

TABLE OF CONTENTS

TABLE OF CONTENTS	1
LIST OF FIGURES	6
LIST OF TABLES	6
EXECUTIVE SUMMARY	8
Title and Location of Project.....	8
Name of the Proponent	8
Name of Consultant Preparing the Report	8
Brief Outline of the Project	9
Major Impacts	10
Recommendations for Mitigation Measures.....	12
Proposed Monitoring	15
1. INTRODUCTION.....	17
1.1. Purpose of the Report.....	17
1.2. Identification of the Project and Proponent.....	18
1.2.1. Details of the Project	18
1.2.2. Details of the Proponent.....	18
1.3. Details of Consultant	19
1.4. Brief Description of Nature, Size and location of the Project	19
1.4.1. Occurrence in Punjab	20
1.4.2. Uses	21
1.4.3. Objectives.....	21
2. SCREENING AND SCOPING	23
2.1. Screening.....	23



2.2. Scoping	23
2.2.1. Spatial and Temporal Boundaries of Environmental Assessment ..	23
2.2.2. Important issues and concern raised during consultation.....	23
2.2.3. Significant impacts and factors to be determined.....	24
3. CONSIDERATION OF ALTERNATIVES	25
3.1. Site Alternatives, their Selection and Rejection Criteria	25
3.2. Design/technology alternatives, their selection and rejection criteria	26
3.3. Environmental Alternatives, their selection and rejection criteria	27
3.4. Economic Alternatives, their selection and rejection criteria	27
4. DESCRIPTION OF THE PROJECT	28
4.1. Objectives of the Project	28
4.2. Location and Site Layout of the Project	28
4.3. Land Use on the Site	29
4.4. Road Access	29
4.5. Vegetation Features of the Site	29
4.6. Cost and the Magnitude of Operation	29
4.7. Schedule of Implementation.....	30
4.7.1. Manpower	30
4.7.2. Water Requirements.....	30
4.7.3. Solid Waste	31
4.7.4. Process Flow Chart	31
4.8. Restoration and Rehabilitation Program	32
5. DESCRIPTION OF THE ENVIRONMENT	34
5.1. Baseline Physical Environment	34



5.1.1. Topography and Geology	34
5.1.2. Meteorology of the District Chakwal.....	34
5.1.3. Temperature	36
5.1.4. Humidity	37
5.1.5. Soils.....	37
5.1.6. Climate	37
5.1.7. Seismicity of the Project Area	38
5.1.8. Geography	39
5.2. Baseline Ecological Environment	40
5.2.1. Fisheries.....	40
5.2.2. Biodiversity	40
5.2.3. Flora	41
5.2.4. Fauna.....	41
5.2.5. Forestry	42
5.3. Baseline Socio-economic Environment	42
5.3.1. Quality of Life Values.....	44
5.4. Recreational Resources and Development:	45
5.5. Lab Reports of Environmental Analysis	46
5.6. Suitability of the Site	46
6. IMPACT ASSESSMENT	47
6.1. What is the Problem?	47
6.2. When Problem Will Occur and When It Should Be Addressed?	47
6.3. Where Problem Should Be Addressed?	47
6.4. How the Problem Should Be Addressed?	47



7. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES	48
7.1. Project location	48
7.2. Project Design	48
7.3. Construction Stage	49
7.4. Operational Stage	51
7.4.1. Topographic/Soil.....	51
7.4.2. Water Resources	52
7.4.3. Mine Workers Health and Safety	54
7.4.4. Emergency Response Plan (ERP) for Accidents/Collapse	55
7.4.5. Climate Change	56
7.5. Summary of Potential Impacts	56
7.6. Potential Environmental Enhancement Measures	60
8. ENVIRONMENTAL MANAGEMENT & MONITORING PROGRAM.....	61
8.1. Introduction	61
8.2. Objectives.....	61
8.3. Schedule of Implementation of EMMP	61
8.4. Environmental Management Team along with their roles and Responsibilities.....	62
8.5. Proposed Monitoring Program to assess performance or output of EMP	64
8.6. Environmental Budget	65
8.7. Environmental Management Plan	66
8.8. Proposed EMP Reporting and Reviewing Procedures	70
8.8.1. Aim	70



8.8.2. Environment, Health & Safety Policies	70
8.9. Training Needs	72
9. INVOLVEMENT OF STAKEHOLDER'S / PUBLIC CONSULTATION	73
9.1. Introduction	73
9.2. Benefits and Objectives of Stakeholder's Consultation	73
9.3. Identification and Classification of Stakeholders	74
9.4. Methodology for Consultation	74
9.5. Key Consulted Stakeholders	75
9.5.1. Responsible Authority	75
9.5.2. Other departments and agencies	75
9.5.3. Environmental Practitioners and Experts Team	76
9.5.4. Affected & Wider Community	76
9.5.5. Summary of Concerns of Consulted Stakeholders	77
10. CONCLUSIONS AND RECOMMENDATIONS	79
APPENDIX	82
APPENDIX-I: GLOSSARY	83
APPENDIX-II: LIST OF ABBREVIATIONS	85
APPENDIX-III: SOURCE OF THE DATA (REFERENCES)	86
APPENDIX IV: TERMS OF REFERENCE OF ENVIRONMENTAL REPORT	88
APPENDIX-V: CONSULTANT TEAM	90
APPENDIX-VI: APPROVALS FROM OTHER CONCERNED DEPARTMENTS	92
APPENDIX VII: ENVIRONMENT & LAYOUT MAP	93



LIST OF FIGURES

Figure 1-1 Location of the Project on Google Earth.....	22
Figure 4-1 Location of the Project	28
Figure 4-2 Iron Ore Mining Flowsheet	31
Figure 5-1 Monthly rainfall data of chakwal	35
Figure 5-2 Decades Rainfall data	35
Figure 5-3 Monthly temperature of Chakwal	36
Figure 5-4 Annual temperature of Chakwal	36
Figure 5-5 Average Humidity	37
Figure 5-6 Seismic zoning map of Pakistan	38
Figure 5-7 Native species of project site	41
Figure 5-8: Population of District Chakwal	44

LIST OF TABLES

Table 1-1 Details of the Proponent	18
Table 1-2 Details of the Consultant	19
Table 1-3 Consultant Team.....	19
Table 4-1 Coordinates of the Iron Ore Lease Area.....	29
Table 4-2 Time Schedule for the Quarry Development	30
Table 4-3 List of Manpower for Iron Ore Mining Operations.....	30
Table 4-4 Restoration and Rehabilitation Program.....	33
Table 5-1 Summary of Socio-economic Indicators.....	43
Table 7-1 Scale Range	56
Table 7-2 Environmental Screening Matrix.....	58



Table 8-1 Environmental Monitoring Plan.....	65
Table 8-2 Environmental Budget Breakdown	65
Table 8-3 EMP for Construction Phase	66
Table 8-4 EMP for Operational Phase Impacts.....	67
Table 9-1 List of stakeholder consulted.....	76
Table 10-1 Conclusions and Recommendations	79



EXECUTIVE SUMMARY

Title and Location of Project

The title of the project is "Prospecting License for Iron Ore over an area of 88.18 acres of land situated near Bharwal in District Chakwal". Prospecting License was granted by Mines and Minerals Department, Government of the Punjab.

Name of the Proponent

The details of the proponent are given below;

Details of Proponent	
Name of the Proponent	Mr. Gulzaib Hassan
Address	PO Khairpur, Tallar Kahar, Chakwal

Name of Consultant Preparing the Report

The name of the consultant preparing the report is as given below;

Contact Details	
Consulting Firm	Prime Environmental Consultants
Representative	Engr. Ali Mehdi
Contact	(+92) 321-7860915
Address	Latif Plaza, Office No. 07-08, 69 Saeed Block Commercial area, Canal Bank Scheme, Lahore
e-Mail	primeenvironmentalconsultants@gmail.com

The team involved in preparing the report is as;

Sr.	Name	Qualifications & Brief Experience	Roles Assigned
1.	Engr. Ali Mehdi	B.Sc. Mining Engineering	- Stakeholder Consultation - Preparation of Environmental Management Plan (EMP) - Preparation of Environmental Monitoring Plan (EMP)



			• Author of EIA Report
2.	Zeba Haseeb	Environmental Scientist M.S Environmental Science	• Preparation of Environmental Management Plan (EMP) • Preparation of Environmental Monitoring Plan (EMP) • Author of EIA Report
3.	Umer Saeed	Environmental Scientist M.S Environmental Science	• Site visits

Brief Outline of the Project

The project area lies over 88.18 acres and involves mining Iron Ore by underground methodology. The project is located near Bharwal in District Chakwal of Punjab.

According to the Pakistan Environmental Protection Agency (Review of IEE & EIA) Regulations, 2000, the proposed project falls in Schedule II under sub-section (2) of Clause C (Mining and Mineral Processing).

Unlike industrial establishment the mining projects are pegged with the favorable geology in the given/granted area. The cost and magnitude of mining operations may be judged from the information given in the report.

The main objectives of Iron Ore mining are

- To enhance the contribution of mineral sector to GDP through improved production.
- To expand mining sector by focusing on exploration and evaluation of mineral resources.
- To enhance public sector investment on resource mapping, Geo-database development and provision of physical infrastructure, roads and electricity etc. in the potential areas.
- To promote facilitation role of the government for the prospective investor.



- To encourage and support exploration of minerals, particularly through private sector.
- To promote environment friendly mining practices and to take measures for mitigation of environmental hazards for sustainable development of mineral sector.

Major Impacts

The summary of the positive and the negative impacts observed on the environment by the mining of Iron Ore on the project area has been summarized in Table below. The impacts have been given magnitude based on the scaling given below.

Scale Range	0 to 5
Major Impact	5
Moderate	4
Intermediate	3
Minor	2
Low	1
No Impact	0

(+) sign is used for positive impacts and (-) sign for negative impacts. The mitigation measures will be explained after a short while.

Sr. No.	Component	Environmental Issue	Impacts	
			Positive	Negative
1	Physical Environment			
	Water	Channel Water Quality		0
		Channel Water Discharge.		0
		Groundwater Quality		0
		Groundwater Level		0
		Surface Run-Off		0
		Flooding		0
		Drainage		0
	Land	Soil Salinity		0
		Soil Erosion		0

		Land Utility / Productivity	+2	
	Solid Waste	Land Pollution Breeding of flies and rodents Odor		0
	Climate	Micro-climate changes.		0
	Atmosphere	Dust		-2
		Noise		-1
	Sub-Total		+2	-3
2	Biological Environment			
	Flora	Forests /Trees	+2	
		Other Terrestrial Vegetation		0
	Fauna	Mammal Communities /Habitat		0
		Reptile Communities /Habitat		0
	Sub-Total		+2	0
3	Socio-economic Environment			
	Social	Population	+1	
		Land Ownership	+2	
		Land Lease	+2	
		Worker's Health and Safety		-2
		Security		0
		Social Cohesion/ Attitude	+1	
		Food/ Nutrition	+1	
		Health		0
		Education	+1	
	Economic	Income Levels	+2	
		Employment	+2	
		Land Value	+2	
	Institutional	Institutional Activities/Effectiveness	+2	
	Human Use	Cultivation	+1	
		Livestock	+1	
		Afforestation	+2	
		Infrastructure	+2	0

		Domestic Water Supply		0
		Community Development	+2	
	Resettlement	Land Lease		0
		Dislocation of Population		0
		Loss of Property		0
		Loss of Infrastructure		0
		Resettlement of Affected		0
	Sub-Total		+24	-2
Grand Total		+28	-5	

Detailed analysis of operational impacts is given in chapter 7.

Recommendations for Mitigation Measures

The negative impacts resulting from Iron Ore mining can be controlled through means and measures demonstrated in Table below. Further, the implementation agencies are also identified who can help in reducing the negative impacts. The aim of these measures is to conserve the local environment commensurate with the NEQS. The implementation of the mitigation measures is however linked to the mine operator link-tenure with the lease. The current adopted system of auction system has made it difficult for the mine operators to invest in the area's development due to short tenure of activity and no security of further affiliation/renewal of lease after expiration of tenure.

Environmental Component	Sources	Potential Impacts	Mitigation Measures
Physical Environment			
Air Quality	- Iron Ore mining activities - Vehicles and machinery	- Dust emissions are generated from site clearing and mining activities. - Exhaust emissions from diesel engine vehicles.	- Controlled water sprinkling will be ensured to reduce PM₁₀. - Maintain appropriate buffers between the site and receptors.

			• Use of PPEs (face masks etc.) will be ensured by the workers and staff.
Solid Waste	• Worker activities • No solid waste will be generated from mining operations.	• If not properly handled, it has the potential to degrade the quality of land. • Odor problem • Breeding of flies, birds, rodents etc. • Nuisance to the nearby communities if present within the proximity of the lease area.	• Proper waste management plan will be developed. • Waste will be stored at site in covered containers. • Containers will be emptied before they reach their carrying capacity. • Littering will be prohibited at the site. • Awareness will be given to the staff and workers about handling of solid waste at site.
Noise	• Heavy machinery and equipment such as excavators and tractor trolleys	• Increased noise levels and vibrations. • Disturbance to workers and local residents (if any). • Reduced hearing issues for workers and staff.	• Use of PPEs (noise suppression equipment-ear muffers, ear plugs etc.) will be ensured by the workers where noise levels are higher than 85 (dBA). • Mining activities will be ensured at daytime when background noise levels are high. • Vehicles speed limit will be maintained to avoid excessive vibrations. • Regular maintenance of machinery will be

			ensured. Where reserves are feasible, manual mining operations will be preferred.
Wastewater	Nil	No wastewater will be generated from mining activities. Therefore, there will be no adverse impact on environmental setting due to this parameter.	Nil
Biological Environment			
Flora	Nil	- The lease area is devoid of any forest cover. - There are no trees except some small size bushes at the project site not worth mentioning. - The proponent will not be cutting any trees coming in direct way of mining activities. - Therefore, there is no question of tree cutting during the operation of the project as well.	Excessive plantation will be done in and around the boundary of the lease area as a potential environmental enhancement measure. (Subject to the agreement between lessee and consultant and consent of the land owner also)
Fauna	Nil	Temporary migration of mammals and birds from the area.	As this impact is temporary, hence, no significant mitigation measures are required.
Endangered	Nil	No endangered	Nil

Species		species found within the vicinity of the project area, hence, no impact.	
Socio-economic Environment			
Worker's Health and Safety	- Noise - Dust	- Health and safety risks to workers due to high levels of dust and noise. - Respiratory problems - Hearing issues	- Provision of first aid box at site. - Provision of Personal Protective Equipment (e.g. dust masks, ear muffs etc.) to workers and staff.
Community Amenity	- Noise - Dust	- Reduced visual amenity - Excessive dust impacts may be harmful for some people, for example, with some experiencing respiratory conditions.	- Adopt and maintain good management practices. - Maintain appropriate buffers between the site and receptors. - If these buffers include vegetative screens, they have the added benefit of providing improvements in visual amenity.

Proposed Monitoring

The environment, safety and health-monitoring program for the operational phase of the project are as follows:

- Regular monitoring of mining machinery and vehicles.
- River flow monitoring (if present within the vicinity of the lease area).
- Monitoring of environmental parameters including ambient air and noise in terms of their quality.
- Monitoring of the environmental parameters as suggested and directed by EPA, Punjab.
- Monitoring of implementation of Environmental Management and



Monitoring Plan.

- Monitoring of parameters including in Occupational Health and Safety. Some of them are as follows:
 1. Provision of PPEs to the workers and staff.
 2. Provision of First Aid box at site.
 3. Provision of fire-extinguisher for emergency situations etc.

The project manager, being aware and conscious of its responsibilities towards environment is committed that the project operations will be made keeping in line with the internationally accepted sustainable measures/practices and methods thus leaving negligible adverse impacts on any segment of environment due to proposed activity. Furthermore, the detailed EMMP has been given in **chapter 8**.



1. **INTRODUCTION**

1.1. **Purpose of the Report**

This report has been prepared to conform to the requirements of the Punjab Environmental Protection (Amendment) Act 2012 (PEPA), which states that:

“No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof.”

Environmental Impact Assessment (EIA) report is being submitted to the environmental protection agency (EPA), government of the Punjab, Lahore in compliance with the legal requirements for Punjab Environmental Protection Act-1997 (amended 2012), section-12 for obtaining the environmental approval (EA) at the project site. The other relevant regulations and guidelines considered while preparing this EIA report will include:

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

Different environmental aspects like social, physical, biological etc and other related features of the project are highlighted in this EIA report. Measures necessary to be adopted to mitigate any environmental impacts on any part of the environment around are also described. All the important information is also provided as described under the format used to help decision makers,



EPA Punjab in the present case, before issuing the desired environmental approval.

The main objective of the EIA study is to assess the environmental impacts likely to occur due to the construction of the roads improvement project, and to suggest mitigation measures to minimize the likely negative impacts. For achieving the above objectives, the study was mainly divided into following sectors:

- Identification of all requirements as set forth by Pakistan Environmental Protection Act, 1997 and the Guidelines for preparation of EIA reports, etc.
- Study of existing regulatory framework in Pakistan with reference to the developmental projects;
- Study of Guidelines for the preparation of EIA reports;
- Collection and scrutinizing data related to physical, ecological and socioeconomic, and physical resources of the project area;
- Evaluation of data and identification of significant environmental impacts;
- Identification of necessary mitigation measures to minimize the negative impacts; and
- Preparation of an Environmental Management Plan.

1.2. Identification of the Project and Proponent

1.2.1. Details of the Project

The project title is "Prospecting License for Iron Ore over an area of 88.18 acres of land situated near Bharwal in District Chakwal". Prospecting License was granted by Mines and Minerals Department, Government of the Punjab

1.2.2. Details of the Proponent

The details of the proponent are given in Table 1-1;

Table 1-1 Details of the Proponent

Details of Proponent	
Name of the Proponent	Mr. Gulzaib Hassan
Address	PO Khairpur, Tallar Kahar, Chakwal



1.3. Details of Consultant

The details of the consultant are given in Table 1-2;

Table 1-2 Details of the Consultant

Contact Details	
Consulting Firm	Prime Environmental Consultants
Representative	Engr. Ali Mehdi
Contact	(+92) 321-7860915
Address	Latif Plaza, Office No. 07-08, 69 Saeed Block Commercial area, Canal Bank Scheme, Lahore
e-Mail	primeenvironmentalconsultants@gmail.com

The team carrying out the project impact assessment is presented in the Table 1-3.

Table 1-3 Consultant Team

Sr.	Name	Qualifications & Brief Experience	Roles Assigned
1.	Engr. Ali Mehdi	B.Sc. Mining Engineering	- Stakeholder Consultation - Preparation of Environmental Management Plan (EMP) - Preparation of Environmental Monitoring Plan (EMP) - Author of EIA Report
2.	Zeba Haseeb	Environmental Scientist M.S Environmental Science	- Preparation of Environmental Management Plan (EMP) - Preparation of Environmental Monitoring Plan (EMP) - Author of EIA Report
3.	Umer Saeed	Environmental Scientist M.S Environmental Science	Site visits

1.4. Brief Description of Nature, Size and location of the Project

The project is about Prospecting License for Iron Ore over an area of 88.18 acres of land situated near Bharwal in District Chakwal.

Iron ores are rocks and minerals from which metallic iron can be economically extracted. The ores are usually rich in iron oxides and vary in colour from dark grey, bright yellow, or deep purple to rusty red. The iron is usually found in the form of magnetite (Fe_3O_4 , 72.4% Fe), hematite (Fe_2O_3 , 69.9% Fe), goethite ($\text{FeO}(\text{OH})$, 62.9% Fe), limonite ($\text{FeO}(\text{OH}) \cdot n(\text{H}_2\text{O})$, 55% Fe) or siderite (FeCO_3 , 48.2% Fe).

Ores containing very high quantities of hematite or magnetite (greater than about 60% iron) are known as "natural ore" or "direct shipping ore", meaning they can be fed directly into iron-making blast furnaces. Iron ore is the raw material used to make pig iron, which is one of the main raw materials to make steel—98% of the mined iron ore is used to make steel. Indeed, it has been argued that iron ore is "more integral to the global economy than any other commodity, except perhaps oil".

1.4.1. Occurrence in Punjab

The Kalabagh iron ore deposits are the largest known deposits in Pakistan of low-grade iron ore in District Chakwal in the Surghar Range, and near Sakesar in the Salt Range. Much work has been done on Kalabagh iron ore deposit in the past, by M/S Pakistan Mineral Development Corporation.

The deposits of iron ore occur in the upper part of the Lumshiwal Formation of Upper Cretaceous age. The ores are very irregular in composition owing to the presence of many different iron minerals in varying amounts. Mineralogical composition the ores controls its chemical composition and metallurgical suitability. The Kalabagh iron ore can be classified into two broad types on the basis of mineralogy. These are the Kuch type (chamosite-siderite) and the Chichali type (glauconite-siderite). A transitional type of ore is also present and is represented by the ore of Chuglan and Tolamangli.



The basal part of the Chitarwala Formation contains iron ore especially in Rakhi Munh (District D.G.Khan) area in the eastern flank of the Fort Munru anticlines. The iron occurs as banded iron ore and is exposed in the foothills at 2 Km west of Rakhi Munh (39 k-I), which is located at 53 Km west of D.G. Khan.

The iron ore deposits are also located south of Chiniot Town in Jhang District. The iron ore deposits are located very close to Chiniot town where all the infrastructure facilities are available.

1.4.2. Uses

The iron ores are used for making iron and steel alloy to iron. The primary use of iron ore is in the production of iron. Most of the iron produced is then used to make steel. Steel is used to make automobiles, locomotives, ships, beams used in buildings, furniture, paper clips, tools, reinforcing rods for concrete, bicycles, and thousands of other items. It is the most-used metal by both tonnage and purpose.

1.4.3. Objectives

The main objectives of Iron Ore mining are

- To enhance the contribution of mineral sector to GDP through improved production.
- To expand mining sector by focusing on exploration and evaluation of mineral resources.
- To enhance public sector investment on resource mapping, Geo-database development and provision of physical infrastructure, roads and electricity etc. in the potential areas.
- To promote facilitation role of the government for the prospective investor.
- To encourage and support exploration of minerals, particularly through private sector.



- To promote environment friendly mining practices and to take measures for mitigation of environmental hazards for sustainable development of mineral sector.

The location of the proposed mining is at given below;

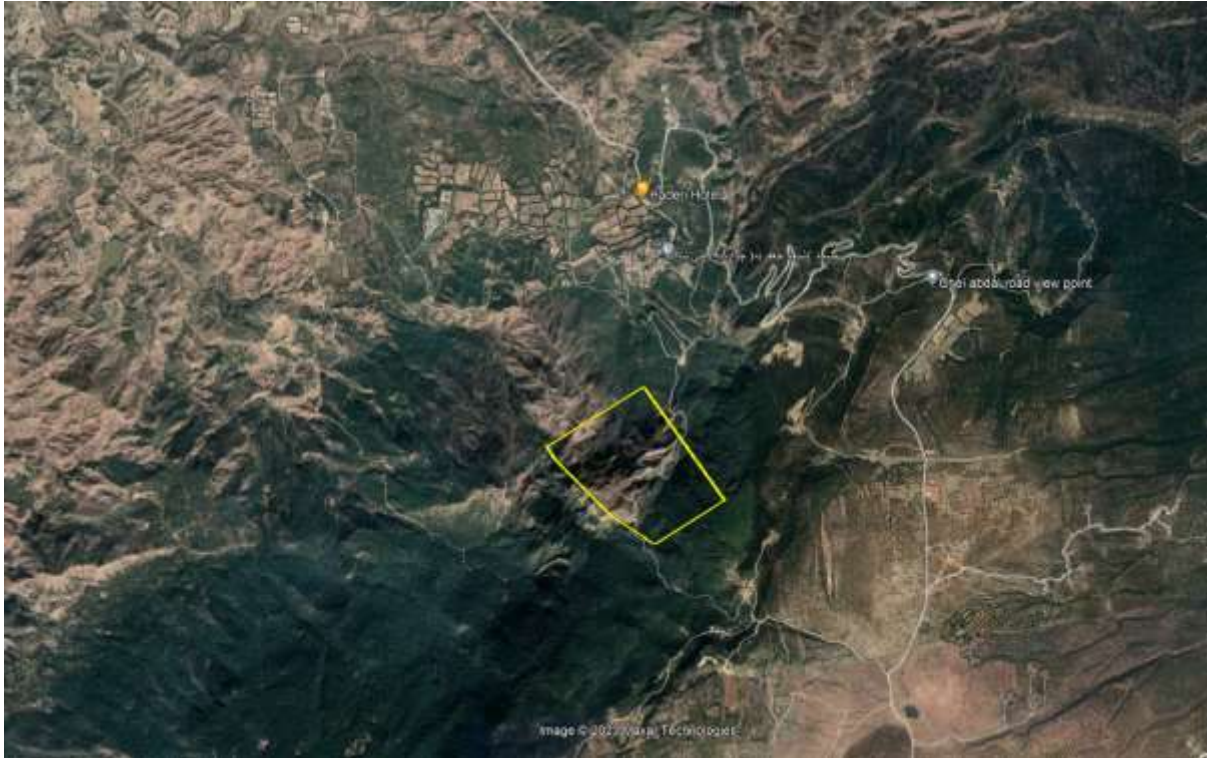


Figure 1-1 Location of the Project on Google Earth

Handwritten signature or mark.

2. SCREENING AND SCOPING

2.1. Screening

Section 12 of Punjab Environmental Protection Act (PEPA), 1997 (Amended 2012) states:

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

As per Review of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Regulations, 2000 made under Section 12 of Punjab Environmental Protection Act, 1997 (Amended 2012), current project (Iron Ore mining) falls under Schedule II (List of projects requiring EIA), Category C-I (Mining and processing of Iron Ore, gold, copper, sulphur and precious stones).

2.2. Scoping

2.2.1. Spatial and Temporal Boundaries of Environmental Assessment

Project site is open land. After its development with time nature of area will change from open land to project site. Already Iron Ore mining activities are being taking place near around. No environmental sensitive area is present that could be impacted due to the current project.

2.2.2. Important issues and concern raised during consultation

The important issues and concerns raised during consultation were mentioned below while they have been discussed in chapter Stakeholder Consultation.



- Air pollution should be controlled effectively.
- Locals should be preferred for the job opportunities.
- Wastewater should be treated prior to final disposal.
- Solid waste should be managed effectively by adopting the standard practices of the area.
- Cleanliness of the area should be ensured.
- An effective EMMP should be designed and enforced with true spirit.
- Health of the workers should be ensured.
- Workers should be hired from local community.
- Indigenous trees around the facility should be planted to control air pollution.

2.2.3. Significant impacts and factors to be determined

The most significant impacts and factors to be determined are;

- Control of Air Emission
- Solid waste management
- Site restoration
- Environmental Management Plans
- Avoid excessive water consumption
- Energy efficient techniques must be adopted
- Tree plantation at designated green areas
- Emergency preparedness
- Occupational Health and safety
- Site Security
- Traffic Management
- Hygiene management
- Community impacts
- Job opportunities for locals
- Confined noisy activities



3. CONSIDERATION OF ALTERNATIVES

3.1. Site Alternatives, their Selection and Rejection Criteria

No other site was considered for the Prospecting License for Iron Ore as it is located in an area which is geologically rich with Iron Ore reserves. Iron Ore existence is subject to geological variations. Among the main considerations for selection of project site include:

a. Roads and other basic infrastructure:

The availability of good roads facilitates movement of Iron Ore at cheaper cost. The other basic facilities are vitally important for the entire business to be run. These facilities also go in favor of the present site selection for the project.

b. Availability of Labor:

Cheap labor is easily available in the project area in more than desired number. This also makes the site also suitable. All categories of the labor required for the project operation are available conveniently and plentifully at affordable cost at the present site. This factor too supports to select the present site for the said project.

c. Basic infrastructure and facilities:

Basic infrastructure like water, roads, transport, repair and maintenance workshops and communication facilities like telephone, e-mail are already available virtually at the project site. This factor also goes in favor of selecting the present site.

d. Environment

And lastly, environmental considerations are extremely important. The land around the project area is entirely open. Settings around the project area do not show any sensitivity of environment. There is no worth mentioning forestry, biodiversity, fishery, flora and fauna, heritage etc. No important religious, archaeological, recreational site, ecologically sensitive, declared protected



area and human settlements exists within close vicinity of the selected site i.e., within 100 m which is considered to be a safe distance.

Following are other some of the additional parameters that favor Iron Ore mining in the respective region:

- i. Favorable geology with Iron Ore bearing area.
- ii. Easy extraction of the Iron Ore by available methodology.
- iii. The project operation doesn't involve human settlements displacement or relocation.
- iv. Mining in the respective zone has provided job opportunities to local people and improved their socio-economic status.
- v. The Iron Ore production has contributed positively in the income stream of the national exchequer as well as contribution in GDP.
- vi. The Iron Ore transportation from mine to market road is easily available.
- vii. The project has a sustainable life span.
- viii. The mining operations are undertaken up to the Iron Ore bearing strata with a geological depth of around 250-400 feet.
- ix. Moreover, there is no railway line, reservoir, canal or public building nearby the mining area.

In view of these facts, it can be concluded that the chosen site per force is fixed. Considering the facts that mine site is at a safe distance from sensitive receptors and has advantage of not only to be environmentally friendly but also potentially sound to enhance sustainable development in the region. Therefore, given site is the most suitable.

3.2. Design/technology alternatives, their selection and rejection criteria

There are two methodologies for the mining which are given below;

- i. Underground Mining
- ii. Surface Mining



Under the present conditions and due to geological along with techno-economic parameters, iron ore will be extracted through surface mining method as it is exposed on the surface.

3.3. Environmental Alternatives, their selection and rejection criteria

The project is about the mining of Iron Ore by the environmental friendly means so no environmental alternative can be considered as the project is environmental friendly.

3.4. Economic Alternatives, their selection and rejection criteria

The project activities are environment friendly and the mining technique is economically efficient. As the Iron Ore is being mined so there is no alternative mineral is present in the project site. All machinery, equipment and materials procured for the said project will be environmentally friendly and sustainable. So there is no material alternative considered in this case as Iron Ore is being mined.



4. DESCRIPTION OF THE PROJECT

4.1. Objectives of the Project

- a) Accelerate pace of development in the existing mines.
- b) Enhance production, productivity coupled with safety by improvising with the adaptable technology-mechanization.
- c) Undertake aggressive marketing to maximize domestic share.
- d) To provide employment to the locals
- e) Expand business through added exploration and exploitation by new entries based on techno-economical parameters.

4.2. Location and Site Layout of the Project

The Prospecting License of Iron Ore is located in District Chakwal of Punjab. The project location is represented in Figure No. 4-1 and more detailed colored image is present in **Appendix VII** on A3 size.

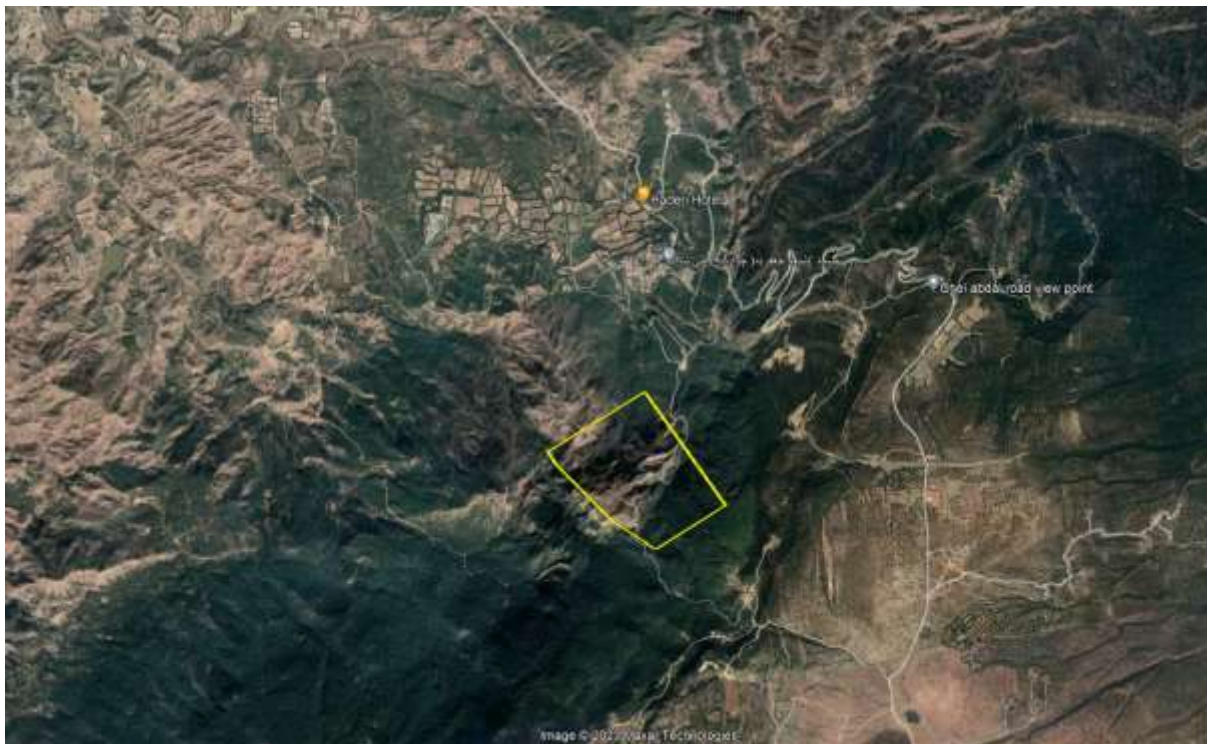


Figure 4-1 Location of the Project

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The proposed site boundary primarily falls within mainly inhabited and presently unused area. The coordinates of the Iron Ore lease area are given in Table No. 4-1.

Table 4-1 Coordinates of the Iron Ore Lease Area

Points	East (Yards)	North (Yards)	East (Meters)	North (Meters)
A	3520546.03	1049745.37	3219187.29	959887.1663
B	3521060.87	1050095.23	3219658.06	960207.0783
C	3521531	1049502	3220087.946	959664.6288
D	3521162.32	1049246.06	3219750.825	959430.5973
E	3520918.71	1049387.28	3219528.068	959559.7288
F	3520598.09	1049675.56	3219234.893	959823.3321
Area: 88.18 Acres				

4.3. Land Use on the Site

The land is not an agricultural land. The iron ore will be extracted through surface mining method. Moreover, nearby surface mining is already held in place by other lessees.

4.4. Road Access

Access road connecting Bharwal is close access of the proposed project site.

4.5. Vegetation Features of the Site

There is no vegetation cover on the project site. The area free of any vast tree cover and dense vegetation.

4.6. Cost and the Magnitude of Operation

The capital cost of the project is Rs. 07 million. The Prospecting License will spread over an area of 88.18 acres. There will not be any other activity except mining of Iron Ore.

4.7. Schedule of Implementation

The Project plans to be completed within 3 to 6 months after getting requisite approvals and NOCs from authorities. Project development schedule (tentative) is described hereunder:

Table 4-2 Time Schedule for the Quarry Development

Sr.	Description	Months
1	Cost of exploration work	03
2	Office and Labor Shed	03
3	Access road	04
4	Quarry Development	18
5	Machinery & Equipment Procurement	02

4.7.1. Manpower

The proposed man power for Iron Ore mining is described in Table4-3

Table 4-3 List of Manpower for Iron Ore Mining Operations

Sr.	Category of Staff	Strength
1.	Mine Engineer	01
2.	Mine Surveyor	01
3.	Mine Sardar	01
4.	Mine Sardar	01
5.	Engine Operator	01
6.	Pump Driver	02
7.	Electrician	01
8.	Accountant	01
Total		09

4.7.2. Water Requirements

The main water supply requirement is for drinking water and nothing in the mining process. The workers are being provided 2-3 liters of water per capita per day. For a 50 workers camp, the quantity of water required is about 100-150 liters per day.



4.7.3. Solid Waste

Iron Ore will be excavated through surface mining method. Estimated width of the body is around 10ft. overburden removed will be dumped within the site and on the extracted iron ore to mitigate the solid waste.

4.7.4. Process Flow Chart

The mining activities are carried out in a very coordinated way. From the selection of site till the mining and conclusion of project, the mining supervisors and laborer are trained to develop an understanding of complexity and sensitivity of the operations.

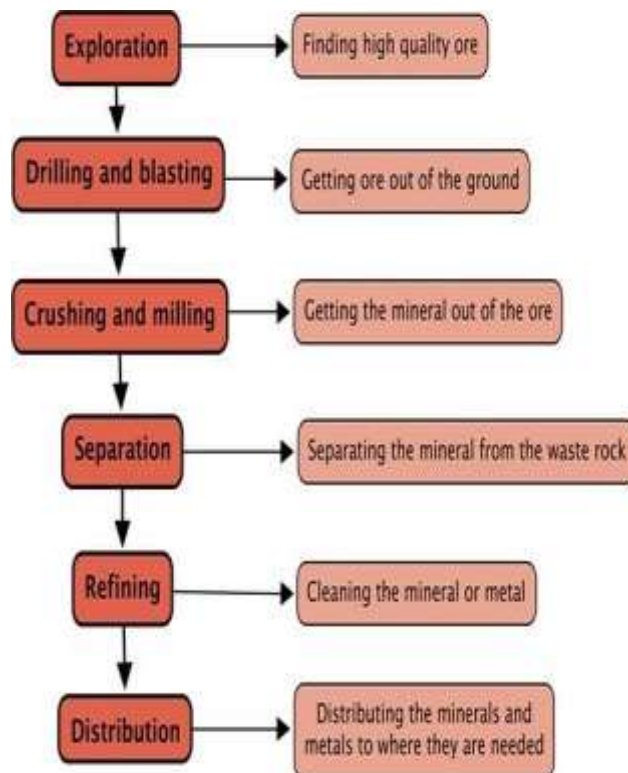


Figure 4-2 Iron Ore Mining Flowsheet

- **Mode of Excavation**

The mode of excavation is through mechanical machines. Dozers or excavators will excavate the in situ iron ore which will be loaded on loader and dumpers. These machines will haul them to the stockyard to sell the iron ore in the market.

- **Market of the Iron Ore**

After loading into the loaders/trucks/dumpers, Iron Ore will be transported to the market places based on demand. Iron Ore may be marketed to Chakwal and nearby areas. It can be used in the cement production and other chemical plants as raw material.

4.8. Restoration and Rehabilitation Program

Following steps can be done by guessing the restoration and restoration of the area:

- Waste dumps are contoured to flatten them out, to further stabilize them against erosion.
- Landfills are covered with topsoil, and vegetation is planted to help consolidate the material.
- Dumps are usually fenced off to prevent livestock denuding them of vegetation.
- The open pit is then surrounded with a fence, to prevent access, and it generally eventually fills up with groundwater.
- No value building located in the area should be relocated or demolished.
- The leased mining process will be a surface mining process in which there will be minimal disruption to the plant and structural aspects of the project structure.
- The value of the site is due to economic activity, if not. It is like a barren land. The question of renewal therefore does not arise without redistributing the land formed by the excavated local mines
- A single location can be used for geo tours for tourists to perform other economic activities once the depots are depleted.
- The site may be used for reconstruction purposes.
- Trees will be planted in the project area through a dry forest planting process and the entire local environment will be greatly improved.



Table 4-4 Restoration and Rehabilitation Program

Measures for Land Rehabilitation & Restoration	Timeframe	Responsible Party
There exists no human settlement within safe radius of the selected project site to be displaced owing to the mining operations. No structure of any significance stands at the site to be relocated or dismantled. Mine is already awarded to proponent, hence, no relocation and rehabilitation is required.	-	-
The details of the land leases documents are attached at the end of this EIA Report. The process of mining employed will be surface mining process but there is no flora and fauna existing within the lease area	-	-
The importance of the site is due to economic activity, otherwise, it is a replica of a barren land. The question of rehabilitation therefore doesn't arise except re-coursing the land formed by the cavities of the mined-out area	After Mine Closure	Proponent
The isolated site can be used for geo-tours to the visitors for generating alternate economic activity once the reserves are exhausted.	After Mine Closure	MMD
The site can be used for re-stocking the livestock.	After Mine Closure	MMD/ Livestock Department
Trees will be planted at the project area by using dry afforestation technique and the overall ecology of the area will be improved significantly.	Till Lease Tenure	Proponent
The land will be available for agricultural use.	After Mine Closure	MMD/ Concerned Authority
The site can be used for re-creational purposes.	After Mine Closure	MMD/ Concerned Authority

5. DESCRIPTION OF THE ENVIRONMENT

The existing environment in the project area has been studied with respect to the physical, biological and socio-economic resources.

5.1. Baseline Physical Environment

Physical resources of the proposed study area include geology, topography, soil, climate, meteorology, ambient air quality, surface water, ground water and other existing pollutants prior to the operation of the project.

Chakwal District is in Pothohar Plateau of Punjab, Pakistan. It is located in the north of the Punjab province, Chakwal district is bordered by Khushab to its south, Rawalpindi to its north east, Jhelum to its east, Mianwali to its west and Attock to its north west. The district was created out of parts of Jhelum and Attock in 1985. Based on geography, topography and geology, the project area is briefly described below:

5.1.1. Topography and Geology

The study area is hilly and sub mountainous. The topography is rugged and elevation ranges from the 450 m to 500 m above the sea level. Hill torrents are present in the area which mostly runs from the north to south and drain the rain and storm water of the hilly area into deeper valleys and places. Population of the study area is about 25,000 including temporary settlements in that area. There is no such historical place is present in the study area. Mostly people of that area are in army and other part of the country for their income. Agriculture is rare due to the calcareous and mountainous region.

5.1.2. Meteorology of the District Chakwal

Chakwal is located in the Dhanni region of the Potohar in northern Punjab, which is a semiarid area with a shortage of irrigation systems and water sources for agriculture. Over 70% of the population engages in agriculture, mostly subsistence agriculture dependent on rainfall. Monthly average rainfall of base line period (1981-2010) is displayed in Figure below.



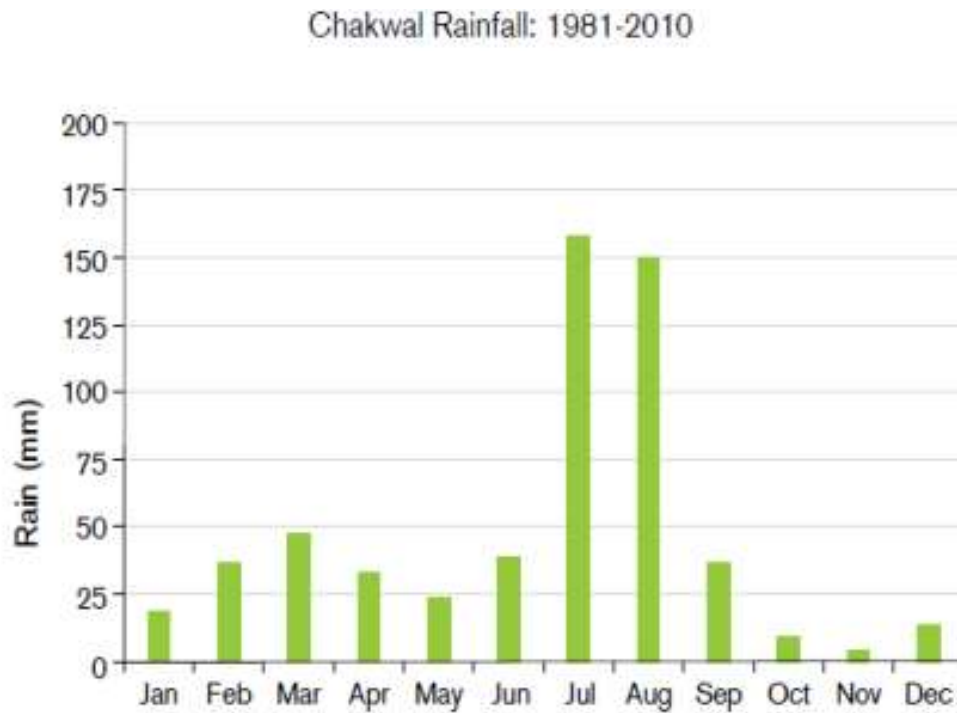


Figure 5-1 Monthly rainfall data of chakwal

The computed rainfall scenarios using the base line data of 1981-2010, for each season with departures from base line period and the preceding

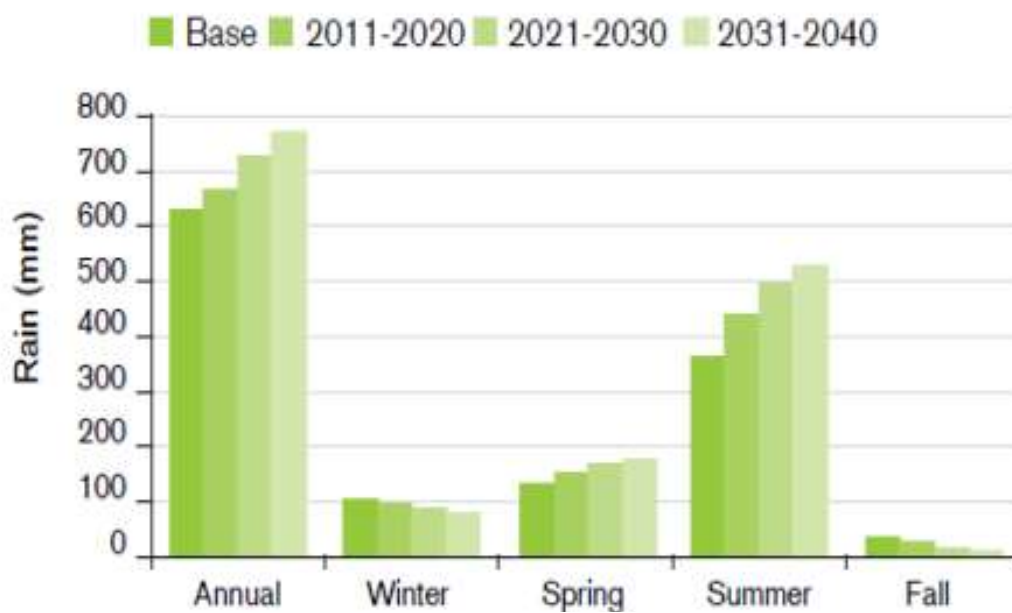


Figure 5-2 Decades Rainfall data

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decades are given below graph.

5.1.3. Temperature

The mean monthly maximum and minimum temperatures, according to the base line data (1981-2010) are displayed in the Figure below. The annual average temperature of Chakwal District is 29.6°C.

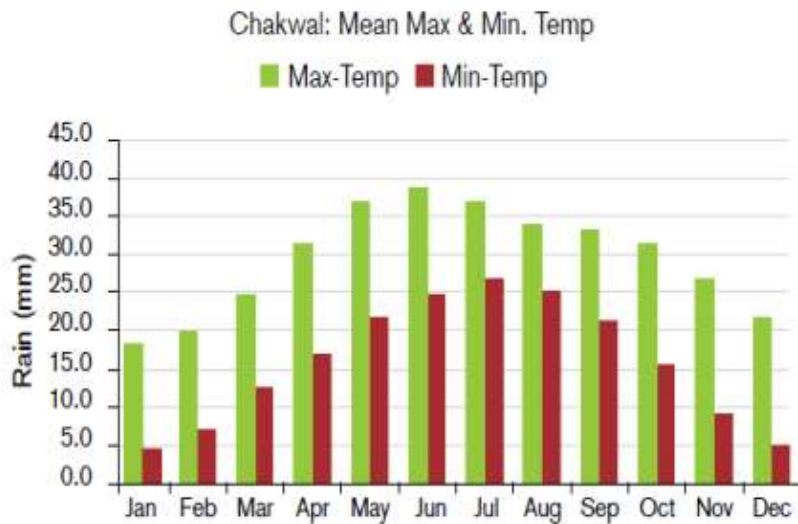


Figure 5-3 Monthly temperature of Chakwal

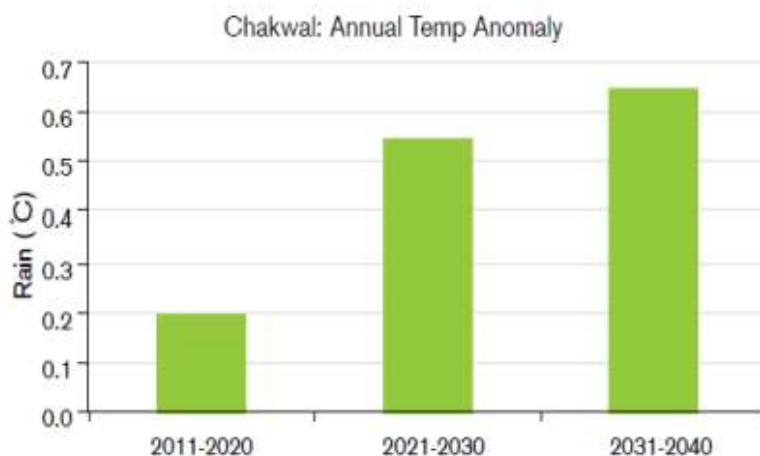


Figure 5-4 Annual temperature of Chakwal

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5.1.4. Humidity

July, August and September are the most humid months in the area, whereas May and June are the least humid months. Average monthly relative humidity values at various locations in the project area are 64%.

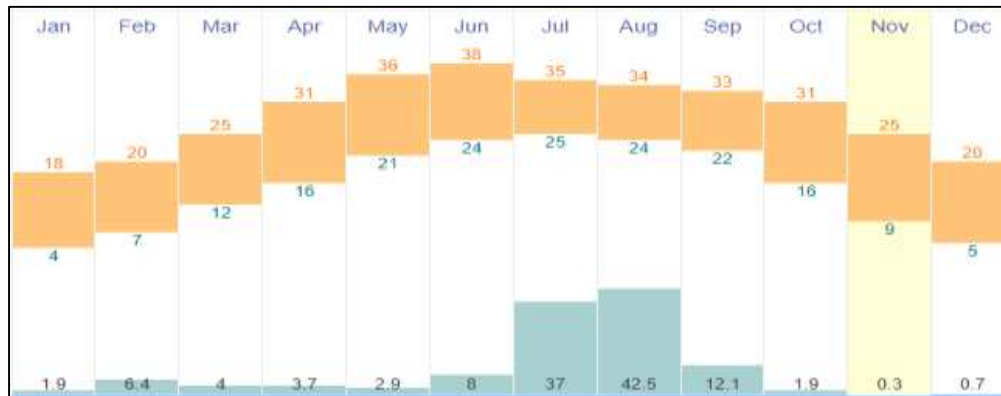


Figure 5-5 Average Humidity

5.1.5. Soils

Mostly area is covered by the mountains. Fertile land is rare in the study area. Small patches of the soil are present that are used by the house hold for the vegetable harvesting. Hard rocks are present all over the upper layer. Clay is also present at about 1-3 km distance from the proposed mining site. The soils are medium textured with considerable amount of clay materials. Soil formation of that area is occurred through the mechanical weather of the old alluvial deposit and loess due to the wind and water of the rains.

5.1.6. Climate

The meteorological data of the proposed study area was collected from the Pakistan Department of Meteorology (PMD) for the last 15 years. The climate of the area can be classified as true semi-arid, sub-tropical with long winter and sub-humid. The general feature is high June- July temperature with occasional hot, dry wind and dust storms, cold nights in winter and two rainy seasons. Unseasonal rain fall is also occurring in the start of the winter Rain fall pattern of the study area are as; 3. Mid Jun to mid-September 4. December to March The wind mostly flow from the north to the south in the study area

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region. Mean annual maximum temperature of the study area reach 29°C and minimum is about 14°C. Humidity of the area is high at night except of the month of the May and Jun when it is about 58% at midnight and 46% at 0300 hrs. During the other month the humidity rage is about 70% to 80% while the midday humidity is low and range is 23%-26%.

5.1.7. Seismicity of the Project Area

According to seismic zoning of Pakistan the project area lies in seismic zone 2Band represents minor damage. Earthquake with high intensity for a fundamental period of more than 1 second may cause damage to infrastructure. Seismic zoning map of Pakistan is given in figure 4-6.

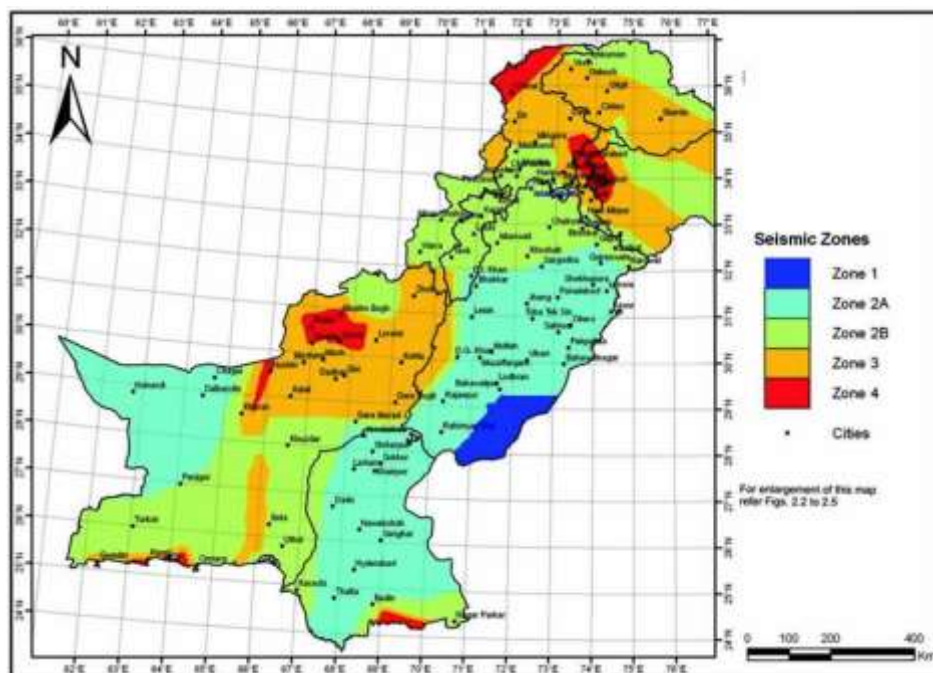


Figure 5-6 Seismic zoning map of Pakistan

There are three main faults in the Salt Range:

- Kalabagh Fault (North South)
- Jhelum Fault (North South)
- Salt range thrust fault (East-West)

In the Region of Salt Range over all earthquake occurrence frequency trend is same and area representing the moderate seismicity.

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5.1.8. Geography

The district is located between 33°40'38"N and 72°51'21"E. Chakwal district borders the districts of Rawalpindi and Attock in the north, Jhelum in the east, Khushab in the south and Mianwali in the west. The total area of Chakwal district is 6,609 square kilometers, which is equivalent to 1,652,443 acres (6,687.20 km²). The southern portion runs up into the Salt Range, and includes the Chail peak, 3,701 feet (1,128 m) above the sea, and the highest point in the district. Between this and the Sohan river, which follows more or less the northern boundary, the country consists of what was once a fairly level plain, sloping down from 2,000 feet (610 m) at the foot of the hills to 1,400 feet (430 m) in the neighborhood of the Sohan; the surface is now much cut up by ravines and is very difficult to travel over.

- **Water Quality**

The Laboratory collected the underground water sample on the 06-06-2015 from the different villages for the water quality analysis of the study area. Water table of the study area is about 400 ft to 550 ft (Source local people during survey of villages).

Water typically is not considered desirable for drinking if the quantity of dissolved minerals exceeds 1,000 mg/L (milligrams per liter). Water with a few thousand mg/L of dissolved minerals is classed as slightly saline, but it is sometimes used in areas where less-mineralized water is not available. Water from some wells and springs contains very large concentrations of dissolved minerals and cannot be tolerated by humans and other animals or plants. Many parts of the Nation are underlain at depth by highly saline ground water that has only very limited uses.

Dissolved mineral constituents can be hazardous to animals or plants in large concentrations; for example, too much sodium in the water may be harmful to people who have heart trouble. Boron is a mineral that is good for plants in small amounts, but is toxic to some plants in only slightly larger concentrations



- **Groundwater**

Ground water resources are found hidden and camouflaged into the surface of earth in the form of mobile and immobile state and exist as shallow and deep wells, confined and un-confined aquifers, springs and watersheds. Ground resourced waters are not easily susceptible to natural and anthropogenic derived contamination caused by Chemical/Biological pollution and thus is directly used for sensitive applications such as drinking even it is un-treated. The project area lies in the district of Chakwal; the groundwater table normally exists approximately 5 feet to more than 20 feet below the GSL.

- **Springs water**

Study area contains two main water bodies which are natural springs named Neelwan and Abbe-shafa. Local people use the drinking water from those sources. Currently there is no pipeline system or water supply is present in the proposed study. Water is good quality of both the springs.

5.2. Baseline Ecological Environment

5.2.1. Fisheries

The project area is almost free from any commercial fishing activity. There are no lakes, natural water springs are present at 4 km distant from the proposed project site. These springs have no fish. Therefore, Fishery or any worth mentioning aquatic biology in this area is out of question.

5.2.2. Biodiversity

Natural capital of a country mainly includes all of the country's wilderness areas and scenic landscapes, including also with their associated flora and fauna. Pakistan has a total of nine major ecological zones. The contribution of the "Natural Capital" is recognized at three distinct levels: species, genera, and communities (habitat and ecosystem) both collectively and within each level, the range or variety of the resources are referred to as the "Biological



Diversity". The term has relevance for each of Pakistan's administrative units district, province, and particularly country. The more the number of species, genera, and habitats and ecosystems present within these units, the greater is said to be the Biodiversity. The biodiversity of the area, with this background, is discussed as under.

5.2.3. Flora

There is a very wide range of plant species in the study area. But proposed project site have very low vegetation and plants species. Following species are most commonly found in the study are of four villages. Amongst plants, the species which are most abundant in the Study area are Kau (*Olea cuspidata*), Phulai(*Acacia modesta*), Sanatha (*Dodones viscosa*), Gurgura (*Monothea buxifolia*), and Pataki (*Gymnospo Riaroyleana*).

The general vegetation consists of dry deciduous scrub. The grass species which are dominant in the area are Sariala (*Heteropogan contortus*), Khawi (*Cymbopogan jwarancusa*), Mesquite (*Prosopis juilfloro*), and Karir (*Capparis sphylla*).



Figure 5-7 Native species of project site

5.2.4. Fauna

The species which exist in various areas of Chakwal district are:

- **Grey partridge**—found all over the district, especially in areas, which are sparsely populated.



- **Black partridge**—found along the seasonal channels and water holes in the bellas throughout the district.
- **Chakore**— found in dry rocky areas in the district especially in the ChoaSaiden Shah area.
- **See See partridge**—found at a number places in the district in the dry rocky area especially in the Kallar Kahar mountain belt leading into subdivision Talaga.

Endangered Specie

There are no game reserves or protected lands/areas or endangered or rare species either in the area in the range of 15km from the project site.

5.2.5. Forestry

The forests which exist naturally, since Chakwal lies in the subtropical, semiarid zone, are dry deciduous scrub, consisting of the plant varieties which are typical of these kinds of forests- keeker, kau, phulai, sanatha, wild beri, gurgura and potaki. The underbush mainly consists of saryala, khawi, mesquite and karir. In the plantations that have been carried out by the Forest Department and private farmers, apart from the naturally occurring species of trees, the sheesham, sufaida and to some extent the poplar trees have also been planted.

At present a total of 92382 acres of the district are under reserve forest and 57868 acres are under unclassed forest. The main reserve and unclassed forests in the district are at Diljabbah, Surullah, Drangan, Gandala, Khokhar Bala, Makhiala, Dandot, Chinji, Kot Kala, Simbli, Nurpur, Bagga, Sammarqand and Thirchak. Forests in Chakwal district are taken care of by the Chakwal Forest Division, headed by the Divisional Forest Officer who is assisted by four Sub-divisional Forest Officers. The Chakwal Forest Division is spread over an area of 150250 acres which includes 375 km roadside and 40 km rail side plantations.

5.3. Baseline Socio-economic Environment



Socio-economic and other relevant information revealed from Multiple Indicator Cluster Survey (MICS) 2007-08. One of the main objectives of Multiple Indicator Cluster Survey (MICS) was to establish credible baseline for socio-economic status at each District and Tehsil Level.

Table 5-1 Summary of Socio-economic Indicators

Socio-economic Indicators	District Chakwal
Number of households	1,270
Number of under-5 children	710
Improved source of drinking water	96.8%
Water treatment used in the household	2.6%
Percentage of population using sanitary means of excreta disposal.	69.5%
Proper disposal of solid waste	1.9%
Literacy rate	72.2%
Percentage of children for primary school entry	67.2%
Total child labor	1.9%
Had cough for more than last three weeks	1.0%
Diagnosed with Tuberculosis during last one year	0.2%
Diagnosed with Hepatitis during last one year	0.6%
Employed	87.6%
Unemployed and seeking job	12.4%
Household Utilities	
Electricity	0.1%
Natural Gas	19.3%
Radio	53.4%
TV	71.2%
Cable TV	10.5%
Telephone	21.7%
Mobile	79.0%



Socio-economic Development	
Livestock	54.1%
Mean household size	6.0%
Govt. hospitals	37.6%

5.3.1. Quality of Life Values

- **Population**

According to the 1998 census, the population was 1083725 with 12.15% living in urban areas. The district consists of three tehsils. Figure 5-8 shows the population difference of District Chakwal between 1998 and 2017.

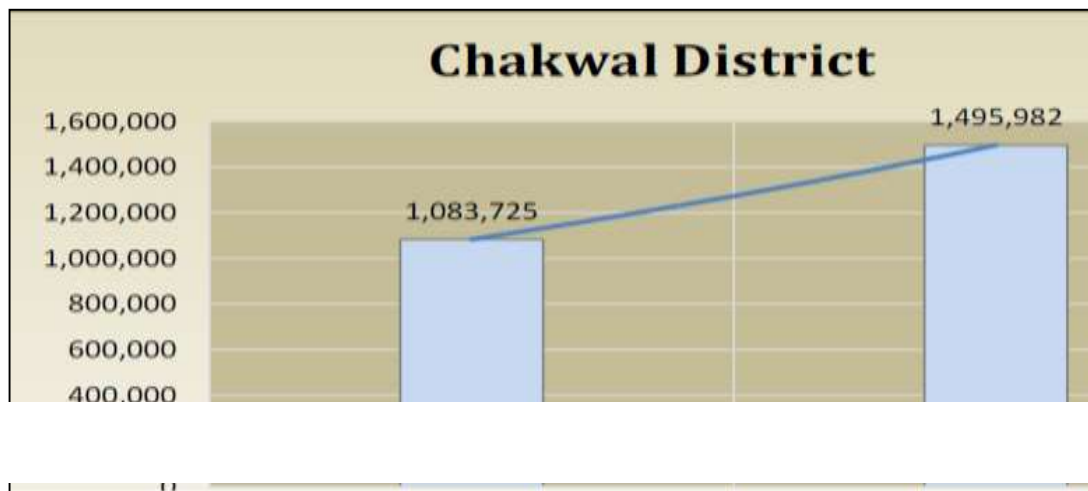


Figure 5-8: Population of District Chakwal

- **Health Facilities**

The coal cutters hail from Swat and as such are resident. Their First Aid and medical care is done by local dispensary maintained by the company. In case of health emergencies suggesting hospitalization, the patients are transferred to Mines Labor Welfare Hospital Choa Saiden Shah.

- **Education**

The primary health and education facilities are provided in the nearby town. The higher education both for boys and girls are available in Choa Saiden Shah, Kallar Kahar, Khewra and Chakwal.

- **Economic**

- **Income Levels**

Generally, the people are poor. However, with increased job opportunities to be provided by Company; their income levels are bound to rise.

- **Land Value**

The cultivation depends on rains; therefore, value of the land is not high.

- **Local Occupations and Employment**

Some of the locals are farmers. Many of them are employed in the mining business around as well as in the transport area. Other persons are doing labor work in Khushab, Chakwal, Islamabad, Faisalabad, Lahore and Gujranwala etc.

Cultural Heritage

The people of Chakwal carry very plain dresses. Men usually wear shalwar kameez or Dhoti Kurta, a turban on special events with Chappals, Khusas or Sandles. In winter season they add a Sweater, Coat or a Dhussa with it. The extra educated class also wears shirts with trousers. Women almost always wear shalwar kameez with dupatta with a sweater or woolen shawl in winter. The culture of Chakwal is mainly based on the mode of living as taught in Islam, but Chakwal is the place where a large number of Hindus lived before independence of Pakistan. The people of Chakwal live a straight and simple life as emphasized by their religion.

5.4. Recreational Resources and Development:



The project area has not any private recreational facilities.

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.

Archaeological and Historical Treasures

Archaeological or historical treasures within the project area are not available.

5.5. Lab Reports of Environmental Analysis

To assess the baseline conditions of the project area, following environmental components were monitored.

- Ambient air quality
- Noise levels and
- Drinking water quality

Lab reports are enclosed with the application.

5.6. Suitability of the Site

The site does not fall in environmental sensitive area and all commodities are at a suitable distance from project site as they will not have impacted by the construction activities even locals will get more benefits and job opportunities. No replacement, relocation and rehabilitation are required for the development of proposed project.



6. IMPACT ASSESSMENT

This section provides the analysis of the potential impacts during different stages of the proposed project on the physical, biological and socio-economic environment of the project area.

6.1. What is the Problem?

The problem is the environmental impacts resulting from project activities related to Iron Ore mining. The project is based on Iron Ore mining operations located near Bharwal in District Chakwal. The environmental impacts resulting from project operations on each environmental setting including physical, ecological and socio-economic environment.

6.2. When Problem Will Occur and When It Should Be Addressed?

The impacts may occur during different stages of the project activity. The impacts should be addressed at every stage of Iron Ore mining operations. The environmental impacts should be addressed at design, construction and operational stage of Iron Ore mining activities.

6.3. Where Problem Should Be Addressed?

The problem as mentioned above should be addressed at project location where mining activities are being carried out. All the impacts resulting from project location should be addressed, if any.

6.4. How the Problem Should Be Addressed?

The problem should be addressed using specified criteria and methods as specified in Guidelines/Checklist. The impacts should be addressed using one or more methods as specified in the Checklist provided by EPA, Punjab.



7. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

Anticipated environmental impacts are discussed as

7.1. Project location

The surrounding area is hilly and mostly barren land. The selected site is present on the belt which has abundant reserves of deposits of our concerned raw material. The site also has good road infrastructure. Manpower is available in the area. After environmental assessment of the study area the subject project site is most suitable to execute the project regarding the location environmental impacts.

7.2. Project Design

Mining activity will be done with proper fencing and specific area would be extracted or mined once in one time. Grazing and harvesting would be allowed on the remaining portion of the mining area other than the specific extracted area.

Following are the possible Environmental impacts due to the design

- Road infrastructure design
- Rain water harvesting capacity of the drainage system

Impact significance: low

Nature of impact: direct

Duration: NA

Timing: NA

Reversibility: NA

Likelihood: Low to Medium

Consequences: Low to Medium



Mitigation measures and recommendations

Following are the mitigation measures and recommendation to minimize the anticipated impacts.

- Proper design of fencing
- Proper Mining activity design
- Scientifically developing of the quarry.
- One specific portion will be mined in one time.
- Road infrastructure should be according to the laws and regulations
- Waste water drainage should be design vast to bear the rain water capacity of the society.

7.3. Construction Stage

The impacts in relation to construction of mine includes the impacts resulting from; construction of access roads, establishment of workers camps at safe sites and distances, land clearing and leveling, drilling, and surveying etc. The impacts resulting from these activities mainly include:

- **Dust Generation**

Dust may be generated due to movement of machinery and vehicles at site for construction purposes. Dust may be generated during access roads development, land clearing and leveling etc. dust will also be generated while the whole mining process of excavation of the mineral. Any access to the mineral deposit is done through jeep-able road which is improved by placing the shingle on top to avoid muddy and slippery situation. The movement of the truck on these "Katcha Roads" provides a phenomenal dust fanning which is rarely visible or seen. Hence the impact is almost nil.

- **Exhaust Emissions**

These emissions may result from the exhaust of vehicles and machinery operation at site. No exhaust emissions are generated due to operation of



generators used for power generation as these generators operate on electricity rather than diesel.

- **Higher Noise Levels**

Higher noise levels and vibrations may be caused due to operation and movement of heavy machinery and vehicles at site and drilling if being carried out in case of hard rocks.

- **Loss of Vegetation**

Vegetation may be lost due to land clearing and leveling if comes in direct way of construction activities.

- **Solid Waste and Wastewater Generation**

Solid waste and wastewater may be generated from construction camps and offices. It will be disposed of as per the standards of TMA.

- **Community Amenity**

Disturbance to nearby community may be occurred due to dust and noise generation. Noise is associated with project operations. Excessive dust impacts may be harmful for some people, for example, with some experiencing respiratory conditions. The paving of the road in the mountainous region is done through backhoe machine and not through drilling and blasting. The labor huts are placed in a contiguous block close to the mines keeping in view the safety, vigilance of the workers encamped. The Prospecting Licenses/license are granted by Mines and Minerals Department while access to the lease to surface is left to the lessee and surface land owner for settlement. These local people, they blackmail the lessees to the last extent and are the biggest stumbling block.

Preventive Measures

- Controlled water sprinkling will be ensured to reduce PM₁₀.



- Maintain appropriate buffers between the site and receptors.
- Use of PPEs (face masks etc.) will be ensured by the mine operators and staff
- Use of PPEs (noise suppression equipment-ear mufflers etc.) will be ensured by the workers where noise levels are higher than 85 (dBA).
- Construction activities will be ensured at daytime when background noise levels are high.
- Vehicles speed limit will be maintained to avoid excessive vibrations.
- Regular maintenance of machinery will be ensured.
- Cutting of vegetation and trees will be avoided as far as possible.
- Afforestation will be carried out as maximum as possible.
- Solid waste will be managed efficiently. Solid waste at site will be stored in containers covered with lid.
- Waste water will be disposed of as per the standards of TMA.

7.4. Operational Stage

The potential environmental impacts resulting during operational phase of the project and their possible mitigation measures are given below.

7.4.1. Topographic/Soil

Land under consideration is mainly planed area with less undulating patches. Some area falls in the mountainous patches/topography.

Mitigation Measure

Based on the discussion above, the following measures are proposed:

- The mining activities will be very slow and spread over for long time period.
- Restoration and reclamation plan will be developed to restore the natural landscape of the area.
- Plant nursery, garden will be developed to rehabilitate the native plants of the area.



- Mining site will be fenced in a way that the exit route for reptiles will be towards the natural habitat but not towards the any human settlements. Technique of controlled and time specific blasting will be ensured for “safe habitat of the animals”.
- Project proponent will make any possible efforts to limit the impact on flora and fauna.

Residual Impact:

If the mitigation measures are effectively implemented and keeping in view the length of time to bring about the change in topography, the overall average impact may not be considered significant.

Impact significance: mild to high

Nature of impact: Direct

Duration: Short-to medium-term

Timing: Construction & Operation phase

Reversibility: Possible

Likelihood: Low (unlikely), as the mitigation measures will ensure that vegetation clearing is minimized

Consequences: Mild or may be positive

7.4.2. Water Resources

The site is nearby the Indus river and the water requirement for the proposed mining project will be fulfilled by fresh water using water tankers. Water will be used during mining activity for the purpose of sprinkling on road and for drilling. In the mining area drinking water requirement is fulfilled by these water takers.

Air Emissions

Air emissions from project-related activities are likely to include:



- Dust due to proposed mining activity, construction and operation of the proposed project.
- Dust raised on dirt tracks by project-related vehicles.
- Dust from drilling of deep holes.
- Dust due to drilling and blasting of the rocks
- Combustion products from vehicles used for project-related activities

Gaseous Emissions:

Exhaust Fumes from Vehicles and Construction Machinery:

Emissions produced by vehicles and equipment will be similar to those produced by diesel generators in terms of the resulting pollutants (SO₂, NO_x, PM, etc.). However, the extent to which they are produced will be considerably lower, since much smaller diesel engines are used in vehicles and construction machinery.

Mitigation Measures

None of the potential effects discussed above are expected to exceed acceptable limits. The mitigation measures given below will further reduce their impact, and ensure that they remain within acceptable limits.

- Water sprinkling on the site will minimize the dust pollution.
- All equipment, generators, and vehicles used during the project will be properly tuned and maintained in good working condition in order to minimize exhaust emissions.
- Vehicle speed will be reduced on track passing through or close to settlements.
- Imposing speed limits and encouraging more efficient journey management will reduce the dust emissions produced by vehicular traffic.
- Water will be sprinkled where necessary to contain dust emissions.
- All project vehicles will be checked regularly to ensure that engines are in sound working condition and are not emitting smoke.



Residual Impact:

After implementing the mitigation measures listed above, the residual impact of the proposed activities on ambient air quality is expected to be insignificant, as shown below:

Nature of impact: Direct

Duration: Short term

Timing: construction & operation

Reversibility: Not applicable

Likelihood: Low (unlikely) as mitigation measures will ensure that air pollution remains within acceptable limits.

Consequences: Moderate to High (Moderate in case of mechanical extraction and high in case of blasting)

Impact significance: Low, based upon low likelihood and mild to moderate consequence.

7.4.3. Mine Workers Health and Safety

Mine safety in iron ore mining is connected to the scientific development and exploration of the lease. With the scientific development, proper benches will be created and there will be no safety issue for the labor. Moreover, iron and over burden excavation will be take place in the daylight in order to keep the environment and working in the safe.

- **Preventive Measures**

The employment of worker is regulated through Labor Laws. The safety and health are regulated through the enactments of Mines Act 1923 and its subordinate laws. The mines are under the control of qualified mining engineers who conducted the mining operations as per legal requirement and SOPs.



The site inspection is carried out by the Regulatory Staff appointed under the Chief Inspectorate of Mines. The medical staff appointed under the Chief Inspectorate monitor sanitation, hygiene conditions as well as health protection of mine workers at mines.

7.4.3.1. Provision of First Aid Facility

At workplace workers and employers have enough information, knowledge and training regarding first aid treatment in case of any emergency. The Inspectorate of Mines in collaboration with Halal e Ahmed and local medical staff arrange refresher courses for First Aid. The employees of the company take due advantage of such opportunities along with other companies.

7.4.3.2. Safety Trainings

Workers and all the staff is provided with proper training about the work and safety practices. Regular training courses are being organized by the training wing of Inspectorate of Mines Punjab and Pakistan Mine Owners Association. The lessee sends its trainees for such courses subject to available seats.

7.4.3.3. Use of Drugs and Narcotics

Drugs and narcotics are strictly prohibited. Smoking will be only allowed in rest timings at properly isolated places.

7.4.3.4. Provision of Personal Protective Equipment

To control any health and safety risk and to reduce the magnitude of any adverse impact, the workers are required by law to have the PPEs such as safety helmet, safety goggles, rubber gloves, long shoes, safety lamps/torches etc. The company will provide the requisite PPE to its employees where required.

7.4.4. Emergency Response Plan (ERP) for Accidents/Collapse

ERP is prepared for Iron Ore mining to act in emergency situations. Following are some of the objectives to ERP:

- To provide an effective response to emergency situations.



- To develop responsibility levels and support coordination.
- To minimize the effect of emergencies on personnel, on the surrounding communities, and on the public.
- To minimize injury; damage to environment; property damage; damage to equipment; and losses to process that result from emergencies.
- To ensure timely communication and cooperation with government and outside agencies.
- To provide suitable information to be conveyed to the public.
- To define the Emergency Response Team as the combination of: site personnel in the area of the emergency, personnel from other areas, Mine Rescue Team, and other off site emergency personnel as needed.

Chief Inspectorate of Mines (CIM) is responsible for mines safety. Rescue stations are established by CIM at the mining areas. Emergency situations are responded through these rescue stations. Mines Labour Hospitals are also established in mining areas. All health and safety measures are made in compliance with Mines Act, 1923.

7.4.5. Climate Change

Iron Ore mining activities doesn't directly contribute in climate change.

7.5. Summary of Potential Impacts

The summary of the positive and the negative impacts observed on the environment by the mining of Iron Ore on the project area has been summarized in Table 7-1. The impacts have been given magnitude based on the scaling given below.

Table 7-1 Scale Range

Scale Range	0 to 5
Major Impact	5
Moderate	4



Intermediate	3
Minor	2
Low	1
No Impact	0

Positive impacts are given (+) sign while (-) sign is used for negative impacts. The mitigation measures will be explained after a short while. The magnitude of positive and negative impacts is given in Table 7-2.



Table 7-2 Environmental Screening Matrix

Description	Physical			Biological		Socioeconomic		
	Soil Contamination	Air Quality	Water Quality	Flora	Fauna	Noise	Land Acquisition and Compensation Issues	Safety Hazard, Public Health
Land Acquisition	N	N	N	N	N	N	N	N
Contractor Mobilization	0	-1	0	N	0	-1	N	-1
Construction Camp Establishment	-1	-1	-1	-1	-1	-2	N	-1
Construction Camp Operation	-1	-1	-1	-1	-1	-1	N	-1
Site Preparation	-2	-1	-1	-1	-1	-1	N	-1
Exploration	-2	-2	-1	-1	-1	-2	N	-2
Laying of Services	-1	-1	-1	-1	-1	-1	N	-2
Exploration Materials Supply	-1	-1	N	0	0	-1	N	-1

Transportation	0	-1	N	0	0	-1	N	-1
Solid Waste Disposal	-2	-1	-2	-1	-1	-1	N	-1
Waste Effluent Disposal	-1	-1	-1	-1	-1	0	N	-1
Mining Activity	-1	-2	-1	-1	-1	-2	N	-2

Key: -2: High negative impact; -1: Low negative impact; 0: insignificant/negligible negative; +1: low positive impact; +2: High positive impact, N: no Impact



7.6. Potential Environmental Enhancement Measures

- All vehicles used in the Iron Ore mining will be regularly inspected and maintained.
- Extracted Iron Ore will be transported to the market places according to proper management practices.
- The labor force will be trained to use personal protective equipment to avoid any accident/ near miss at site.
- The vehicles used for transportation of Iron Ore will be properly designed, covered and cleaned to avoid any risk while departing to and from the project site.
- Extensive plantation will be done in and around the project site to enhance the environmental quality.
- Environmental Management and Monitoring Plan (EMMP) will be strictly operational throughout the project life. All monitored data will be reported to the EPA Punjab, Lahore for scrutiny at their end.



8. ENVIRONMENTAL MANAGEMENT & MONITORING PROGRAM

8.1. Introduction

This section presents the environmental management plan (EMP) for the proposed project. The EMP specifies the mitigation and management measures which the Proponent will undertake and shows how the Project will mobilize organizational capacity and resources to implement these measures.

The EMP covers information on the management and mitigation measures that will be taken into consideration to address impacts in respect of the operational phase of project.

8.2. Objectives

The primary objectives of the EMP are to:

- Facilitate the implementation of the mitigation measures identified in the EIA.
- Define the responsibilities of the HSE manager of proposed project.
- Define a monitoring mechanism and identify monitoring parameters in order to:
- Ensure the complete implementation of all mitigation measures.
- Ensure the effectiveness of the mitigation measures.
- Provide a mechanism for taking timely action in the face of unanticipated environmental situations.
- Identify training requirements at various levels.

8.3. Schedule of Implementation of EMMP

The implementation of EMMP should be carefully coordinated with the design and operational program of the project. This will ensure the implementation of relevant mitigation measures at the appropriate project stages. It will also ensure that adequate resources are properly allocated to achieve the desired results.



This EMMP has been prepared to satisfy the requirement of "IEE and EIA Regulations, 2000".

8.4. Environmental Management Team along with their roles and Responsibilities

The overall responsibility for compliance with the environmental management plan rests with the project proponent.

Roles and Responsibilities:

Environmental Management should become an integral part of policy of proposed project. Therefore, committing to reduce the environmental impacts will reflect the management approach and believe that good performance in this area is synonymous with running well managed efficient proposed project operation. During the construction main responsibility of environmental performance will be followed by the EHS Officer on daily basis.

In case of normal operational phase, main responsibility for environmental performance will be supervised by the site manager while daily management will be performed under the site officer who in turn charges of environmental matters. Under their surveillance, environmental management during operations will be performed as per mitigation and monitoring plans outlined in this EIA. A brief role and responsibilities is given below;

- Top Management

Environmental management plan will regulate by the top management of proposed incinerator plant; therefore, they will play an important role. Some of the key roles and responsibilities are given below;

- To cooperate and consult with relevant environmental agency in order to perform in better way.



- To evaluate the progress of development and implementation of this management plan.
- To approve any change in decision making with the consultation of respective managers, if appropriate.

Following functionaries will be involved in the implementation of EMP:

- Project Proponent
- HSE/Project Manager
- In-Charge Administration
- Supervisor of project
- Environmental Engineer
- **Project Manager**

The role of project manager is very important. The success of an EMP will mainly depend upon effective management of the EMP by project manager. Some of the key roles and responsibilities given to project manager are given below;

- Ensure that contractor is aware of all specifications, legal constraints, standards and procedures pertaining to the project specifically with regards to environment.
- Ensure that all stipulations within the EMP are communicated and adhered to by the contractor.
- Monitor the implementation of EMP throughout the project by means of site inspections and meetings.
- Be fully aware of the environmental assessment of the project, the conditions of approval of EIA and all relevant legislations.
- To monitor the progress of development and implementation of this management plan.
- To improve coordination and exchange of communication between higher management and staff.



- **Contractor for Construction and Operation**

On behalf of contractor, the main responsibilities of all matters pertaining to environment will be that of chief of the assigned contractor. Following are the roles and responsibilities of contractor.

- To carry out constructional and operational activities in an environment friendly manner.
- Shall propose measures to minimize environmental impacts during constructional and operational phase and submit to environmental officer.
- In case of having impacts on the environment, the contractor will inform to project manager in time to get instructions and to take next step.
- Comply with the environmental management specifications.
- Maintain a public complaint register.
- Submitting a report at each site meeting which will document incidents that have occurred during the period before the site meeting.

8.5. Proposed Monitoring Program to assess performance or output of EMP

Following aspects need to be monitored regarding the subject project during pre-construction, during construction and post construction.

- Air quality
- Water quality
- Noise level
- Management of utility services including water supply, sewerage disposal, electric supply and solid wastes.



Table 8-1 Environmental Monitoring Plan

Environmental Component	Frequency	Responsibility
Construction Phase		
Air Quality	Quarterly basis	Proponent
Noise Levels	Quarterly basis	Proponent
Water Quality	Quarterly basis	Proponent
Operational Phase		
Air Quality	Quarterly basis	Proponent
Noise Quality	Quarterly basis	Proponent
Wastewater Quality	Bi-annually	Proponent
Drinking water Quality	Quarterly	Proponent

8.6. Environmental Budget

The environmental budget of the project has been given in Table 8-2.

Table 8-2 Environmental Budget Breakdown

Table 6.2 Environmental Budget Breakdown					
Sr. No.	Item/Activity		Quantity (No.)	Budget (PKR)	Description
1.	Plantation Campaign		100	20,000/-	Cost includes plantation and maintenance up to 5 years
2.	Cost of EMMP		-	95,000/-	Installation + Operational Phases
3.	Environmental Monitoring	Air Quality Monitoring	01	10,000	01 sample @ 10,000/- per sample
		Noise Level Monitoring	02	15,000	02 samples @ 7,500/- per sample
		Drinking Water Quality Monitoring	01	10,000/-	01 sample @ 10,000/- per sample
4.	Miscellaneous			50,000/-	Lump sum
Total Environmental and Social Management				200,000/-	

Cost	
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8.7. Environmental Management Plan

Table 8-3 EMP for Construction Phase

Potential Negative Impacts	Recommended Mitigation Measures	Monitoring responsibility	Parameters For Monitoring
Dust emissions	On exposed construction surface during windy periods fugitive dust generation will be suppressed by spraying water. The construction material will be covered with polyethylene sheets to prevent dust emissions.	Proponent/contractor	Air quality
Soil Erosion	Exposed surface will be resurfaced and stabilized as soon as possible.	Proponent/contractor	Soil
Solid Waste Generation	Solid waste may include waste/unused construction materials, which should be disposed of properly.	Proponent/contractor	Solid waste management
Vehicular Traffic And Noise	Vehicles and other noisy equipment will be kept in good conditions and their regular maintenance will be done. Noisy construction activities will be carried out only during normal working hours.	Proponent/contractor	Noise level
Health And Safety of Work Force	The contractor will ensure that the workers are trained in safety procedures for all relevant aspects of construction. Regular checks will be made to ensure that the contractor is following safety working procedures/safety measures.	Proponent/contractor	Health and safety

	Formal emergency procedures will be developed for construction site in case of an accident. First aid kits and other necessary equipment will be kept available at site along with the list of emergency phone numbers to be contacted in case of any accident. Produced during construction phase will be collected by vehicle for dispose of it at a particular dumping site of the industrial estate from it will be reused. Waste segregation units will be provided. Recyclable items will be provided to recycling contractors		
Water Supply	Water use will be planned depending upon the supply and timing to avoid and inconvenience. Water conservation practices will be adopted.	Proponent/ contractor	Water supply
Surface and Groundwater	At project site, the septic tank will be installed the safe disposal of wastewater into the nearby drain. The storage of lubricant materials such as oil and grease will be confined to a specific area so that in case of any leakage or spillage, the lubricant materials do not contaminate the entire project site.	Proponent/ contractor	Surface and groundwater

Table 8-4 EMP for Operational Phase Impacts

Potential	Recommended Mitigation	Monitoring	Parameters for
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Negative Impacts	Measures	Responsibility	Monitoring
Dust emissions	In operational phase, dust generation by development and exploration of the mineral. Water will be sprinkled to minimize the dust and proper mining plan will be adopted to mitigate the dust emission.	Proponent	Air quality
Noise	Use of PPEs (noise suppression equipment-ear muffers etc.) will be ensured by the workers where noise levels are higher than 85 (dBA). Mining activities will be ensured at daytime when background noise levels are high. Vehicles speed limit will be maintained to avoid excessive vibrations. Regular maintenance of machinery will be ensured.	Proponent	Noise
Waste water	Water conservation practices will be used. Water use will be planned depending upon the supply and timing to avoid and inconvenience	Proponent	Wastewater management



Flora and fauna	The unit includes a plan of the green yard area which is a positive impact on the flora and fauna. There is no significant fauna in that area. However, it is suggested that maximum number of trees should be planted by the management inside and outside the boundary wall in order to enhance aesthetics of the area.	Proponent	Biodiversity
Social impacts	During the operation stage, there will be no social issue for the nearby localities. Moreover, the residents may get opportunities to work in the refining unit which is a major positive impact of the project.	Proponent	Social impacts
Occupational health and safety	There may be occupational health and safety risks associated with different operational activities. Health risks may occur in case of unsafe and/or unfavorable work conditions The mitigation measures include: • The workers should get trained in safety procedures for all relevant aspects of processes. • Enforcement of work safety measures. • Formal emergency procedures will be developed for the segregation hall in case of any accident.	Proponent	Health & safety

	First aid kits and other personal protective equipment (safety gloves, goggles, welding shields etc.) Should be kept available.		
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8.8. Proposed EMP Reporting and Reviewing Procedures

8.8.1. Aim

In the context of Iron Ore mining, the monitoring and evaluation is carried out to achieve following objectives:

- To access whether the project site is being managed in a sustainable manner as planned or certain bottlenecks are experienced both qualitatively and quantitatively.
- To ensure compliance of environmental parameters (i.e. ambient air and noise) with PEQS.
- To ensure the implementation of mitigation measures for overall conservation of environment at the project site.
- To undertake effective environmental surveillance of the site.
- To assess effectiveness of mitigation measures and potential environmental enhanced measures.
- To ensure compliance with national environmental obligations.
- To monitor rehabilitation of recovered land including afforestation.

8.8.2. Environment, Health & Safety Policies

8.8.2.1. Environment Policy

The environment policy right from initiation of project installation to its proper operations will be based on:



- Compliance of applicable regulatory requirements;
- Conservation of natural resources;
- Assurance of sustainable development;
- Maintaining a safe working environment;
- Providing high environmental expertise and know-how; and
- Regular training and refresher courses to achieve continuous improvement of environment.

8.8.2.2. Health & Safety Policy

The proponent identifies safety and health of the personnel as integral part of every work aspect at every level. In addition to compliance with the statutory rules and regulations as the minimum acceptable, the proponent will set nationally acceptable standards for practice and will intend to achieve the above by the following:

- Provide adequate and continuous training to all personnel;
- Prepare an over-all safety & health manual giving general requirements of leadership, planned inspections, job analysis & procedures, emergency preparedness, organizational rules, necessity and use of protective equipment, health control, etc.;
- Systematic evaluation & measurement of system performance at all operational levels and continuously update the over-all safety & health manual;
- Carrying out regular publicity campaigns effective personnel safety and health conscious; and
- To employ a person as in-charge for planning, training & safety and make him responsible for implementation of safety and health policy.



8.9. Training Needs

Training for the management/contractors/engineers and workers on environmental aspects of the project will be arranged. It will be imparted by a team of experienced trainers.

- **Training of mining staff:**

Training of mining staff & workers will be the part of the TORs regarding the subject project. The provisions given in EIA Report Chapter Screening of Potential Environmental Impacts & Their Mitigation Measures will be followed.

TORs will be including the training and submission of reports in the following area:

- Handling of Machineries in a safe way.
- Proper fencing design.
- Proper blasting training and schedules
- Use of PPEs
- Maintenance of vehicles and submission of Environmental Monitoring Reports Maintenance of Water Consumption records
- Testing of water and waste water and submission of Environmental Monitoring Reports
- Placement of safety signs/boards during construction
- Sprinkling of water on the roads and dusty tracks
- Monitoring of generator emissions Training regarding all other aspects of HSE will be ensured by the contractor during the mining activity



9. INVOLVEMENT OF STAKEHOLDER'S / PUBLIC CONSULTATION

9.1. Introduction

Stakeholder's consultation is a tool used for communication with a diverse group of stakeholders having multifarious aims such as information dissemination, exchanging views, soliciting feedback and suggestions on issues pertaining to the project, plan future actions. This practice initiates a need assessment and identifies areas of concern for all the parties that maybe affected by the project activities.

Stakeholders by definition are all those people and institutions who have an interest in the successful design, implementation and sustainability of the project. This includes those positively and negatively affected by the project.

9.2. Benefits and Objectives of Stakeholder's Consultation

Consultation with stakeholders leads to an overall better understanding of the project on the part of the communities and gives the Proponent a clearer understanding of the stakeholders' perspective. Effective public consultation can add substantial value to the EIA study process. The information gained through public consultation on the stakeholders' concerns, interests, and their ability to influence decision-making helps identify key cause of environmental problems.

This can be used to evaluate direct and indirect environmental impacts and assess short term and long-term resource use implications. The input from local communities and NGOs can help evaluate alternatives and strengthen the management planning by incorporating local input and know-how.

An informed public will better understand the tradeoffs between project benefits and disadvantages; be able to contribute meaningfully to the project design; and have greater trust with the project Proponent and support for the



project, says the Asian Development Bank. These factors contribute towards improved project implementation sensitized to the human environment of the area. The objectives of stakeholders' consultation are to:

- Promote better understanding of the proposed operation through explaining its objectives and its potential positive and negative impacts.
- Identify and address concerns of all interested and affected stakeholders.
- Provide a mechanism to resolve issues identified by communities, before project plans are fiBharwalzed and development begins, thereby, avoiding public outcry and resentment.
- Instill trust between various stakeholders and the Proponent to promote cooperation.

9.3. Identification and Classification of Stakeholders

During the field survey, significant efforts were made to identify the possible categories of stakeholders and their stakes. Identification of stakeholders is important for the sustainability of a developmental project and helps to evaluate and envisage the role of stakeholders. The influence or impact of the project on stakeholders can be elaborated in the form of a matrix and the mitigation measures are proposed accordingly. All the stakeholders had different types of stakes according to their professions.

9.4. Methodology for Consultation

Stakeholder consultation is a two-way flow of information and dialogue between the project Proponent and stakeholders, specifically aimed at developing ideas that can help shape project design, resolve conflicts at an early stage assist in implementing solutions and monitor ongoing activities.

Various techniques are used worldwide to carry out the stakeholder consultation that includes discussions, meetings and field visits. A series of scoping sessions



and formal focus group discussions were carried out with environmental experts and individuals. The meetings were held at various locations.

9.5. Key Consulted Stakeholders

The stakeholders consulted in this case are public as well as environmental experts and individuals working in profession of environment. The list of stakeholders consulted and their feedback is given below.

The organizations consulted are as under:

- Chief Inspectorate of Mines Punjab its related field office
- DG Mines and Minerals Punjab, its related field office
- Representative of the Forest Department of the area
- Surface Landowners
- Nearby Village Numberdar
- Mines Labor Welfare Commissioner
- Civil Defense Officer

Each department was contacted to seek wisdom during an interaction of 4-6 man-hours each.

9.5.1. Responsible Authority

The proponent is the responsible authority to take all measures prior to the mining activity.

9.5.2. Other departments and agencies

For the impact analysis detailed meetings of local community, education institutes, health institutes, hospital and NGOs were held with the management. Issues were discussed that may affect the environment and also the implementation of proposed project. All possible mitigation measures were considered and incorporated in the Environmental Management Plan. Scoping sessions, focused group discussion and way side consultations were held with



the relevant stakeholders in the area. The purpose of such consultations is to obtain the feedback from the relevant persons.

9.5.3. Environmental Practitioners and Experts Team

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

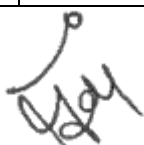
9.5.4. Affected & Wider Community

There is no affected community present in the radius of our study area. The team has consulted with the inhabitants of the different villages. They provided positive remarks regarding the subject project and in the favor of the subject mining activity for the proposed project.

List of Individuals Consulted Along with their Written Feedback

Table 9-1 List of stakeholder consulted

Sr.	Names/ Person consulted	Remarks
1.	Chief Inspectorate of Mines Punjab	Mining activity should follow rules and regulation. No mining activity should be done without submitting environment report to EPA.
2.	Representative of EPD	Project should not cause impacts on the environment. Proper mitigations should be followed during construction and operation



		Phase. Proper monitoring should be done.
3.	DG Mines and Minerals Punjab	PPEs should be given to the workers. No Natural reserve will be affected by the project activity. Proper implementation of mitigation should be done. Job Opportunities will be provided to locals.
4.	Representative (Forest Department)	The proposed project should not affect any forest or within the vicinity of the forests.

9.5.5. Summary of Concerns of Consulted Stakeholders

The summary of stakes of consulted stakeholders is given below.

- The activities of the project must be studied in detail to assess all the impacts resulting from the project.
- All the environmental parameters i.e. ambient air quality, noise levels and water quality must be kept within permissible limits of PEQS.
- Project specific mitigation measures must be implemented during project's lifecycle.
- A proper Environmental Management and Monitoring Plan should be prepared to reduce adverse environmental impacts.
- Waste management must be taken into consideration (if generated during project activities).
- Management practices suggested in EMMP for solid waste should be implemented during operation of the project.



- The findings of the EIA report must be incorporated into the design and planning phase of the project.
- The EIA report should be compiled appropriately according to reporting style as suggested in Guidelines/Checklist.
- The project holds a good economic circulation. The advantages of the project seem more than its disadvantages. Therefore, the project should be operational as soon as possible.

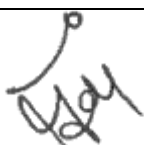


10. CONCLUSIONS AND RECOMMENDATIONS

At the end of this EIA study, following conclusions are drawn and recommendations have been given accordingly.

Table 10-1 Conclusions and Recommendations

Conclusions	
General	- All the positive and negative impacts resulting from the Iron Ore mining operations have been studied in due detail on environmental settings. All the negative impacts have been given magnitude based on the defined criteria and scoring. - Mitigation measures have been suggested for each negative impact resulting from the Iron Ore mining activities.
Physical Environment	- No wastewater will be generated during project activities. The water, if exposed during Iron Ore mining will be used for drinking purposes. - Overburden extracted will be counted as solid waste which will be dumped in a way that the already excavated section will be filled with the over burden for proper mine planning and solid waste handling. - The food waste at the surface will be disposed of in covered containers to avoid any waste littering. - Proper mitigations may be adopted in the preliminary design including safe and environmentally friendly disposal of solid waste. - Physical impacts like soil contamination, water contamination, air pollution, high noise level, etc. are of temporary nature. However, during the operational stage by adopting abatement technologies and development of buffer zones and green areas intensity of negative impacts can be minimized. - All the baseline environmental parameters including ambient air and noise are well within the permissible limits of PEQS. - The settlements are away from the Iron Ore mines at safer distances. All the sensitive receptors are at a safer distance from the project area.
Biological	No forest area or wildlife sanctuary exists within the vicinity of



Environment	the Project Area, which may be affected by the Project.
Socio-economic Environment	• The other social issues like safety of public and workers, security problems, community accessibility issue, women accessibility to fields for their daily routine life etc. will be of temporary nature. • The mining activities will provide additional job opportunities to the community of the area. The project will raise the income levels of the population of the area. • Social cohesion is optimal. • The environmental cost is negligible. • The proponent is committed to ensure eco-friendly, sustainable, safe and sound environment.
Recommendations	
General	• All measures as suggested in EMP should be adopted to minimize adverse impacts. • All appropriate environmental management & monitoring measures detailed in this report, together with any other environment management commitments should be implemented throughout out the entire life of the project. • Environmental Management and Monitoring Plan proposed will be implemented in the true spirit throughout the lifespan of the project. • Regular monitoring and auditing will be taken by the management to ensure the compliance of all the mitigation measures. • Environmental monitoring will be carried out by the company as suggested and communicated by EPA, Punjab.
Physical Environment	• The mining site and the road links should adopt such measures and select such machinery and their operations to minimize the dust spread. • Dust suppression machine should be available on each site for wetting of all the materials to avoid effects of dust such as respiratory diseases. • Water contamination, air pollution and high noise levels will be controlled with the use of good engineering practices. • Proper measures will be taken to control the air emission or high noise levels.

	• Transportation vehicles and equipment must be properly maintained and tuned well.
Biological Environment	• Extensive plantation must be carried out throughout the tenure of lease as an environmental enhancement measure.
Socio-economic Environment	• Periodic monitoring on occupational health and safety must be conducted to avoid workplace hazards. • Proponent will take due care of the local community and its sensitivity towards local customs and traditions. • Safety signs or boards will be placed wherever needed within the premises of the Project site. • Personal Protective Equipment (PPEs) will be provided and ensured that they are used by the workers during working hours. The workers working near the noise generating machines will be strictly required to use ear muffs/ plugs. • Fire extinguishers or firefighting equipment will be provided at well notified points to cope with fire events. • Good housekeeping will be ensured by the management. • First aid medical facility will be provided at the project site.



APPENDIX



APPENDIX-I: GLOSSARY

Act means the Pakistan Environmental Protection Act, 1997.

Air pollution: The condition in which air is contaminated by foreign substances, or the substances themselves. Air pollution consists of gaseous, liquid, or solid substances that, when present in sufficient concentration, for a sufficient time, and under certain conditions, tend to interfere with human comfort, health or welfare, and cause environmental damage. Air pollution causes acid rain, ozone depletion, photochemical smog, and other such phenomena.

EIA (Environmental Impact Assessment): It is the process of identifying, predicting, evaluating and mitigating of effects of biophysical, social and other relevant proposed projects and physical activities prior to major decisions and commitments being made.

EMP (Environmental Management Plan): An EMP is a site-specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation.

Environmental Impact: Possible adverse effects caused by a development, industrial, or infrastructural project or by the release of a substance in the environment.

Topography: Physical features of any area including soil, water and air are called topography.

Fauna: Word used for combination of all the species of animals.

Flora: Word used for combination of all the species of plants.

IEE (Initial Environment Examination): Initial examination of projects for identification of hazards of project.



NOC (No Objection Certificate): It is a kind of clearance issued by EPA necessary for any project to be constructed.

Particulate Matter: Minute airborne liquid or solid particles (such as dust, fume, mist, smog, smoke) that cause air pollution. Particulate matter may vary greatly in color, density, size, shape, and electrical charge, from place to place and from time to time.

PEPA (Punjab Environmental Protection Act 1997) Amended 2012: An act to provide the protection, conservation, rehabilitation and improvement of environment, for the prevention and control of pollution and promotion of sustainable development.



APPENDIX-II: LIST OF ABBREVIATIONS

NOC	No Objection Certificate
EA	Environmental Approval
OHS	Occupational Health and Safety
MICS	Multiple Indicator Cluster Survey
mm	Millimeters
EPA	Environmental Protection Agency
IEE	Initial Environmental Examination
NEQS	National Environmental Quality Standards
EMP	Environmental Management Plan
EMP	Environmental Monitoring Plan
GOP	Government of Pakistan
km	Kilometer
m	Meters
NGO	Non-Governmental Organization
BDL	Below Detection Limit
SWM	Solid Waste Management
TMA	Tehsil Municipal Authority
PPC	Pakistan Penal Code
PEPA	Pakistan Environmental Protection Act
NDWQS	National Drinking Water Quality Standards
LAA	Land Acquisition Act
sq mi	Square Miles
PPE	Personal Protective Equipment
MMD	Mines and Minerals Department
CSR	Corporate Social Responsibility
M. Tons	Metric Tons
in	Inches
GLS	Ground Level Surface
MTa	Metric Tons Annually
TPD	Tons Per Day
HSE	Health Safety and Environment



APPENDIX-III: SOURCE OF THE DATA (REFERENCES)

- <http://www.pakinformation.com/population/Chakwal.html>
- <http://www.findpk.com/cities/html/Chakwal.html>
- <https://en.wikipedia.org/wiki/Chakwal#Economy>
- <https://agrihunt.com/articles/pak-agri-outlook/agricultural-profile-of-district-Chakwal/>
- <http://www.phsrp.punjab.gov.pk/downloads/distance-hq/CHAKWAL.pdf>
- https://en.wikipedia.org/wiki/List_of_educational_institutions_in_Chakwal
- <https://simplicable.com/new/cosmopolitan-city>
- <https://en.wikipedia.org/wiki/Chakwal>
- https://en.wikipedia.org/wiki/Geography_of_Chakwal
- <https://en.climate-data.org/asia/pakistan/punjab/Chakwal-33/>
- https://en.wikipedia.org/wiki/Wildlife_of_Chakwal_District
- http://bos.gop.pk/system/files/MICS_2007-08_LHR.pdf#overlay-context=mics20072008
- Building Code of Pakistan (Seismic Provisions 2007)
- <https://www.waterinfo.net.pk/sites/default/files/knowledge/Time-Rate%20changes%20in%20Groundwater%20Levels%20and%20Quality%2C%20Punjab%2C%202009.pdf>
- Multiple Indicator Cluster Survey (MICS) 2007-08
- The IUCN Red List-A Key Conservation Tool
- Punjab Development Statistics 2005
- International Journal of Science, Environment and Technology, Vol. 1, No 3, 2012, 125 – 134
- Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Initial Environmental Examination Regulations. 2000.
- Guidelines for the preparation and review of Environmental Reports, Pakistan Environmental Protection Agency, Government of Pakistan, October 1997.
- Notification for IEE projects by EPA.
- Pollution Prevention and Abatement Handbook, The World Bank, 1998.
- The Pakistan National Conservation Strategy, Environment and Urban Affairs 'Division (Presently-Ministry of Environment, Urban Affairs and Wild

Life), Government of Pakistan, Islamabad.

- Punjab Environmental Quality Standards for Drinking Water.
- Punjab Environmental Quality Standards for Motor Vehicle Exhaust and Noise.
- Punjab Environmental Quality Standards for Ambient Air.
- Topographical Maps of Punjab.
- Punjab Environmental Quality Standards for Noise.
- The Punjab Plantation and Maintenance of Trees Act, 1974.
- The Punjab Wildlife (Protection, Preservation, Conservation and Management) Act and Rules, 1974.
- https://mnm.punjab.gov.pk/important_minerals_occurring_in_punjab#14



APPENDIX IV: TERMS OF REFERENCE OF ENVIRONMENTAL REPORT

TERMS OF REFERENCE FOR EIA REPORT

The agreement hereinafter called Consultancy service, is made between Prime Environmental Consultants (Consultant) and Mr. Gulzaib Hassan (Client) to carry out follow up of Environmental Study (EIA) Report for obtaining Environmental approval under Section 12 of Punjab Environment Protection Act 1997 (Amended 2012) for proposed project of "Prospecting license of Iron Ore Over an Area of 88.18 acres situated near Bharwal, District Chakwal, Punjab".

The client has requested the consultancy firm to provide consultancy service for preparation/reviewing of EIA Report and so that client may obtain Environmental Approval from EPA, Punjab under the Section 12 of PEPA 1997 (As Amended 2012) so mutually agreed terms and conditions are as under:

NOW THEREFORE, the parties here to hereby agree as follow:

- The client shall provide all available data, maps, reports, etc. about the project including but not limited to layout plan of the project. Client will provide Lab Test Reports from EPA certified lab including noise level monitoring, water analysis and air emissions report or any report/document/information demanded by the EPA.
- The client will provide to the consultancy firm with the letter of introduction and authorization and other documents as may be needed to enable consultancy firm consultant to perform the service.
- The consultancy firm/consultant shall carry out the services in accordance with the provisions of the agreement including:
- Shall prepare/review the EIA Report and other file required with due diligence necessary/required for obtaining its approval from EPA Punjab under the statutory requirements of PEPA 1997 (amended in 2012).
- Shall give the consultancy for the preparation of the detailed Environmental



Management & Monitoring Plan for enhancing the environmental conditions during construction and operational phases such as mitigation measures for wastewater, solid waste, air emissions, plantation, management of surface runoff, mitigation of socially adverse impact, if any.

- Will evaluate all the activities during the construction and operational phases and recommend suggestions/actions to comply with PEQS.
- Will prepare the EIA report and file documents considering information/documents provided by the client.
- If client will not satisfy with the consultant services, he has the right to discontinue the agreement. Client has the right to limit the consultant firm.
- Client and consultant can discontinue the agreement after mutual understanding by giving noticing to counterparty.



Ali Mehdi
For and Behalf of
M/s Prime Environmental Consultants
(Consultants)

For and Behalf of
Mr. Gulzaib Hassan
(Proponent)



APPENDIX-V: CONSULTANT TEAM

Punjab Environmental Consultant has the expertise of highly diversified experience and has completed a total of more than 75 environmental studies across Punjab. The consultant has a range of expertise available in following areas:

- a) Preparation of reports, IEE report, EIA reports.
- b) Preparation of Environment Management Plans
- c) Assessment of Impact of mining on environment and mitigating measures.
- d) Stake Holder Consultations.

Contact Details	
Consulting Firm	Prime Environmental Consultants
Representative	Engr. Ali Mehdi
Contact	(+92) 321-7860915
Address	Latif Plaza, Office No. 07-08, 69 Saeed Block Commercial area, Canal Bank Scheme, Lahore
e-Mail	primeenvironmentalconsultants@gmail.com

The team carrying out the research project is presented in the Table:

Sr.	Name	Qualifications & Brief Experience	Roles Assigned
4.	Engr. Ali Mehdi	B.Sc. Mining Engineering	- Stakeholder Consultation - Preparation of Environmental Management Plan (EMP) - Preparation of Environmental Monitoring Plan (EMP) - Author of EIA Report
5.	Zeba Haseeb	Environmental Scientist M.S Environmental Science	Preparation of Environmental



			Management Plan (EMP) • Preparation of Environmental Monitoring Plan (EMP) • Author of EIA Report
6.	Umer Saeed	Environmental Scientist M.S Environmental Science	• Site visits



APPENDIX-VI: APPROVALS FROM OTHER CONCERNED DEPARTMENTS

NO. DG (M&M)/SSM/PL-CKL-II-IRON ORE (07) Y. 9381
DIRECTORATE GENERAL OF MINES & MINERALS,
PUNJAB (SMALL SCALE MINING DIVISION) POONCH
HOUSE MULTAN ROAD LAHORE

Dated Lahore, the 26-12-2022.

To
✓ Malik Looda Khan S/o Muhammad Khan,
R/o P.O. Khair Pur, Tehsil Kalar Kahar, District Chakwal.

SUBJECT: PROSPECTING LICENSE FOR IRON ORE OVER AN AREA OF 223.01 ACRES NEAR SALOLIN DISTRICT CHAKWAL.

Dear Sir,

With reference to your application dated 25.03.2022 and in pursuance of Rule 119 of the Punjab Mining Concession Rules, 2002, the Licensing / Competent Authority is hereby pleased to grant you a Prospecting License, cited as subject above for a period of three (03) years with effect from the date of issuance of this letter on the following terms and conditions: -

(i) That within one month of the date of issuance of this letter you shall return one copy of the attached three plans to this Directorate and another copy to the Deputy Director Small Scale Mining, Chakwal duly signed and stamped in token of your having accepted the same and retain one copy for your own use and record.

(ii) That you shall arrange to demarcate the area within two months of the issuance of this license in accordance with the enclosed plan containing the data as given below: -

Survey of Pakistan Map/Sheet No: 43-H/2
Scale 1: 50,000

Points	Easting (Yards)	Northing (Yards)
A	3524204	1042968
B	3522647	1041711
C	3522622.87	1041500
D	3522500	1041500
E	3522500	1042186.36
F	3523900	1043300
TOTAL AREA = 191.64 ACRES		

Boundary pillars, shall be erected by you at your own expense and at all times maintained such that each pillar has height of not less than one meter above the surface of the ground and being not less than one meter square or in diameter at the base at every angle or corner of boundary lines. A demarcation certificate to this effect, duly signed by a Surveyor registered with this Directorate shall be submitted in prescribed form to this Directorate as well as to the Deputy Director Small Scale Mining, Chakwal within two months of the date of issuance of this license. The Demarcation Certificate should clearly describe the position of each boundary pillar with respect to nearby surface features of permanent character and should be accompanied with suitable sketches so as to enable location of each boundary pillar independent of the others. If upon subsequent official checking, the demarcation is found to be incorrect, it will be corrected and you shall pay the demarcation fee as determined by the Licensing Authority.

(iii) That you shall prepare and submit within three months from the date of issuance of this letter a scheme of prospecting of the area duly authenticated by qualified Geologist/Mining Engineer to the Deputy Director Small Scale Mining, Chakwal. for

Z

Handwritten signature/initials.

APPENDIX VII: ENVIRONMENT & LAYOUT MAP

