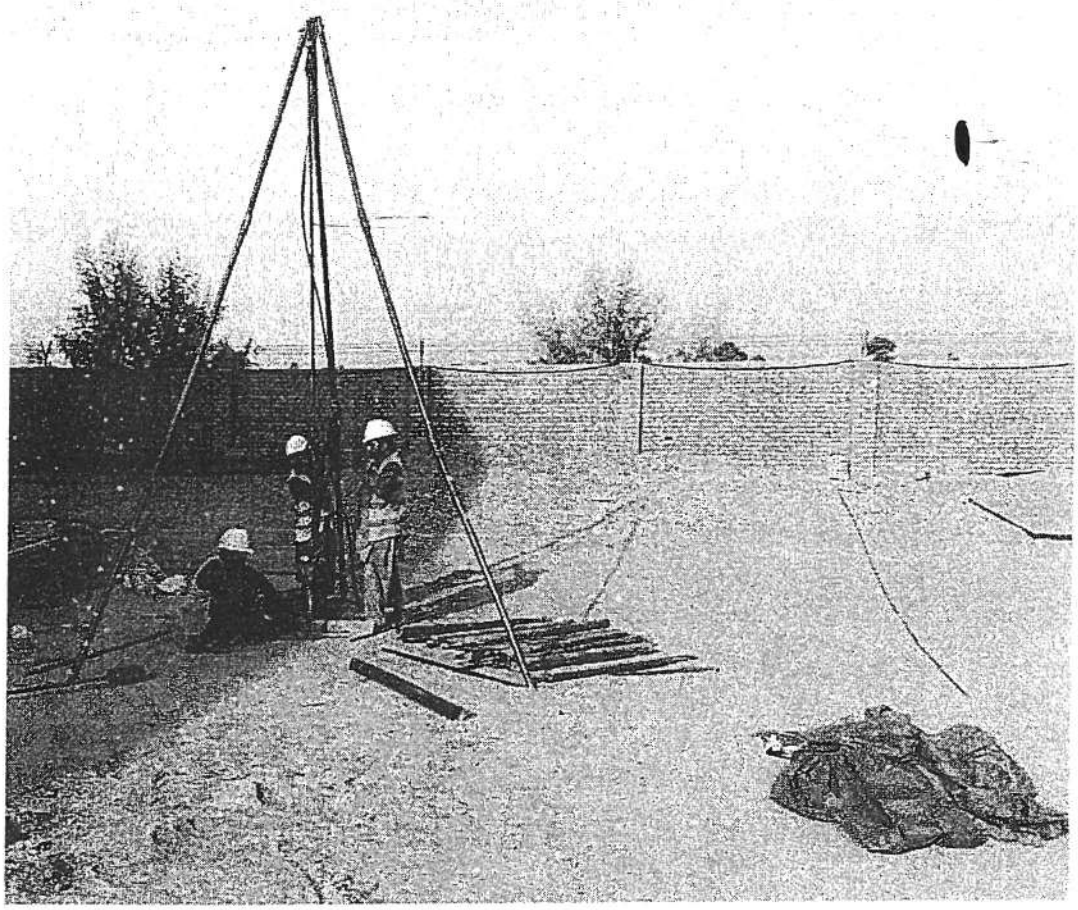
Geotechnical Investigation Report

GEO DRILLERS ENGINEERING®

A Geotechnical Investigation Report supported analysis

For

Proposed Construction of "ALLOY PLANT", Etihad Alloys (Pvt.) Ltd., Rahim Yar Khan



DOCUMENT # GDE/GT/100/21

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DISCLAIMER

The following notes should be read in conjunction with the report;

- The recommendations made and opinions expressed in this report are based on the boring records, the examination of samples and the results of the site and laboratory Tests. Possible variations of the underground conditions, not revealed by the current Investigation cannot be disregarded.

- There are many uncertainties in determining the allowable bearing pressure of the soil. A number of uncertainties can be summarized as the complexity of soil behavior, the lack of control over environmental changes after construction as well as the incomplete knowledge of subsurface conditions. These uncertainties have to be evaluated for each site and a suitable safety factor shall be assigned. As a general rule, the assigned safety factor for sites with limited soil exploration shall be increased since the factor of safety depends not only on the structural information but also on the reliability of soil parameters.

- The interpretations and recommendations contained in this report are based on the Results of then-situ and laboratory tests performed at the time of investigation. A Generalized continuous subsurface succession has been inferred from these findings, the accuracy of which cannot be assured at locations other than those investigated.

- Our professional services have been performed using the degree of care and skill ordinarily exercised under similar conditions by reputable qualified Engineers.

- Geo Drillers Engineers cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

Proposed Construction of "ALLOY PLANT", Etihad Alloys (Pvt.) Ltd., Rahim Yar Khan

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APPENDIX-A	Borehole Logs
APPENDIX-B	Laboratory Test Results
APPENDIX-C	Site Photographs
APPENDIX-D	S te Plan

1. INTRODUCTION

Geo Drillers Engineering (GDE) was engaged by the Client to carry out a subsurface soil investigation campaign at the site for Proposed Construction of "ALLOY PLANT", Etihad Alloys (Pvt.) Ltd., Rahim Yar Khan. This report pertains to the project a brief description of the geotechnical tasks performed at site as well as results of the in-situ field and laboratory tests. The report presents an assessment of the general geotechnical conditions at the investigated site. Specific recommendations for the foundation design are included in this report.

The investigation was performed in accordance with the scope of work stipulated by the client and comprised several tasks that included drilling of boreholes to the designated depths below the existing ground level, in-situ testing and sampling of the sub-soil through standard penetration tests (SPTs) at different depth horizons, laboratory analysis. The scope of GDE services also included preparation of a geotechnical report describing the methodology and presenting results of all the geotechnical investigation, recommendations for foundation design.

This report contains the results of field & laboratory investigation and a brief description of the techniques employed during the field works as well as methods used in performing the laboratory tests. The evaluation of geotechnical parameters together with recommendations for foundations and geotechnical work related to design & construction of foundations is also included in this report.

The borehole logs and laboratory test results are presented in APPENDIX respectively.

2. PURPOSE AND SCOPE OF WORK

The purpose of the present investigation was to assess the prevailing geotechnical conditions at the site and to verify the geo-engineering properties of the deeper subsurface soil strata which will significantly affect the foundations behaviour. The field investigation program comprised of the following:

1. Drilling and sampling of a total of Nine (09) boreholes, Seven (07) Boreholes drilled down to a depth of 80.0 ft. & Two (02) Boreholes drilled down to a depth of 50.0 ft. from surface level at the location designated by the consultant.
2. In-situ testing and sampling of overburden soil by performing Standard Penetration Tests (SPTs) at each 5.0 ft. from surface down to maximum borehole depth.
3. Conducting necessary laboratory tests on selected soil samples retrieved from the boreholes.
4. Preparation of a geotechnical report presenting the investigation procedures and the results of the in-situ and laboratory tests together with recommendations for foundations design and construction.

3. FIELD INVESTIGATION

A total of Nine (09) boreholes drilled at site down to a depth ranging from 80.0-50.0 ft. from surface level. The borehole logs are presented in APPENDIX-A.

3.1 DRILLING OF BOREHOLES

The drilling at each borehole location was carried out using percussion drilling method. Drilling was carried out through a 5" hollow stem auger, using augering method. The Standard Penetration Tests (SPTs) were performed at surface and thereafter at a depth interval of 5.0feet in accordance with ASTM D1586. The drive assembly of SPT consisted of hammer of 140lb. weight, a driving head and a guide permitting free fall of 30inch. The assembly was equipped with split spoon sampler to collect the disturbed samples for necessary identifications and testing. The samples retrieved from the split spoon sampler were examined for their visual identification, packed in airtight polyethylene bags and sent to the laboratory for further evaluation and testing. A record of field observation was maintained in the form of field logs describing the visual identifications (ASTM-2488) of the subsurface materials encountered at different depths, the sampling details and recording the blow count observed in the SPT. These logs were later on refined by incorporating the laboratory test results and are presented in APPENDIX-B.

4. LABORATORY TESTING

Representative soil samples retrieved from the split spoon sampler (SPT) were selected from each borehole. The representative SPT samples were tested in laboratory. The SPT samples were subjected to moisture content, gradation and Atterberg limits in order to identify the subsurface materials. The tests were performed according to relevant American society for testing Materials ASTM. The laboratory test results are presented in LABORATORY TESTING separator.

4.1 SOIL CLASSIFICATION TESTS (ASTM D422)

The classification test performed on selected representative samples of subsurface materials consisted of determination of natural moisture content (ASTM D2216), Liquid Limit and Plastic Limits (ASTM D4318) and Grain-size Analysis (ASTM D422) and sedimentation test by Hydrometer (ASTM D4221-99).

4.2 SPECIFIC GRAVITY OF SOIL (ASTM D 854-06)

Specific gravity tests were performed on selected representative samples of subsurface materials according to (ASTM D854-06).

4.3 UNIT WEIGHT (AASHTO T233-02)

The soil samples retrieved from the boreholes were subjected to density measurement according to AASHTO T233-02 measuring the weight and volume by immersion in water.

Measurements of soil properties in the Laboratory in Table-1 lists various laboratory Tests on Undisturbed and disturbed samples soil samples collected from various depths to find physical properties and strength characteristics.

Measurements of Soil Properties for Proposed Construction of "ALLOY PLANT", Etihad Alloys (Pvt.) Ltd., Rahim Yar Khan

Sr. No	Tests	Performed procedure	Type sample
1	Sample preparation	ASTM(D 2487)	DS/UDS
2	Moisture content	ASTM(D 2216)	UDS
3	Dry unit weight	ASTM(C 29)	UDS
4	Specific Gravity	ASTM(D 854 & C127)	UDS
5	Grain size Analysis	ASTM(D 422)	DS/UDS
6	N- observed	ASTM(D 1586)	DS
7	Atterberg Limits LL,PL,PI	ASTM D4318	DS
8	Direct Shear Test	ASTM D 3080	UDS/ DS

5. RESULTS OF THE INVESTIGATION

5.1 THE SUBSURFACE STRATA

The description of the subsurface soil strata is based on the inspection of soil samples retrieved from the field and later refinements done after laboratory test results. Based upon the results of the field investigation a representative subsurface soil profile has been developed described as follows:

BH. No	Layer Encounter	Type of soil	SPT-N value	Layer Up to	Total thickness
1,2,3,4,5	Layer-1	CL/CL-ML/ML	5~15	0~10	10.0 ft.
1,2,3,4,5	Layer-2	SM/SP-SM	11~37	11~80	70.0 ft.
6	Layer-1	Filling	1~2	0~6	6.0 ft.
6	Layer-2	ML	8~9	7~10	4.0 ft.
6	Layer-3	SM/SP-SM	9~33	11~80	70.0 ft.
7	Layer-1	CL/ML	9~16	0~25	25.0 ft.
7	Layer-2	SM/SP-SM	18~34	26~80	55.0 ft.
8	Layer-1	CL	5~6	0~7	7.0 ft.
8	Layer-2	SM/SP-SM	9~22	8~50	43.0 ft.
9	Layer-1	SM	4	0~4	4.0 ft.
9	Layer-2	CL	6	5~6	2.0 ft.
9	Layer-3	SM/SP-SM	4~23	7~50	44.0 ft.

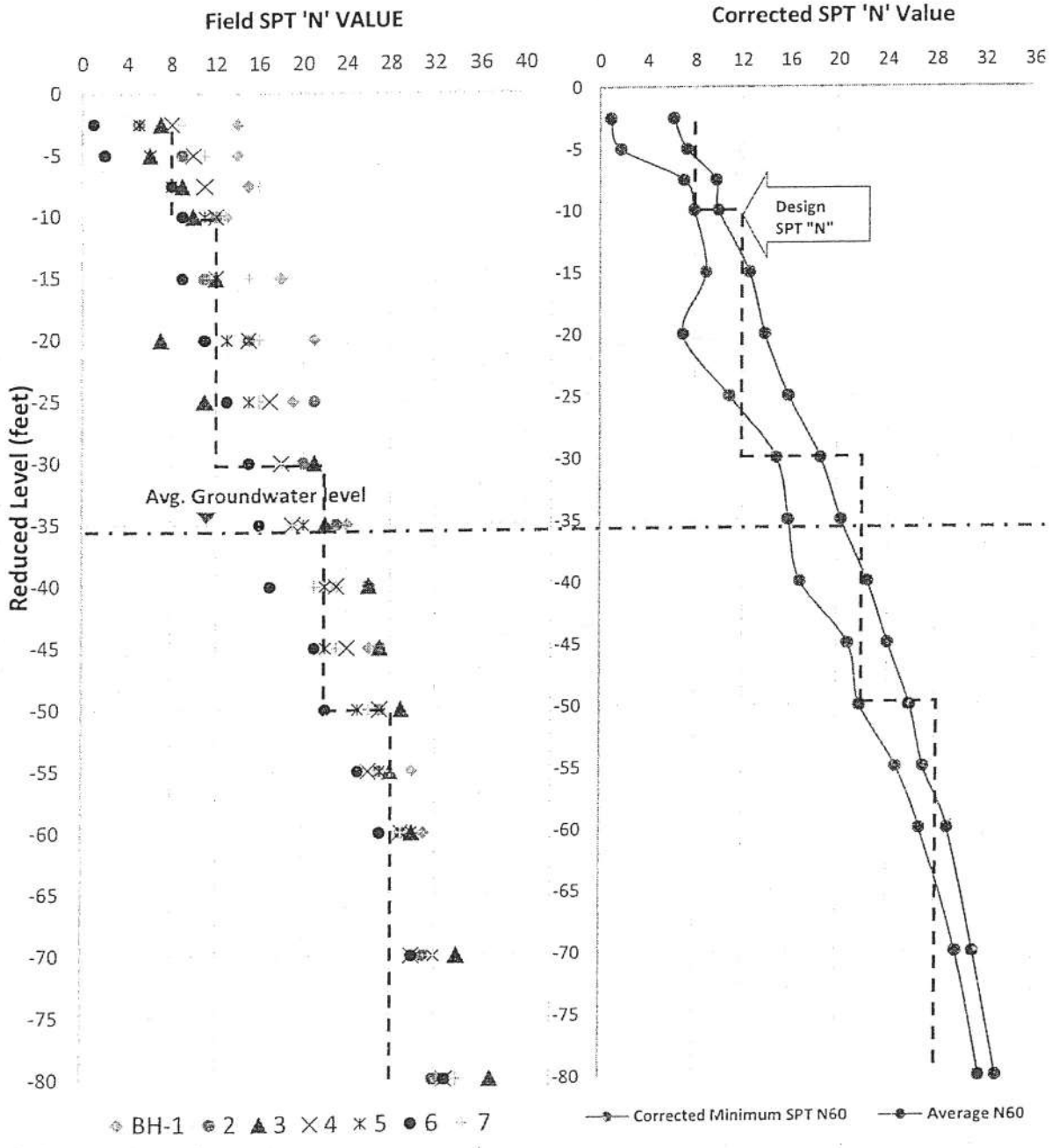
5.2 GROUNDWATER CONDITIONS

Groundwater Table was encountered at only from BH-01 to BH-07 at a depth ranging from 35.0-36.0 ft. during investigation in the 1st Week of July 2021. For establishing the level of the Ground Water Table at other locations, a separate hydro / electrical resistivity study is recommended.

Calculations for Main Structure

Geotechnical Design Parameters

A preliminary assessment of characteristic geotechnical parameter values for soil has been undertaken for each of the strata encountered for the purpose of subsequent preliminary foundation design. The following figures provides the relative density of the subsurface strata, which use to derive the safe allowable bearing pressure for the proposed development.



Graphical Representation of Field SPT "N" & Correction SPT "N" vs Depth

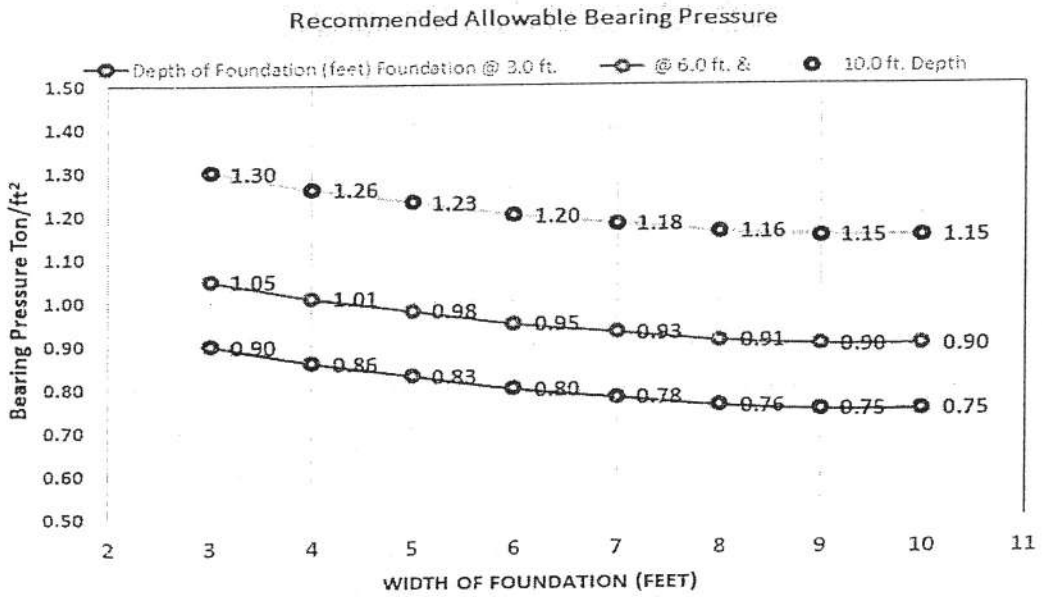
Field SPT "N" correction based on the method developed by Skempton, 1986; Seed, et al., 1985

FOUNDATION EVALUATION & RECOMMENDATIONS

Based on the examinations of the site materials, the field and laboratory testing, engineering analysis and previous practical experience in the area with the soil materials encountered in this investigation, it is our opinion that the proposed structure(s) can be satisfactorily supported by the ground materials at the site subject to the following recommendations:

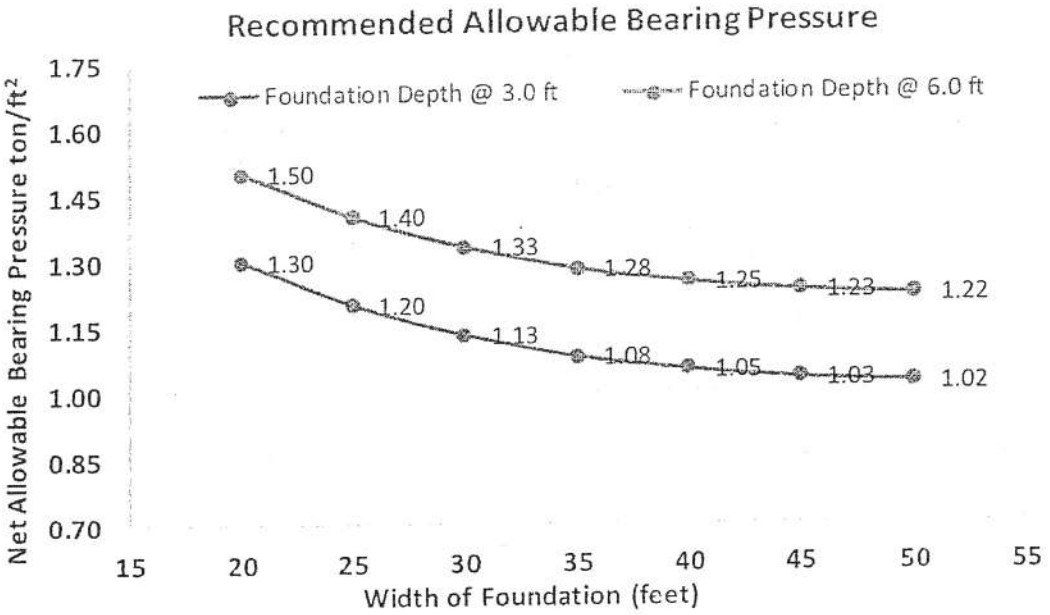
a) Bearing Capacity of Isolated/Strip Foundations

Depth of Foundation (feet)	Width of Foundation (feet)	Net Allowable Bearing Pressure ton/ft^2	Modulus of Subgrade Reaction kN/m^3
3.0*	3.00	**0.90**	10342
	4.00	**0.86**	9882
	5.00	**0.83**	9538
	6.00	**0.80**	9193
	7.00	**0.78**	8963
	8.00	**0.76**	8733
	9.00	**0.75**	8618
	10.00	**0.75**	8618
6.0	3.00	**1.05**	12066
	4.00	**1.01**	11606
	5.00	**0.98**	11261
	6.00	**0.95**	10917
	7.00	**0.93**	10687
	8.00	**0.91**	10457
	9.00	**0.90**	10342
	10.00	**0.90**	10342
10.0	3.00	**1.30**	14939
	4.00	**1.26**	14479
	5.00	**1.23**	14134
	6.00	**1.20**	13790
	7.00	**1.18**	13560
	8.00	**1.16**	13330
	9.00	**1.15**	13215
	10.00	**1.15**	13215



b) Bearing Capacity and Subgrade Reaction of Raft/Mat Foundations

Depth of Foundation (feet)	Width of Foundation (feet)	Net Allowable Bearing Pressure ton/ft²	Modulus of Subgrade Reaction kN/m³
3.0*	20	1.30	7800
	25	1.20	7200
	30	1.13	6780
	35	1.08	6480
	40	1.05	6300
	45	1.03	6180
	50	1.02	6120
6.0	20	1.50	9000
	25	1.40	8400
	30	1.33	7980
	35	1.28	7680
	40	1.25	7500
	45	1.23	7380
	50	1.22	7320



Foundation Construction Note:

Considering the proposed structure and the nature of the revealed strata, shallow foundations by means of **Strip / Isolated footings with tie beams** shall be used to support the applied structure loads.

1).* At Borehole location No. 02 only, Place three (03) layer of compacted granular fill materials (as per AASHTO Soil classification - group A-1-a) of 8 inch thickness each, directly under the proposed foundation level. Level and compact the revealed surface using a heavy duty plate compactor to a minimum of 95% proctor maximum dry density.

2). Prior to laying foundation construction, the soil at foundation level should be compacted to 95% of maximum dry density as determined from a modified Proctor test.

3). The compacted surface should then be protected by immediately covering with a layer of concrete blinding. As a guideline, it is suggested that the blinding layer should be at least 100mm thick, and should extend 100mm to 150mm beyond the edge of the reinforced concrete footing.

Pile Foundations

Pile foundations are used to transfer building loads to deep strata where the soil displays more favourable properties for load bearing than the deposits nearer to the ground surface.

Considering the nature of the project, bored piles can be considered as an alternative option to support the structure, subject to the detailed design and consideration of a piled raft solution.

In the absence of any information about the structural loads or predesigned values, preliminary piles capacities have been calculated for various depth and diameter options. The parameters and capacities given in the following section are preliminary, until verified by final design and live testing on site.

Notes:

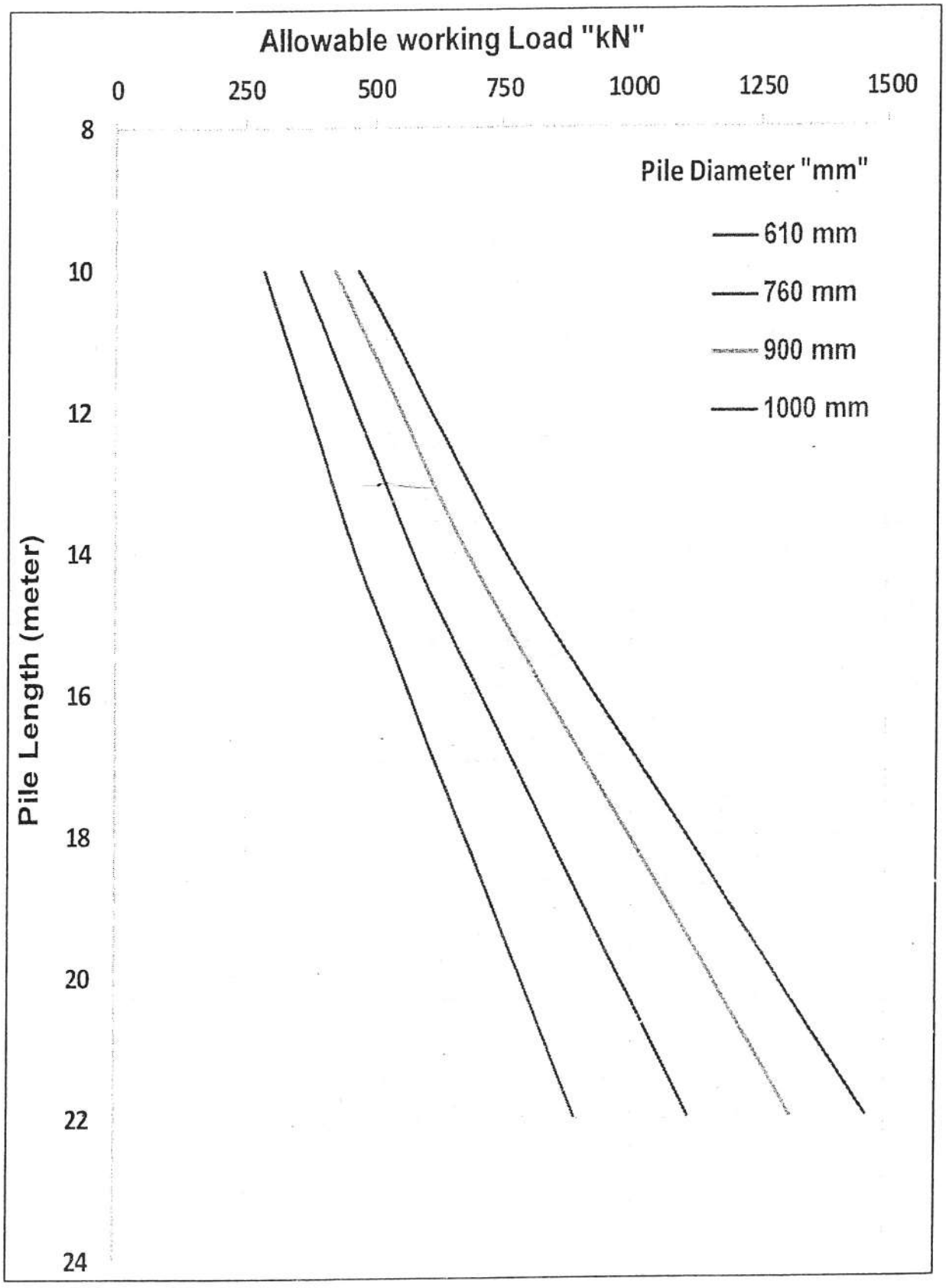
- The Ultimate Skin friction (Shaft resistance) is calculated for each strata along the shaft using the correlation developed by Decourt (1995)
- The Ultimate End Bearing Pressure at the pile toe level is calculated using the relationship by Zhang and Einstein, 1998
- Preliminary Allowable pile capacities for various diameters and depths are calculated considering a factor of safety (FOS) 2.5 for the skin friction and where end bearing capacities have been neglected and can be considered as an additional factor of safety.
- The settlements have been evaluated under the working loads (Pile Design and Construction Practice – M .J Tomlinson 5th Edit. pp298).
- Allowable Uplift pile capacity equals the buoyant weight of the pile plus the skin friction ((Qs + Weight of pile)/3).
- Spring constant for vertical loading is based on the above working load/settlement. These should be verified on site by pile load tests.
- Horizontal modulus of subgrade reaction calculated based on the relation developed by Terzaghi kh = nh $^{Z}/_{B}$ where; Z= Pile length, B=diameter of pile, nh = Co-efficient of Sub-Grade Modulus Variation

Where required by the design, the lateral load capacity of a pier, a single pile or a pile group shall be determined by an approved method of analysis or by lateral load tests to at least twice the proposed design working load. The resulting allowable load shall not be more than one-half of that test load that produces a gross lateral movement of 1 inch (25 mm) at the ground surface (IBC-2006). However, the lateral pile capacity can be taken as 10% of the capacity of the pile in compression. It is strongly recommended that every pile should be tested for its integrity as per ASTM D5882 or any other method statement approved by the engineer. If the results reveal any discontinuity, further detailed analysis should be considered.

Considering the structure, pile cut-off level -1.0 meter from the adjacent ground level is considered.

Table: Preliminary Allowable working load

Pile Dia (mm)	Pile Length m	Skin Friction Qs (KN)	End Bearing Qb (KN)	Allowable Pile Capacity (KN)	Settlement (mm)	Uplift Capacity (KN)	Spring Constant KN/m	Horizontal Modulus kh (KN/m³)
610	10	713	196	285	5.54	209	51489	98361
760	10	888	305	355	6.75	266	52650	78947
900	10	1052	428	421	7.88	321	53420	66667
1000	10	1169	528	467	8.68	362	53882	60000
610	12	932	360	373	9.30	271	40108	118033
760	12	1162	559	465	11.36	345	40915	94737
900	12	1376	784	550	13.28	416	41444	80000
1000	12	1529	968	611	14.64	468	41761	72000
610	14	1152	360	461	9.48	333	48588	137705
760	14	1435	559	574	11.53	423	49801	110526
900	14	1700	784	680	13.44	510	50583	93333
1000	14	1889	968	755	14.80	574	51042	84000
610	16	1417	458	567	9.73	408	58239	157377
760	16	1765	711	706	11.76	517	60037	126316
900	16	2090	998	836	13.67	622	61182	106667
1000	16	2322	1232	929	15.02	700	61841	96000
610	18	1688	458	675	12.10	484	55798	177049
760	18	2103	711	841	14.60	613	57589	142105
900	18	2490	998	996	16.96	737	58720	120000
1000	18	2767	1232	1107	18.64	828	59367	108000
610	20	1959	458	783	12.35	560	63442	196721
760	20	2440	711	976	14.82	709	65853	157895
900	20	2890	998	1156	17.16	852	67368	133333
1000	20	3211	1232	1284	18.83	957	68223	120000
610	22	2230	458	892	12.61	636	70736	216393
760	22	2778	711	1111	15.04	805	73869	173684
900	22	3290	998	1316	17.35	967	75832	146667
1000	22	3655	1232	1462	19.00	1085	76929	132000


Allowable working Load "kN"
0
250
500
750
1000
1250
1500
Pile Length (meter)
8
10
12
14
16
18
20
22
24
Pile Diameter "mm"
610 mm
760 mm
900 mm
1000 mm

Group Piles

Determination of the load bearing capacity of group piles is extremely complicated and is not fully resolved yet. When the piles are placed close to each other, a reasonable assumption is that the stresses transmitted by the piles to the soil will overlap, reducing the load bearing capacity of the piles. Ideally, the piles in a group should be spaced so that the load bearing capacity of the group should not be less than the sum of the bearing capacity of the individual piles. As per the local authority requirements, the minimum spacing center to center for friction plies can be taken 2.5 times the pile diameter. However if the piles center to center is 2.5D than group efficiency factor should be considered which depend on the several factors;

- The number, length, diameter, arrangement and spacing of the piles.
- The load transfer mode (skin friction vs end bearing).
- The construction procedure to install the piles.
- The sequence of installation of the piles.
- The soil/bedrock materials type.
- The interaction, if any, between the pile cap and the soil.
- The direction of the applied load.

Based on the above the axial load capacity of pile groups should be calculated using group efficiency factor "η"

$$\eta = 1 - \frac{\theta(n-1)m + (m-1)n}{90mn}$$

Where;

η: group efficiency factor

θ: Equal $\tan^{-1}$ (B/s) expressed in degrees

n: Number of piles per row

m: Number of rows of piles

B: Diameter of single pile

s: Centre to centre spacing of piles

Cement Type

American Concrete Institute (ACI 318) gives the requirements for concrete exposed to sulphate (SO4) containing solutions. The ACI standards are given below;

Sulphate Exposure	Water Soluble Sulphate in Soil (%)	Sulphate in Water (mg/lit)	Cement Type
Negligible	0.00-0.10	0-150	OPC
Moderate	0.10-0.20	150-1500	Type II
Severe	0.20-2.00	1500-10000	Type V
Very Severe	Over 2.00	Over 10000	Type V plus pozzolan

Soil chemical test result are presented in the appendix A. Chemical analyses result shows that Soil sulphate exposure are negligible in nature. Therefore, the foundation structure in contact with subsurface soil "OPC" cement shall be used.

Seismic Soil Profile Characterization

The project site is located in "Zone 2A" as per the "Seismic Provisions-2007" Building Code of Pakistan. This zone indicates high degree of damage during the seismic loading. Soil profile type is determined from the nature of soils. The soil profile type is related to the ground motion amplification effect caused by the sub soil stratum. Soil profile can be better evaluated from electrical resistivity tests by calculating shear wave velocity, however correlations are available with SPT counts and undrained shear strength.

Chapter 16, Division V of Uniform Building code (UBC 1997, table 16J) describes the procedure for determining Soil Profile Types. It is recommended to use S_D as soil profile type for this site. Here S_D is defined as follows;

Peak Horizontal Ground Acceleration: 0.08 to 0.16g

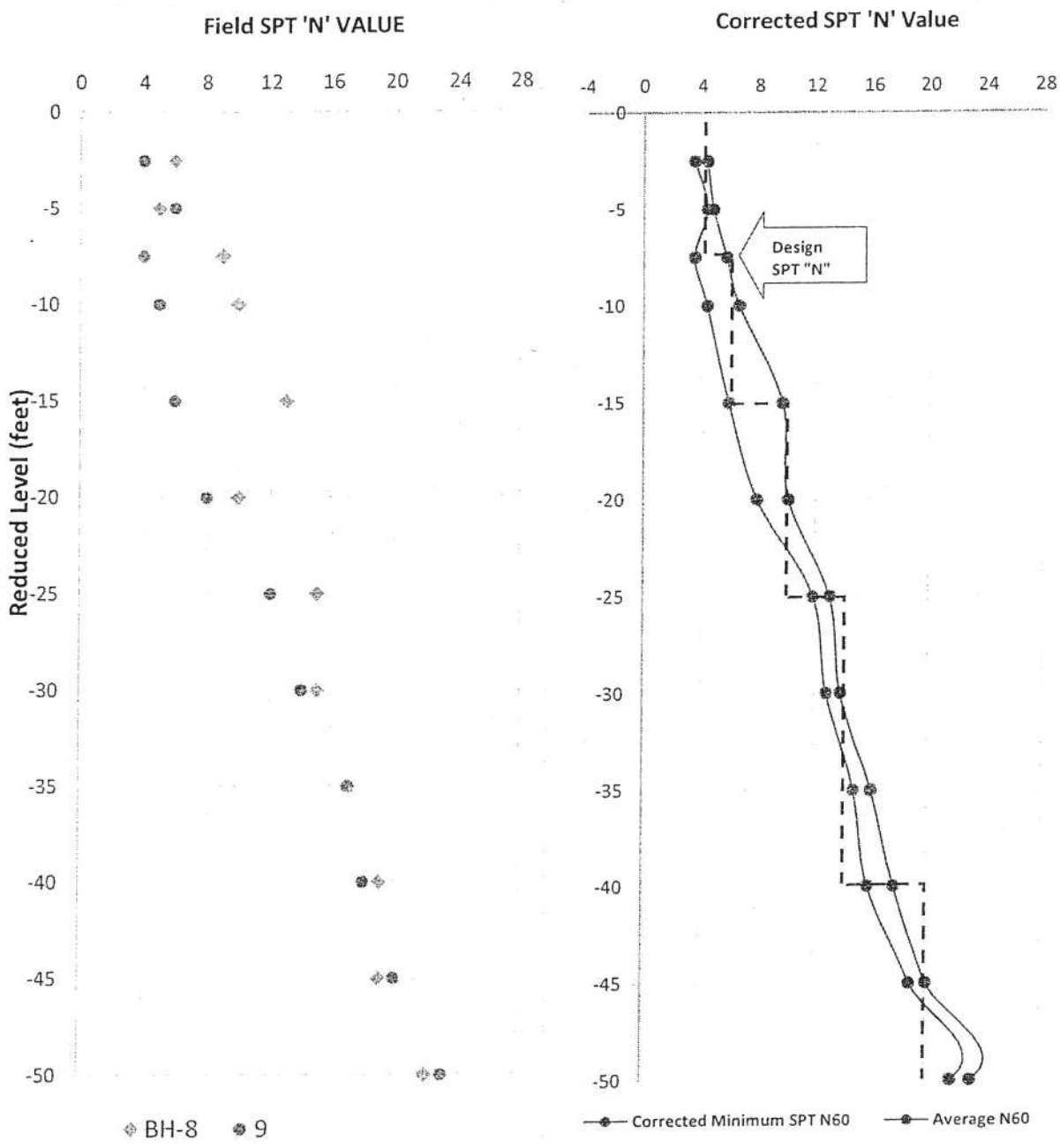
Seismic Zone Factor; Z: 0.15

Seismic coefficients; Ca: 0.22 & Cv: 0.32

Calculations for Secondary Structure (for Storage of Raw Materials)

Geotechnical Design Parameters

A preliminary assessment of characteristic geotechnical parameter values for soil has been undertaken for each of the strata encountered for the purpose of subsequent preliminary foundation design. The following figures provide the relative density of the subsurface strata, which use to derive the safe allowable bearing pressure for the proposed development.



Graphical Representation of Field SPT "N" & Correction SPT "N" vs Depth

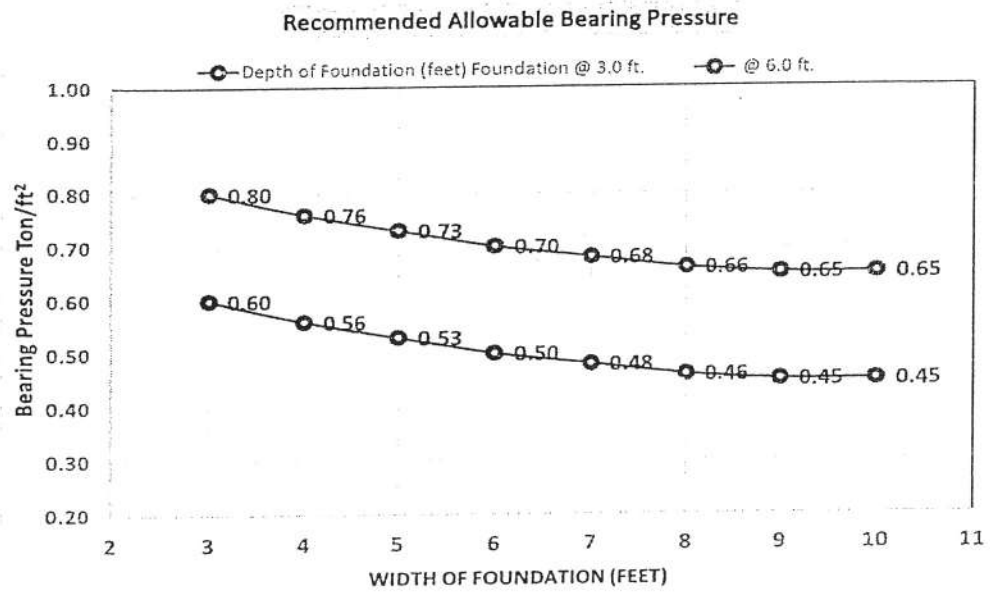
Field SPT "N" correction based on the method developed by Skempton, 1986; Seed, et al., 1985

FOUNDATION EVALUATION & RECOMMENDATIONS

Based on the examinations of the site materials, the field and laboratory testing, engineering analysis, and previous practical experience in the area with the soil materials encountered in this investigation, it is our opinion that the proposed structure(s) can be satisfactorily supported by the ground materials at the Site subject to the following recommendations:

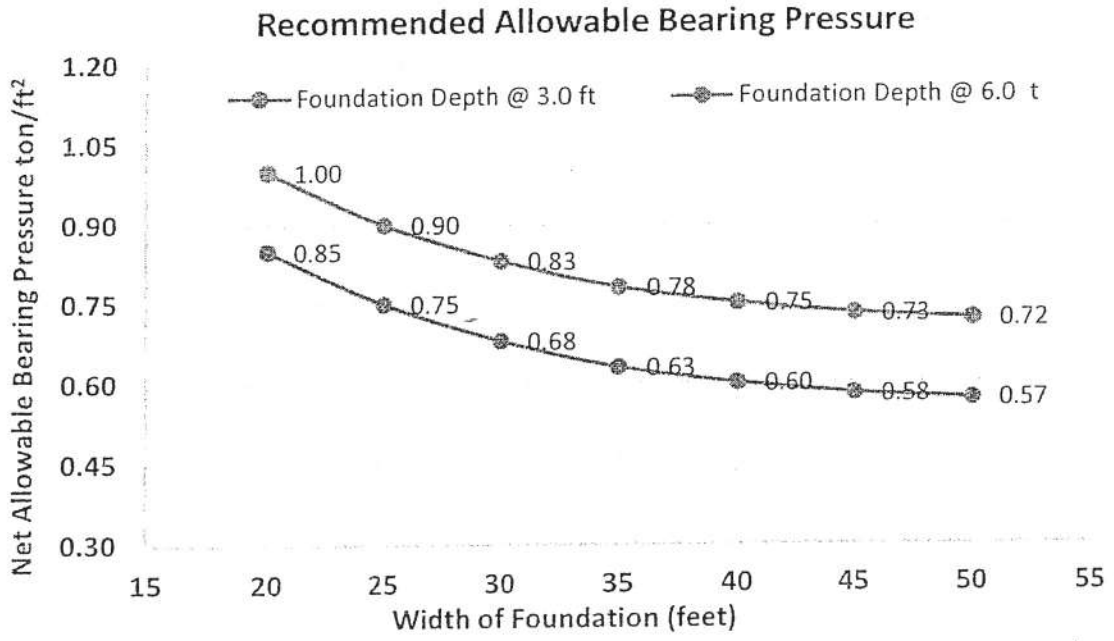
a) Bearing Capacity of Isolated/Strip Foundations

Depth of Foundation (feet)	Width of Foundation (feet)	Net Allowable Bearing Pressure ton/ft²	Modulus of Subgrade Reaction kN/m³
3.0	3.00	0.60	6895
	4.00	0.56	6435
	5.00	0.53	6090
	6.00	0.50	5746
	7.00	0.48	5516
	8.00	0.46	5286
	9.00	0.45	5171
	10.00	0.45	5171
6.0	3.00	0.80	9193
	4.00	0.76	8733
	5.00	0.73	8389
	6.00	0.70	8044
	7.00	0.68	7814
	8.00	0.66	7584
	9.00	0.65	7469
	10.00	0.65	7469



b) Bearing Capacity and Subgrade Reaction of Raft/Mat Foundations

Depth of Foundation (feet)	Width of Foundation (feet)	Net Allowable Bearing Pressure ton/ft^2	Modulus of Subgrade Reaction kN/m^3
3.0	20	0.85	5100
	25	0.75	4500
	30	0.68	4080
	35	0.63	3780
	40	0.60	3600
	45	0.58	3480
	50	0.57	3420
6.0	20	1.00	6000
	25	0.90	5400
	30	0.83	4980
	35	0.78	4680
	40	0.75	4500
	45	0.73	4380
	50	0.72	4320



Foundation Construction Note.

ISOLATED FOOTINGS WITH TIE BEAMS OR RAFT FOUNDATIONS can be used. Subsequently, to minimize the total & differential settlement; it is strongly recommended to the proof role of the excavated surface and replace 2.0 feet of soil with the Granular Fill Material (as per AASHTO Soil classification - group A-1-a); under the proposed foundation level.

I. Granular fill layer shall be compacted using a heavy-duty plate compactor to achieve a minimum of 95% of maximum dry density as obtained from the modified Proctor (ASTM D1557).

II. The backfilling shall be carried out in layers, where each layer compacted thickness should not be more than 6 inches.

III. The compacted surface should then be protected by immediately covering it with a layer of concrete blinding. As a guideline, it is suggested that the blinding layer should be at least 100mm thick and should extend 100mm to 150mm beyond the edge of the reinforced concrete footing.

Seismic Soil Profile Characterization

The project site is located in "Zone 2A" as per the "Seismic Provisions-2007" Building Code of Pakistan. This zone indicates a high degree of damage during the seismic loading. Soil profile type is determined by the nature of soils. The soil profile type is related to the ground motion amplification effect caused by the subsoil stratum. Soil profile can be better evaluated from electrical resistivity tests by calculating shear wave velocity, however, correlations are available with SPT counts and undrained shear strength.

Chapter 16, Division V of Uniform Building code (UBC 1997, table 16J) describes the procedure for determining Soil Profile Types. **It is recommended to use S_D as soil profile type for this site**. Here S_D is defined as follows;

Peak Horizontal Ground Acceleration: 0.08 to 0.16g

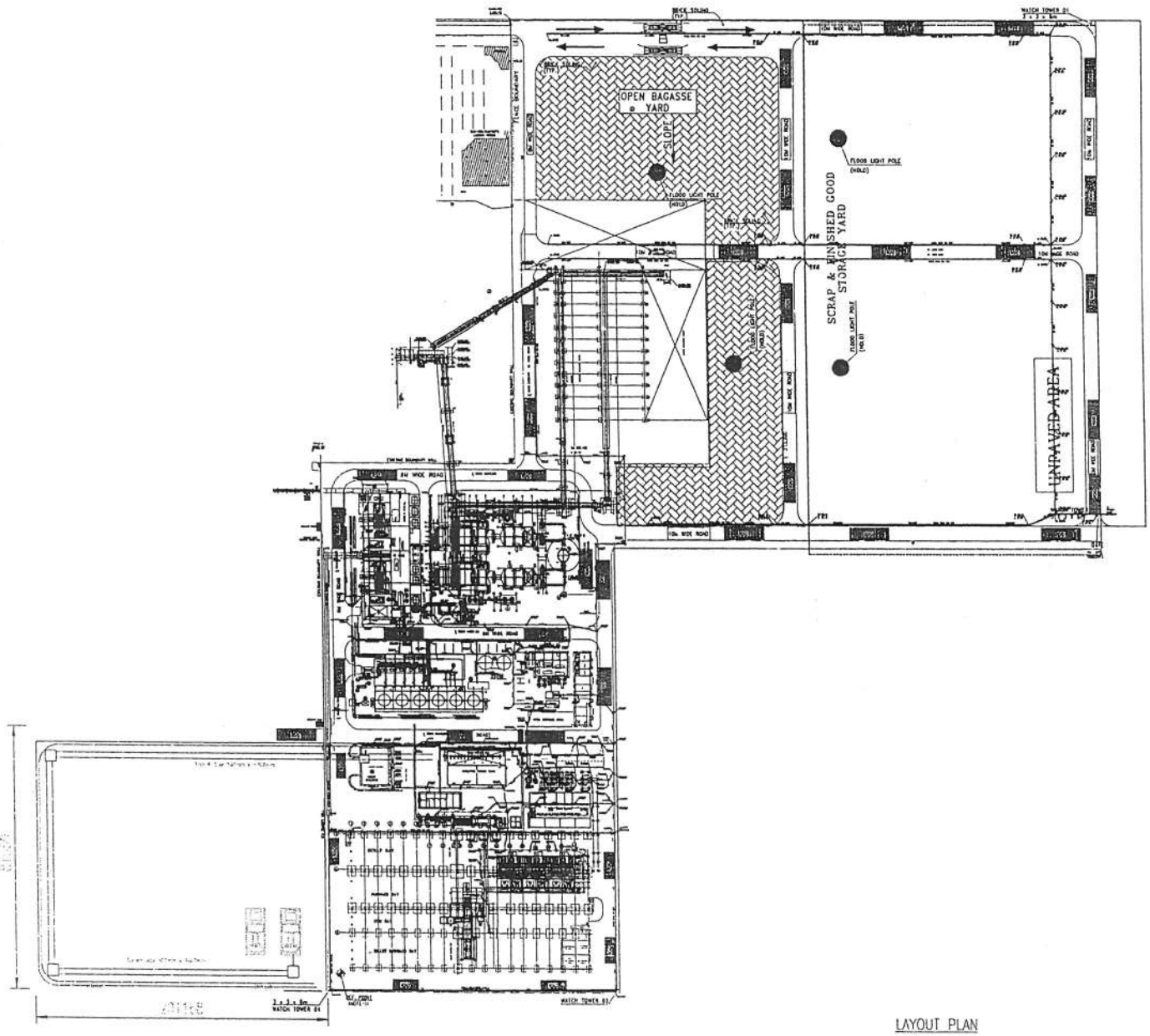
Seismic Zone Factor; Z: 0.15

Seismic coefficients; Ca: 0.22 & Cv: 0.32

Report Written By	Report re-view By
Muhammad Shahid. M.Sc. Engineering Geology. **Geo Drillers Engineering**	Engr. Hafiz Muhammad Hassan Saleem PEC # CIVIL/43579 Civil Engineer **Geo Drillers Engineering**

Annexure-IV

Layout Plan



LAYOUT PLAN

NOTES:

LEGENDS:

REFERENCE DRAWINGS:

DRAWING NO.	DESCRIPTION
21-CP-000-00-00-00-SD-DR-001	GENERAL NOTES CIVIL WORKS
21-CP-000-00-00-00-SD-DR-002	GENERAL NOTES CONCRETE WORKS
22001-D-001-1316-006	UNDERGROUND SERVICES MANHOLE DETAILS
22001-D-001-1316-007	UNDERGROUND SERVICES CATCH BASIN DETAILS
22001-D-001-1316-009	UNDERGROUND SERVICES STORM WATER DRAIN PIT DETAILS
22001-D-001-1316-010	UNDERGROUND SERVICES SEPTIC TANK PLAN AND DETAILS
22001-D-001-1316-011	UNDERGROUND SERVICES STORM WATER DRAIN DETAILS
22001-D-001-1316-012	UNDERGROUND SERVICES CABLE TRENCH DETAILS
22001-D-001-1316-013	UNDERGROUND SERVICES DUCT BANK DETAILS

REV	DATED	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED BY
2	16-05-22	ISSUED FOR CONSTRUCTION	MIJ	YZ	SAQ
1	09-05-22	ISSUED FOR APPROVAL	MIJ	YZ	SAQ
0	30-03-22	ISSUED FOR APPROVAL	MIJ	YZ	SAQ

PROJECT: STEEL PLANT

DATE: 23-03-2022

CLIENT: ETIHAD ALLOYS (Pvt.) Ltd.

TITLE: UNDERGROUND LAYOUT PLAN

SCALE	SIZE	DRAWING NO.
1:1250	A1	21-EAL-003-00-00-DL-DR-001-01-01-2

Annexure-V

SECP Incorporation Certificate

SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN

Company Registration Office

CERTIFICATE OF INCORPORATION

[Under section 16 of the Companies Act, 2017 (XIX of 2017)]

Corporate Unique Identification No. 0171223

I hereby certify that **ETIHAD ALLOYS (PRIVATE) LIMITED** is this day incorporated under the Companies Act, 2017 (XIX of 2017) and that the company is **limited by shares.**

Given at **Lahore** this **Sixteenth** day of **March,** Two **Thousand** and **Twenty One**

Z. Haider

Syed Zargham Haider
Joint Registrar

CERTIFIED TO BE TRUE COPY
ADDITIONAL JOINT REGISTRAR OF COMPANIES
COMPANY REGISTRATION OFFICE
LAHORE.

SEAL OF REGISTRAR OF COMPANIES
SECP

https://eservices.secp.gov.pk/eServices/ControllerServlet?request_id=VERIFY_ONLINE_INCORP_CERT&id=0171223

Annexure-VI

FBR Registration Certificate

Government of Pakistan
Federal Board of Revenue
Inland Revenue Services

FBR PAKISTAN

TAXPAYER REGISTRATION CERTIFICATE

(Under Section 181C of the Income Tax Ordinance 2001)

Registration No.	A077336
Date of Registration	26-Mar-2021
Type of Person	Company
Inc. No.	0171223
Inc. Date	16-Mar-2021
Name	ETIHAD ALLOYS (PRIVATE) LIMITED
Address	4-BAWA PARK, UPPER MALL SCHEME, LAHORE, Lahore
Tax Office	CTO LAHORE
Activity Type	Business

A077336

This is a computer generated certificate and, hence, no signatures are required.

Displaying of Taxpayer Registration Certificate is mandatory as provided under section 181C of Income Tax Ordinance 2001.

This is not a valid evidence of being a "filer" for the purposes of clauses (23A) and (35C) of sections 2 and 181A of the Income Tax Ordinance 2001.

Date of Print 26-May-2023

Annexure-VII

LCCI Membership Certificate

Book No.B 14071 | QDP/7.5/MSD/F-04 | Serial No.B 1407001

MEMBERSHIP CERTIFICATE

MEMBERSHIP NO: 108072- C

Name & address of Chamber XXXXXXXXX **The Lahore Chamber of Commerce & Industry**
11 Shara-e-Aiwan-e-Sanat-o-Tijarat, Lahore.

(Affiliated with the Federation of Pakistan Chambers of Commerce & Industry)

CERTIFIED that **M/s ETIHAD ALLOYS (PVT) LTD.**

(name and address of Member Firm / Company)

4- BAWA PARK, UPPER MALL, LAHORE

G.S.T. No. **3277876230336** N.T.N. No. **A077336-8**

is a member of this Chamber XXXXXXXXX **Since 26/04/2021**

THIS CERTIFICATE shall be valid upto the **31 MAR 2024** *(date)* unless otherwise notified to the NTN / GST Registration authority / Scheduled Bank concerned.

Given on this **31** day of **Mar** 20 **23**

Signature of Secretary General

Countersigned by
Muhammad Adnan Khalid Butt
Vice President 2022-2023
(Name & Designation)

Annexure-VIII

Demand Notice—Electricity Connection

DUE Date: 11-01-2023

Multan Electric Power Company (15618-CHOWK BAHADAR PUR)

12/E-1 ii dt: 10-12-2022

2994 dt: 12-12-2022

10-12-2022	تاریخ	15618011250	درخواست رجسٹریشن نمبر (شعبہ برقیات)
New Connection	(نیا کنکشن، بعلی کنکشن وغیرہ)	New Connection	قسم درخواست
Temporary	قسم مطلوبہ سپلائی (گھریلو، تجارتی، صنعتی وغیرہ)	03214631015	موبائل نمبر صارف
Nill	قسم انڈسٹری یا لیکیڈی	495 (KW)	مطلوبہ مجموعی لوڈ (کلوواٹ میں)
440	مطلوبہ سپلائی وولٹیج	E-1ii(56)	متعلقہ ٹیرف شیڈول / گروپ

2022121940207 — ڈیمانڈ نوٹس کا سلسلہ وار نمبر

12-12-2022 — ڈیمانڈ نوٹس کی تاریخ اجراء

27156180212002 — درخواست حصول کنکشن کو الاٹ شدہ اکاؤنٹ / حوالہ نمبر

Allied Bank Limited, Factory Area Branch, Rahim Yar Khan — جس کے تحت، خود ایشو کنندہ ادارہ کے متعلقہ افسر کے پاس جمع کرائی جائیں) ادارہ کے منظور شدہ بینک کا نام

RAHIM YAR KHAN — ادارہ کے متعلقہ ریونیو افسر کے دفتر کا مکمل پتہ

0 — منجانب: خاتمہ

نوٹ: فراہمی مہیا کیلئے جگہ اور 11KV لائن کیلئے راستہ کی فراہمی آپ کے ذمہ ہوگی۔

ڈیمانڈ نوٹس

(اطلاع نامہ منظوری درخواست وطلبی زر صفانت)

متحرمی / متحرمہ Etihad Alloys (Private) Limited, C/O Naeem Tahir (S/O) Tahir Jamil (Address) Mouza Karam Abad, Tehsil & District Rahim Yar Yar Khan — (درخواست دہندہ یا صارف کا نام اور مکمل پتہ)

پرت برائے درخواست دہندہ

آپ کو بذریعہ ڈیمانڈ نوٹس ہذا اطلاع دی جاتی ہے کہ آپ کی درخواست برائے حصول کنکشن بجلی جس کے کوائف اوپر درج کئے گئے ہیں افسر مجاز نے ادارہ کی مروجہ عام شرائط بجلی کے علاوہ مندرجہ ذیل شرائط پر منظوری کر لی ہے۔

آپ اس نوٹس کے اجراء کی تاریخ سے 30 دن کے اندر اندر مندرجہ ذیل رقوم ادارہ کے منظور شدہ بینک میں یا خود ادارہ کے متعلقہ افسر کے پاس جمع کروا کر ان کی ادائیگی سے متعلق رسید نمبر اور تاریخ سے میرے دفتر کو مطلع کریں۔

(الف) اخراجات سروس کنکشن بمطابق منظور تخمینہ خرچ 4457600 زر ضمانت 3583800 روپے (یہ رقم ادارہ کے متعلقہ افسر کے پاس جمع کروانی ہے) اگر کنکشن لگانے سے پہلے اخراجات سروس کنکشن منظور شدہ تخمینہ سے تجاوز کر جائیں تو مزید رقم کے فرق کے برابر جمع کروانا ہوگی جس کے لیے اضافی ڈیمانڈ نوٹس جاری کیا جائے گا۔

(ب) بصورت بجلت یا بوجہ عدم ادائیگی سابقہ طے بجلی وغیرہ ——— روپے (یہ رقم ریونیو آفیسر سے آخری طے وصول کر کے پیکج میں جمع کرانی ہے)۔

نوٹ: اگر آپ کمرشل / تجارتی (کمرشل) صنعتی ٹیوب ویل کی درخواست دہندہ یا صارف ہیں آپ اس سلسلہ میں ڈیمانڈ نوٹس ہذا کی ذیلی پرت کو (جو آپ کے جواب کے لیے مختص کی گئی ہے) پر کر کے اس پر اپنے دستخط بمعہ تاریخ ثبت کر کے میرے دفتر کو واپس بھجوائیں۔

آپ اس نوٹس کے اجراء کی تاریخ سے 30 دن کے اندر اندر رہائی عمارت کی اندرونی وائرنگ کے پختہ اور معیاری ہونے اور نئے آلہ جات برائے استعمال بجلی کی تنصیب مکمل ہو جانے کے ثبوت میں گورنمنٹ کے منظور شدہ وائرنگ کنٹریکٹر سے ٹیسٹ رپورٹ حاصل کر کے (نمائشی ٹیسٹ رپورٹ فارم کی پشت پر) میرے دفتر کو بھجوائیں اور سند حاصل کر کے

آپ نے چونکہ ادارہ کو بجلی کی سپلائی کی بحالی کے لیے بنیادی خرید میٹر مہیا کرنا ہیں کیا ہیں لہٰذا آپ سے ادارہ کی مروجہ میٹر اسٹیمپ چارجز کے مطابق ——— روپے بطور کرایہ میٹر چارج کیا جائے گا۔

ڈیمانڈ نوٹس برائے زر صفانت ملحقہ وارسال کیا گیا ہے کنکشن کی کارروائی دونوں ڈیمانڈ نوٹس کی رقوم ملحقہ داخل ہونے کے بعد شروع ہوگی۔

(تخمینہ منسلکہ ہو تو کاٹ دیا جائے)

اگر آپ نے ڈیمانڈ نوٹس ہذا کے جواب میں مندرجہ بالا شرائط کی مقررہ معیاد کے اندر قبولیت کی آپ کی درخواست فارم برائے حصول بجلی کو الاٹ شدہ جاری نمبر گمانا نہیں رکھا جائے گا۔ ڈیمانڈ نوٹس ہذا (تاریخ اجراء سے 01 یوم بعد) خود بخود غیر موثر تصور ہوگی۔

خیر اندیش

Circle Office 15618-CHOWK BAHADAR PUR SE Wapda

The Superintendent 15618-CHOWK BAHADAR PUR SE Wapda

DUE Date: 11-01-2023

برائے استعمال بینک

(متعلقہ بینک اس پرت کو ڈیمانڈ نوٹس سے علیحدہ کر کے اپنے بینک سکرول کے ساتھ ریونیو آفیسر کو بھجوائے گا)

رسید رپورٹ اندر معیاد جمع کرائیں

درخواست دہندہ یا صارف کا نام اور مکمل پتہ: Etihad Alloys (Private) Limited, C/O Naeem Tahir (S/O) Tahir Jamil (Address) Mouza Karam Abad, Tehsil & District Rahim Yar Yar Khan

درخواست رجسٹریشن نمبر 15618011250 تاریخ 10-12-2022

ڈیمانڈ نوٹس کا سلسلہ وار نمبر 2022122022121940207 تاریخ 12-12-2022

4457600 (Service Connection) سروس کنکشن — نمبر شناخت رقم رسید نمبر تاریخ ادائیگی

درخواست کو الاٹ شدہ اکاؤنٹ / حوالہ نمبر 27156180212002 — 3583800 (Security Cost) زر ضمانت

منظور شدہ بینک کا نام اور پتہ Allied Bank Limited, Factory Area Branch, Rahim Yar Khan — (Grid Share, Feeder Rehab. Charges) گرڈ شیئر، فیڈر بحالی اخراجات

دستخط سب اوورسیئر / لائن سپرنٹنڈنٹ / انچارج — مہر دستخط افسر بینک

بمعہ تاریخ اور مہر دفتر

DUE DATE: 11-01-2023

درخواست دہندہ کا چالان

میں / ہم نے زر صفانت بابت سروس کنکشن مبلغ 3583800 مزید مبلغ 4457600 روپے ادارہ کے منظور شدہ Allied Bank Limited, Factory A بینک میں بذریعہ رسید نمبر ——— بتاریخ ——— جمع کرا دیا ہے۔

میں / ہم چونکہ ادارہ ہذا کو بجلی مہیا کیا اس لیے میں / ہم ادارہ کو مبلغ ——— روپے بابت کرایہ میٹر بطور کرایہ کو بجلی ذمہ داری قبول کرتا / کرتی ہوں / کرتے ہیں۔

میں / ہم اپنی عمارت کی اندرونی وائرنگ کے پختہ اور معیاری ہونے اور اپنے آلہ جات برائے استعمال بجلی کی تنصیب مکمل ہو جانے کے ثبوت میں گورنمنٹ کے منظور شدہ وائرنگ کنٹریکٹر سے تصدیق شدہ ٹیسٹ رپورٹ ڈیمانڈ نوٹس ہذا کے ساتھ بھجوا رہا / رہی ہوں / رہے ہیں بعد میں مقررہ معیاد کے اندر ملحقہ بھجوں گا / گی / گے / گیں

برائے استعمال کیشیئر دفتر

(کوائف ڈیمانڈ نوٹس)

2022121940207 — درخواست فارم نمبر

15618011250 — درخواست رجسٹریشن نمبر

2022121940207

8041400 — واجب الادا رقم

12-12-2022

دستخط ایس ڈی او بمعہ تاریخ و مہر دفتر

Generated demand notice. Ungen...

Annexure-IX

Application for Land Conversion Status

Etihad Alloys (Private) Limited.

HEAD OFFICE: 4 - Bawa Park, Upper Mall Lahore-Pakistan.
Tele : 042 - 111 888 333, 35758724, 35758727
Fax : 042 - 35751610, 35762903

To,

Date: April 17, 2023
Ref: EAPL/Fin/2023/4/25

District Officer Planning
District Council
Rahim Yar Khan

Subject: Conversion of Agricultural Area of 09 Acres to Industrial Use – Site Location at Mouza Karam Abad, District Rahim Yar Khan

Dear Sir,

I am writing on behalf of Etihad Alloys (Private) Limited, (the Company) to request a No Objection Certificate (NOC) for the conversion of agricultural land to industrial use within your district. We believe that it will bring significant economic benefits to the community, while still preserving the integrity of the surrounding land.

Please find enclosed all the necessary documents including land acquisition documents and other relevant certificates that are required for this application.

We kindly ask You to consider our request for the issuance of a demand notice for payment of the applicable conversion fee and the issuance of a No Objection Certificate (NOC) for the conversion of land to industrial use.

For and on Behalf of
Etihad Alloys (Private) Limited

Mr. Zahid Jamil
Chief Executive

ETIHAD ALLOYS (PRIVATE) LIMITED LAHORE

DO (P)

n/a

District Council Rahim Yar Khan

Annexure-X

Environmental Monitoring Reports

AMBIENT AIR MONITORING REPORT

Project Title:	Etihad Alloys Pvt. Ltd. (Extension)—EIA	**Address:**	Karamabad Near Etihad Sugar Mill Raheem Yar Khan.
Monitoring Point:	Mid of Project	**Time Duration of Monitoring:**	24 Hours
Monitoring Date:	24-05-2023 to 25-05-2023	**Reporting Date:**	30-05-2023
Monitoring By:	Solution Environmental & Analytical Laboratory	**Sample ID:**	SEAL/LAB/2023/AA/001
Results:			

Sr. No.	Parameter	Method	Unit	Results	PEQS
1	Particulate Matter (PM_{10})	40 CFR Part 50, App J (US-EPA)	$\mu g/m^3$	112.0	150
2	Carbon monoxide (CO)	40 CFR Part 50, App. C (US-EPA)	mg/m^3	1.2	5
3	Oxides of Nitrogen NOx (NO& NO_2)	40 CFR Part 50, App F (US-EPA)	$\mu g/m^3$	30.0	120
4	Sulphur dioxide SOx(SO_2)	EQSA-0197-114 (US-EPA)	$\mu g/m^3$	40.2	120
5	Particulate Matter ($PM_{2.5}$)	40 CFR Part 50, App J (US-EPA)	$\mu g/m^3$	20.8	35

PEQS: Punjab Environmental Quality Standards

Note:

- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for any negotiations

ANALYZED BY	REVIEWED BY	APPROVED BY
Lab Analyst	Assistant Lab Manager	Lab Manager

NOISE LEVEL MONITORING REPORT

Project Title:	Etihad Alloys Pvt. Ltd. (Extension)—EIA	**Address:**	Karamabad Near Etihad Sugar Mill Raheem Yar Khan.
Monitoring Point:	Mid Of Project		
Monitoring Date	24-05-2023 to 25-05-2023	**Instrument Used:**	Digital Sound Level Meter SMART SENSOR
Reporting Date:	30-05-2025	**Time of Monitoring:**	24 Hours
Monitoring By:	Solution Environmental & Analytical Laboratory	**Reference No.:**	SEAL/LAB/2023/NM/001

Results: -

Sr. No.	Time	Noise dB(A)		PEQS
1	10:00 AM	60.6	Day Time	65
2	11:00 AM	58.2		
3	12:00 PM	57.3		
4	01:00 PM	56.5		
5	02:00 PM	56.2		
6	03:00 PM	57.6		
7	04:00 PM	59.5		
8	05:00 PM	59.2		
9	06:00 PM	57.6		
10	07:00 PM	59.5		
11	08:00 PM	58.1		
12	09:00 PM	56.2		
13	10:00 PM	54.2		

14	11:00 PM	55.4	Night Time	55
15	12:00 AM	53.3		
16	01:00 AM	55.0		
17	02:00 AM	57.2		
18	03:00 AM	58.1		
19	04:00 AM	54.9		
20	05:00 AM	55.7		
21	06:00 AM	58.2	Day Time	65
22	07:00 AM	56.5		
23	08:00 AM	57.4		
24	09:00 AM	56.2		

PEQS: Punjab Environmental Quality Standards

Note:

- The average noise levels describe the overall ambient noise levels of the points.
- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report in not valid for any negotiation.

ANALYZED BY	REVIEWED BY	APPROVED BY
Lab Analyst	Assistant Lab Manager	Lab Manager

GROUND WATER ANALYSIS REPORT

Project Title:	Etihad Alloys Pvt. Ltd. (Extension)—EIA	**Address:**	Karamabad Near Etihad Sugar Mill Raheem Yar Khan.
Sampling Point:	Tap Water	**Nature of Sample:**	Ground Water
Sampling Date:	24-05-2023	**Date of Completion:**	30-05-2023
		Temp. & Humidity	23-27 C^0 & 50-70 %
Sampling By:	Solution Environmental & Analytical Laboratory	**Reference No.:**	SEAL/LAB/2023/GW/281

Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
1	pH	APHA 4500-H^+ B	--	6.77	6.5-8.5
2	Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	725	1000
3	Chloride	4500- APHA Cl^- B	mg/l	34.24	250
4	Fluoride	APHA 4500-F^- D	mg/l	0.24	1.5
5	Taste	APHA 2120 B	Object. /unobj.	Non-object.	Unobject.
6	Odour	APHA 2120 B	Object. /unobj.	Non-object.	Unobject.
7	Colour	APHA 2120 B	TCU	0.4	15
8	Nitrate (as NO_3^-)	APHA 4500-NO^{3-} E	mg/l	7.7	50
9	Nitrite (as NO_2^-)	APHA 4500-NO^{2-} B	mg/l	BDL	3
10	Lead	APHA-Pb B	mg/l	0.01	0.05
11	Total Hardness as $CaCO_3$	APHA 2340 C	mg/l	322.9	500
12	Turbidity	APHA 2130 B	NTU	1.0	5
13	Zinc	APHA 3500-Zn B	mg/l	0.25	3
14	Aluminum	APHA 3111 D	mg/l	0.10	0.2
15	Chromium	APHA 3500-Cr B	mg/l	0.014	0.050
16	Cadmium	APHA 3500-Cd D	mg/l	BDL	0.01
17	Copper	APHA 3500-Cu C	mg/l	0.045	2
18	Boron	APHA 4500-B C	mg/l	0.015	0.300
19	Barium	APHA 3111 B	mg/l	0.020	0.700

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Plot # 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Lahore, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922296
Email: info@seal.com.pk | nihalasghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
Office No. M-06-07 in Fort Sultan opp. Air Port Telephone Exchange, Shahrah-e-Faisal, Karachi, Pakistan. Phone : 92-300-9768799
Email : karachi@seal.com.pk

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Project Title:	Etihad Alloys Pvt. Ltd. (Extension)—EIA	Address:	Karamabad Near Etihad Sugar Mill Raheem Yar Khan.
Sampling Point:	Tap Water	Nature of Sample:	Ground Water
Sampling Date:	24-05-2023	Date of Completion:	30-05-2023
		Temp. & Humidity	23-27 C^0 & 50-70 %
Sampling By:	Solution Environmental & Analytical Laboratory	Reference No.:	SEAL/LAB/2023/GW/281

Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
20	Antimony	APHA 3114 C	mg/l	0.002	0.020
21	Arsenic	APHA 3114 C	mg/l	0.005	0.050
22	Cyanide	APHA 4500-CN^- D	mg/l	BDL	0.05
23	Mercury	APHA 3112	mg/l	0.00	0.001
24	Nickel	APHA 3111 B	mg/l	0.004	0.020
25	Residual Chlorine	APHA 4500-Cl_2	mg/l	0.30	0.2 – 0.5
26	Total Thermo Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
27	Total Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
28	E. coli	APHA 9222 C	Number/100ml	0	0/100 ml

PEQS = Punjab Environmental Quality Standards

BDL (Below Detection Limit)

APHA = American Public Health Association

Note:

- Standard Method for the Examination of Water & Wastewater, 23rd Edition, 2017
- This report should be reproduced as a whole and not in parts.
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- The left-over samples (if so available) shall be retained for 15 days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiation.

ANALYZED BY	REVIEWED BY	APPROVED BY
Lab Analyst	Assistant Lab Manager	Lab Manager

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WASTEWATER ANALYSIS REPORT

Project Title:	Ittihad Alloys Pvt Ltd (Extension) - EIA	**Address:**	Karamabad Near Ittihad Sugar Mill Raheem Yar Khan.
Sampling Point:	Drain Near Site	**Nature of Sample:**	Wastewater
Receiving Date:	24-05-2023	**Completion Date:**	30-05-2023
		Temp. & Humidity	23-27 C° & 50-70 %
Sampling By:	SEAL	**Reference No.:**	SEAL/LAB/2023/WW/011

Results:-

Sr. No.	Parameters	Method	Parameter	Result	PEQS
1	Temperature	APHA 2550 B	°C	26.0	≤3°
2	pH	APHA 4500-H+ B	---	7.25	6-9
3	Chemical Oxygen Demand (COD)	APHA 5220 D	mg/l	119	150
4	Biochemical Oxygen Demand (BOD_3)	APHA 5210 D	mg/l	62.0	80
5	Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	1801	3500
6	Total Suspended Solids (TSS)	APHA 2540 D	mg/l	143.0	200
7	Oil & Grease	APHA 5520 B	mg/l	3.3	10
8	Chromium (Hexa & Trivalent)	APHA 3500-Cr B	mg/l	0.01	1.0
9	Sulphate (SO_4^{2-})	APHA 4500-SO_4^{2-} C	mg/l	230.0	600
10	Iron (Fe^{2+})	APHA 3111 B	mg/l	1.0	8
11	Chlorine (Cl_2) Free	APHA 4500-Cl_2 G	mg/l	0.41	1.0
12	Fluoride (F^-)	APHA 4500-F^- D	mg/l	2.01	10
13	Chloride	APHA 4500-Cl^- B	mg/l	222.5	1000
14	Ammonia (NH_3)	APHA 4500-NH_3 C	mg/l	22.35	40
15	Cadmium	APHA 3500-Cd D	mg/l	0.00	0.1
16	Lead	APHA-Pb B	mg/l	0.03	0.5
17	Arsenic	APHA 3114 C	mg/l	0.00	1.0
18	Phenolic Compounds	APHA 5530 D	mg/l	0.01	0.1
19	Copper	APHA 3500-Cu C	mg/l	0.25	1.0

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

9001:2015

Project Title:	[illegible]	Address:	[illegible]
Sampling Point:	[illegible]	Nature of Sample:	[illegible]
Receiving Date:	[illegible]	Completion Date:	[illegible]
Sampling By:	SEAL	Temp. & Humidity	[illegible]
		Reference No.:	SEAL/LAB/2023/WS/011

Results:-

Sr. No.	Parameters	Method	Parameter	Result	PEQS
20	Barium	APHA 3111 B	mg/l	0.25	1.5
21	Silver	APHA 3111 B	mg/l	0.10	1.0
22	Zinc	APHA 3500-Zn B	mg/l	0.03	5.0
23	Nickel	APHA 3111 B	mg/l	BDL	1.0
24	Boron	APHA 4500-B C	mg/l	0.09	6.0
25	Mercury	APHA 3112 B	mg/l	BDL	0.01
26	Sulphide (S^{-2})	APHA 4500-S^{-2} F	mg/l	0.26	1.0
27	Total Toxic Metals	---	mg/l	0.41	2.0
28	Cyanide	APHA 4500-CN^- D	mg/l	0.18	1.0

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- The report is not valid for any negotiations.
- Total Toxic Metals(Cadmium, Lead,Mercury,Arsenic,Chromium,Copper,Nickle,Cobalt,Zinc and Barium.
-
-

ANALYZED BY	REVIEWED BY	APPROVED BY
Lab Analyst	Assistant Lab Manager	Lab Manager

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