ENVIRONMENTAL IMPACT ASSESSMENT REP
(EIA)

MINING LICENSE FOR COAL OVER AN AREA OF 326.19 ACRE FROM NEAR DHOK ANAR, DISTRICT CHAKWAL



PROPONENT

Aziz ur Rehman
M/s Aziz & Co.

Final Report
(Sep. 2023)

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CONTENTS

Sr. No.	Contents	Page No.
	Acknowledgement & Disclaimer	i
	Abbreviations/Acronyms	ii
	Contents	iii
	Executive Summary	a
Section-1	**Introduction**	**1-2**
1.1	Purpose of Report	1
1.2	Identification of the Project & Proponent	1
1.3	Environmental Consultant	1
1.4	Brief Description of the Project	2
Section-2	**Brief Description of the Project**	**3-16**
2.1	Type & Category of Project	3
2.2	Objectives of the Project	3
2.3	Alternatives of the Project	4
2.4	Location & Layout of the Project	4
2.5	Land Use of the Site	7
2.6	Road Access	7
2.7	Vegetation Features of the Site	7
2.8	Cost & Magnitude of Operation	7
2.9	Schedule of Implementation	7
2.10	Brief Description of the Project	8
2.10.1	Coal	9
2.10.2	Coalmining	9
2.10.3	Historical Overview	9
2.10.4	Stages of Mining	10
2.10.5	Classification	10
2.10.6	Tools & Machinery for Coalmining	10
2.10.7	Steps of Coalmining (Process Flow)	13
2.10.8	Discussion & Analysis	14
2.11	Benefits Likely to Accrue from the Project	14
2.12	Restoration & Rehabilitation Plans	15
2.13	Government Approvals	15
2.14	Conclusion and Recommendations	15
Section-3	**Baseline Environmental & Socioeconomic Profile**	**17-32**
3.1	Baseline Environmental Settings	17
3.2	Studies and Surveys for Baseline Profile	17
3.3	Environmental Description of the Area	18
3.4	Geo-Physical Environment	18
3.4.1	Project District	19
3.4.2	Location of the Site	20
3.4.3	Geography	20
3.4.4	Topography	20
3.4.5	Geology	21
3.4.6	Seismology	21
3.4.7	Soil Morphology	21
3.4.8	Surface Hydrology	21
3.4.9	Hydrogeology & Groundwater	22
3.4.10	Meteorology and Climate	23
3.4.11	Air Quality	24
3.4.12	Effluent Disposal	24
3.4.13	Background Radiological Characteristics	25
3.4.14	Ambient Noise Characteristics	25

CamScanner

3.5	Eco-Biological Environment	26
3.5.1	Forests, Habitat, and Ecologically Sensitive Areas	26
3.5.2	Local Flora	26
3.5.3	Local Fauna	26
3.5.4	Protected and Ecologically Sensitive Areas	27
3.6	Sociocultural Environment	27
3.6.1	Demographic Profile	27
3.6.2	Land Use/Agricultural Profile	27
3.6.3	Industrial Profile	28
3.6.4	Healthcare Facilities Profile	29
3.6.5	Educational Facilities Profile	29
3.6.6	Livestock and Farming	30
3.6.7	Infrastructure Profile	30
3.6.8	Socioeconomic Profile	31
3.6.9	Culture, Religion, Customs and Specialities	31
3.6.10	Historical and Archaeological Heritage	31
3.7	Lab Reports of Environmental Analyses	31
Section 4	**Screening of Potential Environmental Impacts and their Mitigation**	**33-51**
4.1	Environmental Impacts and Their Mitigations	33
4.2	Assessment Methodology	34
4.3	Mitigation Strategy	34
4.4	Likely Environmental Impacts of Coalmining	34
4.5	Likely Impacts and Mitigations of Location, Design & Planning	34
4.5.1	Design, Location & Layout Planning	35
4.6	Likely Impacts and Mitigations of Construction Phase	35
4.6.1	Parametric Impacts of Construction Phase	35
4.6.1.1	Soils and Lands	35
4.6.1.2	Surface Water Quality	35
4.6.1.3	Groundwater Abstraction and Quality	36
4.6.1.4	Wastewaters and Effluents	36
4.6.1.5	Air Quality	37
4.6.1.6	Noise and Vibrations	38
4.6.2	Non-Parametric Impacts of the Construction Phase	38
4.6.2.1	Land use change	38
4.6.2.2	Solid Wastes	38
4.6.2.3	Access, Easement, Health, Wellbeing, and Worksite Safety	39
4.6.2.4	Cutting and Removal Trees and Crops	39
4.7	Likely Environmental Impacts of the Operation Phase	40
4.7.1	Parametric Impacts of the Operation Phase	40
4.7.1.1	Soils and Land	40
4.7.1.2	Surface Water Quality	40
4.7.1.3	Groundwater Abstraction and Quality	41
4.7.1.4	Wastewaters and Effluents	41
4.7.1.5	Air Quality	42
4.7.1.6	Noise & Vibrations	43
4.8.2	Non-Parametric Impacts of the Operation Phase	43
4.8.2.1	Electricity Usage	43
4.8.2.2	Water Usage	43
4.8.2.3	Solid Wastes	44
4.8.2.4	Noise, Vibrations and Odours	45
4.8.2.5	Access, Easement, Health, Community Wellbeing and Worksite Safety	45
4.8.2.6	Cutting and Removal of Trees and Crops	46
4.8.2.7	Other Mining Operations	46
4.8.2.8	Quarrying & Extraction Operations	46
4.8.2.9	Transportation of Mined Coal	47
4.9	Environmental Impacts of Surface Mining	47
4.10	Environmental Impacts of Underground Mining	47

CamScanner

	Environmental Impacts of Transportation	48
	Likelihood of Ecosystem Effects	48
	Summary of Environmental Issues of Coalmining	48
	Environmental Enhancement Measures	48
n 5	**Restoration & Rehabilitation Plan**	**52-57**
	Introduction	52
	Rehabilitation Plan	52
	Need for Rehabilitation Plan	52
	Planning Authorities	52
	Plan Implementation	53
	Attributes of Plan	53
	Submitting a Rehabilitation Plan	54
	Rehabilitation Plan	54
	Restoration of Borrow Pits	54
	Restoration of Stockpile Areas and Campsites	54
	Restoration of Side tracks	54
	Restoration Steps or Flowchart	55
	Activity / Site Specific Restortion & Rehabilitation Plan	55
tion 6	**Environmental Management & Monitoring Plan (EMMP)**	**58-61**
	Institutional Capacity	58
	Training Schedule	58
	Summary of Impacts & Mitigations	59
	Equipment Maintenance	60
5	Environmental Budget	60
ction 7	**Stakeholders Consultations**	**62-65**
.1	Objectives and Rationale of Consultations	62
.2	Identification of the Relevant Stakeholders	62
.3	Consultation Methodology	63
.4	Issues Discussed	63
.5	Outcome of the Consultation	64
7.5.1	Design Aspects	64
7.5.2	Construction Aspects	64
7.5.3	Operation Aspects	64
7.6	Measures to Address the Concerns	64
	Findings & Conclusion	**66**
	Findings & Conclusion	66
	References	**67**
	References	67

TABLES

Table No.	Description	Page
1.3	Contact Details of the Focal Persons of Proponent & Environmental Consultant	1
1.4	Location Corrdinates of the Site	2
2.4	Location Corrdinates of the Site	4
2.10	Location Corrdinates of the Site	9
2.10.7	Summary of the Steps Involved in Coalmining (Process Flow)	13
3.3	Location Corrdinates of the Site	18
3.4.2	Location Corrdinates of the Site	20
3.4.8	Surface Water Quality of the Area	22
3.4.9a	Typical Groundwater Quality of Area	23
3.4.9b	Typical Microbiological Quality of Groundwater of Area	23
3.4.9c	Number of Tubewells in the Project District	23
3.4.10	Typical Climatic Features of the Area	24
3.4.11	Typical Ambient Air Quality Profile of the Area	24

CamScanner

3.4.14a	Noise Records at the Site	25
3.4.14b	Expected Noise Levels at various Project Locations	25
3.4.14c	Noise Annoyance Levels for Resident Communities	25
3.5.3	Some Common Flora & Fauna of the Area alongwith Botanical & Zoological Names	26
3.6.1	Demographic Profile of the Project District	27
3.6.2a	Land Use/Agricultural Profile of the Project District	28
3.6.2b	Production of Main Vegetables	28
3.6.3a	Census Statistics of Industry in the Project District	28
3.6.3b	Number of Registered Factories and Employment	28
3.6.4a	Healthcare Profile of the Project District	29
3.6.4b	Some Common Diseases of the Area	29
3.6.5	Education Sector Profile of the Project District	30
3.6.6	Livestock Resources of the Project District	30
3.6.7	Infrastructure Profile/Length of Roads	30
3.6.10	Archaeological & Historical Heritage	31
4.3a	Modified Environmental and Social Impact Matrix (Unmitigated Impacts)	49
4.3b	Modified Environmental and Social Impact Matrix (Mitigated Impacts)	50
4.3c	Environmental Questionnaire	51
5.12	Steps or Flowchart of a Proto type Rehabilitation and Restoration Plan	55
5.13	Activities Likely to Impact the Site & Restoration & Rehabilitation Measures	56
6.3	Activity based Chart of Mitigation Measures	60
7.2a	Stakeholders of the Project and Nature of their Stakes (Construction Phase)	62
7.2b	Stakeholders of the Project and Nature of Their Stakes (Operation Phase)	62
7.6	Summary of Stakeholders' Concerns alongwith Remedial Measures	64

FIGURES & PLATES

Fig/Plate	Description	Page
2.4a	A Google Earth Imagery of the Site	4
2.4b	A Google Earth Imagery of the Site	5
2.4c	A Google Earth Imagery of the Site	5
2.4d	A Google Earth Imagery of the Site	5
2.4e	A Google Earth Imagery of the Site	6
2.4f	A Google Earth Imagery of the Site	6
2.4g	A Google Earth Imagery of the Site	6
2.10.6a	Handtools for Coalmining	11
2.10.6b	Handtools for Coalmining	11
2.10.6c	Handtools for Coalmining	11
2.10.6d	Handtools for Coalmining	11
2.10.6e	Excavator with Drill Head	12
2.10.6f	Tractor with Front Blade	12
2.10.6g	Excavator with Front Bucket	12
2.10.6h	A Dumper Truck	12
2.10.6i	A Loader Truck	12
2.10.6j	A Bulldozer with Front Blade/Bucket	12
2.10.6k	A Tractor Trolley	12
2.10.6l	A Typical Hand Barrow	12
2.10.6m	A Tractor Trolley	12
2.10.6n	A Typical Chain Pulley Block	13
2.10.6o	Some Other Coalmining Implements/Tools	13
2.10.7	Coalmining Process Flowchart	13
3.3	Site's Zone of Environmental and Social Influence	18
3.4.8	Layout of the Indus River Basin	22
3.4.1a	Map of Punjab showing location of Jhelum relative to other distts	32
3.4.1b	Map of Punjab showing location of Jhelum relative to other distts	32
3.5.1a	Wildlife Map of the Punjab	32
3.5.1b	Ecological Map of the Punjab	32

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EXECUTIVE SUMMARY

:le & Location of the Project

ıg License vide No.ML.CKL.I.Coal(148) dated 02.11.2018 for Coal over an area of 326.19 acre from near ANAR, Distt. Chakwal, under a valid Lease from Mines & Mineral Department, GoPb".

tion:

ite is DHOK ANAR Coalmine spread over an area of 326.19 acre near DHOK ANAR, Distt. Chakwal under a Lease from Mines & Mineral Department, GoPb. The site is bound all around by wide open vacant lands dby various landowners except on the north, on which side, it touches the approach road to the site. There human settlement within 0.5 km radius of the proposed site. The geographical spread of the mine site ists of Six points from Point-A to Point-F, which match with the below given geographical coordinates

Point	Easting (Yards)	Northing (Yards)
A	3195204.01	0947726.31
B	3196129.75	0947254.39
C	3196321.77	0948123.07
D	3196321.77	0948461.40
E	3197344.07	0948515.34
F	3195828.00	0948872.88
Total Area: 326.19 Acres		

Name of Proponent

ıme: Aziz ur Rehman

:iz & Co. is the lessee/proponent of the lease mining rights auctioned by Mines & Minerals Department, GoPb. ıe lessee/proponent will take all requisite actions for obtaining environmental approval from EPA-Pb.

eing a small scale ordinary mining project, the project has setup only by the licensed and the authorized ontractor having valid lease from the concerned regulatory agency in this respect in perfect accordance with he terms and conditions as may be applicable, if any. This arrangement will ensure setting up of the project vith the highest parameters of safety and security and as per the international standards and the international ›est practices concerning the sector.

3 Name of Organization Preparing Report

"Rock EC", Lahore

4 Brief Outline of the Proposal

As the name implies, the proposal in essence is safe and secure mining, quarrying & extraction of ordinary coal from a designated and approved area measuring 326.19 acre of a known coalmine, near DHOK ANAR, District Chakwal. The Mines & Minerals Department has granted mining rights to the lessee/proponent for a period of five years to mine out ordinary coal from here. The Licencing Authority held open auction for the grant of mining rights of ordinary coal at the said approved quarry on 21.07.1992, which was won by the lessee/proponent as the successful competitive bidder. The Deputy Director (Mines & Minerals) Punjab, on behalf of the Licencing authority, has issued the lease offer Letter No.ML.CKL.I.Coal(148) dated 02.11.2018 to the lessee/proponent to commence the mining operations. Owing to reasonable deposits, the site is suitable for the commercial mining of ordinary coal from here.

The proposed site is bound all around by wide open vacant lands owned by various landowners except on the north, on which side, it touches the approach road to the site. There is no human settlement within 0.5 km radius of the proposed site. The geographical spread of the minesite consists of Six points from Point-A to Point-F, which match with the below given geographical coordinates

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Being a small scale ordinary mining project, the project has setup only by the licensed and the authorized contractor having valid lease from the concerned regulatory agency in this respect in perfect accordance with the terms and conditions as may be applicable, if any. This arrangement will ensure setting up of the project with the highest parameters of safety and security and as per the international standards and the international best practices concerning the sector.

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"Rock EC", Lahore

4 Brief Outline of the Proposal

As the name implies, the proposal in essence is safe and secure mining, quarrying & extraction of ordinary coal from a designated and approved area measuring 326.19 acre of a known coalmine, near DHOK ANAR, District Chakwal. The Mines & Minerals Department has granted mining rights to the lessee/proponent for a period of five years to mine out ordinary coal from here. The Licencing Authority held open auction for the grant of mining rights of ordinary coal at the said approved quarry on 21.07.1992, which was won by the lessee/proponent as the successful competitive bidder. The Deputy Director (Mines & Minerals) Punjab, on behalf of the Licencing authority, has issued the lease offer Letter No.ML.CKL.I.Coal(148) dated 02.11.2018 to the lessee/proponent to commence the mining operations. Owing to reasonable deposits, the site is suitable for the commercial mining of ordinary coal from here.

The proposed site is bound all around by wide open vacant lands owned by various landowners except on the north, on which side, it touches the approach road to the site. There is no human settlement within 0.5 km radius of the proposed site. The geographical spread of the minesite consists of Six points from Point-A to Point-F, which match with the below given geographical coordinates

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F	3195828.00	0948872.88
Total Area: 326.19 Acres		

The total area of the lease is 326.19 acre in a known coalmine, near DHOK ANAR, Distt. Chakwal. The leased site isbeing used for commercial extraction of ordinary coal in strict accordance with the conditions of the lease offer letter and the national and the international best practices regarding mining, quarrying & extraction and transportation of the mined ordinary coal. The extracted coal is being supplied to its various and diverse users in the country. Coal is used widely as a source of heat energy and as a fuel. Therefore, it is always in great demand in the country.

5 Major Impacts

In terms of its cost, size, magnitude and socio-environmental impacts, the Mining License for Coal can be termed as an activity of significance from the environmental standpoint. The instant project is mining, quarrying & extraction of ordinary coal by the lessee/proponent under a five years lease fromMines & Minerals Department, Government of the Punjab over an area of 326.19 acre of a known coalmine near DHOK ANAR, Distt. Chakwal. The lessee/proponent will carryout Mining License for Coal in strict accordance with the terms and conditions as contained in the offer letter/lease award letter No.ML.CKL.I.Coal(148) dated 02.11.2018 issued on behalf of the Licencing Authority by the Deputy Director (Mines & Minerals) Punjab. It may be mentioned here that competitive bidding and open auction for leasing of mining rights of ordinary coal for a period of five years from DHOK ANAR Coalmine, Chakwal was held on 21.07.1992. The lessee/proponent took part in this open auction as a competing participant and won the mining rights by offering the highest financial bid for a period of five years. The commercial mining, quarrying & extraction and transportation to destination point started only after taking over of the mining site (coalmine) by the lessee/proponent from the Mines & Minerals Department, GoPb. The quarried coal is transported to the intended buyers, coal dealers and end-users on appropriate carriage vehicles.

The primary objective of the mining, quarrying & extraction of ordinary coal is to ensure unhindered and round the year supply and availability of coal for various parts of the country, even to the far off areas. On account of its being a source of thermal energy and a fuel for various electricity generation, industrial and like activities, coal is in great demand in the country. Therefore, its easy and all-time availability in the nook and corner of the country is extremely essential to ensure flourishing of the concerned sector of the economy that depend on coal as a source of energy, fuel or other like purposes.

The mining, quarrying & extraction and transportation of the excavated ordinary coal will require deployment of certain essential machinery and equipment including, amongst others, pointed hammers, spine, trolley, and loaders, dumpers and trucks etc. Additionally, certain equipment and machinery for measuring, weighing, grading the extracted coal will also be required. In order to ward off the situations of risk and emergency, firefighting equipment (standalone fire extinguishers) will also be arranged and installed at the site. Some trees of indigenous varieties will also be planted during each plantation season during the currency of the lease to enhance environmental ambience of the site. The lessee/proponent has allocated a separate sum of Rs. 0.5 million for environmental enhancement, improvement of aesthetics and up-facing of the site's outlook. This cost estimate is based on the market rates of the various input materials as prevailing in the market currently. It has been found that implementation and operation of the project will not be associated with any undesirable environmental and social impacts. The setting up of theproject, therefore, will not produce any untoward effects on the ambient environment. Nevertheless, certain routine mitigation measures have been suggested to further enhance the environmental acceptability of the project. Some of the theoretically possible impacts could be the ones as described hereunder:

- **Impacts relating to land use change**: Not any permanent impacts of land use change are expected, as the land surrounding the coalmine site is not under any productive agricultural or other usage. The site is a known coal quarry owned and possessed by Mines and Minerals Department, Government of the Punjab. Owing to this very position, there will not be any adverse land use change. The temporary land use changes will be reversed from rehabilitation and reclamation of the site upon closure of the mine (***The aspect under consideration has no environmental and social impacts at all***)

- **Loss of livelihood and structural damages**: Not any permanent impacts relating to loss of livelihood or structural damage are expected, as the mining operations are being carried out on a known coal mine. The

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land surrounding the coalmine site is not under any productive agricultural or other usage. There do not exist any built-up structures nor any sources of livelihood as might be impacted upon from mining operations. The mining operations will not cause any loss of livelihood or structural damage, as no such structures exist around the site. Likewise, there are neither any human population nor any built-up sites upto a considerable distance from the mining site (***The aspect under consideration has no environmental and social impacts at all***)

- **Acquisition of houses and allied structures**: Not any impacts relating to compulsory acquisition of houses and allied structures as the mining operation are being carried on a known coal quarry owned and possessed by Mines and Minerals Department. There are neither any built-up structures nor any houses on or upto a considerable distance from the mining site. The mining operations do not require acquisition of any land, houses or other structures. Likewise, there are neither any human population nor any built-up sitesupto a considerable distance from the mining site (***The aspect under consideration has no environmental and social impacts at all***)

- **Cutting and removal of trees and crops**: Not any permanent impacts relating to cutting and removal of trees or field crops. The mining operations are being carried out on a known coal mine owned and possessed by Mines and Minerals Department. There are neither any trees nor standing crops at or around the mine site. The mining operations will not require or involve cutting of any trees or crops. Contrarily, seasonal tree plantation around the site has been suggested as the premier step to improve aesthetics ofthe site (***The aspect under consideration has no environmental and social impacts at all***)

- **Impeachment of easement rights of the local community**: Not any permanent impacts of impeachment of the easement rights of the local community as the mining operations are being carried out on a known coal mine area, owned and possessed by Mines and Minerals Department. The coalmine is situated far-off any human population or community dwellings. The mining operations on an isolated site are not impeaching any of the easement rights of the local community relating to sunlight, aeration, ventilation and access to natural resources. There is no human population near to the site. Moreover, the mining operations are all below the ground level (***The aspect under consideration has no environmental and social impacts at all***)

- **Impacts on groundwater**: Not any permanent impacts of groundwater quality and quantity as the mining operations are being carried out on a known coal mine area. The mining operations are not impinging upon the local groundwater resources. Except for some limited scale ordinary usages for normal human needs, groundwater is not required for any major operational activity under the project (***The aspect under consideration has no environmental and social impacts at all***)

- **Impacts on surface water**: Not any permanent impacts on surface water resources as the mining operations are being carried out on a known coal mine site. There is not any nearby surface water channel as might be affected from mining operations. However, as a result of heavy rainfall, the storm water may wash away surficial coal particles and may take them to the receiving water body (***The aspect under consideration has no environmental and social impacts at all***)

- **Impacts of inadequate treatment and disposal of wastewaters**: Not any permanent impacts of inadequate treatment and disposal of wastewater. The mining operations are not producing any wastewaters. Hence, there does not arise any question of inadequate treatment/disposal of wastewater at all (***The aspect under consideration has no environmental and social impacts at all***)

- **Impacts of inadequate disposal of the MSW**: Not any permanent impacts relating to inadequate treatment and disposal of MSW. The mining operations at a well-known coal mine, do not generate any municipal type solid wastes. Hence, there does not arise any question of inadequate disposal of solid wastes at all (***The aspect under consideration has no environmental and social impacts at all***)

- **Impacts of generation of ambient or neighbourhood noise**: Not any permanent impacts of generation of excessive noise and vibrations, as there are not any vicinity residents to be affected from the mining operations. The mining operations are being carried out on a known coal mine site, where there is not

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any human population upto a considerable distance from the mining site. The noise and vibrations generated from mining operations is therefore not affecting any resident population. As regard the mine workers, they have been provided the requisite safety equipment to protect against noise and vibrations. Hence, there are not any impacts relating to this aspect (***The aspect under consideration has no environmental and social impacts at all***)

- **Impacts on local air quality**: The coaldust produced during coalmining and coal loading operations may affect the local air quality temporarily during the span of operational activity. The dry fallout of the coaldust is not of any significance as there are neither any settled population nor any other important receptors within the coaldust zone. Likewise, billowing of the drag dust and fugitive dust from vehicular movement on the access road of the mine site, is also devoid of any permanent impacts. The transitory and momentary billowing of the fugitive dust and coal particulate is not of any significance from environmental standpoint. Moreover, the transient impacts of fugitive dust and fine coal dust, except human affiliations, are mitigabe and can be avoided or countered by implementing the requisite mitigation measures (***The aspect under consideration has no environmental and social impacts at all***)

- **Billowing of the drag dust**: No any permanent impacts of billowing of the drag dust. The drag dust produced during coalmining and coal loading operations may affect the local air quality temporarily during the span of operational activity. The dry fallout of the coaldust is not of any significance as there are neither any settled population nor any other important receptors within the coaldust zone. Likewise, billowing of the drag dust and fugitive dust from vehicular movement on the access road of the mine site, is also devoid of any permanent impacts. The transitory and momentary billowing of the fugitive dust is not of any significance from environmental standpoint. Moreover, the transient impacts of fugitive dust and fine coaldust, except human affiliations, are mitigabe and can be avoided or countered by implementing the requisite mitigation measures (***The aspect under consideration has no environmental and social impacts at all***)

- **Impairment of air quality from exhausts of fossil fuel burning**: Not any permanent impacts on local air quality from exhausts of fossil fuel burning. There is not any direct fossil fuel burning with respect to any of the mining operations. The momentary burning of fossil fuels in the engines of the carriage vehicles near the mine site is of no significance. The mining activities do not produce any fossil fuel exhausts, per se. Hence, not any impacts relating to this aspect (***The aspect under consideration has no environmental and social impacts at all***)

- **Impacts on ambient air quality**: Coalmining operations are known to affect the ambient air quality from billowing and flying off the fine particulate, fugitive and coaldust. The tiny particulate matter may remain suspended in the air for quite sometime, particularly during the active mining operations. However,it is mitigable and is being controlled by frequent sprinkling of the road and the bare area with water (***The aspect under consideration has some environmental and social impacts, which are mitigable***)

- **Likelihood of accidents and risks of personal injuries**: Coalmining, being an underground activity of digging and excavation of a carbonaceous matter is associated with number of risks, hazards and chances of accidents. Apart from the minor worksite injuries, the major accidents that might take place at a coalmine include the following:

  - Subsidence of the loosened area
  - Collapse of the mine
  - Spontaneous fire
  - Mine blast from accumulation of methane (CH_4) gas
  - Flooding and choking of mine

- Some of the above listed risks and hazards can be avoided by employing appropriate preventive andprotective measures. As regard the minor personal injuries, most of the time, these are an unfortunate outcome of non-observance of the standard operating procedures, safety precautions, steps for carrying outa particular activity in a safe manner and non-compliance of the recommended precautionary measures. Negligence and carelessness at the worksite may render the workers prone to higher chances of worksite accidents. It is imperative that all workers, particularly those working inside the mine, use the requisitesafety equipment and the right kind of tools, equipment and apparel while on work. Similarly, smoking atthe worksite, wearing loose clothes while on worksite and the tendency to avoid putting-on safety equipment and apparel while on

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k, should be strictly discouraged (***The aspect under consideration has some potentiality of pacts, most of which are mitigable***)

elihood of land instability and land sliding: Deep underground mining is a known factor of land sidence in the mining area. However, if appropriate rehabilitation and reclamation steps are taken upon sure of the mine, then chances of subsidence are greatly minimized (***The aspect under consideration s some probability of impacts that are mitigable***)

pacts on local ecology, biodiversity and the habitat: Coalmining over an extensive and wider a is a known factor to affect local ecology and biodiversity provided the area has some specific habitat and diversity features. As regard the present minesite, the same is devoid of any particular ecology, habitat and diversity. Therefore, mining activities are not likely to disturb the local ecological features in any manner, atsoever. The wider area around the minesite is un-inhabited. Therefore, no likelihood of disturbance to ighbourhood communities. Furthermore, mining operations do not involve cutting of any trees or plants. wertheless, if any tree is cut, although there are no chances, compensatory tree plantation@ two trees for ery tree cut has been recommended as the prime mitigation measure to keep the local ecology intact (***The pect under consideration is without any impacts and if there be any, are all mitigable***)

isplacement & resettlement issues: Not any permanent impacts relating to displacement, migration d resettlement of human population. There is not any human population upto many kilometres from the inesite. The minesite area is an un-inhabited site and a vacant land, where there are not any human wellings. The mining operations, therefore, will not have any impacts relating to displacement and settlement, as there is no human population at or around the minesite (***The aspect under nsideration has no environmental and social impacts at all***)

ocial and cultural issues: Not any permanent impacts relating to social and cultural issues. The minesite a vacant and un-inhabited land owned and possessed by Mines and Minerals Department, Government of he Punjab. The lessee/contractor has taken the site on a five years lease from the Department for extraction f coal from here. As there is not any neighbourhood community or likelihood of impeachment of any public ights, there is no likelihood of any kind of social or cultural issues at all (***The aspect under consideration as no environmental and social impacts at all***)

mpacts of likelihood of poor designing: Not any impacts relating to likelihood of poor designing, as he site is a known coal quarry owned and possessed by Mines and Minerals Department, Government of the unjab. All mining operations will be carried out in strict accordance with the terms and conditions of lease as well as provisions of the Mining Concession Rules 2002. Furthermore, not any permanent civil structures or uildings will be constructed at or near the minesite by the lessee/contractor. Hence, the aspect of architectural or structural features of the minesite is not relevant (***The aspect under consideration has no environmental and social impacts at all***)

Likelihood of risks of personal injury: The mining operations being a kind of hard activities, the risks of personal injuries and accidents cannot be rules out altogether. The likelihood of happening of personal injuries is always there. But, the same can be curtailed or minimized if exposure to the avoidable risks and site hazards is minimized. The most likely causes of risks of personal injuries are non-observance of the standard operating procedures and non-observance of the safety precautions for carrying out a certain activity. Adventurism on the part of the workers can be another cause of personal injuries. Nevertheless, likelihood of personal injuries from other causes cannot be ruled out altogether. However, efforts should be made to minimize exposure to risks of personal injuries by instituting a dependable hazard assessment and risk avoidance strategy (***The aspect under consideration has no environmental and social impacts at all***)

detailed account of the genesis of the above-referred adverse impacts, their potentiality to affect the ambient nvironment and the measures for mitigations has been presented in the Chapter titled, "Environmental Impacts nd Their Mitigations" as contained in this EIA Report. However, it would be suffice here to state that if the ining operations are carried out in a sustainable manner, in accordance with the ESRMP and the mitigation easures, as are given in this EIA study, then the majority of these adverse impacts would become insignificant nd of no relevance at all.

6 Recommendations for Mitigation Measures

Besides presenting an in-depth analysis of the environmental and social impacts of the project, the EIA report details a set of comprehensive mitigation measures and strategies for avoiding and countering the adverse environmental and social impacts of the project. Apart from the construction phase measures, additional measures for the operation phase activities have also been presented.

The majority of the mitigation measures, as suggested in the instant EIA report, are activity based. Forexample, inconveniences to the affected persons during implementation of the project, if any, can be avoided by implementing the suggested mitigation measures. The exposed surfaces or the bare soils should be sprinkled with water regularly to reduce flying off dust therefrom. The transient air quality impacts, like blowing of fugitive dust from open surfaces, can be avoided through regular water sprinkling of the bare soils. Similarly, dust blowing from the unpaved ground surfaces from vehicular movement during operation phase ofthe project, can be avoided by planting trees on all sides of the project land. The risks of personal accidents during the operation phase can be curtailed by promoting usage of the safety equipment and by instituting a dependable and effective monitoring system for checking delinquencies in this respect. The workers doing welding, moulding and steel fixing works should take all necessary precautions and use recommended safety equipment and gadgets to avoid any untoward incident.

As regards the operation phase, the exposure to fugitive and coaldust can be avoided by using appropriate masks and other safety equipment. Likewise, probable extravagant use of freshwater at washrooms and other places can be minimized by fitting auto-shutoff taps. As regards treatment of the sanitation origin wastewater from the toilets, septic tanks of appropriate capacities be constructed and kept functional. The chances of subsidence can be mitigated by carrying out reclamation of the site upon closure of the mine. The environmental ambience of the site be enhanced by planting green trees, plants and exotic flora. The trees andplants should be watered regularly to keep them green and alive.

The most significant positive impact of the project is round the time availability of coal in sufficient quantities for the needs of the energy production sector, brick kiln industry, industrial concerns and domestic users in the country. Coal is an excellent source of heat and thermal energy. Its usage ranges from small scale roadside bar-b-que grilling to generation of power in huge coal-fired power plants. It is a fuel of choice of the brick kilns in the country. Therefore, it is in high demand all over the country. Therefore, their round the year availability is a crucial factor for the brick kiln and the dependent allied industry of the country. The mined out coal is being supplied to various buyers and commercial users even in the far off, remote and distant areas of the country. The mining of coal is beneficial for the economy, as it will give an impetus to dependent sectors like the coal carriage and transportation industry of the country. Host of carriage trucks, dumpers, haulage vehicles and trucks are being used for transporting the mined out coal to various destinations across the country. The supply and availability of coal will give an impetus to the national economy, as well.

The above-mentioned socioeconomic and environmental benefits of the project far outweigh the potentially negative or the adverse impacts of the project, if any. Given the present state of affairs and ever increasing demand of coal in almost all parts of the country, the setting-up of the project for mining of coal is of great benefit for the people, area, and the environment for all times to come, as it will ensure uninterrupted supply of coal, even for the distant and remote areas equally and at par with other areas.

The project simply is mining, quarrying & extraction of ordinary coal from its known and notified quarry area in an environmentally safe and secure manner. There will not be any irreversible undesirable environmental impacts from any of the project activities relating to mining, quarrying & extraction of ordinary coal. Conversely, there beneficial impacts on the local environment from the improved landscape, aesthetics and abatement of the environmental pollution from environmentally controlled excavation of the coal. In addition to the above listed benefits, some other significant socioeconomic benefits and positive impacts of the project are the opportunities of employment, training and the skill development both for the professionals and for thegeneral cadre personnel who would be employed or whose services would be hired in connection with setting-up and operation of the project. Another social benefit of the project is the income prospects for large numberof persons (traders, shopkeepers, suppliers, vendors, service providers, mechanics, artisans etc.) who would be providing goods and services during setting up and subsequently during operation of the project. In nutshell, the mining, quarrying & extraction of ordinary coal can be considered as a big leap forward towards ensuring easy and free supply of coal for various consumers in various parts of the country equally and equitably.

7 Proposed Monitoring

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onmental, social and risk management plan (ESRMP), as given in this document, is meant to provide a nechanism for addressing the adverse environmental and social impacts of the project. It presents a ystem of mitigation and prevention of the adverse impacts in the form of environmental guidelines, s for risk and hazard avoidance, and institutional setup for implementing the ESRMP. The hierarchy of es of implementation of the ESRMP are firstly to avoid, and if it is not possible, to attenuate the adverse to an acceptable level by adopting suitable administrative and or technical options. The key components SRMP will include environmental guidelines for the project sponsors, planners, design- engineers, ors, vendors and suppliers of goods, commodities and services for the project, lessee/ proponent and oncerned.

offering a framework of mitigations in the shape of environmental and social management guidelines, MP offers an institutional setup for implementing the environmental guidelines by identifying and ting focal persons for various activities and other mitigation measures. These focal persons will ensure and downward coordination and linkages, removal of bottlenecks in the way of smooth implementation SRMP, establishing a two-way flow of information between the project authorities andthe EPA as well r regulatory authorities, and maintaining all project related monitoring records for a meaningful follow-

rom relevant focal persons for the various sub-components, there will be an environmental safety, health cial management unit (ESHU) headed by an environmental manager to cater for environmental and safety of the project right from planning stage to its lifelong operations. The job of the ESHU will be to ensure iance of the environmental guidelines and implementation of the prescribed mitigation,safety, health, ygiene measures at the site. The Environmental Manager will have an independent office and appropriate er of staff to assist him in smooth accomplishment of his duties.

SRMP also delineates mechanisms for internal and external compliance monitoring of the project's setting- nd operational activities to ensure regimental observance of the guidelines and other recommended ures at various tiers of responsibilities. Members of the environmental safety, health and social agement unit (ESHU) will institute a regular system of the sites' inspections to take note of the onmental non-conformances by the construction contractors, vendors and others concerned. They may he checklist proforma that has been especially developed by the environmental consultant for thepurpose. will submit daily as well as periodical monthly environmental compliance status reports to the onmental unit and will seek guidance from the Environmental Manager during both setting-up and ration phases as well as on need basis as and when required.

rder to ensure long-term environmental and social sustainability of the project, the report presents a system xternal monitoring in the form of regular annual environmental audits. To ensure objectivity and impartiality, environmental audit and external monitoring should be outsourced to an environmental consultancy of nding and repute. The consultancy should be given the mandate to review implementation of the ESRMP, ntify on-the-ground environmental issues and offer recommendations for making the project activities npatible with the actual requirements.

order to enhance capacity of the concerned personnel in managing the environmental and social issues, the RMP presents a system of environmental trainings and capacity building of the project authorities, particularly the key stakeholders (officers, staff, community and others). Specialized trainings will be offered to nctionaries of the environmental management unit.

hese training sessions will aim at raising participants' understanding about the environmental and social issues f the project. They will also emphasize on importance of involvement of the stakeholders towards tackling and ddressing various environmental and social concerns of the project.

These workshops will be interactive in essence rather than being one-way flow of information. Some sessions will be reserved solely for the officers and staff of the ESHU and will focus more on policy issues and troubleshooting strategies rather than other routine aspects. Development of the training manuals, selection of the suitable environmental consultancy and selection of the appropriate resource persons will precede actual holding of these workshops.

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1. INTRODUCTION

urpose of Report

rpose of the instant report is to present a comprehensive Environmental Impact Assessment (EIA) of the t. The project simply is mining, quarrying & extraction of ordinary coal from a known coalmine near DHOK Distt. Chakwal and its transportation to various destinations for host of usages including heat generation ermal energy production. Coal is used extensively in the boilers, energy production industry and various sectors of the country. Owing to various factors, the demand of coal has gone-up manifold. The mining spread over an area of 326.19 acre in DHOK ANAR Coalmine, Chakwal. The report presents a detailed w of the various likely environmental impacts of the setting up of the machinery and equipment for the g operations at the project mining site. In addition to the impacts relating to setting up of the mining, rying & extraction machinery and equipment, the report also presents an overview of the foreseeable and ikely impacts of the operation phase i.e., mining, quarrying & extraction followed by transportation of the ed out coal to various destinations.

EIA report presents a critical review of the project's activities and the processes operations during the chinery installation phase as well as the subsequent operation phase. The report presents a review the ure, magnitude and implications of the environmental and the social impacts of the project against the ndard environmental parameters as prescribed under the National Environmental Quality Standards (NEQS). e environmental and social impacts of the various activities in relation to setting up of the project machinery d the process operations all during the lifelong operations of the project are the two key areas of focus of the udy. Besides evaluating the environmental profile of the activity, the report also outlines a comprehensive echanism for addressing the various environmental concerns particularly those relating to usage of freshwater r the various process and non-process activities. The report also suggests a long-term framework of monitoring he impacts of the process operations for early detection and remediation of the environmental issues that may ome up during the operation of the project. Additionally, the report outlines a robust and dependable mechanism to ensure optimal environmental performance of the mining operations from across the board implementation of the mitigation guidelines.

1.2 Identification of the Project & Proponent

Project:
"Mining License for Coal from an area of 326.19 acre of near DHOK ANAR, Distt.Chakwal under a valid Lease from Mines & Mineral Department, GoPb"

Proponent:
Aziz ur Rehman is the lessee/proponent of lease mining rights auctioned by Mines & Minerals Department, GoPb. The lessee/proponent will look after all the aspects concerning environmental approval from the EPA-Pb. He will carry out all necessary steps and measures for installation of the mining machinery and removal of the bottlenecks and troubleshooting in the way of smooth carrying out of the mining operations.

1.3 Environmental Consultant

M/s Rock Environmental Consultancy are acting as the accredited consultant for conducting a detailed and in-depth EIA of theproject in accordance with the rules, regulations, guidelines and provisions of relevant laws in vogue. The below named persons will act as the Focal Persons for and on behalf of lessee/proponent and Consultant:

1.4 Brief Description of the Project

Nature:
A simple project of mining, quarrying & extraction of ordinary coal and its transportation to various destinations in an environment friendly manner under lease from Mines and Minerals Department, Government of the Punjab

Size: 326.19 acre

Location:
The site is a known coalmine over area of 326.19 acre near DHOK ANAR in Distt. Chakwal. The site is bound all around by wide open vacant lands owned by various landowners except on the north, on which side, it touches

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the approach road to the site. There is no human settlement within 0.5 km radius of the proposed site. The geographical spread of the minesite consists of Six points from Point-A to Point-F, which match with the below given geographical coordinates (**Table 1.4**).

Table 1.4: Location Coordinates of the Site

Point	Easting (Yards)	Northing (Yards)
A	3195204.01	0947726.31
B	3196129.75	0947254.39
C	3196321.77	0948123.07
D	3196321.77	0948461.40
E	3197344.07	0948515.34
F	3195828.00	0948872.88
Total Area: 326.19 Acres		

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2. BRIEF DESCRIPTION OF THE PROJECT

Type & Category of Project

:

ple project of mining, quarrying & extraction of ordinary coal and its transportation to various destinations environment friendly manner under lease from Mines and Minerals Department, Government of the ab

egory:

mining and mineral processing operations are listed under Category "C" of Schedule-II of the IEE/EIA ulations 2022.

2 Objectives of the Project

e primary objective of the project is to extract ordinary coal over an area of 326.19 acre near DHOK ANAR, stt. Chakwal for its supply and usage by the concerned industry and the coal consumers. Being an excellent urce of heat and thermal energy, coal is in great and ever increasing demand in the country. The mining, uarrying & extraction of ordinary coal is in perfect accordance with the terms and conditions of the offer/lease ward letter and the international best practices, standards and specifications in an environment friendly nanner.

As such, the underlying objective of the instant project is mining, quarrying & extraction of ordinary coal by the lessee/proponent under a five years lease from Mines & Minerals Department, Government of the Punjab over an area of 326.19 acre of a known coalmine near DHOK ANAR, Distt. Chakwal. The lessee/proponent will carryout Mining License for Coal in strict accordance with the terms and conditions as containedin the offer letter/lease award letter No.ML.CKL.I.Coal(148) dated 02.11.2018 issued by theDeputy Director (Mines & Minerals) Punjab. It may be mentioned here that competitive bidding and open auction for the leasing of the mining rights of ordinary coal for a period of five years from DHOK ANAR Coalmine, Chakwal was held on 21.07.1992. The Mines & Minerals Department has granted mining rights to the lessee/proponent for a period of five years to mine out ordinary coal from here. The commercial mining, quarrying & extraction started only after taking over of the mining site (coalmine) by the lessee/proponent from the Mines & Minerals Department, GoPb. The quarried coal is transported to the desired destinations. Coal is an excellent source of heat and thermal energy. Its usage ranges from small scale roadside bar-b-que grilling to generation of power in huge coal-fired power plants. It is a fuel of choice of the brick kilns in the country. Therefore, it is in high demand all over the country. The local tree plantation around the site, which has been proposed as a prime mitigation measure, will enhance environmental ambience and aesthetic outlook around the site and will help to reduce environmental pollution in the area.

The socioeconomic benefits coming in the wake of implementation of the project will help in uplifting of the socioeconomic conditions and lifestyle systems of the populace of the neighbouring villages and towns. This can be counted as another important benefit of the activity. Similarly, impetus to commercial activities and creation of new job opportunities for the locals, which will come in the wake of implementation of the project, is another inseparable benefit of the project. The setting up of the project will ensure timely availability of coal in the far off and distant areas and the dependent financial benefits for the people of those areas from trading of coal and the allied commercial activities. Thus, apart from these primary objectives, there are host of secondary benefits coming in the trail of implementation of the project, which are beneficial for inhabitants of the area and the neighbourhood communities[1].

The instant project is in line with the "Mineral Development Policy" of Government of the Punjab (GoPb), which policy encourages environment friendly extraction of ordinary and precious minerals from the known mine areas in the province. The underlying objective of the instant project is to ensure environmentally compatible mining, quarrying & extraction of ordinary coal. Being a cheaper source of heat and thermal energy, coal is in great demand by the concerned end-users.

[1] Project Brief as provided by the Proponent

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site is located in a known coalmine spread over an area of 326.19 acre near DHOK ANAR in Distt. Chakwal. site is suitable for the mining, quarrying & extraction of ordinary coal, which is a cheaper source of heat and rmal energy and therefore in high in the country. Viewing in this backdrop, the primary objective of theinstant ject, apart from keeping the environmental pollution in check, is to ensure the abundant off-season ilability of coal for the various consumers in the country.

3 Alternatives of the Project

e following alternatives were considered while carrying out EIA of the proposed project.

Abandonment of the Project (No Project Alternative)
Changing Project's Scope (Downsizing or Upsizing)
Shifting the Project to some other Site
Process Modification Alternative

None of the alternatives considered, reviewed and examined were found a better choice than the instant proposed project. All other alternatives were found either costly, time consuming, non-beneficial for the environment and of no advantage on any account compared to the instant proposed project. Hence, they were all dropped.

2.4 Location & Layout of the Project

Location:

The site is a known coalmine spread over an area of 326.19 acre near DHOK ANAR in Distt. Chakwal. The site is bound all around by wide open vacant lands owned by various landowners except on the north, on which side, it touches the approach road to the site. There is no human settlement within 0.5 km radius of the proposed site. The geographical spread of the minesite consists of Six points from Point-A to Point-F, which match with the below given geographical coordinates (**Table 2.4**). **Fig 2.4a to 2.4f** are the Google Earth images of site.

Table 2.4: Location Coordinates of the Site

Point	Easting (Yards)	Northing (Yards)
A	3195204.01	0947726.31
B	3196129.75	0947254.39
C	3196321.77	0948123.07
D	3196321.77	0948461.40
E	3197344.07	0948515.34
F	3195828.00	0948872.88
Total Area: 326.19 Acres		

Layout: Appended as **Annex-3** of with the instant EIA



Fig 2.4a: Google Earth View of the Site

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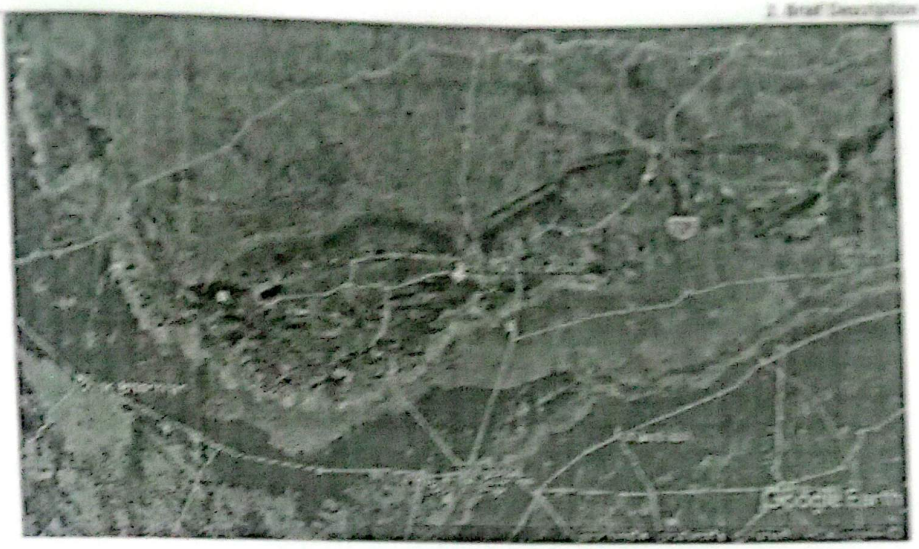


Fig 2.4b: Google Earth View of the Site

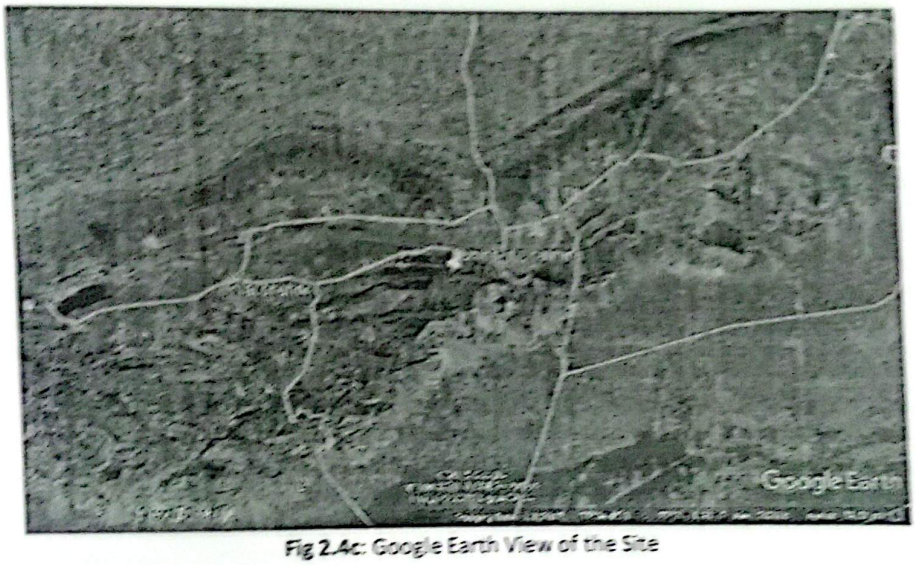


Fig 2.4c: Google Earth View of the Site

2.5 Land Use of the Site

The site a known coal repository named as DHOK ANAR Coalmine, near DHOK ANAR, District Chakwal. The entire site and the surrounding area is all coalmine area owned and possessed by the Mines and Minerals Department, Government of the Punjab.

2.6 Road Access

The access road to the mining site is an existing road (DHOK ANAR Road).

2.7 Vegetation Features of the Site

The site is devoid of any vegetation features. However, seasonal plantation of the shadowy trees and development of the grassy patches near the site is being done by the lessee/proponent as a prime aesthetic enhancement measure. It is expected that plantation of new trees will add to scenic beauty, outlook and soonthness of the site and the vicinity.

2.8 Cost & Magnitude of Operation

Magnitude:

The lease has been granted to the proponent for the period of 3-years. The capacity of the project is about 3-4 trolleys of excavated iron ore per day. This is also the threshold limit of the project.

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ost and magnitude of mining operations may be judged from the information given below. The anticipated l project cost is shown in table below:

Capital cost of the project and breakdown enumerated below

Description	Cost (Rs.)
Auction Cost	2.5 Million
Mine Development Operation	0.3 Million
Mine Machinery and Equipment	0.7 Million
Camp Office Expenses	0.5 Million
Environmental Compliance Budget	0.5 Million
Supervisory Staff	0.5 Million
Total	**5.0 Million**

gnitude of Operation:

ing, quarrying & extraction of ordinary coal from a known coal mine for a period of five years under lease n the Mines and Minerals Department, Government of the Punjab. The mined out coal is transported to the nded destinations in an environmentally compatible manner. Coal is in great and ever increasing demand by concerned industry in the country.

9 Schedule of Implementation

e lessee/proponent intends to install the necessary mining machinery as a one-go activity on fast track basis d within the shortest possible time immediately upon completion of the requisite codal formalities and taining of the different NOCs & licences from the concerned regulatory agencies of the Government,primarily e EPA-Pb. The lessee/proponent has already started the necessary spadework regarding preparation of tailed engineering drawings, geotechnical investigations and surveys. The instant EIA is one of these eliminary steps towards completion of the requisite formalities prior to onsite setting-up of the mining achinery. The landscaping and external beautification of the site is to be taken up side-by-side of the stallation of the mining machinery and equipment. Thus, by the time the installation of the mining machinery complete, the entire site will present a beautiful and picturesque scene of soothing ambience and serene esthetics owing to simultaneous completion of the beautification work.

xcluding the concept planning and the preliminary spadework, the setting up of the machinery and equipment or the mining, quarrying & extraction of ordinary coal, the mining operations following setting up of the achinery and equipment is a continuous activity spanned over the entire validity period of mining spread over ive years. The various support operations will include laying of railing track for pulling out coal-loaded trolleys rom deep inside the mine, fixation of support pillars to stabilize the mine, installation of firefighting system and construction of parking lots for loading coal on the carriage vehicles. These support operations are accomplished ide by side with construction of coal mine to ensure concurrent completion and timely setting-up of the project. The lessee/proponent intends to award setting up of the machinery, equipment and other allied jobs to contractors of standing and repute having experience of setting up such like projects. However, wherever necessary, services of the experts of the field were hired to ensure the best quality mining operations in the best professional manner. The commissioning of the project will comprise the following essential components:

Preconstruction Phase

- Procurement and possession of the requisite landsite for setting up the project
- Preparation of the various project documents, layout maps and engineering drawings etc.
- Conducting various investigative studies such as geo-technical studies, environmental examination and economic feasibility studies, if needed
- Obtaining consents, approvals and NOCs from different regulatory agencies and departments of the Government, wherever applicable
- Selecting the appropriate and the most efficient machinery and equipment as per the applicable standards
- Signing the contracts and agreements for various jobs, procurements, installations, and implementation of the project or its sub components

Construction Phase

- Clearing the site for installation of the mining machinery and equipment
- Removal of any unspent material or debris upon completion of installation and commissioning of the project
- Carriage and transportation of mining machinery and equipment at the coalmine site

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- Procurement, installation and commissioning of the project machinery and equipment
- Onsite installation and setting up of the machinery and equipment for the mining and allied operations
- Provision of temporary worksite toilets and washrooms for the labour, if needed
- Provision of a machinery repair and maintenance workshop
- Installation of boundary lights for nighttime illumination

Post Construction Phase

- Routine and emergency repair and maintenance works relating to machinery & equipment
- Maintenance of the supply line of the extracted coal to the supply destinations
- Uploading of the mined out coal on the carriage vehicles for their onward transport to the desired destinations and end-users all across the country
- Periodic inspection and testing of the machinery and equipment as per the inspection regime prescribed by the concerned regulatory agency
- Upkeep of the site and other environmental enhancement measures, janitorial services, horticulture, and beautification (plantation of trees, exotic shrubs and ornamental flowers)
- Maintenance and upkeep of the firefighting system (risk/hazard management)
- Ensuring round the clock security of the site
- Provision of medical cover for the workers
- Social wellbeing of the neighbouring communities (corporate social responsibility), if relevant
- Environmental audit and compliance monitoring (annual as well as periodic)

The activities for accomplishing installation and operation of the project will include the following:

- Essential topographic, hydrological, geological, and tectonic studies and surveys of the site to ascertain the baseline environmental conditions, if and where needed
- Detailed architectural, engineering, environmental, economic, social, and cost-benefit feasibility and technical studies, if and where needed
- Completion of the codal and legal formalities and obtaining of NOCs and other go ahead clearances from the concerned regulatory agencies of the Government, if and where needed
- Preparation of the project documents containing the project's scope of activities, mode of execution, and mechanism for supervision of project related activities, if and where needed
- Awarding of the contract for setting up the project machinery as per proponent's code of practice, if and where needed
- Monitoring and supervision of the installation and fabrication works for ensuring their proper execution quantitatively as well as qualitatively, if and where needed
- Removal of the unspent materials, manufacturing wastes and debris and its safe disposal, if & where needed
- Operations, maintenance and monitoring of the project activities all during the operation phase

2.10 Brief Description of the Project

As the name implies, The instant project is mining, quarrying & extraction followed by transportation of ordinary coal by the lessee/proponent over an area of 326.19 acre of a known coalmine near DHOK ANAR, DistrictChakwal under a five year lease from Mines & Minerals Department, Government of the Punjab. The lessee/proponent will carryout Mining License for Coal in strict accordance with the terms and conditions as contained in the offer/lease award letter No.ML.CKL.I.Coal(148) dated 02.11.2018 issued on behalf of the Licencing Authority by the Deputy Director (Mines & Minerals) Punjab. It may be mentioned here that competitive bidding and open auction for the leasing of the mining rights of ordinary coal for a period of five years of DHOK ANAR Coalmine near DHOK ANAR, Chakwal was held on 21.07.1992. The Mines & Minerals Department has granted mining rights to the lessee/proponent for a period of five years to mine out ordinary coal from here. The commercial mining, quarrying & extraction started only after taking over of the mining site (coalmine) by the lessee/proponent from the Mines & Minerals Department, GoPb. The quarried coal is transported to the buyers and consumers in the country. Coal is an excellent source of heat and thermal energy and therefore in high demand all over the country.

The site is bound all around by wide open vacant lands owned by various landowners except on the north, on which side, it touches the approach road to the site. There is no human settlement within 0.5 km radius of the proposed site. The geographical spread of the minesite consists of Six points from Point-A to Point-F, which match with the below given geographical coordinates (**Table 2.10**).

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D	3196321.77	0948461.40
E	3197344.07	0948515.34
F	3195828.00	0948872.88
Total Area: 326.19 Acres		

e mining operations are carried out in conformity with the applicable standards and guidelines, as contained the offer/lease award letter issued by the Licencing Authority in that respect. The installation of the mining achinery was in line with the international codes and the standards for such like facilities.

10.1 Coal

oal is a non-renewable fossil fuel Formed from the remains of plants that lived and died about 100 to 400 illion years ago. Coal is formed by geological processes that take millions of years to complete and is usually und in 'seams' (layers of up to several feet thick) deep underground. Coal is one of the world's most plentiful nergy resources, and its use is likely to quadruple by the year 2023. Coal occurs in a wide range of forms and ualities. There are two broad categories: (a) hard coal, which includes coking coal (used to produce steel) and ther bituminous and anthracite coals used for steam and power generation; and (b) brown coal (sub-ituminous and lignite), which is used mostly as on-site fuel. Coal has a wide range of moisture (2-40%), sulfur).2-8%), and ash content (5-40%). These can affect the value of the coal as a fuel.

oal is a readily combustible rock containing more than 50 percent by weight of carbonaceous material, formed om compaction and induration of variously altered plant remains similar to those in peat. Most coalis fossil eat. Peat is an unconsolidated deposit of plant remains from a water-saturated environment such as abog or nire; structures of the vegetal matter can be seen, and, when dried, peat burns freely.

2.10.2 Coalmining

The depth, thickness, and configuration of the coal seams determine the mode of extraction. Shallow, flat coal deposits are mined by surface processes, which are generally less costly (per ton of coal) than underground mines of similar capacity. Strip mining is one of the most economical surface processes. Here removal of overburden and coal extraction proceed in parallel strips along the face of the coal deposit, with the spoil being deposited behind the operation in the previously mined areas. In open pit mining, thick seams (tens of meters) are mined by traditional quarrying techniques. Underground mining is used for deep seams. Underground mining methods vary according to the site conditions, but all involve the removal of seams followed by more or less controlled subsidence of the overlying strata. Coal seams usually contain an explosivegas, methane.

2.10.3 Historical Overview

Ancient people mined coal by picking and scraping and used it for heating, cooking, and in ceremonial chambers as early as the 12th century AD; in the 14th century they used it industrially in pottery making. Small-scale mining of surface coal deposits dates back thousands of years. The Romans were exploiting all major coalfields by the late 2nd century AD. Coal was mined in America in the early 18th century, and commercial mining started around 1730 in Midlothian, Virginia. Coal-cutting machines were invented in the 1880s. Before this invention, coal was mined from underground with a pick and shovel. By 1912, surfacemining was conducted with steam shovels designed for coal mining. Coal mining has had many developments over the recent years, from the early days of men tunneling, digging and manually extracting the coal on carts, to large open cut and long wall mines. The various methods of mining a coal seam can be classified under two headings, surface mining and underground mining.

2.10.4 Stages of Mining

The operational life of a mine and the mineral exploitation from a mine progresses through about five stages:

Mining: Mining is the first stage in the utilization of a mineral deposit, is the search for ores or other valuable minerals (coal or nonmetallics). Because mineral deposits may be located either at or below the surface of the earth, both direct and indirect Mining techniques are employed.

Exploration: Exploration is the second stage in the life of a mine. Once the deposit is assured, this is done to assess the size, shape, location and economic value of the deposit. Exploration determines as accurately as possible the size and value of a mineral deposit, utilizing techniques similar to but more refined than those used in Mining. The line of demarcation between Mining and exploration is not sharp. In fact, a distinction may not

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be possible in some cases. Exploration generally shifts to surface and subsurface locations, using a variety of measurements to obtain a more positive picture of the extent and grade of the ore body.

Development: Development, i.e., third stage, is the work of preparing access to the deposit so that the coal can be extracted. During this stage, the work of opening a mineral deposit for exploitation is performed. With it begins the actual mining of the deposit, now called the ore. Access to the deposit must be gained either (1) by stripping the overburden, which is the soil and/or rock covering the deposit, to expose the near-surface ore for mining or (2) by excavating openings from the surface to access more deeply buried deposits to prepare for underground mining.

Exploitation: The fourth stage of mining, means extraction of coal. Open cast mining and underground mining (room pillar, long wall, drift, shaft, slope mining) are some types of coal mining. Exploitation is associated with the actual recovery of minerals from the earth in quantity. Although development may continue, the emphasis in the production stage is on production. Usually only enough development is done prior to exploitation to ensure that production, once started, can continue uninterrupted throughout the life of the mine.

Reclamation: Reclamation is the final stage in the operation of most mines. It is the process of closing a mine and recontouring, revegetating, and restoring the water and land values. The best time to begin the reclamation process of a mine is before the first excavations are initiated. In other words, mine planning engineers should plan the mine so that the reclamation process is considered and the overall cost of mining plus reclamation is minimized, not just the cost of mining itself. The new philosophy in the mining industry is sustainability, that is, meeting of economic and environmental needs of the present while enhancing the ability of future generations to meet their own needs.

2.10.5 Classification

Depending on the content of volatiles, coal is classified into Lignite, Sub-bituminous coal, Bituminous coal and Anthracite.

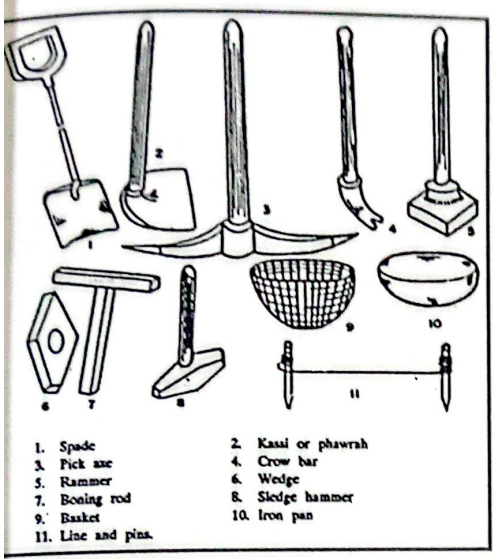
2.10.6 Tools & Machinery for Mining Operations

Various tools, instruments, equipment and machinery are used for mining, drilling, breaking, picking, loading and transportation of the collected coal. These will include from small size handtools to machine excavators. Except the small handtools, the proponent will get all machinery and vehicles on rent from the market.

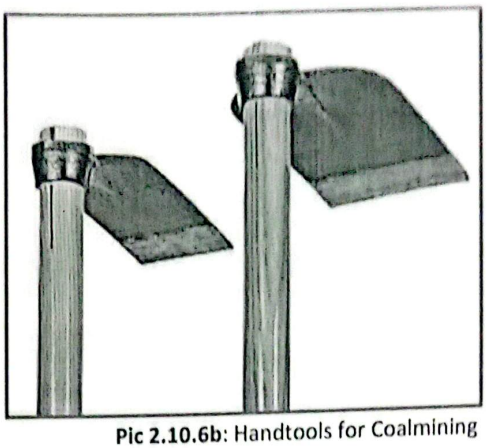
Handtools: The small handtools will include the following items (**Pic 2.10.6a to 2.10.6d**):

- ✓ Spade
- ✓ Mallet
- ✓ Pick Axe
- ✓ Crow Bar
- ✓ Rammer
- ✓ Wedge
- ✓ Rake
- ✓ Hammer
- ✓ Windlass
- ✓ Basket
- ✓ Bucket
- ✓ Wheel Barrow
- ✓ Donkey Bags

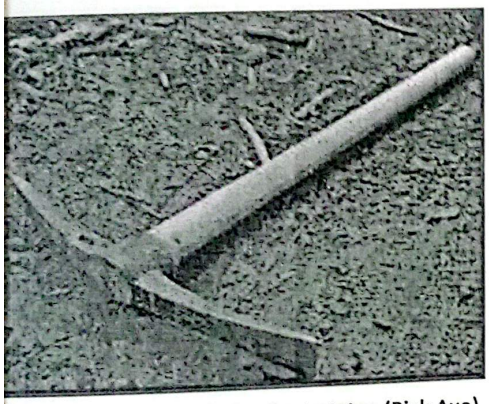
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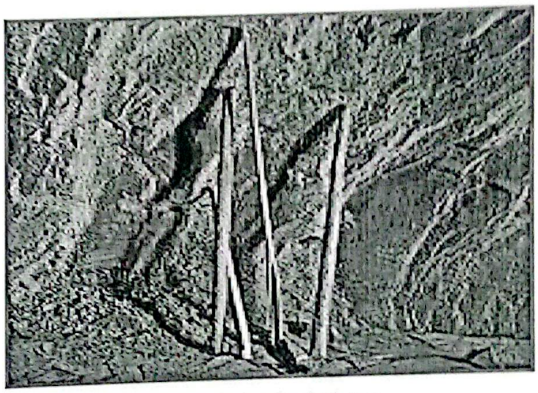
Pic 2.10.6a: Handtools for Coalmining



Pic 2.10.6b: Handtools for Coalmining



Pic 2.10.6c: Handtools for Coalmining (Pick Axe)

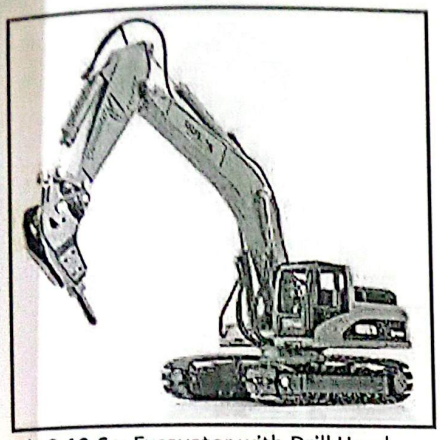


Pic 2.10.6d: Handtools for Coalmining

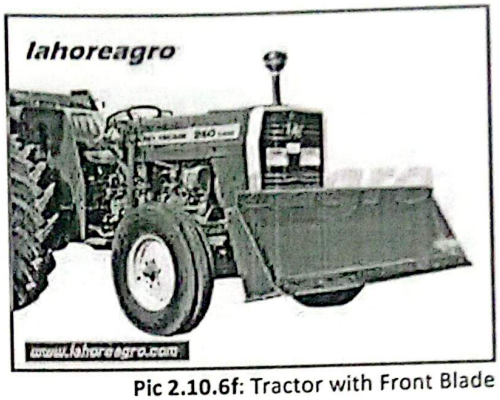
Mechanical Tools & Machinery: The mechanical tools and machinery will include the following items (Pic 2.10.6e to 2.10.6o):

- ✓ Excavator (with drill & bucket)
- ✓ Bulldozer
- ✓ Tractor (with front blade/bucket)
- ✓ Loader Truck
- ✓ Dumper Truck
- ✓ Carriage Truck
- ✓ Coal Loading Rail Track Trolley

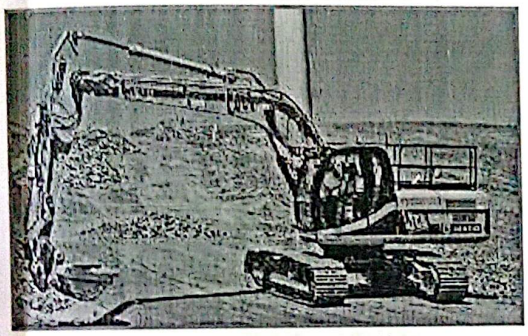
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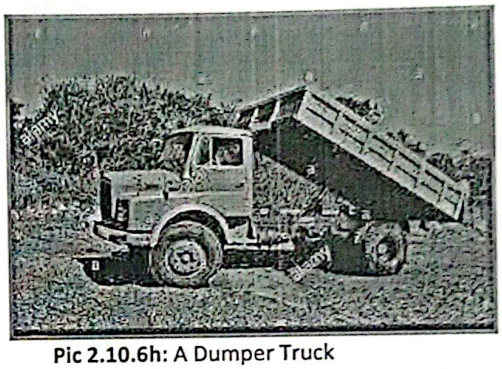
Pic 2.10.6e: Excavator with Drill Head



Pic 2.10.6f: Tractor with Front Blade



Pic 2.10.6g: Excavator with Front Bucket



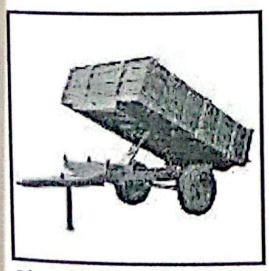
Pic 2.10.6h: A Dumper Truck



Pic 2.10.6i: A Loader Truck



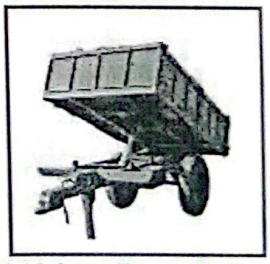
Pic 2.10.6j: A Bulldozer with Front Blade/Bucket



Pic 2.10.6k: A Tractor Trolley



Pic 2.10.6l: A Typical Hand Barrow



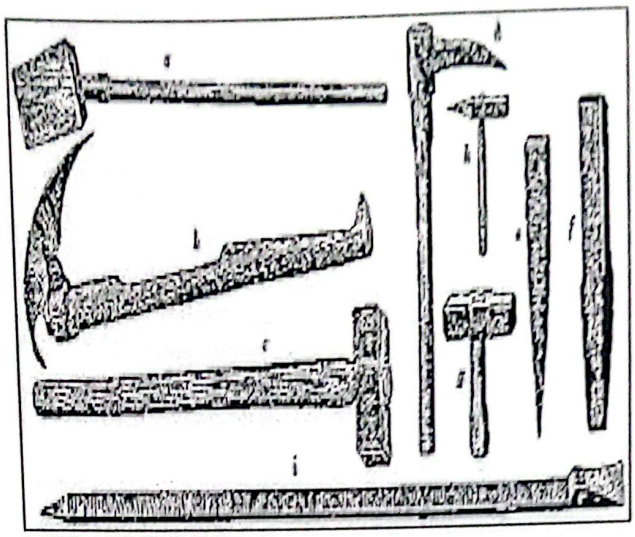
Pic 2.10.6m: A Tractor Trolley

Complementary Tools: The complementary tools will include the following items **(Pic 2.10.4m to 2.10.4n)**:

- ✓ Chain Pulley Block
- ✓ Hand Barrow
- ✓ Weighing Scale



2.10.6n: A Typical Chain Pulley Block



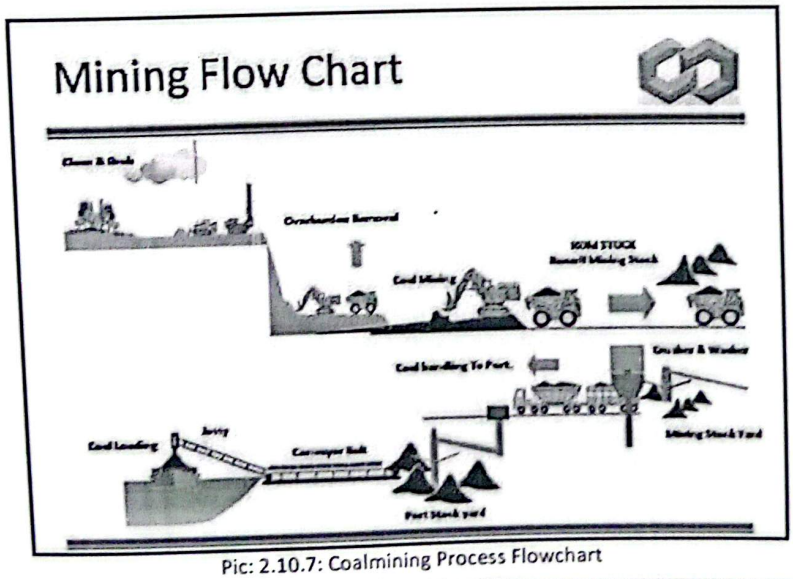
Pic 2.10.6o: Some Other Coalmining Implements/Tools

10.7 Steps of Coalmining (Process Flow)

ble 2.10.7 presents a tabulated summary of the steps involeved (process flow) of coal mining, picking, llection, loading and transportation to destination site, as depicted in Pic 2.10.7.

able 2.10.7: Summary of the Steps Involeved in Coalmining (Process Flow)

Step	Activity	Description
1.	Taking over & Fencing of Coalmine Site	The coalmine site is fenced to demarcate and distinguish the area ofoperation and activity. This can be done by grouting pre-cast cement pillars in the ground and running barbed wire around them
2.	Stripping & Excavation	The surface soil is stripped and excavated to make a trench way to reach to the coal seam down
3.	Construction of Trench	The trench for bringing out coal is constructed by reinforcing sidewalls and roof pillars, domes and other weight bearing structures. A rail track for pulling our coal and electrical wiring is done also during this stage
4.	Drilling & Excavation of Coal	Coal is frilled, hammered and broken off the rock. The coal so obtained is collected in a bucket, which is then emptied in the rail track trolley. The coal filled trolley is pulled out and emptied for the next round
5.	Loading of coal on carriage vehicle	Loader trucks, dumper trucks, tractor trolley etc. are used for transporting the coal from the mining site to the destination point



Pic: 2.10.7: Coalmining Process Flowchart

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0.8 Discussion & Analysis

angements have been put in place for handling any incident of fire The standalone fire extinguishers have n placed at key points at site. The firefighting system is kept in an always ready-to-use state.

mining, quarrying & extraction followed by transportation of the mined out ordinary coal is being done in formity with the conditions of the lease grant, applicable standards and guidelines, if any, as notified by vernment in that respect and in line with international codes and standards for such like mining and allied rations. The basic design features of the proposed facility are as under:

he mined out coal is transported on dumpers, loader trucks and carriage trailers etc.
here is a receiving/delivery ramp for off-loading the incoming commodities, if any, and up-loading of the nined out coal on carriage vehicles for dispatch to various destinations
here is a network of standalone foam extinguishers to combat dry fire in case of an accidental fire
he site is accessible easily via an existing road, which runs on the north side of the site and is the principal pproach road to the mine site
As per the field survey by the Consultant's Team of Professionals, there is not any large size human settlement within 0.5 km radius of the proposed site
As per the approved quarrying map, the Licencing Authority of the Mines and Minerals Department has granted mining rights to the lessee/proponent to mine, quarry, extract and transport coal to various users ad destinations to fulfil needs of the concerned sectors of economy and industry of the country
M/s Rock Lahore are providing consultancy and advisory services with respect to the environmental aspects of the activity including the instant EIA.
The Mines &b Minerals has asked the lessee/proponent to submit an Environmental Impact Assessment Report to the EPA Punjab, as required under Section 12 of the Punjab Environmental Protection Act 1997 and the rules and regulations framed thereunder.

per findings of the EIA, there will not be any serious impacts, whatsoever. However, if any, are found at a ter stage, they will be all mitigable in character. The transient impacts of the implementation phase as have een identified in the instant EIA are all reversible and can be made good by implementing the mitigation easures and the environmental monitoring programme as given in this EIA report. To conclude, the nvironmental and social impacts of the project, if any, are countered by the availability of coal for diverse end-sers. This will give impetus to the dependent industry and promotion of country's economy including provision f job and employment opportunities in the country. In nutshell, the impacts of the project are all positive in ature and beneficial for the environment, economy and the community.

he findings of the EIA further show that the operations for mining, quarrying & extraction of ordinary coal for s usage by host of consumers, are of immense advantage and benefit for the community and the environment. he EIA also shows that there are not any exhaustive exploitation and consequential depletion of the local atural resources from any of the operations. In view of the calculated scope and magnitude of theproject, the ocal resources will remain conserved and available for sustainable future development. The project will herefore bring-in positive and healthy improvements in the socio-economic environment of the area. The roject has benefit thousands of the people, locally and distantly.

he source of water supply, both during setting-up the machinery and the subsequent mining operations, if eeded, is the groundwater obtained from the existing water sources near the site. The depth of water table t the site is approx. 95-135 feet. The groundwater, although a little brackish, is suitable for the intended urposes. The electricity requirements of the project are being met from an electricity connection obtained from he concerned electricity supply company.

Annex-1 is the Lease Offer/Award Letter. **Annex-2** contains some project related documents. **Annex-3** contains site's layout plan. **Annex-4** is the list of the persons alongwith their names and designations, who were consulted during EIA. **Annex-5** contains the checklist proforma. **Annex-6** is Terms of Reference.

2.11 Benefits Likely to Accrue from the Project

The major benefits likely to accrue from the project have been enumerated in the sections above. These include not only the business prospects, social uplifting of the area but also availability of coal in the country. The majority of the qualitative benefits are those that are realized as a result of accomplishment of the underlying objectives of the project.

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nost significant positive impact of the project is the availability of the adequate stocks of coal for end- users oncerned industry of the country. Coal is an excellent source of heat and thermal energy. Its usage ranges small scale roadside bar-b-que grilling to generation of power in huge coal-fired power plants. It is a fuel oice of the brick kilns in the country. Therefore, it is in high demand all over the country. The miningof coal the approved quarry will not cause any environmental pollution. Some of the significant quantitative fits likely to accrue from the project can be enumerated as hereunder:

e project indicators depict a positive cost to benefit ratio (CBR) showing that the project is feasible and is ely to bring forth economical and socio-cultural benefits in its wake
e economic analysis of the project reveals a healthy Expected Internal Rate of Return (EIRR)
e NPV of the project @10% is positive which makes execution of the project feasible
ere is an all-time availability of coal for end consumers of the commodity
e cumulative monetized benefits from the project are in thousands of rupees per annum
e project is likely to create more than 25 new job opportunities

above-mentioned socioeconomic and environmental benefits of the project will far outweigh the potentially ative or the adverse impacts of the project, if any. Given the present state of affairs regarding demand and ply of coal in the country, setting-up of the project is of great benefit for the people, area and the ironment for all times to come.

operations will consist of mining, quarrying, extraction and transportation of the mined out coal to the tination points. Coal is an excellent source of heat and thermal energy. Its usage ranges from small scale dside bar-b-que grilling to generation of power in huge coal-fired power plants. It is a fuel of choice of the k kilns in the country. Therefore, it is in high demand all over the country. Mining, quarrying & extraction will be associated with any undesirable environmental impacts. Contrarily, there are beneficial impacts on the al environment. The mining operations will not generate any pollutants, wastes or emissions. Some other sitive and significant socioeconomic benefits of the project are the opportunities of employment, training and ll development both for the professionals and for the general cadre personnel who would be employed or ose services would be hired in connection with setting-up and operation of the project. Another social benefit the project are the income prospects for large number of persons (traders, shopkeepers, suppliers, vendors, rvice providers, mechanics, artisans etc.) who would be providing goods and services during setting up and bsequently during operation of the project. In nutshell, setting up of the project can be considered as a big ep forward towards providing safer, cleaner and environment friendly fuel for the end consumers.

.12 Restoration & Rehabilitation Plans

ot any restoration or rehabilitation plans required, mainly because of the following reasons:

The project, being a coal mining activity, has been setup on a known coalmine
The site is situated away from any human settlement, villages and towns
There are no houses, shops or other structures around the mining site as might require their dislocation
There will not be acquisition of any additional private land as might involve land use change
There is not any displacement of persons or squatters over the proposed project land
There will not be displacement of any person or damage to any nearby property
There will not be any cutting or removal of trees or plantation as none exist on the site
There will not be any damage to a public infrastructure as none passes through the site
There will not be any issue of payment of cash compensation as there will not be any affected persons
Aggressive tree plantation, development of greenbelts and grassy lawns is being taken up for improving environmental ambience and aesthetics of the site

2.13 Government Approvals

Not any approval is required from any other agency or authority in respect of the proposed project except the environmental approval.

2.14 Conclusion and Recommendations

Coal is an excellent source of heat and thermal energy. Its usage ranges from small scale roadside bar-b-que grilling to generation of power in huge coal-fired power plants. It is a fuel of choice of the brick kilns in the country. Therefore, it is in high demand all over the country. Coalmines are found extensively in the Potohar region of the Punjab, which region is replete with such like mining sites. District Chakwal is famous for the coal

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s. The instant project is "Mining License for Coal over an area of 326.19 acre from a known Coalmine near K ANAR, Distt Chakwal" under a valid Lease from Mines & Mineral Department, GoPb. The extracted coal is sported and supplied to the destination points. There is no denying the fact that the coal mining operations ld be subjected to prior environmental scrutiny, as envisaged in Schedule-I of the IEE/EIA Regulations 2000, der to avoid their adverse environmental impacts, if any.

eds no mention that mining, quarrying & extraction of the coal from its source i.e., coalmines has been ssitated to ensure all time availability of coal. Coal in great and ever increasing demand by the concerned stry of the country. Coal is an excellent source of heat and thermal energy. Its usage ranges from small scale side bar-b-que grilling to generation of power in huge coal-fired power plants. It is a fuel of choice of the kilns in the country. Therefore, it is in high demand all over the country.

efore, mining, quarrying & extraction of the coal should be taken up on priority basis. The focus should be ring this cheaper energy source within the reach, access and affordability of the common man. This will ide immediate as well as long-term relief to the people. Nevertheless, concomitant to the same, respect for environment should not be compromised on this score. Environmental aspects of the project should be rded due importance in the planning, designing, setting-up and operation of such facilities. It is the duty of lessee/proponent to ensure that establishment and operation of such like new setups do not affect the ironment in an adverse manner. The lessee/proponent should further ensure that implementation of the ject does not bring about unfavourable land use changes, large-scale exploitation of the natural resources, irreversible pollution of the air, water and the soil environments from emissions, effluents, solid wastes and er substances released during setting-up and the subsequent operation phases of the project. It is therefore erative that before taking up implementation of any such like project, the project is subjected to optional ironmental Impact Assessment, as envisaged under the Punjab Environmental Protection Act 1997. The ective of the EIA should be to ascertain the adverse impacts relating to both setting-up and operation phases to provide for remedial measures, wherever required and indicated in the best interest of the local and the ional environment.

far as the instant project is concerned, there are not any adverse or negative environmental impacts of the ject, whatsoever. The identified foreseeable environmental impacts are insignificant. They are controllable implementing the proposed mitigation measures and by complying with the environmental laws of the ntry. In the instant case, implementation of the environmental mitigation measures and the guidelines, as e been given in this document, are expected to bring down the negative environmental impacts of the project hin the fold of the acceptable limits. Nevertheless, to ensure the long-term environmental sustainability of project, institutional arrangements must be put in place, which effectively control the undesirable impacts during the implementation phase and the subsequent operational life of the project.

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3. ENVIRONMENTAL PROFILE

Baseline Environmental Settings

cription of the environmental settings (also referred to as "baseline", "existing", "background", or "affected ironment") is an integral part of an environmental impact/environmental examination study. There are two or purposes of describing the environmental settings in an impact study, namely:

o ascertain and evaluate the existing environmental quality, as well as environmental impacts of the lternatives being studied, including the no-action or no-project alternatives, and
o identify environmentally significant factors or geographical areas that could preclude the development of given alternative or alternatives

ditional purposes of describing the baseline settings include, but are not limited to, provision of sufficient ormation so that the decision makers and the study reviewers, who might be unfamiliar with the general ation, may develop an understanding of the project needs and environmental characteristics of the area.

e of the significant environmental impacts of a developmental scheme could be the likely changes in the land e profile. If implementation of a developmental scheme involves massive conversion of agriculturally useful nd into agriculturally or otherwise less useful lands or leads to deterioration of the ecological environment by bstantially altering the land use pattern in a manner, which is less favourable for propagation of agriculture, en the resultant impacts can be labelled as deleterious and harmful for the environment. Conversely, if a evelopmental scheme envisages very little or negligible changes in the existing land use scenario or the new nd usage is of superior nature, then the development is regarded an environment friendly activity to the extent this parameter.

would not be out of place to mention here that usually the format of an EIA/EIA is either project specific or rea specific or a combination of both. Because of the nature of the project being a mining activity, the instant IA has been prepared according to the combination format. The baseline environmental conditions, therefore, ave been described according to this format approach. The text following hereafter contains a description of he baseline characteristics of the area and the project district, wherever relevant.

3.1 Studies and Surveys for Baseline Profile

The Consultant's Professional Team in conjunction with the lessee/proponent and other concerned agencies undertook various studies and surveys relating to the project, such as:

- Studies and investigations into the baseline environmental profile of the area, where relevant
- Physical, geological, hydrological, and topographic environmental surveys of area, where relevant
- Socioeconomic surveys of the area, where relevant
- Surveys about education profile and services in the area, where relevant
- Soil quality surveys and investigations, where relevant
- Water quality investigations and analyses
- Ambient noise profile in the vicinity of the site
- Social study surveys
- Surveys and interactive meetings with the neighbouring populations to know their understanding of the project and to solicit their specific concerns over the project, if any

The objectives of the social study surveys were:

- Finding out impacts of the project on education, health, hygiene, lifestyle and social value system of the workers and inhabitants within the project's zone of influence
- Any probable dislocation of the persons and property and removal of encroachments, if any from project's implementation, expansion or operation
- Assessing the prospects of employment and job opportunities and impacts on the economic portfolio of the beneficiary population in the area
- Ascertaining likelihood of cropping up of any social conflicts and sources of frictions with the neighbouring community or the locals
- Finding out any sources of social and physical nuisances for the project or the local community

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above-mentioned studies included visits and physical surveys of the sites and the nearby populations within dius of 1 km from the project. The social surveys were carried out through random selection of the eficiaries and the stakeholders. The nearby residents and the businesspersons, being the important eholders, were consulted in particular to solicit their views over various aspects of the activity. Direct rviewing and soliciting the requisite information by asking short questions was found the best mode of ting the requisite information. The collective public gatherings were found another effective mode of uring the requisite information. By and large, the stakeholders and the persons, who were consulted during study, appreciated the project and welcomed implementation of the project as beneficial to them from all les and aspects.

Environmental Description of the Area

the purpose of environmental description, a circular area upto 0.1 km from centre of the site was taken as project's assumed zone of environmental influence (**Plate 3.3**). The site is bound all around by wide open ant lands owned by various landowners except on the north, on which side, it touches the approach road to site. There is no human settlement within 0.5 km radius of the proposed site. The site is bounded on all sides pen space except on the north, on which side it joins the approach road. The geographical spread of the esite consists of Six points from Point-A to Point-F, which match with the below given geographical rdinates (**Table 3.3**).

Table 3.3: Location Coordinates of the Site

Point	Easting (Yards)	Northing (Yards)
A	3195204.01	0947726.31
B	3196129.75	0947254.39
C	3196321.77	0948123.07
D	3196321.77	0948461.40
E	3197344.07	0948515.34
F	3195828.00	0948872.88
Total Area: 326.19 Acres		

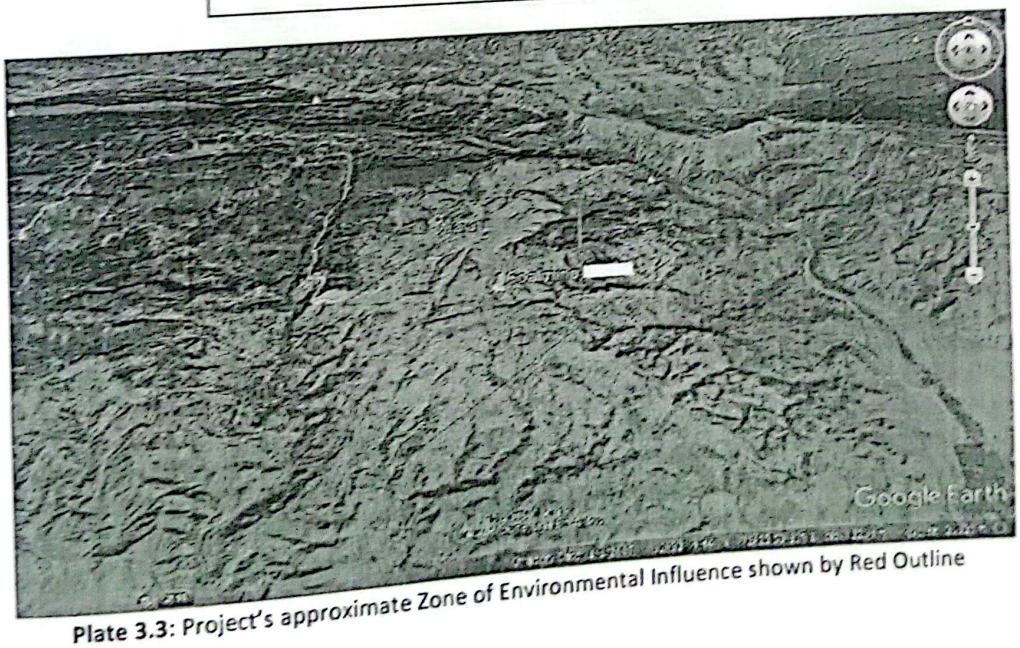


Plate 3.3: Project's approximate Zone of Environmental Influence shown by Red Outline

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eophysical Environment

ophysical environment is that part of the overall environmental profile of an area that relates to the ical and physical entities in the area under study, the assumed radius of influence of the project in the case. Amongst number of parameters, the description of the geophysical environment includes larly the narration of the site, location of the site, geology, hydrology, meteorology and atmospheric es of the site and the surrounding areas.

Introduction to the District & Tehsil[2]

al District (Punjabi and Urdu: ضلع چکوال) is in Pothohar Plateau of Punjab, Pakistan. It is located in the of the Punjab province, Chakwal district is bordered by Khushab to its south, Rawalpindi to its north helum to its east, Mianwali to its west and Attock to its north west. The district was created out of parts lum and Attock in 1985. Chakwal district covers an area of 6,524 square kilometres.

wal district has an extreme climate, with a long, hot summer season and cold, dry winters. Summer lasts May to September and winter lasts from November till February. June is the hottest month with average eratures of 42 °C (highest recorded temperature 52 °C); in winter, December and January monthly average eratures can be as low as 3 to 4 °C. The average rainfall in the district is about 385 mm.

ancient history of Chakwal is not very much known. The real historical representation of Chakwal Region is r than 900 AD but the true accuracy is traced to the arrival of Qutb Shah in 1090 AD in this region who in years of his conquest allowed his sons to settle and further rule the region.

ing British rule, Chakwal was a tehsil of Jhelum district, the population according to the 1891 census of India 164,912 which had fallen to 160,316 in 1901. It contained the towns of Chakwal and Bhaun and 248 villages. land revenue and cesses amounted in 1903-4 to 3–300,000.[3] The predominantly Muslim population ported Muslim League and Pakistan Movement. After the independence of Pakistan in 1947, the ority Hindus and Sikhs migrated to India while the Muslims refugees from India settled down in the area of kwal later it was upgraded as a District on 1st of July 1985.

er independence of Pakistan in 1947, many Muslims from India migrated to and settled in district Chakwal. e predominantly Muslim population of the district supported the All India Muslim League and Pakistan vement. After the independence of Pakistan in 1947, the minority Hindus and Sikhs migrated to India while e Muslim refugees from India settled in Chakwal. Sheikh, Sayed, Qazi, Japaa, Bala, Chadhar, Haral, Sangha, okhar, Lali, Sipra, Nesoana, Rehan, Wallahrai and Khundowaa tribes are the leading tribes of the district. cording to the 1998 census of Pakistan, the district had a population of 1,057,000, of which 21% resided in ban settlements. The first languages spoken were Punjabi (74% of the pulation), Saraiki (12%), Pashto (10%) and Urdu (3.5%).

he southern portion runs up into the Salt Range and includes the Chail peak, 3,701 feet (1,128 m) above the ea, the highest point in the district. Between this and the Sohan river, which follows more or less the northern oundary, the country consists of what was once a fairly level plain, sloping down from 2,000 feet (610 m) at the ot of the hills to 1,400 feet (430 m) in the neighbourhood of the Sohan; the surface is now much cut up by avines and is very difficult to travel over.

Chakwal was created as an independent district of Rawalpindi in 1985 by combining sub division Chakwal of district Jhelum, sub division Talagang of district Attock and the police station Choa Saidan Shah, carved out of sub division Pind Dadan Khan of district Jhelum. At the start, the district was divided into three tehsils, Chakwal and Choa Saidan Shah & Kallar Kahar. According to the last general Census of 1998, the total population of Chakwal district was 1.496 M. The population density of the district is quite low and has been recorded as 139 persons per square kilometre. The male to female ratio is 99:100. Administratively, District Chakwal is subdivided into four tehsils, namely:

[2] Wikipedia
[3] Punjab Sustainable Development Strategy, EPD, Final Report, 2008

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1. Chakwal
2. Choa Saidan Shah
3. Kallar Kahar
4. Talagang
5. Lawa

tes 3.4.1a to 3.4.1b show geographical map of the Punjab and location of the district with respect to other tricts in the province.

3.2 Location of the Site

e site is bound all around by wide open vacant lands owned by various landowners except on the east, on ıich side, it touches the approach road to the site. There is no human settlement within 0.5 km radius of the oposed site. The geographical spread of the minesite consists of Six points from Point-A to Point-F, which atch with the below given geographical coordinates **(Table 3.4.2)**.

Table 3.4.2: Location Coordinates of the Site

Point	Easting (Yards)	Northing (Yards)
A	3195204.01	0947726.31
B	3196129.75	0947254.39
C	3196321.77	0948123.07
D	3196321.77	0948461.40
E	3197344.07	0948515.34
F	3195828.00	0948872.88
Total Area: 326.19 Acres		

3.3.3 Geography

Barring the side, which faces the road, the entire site is bound all around by vast open lands. In fact, the site is located in vast open countryside. The site is not surrounded by any built-up areas. Similarly, there are no residential settlements, commercial properties, shops, educational buildings, healthcare establishments, graveyards, shrines and places of worship etc. within the project's radius of influence. **Plates 3.4.3a & 3.4.3b** presents geographical disposition of District Chakwal with respect to other districts of the province.

3.3.4 Topography

Topographically, the site, being a contiguous part of the surrounding lands, falls in the sub-montane zone of the Hindukash foothills. This zone is characterized by flat lands mixed with some dry areas called bars. Topographically, the area around the site forms a part of the wider system of Indus floodplains. The site exhibits the features typical of the flat but undulated floodplains of the central west Punjab. The site as well as the wider floodplains around are devoid of any significant topographic features. The relief of these flat floodplains has therefore facilitated large-scale cultivation, development of an extensive irrigation network, construction of roads, railways and other infrastructure. The wider area around the site exhibits the same very topographic features, which are typical of the floodplains of the region. The general surface gradient in the region is from north to south and from west to east with an extremely gentle slope of 0.2 to 0.3 m per kilometre[4]. According to the Google map imagery, elevation of the site is 1685' above the mean sea level[5]. The most important natural surface water channel of the area, besides some hill torrents, is river Dor. Under the Indus Water Treaty, waters of three eastern most rivers of the Indus have been given to India and the remaining three eastern rivers to Pakistan. There are a few irrigation channels, spread all over the wider area. There is not any significant wastewater drain near the site. Apart from the above-mentioned aspects, the area does not exhibit any other special physical, geological and geomorphologic features.

3.3.5 Geology

Geologically, the lands at and around the site, being a part of the wider area are mantled lightly with alluvial deposits. The mighty Indus and its tributary rivers have transported these deposits down from the Himalaya foothills to the floodplains of the Punjab over the centuries. The underlying bedrock is composed of Precambrian to Metamorphic and Tertiary consolidated rocks. The overlying alluvium consists of Pleistocene to recent unconsolidated deposits of sand/gravel, clay and silt. The formation age of the alluvium dates back to Pleistocene to recent, the latter being predominant near the riverbanks and the former around central part of the plains[6].

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Seismology

ding to the Seismic Survey Map of Pakistan, District Chakwal falls in the seismic zone, which has the seismic
y equivalent to zone "2B" of the Earthquake Zones Classification of the United States Uniform Building
1997 (UBC-97). This zone is associated with unknown geological conditions and the reported earthquake
ge is "moderate". Nevertheless, earthquakes of magnitude up to five on the Richter scale, which generate
d acceleration up to 0.1 g, have been reported for this zone[7]. No major earthquake has been reported in
istrict during past two decades[8]. According to the Pakistan Building Code 2007, district Chakwal falls in
e[9] of the seismic zoning map of Pakistan. This zone has very low seismic activity.

Soil Morphology

eir very nature and composition, the soils at the site, which are contiguous with the soils of rest of the
t, are granular to amorphous mix of sand, silt, clay and loam. The texture, morphology, and moisture
ng capacities of these soils show some intrinsic variations as one travels from north to south and from east
st. The soil crust is composed of alluvial deposits consisting of silt, clay, sand, and loam. Clay and silt
ations occur in discontinuous layers with limited lateral extent. Their thickness is generally less than five
ns[10]. Because of the presence of a rich surface irrigation network, the overall fertility and the per acre yield
e soils is reasonably good[11].

Surface Hydrology

Jhelum is the major surface water channel of the area and is located far off the project site. Under the
s Water Treaty of 1965, waters of the three eastern rivers of the country (Ravi, Beyas, and Sutlej) have been
to India, whilst those of the western rivers (Indus, Jhelum and Chenab) have been given to Pakistan.

r Jhelum is a large eastern tributary of the Indus. It drains areas west of Pir Panjal separating Jammu and
mir. The Jhelum rises from the spring of Verinag, on the northwestern side of Pir Panjal and flows in a
ction parallel to the Indus at an average elevation of 5,500 feet. It drains about 2,300 square miles of alluvial
s in the Kashmir Valley and gets water from various important sources including glaciers located in the north
e valley. The river first flows through Dal Lake and then an even bigger lake, Wular Lake, into which it drops
se grades of sediment. On emergence from the Wular Lake near Baramula, it runs through an eighty-mile
gorge at an average slope of 33 feet per mile. At Domel, near Muzaffarabad, the river is joined by its largest
utary, Neelum (earlier called the Kishan Ganga), which drains about 2800 square miles of hilly area lying on
eastern side of the Nanga Parbat. The Neelum drains Himalayan ranges between 15,000 to 20,000 feet high
t are perpetually covered by snow and glaciers. In the lower reaches, the 150- mile long river flows through
untainous country covered by forests.

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ological Features of Punjab, Lecture Notes, Dr. M Nawaz Ch., Punjab University Lahore
o-sheet of District Chakwal, Survey of Pakistan, 2007
ological Survey of Pakistan <www.gsp.com.pk>
ological Survey of Pakistan <www.gsp.com.pk>
ological Survey of Pakistan, www.gsp.gov.pk
://www.pec.org.pk/buildingcode.aspx
unjab Sustainable Development Strategy, EPD, Final Report, 2008
unjab Sustainable Development Strategy, EPD, Final Report, 2008

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e miles below the Thal Canal, the Canal, another tributary, joins the River Indus, draining nearly 1,080 square les of the famous Kaghan Valley. Sources of River Kunar lie at about 15,000 to 17,000 feet above sea level. Its total length of about a 100 miles are situated in the hills where it falls at nearly 120 feet per mile, forming numerable rapids and flowing through the Lalusar Lake. One of Kunar's tributaries also flows through the mous Saif-ul-Maloock Lake. From Domel to Mangla, a distance of about 90 miles, two streams, the Kanshi and onch join the River Jhelum. The Kanshi is a floodwater stream draining eroded areas of the Jhelum and walpindi districts. This stream carries mainly monsoon rain or seepage water. The Poonch is an important eam joining the Jhelum at Tangrot, about seven miles above Mangla. The site where the two rivers meet, used be a famous fishing spot but now lies within the storage area of the Mangla Dam. The Poonch drains the uthern sides of Pir Panjal, which ranges between 10,000 to 12,000 feet in height and becomes snow bound uring winter. Its catchment area of 1,520 sq. miles is partly covered by forests. The river flows through hilly untry for its entire length of 80 miles and drains areas of Poonch, Kotli and Mirpur.

he Mangla Dam has been constructed near the head regulator of Upper Jhelum Canal. From Mangla down to asul, several floodwater streams drain into the Jhelum. The Kahan Nullah is nearly forty miles long and drains he Rohtas area, where an auxiliary storage of Mangla Dam was considered. Suketar, Jabe Kas and Bunha are hree of the many floodwater nullahs that drain into the Jhelum, through a level crossing of Upper Jhelum Canal.

he pollution of the surface waters in Pakistan is assuming serious proportions, because of discharging of the ntreated industrial and municipal effluents into the nearby rivers with impunity. This problem is more onspicuous in case of the eastern rivers because of lesser volume and lower level of the flowing water. The dilution of the poured-in untreated raw sewage waters, especially near the city section reaches is therefore quite lower. As a result of the unscrupulous pouring in of the effluents, the water quality of the rivers has been deteriorating. The canals are also not saved from this nuisance of direct pouring of the raw sewage. There are number of illegal sewage outlets opening directly into the canals and polluting their waters. **Plate 3.4.8** presents layout of the Indus basin system & **Table 3.4.8** presents typical quality of the surface waters in the wider area.

Table 3.4.8: Surface Water Quality of the Area/Site

Sr.	Parameter	Unit	Results
1.	Alkalinity	m.mol/l	7.11
3.	Calcium	mg/l	50
5.	Hardness	mg/l	375
7.	Nitrate	mg/l	1.69
9.	Sulphates	mg/l	121
11.	Turbidity	NTU	0.8
13.	Total coliform	In 100 ml	5 – 8

Sr.	Parameter	Unit	Results
2.	Bicarbonates	mg/l	369
4.	Chlorides	mg/l	51
6.	Iron	mg/l	0.07
8.	Phosphate	mg/l	0.28
10.	TDS	mg/l	780
12.	pH	–	6.9
14.			

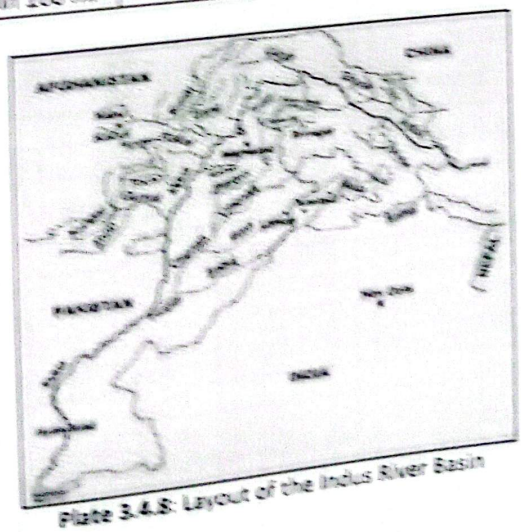


Plate 3.4.8: Layout of the Indus River Basin

3.4.9 Groundwater

ing to its location near hill torrents, the rate of groundwater recharge through downward infiltration in the a, including the site itself, is fair. The water table at the site is at a depth of around 50~60 metres[12]. The neral quality of the groundwater of the site/area is satisfactory and conforms to the WHO Guidelines for table water.

oundwater at the site, like the wider area of the district, is in flux with the recharge occurring from infiltration the nearby torrents as well as from the surface precipitation. The instant torrent is the major source of harge of groundwater in particularly after heavy rainfalls and floods. Owing to the natural east to west pographical gradient, the groundwater of the region and that of the site per se exhibits the flow characteristics nformant to area's topography. As per water quality inspection, the groundwater is of good potable and igable quality with no visible impurities.

overnment has installed reasonable number of tubewells in the district for abstraction and supply of oundwater to domestic and commercial consumers. As there is deficiency of the canal irrigation water, many the landowners in the area have installed their own tubewells privately for abstracting groundwater to cater r their irrigation water needs. The number of existing tubewells and the pace of groundwater abstraction hibit the aquifers to be of reasonable reserve. It is pertinent to mention that tubewell irrigation is the second ajor mode of irrigation in the province. According to "Agricultural Statistics of Pakistan", irrigation by tubewells ccounts for nearly 30% of water consumption for agriculture[13].

ccording to Bureau of Statistics, Government of Punjab, there exist 12,175 tubewells in the district. The number f tubewells was around 4,330 in early eighties. Thus, tubewells have approximately trippled in about 40 years[14]. he proposed site and its surrounding areas are both rainfall and tubewell irrigated. According to ydrogeological mapping of the area, the groundwater yield in the vicinity of the site varies between 30-50 m^3/hr lown to the 150m and the aquifer is moderately thick and extensive[15]. **Tables 3.4.9a, 3.4.9b & 3.4.9c** present espectively the number of tubewells, typical groundwater quality, and microbiological quality of the groundwater of district Chakwal [16].

Table 3.4.9a: Number of Tubewells in District Chakwal

Total			Diesel			Electric		
Private	Govt	Total	Private	Govt	Total	Private	Govt	Total
10330	112	10442	9968	0	9968	362	112	474

Table 3.4.9b: Groundwater Quality of the Site

Sr.	Parameter	Unit	WHO Desirable Level	WHO Max Permissible Level	Results
1.	Temperature	--			30°C
2.	pH	--	7.0~8.5	6.5~9.2	6.9
3.	Odour	P.C.U	Unobjectionable		Odourless
4.	Colour	--	05 Units	50 Units	Colourless
5.	Taste	NTU	Unobjectionable	Unobjectionable	Tasteless
6.	Turbidity ppm Silica Units	--	05 Units	25 Units	--
7.	Total Dissolved Solids	ppm	500	1500	815
8.	Calcium as Ca^{++}	ppm	75	200	80
9.	Magnesium Mg--	ppm	50	150	53
10.	Total hardness as $CaCO_3$	ppm	100	500	410
11.	Total alkalinity as $CaCO_3$	ppm			300
12.	Sulphate as SO_4^-	ppm	200	400	180
13.	Chloride as Cl^-	ppm	200	600	99
14.	Conductivity at 25°C	µs/cm			1160

Table 3.4.9c: Microbiological Quality of Groundwater of the Site

Sr.	Parameter	Results

[12] Geotechnical Investigations of the project
[13] Agriculture Statistics of Pakistan, Ministry of Agriculture, Islamabad, 2017
[14] Punjab Development Statistics, Bureau of Statistics, GoPb, 2017
[15] Hydrogeological Map of District Chakwal, WAPDA, 2017
[16] Punjab Development Statistics, Bureau of Statistics, GoPb, 2017

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1.	Total plate count/ml	--	2.	Total coliforms (MPN/100 ml)	--
3.	Faecal coliforms (MPN/100 ml)	--	4.	E. coli (MPN/100 ml)	--

3.10 Meteorology & Climate

he site, being part of exhibits a hot and dry climate with low rainfall like rest of the district[17]. According to eteorological profile of the area, summers are generally hot with moderate humidity, whilst winters exhibit xtreme cold. Spring and autumn seasons are the most pleasant parts of the year. The mean winter temperature December/January) ranges between 10.5°C to 14.5°C. The mean summer temperature remains around 35°C to 7°C with spikes crossing 40°C. The mean of the maximum temperature ranges between 29- 30°C and mean of he minimum from 15-16°C[18]. Approximately 50 percent of the average annual rainfall occurs during monsoon n the months of July and August[19].

he past climatic records indicate that rain rich years have been occurring at a cycle of 15-20 years with ntervening dry period[20]. The site being a part of the floodplains of central Punjab, the general climatic pattern s characterized by a dry climate except during monsoon whence humidity level in the air is high. There occurs profuse rainfall during the monsoon season with substantial precipitation (approx. 50% of annual total) occurring n July and August. The average annual precipitation of the district for the past 10 years (2005~2015) has been around 229 mm. The wind flow is gentle during most of the year with occasional and sporadic dust storms during peak summer. The rate of evapotranspiration in the built-up areas, for example, the city and the surroundings is lower, compared to the open grassland/cropland in the periphery of the built-up areas. **Table 3.4.10** presents typical meteorological features of the district[21].

Table 3.4.10: Climatic Features of the Site/Area

Sr.	Parameter	Value	Sr.	Parameter	Value
1.	Classification of Climate	Hot humid (Tropic)	2.	Wind Direction	East/Southeast
3.	Wind Intensity	Weak to moderate	4.	Average Rainfall (annual)	<229 mm
5.	Rainy Season Duration	July to September	6.	Dry season Duration	October to June
7.	Average Temp (Annual)	19-20 °C	8.	Average Temp (Summer)	36-38 °C
9.	Average Temp (Winter)	6.5-10.5 °C	10.		

3.4.11 Air Quality

The entire site is located amidst the vast open lands in rural settings. Because of this disposition, the air quality profile is reasonably good with a low level of airborne dust and pollutants. However, fugitive dust levels are a bit higher on and near the highly trafficked roads than the surrounding open lands. There is no smoke emiting industry, brick kilns or other stationary source of stack emissions within the site's zone of environmental influence. Hence, there is no stack emission from any such sources in the said zone of environmental influence of the site. At the time of visit inspection of the site, the general atmosphere at the site was clear from particulate dust and was of good visibility.

When talking on national scale, the air quality profile of the country, particularly that of some major urban centres show concentrations of some of the air quality parameters higher than the WHO Guideline Values as well as those prescribed under the Provincial Environmental Quality Standards (PEQS). According to a joint air quality investigation report of the major districts in the country by the Pak-EPA and the Japan International Cooperation Agency (JICA), the average suspended particulate matter (SPM) in the study districts was 6.4 times higher than WHO Guideline Values. The levels of sulphur dioxide, carbon monoxide, and oxides of nitrogen also exceeded the acceptable standards in some areas, but the average levels were below the Guideline Values[22]. Another similar study revealed higher concentrations of SPM in the ambient air[23]. However, barring the congested urban centres, the air quality in rest of the province generally conforms to WHO Guideline Values[24]. **Table 3.4.11** presents typical air quality profile of the district, which has been used as the benchmark, because the air quality profile of the site by EPA is not available[25].

[17] Meteorological Profile of Punjab, Pakistan Meteorology Department, Lahore, 2017 (soft copy)
[18] Meteorological Profile of Punjab, Pakistan Meteorology Department, Lahore, 2017 (soft copy)
[19] Meteorological Profile of Punjab, Pakistan Meteorology Department, Lahore, 2017 (soft copy)
[20] Meteorological Profile of Punjab, Pakistan Meteorology Department, Lahore, 2017 (soft copy)
[21] Meteorological Profile of Punjab, Pakistan Meteorology Department, Lahore, Rawalpindi, Islamabad), JICA/Pak-EPA, 2001
[22] 3-Cities Investigation of Air and Water Quality (Lahore, Rawalpindi, Islamabad), JICA/Pak-EPA, 2003
[23] 2-Cities Investigation of Air and Water Quality (Gujranwala and Faisalabad), JICA/Pak-EPA, 2003
[24] Air Quality Monitoring in Six Districts of Punjab using Physico-Chemical Techniques, EPD, GoPb, 2005
[25] Air Quality Monitoring in Six Districts of Punjab using Physico-Chemical Techniques, EPD, GoPb, 2005

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Table 3.4.11: Ambient Air Quality Profile of the Area

Parameter	Ozone (ppb)	SO_2 (ppb)	NOx (ppb)	NO (ppb)	CO (ppm)	Dust ug/m³	Humidity (%)	Wind speed (m/s)
Conc.	5.9	10.8	42.0	30	8	395.7	23-35	1.0-2.1

3.4.12 Effluent Disposal

According to Pakistan Economic Survey[26], availability of underground sewerage in the country is deplorable. Barring some major towns, there is hardly any proper sewerage and sanitation system in particularly so in rural areas. Hence, disposal of the domestic effluents in the rural areas outside the municipal limits of the cities and towns is not very satisfactory. Similarly, there is hardly any separate and dedicated system for handling the storm water. Because of non-availability of the storm water channels, the rainwater and the storm water usually make their own ways out to the nearby drains. The site itself is devoid of water supply, effluent disposal and sanitation system.

3.4.13 Background Radiological Characteristics

There are no known background radiological characteristics along and around the site. The X-ray machines, scanners and the radiotherapy equipment installed at the healthcare establishments and the biomedical facilities at major towns in the district do have radioactive sources installed in them. However, the quantum of emission of radioactivity from these sources is negligible and does not contribute much towards the background ambient radioactivity levels[27]. Because of its rural disposition, there is no likelihood of any background radiological characteristics at or near the site and the immediate surroundings.

3.4.14 Ambient Noise Characteristics

The ambient noise levels in the district and the site vary from place to place and from time to time. Generally, levels of the ambient and background noise in our settings are higher during the peak hours. Vice versa, the ambient noise levels are higher at the busy road junctions, near industrial establishments, commercial concerns and educational institutions during evening and late morning.

Table 3.4.14b: Expected Noise Level at Different Project Locations

Sr.	Location	Noise Level (dB)
1.	Active Construction Zone	75-80
3.	Loading/Unloading Areas	70-80
5.	Parking Area	40-50
2.	Offsite Areas	70-75
4.	Office/Support Facilities	50-70
6.	Residential Areas	60-75

Table 3.4.14c: Noise Annoyance Levels for Resident Communities

Day-night average sound level (dB)	Hearing Loss	Average Community Reaction (Likely)	Significance
75 and above	May begin to occur	Very severe	Noise is likely to one of the important adverse aspects of the community environment
70	Will not likely to occur	Severe	-do-
65	Will not occur	Significant	-do-
60	Will not occur	Moderate to slight	-do-
55 and below	Will not occur	Un-noticed	-do-

3.4 Ecological and Biological Environment

The ecological and biological environment of an area is considered prone generally to large-scale developmental schemes. The disturbances and imbalances in the ecological and or biological environment can affect the biodiversity features of an area adversely. The biodiversity of an area reflects generally the abundance and richness of the biological and or the ecological resources. The subsections hereunder contain discussion of the important impacts of the setting-up and operation of the project on the eco-biological environment as well as on the biodiversity characteristics of the area.

3.4.1 Forests, Habitat, and Ecologically Sensitive Areas

The site per se, because of its location in the rural landscape, is devoid of any specific species of flora or fauna. Nevertheless, one comes across number of self-grown as well as planned plantation of trees in the area and along the water channels. Almost all the trees are of indigenous varieties like kikar, shisham, beri, bargad, jaman, toot, and sufeda. The Iron Ore mining activities under the project will not involve cutting and removal of any trees or green plants. There are no major forest plantations within the assumed zone of environmental influence

of the site except some planned linear roadside plantation. There also are no horticulture parks, wildlife sanctuaries and planned gardens along or around the site. The linear plantations along the roads, railway tracks and water channels constitute as the major floral resources of the wider area[28]. There are no sensitive bio-receptors at or near the site.

It may be mentioned as a passing reference here that owing to persistent human interventions over centuries, the existing natural habitat of the area, as it exists today, is largely a modified form of the original habitat of the tropical thorn forests. Construction of an extensive irrigation network during the early 20th century paved the way for transformation of the tropical thorn forests into agricultural lands. This has led to a changed landscape and loss of wildlife. The predominant habitat of Chakwal is the Tropical Bushy Forest[29].

3.4.2 Local Flora

Apart from some scanty trees along the water channels, there are no large-scale plantations in and around the site. The predominant species of the flora at the site include shisham (*dalbergia sissoo*), eucalyptus, silver oak, kikar (*acacia nilotica*), jand (prosopis spicigera), karir (capparis aphylla), beri (zizyphus jajaba), van (salvadora abeoides) and akk (calotropois hamiltonit). Additionally, some wild varieties of self-grown grass species are found along some poorly maintained watercourses. There are no horticulture, and or wildlife parks and planned gardens near or around the site. some common forms of weed, bush and the self-grown endemic species of plants are found in the open agricultural lands.

3.4.3 Local Fauna

There is no specific fauna indigenous either to the site or even to the wider area within the radius of influence of the site. Similarly, there are no species of aviary, aqua, or wildlife indigenous, resident or migratory to the site. As such, the biodiversity features of the site are insignificant. Some common forms of reptiles, mammals, and rodents are seen occasionally in the open countryside. Rarely, wild boar, jackals and fox are seen in thick plantations or sugarcane crops. **Table 3.5.3** presents names of some common flora and fauna of area alongwith botanical and zoological names. **Plates 3.5.3a and 3.5.3b** present the wildlife distribution and ecological resources of the Punjab[30].

Table 3.5.3: Some Common Flora & Fauna along with Botanical & Zoological Names

Sr.	Common / Local Name	Botanical Name
1.	Jand	Prosopis spicigera
2.	Van	Salvadora obeoides
3.	Peelu	Salvadora Percica
4.	Keekar	Acacia Nilotica
5.	Shisham	Dalbergia
6.	Baqain	Azadrachta indica
7.	Shreen	Albizzia Lebeck
8.	Popular	Popules deltoids
9.	Sufeda	Euclyptus canaldulensis
10.	Pippal	Phycus Religiosa

Sr.	Common / Local Name	Zoological Name
1.	Geedarh	Cannis aurius
2.	Sayyarh (Khargosh)	Lepus capensis
3.	Percupine (Seh)	Hysterix Indica
4.	Black partridge (Teetar)	Electoris melanocephala
5.	Eagle (Cheel)	Mitrus migrans
6.	Vultures (Giddh)	Gyps futros
7.	Bulbul	Pycnonodus xynthopygos
8.	Pigeon (Kabootar)	Treron waalia
9.	Dove (Fakhta)	Streptopilia roseogrisera
10.	Ducks (Batakh)	Anas spp

(Source: Forestry and Wildlife Department GoPb, 2017)

3.4.4 Protected and Ecologically Sensitive Areas

There are no notified wildlife sanctuaries or ecologically sensitive areas near or around the site[31].

3.5 Socio-Cultural Environment

The sociocultural environment represents the demographic features, social traditions, cultural practices, economy and the lifestyle value system of the area. The pertinent features of socioeconomic environment of the area/district have been highlighted in this subsection.

3.5.1 Demographic Profile

The existing status of population count of the site is not known because of non-availability of the pertinent information and data. Therefore, demographic profile of Chakwal has been used as an alternative for ascertaining the baseline conditions pertinent to this aspect. The population of the district, which was 1057 thousand in the 1998 Census, is now crossing over 1407 thousands[32]. The average rate of population growth of the district is 2.96 percent per annum[33]. With the existing growth rate, the population is expected to double by 2025. The urban population is 20.8% and the rural population is 79.2%. Overall sex ratio is 101 males per 100 females[34]. The population density is 181 persons/km^2. The city of Chakwal has considerably expanded during the

recent years. The sign of expansion are visible around the cities, where agricultural lands interpose with new constructions, inhabitations, and farmhouses[35]. **Table 3.6.1** shows demographic profile of Chakwal.

Table 3.6.1: Demographic Profile of District Chakwal

Tehsil	Area (km²)
Chakwal	3120
Talagang	2022
Kallar Kahar	953
Choa Saiden	473
Lawa	977
Total	**6524**

(Source: Punjab Development Statistics, Bureau of Statistics, GoPb, 2017)

(Thousands)

3.5.2 Land Use/Agricultural Profile

The land use pattern at or around the site, per se, is typical of the open country lands marked by agricultural fields with mixed disposition of villages and rural dwellings. However, due to pressures of the ever-growing population, the hitherto uninhabited areas are changing fast into residential areas. The land use status of the areas near the major roads is fast changing into residential and industrial usage. Because of this shift in the land use profile, the agricultural lands now interpose with built-up areas, inhabitations, farmhouses and miscellaneous constructions etc.

Owing to its location and importance, Chakwal has expanded tremendously. Resultantly, there has been a marked shift in the land use in the district from agricultural to residential, commercial and industrial categories and from open lands into built-up structures. This change is continuing with an enhanced pace, particularly in the peripheral rim around the big towns. Whereas, land use profile in the major towns is predominantly that of permanent and fixed structures, it is of mixed type in the suburbs and along the outer rim of the main towns, where agricultural lands still interpose with new fixed developments, constructions and inhabitations.

Despite industrialization, agriculture and the agriculture dependent pursuits are still the predominant economic activity of the district. District Chakwal is famous for the production of wheat, fruits and fodder. There are large agricultural farms that produce vegetables and fruits. Sericulture, horticulture, and aviculture are also gaining popularity. Investments in honeybee- sheep-, goat-, fish-, poultry, and dairy farming are also increasing. The major seasonal crops include wheat, rice, maize, and vegetables. Other agricultural products include fodder, fresh vegetables and lattice[36].

The reported area of district Chakwal is 578,000 hectares, out of which 377,000 hectares is cultivated land. Out of the cultivated area, 307,000 hectares is the net sown and 70,000 hectares is the fallow[37]. Area under forest cover is 16,000 hectares. The cropped area is 340,000 hectares and the area not available for cultivation, i.e., partly occupied by fixed structures, buildings, roads is 48,000 hectares.

The principal modes of irrigation are the surface channels supplemented by tubewells. Rainfall accounts only for a small proportion of the irrigation supplies. The major seasonal crops are wheat, rice, maize, and vegetables. Other agricultural products include fodder, fresh vegetables and lattice[38]. Sericulture, horticulture and aviculture are also a flourishing agriculture related activity. Honeybee farming is also a growing trade. Sheep, goat, fish and poultry farming are also gaining popularity. **Tables 3.6.2a & 3.6.2b** present respectively the land use profile and production of main vegetables in district Chakwal [39].

Table 3.6.2a: Land Use/Agricultural Profile of District Chakwal

Reported Area	Cultivated Area	Net Sown	Current Fallow
654	468	30	468

(Source: Punjab Development Statistics, Bureau of Statistics, GoPb, 2017)

(Thousand hectares)

Table 3.6.2b: Production of Main Vegetables (2014-15 to 2016-17)

Vegetable	Production (m. tons)		
	2014-15	2015-16	2016-17
Potatoes	75699	67304	62733
Carrot	11533	11589	15676
Cauliflower	5786	6047	6352
Turnip	3166	3376	3434
Ladyfinger	2867	2985	3396

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Onion	2874	2318	1792
Tomato	974	784	694

Source: Punjab Development Statistics, Bureau of Statistics, GoPb, 2017)

3.5.3 Industrial Profile

There is not any industrial unit in the zone of influence of the site. According to the survey status of the industry, conducted by the Directorate of Industries and Mineral Development Department Punjab, there are 329 industrial units operating in district Chakwal. Currently, the district presents a mix economy of industrial, agricultural, services commercial sectors and the expatriates' income. The pace of industrialization in district Chakwal has remained impressive primarily because of its proximity to Lahore. There are number of small to medium industrial estates in both districts but more so in district Chakwal. Chakwal Chamber of Commerce & Industry (KCCI) is the main hub of industrial economic activities in the district. The district has over 77 small to large industrial and cottage units absorbing an average daily labour force of 4,300 persons[40]. **Tables 3.6.3a & 3.6.3b** present glimpses of industrial profile of the district[41].

Table 3.6.3a: Census Statistics of Manufacturing Industry

District	Census Year	No. of Factories	Avg. Daily Employment	Gross value of industrial production
Chakwal	2015-16	110	12,628	64,625 M

(Source: Punjab Development Statistics, Bureau of Statistics, GoPb, 2017)

Table 3.6.3b: Number of Registered Factories & Employment Status

District	Factories & Employment (30.06.2017)		
	<100	>100	Total
Chakwal	13	97	110

(Source: Punjab Development Statistics, Bureau of Statistics, GoPb, 2017)

3.5.4 Healthcare Facilities Profile

There is no healthcare facility in the area of environmental influence of the site. The public sector health facilities of the district, besides specialized medical care institutions, include a District Headquarter Hospital (DHQH), a Tehsil Headquarter Hospital (THQH) in each Tehsil, and number of Rural Health Centres (RHCs) and Basic Health Units (BHUs). A few private clinics, home based healthcare facilities and some small to medium sized medical care facilities are seen in some major towns and cities of the district. The major healthcare setup nearest to the site is the THQH which is located approx. 7.5 km from the site. The hospital is providing only selective diagnostic, therapeutic and preventive healthcare services including surgery. The hospital provides healthcare facilities to the surrounding population and even to patients from other parts of the districts.

The number of healthcare facilities, their service level, and the area-coverage is reasonable and satisfactory. There is fair number of general and specialized healthcare facilities for providing round-the-clock medical care services. The DHQ hospital has Nursing School for training of nurses and some offer different paramedical and laboratory technician courses as well. The hospital also offers internship facilities for the fresh medical graduates. There are number of private healthcare facilities of comparable standard and quality. The number of private clinics has grown in the recent past. The public sector healthcare facilities include large hospitals, RHCs, BHUs, Rural Dispensaries[42]. All these are providing primary to secondary level outdoor and indoor healthcare services for the affording patients. However, there is no medical teaching hospital in the district. **Table 3.6.4a** presents healthcare profile of district Chakwal. **Table 3.6.4b** some common diseases of area[43].

Table 3.6.4a: Healthcare Profile of District Chakwal

Hospitals		Dispensaries		RHCs		BHUs		TB Clinics		SHC	MCH
No	Bed	No	Bed	No	Bed	No	Bed	No	Bed		
8	437	33	--	5	100	42	82	--	--	00	7

(Source: Punjab Development Statistics, Bureau of Statistics, GoPb, 2017)

Table 3.6.4b: Some Common Diseases of the Area

Sr.	Common / Local Name
1	Influenza (endemic)
3	Whooping cough
5	Measles
7	Infantile diarrhoea
9	Amoebic dysentery
11	Bacillary dysentery
13	Infectious hepatitis
15	Viral hepatitis
17	Tuberculosis
19	Malaria

Sr.	Common / Local Name
2	Typhoid fever
4	Leprosy
6	Conjunctivitis
8	Dermatitis
10	Glaucoma
12	Pneumonia
14	Mumps
16	Arthritis
18	Allergic rhinitis
20	Nutritional deficiency

ource: Health Development Statistics, GoPb, 2017)

he city of Chakwal has reasonable healthcare facilities. Both public and private medical care facilities including e Mother and Child Healthcare Centre (MCH) and Civil Hospitals are available at a fair distance. The emergency over by the THQH Chakwal is reasonably fair.

.5.5 Education Facilities Profile

here are two main streams of education in the area:

Formal school education according the Government education system
Informal madrassah education in madrassah attached with masjids or run by religious organizations

xcept a Government Primary School, there are no other educational facilities in the area. However, Educational cilities in the district range from primary level Masjid-Maktab[44] schools upto Degree Colleges for Boys and irls. There is not any public sector university in Chakwal. However, a private university named, Namal University there near famous Namal Lake. There also are a few technical and vocational training institutions and a fair umber of special education institutions in the district run by the Technical Education and Vocational Training uthority (TEVTA) and the Department of Special Education, respectively[45]. There are number of privately owned nd public sector schools, academies and tuition centres. The literacy rate of the district, as per 1998 Census, is 2.8%. The literacy rate in the urban population is 57.1% and in the rural folk 38.3%[46]. The male/female literacy te is 63.8% & 22.1%.

hile travelling on Chakwal Road, one sees some privately owned schools and tuition academies. The eographical spread of the public sector and government schools in the district is fair. There is a government rimary school in a village in the vicinity of the site. the higher level schools and colleges for both boys and girls re also present at approachable distances from the site. **Table 3.6.5** presents education profile of district hakwal[47].

able 3.6.5: Educational Profile of District Chakwal

Masjid Schools	Primary Schools	Middle Schools	High/HS Schools	Colleges
00	701	121	107+12	17 (2+12+3)

ource: Punjab Development Statistics, Bureau of Statistics, GoPb, 2017)

.5.6 Livestock and Farming

griculturally fertile land is a big asset of the country. However, because of its fast engulfment by the housing nd other non-agrarian sectors, the availability of lands for agricultural pursuits has squeezed over the time. levertheless, agriculture and livestock farming are still the major sources of income for the peri-urban and the ural communities of the district. A number of small to medium size dairy and cattle farms can be seen in the illages as well as at some places around the site. These dairy farms provide fresh milk for the residents of the earby cities. Because of number of factors, livestock-, goat-, and sheep farming are becoming attractive sectors f investments. In a way, livestock is complimentary and dependent on the agricultural farming. Usage of the usbandry for ploughing and for farming purposes is at the decline and is being replaced rapidly by mechanical mplements of farming. Government and commercial financial institutions are granting liberal loans to the armers and the growers for purchasing agricultural machinery[48]. **Table 3.6.6** presents livestock resource profile f Chakwal[49].

Table 3.6.6: Livestock Resources of District Chakwal

Cattle	Buffaloes	Sheep	Goats	Work Animals
503,000	201,000	167,000	529,000	45,990

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3.5.7 Communication, Transport and Infrastructures Profile

The site, per se, is devoid of any landline communication and infrastructure facilities except its coverage by the mobile telephony. As far as the district is concerned, there are wide variations in the availability of infrastructure facilities in the district. Whereas, availability and condition of roads in the city of Chakwal is fair, it is deplorable in rural areas including the area[50]. As a part of its developmental agenda, the Government is focussing attention on the construction of farm-to-market roads (FMR) in the province and constructing the highway infrastructure under the Annual Development Program (ADP) and the Public Sector Development Programs (PSDP). Construction of the roads under various programs has substantially improved agricultural marketing and timely transportation of the farm produce to markets[51]. However, the outreach of public transport is not enviable. The site is currently devoid of any important infrastructure. However, basic infrastructure is present along Chakwal Road. **Table 3.6.7** presents infrastructure profile of Chakwal[52].

Table 3.6.7: Infrastructure Profile (Length of Roads in km) District Chakwal

National Highways	Motorway	Provincial Highways	R&B Sector	FMR	Sugarcane Cess Road	Ex-Distt. Council Roads	Total Length
--	--	263.91	307.42	878.22	82.04	172.36	1704.95

Source: Punjab Development Statistics, Bureau of Statistics, GoPB, 2017) *(Kilometres)*

3.5.8 Socioeconomic Profile

On the socioeconomic front, district Chakwal is still not a fully developed district. However, opportunities exist in business, trade, industry, and agriculture in the district. A reasonable section of the population is absorbed in services sector, in the army, and in the civil service[53]. Many are working abroad as expatriates. However, still the majority are absorbed in the agricultural sector. The mean income level of the city residents is higher than their rural counterparts[54]. Communication facilities in the form of regular landlines and mobile telephony are available in the entire district[55].

Telecommunication system in the form of regular landline, broadband wireless telephony, and mobile telephone connections is one of the fast growing areas. There are various radio and cable networks broadcasting in the district, such as FM 95, FM 100 and FM 101. Internet facility through dialup and broadband high-speed wireless DSL is available in the district. Chakwal is also connected with all major cities of Pakistan through fibre optic communication system. Almost all educational institutions in the public and private sector have computers for teaching and for practical computer laboratory work. The site, being a rural outpouring of district Chakwal, exhibits the same socio-cultural traits as that of the main town itself.

3.5.9 Culture, Religion, Customs, Traditions and Specialties

The population of the wider area around the site consists predominantly of Muslims. However, there are reasonable number of Christians residing at the surrounding areas. Punjabi is the native language and is spoken widely in the locality. However, Urdu is gaining popularity and is becoming the lingua franca, particularly amongst the youngsters. People generally respect chadar and chardewari, i.e. they do not mingle up with women publically and stay away from others houses and respectfully wait to be called in or the residents to come out from their houses. A reasonable proportion of womenfolk observe the purdah etiquette, i.e. they remain secluded from outsiders. However, womenfolk do participate in almost all sort of social, cultural, economic, educational, and service activities[56].

Although joint family system is seen in number of households in the surrounding areas, yet the nucleus or small family system is fast emerging as the preferred mode of living, particularly in the urban areas, because of socio economic compulsions and attitudinal shifts in the youth.

3.6 Lab Reports of Environmental Analyses

No lab reports are required in respect of a project subjected to an EIA. Even otherwise, Mining License for Coal is neither an industrial nor an environment affecting activity. Therefore, not any lab reports are required or relevant as none of the activities will affect any of the environmental parameters at all.

4. SCREENING OF ENVIRONMENTAL IMPACTS & MITIGATIONS

4.1 Environmental Examination & Mitigations

The instant section describes the aspects of environmental examination both of the machinery installation and the operation phase of the project unit on the physical, biological, social aspects of the environment. The report presents an outline of the measures for mitigation of the identified impacts. Both the primary and secondary as well as the direct and the indirect impacts have been discussed with respect to their immediate and the ultimate impacts on the various environmental quality parameters and the social significance.

Unlike the large-scale developmental projects, the instant project, because of its extremely small size, scale and spread, is likely not to produce any significant or even insignificant impacts on the local physical, biological and social environment within or out the project's zone of environmental influence. The coal mining will not involve any civil works in the form of construction of buildings. Since the project has been setup over a known coalmine, all essential structures were constructed anew, as none existed onsite. The civil and mechanical components have been designed and the architectural plan has been laid out in such a manner so as to ensure minimum disturbance to the environment. All and the various activities regarding implementation of the project (such as civil, mechanical & electrical works etc.) were carried out concomitantly in a single phase. Their interaction with the environmental parameters and the possible impacts on the baseline environment profile (positive & negative; visible & invisible; concrete & absolute; and reversible & irreversible) have been examined together.

The sections and subsections, following hereinafter, present a discussion and analysis of the various foreseeable environmental and social impacts of the project, if any, during both phases of the project i.e., the machinery installation phase and the subsequent operation phase. Besides presenting analysis of the likely impacts, the discussion presents an outline of the mitigation strategy and the best-suited mitigation measures for avoiding and addressing the identified adverse impacts, if any. The report presents discussion and analysis of the various primary and the secondary impacts as well as the direct and the indirect impacts of the project with respect to their immediate and the ultimate or distant effects on the various environmental quality parameters and the social factors of significance, wherever relevant.

The environmental impacts of the project are likely to relate mainly to flying-off of particulate matter from mining, quarrying & extraction of the coal. It is expected also that some of the machinery running on fossil fuels (viz., petrol, diesel) is being used for some mining operations. The end-of-pipe exhaust emissions from engines of such machinery may produce some limited scale and momentary impacts on the local environment.Similarly, generation of noise from the mining, quarrying & extraction operations may be associated with undesirable noise annoyance. Additionally, the generation and disposal of the striped surface crust, unspent materials, debris and solid wastes, if any, may also be associated with some other insignificant and transitory impacts on the immediate environment only. Since the primary operations will comprise mining, quarrying & extraction of the coal from a known coalmine, there will not be any civil works. Therefore, the majority of the impacts concerning setting-up of the mining machinery were temporary and transitory in nature, e.g., generation noise from machinery installation operations. These will abate once machinery installation iscomplete and the routine mining operations start.

As against the negative impacts, there are number of positive impacts of the project. These would be availability of jobs for both skilled and unskilled personnel, income prospects for the persons involved in carriage and transport of materials and goods for the project and above all easy availability of coal for the diverse end-users. The premier most positive benefit of the project is all-time availability of coal to meet its growing demand. Thus, the end consumers have benefitted greatly from availability of coal. It need nomention that coal is an excellent source of heat and thermal energy. Its usage ranges from small scale roadsidebar-b-que grilling to generation of power in huge coal-fired power plants. It is a fuel of choice of the brick kilns in the country. Therefore, it is in high demand all over the country. Because of these benefits, it will sufficehere to state that the positive impacts of the project will outweigh the potentially negative impacts, if any, particularly, whence most of the latter are insignificant and mitigable. The environmental and social impacts ofthe mining operation are likely to remain confined to the chances of some infrequent mining related accidents and the like only.

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Assessment Methodology

stant EIA Report is based on the standard impact assessment methodology as prescribed by Government kistan[3]. In accordance with the said methodology, comparative analysis, both of the negative and the ve impacts has been carried out with respect to the already existing baseline conditions. The said arison follows a parametric and a non-parametric scheme i.e., how and to what extent various onmental quality parameters (e.g., those relating to soil, air, water, and aesthetics) and non-parametric ts (economy, social value system, employment, lifestyles, and behavioural patterns) might be influenced ious project activities within the project's zone of environmental influence.

Modified Impact Assessment Matrices (**Tables 4.2a & 4.2b**) and a specific questionnaire (**Table 4.2c**) have used for identification, screening and characterization of the unmitigated as well as the residual impacts e physical, biological and social aspects using a numerical scale from (-)2 to 0 to (+)2 respectively. The value denotes high adverse impacts, (-) 1 low adverse impacts, 0 insignificant impacts, (+) 2 high beneficialimpacts, low beneficial impacts, and N denotes nil impacts. This method of scaling up of the magnitude ofthe impacts s in easy appreciation of the nature, quantum and effect of the project's impacts.

Mitigation Strategy

mitigation measures, as presented in this document, are intended to prevent and reduce the foreseeable acts of the project activities during both installation of mining machinery and the subsequent operation se. The mitigation strategy for countering the adverse impacts is built on the following hierarchy ofchoices:

Avoiding a particular impact altogether by taking or not taking a certain action or activity
Minimizing the impact by limiting the degree or magnitude of the action and its implementation
Rectifying the impacts by repairing, rehabilitating or restoring the affected environment
Reducing or eliminating the impacts over the time by preserving and maintaining the operations all during life of the action
Compensating for the impacts by replacing or providing substitute resources or environments
Installing pollution control equipment and devices wherever indicated and necessary
Improving landscape of the site to augment aesthetics and to reduce visual intrusion
Reducing transmission of unwanted noise from site or spots of noise generating activities
Taking any other appropriate step on the basis of feedback information regarding the project

t is advisable that these measures are implemented in a sequential order, beginning with avoiding the impacts nd thereafter adopting the next sequential choices according to the ease of their implementation and cost considerations. Adoption of the above outlined mitigation strategy is expected to ensure long-term environmental and social sustainability of the project.

4.4 Likely Env Impacts of Coalmining

Coal is considered as the most polluting source of energy which creates environmental problems at various stages of its procurement from mining, transportation, stock piling, coal preparation and utilization stages of operations. Coal produces a variety of pollutants during electricity generation and releases numerous toxic pollutants into the air, water and land. The environmental impacts of coal mining are complex and depend on the mining method and its location with respect to the place of utilisation. Environmental impacts for coal mining range from mining subsidence, changes in ground water regimes and mining hydrology. Mining activities also give rise to the visual effects on the environment surrounding the mine including the release of methane into the atmosphere, the release of contaminated water and the generation of solid waste products.

Coal mining has significant impact on land and land use, some of the land related impact are: Loss of biodiversity, Economic loss or loss of livelihood due to displacement and encroachment of agricultural land andImpact on water resource (in term of water availability and quality). Open cast mine has significant impact on land as compared to underground mine.

4.5 Likely Impacts and Mitigations of Location, Design & Planning

The discussion following hereinafter relates to impacts of the project's construction phase on various important environmental parameters.

[3] Environmental Impact Assessment Guidelines, GoPk Islamabad, 1997

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4.5.1 Design, Location & Layout Planning

The subsections following hereinafter present a discussion on environmental impacts of the project's design and planning stage. As per the information provided by the lessee/proponent, the professional mining engineers have surveyed and demarcated the site perfectly in accordance with the laid down criteria, guidelines and specifications of Mines and Minerals Department. However, the lessee/proponent himself will carry out the implementation work through the hired-on-contract labour force and a petty contractor. Therefore, both the lessee/proponent and the petty contractor is responsible for the aspects relating to designand construction of the project in accordance with the design criteria and specifications of the Mines and Mineral Department. The contractor will also carry out site investigations, if any are necessary, for developing and drafting a mine development schedule as is sufficient to meet requirements of the project.

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Design & Planning (Not Relevant)	NA	NA	NA	NA	NA	NA	NA	NA

4.6 Likely Impacts and Mitigations of Construction Phase

The discussion following hereinafter relates to impacts of the implementation phase of the project on various important environmental parameters.

4.6.1 Parametric Impacts of Construction Phase

The subsections following hereinafter present a discussion on various parametric impacts of the project's construction phase.

4.6.1.1 Soils and Lands

Impacts on the soil quality will emanate mainly from stripping of surface crust for reaching yo coal seam below and excavations for making the tunnel. It is claimed that around 4 ha of land is damaged for every million tons of coal mined by the surface mining. For instance, a capacity of 10 million-tons opencast coal mine in 20 years has a potential to destroy around 800 ha of land. However, there is no likelihood of such an occurrence in the instant case.

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Stripping of surface crust and excavation for making mine shaft	Flying off of particulate fugitive dust and its dry fall out in the vicinity	Start of stripping and digging and so long as the activity continues	During continuation of the activity	reasonable	Minor, Local, Insignificant, Temporary, Without any permanent Impacts	Max. Upto 30 Feet from stripping or digging Point	Diggers and Vicinity Persons within zone of effect	Sprinkling of site during stripping and digging. No one should be present in the dust zone during digging
2.	-do-	Dry fallout of flown off dust on nearby Land, Vegetation and Vehicles etc.	Start of stripping and digging and so long as the activity continues	During continuation of the activity	reasonable	Minor, Local, Insignificant, Temporary, Without any permanent Impacts	Max. Upto 30 Feet from stripping or digging Point	Diggers and Vicinity Persons within zone of effect	Sprinkling of site during stripping and digging. No one should be present in the dust zone during digging

4.6.1.2 Surface Water Quality

As mentioned earlier under Chapter 2, there are not any significant surface water channels in the zone of environmental influence of the minesite.

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Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Mine construction	NA. No surface water channel near minesite	NA	NA	Improbable	NA	NA	NA	NA

4.6.1.3 Groundwater Abstraction and Quality

As there was minimal civil work or building construction activities, there was hardly any usage or consumption of freshwater during setting-up of the project. Similarly, due to very nature of the project, there is not any indication of construction of a borehole. Therefore, the same is not included in the project's scope of work. The freshwater requirements for other needs, if any, are being met from the existing water sources of the areaunder permission of the concerned.

Breaching of groundwater can affect the local availability of water. High risk to alter the water quality of areas e.g. low pH, increase in total solids, TDS and heavy metal concentration. Acid mine drainage produced by the leaching of sulphide minerals present in the coal can leave a direct impact on drinking water quality, aquatic life and corrosion of equipment and structures. Trace of arsenic and hexavalent chromium around 0.05 ppm has been found in some cases.

Not any significant quantity of water was required during installation and setting-up of the machinery phase. The approx. water requirement during this phase was 100 gallons per day. This requirement was met from the existing nearest source in the area. The obtaining of water from the nearby source is likely not to compete with water resources of the area. After the machinery installation phase is over, the water requirement was reduced considerably. Now, it is required for normal routine human needs of the project staff and the drivers coming with carriage trucks for loading of the quarried coal. The site is located about 15 km from the nearby city of Chakwal. There is no population or human settlement near the site. Therefore, obtaining of water during the temporary machinery installation and setting-up phase of the project will not affect the community water supplies in any manner, whatsoever.

Generally, the routine mining activities, per se, do not cause groundwater contamination. The groundwater quality is likely to be affected only if wastewater (from any source) somehow succeeds in reaching to the groundwater aquifer. The most plausible route is a groundwater borehole. As no boreholes were constructed under the project, therefore, there is no probability of contamination of groundwater from installation of machinery and setting-up of the project.

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Mine construction	Usage of water to get settle the flying off particulate dust	Start of mine construction and so long as the activity continues	During continuation of the activity	reasonable	Minor, Local, Insignificant, Temporary, Without any permanent Impacts	Feeding area of aquifer	Neighbour community if any	Ensure water conservation by using as mininal quantities of water as possible
2.	Water consumption by site workers	Usage of water by workers	Start of mine construction and so long as the activity continues	During continuation of the activity	reasonable	Minor, Local, Insignificant, Temporary, Without any permanent Impacts	Feeding area of aquifer	Neighbour community if any	Ensure water conservation by using as mininal quantities of water as possible

4.6.1.4 Wastewaters and Effluents

The mine construction works will not produce any wastewaters, whatsoever

4. Screening of Potential Environmental Examination & Mitigations

Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
Mine construction	NA. No wastewater generation from mine construction activities	NA	NA	NA	NA	NA	NA	NA
Generation of sanitation & other wastewater from water use by site workers	Wastewater generation	Start of construction	Constr-uction Period	Frequent	Minor, Local, Insignificant, Temporary, Without any permanent Impacts	Wastewater generation point & around	Site workers	Construct Septic Tank for wastewater treatment & disposal

5.1.5 Air Quality

The air impact is mainly in the form of fugitive dust. Most mining operations, such as drilling, blasting,vehicular movement on haul roads, collection, transportation and handling of coal, screening, sizing and segregation and storage etc. generate dust. For example, a coal stack of 50,000 tonnes can generate 250 tonneof fugitive dust per if assuming loss of only 0.5 per cent as fugitive dust. However, it is not applicable in the instant case

Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
Mine construction	Flying off of particulate dust during construc-tion activities	Start and during construc-tion span	Construc-tion span	reasonable	Minor, Local, Insignificant, Temporary, Without any permanent impacts	Max. Upto 30 Feet From Activity Point	Site workers, Vicinity Persons within effect zone	Sprinkling of site during stripping and digging. No one should be present in the dust zone during digging
-do-	Dry fallout of flown off dust on nearby Land, Vegetation and Vehicles etc.	Start of stripping and digging and so long as the activity continues	During continuation of the activity	reasonable	Minor, Local, Insignificant, Temporary, Without any permanent Impacts	Max. Upto 30 Feet From Stripping Or Digging Point	Diggers and Vicinity Persons within zone of effect	Sprinkling of site during stripping and digging. No one should be present in the dust zone during digging
-do-	Airborne Suspension of Flown Off Particulate Dust	Start of stripping and digging and so long as the activity continues	During continuation of the activity	reasonable	Minor, Local, Insignificant, Temporary, Without any permanent Impacts	Max. Upto 30 Feet From Stripping Or Digging Point	Diggers and Vicinity Persons within zone of effect	Sprinkling of site during stripping and digging. No one should be present in the dust zone during digging

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4.6.1.6 Noise and Vibrations

Generally, the noise and vibrations are of relevance to construction activities only if their levels exceed the prescribed limits. The noise levels higher than a threshold can produce psychological and social impacts of disturbed attention, irritation and short-temperedness. However, owing to non-cumulative property of sound and vibrations, the impacts are reversible and of significance only during continuation of the noisy activities. Cumulative effect of mining activities may produce considerable noise from activities like drilling, crushing and movement of vehicles.

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1	Mine construction	Noise & Vibrations	Start of construction	All during construction phase	Infrequent, Irregular	Minor, Local, Insignificant, Temporary, Without any permanent impacts	Max. Upto 30 feet from activity point	Mine workers, Vicinity Persons within Noise Zone	Use PPEs, earplugs etc
2	Usage of Machinery & Tools	Noise & Vibrations	Start of construction	All during construction phase	Infrequent, Irregular	Minor, Local, Insignificant, Temporary, Without any permanent impacts	Max. Upto 30 feet from activity point	Mine workers, Vicinity Persons within Noise Zone	Use PPEs, earplugs etc. Keep all machinery tuned-up & in good working condition

4.6.2 Non-Parametric Impacts of Construction Phase

The subsections following hereinafter present a discussion on the non-parametric impacts of the project's construction phase.

4.6.2.1 Land Use Change

Land use change from a more useful purpose to a less useful purpose is considered generally a kind of negative environmental impact. As regards the instant project, there will not be any land use change from setting up of the mining machinery at the minesite. The minesite is a vacant land and available for the constructing the project immediately. Therefore, there will not be any land use changes, whatsoever from mining operations.

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Mine construction	likelihood of adverse Land Use Change (Only if there is such a Change)	Start of mine construction	Lifelong (Only if there is Adverse Land Use Change)	Improbable, Unlikely	Permanent (Only if there is Adverse Land Use Change)	Mine zone as leased by Mines & Minerals Deptt.	Mine workers	NA (No Likelihood of any Land Use Change). Post closure reclamation in case of a change

4.6.2.2 Solid Wastes

There will not be the generation of any solid wastes either during construction or operation of the project. The generation of food based kitchen waste from meal making activities by the site labour will not be of any significance or relevance. Overburden of organic material and soil that overlie a mineral deposit. Overburden generation is denoted by stripping ratio which is the ratio of overburden that needs to be removed to the amount of ore removed. Low stripping ratio translates into low quantities of waste. Mining operation results in excavation of large quantities of top soil. It is precious as it holds nutrients and is essential for successful rehabilitation and afforestation. Top soil management and its reuse are important. Poor storage can lead to run-off.

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)

4. Screening of Potential Environmental Examination & Mitigations

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Mine construction	Not any solid waste generation	NA	NA	Improbable, Unlikely	NA	NA	NA	NA (No likelihood of any solid waste genration)
2.	Foodstuff consumption activities & generatin of kitchen trash	Littering of site, Putrefactio & foul smells, Ugly sightendness, Breeding of vectors, Rodents & flies etc.	Start of mine construc-tion	Project Life	Frequent, Daily	Minor, Local, Insignificant, Temporary, Without any permanent impacts	Max. upto 10 feet from disposal point	Mine workers, other staff	Segregate organic & inorganic waste. Reuse or recycle inorganic waste. Dispose of organic waste in a burial pit. Sprinkle burial pit with lime powder

4.6.2.3 Access, Easement, Health, Wellbeing and Worksite Safety

The environmental and social impacts pertaining to rights of access, easement, health, community wellbeing and worksite safety will relate to the setting-up as well as to the design phase of the project. Improper and poor design can lead to construction of poor quality structures, which in turn can produce psychological, behavioural and health impacts on the users of the facility. A poorly designed structure can be troublesome forthe users and the neighbouring communities. Haphazardly placed materials and debris on or near the site can cause impedance of movement, risks of personal injury and inconvenience for the neighbours. Non- observance of the worksite safety instructions and non-use of safety gadgets during installation operations can increase vulnerability of the exposed persons to adverse health and personal safety impacts.

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Mine construc-tion	Positive socio economic impacts. Source of livelihood for number of persons	Start of construc-tion	Project life	Frequent, Continuous, Project life	+ve, Lifelong, Permanent, Beneficial	Very Wide	Numerous	NA (+ve Economic Activity)
2.	-do-	Likelihood of Accidental Personal Injury	Time of accident	Project life	Infrequent, Incidental, Probable	May be Temporary or Permanent. May be Significant or Insignificant. May be Minor or Major. May be Reversible or Irreversible	Activity Spot & Around	Site Workers, Staff, Labourers	Use PPEs, Put on Safety Measures, Display Safety Instructions, Warning Boards, Comply with SOPs, Keep First Aid Box ready and handy

4.6.2.4 Cutting and Removal Trees and Crops

Construction of the project will not involve cutting and removal of any trees, whatsoever

Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
Mine construction	NA No tree cutting involved	NA	NA	Improbable Unlikely	NA	NA	NA	NA
do-	NA No crop removal involved	NA	NA	Improbable Unlikely	NA	NA	NA	NA

4.7 Likely Environmental Impacts of Operation Phase

The discussion following hereinafter relates to some foreseeable impacts of the project's operation phase on various important environmental parameters as well as of the non-parametric aspects. As a general rule, the magnitude of the negative impacts of a project is likely to increase with the number of persons present at the site. Higher the number of the persons present, higher will be the amount of the wastes, effluents and air emissions generated. Thus, volumetric increases of consumption of resources and the resultant generation of effluents and emissions will be directly proportional to the number of the project users.

4.7.1 Parametric Impacts of the Operation (Usage) Phase

The subsections following hereinafter present a discussion on the parametric impacts of the project's operation phase.

4.7.1.1 Soils and Lands

Operation of the project will not have any significant interventions with the land and soils at all. Impacts on the soil quality will emanate mainly from stripping of surface crust for reaching yo coal seam below and excavations for making the tunnel. It is claimed that around 4 ha of land is damaged for every million tons of coal mined by the surface mining. For instance, a capacity of 10 million-tons opencast coal mine in 20 years hasa potential to destroy around 800 ha of land. However, there is no likelihood of such an occurrence in the instant case.

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Mining Operation	Flying off of particulate fugitive dust and its dry fall out in the vicinity	Start of mining operations	Life of mining operations	reasonable	Minor, Local, Insignificant, Temporary, Without any permanent Impacts	Max. Upto 30 Feet from stripping or digging Point	Diggers and Vicinity Persons within zone of effect	Sprinkling of site during stripping and digging. No one should be present in the dust zone during digging
2.	-do-	Dry fallout of flown off dust on nearby Land, Vegetation and Vehicles etc.	Start of stripping and digging and so long as the activity continues	During continuation of the activity	reasonable	Minor, Local, Insignificant, Temporary, Without any permanent Impacts	Max. Upto 30 Feet from stripping or digging Point	Diggers and Vicinity Persons within zone of effect	Sprinkling of site during stripping and digging. No one should be present in the dust zone during digging

4.7.1.2 Surface Water Quality

The mining, quarrying & extraction operations will not have any interaction with the nearby surface waters. There are not any noticeable surface water channels in the area, except small lean torrents, which will not be affected in any manner whatsoever from the mining operations. The local geographical gradient also does not suggest any likelihood of effects on the surface water from any of the mining activities. Therefore, no chances of pollution of the local surface waters from mining operations.

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Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
Mining operation	NA. No surface water channel near minesite	NA	NA	Improbable	NA	NA	NA	NA

4.7.1.3 Groundwater Abstraction and Quality

The Mining License for Coal will neither involve nor require usage or consumption of groundwater for any of the mining operations. Therefore, there will not be any impacts on the groundwater quality or availability all during the mining and even the post-mining operations.

Leaching of groundwater can affect the local availability of water. High risk to alter the water quality of areas by low pH, increase in total solids, TDS and heavy metal concentration. Acid mine drainage produced by the leaching of sulphide minerals present in the coal can leave a direct impact on drinking water quality, aquatic life and corrosion of equipment and structures. Trace of arsenic and hexavalent chromium around 0.05 ppm has been found in some cases.

Not any significant quantity of water will be required during coalmining. The approx. water requirement during this phase was 100 gallons per day. This requirement was met from the existing nearest source in the area. The obtaining of water from the nearby source is likely not to compete with water resources of the area. The site is located about 15 km from the nearby city of Chakwal. There is no population or human settlement near the site. Therefore, usage of water for humanly needs during mine operations is not affecting the community water supplies in any manner, whatsoever.

Generally, the routine mining activities, per se, do not cause groundwater contamination. The groundwater quality is likely to be affected only if wastewater (from any source) somehow succeeds in reaching to the groundwater aquifer. The most plausible route is a groundwater borehole. As no boreholes were constructed under the project, therefore, there is no probability of contamination of groundwater from mining activities.

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Mining operations	Usage of water to get settle the flying off particulate dust	Start of mining operations and their continu-ation	During continuation of mining operations	reasonable	Minor, Local, Insignificant, Temporary, Without any permanent Impacts	Feeding area of aquifer	Neighbour community if any	Ensure water conservation by using as mininal quantities of water as possible
2.	Water consumption by site workers	Usage of water by workers	Start of mine construction and so long as the activity continues	During continuation of the activity	reasonable	Minor, Local, Insignificant, Temporary, Without any permanent Impacts	Feeding area of aquifer	Neighbour community if any	Ensure water conservation by using as mininal quantities of water as possible

4.7.1.4 Wastewaters and Effluents

Because of its very nature, the mining activities will not generate any type of effluents all during its operational life. Hence, no generation of wastewaters is expected and therefore no resultant impacts.

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Mining operations	NA. No wastewater generation	NA	NA	NA	NA	NA	NA	NA

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Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
	Rodents & flies etc.							Dispose of organic waste in a burial pit. Sprinkle burial pit with lime powder

4.8.2.4 Noise, Vibrations and Odours

There will not be the generation of any undesirable noise and vibrations during operation phase of the project. Generally, the noise and vibrations are of relevance to operational activities only if their levels exceed the prescribed limits. The noise levels higher than a threshold can produce psychological and social impacts of distracted attention, irritation and short-temperedness. However, owing to non-cumulative property of sound and vibrations, the impacts are reversible and of significance only during continuation of the noisy activities. Cumulative effect of mining activities may produce considerable noise from activities like drilling, crushing and movement of vehicles.

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Mining operations	Noise & Vibrations	Start of mining operations	All during operational life	Infrequent, Irregular	Minor, Local, Insignificant, Temporary, Without any permanent Impacts	Max. Upto 30 feet from activity point	Mine workers, Vicinity Persons within Noise Zone	Use PPEs, earplugs etc.
2.	Usage of Machinery & Tools	Noise & Vibrations	Start of mining operations	All during operational life	Infrequent, Irregular	Minor, Local, Insignificant, Temporary, Without any permanent impacts	Max. Upto 30 feet from activity point	Mine workers, Vicinity Persons within Noise Zone	Use PPEs, earplugs etc. Keep all machinery tuned-up & in good working condition

4.8.2.5 Access, Easement, Health, Wellbeing and Worksite Safety

The environmental and social impacts pertaining to rights of access, easement, health, community wellbeing and worksite safety will relate to the setting-up as well as to the design phase of the project. Improper and poor design can lead to construction of poor quality structures, which in turn can produce psychological, behavioural and health impacts on the users of the facility. A poorly designed structure can be troublesome forthe users and the neighbouring communities. Haphazardly placed materials and debris on or near the site can cause impedance of movement, risks of personal injury and inconvenience for the neighbours. Non- observance of the worksite safety instructions and non-use of safety gadgets during installation operations can increase vulnerability of the exposed persons to adverse health and personal safety impacts.

Occupational health: The workers in mine have high risk of the occupational diseases like coal workers' Pneumoconiosis, due to inhalation of coal dust. Pneumoconiosis can cause severe lung problems and lung cancer, dust allergy and asthma, noise hazard such as temporary or permanent hearing loss, headache and high blood pressure.

Socioeconomic: Coal mining can affect communities at multiple levels. During mine's opening-Displacement, Loss of livelihood. During mine's operation-pollution impact (air, water, noise, vibration), Health impact. Mine closure-sudden economic halt and Land contamination.

Mine fires: An issue for not only the workers but also the people living in adjoining area is a major problem.



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4. Screening of Potential Environmental Examination & Mitigations

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Mining operation	Positive socio economic impacts. Source of livelihood for number of persons	Start of operation	Project life	Frequent, Continuous, Project life	+ve, Lifelong, Permanent, Beneficial	diffused	Numerous	NA (+ve Economic Activity)
2.	-do-	Likelihood of Accidental Personal Injury	Time of accident	Project life	Infrequent, Incidental, Probable	May be Temporary or Permanent. May be Significant or Insignificant. May be Minor or Major. May be Reversible or Irreversible	Activity Spot & Around	Site Workers, Staff, Labourers	Use PPEs, Put on Safety Measures, Display Safety Instructions, Warning Boards, Comply with SOPs, Keep First Aid Box ready and handy

4.8.2.6 Cutting and Removal Trees and Crops

Mining operations will not involve cutting and removal of any trees, whatsoever

Sr.	Activity	Likely Impacts	Time of Occurrence	Duration of Impact	Frequency Probability Occurrence	Category of Impact	Area of Effect	Exposed Persons	Mitigation Measure (EMP)
1.	Mining operation	NA. No tree cutting involved	NA	NA	Improbable Unlikely	NA	NA	NA	NA
2.	-do-	NA. No Crop removal involved	NA	NA	Improbable Unlikely	NA	NA	NA	NA

4.8.2.7 Other Mining Operations

The project is designed for environmentally compatible Mining License for Coal from its source i.e., coalmine. Some of these activities (e.g., loading of coal on carriage trucks) may result in flying off of fine coal particulate that might stay for some time in the local environment. However, owing to the fact that there is not any human population in the vicinity site, there are not any impacts on the land use status of the site. The mined out coal is dispatched to the desired destinations through loader trucks, dumper trucks andcarriage trailers. Essential equipment for weighing, loading and unloading of the mined out coal has been setup. For the provision of first aid, an emergency management system is in place.

i) Likely Impacts

- As already discussed above under various heads and subheads

ii) Activities Likely to Produce the Impacts

- As already discussed above under various heads and subheads

iii) Mitigation Measures

- As already discussed above under various heads and subheads

4.8.2.8 Quarrying and Extraction Operations

The mining, quarrying & extraction are being done in strict accordance with the conditions of lease, the international best practices and the mining code under the supervision of the experienced supervisors. Arrangements have been put in place for handling any incidence of fire The standalone fire extinguishers have been placed at key points at site. The firefighting system is being kept in an always ready-to-use state.

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ely Impacts
already discussed above under various heads and subheads

ctivities Likely to Produce the Impacts
already discussed above under various heads and subheads

Aitigation Measures
already discussed above under various heads and subheads

2.9 Transportation of Mined Coal

ined coal is transported in the carriage trucks, dumpers and other suitable haulage vehicles to the desired nations. The loading is through a properly designed loading and unloading mechanism.

ely Impacts
already discussed above under various heads and subheads

ctivities Likely to Produce the Impacts
already discussed above under various heads and subheads

Aitigation Measures
already discussed above under various heads and subheads

Environmental Impacts of Surface Mining

ace coal mining operations require large areas of land to be temporarily disturbed creating a number of ironmental challenges, including soil erosion, dust, noise, water pollution, and impacts on local biodiversity. l mine drainage is composed of metal-rich water formed from the chemical reaction between water and osed rocks containing sulphur-bearing minerals (FeS2). Effective mine design can keep water away from the l generating materials. The key impacts of surface mining are typically massive disturbances of large areas of l and possible disruption of surface and groundwater patterns. In some surface mines, the generation of acid e drainage (AMD) is a major problem. Other significant impacts include fugitive dust and disposal of rburden/waste rock.

it levels can be controlled by spraying water on roads, stockpiles and conveyors and with dust collection tems. Noise can also be controlled through the careful selection of equipment and insulation and sound closures around machinery. Foliage planted in these buffer zones can reduce emitted noise levels while nimizing the visual disturbance of mining operations on local neighbourhood. The emission of green house ses can be increased due to spontaneous combustion of stock piles. The water spraying is generally used to press dust emissions. The action of water and weathering causes water run-off and acidic leachates issions which has a potentially high impact on the environment. As the acid pass through the coal, metals are solved producing a toxic flux that is usually high in aluminium, iron and sulphate.

.10 Environmental Impacts of Underground Mining

underground mines, the surface disturbance is less obvious, but the extent of possible subsidence can be very rge. Methane generation and release can also be a problem under certain geological conditions. If groundwater /stems are disturbed, the possibility of serious pollution from highly saline or highly acidic waterexists. Impacts ay continue long after mining ceases. The land can deteriorate because of the presence of chemical wastes or hysical hazards such as abandoned shafts, boreholes and tunnels. Mine wastes generated in huge quantities re mostly flammable and ready to spontaneous combustion. They may also contain heavy metals capable of eaching out into local rivers, streams and groundwater which may bio-accumulate along theaquatic food chain. Coal washing generates similar waste problems. Sulphuric acid is created when exposed coal gets wet and dissolves toxic metals which is very deadly to aquatic life and contaminates drinking water sources. Health and safety hazards include respiratory illnesses such as emphysema, black lung disease and chronic bronchitis; exposure to toxic fumes and gases; noise-induced hearing loss; heatstroke and exhaustion. Coal-bedded Methane (CBM) contains C2H2, CO2, N2, H3 and H2, formed as part of the process of coal formation. The majority of gas is in the adsorbed state and attached to the coal surface in micro-pores. It is released in significant quantities from the coal seam and the surrounding disturbed strata during mining operations and continues to release throughout the life of the mine, and after the mine has been abandoned. CBM can be utilised rather than released to the atmosphere, providing variety of uses; including on-site/offsiteelectricity produc[illegible]use in industrial processes and fuel for co-firing boilers. Subsidence is another adverse

ct of underground mining on the surface which can be predicted, by understanding of its patterns in a icular region, and ensuring the safe and maximum recovery of coal resource and providing protection to er land uses.

.11 Environmental Impacts of Transportation

cks, rail, ports and barges which are used to transport coal, may all affect air and water quality, in addition the environmental health impacts from blowing coal dust and air pollution coming from the vehicles emselves. The environmental impact of coal transportation is moderate and associated with energy nsumption used for loading/unloading equipment, water usage for dust suppression and spillages occurring m rail cars, trestle conveyors and wharf transfer points. Noise from jack hammering and dust from unloading al wagons can also cause environmental problems.

.12 Likelihood of Ecosystem Effects

almining can cause extensive degradation to natural ecosystems such as forests and can scar the landscape eparably. Damage to humans, animals and plants, occurs due to habitat destruction and environmental ntamination disrupting ecosystems and endanger human health. Steps are taken in modern mining operations ch as good planning and environmental management minimize the impact of mining on the environment and lp to protect biodiversity. Clean coal technologies have been developed and are widely used to limit rticulate emissions, waste from coal production, trace elements, NOx, SOx and CO2, limiting the negative fects of coal production and its use. Improvements in the efficiency of coal combustion for coal-fired power neration have already achieved significant reductions in CO_2 emissions.

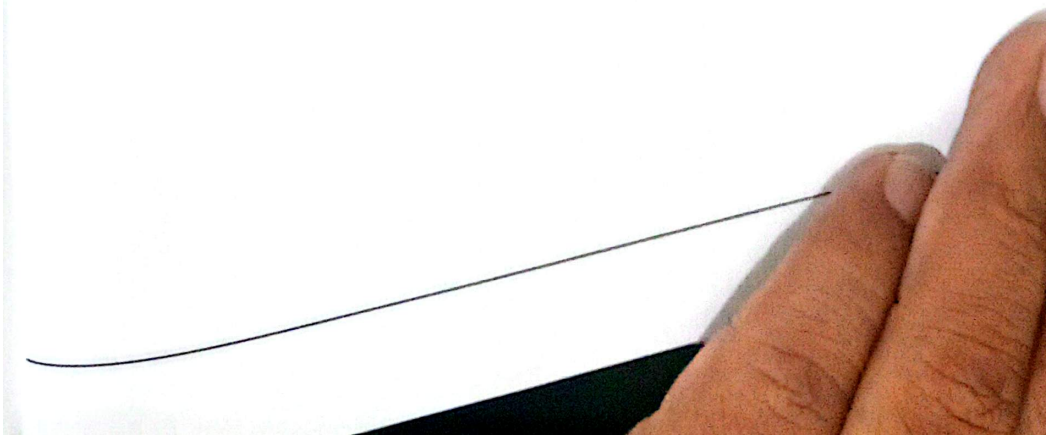
.13 Summary of Environmental Issues of Coalmining

e potential environmental effects due to coalmining and coal utilisation can be summarised as follows:

Subsidence above mined area, sometimes damaging infrastructure
Dust, noise and vibration during blasting, loading and transportation processes
Destruction of groundwater regimes and rearranging the water tables
Impact of water use on flows of rivers and consequential impact on other land-uses
Mining operations rendering land unfit for other uses
Waste products in the power-plant ash containing radio-active minerals including uranium, thorium and other heavy metals presenting health hazards
Release of major conventional air pollutants during coal combustion process (particulate matter, NOx, SO_2, Hg and other toxic substances, CO_2 and CH_4)
Generation of acid rain
Coal-fired power plants without effective fly ash capture causing solid waste pollution problems

.14 Environmental Enhancement Measures

ggressive tree plantation, development of grassy plots, lawns and greenbelts is proposed as the prime measure or enhancing and improving the environmental ambience and aesthetics of the project premises



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Simplified Environmental and Social Impact Matrix (Construction Phase)

Environmental Components	Physical				Biological		Social and Socioeconomic																
Project Activities	Soil Erosion / Contamination	Surface Water Quality	Groundwater Quality	Air Quality	Natural Vegetation	Wildlife	Access and Easement	Noise and Vibrations	Agriculture / Farming	Livestock Grazing	Safety and Hazards	Public infrastructure	Aesthetic Value	Wetlands Eco-System	Health and Wellbeing	Education / Learning	Gender Issues	± Employment / Income	± Community Empowerment	± Price of Land	Community Participation	Archaeological Heritage	Cultural Issues	Impact on occupants
Site Selection	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	±1	±1	±1	0	N	N	N
Master Planning / Layout Designing	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	+1	N	+1	0	N	N	N
Construction Activities	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	+2	+1	+1	+1	N	N	N
Operation	N	N	N	N	N	N	N	N	N	N	N	N	N	N	+2	+2	+1	+2	+1	+1	+1	N	0	N

Key:-2=High Negative Impact -1=Low Negative Impact 0=insignificant/Negligible Impact +1=Low Positive Impact +2=High Positive Impact N=No Impact

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Simplified Environmental and Social Impact Matrix (Villages & Nallah Widths)

Environmental Components	Physical				Biological		Social and Socioeconomic															
Project Activities	Soil Erosion / Contamination	Surface Water Quality	Groundwater Quality	Air Quality	Natural Vegetation	Wildlife	Access and Easement	Noise and Vibrations	Agriculture / Farming	Livestock Grazing	Safety and Hazards	Public infrastructure	Aesthetic Value	Wetlands Eco-system	Health and Wellbeing	Education / Learning	Gender Issues	Employment / Income	Community Empowerment	Price of Land	Community Participation	Archaeological Heritage	Cultural Issues	Impact on occupants
Site Selection	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	+1	+1	+1	0	N	N	N
Master Planning / Layout Designing	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	+2	+1	+1	+1	N	N	N
Construction Activities	N	N	N	N	N	N	N	N	N	N	N	N	N	N	+2	+2	+1	+2	+1	+1	+1	N	O	N
Operation	N	N	N	N	N	N	N	N	N	N	N	N	N	N	+2	+2	+1	+2	+1	+1	+1	N	O	N

Key:-2=High Negative Impact -1=Low Negative Impact 0=insignificant/Negligible impact +1=Low Positive Impact +2=High Positive Impact N=No Impact

A: Environment / Resource Linkages:	
Will environmental considerations, including present human land use pattern in the vicinity, be incorporated into the selection of technology, the location, scale & design of the plant?	Not relevant
Have hydrologic, geologic, seismological, and meteorological studies have been made to anticipate and minimize possible damage to humans, fish & wildlife resources and vegetation?	Pertinent aspects have been studied
Does a comprehensive plan link the project to environmental aspects of raw materials, bye-product utilization, shipping, and processing?	yes

B: Project Design & Construction:	
Have alternative sites or locations of the plant been considered in an effort to avoid or mitigate environmental degradation?	yes
What features for environmental protection will be incorporated in the design & operations?	As given in technical feasibility and EIA
Is there a comprehensive construction plan that takes into account ecological factors?	Yes
Are road patterns, land excavation, fill sites, refuse disposal activities etc., planned to minimize damage to the natural environment?	Yes
What provisions have been made for restoring sections of the construction area	Not relevant
Will construction personnel be exposed to unique local health problem, or will they introduce diseases?	No

C: Operations:	
Do offloading & on-loading methods incorporate human & environmental safeguards?	Yes
What are the dangers of an explosion or spill of hazardous material	negligible
Will contingency plans, including manpower & materials, be available to cope with the accidents?	Yes
Has adequate attention been given to the aspects concerning safe storage of potentially hazardous materials?	Yes. But not relevant
Will floating roof tanks be employed?	No
What types and quantities of effluents or particulate emissions the project will produce?	No

(Adapted from the EIA Guidelines, Govt. of Pakistan)

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5. ENVIRONMENTAL MANAGEMENT& MONITORING PROGRAMME

5.1 Institutional Capacity

This section describes the environmental, social and risk management plan (ESRMP) for ensuring smooth environmental and social management of the project at all stages of activities and dealing with an emergency is and when it may occur. The objective of including the ESRMP into this EIA report is to ensure prevention of ny situation of emergency and in case of development of such a situation, the steps required to be taken to anage the situation. The section also contains a set of environmental guidelines for avoiding and or preventing he adverse environmental impacts of the project. Besides, institutional setup for implementing theESRMP, anagement of hazards and emergencies, importance of the compliance-monitoring program has also been iscussed.

he ESRMP is considered as the core area of an environmental examination study. It focuses on environmental rotection through minimization of the impending risks and the likelihood of occurrence of hazards. The ESRMP ims to ensure that adverse consequences of an emergency are addressed appropriately at all stagesof disaster anagement from prevention to rehabilitation and resettlement of the affected individuals. The ESRMP also rovides a mechanism to reduce likelihood of occurrence of the risks to an acceptable level by adopting the risk revention strategies. Wherever possible and applicable, the ESRMP provides for avoiding environmental risks nd, in case they are unavoidable, then identification of the most direct and the best possible measures for educing the extent of damage to persons and property. Additionally, ESRMP designatesthe special risk areas nd proposes stringent measures for hazard avoidance at these high risk and sensitive areas. In nutshell, the bjectives of the proposed ESRMP would be as under:

To provide an early warning system for the potential or actual risks
To provide a systematic and implementable mechanism for risk characterization and risk mitigation
To test effectiveness of the risk handling mechanism and hence improve upon the weaker areas
To ensure that operational activities are carried out in sound and secure manner by avoiding the probability of risks occurrence

afety measures, including appropriate design solutions, onsite handling of hazardous materials during nstallation of machinery and resolution of social conflicts during operational phase of the project represent ome major components of the ESRMP. The ESRMP also aims to ensure that the quality of the life values as well ultural and religious sensitivities are fully preserved all through various stages of the project to avoid social everances and conflicts. Lastly, the ESRMP has been framed in line with the national legislative framework, nvironmental standards and regulations to ensure environmental compatibility of the project.

he lessee/proponent shall setup an Environmental Safety and Health (ESH) Unit for timely appreciation, dentification, and reporting of the environmental issues relating to the project activities and for takingnecessary reventive and corrective measures for addressing the issues at various levels of responsibilities. The ESH will e permanent setup and will exist during the operation phase as well but with a little changed composition and nandate. During the operation phase, the ESH may consist of the persons appointed in consultation with the EPA and other relevant agencies. Expenses of the ESHU may be met with from regular budget of the project. The ESHU would be an independent functional unit headed by an ESH Officer, who will be assisted by an appropriate number of subordinate officers, technical personnel, and others. The ESHU should be equipped all essential equipment for dealing with any situation of emergency and disaster.

5.2 Training Schedule

The prime objective of the trainings and capacity building programmes will be to ensure long-term environmental sustenance of the project's operations and activities and to keep the ESH Manager and the project management abreast of the emerging issues, troubleshooting strategies, and modern techniques of environmental management and handling emergencies. The efficacy of trainings will be tested from quickness of the response to a crisis as exhibited by the preparedness exercises.

It is recommended to hold at least one training or practice drill session into environmental issues every six months all during the operational life of the project. The selected personnel and the employees posted on key points may attend these training sessions. These training sessions should focus on issues of practical nature

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ly to come up during the project's operations. They should also focus on sensitizing the participants about vironmental stakes of the project and its various process operations. The training programmes must cater managing the on-ground environmental problems and the strategies for implementing the suggested vironmental mitigation measures. A comprehensive training session or a training workshop of appropriate ation be held annually with a much wider participation from the project management down to the plant rkers. These workshops may focus on the policy issues, sustainable development strategies, and the oubleshooting mechanisms on the basis of the experiences of the preceding years. An externalenvironmental nsultancy of eminence and repute will be involved in making these training sessions and workshops eaningful.

.3 Mitigation and Environment Management Plan

MP is a framework for the implementation and execution of mitigation measures and alternatives. Ideally EMP ould covers all phases of project development i.e. Preconstruction, Operation of mine and Decommissioning the mine. It is a documented plan containing details of impacts, recommended mitigation and monitoring easures etc. and legal document based on which the performance is monitored. Some salient features of itigation plans will include the following aspects. **Table 6.3** is a chart of activity based mitigation measures.

psoil Management: The best practices for topsoil management is to scrap the topsoil prior to drilling and asting, Scraped topsoil should be used immediately for plantation/agriculture. If it is not possible to use the psoil immediately, then it should be stacked at a designated area. Storage must be done in a pyramidal form, ith garland drains all around.

verburden Management: If an external overburden dump is unavoidable, then it should be stabilized with iological reclamation. Excavation from a new pit should begin after an existing pit has been exhausted. This ould ensure that the overburden and inter burden generated is used for backfilling the exhausted pit, instead f being dumped elsewhere. Till a pit is exhausted, the overburden should be compacted and stacked in specified cations in lowlying, non-mineralized zones within the lease area. Vegetation should be planted over the dump opes as early as possible. The height and slope of the overburden dumps should be maintained to prevent ope failure. Sedimentation tanks should be constructed to treat run-off from external overburden dumps. For xternal overburden dumps, the bench height should not exceed 10 meters and the final dump height should ot be more than 60 meters.

ubsidence Management: Planned subsidence by considering surface structures and human lives, as in the case f long-wall mining. Preparation of a subsidence management plan and its approval by the regulatory agency. he plan should ensure the following:

- Simultaneous stowing of the de-coaled area.
- Compensation to and rehabilitation of the affected people.
- Fencing of the subsidence zone during active mining operation to prevent unintended entry into the affected area.
- Reclaiming the subsided area by afforestation.
- Regular monitoring and inspection of subsidence area to detect any subsidence and taking the necessary steps.
- Preparing a subsidence monitoring programme that covers the impact of subsidence on surface and groundwater (quality and quantity) and its management

Management of Water Pollution: Use of mine seepage water (after treatment) for different purposes, Construction of gabbion wall, garland drain, siltation pond, wherever appropriate and coal stockpiles, overburden and topsoil should be selectively placed in a stable area which is less prone to erosion.

Mitigation Measures for Air Pollution: fixed and mobile water spraying on the haulage roads. Asphalting of the road junction meeting public roads. Covering of the trucks carrying ore with tarpaulin. Wheel wash system.9 inch free board for all the trucks. Green belt around mining area as physical barrier.

Mitigation of Noise and Vibration: Use of closed and advanced blasting technology like shock tube technology Conducting blast only during day time, use of hydraulic drills and provision of sound insulated chambers for workers deployed on machines producing higher levels of noise like bulldozers, drills etc. Enclosing crusher units in covered buildings to minimize sound propagation. Providing silencers or enclosures for noise generating machines such DG sets, compressors etc. Creating a green belt around potential noise prone area

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Closure Plan: A good mine closure plan should include the following:
- A detailed final closure plan to create productive and sustainable land use
- A plan to protect the health and safety of the surrounding habitat, and
- A plan to eliminate/contain all possible sources of pollution post-mining

The plan must be accepted by mine owners, regulating agencies, and local communities.

Mitigation of Occupational Health and Safety Issues:

Table 6.3: Activity based Chart of Mitigation Measures

Sr.	Activity	Mitigation Measure
1.	Coal Seam Drilling	▪ Driller shall be equipped with a closed cabin to reduce exposure to noise and dust ▪ The operators and other workers should be provided with masks, helmets, gloves and earplugs ▪ Safety zone: Provisions should be made for a buffer zone between the local habitation and the mine lease in the form of a green belt of suitable depth ▪ Restricted entry: use of sirens and cordoning of the drilling area are some of the good practices to avoid accidents
2.	Workers Health Surveillance	▪ Health survey programmes for workers and local community ▪ Regular training and awareness of employees to be conducted to meet health and safety objectives
3.	Mine Inundation	▪ Mine inundation may lead to a serious disaster if a river is flowing close to the mine pit. Hence a buffer space of a suitable width should be maintained, which should be followed by construction of embankments after considering high flood level ▪ In underground mines, if the shaft is located in a low lying area or is vulnerable to flood risk, garland drains should be provided around the shaft
4.	Mine Fires	▪ Try to extinguish the new fires and try to isolate existing fires ▪ Try to take a scientific approach to mining practices and give due consideration to proposed fire prevention plans ▪ Carry out monitoring using new scientific techniques ▪ Risk of explosions in underground mines can be managed by good mine planning, methane gas monitoring, good ventilation and controlling dust levels
5.	Dust Collection	▪ Efficiency based Low, Moderate & High Dust Capturing Herbs, Shrubs and Trees

5.4 Equipment Maintenance

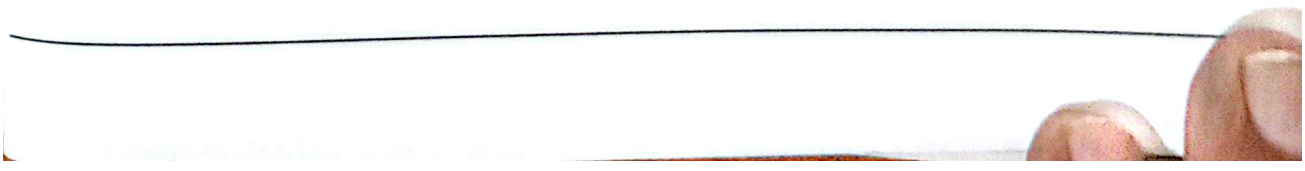
All the machinery and equipment, as installed at the site, is being kept clean, tidy, tuned-up and up-to-date as per the instructions and the operating manuals of their respective manufacturers. The ESH Unit will verify the daily monitoring checklists of the upkeep and maintenance schedules.

5.5 Environmental Budget

Funds will be required for efficient performance of the ESH Unit. Apart from expenses on maintenance, payment of utilities, salaries of the staff, external compliance monitoring by an environmental firm will also require allocation of money. It is, therefore, recommended that the project complex should have suitable environmental budget.

5.6 Summary of Impacts & Mitigations

The project, being the mining activity, is one of the many such like activities already operational in the mining sites in the country. The setting up of the project unit will help to ensure equitable availability of coal for various and diverse users of the commodity in the country. The demand of coal is increasing with every passing day and therefore its equitable availability across the country is all the more essential. Setting-up of such like facilities for mining, quarrying and extraction followed by transportation of coal will help to overcome this ardous challenge efficiently and effectively.



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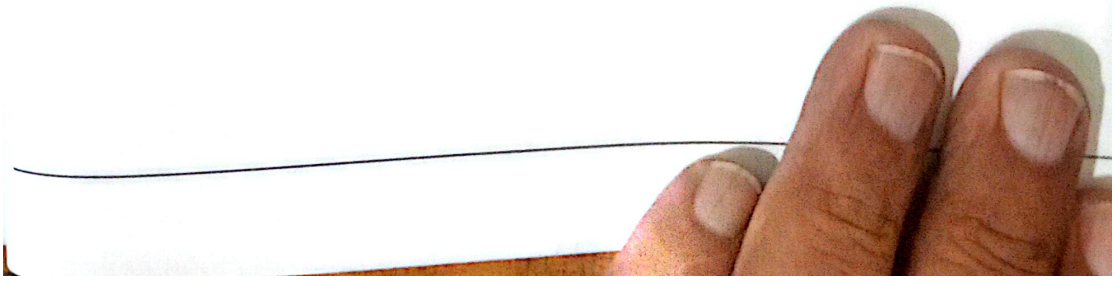
ecause of number of reasons, demand of coal is increasing with the growing population, every passing day. T
ailability of coal is essential for various dependent sectors of economy and businesses. The demand of c
mains there all the year round. Therefore, round the time availability of coal is all the more required to sati
e consumer demand. The setting-up of coal mining facilities near the known coalmines in the country will h
solve this problem effectively. The instant project, therefore, is one such step in this direction. The setting-
f the instant project can be reckoned as a welcome step to cater for and to address this distortion.

s mentioned earlier under Executive Summary, the majority of the potentially negative environmental impac
ing of low rating, are manageable through good management and housekeeping practices. Implementati
f the proposed mitigation measures and compliance of the environmental laws of thecountry will furth
nsure their attenuation to the desired level. In this particular case, implementation of the recommend
nvironmental mitigation measures and the management guidelines, as given in the relevant chapters of t
A, are expected to bring down the negative environmental impacts of the project within the fold
cceptability.

s far as mitigation of the environmental impacts of the operation phase is concerned, their actual magnitu
annot be determined in advance at this very early and premature stage of concept planning of the project un
herefore, based on the tentative assessment of the likely impacts, if any, only some tentative mitigati
easures have been suggested to address the likely impacts of the operation phase. These suggested measur
ill be reviewed for their efficacy, once the project goes into full operation. In addition to the above,a stringe
onitoring regime has been proposed to monitor adverse environmental impacts of the project all during i
peration with a view to take up timely corrective and ameliorative measures to address them.

view of the increasing demand of coal in the country, it is an urgent need of the time to take up establishme
f such like projects to meet the market demand on the one hand and to provide opportunities of jobs for th
ommunity on the other hand. Nevertheless, this emergent necessity of setting up these units should n
ndermine importance of the environment. It is imperative that the impacts of such projects on theenvironme
ould be well evaluated and addressed in the planning, construction and operation of these like projects.
eeds to be ensured that construction of such like projects does not affect the environment adversely b
ringing about unfavourable land use changes, large-scale exploitation of natural resources, and irreversib
ollution of the air, water, and soil environments from emissions, effluents, solid wastes and other contaminan
riginating from such projects. It is therefore imperative that these projects are subjected to compulso
nvironmental examination prior to their implementation, as envisaged under the Punjab Environment
rotection Act 1997 to ascertain the adverse impacts relating to both construction and operation phases well i
dvance.

ast but not the least, implementation of the mitigation measures should not be taken to undermine th
nportance of research and development (R&D) which is the keystone for finding better measures an
echnologies for addressing the environmental issues and concerns. Importance of the R&D must be recognize
s one of the most suitable tools to find solutions for the diverse environmental issues that may crop up durin
he project's lifespan. It is, therefore, recommended that the lessee/proponent may review the proces
perations continuously to make them compatible with the applicable environmental quality standards. Th
vill help to improve environmental profile of the project plant and will improve its socio- environmental outloo



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6. STAKEHOLDERS' CONSULTATIONS

6.1 Objectives and Rationale of Consultations

The primary objective of the stakeholders' consultations was to learn and know the apprehensions, concerns, and opinions of the key stakeholders over environmental implications of the project. The consultation sessions also served as a source of first-hand information about expectations of the community and beneficiaries of the project. Dialogue with the stakeholders and recording their concerns at appropriate stages of the project can help to tailor the project in line with stakeholders' aspirations and therefore likely to promote public acceptance of the project and its sub-components.

6.2 Identification of the Relevant Stakeholders

The consultation process began with identification of the most pertinent stakeholders. Efforts were made to identify the relevant stakeholders through a systematic process based on the nature and degree of their actual and perceived stakes in the project. **Tables 6.2a and 6.2b** are the various categories of the stakeholders and the nature of their stakes into the project pertaining both to construction and operation stages of the project:

Table 7.2a: Stakeholders of the Project and Nature of their Stakes (Construction Phase)

Category	Stakeholders	Nature of the Stakes
Design & Construction Stage		
Project Funding Agency	▪ Proponent	▪ All those stakes which a funding agency would have i.e., achieving the desired objectives and reaping benefits of investment into the project
Project Sponsoring Agency	▪ Proponent	▪ That the project is carried on smoothly in accordance with scheduled timeline
Project Implementing Agency	▪ Proponent ▪ Project's Design Consultant ▪ Construction Contractor ▪ Sub-contractors and Labour ▪ Vendors of machinery, equipment and various goods and services for the Project	▪ That the project is implemented as per schedule and delays on whatsoever account are avoided ▪ That all bottlenecks and impediments are removed in a timely and effective manner ▪ That the bills are cleared in timely manner and payments are made as per contract agreement
Regulatory Authorities	▪ Environmental Protection Agencies ▪ Local District and the Municipal Administration ▪ Local Building Control Authority	▪ That constructions under the project conform to applicable building codes, rules, regulations, bylaws, and environmental standards
Project Users/Beneficiaries	▪ Proponent ▪ Construction contractors ▪ Persons employed at the project ▪ Goods & Service providers ▪ Others	▪ That the project is completed as per schedule and that they get maximum benefits from the project ▪ That the project structures meet with their needs and requirements
Public and Community	▪ Neighbourhood community, Industrialists, Residents, Vendors, Agriculturists and Land owners	▪ That the project activities do not affect their living, business, and civic rights in an adverse manner ▪ That the project activities are not harmful for their health, hygiene and aesthetic ambience ▪ That the locals are preferred in provision of jobs at the project

Table 7.2b: Stakeholders of the Project and Nature of Their Stakes (Operation Phase)

Category	Stakeholders	Nature of the Stakes
Operation Stage		
Project Funding Agency	▪ Proponent	▪ That the fruits of investment are fully realized to the desired extent and the objectives are

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Category	Stakeholders	Nature of the Stakes
	Operation Stage	
		achieved to a satisfactory level
Project Sponsoring Agency	▪ Proponent	▪ That the project operates as a successful venture and serves as a role model for replicating similar projects by others
Project Operating Authorities	▪ Proponent	▪ That operational bottlenecks are removed in a timely manner and the project's operations carries on smoothly
Regulatory Authorities	▪ Environmental Protection Agencies ▪ Local District and the Municipal Administration	▪ That the project remains conformant to the applicable rules, laws and the environmental standards
Project Beneficiaries	▪ Proponent ▪ Employees and Project Staff ▪ Persons providing services and goods at and for the project ▪ Others	▪ That the project provides all the services and facilities for which it has constructed ▪ That the project is safe and secure from any outside intrusion ▪ The food served at the project facilities (canteens, mess, cafeteria etc.) is of prime standard and quality ▪ That the project activities do not pollute the environment ▪ That appropriate training and capacity building is provided to the project staff ▪ That operation of the project is free from corrupt practices and maladies and is geared to serve its underlying objectives ▪ That payment to suppliers are made in a timely manner without any hassle and problems
Public and Community	▪ Neighbourhood community ▪ Project beneficiaries	▪ That the project activities do not affect their living, business, and civic rights in an adverse manner ▪ That the project activities are not harmful for their health, hygiene and aesthetic ambience ▪ That the locals are preferred in provision of jobs at the project

6.3 Consultation Methodology

Onsite consultations were held with representatives of the various categories of the stakeholders as were available during field visits of the sites. **Annex-4** is a list of the persons consulted and interviewed. Additionally, wherever found feasible, general public in the vicinity were also consulted to know their views and concerns over the project activities. The majority of these consultations were either one to one meetings or small and focused group discussions.

6.4 Issues Discussed

The points listed below are some of the issues discussed during the consultations:

- Are the constructions being undertaken in accordance with applicable codes, rules, and regulations?
- Are the constructions commensurate to their usage after completion?
- Are the contractors complying with the environmental requirements?
- Are there any concerns apprehensions, and views of the community and the stakeholders over the project activities relating to design, construction and operational aspects? What are these?
- What are the likely adverse impacts of the project on the various components of the environment i.e., physical, biological, and social components?
- What could be the possible remedies for the concerns and apprehensions? How they concerns can b effectively addressed?
- Any particular and specific personal or site related concerns.
- What steps would be needed to ensure long-term sustainability of the project and the activities under th project?

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- How the operations can come up to expectations of the users and or the beneficiaries?

6.5 Outcome of the Consultations

The neighbourhood communities did not express any specific or significant concerns. Interestingly, different stakeholders had different perceptions and different concerns about the project. Some of the concerns and apprehensions relating to various aspects of the project are reproduced below:

6.5.1 Design Aspects

- The design aspects need to take into account the relevant engineering codes, byelaws, and the applicable governmental policies.

6.5.2 Construction Aspects

- Delays in construction and completion of the project are likely to result into escalation of construction costs.
- Delays in payments to the contractors, sub-contractors, suppliers and the labour can cause delays in the project implementation.
- Delays in handing over the sites and later changes in the drawings and scope of work result into slow progress of the constructions under the project.
- Interferences by the local regulatory agencies and the municipal authorities are also likely to cause delays in completion.
- Disorderly and haphazard placement of construction materials with its attended consequences could be a nuisance for the labour and other persons working on the project.
- Construction related noise could be troublesome for the neighbourhood community.
- Flying off of coal dust and its fallout deposition on exposed surfaces may require frequent dusting.

6.5.3 Operation Aspects

- There could be disruptions and discontinuations in the supply of the machinery and equipment and other materials for timely completion of the project
- There could be non-payment or delayed payment of wages to the work charge and the temporary employees.
- There could be unsatisfactory cleanliness of the premises due to administrative and supervisory lapses.

6.6 Measures to Address the Concerns

Table 7.6 presents a summary of the concerns and apprehensions of the various stakeholders to the project and the plausible measures to address them:

Table 7.6: Summary of Stakeholders' Concerns alongwith Remedial Measures

Persons Consulted	Concerns/Apprehensions	Remedial Measures
Environment Protection Agency	▪ Environmental and functional compatibility of the project ▪ An institutional setup for addressing the issues and concerns ▪ No or minimal delays at various milestones	▪ EIA, EMP and the Environmental Guidelines as given in this documents will ensure environmental and functional compatibility of the project ▪ An Environmental Safety, Health and Social Management Unit (ESHU) will be setup to manage all environmental and social issues of the project during both construction and subsequent operation
District Executive Authorities	▪ The project carries on smoothly without creation of any serious impediments	▪ The core administration of the project as well as ESHU will ensure smooth functioning of the project without eruption of any unpleasant situation
Project Staff	▪ Wages are paid in time and no deductions are made therefrom on any count ▪ Good quality and hygienic food is served ▪ Social security cover is provided for the project staff and the labour	▪ The core administration and the ESHU will ensure that all apprehensions are allayed in a timely manner
Contractors	▪ Delays in construction and	▪ The majority of the contractors' concerns

Persons Consulted	Concerns/Apprehensions	Remedial Measures
	completion of the project and resultant escalation in construction costs ▪ Delays in clearing of the running bills/ payments ▪ Poor coordination between various departments and functionaries ▪ Changes in the drawings and scope of work ▪ Lengthy and tedious procedural requirements ▪ Interferences by the local regulatory agencies and the municipal authorities	relate to procedural and management issues. The institutional setup proposed for environmental and social management of the project will help solve the problems
Office staff and other employees	▪ Non-fulfilment of promises by the project authorities ▪ Disruptions in the supply of essentialities like office stationery, diesel for generators, and ink for printers ▪ Non-payment or delayed payment of wages to the work charge and the temporary employees ▪ Unsatisfactory cleanliness of the premises ▪ Lack of appropriate working space for the employees ▪ Lack of space for placing the important record and files ▪ Lack of safe drinking water facility	▪ The majority of the concerns relate to procedural and management issues. The proposed institutional setup will help solve the problems
Neighbourhood community and shopkeepers	▪ Noise pollution ▪ Dust and air pollution ▪ Disorderly placement of construction materials ▪ Environmental compatibility of the project ▪ Neighbours are not displaced or their business are not affected ▪ Timely completion of the project ▪ Preference in provision of jobs to locals	▪ The ESHU will keep constant liaison with the neighbouring community and will resolve all disputes and differences in an amicable manner through negotiations and consultations ▪ Timely completion of the project will be ensured ▪ No person will be dispossessed or displaced from his land without paying for due compensation ▪ The proponent will give due preference in provision of jobs to the locals provided they otherwise qualify for the job as per the prescribed qualification and applicable Conditions



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CONCLUSION

Conclusion

Results of the instant EIA study show that Mining License for Coal and transportation of the mined out coal will not have any significant adverse environmental impacts. The mining is being done on an area measuring 326.19 acre from a known Coalmine near DHOK ANAR, Distt. Chakwal. The Mines & Minerals Department has granted mining rights to the lessee/proponent for a period of five years to mine out ordinary coal from here vide No.ML.CKL.I.Coal(148) dated 02.11.2018. The Environmental Impact Assessment of the likely operations relating to mining shows that there will not be any adverse or the negative impacts on the physical as well as the biological environment. The transitory and insignificant impacts relating to flying off particulate dust and noise, during both installation of the mining machinery and actual mining of the coal from the source (coalmine), are all negligible and of no eventual consequence at all. As per findings of the instant EIA, there will not be any impacts of the mining and the allied activities, whatsoever. However, if any impacts surface up at a later stage, these will be mitigated appropriately. Even after a comprehensive and in-depth examination of the parametric and the non-parametric aspects of the likely environmental impacts of the mining and the allied operations, the Consultant's Professional Team of Experts did not find any negative impacts of these operations. The transient impacts of the mining operations, as have been identified in the instant EIA, are all-reversible and can be made good by implementing the mitigation measures and theenvironmental monitoring programme as given in this EIA report. To conclude, the environmental and social impacts of the mining operations, if any, are countered by the more positive impact of round the time availability of coal for various end-users and the dependent industry. In nutshell, the impacts of the instant project of mining of ordinary coal from a known source (coalmine) under a valid lease from the Government are all positive in nature and beneficial for the environment, economy, industry and the community.

The environmentally compatible mining, quarrying & extraction followed by transportation to desired destinations for the diverse consumers, end-users and the dependent industry are of immense advantage and benefit for the community and the environment. The EIA study also shows that there will not be any exhaustive exploitation and consequential depletion of the local natural resources from any of the project activities. In view of the calculated scope and magnitude of the project activities, the local resources will remain conserved and available for sustainable future development. The project will therefore bring-in positive and healthy improvements in the socio-economic environment of the area. As a result of economic trickle down, the operations have benefitted thousands of people, locally and distantly.

In nutshell, the high-end positive impacts of the project far outweigh all the low-end negative impacts of the project, thereby making the project an **environmentally sustainable, compatible, feasible and implementable project.**

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