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EXECUTIVE SUMMARY

Title and Location of Project

M/s M & S Enterprises holds a mining lease for coal near Joggi Tilla in District Jhelum, Punjab, Pakistan. The coal lease area is over 588.42 acres and was granted by Mines and Minerals Department, Government of the Punjab.

Name of the Proponent

The affairs of the company are controlled by M/s M & S Enterprises who is the proponent of the company.

Name of the Proponent	M/s M & S Enterprises
Representative	Malik Ghulam Rasool Sangha
Address	P-110 DHA, Lahore

Name of Organization Preparing the Report

Hi-Tech Environmental Services (Pvt.) Ltd. is a business entity managed by geoscientists and environmental experts. The company has the expertise of highly diversified experience and has completed a total of more than 150 environmental studies across Punjab. The consultant has a range of expertise available in following areas:

- Economic Geology
- Determination of geological exploratory techniques and mine design
- Preparation of feasibility reports, IEE report, EIA reports, Development Schemes & Prospecting Scheme.
- Preparation of Environment Management Plans
- Preparation of reports on HRD /Mines Rescue & Recovery.
- Assessment of Impact of mining on environment and mitigating measures.
- Mine surveying & interpretation of boundary disputes.
- Legal opinion on mine regulatory regime.
- Energy fuels and selection of choice fuels for specific energy
- Drilling and blasting for underground and surface mining techniques.
- Safety measures for mines operation.

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Sr.	Name	Qualifications & Brief Experience	Roles Assigned
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2)	Maryam Nazir	Mining Engineer and GIS Expert B.Sc. Mining Engineering	• Development of Maps
3)	Ch. Awais Ahmad	LLM (London)	• Site Visits • Legal Reviews • Coordination with Locals
4)	Engr. Harris Naeem	B.Sc. Mining Engineering	• Mining Techniques

Brief Outline of the Project

The project area lies over 588.42 acres and involves mining coal by underground methodology. The project is located near Joggi Tilla in District Jhelum, of Punjab.

The huge coal resources of Pakistan can play a significant role in meeting its energy demand for a long time. In this connection it will be necessary to make all out concerted efforts towards:

- Expanding the coal resources base through intensive exploratory efforts in all known fields as well as in new prospective areas;
- Introducing semi-mechanization in coal mining to keep up production as well as its cost at competitive levels;
- Developing indigenous R&D capabilities for adopting various advanced coal technologies to suit local conditions. Coal briquetting needs especial attention to cope with the energy requirements of villages and remote areas. In these areas, due to fuel shortage, the deforestation has reached at an alarming stage.

The mining industry is capital intensive and has the longest gestation period where success stories are about 40-50%. The minimum time required to reach the coal seam in Punjab is 18-24 months for developing a mine to raise an average production of 25 tons/day with an investment portfolio of 15-20 million Rupees. The investment portfolio and mineability enhancement are appended in the following pDhok Chabalagraphs. Again success is the function of all favorable factors mentioned above. The mineral managers either intentionally ignore or they are not well versed with the intricacy of the mining system. The decision making in a production mine go side by side with the development as well because the coal seam once in position may fade away or change in thickness or quality. This phenomenon adversely affects the mineability and marketability.



Major Impacts

The impacts related to design incorporates the impacts resulting from underground shortwall mining method. The steps involved in shortwall mining method have been discussed earlier in above sections. The overall impacts resulting from underground coal mining operation are discussed below.

- **Dust Generation**

Dust may be generated during extraction of coal from coal face either manually or through continuous miner. It may also be generated during haulage of coal to the surface.

- **Higher Noise Levels**

Higher noise levels and vibrations due to operation and movement of carts or continuous miner underground and drilling if being carried out in case of hard rocks.

- **Solid Waste and Wastewater**

No solid waste and wastewater will be generated underground due to mining method. The solid waste generated at mine site underground is partially dumped underground in the extracted coal chambers which may act as packing material and support system for walls stability. The shales associated with coal are generally dumped outside close to the mine mouth. These shales have impregnation of alum. This impregnation mixed with water is supporting mixture for vegetation growth. Hence, this impact is negligible.

- **Loss of Vegetation**

As coal mining method is underground. Therefore, there will be no loss of vegetation due to this neither at surface or underground. This impact is negligible in this case scenario.

- **Preventive Measures**

- Use of PPEs (face masks etc.) will be ensured by the mine operators and staff working at coal face.
- Use of PPEs (noise suppression equipment-ear mufflers etc.) will be ensured by the workers where noise levels are higher than 85 (dBA).
- Underground working carts/miners speed limit will be maintained to avoid excessive vibrations.
- Regular maintenance of underground equipment will be ensured.

Environmental Impacts during Construction Stage

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



- **Dust Generation**

Dust may be generated due to movement of machinery and vehicles at site for construction purposes. Dust may be generated during access roads development, land clearing and leveling etc. The mines are located in far flung areas away from population. Mining concedes with mountainous region void of population. Any access to the mineral deposit is done through jeep-able road which is improved by placing the shingle on top to avoid muddy and slippery situation. The movement of the truck on these “Katcha Roads” provides a phenomenal dust fanning which is rarely visible or seen. Hence the impact is almost nil.

- **Exhaust Emissions**

These emissions may result from the exhaust of vehicles and machinery operation at site. No exhaust emissions are generated due to operation of generators used for power generation as these generators operate on electricity rather than diesel.

- **Higher Noise Levels**

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

- **Loss of Vegetation**

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

- **Solid Waste and Wastewater Generation**

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

- **Community Amenity**

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

- **Preventive Measures**

- Controlled water sprinkling will be ensured to reduce PM₁₀.
- Maintain appropriate buffers between the site and receptors.
- Use of PPEs (face masks etc.) will be ensured by the mine operators and staff



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

Environmental Impacts during Operational Stage

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

Environmental Component	Environmental Issue	Description
Water Resources	Channel Water Quality	Since the Coal does not flow into the channels, quality of water is not affected. Hence, this impact is nil.
	Channel Water Discharge	The mining operation will not interrupt the flow of water into water channels. Hence, the flow of water in the channels will remain unchanged. On account of this finding, this will cause no impact on the channel water flow.
	Groundwater Quality and Level	Coal mining operation will not affect the quantity/level of GW. Pumping is sometimes needed in rainy season. The quality of GW will remain unchanged as there is no introduction of any contaminant into the GW during coal mining.
	River Degradation	The question of river degradation arises in case if any river is present within the close vicinity of the mine. No river is present within the safe distance from the project area. Hence, no river degradation will take place.
	Surface Run-Off	Because of the coal mining operations underground, the surface topography is not being disturbed and hence no obstruction to the surface run-off. Thus, this impact will be insignificant.
	Drainage	The mining area lies on the natural developed crisscross drainage pattern and doesn't disturb its ecology, pattern and flow. Thus, this impact will be nil.



Land Resources	Soil Salinity	The coal mining operations will not add any saline materials into the soil. Thus, there will be no effect on the soil salinity.
	Soil Erosion	The coal mining operations will be carried out underground. The type of coal mining is underground coal mining. As all the mining activities will be operated underground, hence, no impact on soil erosion is observed.
	Land Use Change	The areas where the mining will be done is under no use. Most of proposed coal mining sites are abandoned. So, there won't be any loss or degradation of productive land. Moreover, the coal is being extracted underground making no change on surface. Hence, there will be no impact on land use of the site.
	Land Utility / Productivity	The mineral is being worked underground and after the extraction of the mineable reserves the area will be available for the use of geo tours. Hence, this impact will be positive.
Climate	Micro-climate Changes	After mining of the coal, plantation will help in improving local climatic conditions to some extent. This impact will be positive.
Atmosphere	Dust and Air Emissions	Coal mining operations will be carried out underground. Small quantity of dust will be generated only at underground locations. Dust will not be generated during loading of coal in trucks for its transportation to the markets as coal is in lumpy form. Hence, this impact will be negligible. Some additional measures will be taken to reduce the dust emissions.
	Noise and Vibrations	The sources of noise generation are generators, vehicular movement and drilling & blasting activities. All these operations will be carried out under controlled environment and do not exceed the threshold limit of 80 dBA. Hence, this impact is nil.
Waste Generation	Wastewater	The mining operations incidentally are carried out through such rock structures which do not provide access to water ingress in the mines. The question of effluents therefore doesn't arise. This impact is nil.
	Solid Waste	The solid waste generated at mine site is partially dumped underground in the extracted coal chambers which may act as packing the support system for walls stability. Hence, this impact will be negative.



Flora	Forests / Trees	The project area is devoid of any forest cover. Scant wild species are found. There are no trees except some small size bushes on the project site not worth mentioning. Therefore, there is no question of tree cutting during the operation of the project as well. The forest reserves are at a safer distance from the lease area. Hence, no impact is envisaged.
	Other Terrestrial Vegetation	Insignificant vegetation is growing in the area. Hence, there will be no impact on this parameter.
Fauna	Mammal Communities / Habitat	Only wild mammalian species are found. On extraction of coal underground, these species will rarely migrate to nearby areas. Hence, this impact will be temporary and insignificant.
	Reptile Communities / Habitat	Reptile species will not be migrated and affected due to underground coal mining operations. Hence, these species will remain un-effected. The impact on these species will be negligible.
Social	Population	Population is likely to increase by a national growth rate. Hence, positive impact is envisaged.
	Land Ownership	On completion of mining, the lease area land will be available for geo-tours. Impact will be positive.
	Land Lease	As the mineral resources belong to Provincial Government which will enable the mineral exploitation and adding government revenue. Overall impact is positive.
	Social Cohesion/ Attitude	The project has added interwoven knitwear awareness. The group of people working from the local area will have more social inter-woven cohesion and inter-dependence for economic survival. The impact is positive.
	Food/ Nutrition	There will be positive impact since more resources will be available for the purchase of foodstuff.
	Health	Health of residents of nearby villages and workers will not be affected due to mining operations and activities. This impact is not significant.
	Education	On improvement of income level, people will send their children to educational institutions. Hence, this impact will be positive.
Economic	Income Levels	The project has positive impact on the income levels of the locals. The people of other parts of the country will also benefit from this project.



	Employment	The mining operations employ the locals from the nearby villages. Hence, the job avenues will increase for the locals. This impact is positive.
	Land Value	During the tenure of the mining project life, land value will escalate and may stabilize on post mining operation. Hence this impact is positive.
Institutional	Institutional Activities / Effectiveness	Various governmental and non-governmental offices will become more active due to this activity. There will be positive impact.
Human Use	Cultivation and Livestock	As the area is non-agriculture, hence the livestock will not have greasing ground. This impact is nil.
	Afforestation	Different plant species will be planted within the vicinity of the project area to enhance the environmental conditions of the project area. Hence, this impact will be positive.
	Domestic Water Supply	The project is located well away from the nearby towns/ villages. The project will not affect the quality and quantity of water supply to communities in the surrounding areas. This impact is nil.
	Community Development	The proponent is already on the supportive grid on community welfare program. Hence, this impact will be positive.
Relocation/ Resettlement	Dislocation of Population	The project does not involve any dislocation of the local people. So, there will be no impact.
	Loss of Property and Infrastructure	No movable or immovable property of public and private sectors will be lost during mining operations. Hence, this impact will be nil.
	Resettlement of Affected Communities	There is no requirement of resettling of even a single individual of the community as there will be no loss of property and relocation. Therefore, this impact will be nil.

Summary of Potential Impacts

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

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



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

Sr. No.	Component	Environmental Issue	Magnitude	
			Positive	Negative
1	Physical Environment			
	Water	Channel Water Quality		0
		Channel Water Discharge.		0
		Groundwater Quality		0
		Groundwater Level		0
		River Degradation		0
		Surface Run-Off		0
		Acid Mine Drainage		0
		Flooding		0
		Drainage		0
	Land	Soil Salinity		0
		Soil Erosion		0
		Land Use Change		0
		Land Utility / Productivity	+2	
	Solid Waste	Land Pollution Breeding of flies and rodents Odor		-2
	Wastewater	Land Pollution Water Pollution		-2
	Climate	Micro-climate Changes		0
		Climate Change		0
	Atmosphere	Dust		0
		Noise		-3
	Sub-Total		+2	-5
2	Biological Environment			
	Flora	Forests /Trees	+2	
		Other Terrestrial Vegetation		0
	Fauna	Mammal Communities /Habitat		0



		Reptile Communities /Habitat		0
		Sub-Total	+2	0
		Socio-economic Environment		
3	Social	Population	+1	
		Land Ownership	+2	
		Land Lease	+3	
		Security		0
		Social Cohesion/ Attitude	+1	
		Food/ Nutrition	+1	
		Health & Safety		-3
		Education	+1	
	Economic	Income Levels	+2	
		Employment	+2	
		Land Value	+2	
	Institutional	Institutional Activities/Effectiveness	+1	
	Human Use	Cultivation	+1	
		Livestock	+2	
		Afforestation	+2	
		Infrastructure	+2	0
		Domestic Water Supply		0
		Community Development	+2	
	Relocation/ Resettlement	Land Lease		0
		Dislocation of Population		0
		Loss of Property		0
		Loss of Infrastructure		0
		Resettlement of Affected		0
		Sub-Total	+25	-2
		Grand Total	+29	-7



Recommendations for Mitigation Measures

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

Environmental Component	Sources & Potential Impacts	Mitigation Measures
Physical Environment		
Noise	- Increased noise levels due to use of heavy machinery such as tractors for transportation of extracted coal. - Disturbance to workers and residents. - Drilling and Blasting	<u>For Drilling and Blasting</u> - All blasting operations will be carried out in compliance with conditions as specified in Coal Mines Regulations, 1926. - The area where blasting is being carried out will be fenced properly. - To avoid noise problems and disturbance to the community, blasting will be carried out at specified days and between specified timings. - Proper monitoring of blasting operations will be carried out by manager or concerned persons. <u>For Noise</u> - Use of PPEs (noise suppression equipment-ear mufflers etc.) will be ensured by the workers where noise levels are higher than 85 (dBA). - Mining activities will be ensured at daytime when background noise levels are high. - Vehicles speed limit will be maintained to avoid excessive vibrations. - Regular maintenance of machinery will be ensured.
Air Quality	- Dust generation due to movement of trucks and vehicles - Drilling and Blasting	- Maintenance of buffers between the site and receptors. - Controlled water sprinkling will be ensured to reduce PM₁₀. - Use of PPEs (face masks etc.) will be ensured by the mine operators and staff.



		To prevent air quality, blasting may not be carried out in extreme weather conditions, if practical/possible.
Wastewater	- The mining operations incidentally are carried out through such rock structures which do not provide access to water ingress in the mines. The question of effluents therefore doesn't arise. - The domestic wastewater will be generated from camp offices and labor activities.	The domestic wastewater generated from camp offices should be disposed of as per standards of TMA if applicable.
Solid Waste	- The solid waste generated at mine site is partially dumped underground in the extracted coal chambers as well as packing the support system for walls stability while the remaining rock waste is dumped on hill slopes without disturbing the natural drainage pattern. - Solid waste from camp sites will be produced by labor activities.	- Proper waste management plan will be developed. - The vegetation of the coal waste dumps happens to be a mitigation measure for the coal waste dumps already developed - Littering will be prohibited at the site. - Containers will be emptied before they reach their carrying capacity. - Waste will be stored at site in covered containers.
Acid Mine Drainage	- Damage to aquatic life - Risks to human health - Soil contamination - Surface and groundwater quality contamination	The water percolating in the mines is through limestone beds which are non-acidic. The metalliferous mines having sulfide ores can have the chances of acidity. In such cases the pumps used are specially galvanized for rotors or screw type pumps are used having impregnation of rubber. In case of muddy mines pulsatory pumps are used which are non-rotating and take care of acidity factor if available. Once the pumping is done, the water stored



		on the surface tank is mixed with fine dust of calcium carbonate powder to mitigate its acidic factor.
Biological Environment		
Flora	The project area is devoid of any forest cover. There are no trees except some small size bushes on the project site not worth mentioning. Therefore, there is no question of tree cutting during the operation of the project as well.	Nil
Fauna	Temporary migration of mammals and birds from the area.	This impact is temporary and no significant mitigation measures are required.
Endangered Species	There are no endangered species found in the project area, hence this impact will be negligible.	Nil
Socio-economic Environment		
Community Amenity	- Dust and visual amenity - Excessive dust impacts may be harmful for some people, for example, with some experiencing respiratory conditions. - Noise associated with coal mining activities and traffic.	- Adopt and maintain good management practices. - Maintain appropriate buffers between the site and receptors. - If these buffers include vegetative screens, they have the added benefit of providing improvements in visual amenity.
Mine Workers Health and Safety	- Health and safety risks to workers due to explosion underground, formation of sink holes etc. - Damage to worker's health and can cause fatal injuries as well.	- Provision of first aid facility. - Provision of safety trainings to mine workers and staff. - Prohibition for use of drugs and narcotics at coal face underground. - Provision of Personal Protective Equipment to workers and staff working underground near coal face.



Responsibilities of the relevant stakeholders for implementation of the environmental enhanced measures are delineated in the table below. These measures are subject to the tenure of the lease holder.

Positive Impacts	Enhancement Measures	Implementing Agencies
Improving Land Utility	• Optimize use of recovered land. • Consolidation of land • After conclusion of mining activities, geo-tours can be arranged. • Forest Cultivation can also be taken.	• Agricultural Department • Revenue Department • Proponent
Improvement of land activity	• Education of farmers on modern techniques of agriculture. • Use timely inputs for suitable soil conditioners.	• Agricultural Department • Farmers
Improvement of Economic Conditions	• Provision of more jobs to locals with efforts on integration of project products.	• Lease Owner • NGOs
Improvement of institutional performance	• Arrangements of credit facilities for agro based business encourage establishment of NGOs for improvement of socio environmental and literacy condition. • Persuade schools, banks and other departments to be effective and provide facilities to locals.	• Agricultural Development Bank/ Schedule Bank/ NGOs/ Education Department
Improvement of agriculture and forestry	• Adopt modern techniques for agro productivity to use optimal inputs. • Plant trees and crops with lesser water requirement	• Agricultural Department • Forest Department • Farmers
Community Development	• Educate and train resident of villages on improvement of local conditions through NGO. • Encourage local participation in social education and health activities and programs.	• NGOs • Locals



Proposed Monitoring

The Environmental Management and Monitoring Plan (EMMP) will be used as a management and monitoring tool for implementation of the mitigation measures identified in the EIA report. The EMMP matrix lists down:

- The required mitigation measures recommended in the EIA report.
- The person/organization directly responsible for adhering to or executing the required mitigation measures and monitoring adherence to the mitigation measures.
- The parameters, which will be monitored to ensure compliance with the mitigation measures.
- The timing at which the mitigation or monitoring has to be carried out.
- Budget allocated for management practices (cost of EMMP).
- Project Proponent will hold primary and overall responsibility for ensuring full implementation of the EMMP.

The Environmental Management and Monitoring Plan have been provided for both installation and operational phases of the project below:

EMMP for Installation Phase

The EMMP for installation phase of the project includes following:

- Air quality management & monitoring plan
- Noise management & monitoring plan
- Solid Waste management & monitoring plan
- Health and safety management & monitoring plan

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Reduce Dust Emissions					
1	Dust Emissions	Monitor speed limits of vehicles operating at project site.	Throughout installation period	Proponent	0/-
		Avoid installation activities in extremely dry weathers.	Throughout installation period	Proponent	0/-
		Sprinkle water at site when necessary, to reduce dust spread.	Throughout installation period	Proponent & Contractor	5,000/-



		Ensure the use of Personal Protective equipment by workers and staff.	Throughout installation period	Proponent & Contractor	5,000/-
Reduce Exhaust Emissions					
2	Exhaust Emissions	Ensure minimization of Vehicle idling time.	Throughout installation period	Proponent & Contractor	0/-
		Alternatively, fueled equipment shall be used where feasible equipment shall be properly tuned and maintained.	Throughout installation period	Proponent & Contractor	0/-
		Give awareness to vehicle drivers and operators to avoid unnecessary racing of vehicle engines at loading/un-loading points. Ensure that vehicles engines must be switched off at these points.	Throughout installation period	Contractor	0/-
Sub-Total					10,000/-

Noise Management & Monitoring Plan for Installation Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Minimization of Noise and Vibrations					
1	Noise and Vibrations	Aware vehicle and machinery operators to switch off engines of vehicles or machinery not being used to avoid excessive noise and vibrations.	During installation period	Proponent & Contractor	0/-
		Sensitize drivers to avoid gunning of vehicle engines or unnecessary hooting especially when passing through sensitive areas such as churches, mosques, residential areas and schools.	Throughout installation period	Proponent & Contractor	0/-



		Ensure that machinery is kept in good condition to reduce noise generation.	Throughout installation period	Proponent & Contractor	5,000/-
		The noisy installation works will entirely be planned during day time when most of the neighbors will be at work.	Throughout installation period	Proponent & Contractor	0/-
Sub-Total					5,000/-

Solid Waste Management & Monitoring Plan for Installation Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Minimization of solid waste generation and ensure efficient solid waste management					
1	Increased solid waste generation	Donate recyclable/reusable or residual materials to local community groups, institutions.	During installation period	Proponent	0/-
		Proper waste management plan must be developed.	During installation period	Proponent	0/-
		Waste must be stored at site in covered containers.	During installation period	Proponent	10,000/-
		Containers must be emptied before they reach their carrying capacity.	During installation period	Proponent	0/-
		Littering must be prohibited at the site.	During installation period	Proponent	0/-
		Awareness will be given to the staff and workers about handling of solid waste at site.	During installation period	Proponent	0/-
		Use of an integrated solid waste management system i.e. through a hierarchy of options: • Source reduction	Throughout installation period	Proponent & Contractor	0/-



		• Reuse • Recycling			
		Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of waste generated over time.	Throughout installation period	Proponent & Contractor	0/-
Sub-Total					10,000/-

Health and Safety Management & Monitoring Plan for Installation Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Minimization of occupational health and safety risks					
1	Health and Safety Impacts	Implement all necessary measures to ensure health and safety of workers and the general public during installation of the project.	Throughout installation period	Proponent	0/-
		Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc. should be made available and personnel must be trained to use the equipment.	Once off	Proponent & Contractor	5,000/-
		Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises.	Continuous	Proponent	5,000/-
2	First Aid	Provision of well stocked first aid box must be ensured within the premises of the project area.	One-off/as per required	Proponent	5,000/-
		Provision must be made for persons to be trained in first aid.	One-off	Proponent	5,000/-
Sub-Total					20,000/-
Grand-Total					45,000/-



EMMP for Operational Phase

The EMMP for operational phase includes following:

- Air quality management & monitoring plan
- Noise management & monitoring plan
- Solid Waste management & monitoring plan
- Health and safety management & monitoring plan

Air Quality Management & Monitoring Plan for Operational Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Reduce Dust Emissions					
1	Dust Emissions	Monitor speed limits of vehicles operating at mining site.	Throughout operational period	Proponent	0/-
		Avoid operational activities in extremely dry weathers.	Throughout project lifecycle	Proponent	0/-
		Sprinkle water at site when necessary, to reduce dust spread.	Throughout operational period	Proponent & Contractor	5,000/-
		Ensure the use of Personal Protective equipment by workers and staff.	Throughout operational period	Proponent& Contractor	5,000/-
Reduce Exhaust Emissions					
2	Exhaust Emissions	Ensure minimization of Vehicle idling time.	Throughout operational period	Proponent & Contractor	0/-
		Alternatively, fueled equipment shall be used where feasible equipment shall be properly tuned and maintained.	Throughout operational period	Proponent & Contractor	0/-
		Give awareness to vehicle drivers and operators to avoid unnecessary racing of vehicle engines at loading/un-loading points.	Throughout operational period	Contractor	0/-



		Ensure that vehicles engines must be switched off at these points.			
Sub-Total					10,000/-

Noise Management & Monitoring Plan for Operational Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Minimization of Noise and Vibrations					
1	Noise and Vibrations	Aware vehicle and machinery operators to switch off engines of vehicles or machinery not being used to avoid excessive noise and vibrations.	During operational period	Proponent & Contractor	0/-
		Sensitize drivers to avoid gunning of vehicle engines or unnecessary hooting especially when passing through sensitive areas such as churches, mosques, residential areas and schools.	Throughout operational period	Proponent & Contractor	0/-
		Ensure that machinery is kept in good condition to reduce noise generation.	Throughout operational period	Proponent & Contractor	5,000/-
		The noisy production works will entirely be planned during day time when most of the neighbors will be at work.	Throughout project life	Proponent & Contractor	0/-
Sub-Total					5,000/-

Solid Waste Management & Monitoring Plan for Operational Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Minimization of solid waste generation and ensure efficient solid waste management					



1	Increased solid waste generation	Donate recyclable/reusable or residual materials to local community groups, institutions.	During operational period	Proponent	0/-
		Proper waste management plan must be developed.	During operational period	Proponent	0/-
		Waste must be stored at site in covered containers.	During operational period	Proponent	5,000/-
		Containers must be emptied before they reach their carrying capacity.	During operational period	Proponent	0/-
		Littering must be prohibited at the site.	During operational period	Proponent	0/-
		Awareness will be given to the staff and workers about handling of solid waste at site.	During operational period	Proponent	0/-
		Use of an integrated solid waste management system i.e. through a hierarchy of options: • Source reduction • Reuse • • Recycling	Throughout operational period	Proponent & Contractor	0/-
		Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of waste generated over time.	Throughout operational period	Proponent & Contractor	0/-
Sub-Total				5,000/-	

Health and Safety Management & Monitoring Plan for Operational Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)



Minimization of occupational health and safety risks					
1	Health and Safety Impacts	Implement all necessary measures to ensure health and safety of workers and the general public during operation of the project.	Continuous	Proponent	0/-
		Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc. should be made available and personnel must be trained to use the equipment.	Once off	Proponent & Contractor	10,000/-
		Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises.	Continuous	Proponent	5,000/-
2	First Aid	Provision of well stocked first aid box must be ensured within the premises of the lease area.	One-off/as per required	Proponent	5,000/-
		Provision must be made for persons to be trained in first aid.	One-off	Proponent	10,000/-
Sub-Total					30,000/-
Grand-Total					50,000/-



1 INTRODUCTION

1.1 Purpose of the Report

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

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

It is of utter importance to examine the environmental impacts, both beneficial and adverse, of the proposed project, and to recommend and propose mitigating measures to prevent, minimize or mitigate such impacts. The EIA study of the proposed project is necessary to assess the environmental consequences of the extraction at the proposed sites and to suggest appropriate, practical and site-specific mitigation as well as enhancement measures.

Furthermore, Environmental Impact Assessment (EIA) of mining concession has been made mandatory and has also been demanded by the Mines and Minerals Department, Government of the Punjab, Pakistan.

The objectives of EIA study are to:

- Assess the environmental settings, including the identification of environmental sensitive areas and social baseline conditions of the project area .
- Assess the coal mining activities and their potential environmental impacts.
- Identify the environmental impacts in terms of both quality and quantity.
- To develop an appropriate Environmental Management Plan (EMP), including mitigation and monitoring measures for adverse environmental impacts to enhance the capacity building.
- To propose rehabilitation development plan for the project site.

1.2 Identification of the Project and Proponent

1.2.1 Details of the Project

M/s M & S Enterprises holds a mining lease for coal located near Joggi Tilla in District Jhelum, Punjab, Pakistan. The coal lease area is over 480.82 acres and was granted by Mines and Minerals Department, Government of the Punjab.

1.2.2 Details of the Proponent

The affairs of company are controlled by M/s M & S Enterprises.



Table 1-1 Details of the Proponent

Name of the Proponent	M/s M & S Enterprises.
Representative	Malik Ghulam Rasool Sangha
Address	P-110 DHA, Lahore

1.3. Brief Description of the Project

The project area lies over 588.42 acres and involves mining coal by underground methodology. The project is located near Joggi Tilla in District Jhelum of Punjab.

The huge coal resources of Pakistan can play a significant role in meeting its energy demand for a long time. In this connection it will be necessary to make all out concerted efforts towards:

- Expanding the coal resources base through intensive exploratory efforts in all known fields as well as in new prospective areas;
- Introducing semi-mechanization in coal mining to keep up production as well as its cost at competitive levels;
- Developing indigenous R&D capabilities for adopting various advanced coal technologies to suit local conditions. Coal briquetting needs especial attention to cope with the energy requirements of villages and remote areas. In these areas, due to fuel shortage, the deforestation has reached at an alarming stage.

The mining industry is capital intensive and has the longest gestation period where success stories are about 40-50%. The minimum time required to reach the coal seam in Punjab is 18-24 months for developing a mine to raise an average production of 25 tons/day with an investment portfolio of 15-20 million Rupees. The investment portfolio and mineability enhancement are appended in the following pDhok Chabalagraphs. Again success is the function of all favorable factors mentioned above. The mineral managers either intentionally ignore or they are not well versed with the intricacy of the mining system. The decision making in a production mine go side by side with the development as well because the coal seam once in position may fade away or change in thickness or quality.

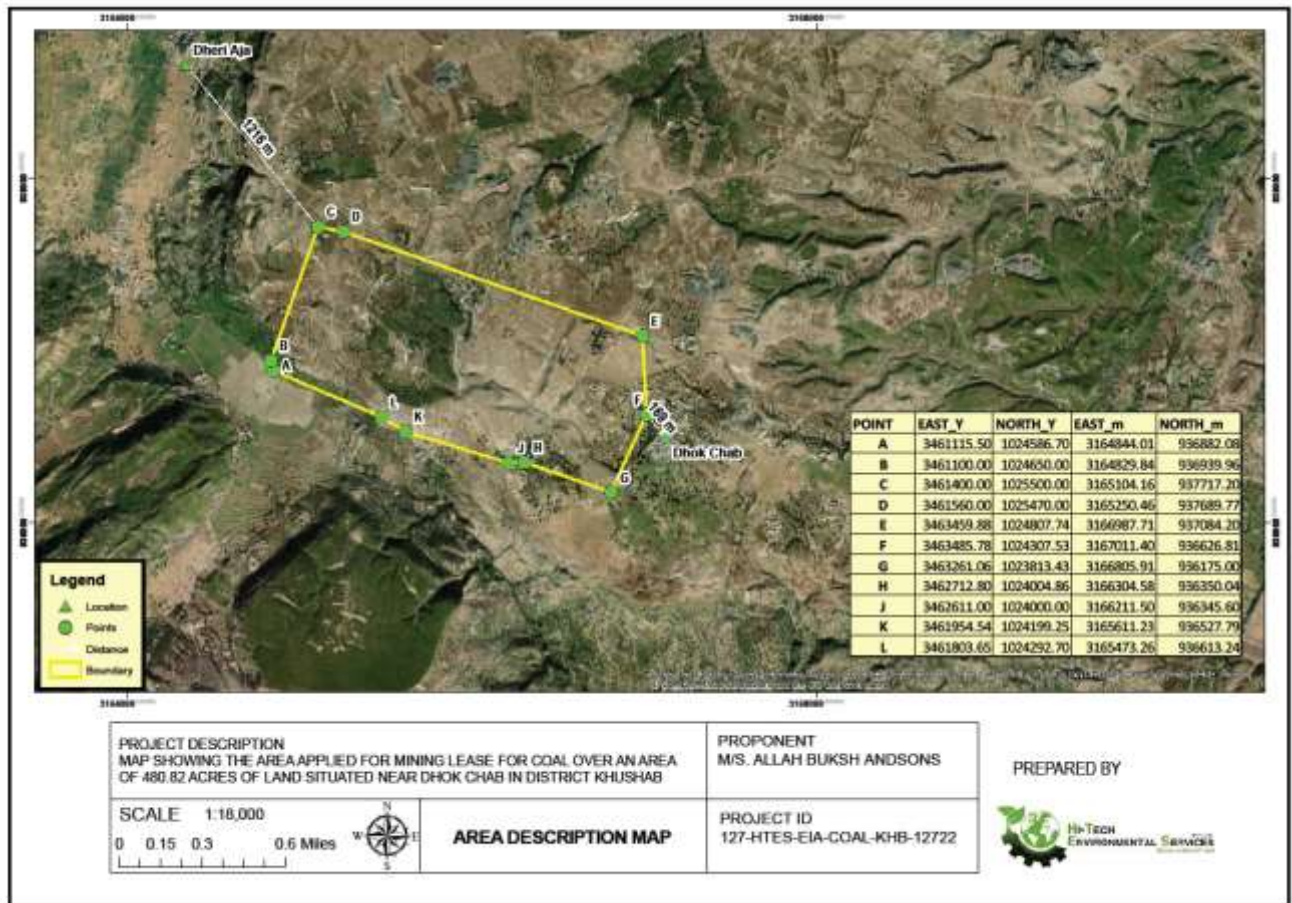


Figure 1-1 Location of the Project on Google Earth



2 SCREENING AND SCOPING

2.1 Details of Consultant

Hi-Tech Environmental Services (Pvt.) Ltd. is a business entity managed by geoscientists and environmental experts. The company has the expertise of highly diversified experience and has completed a total of more than 150 environmental studies across Punjab. The consultant has a range of expertise available in following areas:

- l) Economic Geology
- m) Determination of geological exploratory techniques and mine design
- n) Preparation of feasibility reports, IEE report, EIA reports, Development Schemes & Prospecting Scheme.
- o) Preparation of Environment Management Plans
- p) Preparation of reports on HRD /Mines Rescue & Recovery.
- q) Assessment of Impact of mining on environment and mitigating measures.
- r) Mine surveying & interpretation of boundary disputes.
- s) Legal opinion on mine regulatory regime.
- t) Energy fuels and selection of choice fuels for specific energy
- u) Drilling and blasting for underground and surface mining techniques.
- v) Safety measures for mines operation.

Table 2-1 Details of the Consultant

Contact Details	
Consultant Company	Hi-Tech Environmental Services (Pvt.) Ltd.
Address	26-B, Zahoor Elahi Road, .
Representative	Advocate Chaudhry Awais Ahmed
Contact	(+92) 3219443210
e-Mail	consultantshtma@gmail.com info@hitechma.com

The team carrying out the research project is presented in the Table 2-2.



Table 2-2 Team Carrying Out the Study

Sr.	Name	Qualifications & Brief Experience	Roles Assigned
1.	M. Hamza Tariq	Environmental Scientist B.S Hon. Environmental Science	• Preparation of Environmental Management Plan (EMP) • Preparation of Environmental Monitoring Plan (EMP) • Author of EIA Report
2.	Maryam Nazir	Mining Engineer and GIS Expert B.Sc. Mining Engineering	• Development of Maps
3.	Ch. Awais Ahmad	LLM (London)	• Site Visits • Legal Reviews • Coordination with Locals
4.	Engr. Harris Naeem	B.Sc. Mining Engineering	• Mining Techniques

2.2 Screening

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

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

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

2.3 Scoping

2.3.1 Spatial and Temporal Boundaries of Environmental Assessment

Project site is open land. After its development with time nature of area will change from open land to project site. Already coal mining activities are being taking place near around. Currently there is no significant population center present in the lease area. The current project site is 1-2 kilometers from population centers and all the parameters are within PEQS. No environmental sensitive area is present that could be impacted due to the current project.

2.3.2 Important issues and concern raised during consultation

During consultation it was observed that maximum of people was in favor of project and following issues and concerns were raised which have also been discussed in length in Chapter 9 Stakeholder Consultation:

- Air pollution should be controlled effectively.
- Locals should be preferred for the job opportunities.



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

2.3.3 Significant impacts and factors to be determined

Main impacts and factors to be determined are;

- Occupational Health and safety
- Site Security
- Traffic Management
- Hygiene management
- Community impacts
- Control Air emissions
- Job opportunities for locals
- Confined noisy activities
- Resource conservation
- Avoid excessive water consumption
- Energy efficient techniques must be adopted
- Proper site restoration after construction
- Tree plantation at designated green areas
- Emergency preparedness



3 CONSIDERATION OF ALTERNATIVES

3.1 Site Alternatives, their Selection and Rejection Criteria

Unlike industrial establishment the coal mining projects are pegged with the favorable geology in the given/ granted area. There are proven coal reserves in the area. Coal existence is subject to geological variations.

The projects involving mining of minerals are located in the areas which geological favor the presence of coal or other minerals. The site selection needs very careful, well thought out and wise decision. The most important factors for such a site selection include availability of raw material and land, seismic stability of site, existence of basic infrastructure including roads, water, manpower, proximity to electric transmission system, project economic viability with reference to specific site, land use policies, further expansion possibilities etc.

From the standpoint of environmental sustainability, the site selection is based on numerous factors including proximity from residential areas, protected areas, surface water bodies, wild life reserves etc. No site alternative was considered because site was already selected by the proponent and it lies within coal bearing formation. Site was not rejected because the geological formations support the existence of coal subject to exploration.

The project site is located in the area where geology favors the coal mining activities as enough reserves of coal are available. Coal mining operations cannot be carried out at a site where reserves are not enough. Hence, there is no alternative location available in this case.

Following are some of the additional parameters that favor coal mining in the respective region:

- i. Favorable geology with coal bearing area.
- ii. Easy extraction of the coal by available methodology.
- iii. The project operation doesn't involve human settlements displacement or relocation.
- iv. Mining of the coal in the respective zone has provided job opportunities to local people and improved their socio-economic status.
- v. The coal production has contributed positively in the income stream of the national exchequer as well as contribution in GDP.
- vi. The coal transportation from mine to market road is easily available.
- vii. The project has a sustainable life span.
- viii. The mining operations are undertaken up to the coal bearing strata with a geological depth of around 250-400 feet.
- ix. Moreover, there is no railway line, reservoir, canal or public building within 2 km distance of the mining area.



- x. No important religious, archaeological, recreational site, ecologically sensitive, declared protected area and human settlements exists within close vicinity of the selected site i.e., within 100 m which is considered to be a safe distance.
- xi. The lease granted concedes with the fixed geology. The lease held in the past has been renewed for the same location based on satisfactory performance of the lessee. There is no alternative to the fixed geology at site. The grant of lease is specific to the lessee and coal discoveries in the leased area. The sequence of rocks being the same in salt range with small variations of thickness due to depositional environment. The working for coal in the Patala Shale remains an unchanged phenomenon.

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

3.2 Design/technology alternatives, their selection and rejection criteria

The coal can be mined out majorly by two methodologies namely:

- i. Underground Mining
- ii. Surface Mining

Under the present conditions and due to geological along with techno-economic parameters, only underground methodology.

3.2.1 Environmental Alternatives, their selection and rejection criteria

The project simply involves the mining of coal and transporting it to the required sites. The extraction of coal often involves extraction of other insignificant minerals such as limestone and shales. The lessee is committed to utilize coal extracted built while the shales will be levelled off and covered with additional layer of soils leading to plantation activities.

3.2.2 Economic Alternatives, their selection and rejection criteria

The current selected mythology, designing and mining technique is economically efficient and provides extensive job creation avenues. It refers to the shift of materials used in the proposed project towards environmentally friendly and sustainable materials. In present case, the material that is being mined is coal and there is no alternative mineral present. All machinery, equipment and materials procured for the said project will be environmentally friendly and sustainable. Hence, there is no material alternative considered in this case as coal is being mined



4 DESCRIPTION OF THE PROJECT

4.1 Objectives of the Project

The objectives of the project are:

- a) To meet coal-based energy demands through environmentally friendly coal mining at national level.
- b) Expand business through added exploration and exploitation by new entries based on techno-economical parameters.
- c) Accelerate pace of development in the existing mines.
- d) Enhance production, productivity coupled with safety by improvising with the adaptable technology-mechanization.
- e) Add matching infra-structure, machinery and equipment along with other inputs needed as a factor of production to keep pace with the envisaged programs.
- f) Undertake aggressive marketing to maximize domestic share.
- g) Expand community development program and social fabrics
- h) Consider feasible options to utilize mine effluents if possible as a raw material for compatible industrial use and minimize the adverse impact of mining on environment (Use of shale in cement plants)
- i) Supporting government's economic agenda by creating job avenues.

4.2 Location and Site Layout of the Project

To define the boundaries of the EIA study, location and site layout map is prepared. The lease of coal is located in District Jhelum of Punjab. The project location is represented in Figure No. 4-1 and more detailed colored image is present in **Appendix II** on A3 size.

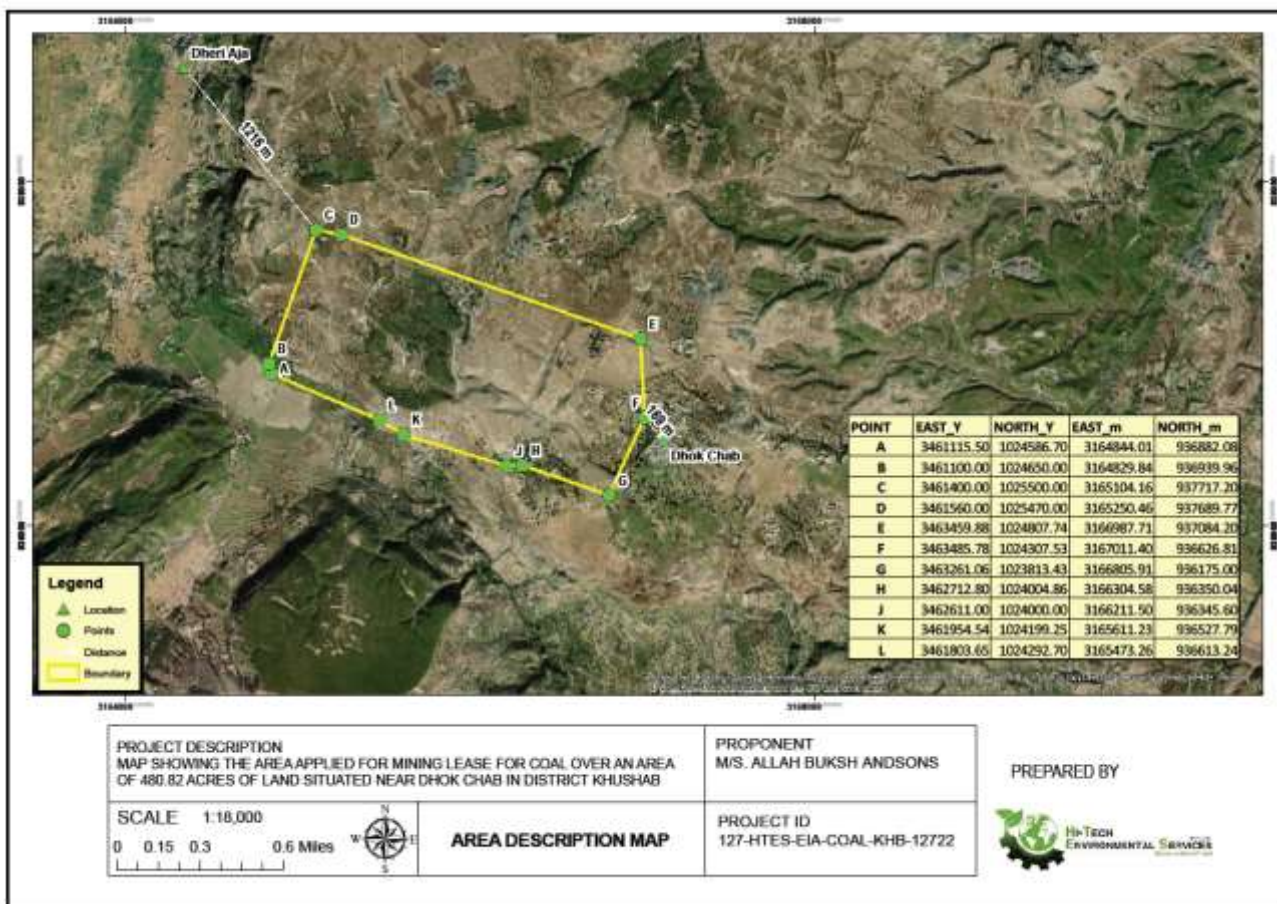


Figure 4-1 Location of The Project

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

Table 4-1 Coordinates of the Coal Lease Area

Points	East (Yard)	North (Yard)
A	3554300	1056000
B	3552524	1056000
C	3553503.79	1057156.7
D	3552000	1057156.7
E	3552000	1058000
F	3553000	1058000
G	3553000	1057672
H	3554000	1057672
J	3554000	1057140
K	3554110	1057140
L	3554220	1057190
Total: 588.42 Acres		



The distances of major locations from project site are shown in Table No. 4-2.

Table 4-2 Distance of the Important Areas from the Active coal Mining Zone

Location	Approximate Distance (KM)
POPULATION CENTERS	
Tilla Jogian	1.69
Village Bangial	7.73
Bhati	3.55
Jhunda	3.28
Dhoke Sheryan	4.44
Dilo Da Mohra	5.80
INDUSTRIAL & MINING PROJECTS	
Haji Allah Ditta Sons Engineering Industry	27.82
BB Industries	27.77
New Hussain Rular Flour Mill	28.94
District Industrial Home Jhelum (Sanat Zar)	31.19
WATER BODIES	
Lake Dhok Suba	5.15
Baral Dam Lake	33.02
FOREST AREAS	
Jhelum Forest	33.14
Jhelum River Side Forest	32.15

4.3 Land Use on the Site

The areas where the mining will be done is under no use. Most of proposed coal mining sites are abandoned. So, there won't be any loss or degradation of productive land. Moreover, the coal is being extracted underground making no change on surface.

4.4 Road Access

The lease site is easily accessible from Kallar Kahar Road via access road. This road leads towards the village Dheri Aja.

4.5 Vegetation Features of the Site

On the proposed mining areas, the land has no vegetation cover. The area is devoid of any vast tree cover.

4.6 Cost and the Magnitude of Operation

The mining of coal can be done over an area of 588.42 acres subject to favorable reserves and coal quality. The details the coal mining project costing is presented in Table 4-3.



Table 4-3 Cost of the Coal Mining Project

Sr.	Description	Amount
1	Lease Auction	11,500,000
2	Office and Labor Shed	1,000,000
3	Access road	1,000,000
4	Mine Development	30,000,000
5	Machinery & Equipment	10,000,000
6	Land Infrastructure	10,000,000
Total Development Cost		63,500,000

The magnitude of operation includes:

- Detailed site survey, planning and demarcation of the various regions in the project area
- Site suitability assessment
- Process of mine designing
- Purchase and delivery of equipment
- Mine development
- Testing and commissioning
- Plantation of various ecologically important species on the designated green space

4.7 Schedule of Implementation

The mining operations are conducted with due care and vigilance not to pollute the environment or inflicting any kind of danger/threat to environments downstream. The impact of mining is being analyzed in the subsequent chapters. In case of any adverse impact the mitigating measures will be suggested for implementation and its schedule shown at respective chapter. The time schedule for the development of the quarry is shown in Table 4-4.

Table 4-4 Time Schedule for the Quarry Development

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

4.8 Description of the Project

The mining activities will be carried out by considering all the environmental parameters. No mining activity will pose any threat and danger to the environment. The mining operations will be carried with due care and vigilance. All the impacts will be assessed in detail on every environmental setting. The corresponding mitigation measures will be suggested for every impact resulting from the project activities.

The method of mining is a function of mineral deposition, its environment, geological surrounding, seam thickness, its dip and nature of coal whether gassy or non-gassy, or fire



prom or not. The Punjab coal seams are thin less than 2 feet which is a world record on coal extraction for such a thin coal seam.

The access to coal seam either through adits or shaft is made as the permanent access road ways to the coal seam. These openings are used for the passage of miners, machinery and for the passage of mined coal. There are three choices for making access roadways to the mineral deposit for underground mining i.e. shafts, tunnels and adits.

The shaft is opted where the strata is nearly horizontal in bedded deposit. The tunnels are opted for an almost vertical or nearly vertical stratum in a bedded deposit. The adits are artesian way of making access to the mineral deposit and are in practice since time in memorial. Worldwide the fastest means of mineral transportation from underground to surface are shaft and tunnel. The adits are compromise in-between.

Shafts are sunk by using conventional drilling and blasting by artesian method which is not cost effective and takes 12-15 months with shaft diameter of 2.5 meter and average depth of 150 meters. The existing mine which have gone deeper and have expanded laterally are confronted with ventilation problem. Bore-raising from the last workstation to the surface will improve the ventilation. In nutshell, the shaft sinking and bore-raising technology must be adopted with imported machines with government support.

With the exception of Makarwal, tunneling has been rarely adopted in private sector. There are a few locations like in Dandot, Kamlial where an effort has been made for tunneling. Rest of Punjab coal mining is on adit.

The coal extraction is done generally on room and pillar method. Makarwal area claims to have adopted longwall advancing and retreating both. In most of the mines a combination of advancing is improvised by Surakhi System.

There are different underground Coal mining methods which are as follows:

1. Room and Pillar Mining
2. Long wall Mining
3. Short wall Mining

4.8.1 Short Wall Coal Mining Method

In the short wall mining method, mine development is carried out in such a manner that large block of coal, usually less than 100 meters wide is available for complete extraction.

A block of coal is extracted in slices, the dimensions of which are fixed by the height of coal extracted, the width of the short wall face, and the thickness of the slice. This method is adopted to extract coal while advancing towards boundary depth or strike. This is adopted in a coal seam which are non-gassy and non-firy. If the size of the working face from where the coal is to be extracted is 100 meter or more it can be taken as long wall and any dimension less than that can be taken as short wall.

The ventilation system in the mines are through mechanical exhaust fans installed at a return airway. The water problem is tackled through constant pumping from grade depth of 100-150 meters. The coal dust is suppressed underground by water sprinkling or as per



legal requirement of limestone dust sprays. The temperature is controlled through the ventilation current underground. The strata are controlled through coal pillars and timber provided in the shape of doors erected at 2.5 to 3 feet apart. The timber used is Kikar.

The general layout plan of short-wall mining is given in Figure 4-2.

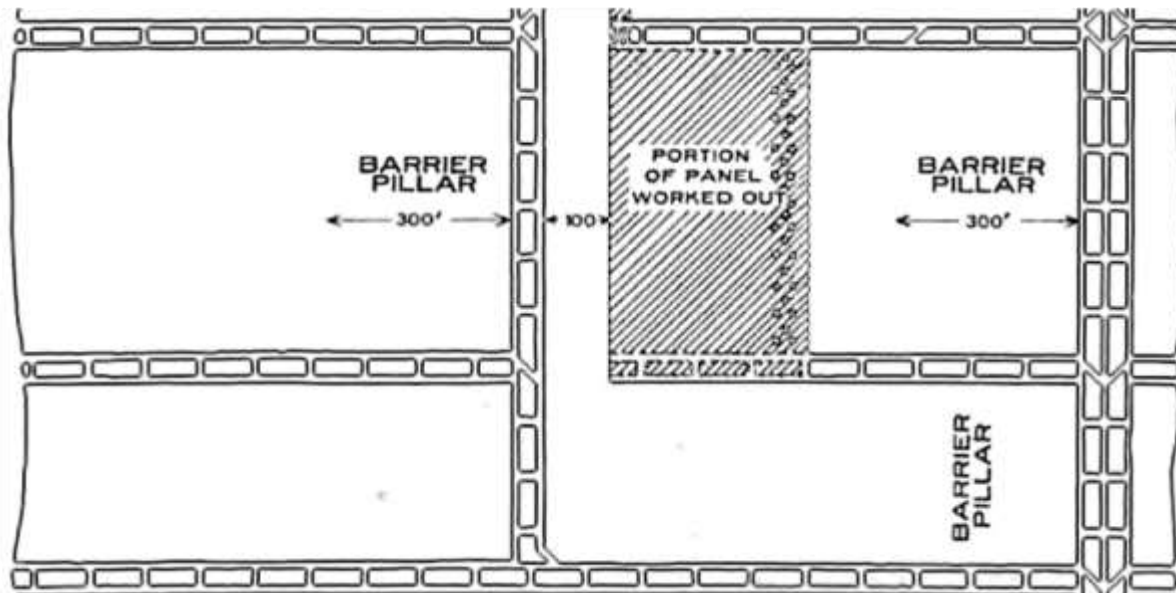


Figure 4-2 General Layout Plan of a Short wall Mining Method

4.8.2 List of Equipment & Machinery for Coal Mining

The list of equipment proposed to be used for coal mining operations is given in Table 4-5.

Table 4-5 List of Equipment for Coal Mining Operations

Sr. No.	Nomenclature	Purpose
1.	Engine Generator	Power Generation
2.	Compressor	Development
3.	Fan blower	Ventilation
4.	Haulage	Development
5.	Water tank	Sprinkling
6.	Pick Machine	Development
7.	Cables	Development

The mode of coal extraction is manual. The mining will be carried out either by hand-spades or by hand picks. No machinery is used for extraxction of coal from coal face.

4.8.3 Coal Haulage, Storage, Loading, Transportation & Unloading

The details of coal haulage, storage, loading, transportation & unloading are given below:

- Coal Haulage



The development incline or shaft are generally track mining. In this case the rail track is used to facilitate the mining cars which are hauled up through a haulage installed at top. Rarely, the trackless system is adopted for underground mining in mining due to the low volume and high grade as well as absence of electricity from national grid. The loading and unloading is done through improvised method of mechanical levers. In certain cases, for low production or low volume it is opted as manual operation. Underground transportation is generally through hand-tramming of mining cars carrying about one ton of coal.

Most of the mines being worked on conventional system using donkeys do not need hand tramming underground. The cutting of coal and stone at the face is done by hand pick where the output per man per shift at the face is 0.75 tons and on overall basis 0.33 tons.

Coal haulage is the transport of mined coal from working faces to the surface, is a major factor in underground mine efficiency. In present case, the coal will be loaded into tubs/carts using shovels and picks and then hauled from working faces to the surface.

- **Coal Storage**

Coal will not be stored at site in the form of coal piles after extraction from coal face and haulage at the surface. Coal will be loaded onto trucks for transportation to market places/consumer end after haulage at surface.

- **Loading**

After haulage at the surface, coal will be loaded onto trucks from carts to be supplied to consumer end. Coal will be loaded from carts into trucks either using hand spades or shovels.

- **Transportation**

Coal will be transported to the consumer end/ market places using trucks. Coal extracted from this area is transported to various cities in Punjab province.

- **Unloading**

The unloading of coal is done by consumer or truck/ tractor trolley owner/ agency at the consumer area which is concern of consumer.

4.8.4 Manpower

Coal mining industry is labor intensive and hence carries potential for employment generation in remote locations. The supervisory staff is non-local and hired on monthly wages. The engineering and executive staff follows the suit. The employment expected is given in Table 4-6.



Table 4-6 List of Equipment for Coal Mining Operations

Sr. No.	Category of Staff	Strength
1.	Surveyor	01
2.	Mine Sardar	01
3.	Electrician	01
4.	Munshi	01
5.	Mine Incharge	01
6.	Labor	09
Total		14

4.8.5 Blasting Details

The hard rocks may be during developing or associated with rocks are fragmented by the use of appropriate explosive with different drilling and blasting pattern which is purely need based. The coal is manually cut and excavated while hard-stone in the development galleries or chipper are excavated by adopting conventional drilling and blasting using high explosive coupled with safety fuse and detonator. The amount of explosive to be used is procured on daily basis and utilized as per Rules and Regulations of Mines Act 1923.

- **Blasting Frequency**

The blasting frequency is almost once a day at each workstation requiring the support for use of explosive to the extent of its licensed limits i.e. 5 kg/day. Whenever, there are hard-rocks exposed in development galleries or chipper, drilling and blasting has to be carried out.

- **Method used for Blasting**

Conventional blasting method will be used with high explosive coupled with safety fuse and detonator.

- **Location Designated for the Storage of Explosives**

The Explosive is stored on the surface in an approved manner as per provision of Mines Act 1923. The amount of explosive to be used is procured on daily basis and utilized as per Rules and Regulations of Mines Act 1923.

- **Mitigation Measures to Control Environmental Impacts during Blasting**

Following are the preventive measures adopted for environmentally friendly and safe blasting operation:

- All blasting operations will be carried out in compliance with conditions as specified in Coal Mines Regulations, 1926.
- The area where blasting is being carried out will be fenced properly.
- To avoid noise problems and disturbance to the community, blasting will be carried out at specified days and between specified timings.



- To prevent air quality, blasting may not be carried out in extreme weather conditions, if practical/ possible.
- Proper monitoring of blasting operations will be carried out by manager or concerned persons.

4.8.6 Health, Safety & Hygiene

Health, Safety & Hygiene includes the following:

- **First Aid Facility**

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

- **Safety Trainings**

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

- **Use of Drugs and Narcotics**

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

4.8.7 Personal Protective Equipment

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

4.8.8 Water Requirements

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

4.8.9 Solid Waste

The coal seam is not very thick. The solid rocks associated with the coal seams are required perforce to be extracted for making the size of galleries within the prescribed limits of comfort. Generally speaking, the size is kept 6x6 feet in the gallery. The cavity created by the coal extraction provides enough space for hosting the solid rock dumping underground up to 40%. The surplus stones are hauled up and dumped on the surface on the hill slope in a way that natural drainage pattern is not blocked if required.



4.8.10 Process Flow Chart

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

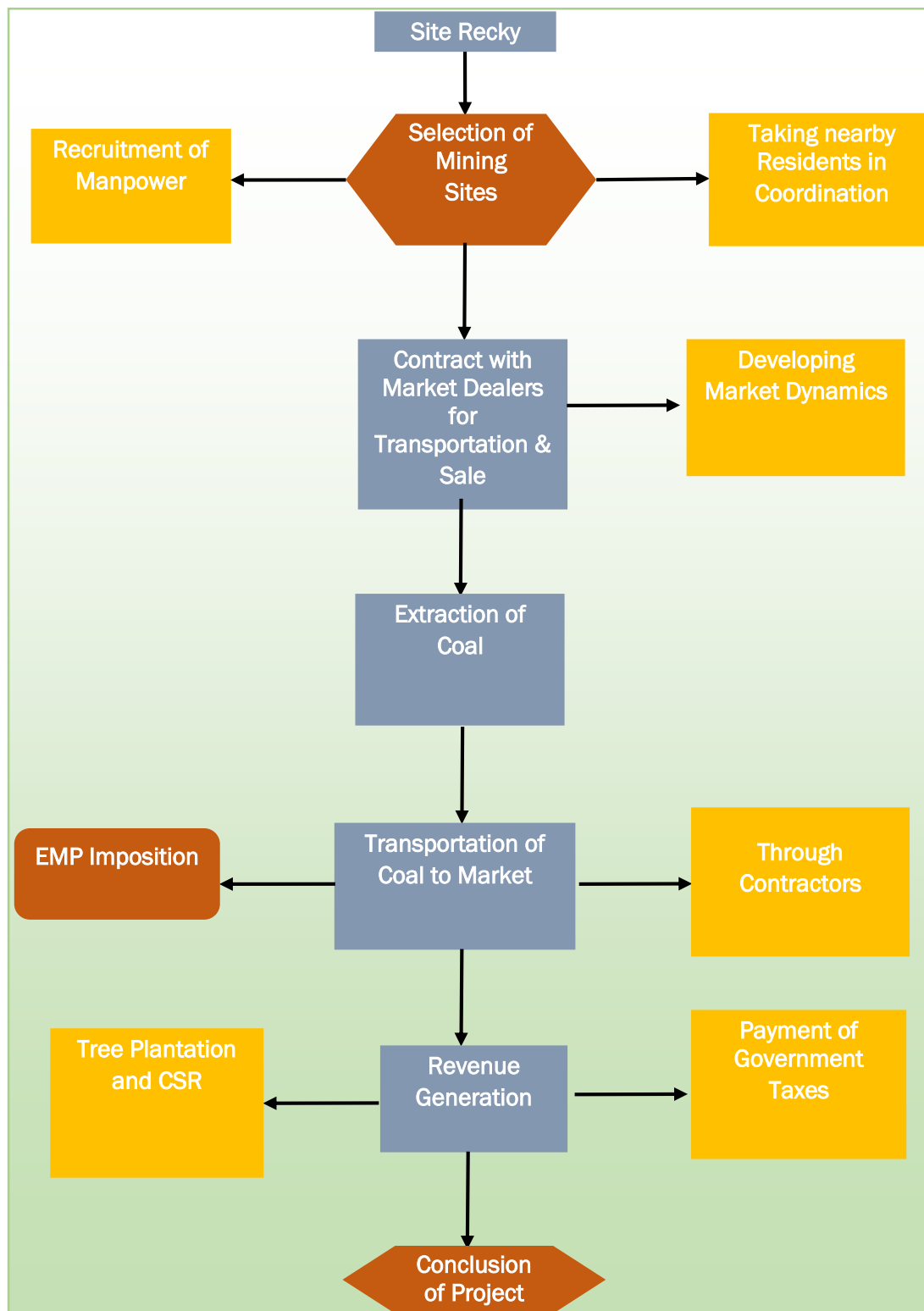


Figure 4-3 Process Flow Chart



- **Mode of Excavation**

The mode of excavation is manual. The mining will be carried out either by hand-spades or by hand picks. No machinery is used for extraxction of coal from coal face. The coal mining is done at depth of about 400 to 500 feet. The coal deposits are generally present at such depths in the Salt Range.

- **Market of the Coal**

After loading into the trucks, coal will be transported to the market places based on demand. Trucks will be used for the transportation of coal to the market places. Coal may be marketed to Chakwal and nearby areas.

4.9 Restoration and Rehabilitation Program

Following measures can be adopted hypothetically to restore and rehabilitate the site:

- There exists no human settlement within safe radius of the selected project site to be displaced owing to the mining operations. No structure of any significance stands at the site to be relocated or dismantled. Mine is already awarded to proponent, hence, no relocation and rehabilitation is required.
- The process of mining employed will be surface mining process in which least disturbance to the vegetation features and the infra-structure at the project site will occur.
- The importance of the site is due to economic activity, otherwise. It is a replica of a barren land. The question of rehabilitation therefore doesn't arise except re-coursing the land formed by the cavities of the mined-out area
- The isolated site can be used for geo-tours to the visitors for generating alternate economic activity once the reserves are exhausted.
- The site can be used for the re-creational purposes.
- Trees will be planted at the project area by using dry afforestation technique and the overall ecology of the area will be improved significantly.
- The site can be used for re-stocking the livestock

Reclamation practice varies widely, depending on the type of mine, its location and the applicable legal requirements. The proponent will strictly follow the provisions of Environmental Protection Act, 1997 and the Punjab Mining Concession Rules, 2002.

Considering its importance proponent will operate to the highest environmental standards of environmental management within the context of sustainable development. Each mine requires a particular solution depending on the region where it is situated, the type of mine and the mining methods applied.



Table 4-7 Restoration and Rehabilitation Program

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



5 DESCRIPTION OF THE ENVIRONMENT

An environmental baseline study is intended to establish a data base against which potential impacts can be predicted and managed subsequently. The EIA of the proposed project covers a comprehensive description of the project area, including regional resources which are expected to be affected by the project, as well as, those which are not expected to be directly affected by the operation of the project.

A site visit was conducted to survey the field area for collection of relevant data. Interviews were conducted with the general public and stakeholders of the project area in order to seek the public opinion on the implementation of the proposed project. The environmental impacts of any activity or process will be assessed on the basis of deviation from the baseline or normal situation. The following components form part of the baseline study.

- Physical Environment
- Ecological Environment
- Socio-economic Environment

5.1 Baseline Physical Environment

5.1.1 Alluvial Deposits

Project site is located in District Jhelum, which is situated entirely on the alluvium plain. Kanker is found all over the district. Sediment deposits are visible in the low velocity area of the river where initial plant colonizers can be seen at the early serial stages of succession of vegetation. Along the banks of the river, gradual accumulation of sediments has resulted in “Bela” formation, which supports tree growth and hence named as “Zakeeras”.

5.1.2 Physiography

Jhelum district is part of Pothohar Plateau. The district stretches from the River Jhelum to the vicinity of River Indus. Jhelum district consists of salt range consisting of Mayo mines. 388 mines of numerous minerals are located in Chakwal including 246 mines of Coal. From the north-western coal-mine railway obtains partial supply.

5.1.3 Soil Type

There is a long strip of very rich and virgin soil along the river which could be made a paradise of citrus plantation by drip irrigation if the local people are motivated. The types of soil commonly found are silt loam, loam, sandy loam, sandy clay loam and riverine silt. The immediate project area soil is riverine alluvial silt tending to fall in sandy loam and silt loam with Kankers.



5.1.4 Land Use

On an average, within the direct influence of the river and in the immediate vicinity of the project area, 20% of the land is under agriculture. About 0% is under settlements, 20 % wetlands and 0 percent forest/range land. About 80% of total population depends upon agriculture. Most of the agriculture land is under cultivation. Rice is the main Kharif (summer) crop. Wheat is the main Rabi (winter) crop while fodder is the other crop. The cropping intensity is over 100% and multi cropping is quite common.

Table 5-1 Land Use in Jhelum District

LAND USE	AREA (Ha)	% of Total Distt. Area
Total Geographical Area	750	100
Area Reported	359	47.86
Area Under Forest	45	6.0
Not Available for Cultivation	133	17.73
Culturable Waste	56	7.46
Current Fallow (C.F)	59	7.86
Net Sown (N.S)	66	8.80
Area Sown more than once (A.S.M.T.O)	32	4.26
Net Cultivated Area (C.F + N.S)	125	–
Net Cropped Area (N.S + A.S.M.T.O)	98	–

5.1.5 Climate

Jhelum has a humid subtropical climate (Köppen climate classification Cfa) and is extremely hot and humid in summer, and cold and generally dry in winter. The maximum recorded temperature in the pre-monsoon season of April to June is 49.2 °C (120.6 °F), whereas in winter the minimum temperature recorded is –0.6 °C (30.9 °F). Average annual rainfall is about 850 millimetres (33 inch). Nevertheless, in the rainy season water torrents flow from the north to Jhelum River very rapidly and cause damage to the crops, bridges and roads. This is responsible for the soil erosion in the district.



Table 5-2 Average Rainfall & Temperatures in District Jhelum

MONTHS	J	F	M	A	M	J	J	A	S	O	N	D	Avg.
Mean Rainfall	39	32	28	20	14	42	95	95	44	18	15	39	40.0
Max. Temp.	16	20	25	31	36	38	35	34	33	30	25	18	28.4
Min. Temp.	3	5	9	16	21	24	24	24	21	15	9	5	14.6

5.1.6 Water Resource near Project Area

- **Surface Water/Wetlands**

Main source of surface water in the nearest vicinity of project area is River Jhelum itself. However, the surface water consists of several Nullahs (torrents) and discharge from Mangla Dam. These seasonal Nullahs on both sides of the river carry rainwater from the hills and other adjoining areas into the river during period of heavy rain. The surface water supply plays an important role in irrigation and drainage of the extended project area. Major source of irrigation water is River Jhelum. It is suitable for irrigation purposes. Discharge data is collected, from the gauge installed at Jhelum Bridge on Lahore Islamabad G.T. road, for two months i.e. September and October of every year.

- **Ground Water**

The ground water aquifer is recharged by surface water. The sub-soil ground water table within the immediate project area is about 30-60 feet. The quality of the groundwater is such that it is suitable for domestic use. It is sweet and of drinkable quality. By and large, the tube wells are owned privately by people of the area.

5.2 Baseline Ecological Environment

Ecological Environment includes:

- Flora
- Fauna
- Endangered species

5.2.1 Biodiversity

The natural vegetation found throughout the district is thorny.

- **Forest and Flora**

Vegetation of the Jhelum Forest Division is dry deciduous scrub type, Phulai, Kau and Sanatha are the main species. The stocking on the whole is poor and the forests are open. Vegetation is poor on sandstone and redmarl. The southern slopes are often devoid of



vegetation while north western slopes carry good forests. The forests of Jhelum Divisions are burdened with right of grazing, browsing and firewood. Under settlement out of total area 93,566 acres (378.65 km²) only 5,468 acres (22.13 km²) about (45%) are right free. Remaining 55% are open to grazing. Some other species such as eucalyptus, sheesham, keekar and mulberry are also present.

Agricultural crops like wheat in Rabi season and rice and pulses in Kharif season are grown. The riverian as well as the inland flora plays a significant role in the local economy by way of timber and fuelwood production, protection from wind and water erosion, habitat of birds and animals, environmental balance, cultural identification and rehabilitation of soils affected by water logging and salinity

- **Fauna**

The fauna of the District is mostly indigenous, restricted (confined), like the vegetation, but similarly varied. The rugged and rough terrain, low rainfall, the scanty cover of vegetation and the increasing number of hunters, all have their share in limiting the fauna in the District. The riverine area offers a better environment than elsewhere though the hills support a more interesting wildlife. Urial and Chinckara are spot aids while wild bores are found in the Salt Range. Wolves, Foxes and Wild Cats are also found. Hare is fairly common. Chikor grey and black Partridge are also found in the parts of the district. Migratory ducks like Teal Pintail and Mallard and some geese visit during winter. Fish such as Teal, Sohal, Silver Carp, Sanghara Rahu and Grass Carp have been reportedly fou

5.3 Socio-Economic Perspectives

Socio-economic aspects of the project area were studied on the basis of Focus Group Discussions and by exploiting the available secondary data. The results of surveys carried out have been drawn which are presented in the section below:

5.3.1 Jhelum City

The district headquarter of Jhelum is Jhelum City. This is situated on the right bank of Jhelum River. Grand Trunk Road constructed initially in 16th century passes through the city. Jhelum is the 35th largest city of Pakistan in terms of population. A cantonment was built during the British rule, which has grown up into a Garrison with an Infantry Division commanded by a Major General. In the past few years, the city has experienced rapid expansion and has become a vibrant economic and cultural center. The old city has narrow streets and crowded bazaars.



5.3.2 Pind Dadan Khan

Pind Dadan Khan is located at 32°35'16N 73°2'44E on the bank of River Jhelum, about 24 kilometers east from the M2 motorway and 85 kilometers from Jhelum. Pind Dadan Khan lies 6 km south of Khewra Salt Mine (or Mayo Salt Mine), 24 km east of the Lillah-Toba interchange of M2 motorway and 8 km east north of Pither Nadi. It borders with Khushab, Chakwal, Sargodha and Mandibahudin.

The population according to the 1901 census was 13,770. It was formerly the depot to which salt was brought from the Mayo Mine, from which it was carried across the river to the railway; but the bridging of the Jhelum at Haranpur and the extension of the railway to Khewra have by-passed. In earlier days, brass vessels were made in the town and there was a considerable weaving industry. Embroidered lungis were often sold at high prices. Boat-building was a source of skilled employment, and river boats of Pind Dadan Khan make were in request throughout the whole course of the Jhelum. However, after the construction of Mangla Dam to strengthen the irrigation system of the country as part of the Indus Basin Project, there is now diminished water flow[quantify] in the river Jhelum except during the flooded season

5.3.3 Jhelum District

Jhelum district locates in the Punjab province of Pakistan. It is located in the northern part of the province. Jhelum district is bordered by Sargodha to its south, Gujrat and the Jhelum River to its south and east, Chakwal to its west, Mirpur to its east and Rawalpindi to its north.

According to Punjab Development Statistics 2011, total population of Jhelum district is 1,148 thousand persons out of which 574 thousand are males and 574 thousand are female. Density of population in the district is 320 persons per square Kilometer. The district of Jhelum stretches from the river Jhelum to the vicinity of River Indus. Salt range exists in the district including Mayo mine from where salt is quarried. The prime centre of the salt trade is Pind Dadan Khan. Jehlum is known for providing a large number of soldiers to the British and later on to the Pakistan armed forces. That is why the district is also known as city of soldiers or land of martyrs and warriors. The district is crossed by the main line of the North-Western railway, and also traversed along the south by a branch railway line.



5.3.4 Major Castes in the District

The major castes of the district are Awan, Akra, Bharat, Gakhar, Gujar, Janjua Rajput, Jalap, Jat (Cheema, Dhamial, Gondal, Ghuman, Sipra, Nagyal, thathal, Kashmiris, Khokhars, Lilla Qureshi, Phaphra Mughal, Bhakral, Bhatti, Chib, Minhas, Narma and Sohlan.

5.3.5 Languages

Punjabi language is spoken by the majority of the population in the District Jhelum.

5.3.6 Minerals

Jhelum has very rich reserves of mineral resources. Minerals like Rock Salt, Brine, Gypsum, Coal, Bentonite and Silica Sand are being exploited commercially by private and public sector agencies in the district. Khewra Salt mine also located in district Jhelum.

5.3.7 Industry

There are numbers of industry in and around Jhelum City. Major industries include tobacco factory, wood, marble, glass, flour mills, cement and soda ash manufacturing units.

5.3.8 Major Profession

The major professions adopted by local people are service in Armed Forces. A large number of people of this district are settled in foreign countries particularly Western Europe. Agriculture and labour (workers on daily wages in construction, agricultural and other sectors) are also significant professions of the people living in Jhelum district.

5.3.9 Source of Drinking Water

Ground water is the main source of drinking water in the district. Households residing along the project area mostly have water supply in their houses for domestic use. Ground water is sweet and fit for drinking.

5.3.10 Literacy Level

Literacy is a basis for lifelong learning and plays a foundational role in the creation of sustainable, prosperous and peaceful societies. The Literacy ratio (10 years age and above) of Jhelum District was 63.9 % percent in 1998 on an overall basis. The literacy ratio for males calculated 77.66 % percent as against 50.47 % percent for females.

5.3.11 Impact on Land

During the impact assessment survey, data regarding the impacts of project was collected. However, the field investigations revealed that overall adverse impacts of the project on



the local people, land, structure, crops, trees, business, and employment etc. are not significant.

5.3.12 Indigenous People

There are no indigenous people in the sub-project area. No notable migration of any tribe inside the area was observed for many decades. So, the project does not fall in the categorization of indigenous people.

5.4 Institutional

5.4.1 Institutional Activities

There are a number of governmental and non-governmental institutions in the project area.

5.4.2 Institutional Effectiveness

The institutions are yet in infancy stage. These are not fully effective.

5.5 Human Use

5.5.1 Telephone

Nationwide and international telephonic and fax linkages are available.

5.5.2 Livestock and Agriculture

The project area is famous for buffaloes known as one of highest milk producing animals. Livestock such as goats/sheep, camel and other cattle are also reared by the locals. The livestock includes cattle, buffaloes, sheep, goats, camels, horses, asses and mules. Nearly 25% of the farmer's income is from livestock. At least 10% of the population is landless, cattle raisers and their living comes from cattle milk marketing. On the average each family possesses 5-6 cattle and 7-10 sheep and goats.

Jhelum District has a total area of 858,767 acres, out of which 316,815 acres are cultivated. Agriculture in the District Jhelum depends mainly on rainfall. The average rainfall of the area varies from 20 to 40 inches. The irrigated area at present is limited but the emphasis on construction of small Dams and Mini Dams is gradually increasing. Besides, Wheat, Sugarcane, Rice, Moong, Mash, Masoor, Gram, Ground Nut, Jawar, Oil Seed Such as Rape/Mustard and Sun Flower are grown in the district. About 80% of the population of project area depends upon agriculture. Most of the area is well cultivated. Rice is the main Kharif crop.

5.5.3 Cultural Heritage



The area does not boast of any significant cultural development. People follow the family/village traditions.

5.5.4 Archaeological Monuments / Relics

No sites of archeological, historical, cultural or religious significance are known to exist in the areas where construction will take place or where different project facilities will be established / located. In case, if any such site is found during the subsequent phases of project, it can be handled as per Law and Procedures.

5.6 Ambient Quality of Environment

5.6.1 Ambient Air Quality

Field visit observations indicate that ambient air quality is generally acceptable. There will be mechanical equipment to be used in the operational works which may generate gaseous emissions. However, it is anticipated that these emissions will not be a threat to the environment in the project area since it can be managed through proper implementation of Environmental Management Plan. It is also anticipated that Carbon Monoxide and Oxides of Sulphur and Nitrogen derived from powered vehicles can also be managed through proper implementation of environmental Management Plan.

5.6.2 Noise Level

Field visit observations indicate that ambient noise levels are within permissible limits as there is neither any mobility of vehicles nor industrial units exist in the project area. It is anticipated that powered mechanical equipment and vehicle to be used during construction period can generate noise of moderate level. This can be minimized through proper implementation of Environmental Management Plan.

5.6.3 Natural History Event/Seismic Hazards

The area has no history of any serious damages due to earthquake. The area lies in Zone 2B which is a Minor Hazard Region.

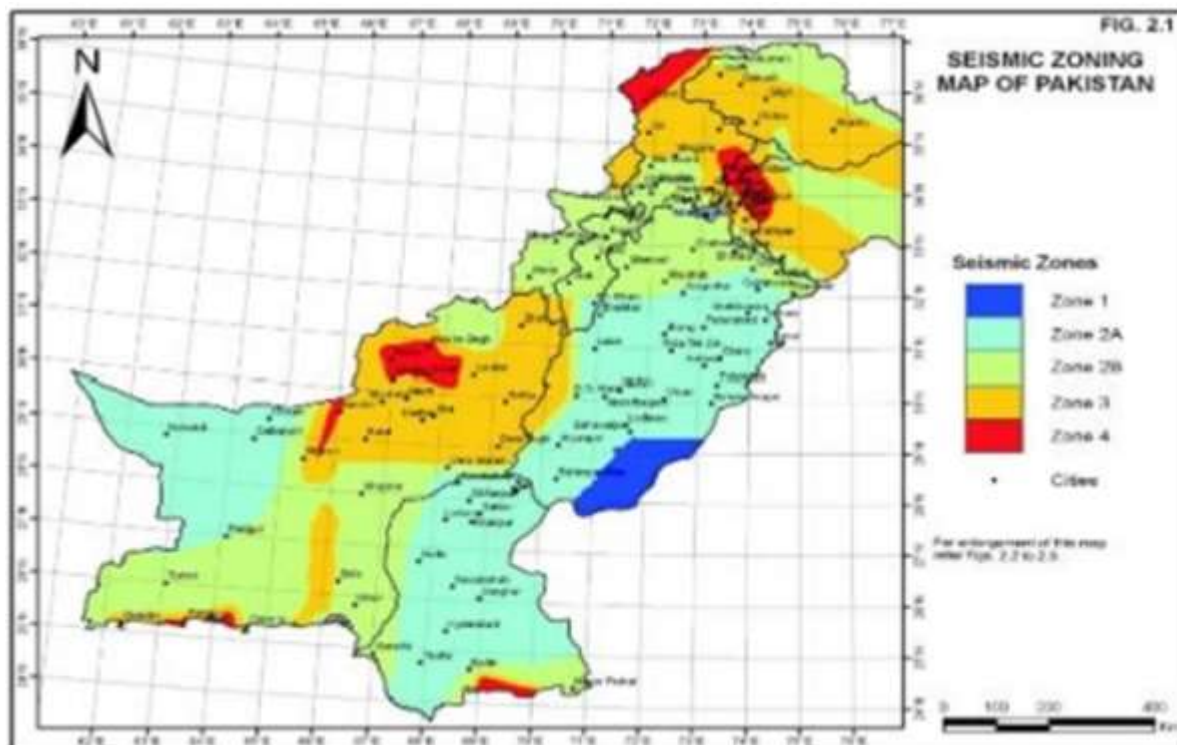


Figure 5-1 Seismic Hazard Zones of Pakistan

5.7 Lab Reports of Environmental Analysis

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

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

The lab reports of environmental analysis of the above mentioned parameters are attached in Annexure IX.

5.8 Suitability of the Site

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



6 ENVIRONMENTAL IMPACT ASSESSMENT

This section discusses the potential environmental impact for coal mining, methodologies for impact identifications and characteristics of impacts including nature, magnitude, extent and location, timing, duration, reversibility, risk. The assessment carried out in this Section is based on potential impacts on overall environmental receptors within the project area.

6.1 Methodology for Impact Identification

The potential impacts due to coal mining can be both positive (beneficial) and negative (adverse) depending on the resources and receptors involved along with other parameters such as geographical scope (magnitude and extent), temporal scope (duration) and reversibility.

It is anticipated that this project will have positive impacts on sectors such as the economy, employment and foreign exchange earnings among others. Moreover, the project is expected to result in negative impacts of short-term duration and transient in nature.

Environmental sensitivity of the project area is described through a thorough review of the project activities and the evaluation of significance of impacts is carried out through Environmental Checklists and GIS and computer expert system. In checklists, the impacts have been given magnitude based on their severity. A detailed map of the project area is developed on GIS to study the impacts on nearby environmental settings. This chapter then suggests effective mitigation strategies to help combat the adverse nature of these impacts and delivers a monitoring scheme to manage them.

6.2 Impacts Analysis and Prediction

The impacts on different environmental settings were analyzed by conducting different consultation sessions with environmental experts and individuals. Their views were recorded and incorporated in the report. The list of stakeholders and individuals consulted will be provided in the chapter of Stakeholder's Consultation.

6.3 Characterization of Impacts

Impacts were characterized on the basis of following parameters:

- Nature
- Magnitude
- Extent
- Duration
- Spatial Boundaries
- Reversibility



Categories	Characteristics
Nature	Direct: The environmental parameter is directly changed by the project. Indirect: The environmental parameter changes as a result of a change in another parameter.
Duration of impact	Short-term: Lasting only for the duration of the project such as noise from the construction activities. Medium-term: Lasting for a period of few months to a year the project before naturally reverting to the original condition such as loss of vegetation due to the clearing of the construction site, contamination of soil or water by fuels or oil. Long-term: Lasting for a period much greater than medium-term impact before naturally reverting to the original condition such as loss of soil due to soil erosion and air emissions.
Geographical extent	Local, regional (spatial dimension)
Reversibility of impact	Reversible: When a receptor resumes its pre-project condition. Irreversible: When a receptor does not or cannot resume its pre-project condition.
Likelihood of the impact	High: Impact expected to occur under most circumstances Moderate: Impact will probably occur under most circumstances. Low: Impact could rarely occur at some time.
Significance of impact	Categorized as Positive or Negative. Based on the consequence, likelihood, reversibility, geographical extent, and duration; the level of public concern; and conformance with legislative of statutory requirements.



The impacts characterization for the project has been given in Table 6-1.

Table 6-1 Characterization of Impacts

Environmental Component	Impacts		Nature of Impact		Duration			Spatial Boundaries			Likelihood			Reversibility	
	Positive	Negative	Direct	Indirect	Short Term	Intermediate	Long term	Local	National	Global	Low	Moderate	High	Reversible	Irreversible
Water Resources								Nil							
Acid Mine Drainage								Nil							
Land Resources															
Air Quality															
Climate Change								Nil							
Noise															
Solid waste															
Wastewater															
Flora & Fauna															
Community Amenities															
Afforestation															
Local Economy, Community Development and Employment															
Resettlement								Nil							
Health & Safety															

6.4 Impact Significance

After the evaluation of all the potential impacts, the impacts significance is being given using Impact matrix. The impacts significance of Physical importance, Ecological importance, Social importance is given using the matrix approach. The impacts significance is given based on the characterization of impacts. From the Table 6-1 which is showing the characterization of each impact the following significance is given to each physical, biological and socio-economic impact.



Table 6-2 Significance of Environmental Impacts

Environmental Parameters	Significance
Water Resources	None
Land Resources	None
Air Quality	Require mitigation
Climate Change	None
Acid Mine Drainage	None
Noise	Require mitigation
Solid waste	Require mitigation
Wastewater	Require mitigation
Flora & Fauna	Acceptable
Community Amenity	Acceptable
Afforestation	Acceptable
Local Economy, Community Development and Employment	Acceptable
Health & Safety	Require mitigation



7 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

7.1 Anticipated Environmental Impacts Related to Project Design

The impacts related to design incorporates the impacts resulting from underground shortwall mining method. The steps involved in shortwall mining method have been discussed earlier in above sections. The overall impacts resulting from underground coal mining operation are discussed below.

- **Dust Generation**

Dust may be generated during extraction of coal from coal face either manually or through continuous miner. It may also be generated during haulage of coal to the surface.

- **Higher Noise Levels**

Higher noise levels and vibrations due to operation and movement of carts or continuous miner underground and drilling if being carried out in case of hard rocks.

- **Solid Waste and Wastewater**

No solid waste and wastewater will be generated underground due to mining method. The solid waste generated at mine site underground is partially dumped underground in the extracted coal chambers which may act as packing material and support system for walls stability. The shales associated with coal are generally dumped outside close to the mine mouth. These shales have impregnation of alum. This impregnation mixed with water is supporting mixture for vegetation growth. Hence, this impact is negligible.

- **Loss of Vegetation**

As coal mining method is underground. Therefore, there will be no loss of vegetation due to this neither at surface or underground. This impact is negligible in this case scenario.

- **Preventive Measures**

- Use of PPEs (face masks etc.) will be ensured by the mine operators and staff working at coal face.
- Use of PPEs (noise suppression equipment-ear mufflers etc.) will be ensured by the workers where noise levels are higher than 85 (dBA).
- Underground working carts/miners speed limit will be maintained to avoid excessive vibrations.
- Regular maintenance of underground equipment will be ensured.

7.2 Environmental Impacts during Construction Stage

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



- **Dust Generation**

Dust may be generated due to movement of machinery and vehicles at site for construction purposes. Dust may be generated during access roads development, land clearing and leveling etc. The mines are located in far flung areas away from population. Mining concedes with mountainous region void of population. Any access to the mineral deposit is done through jeep-able road which is improved by placing the shingle on top to avoid muddy and slippery situation. The movement of the truck on these “Katcha Roads” provides a phenomenal dust fanning which is rarely visible or seen. Hence the impact is almost nil.

- **Exhaust Emissions**

These emissions may result from the exhaust of vehicles and machinery operation at site. No exhaust emissions are generated due to operation of generators used for power generation as these generators operate on electricity rather than diesel.

- **Higher Noise Levels**

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

- **Loss of Vegetation**

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

- **Solid Waste and Wastewater Generation**

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

- **Community Amenity**

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

- **Preventive Measures**

- ✓ Controlled water sprinkling will be ensured to reduce PM₁₀.
- ✓ Maintain appropriate buffers between the site and receptors.
- ✓ Use of PPEs (face masks etc.) will be ensured by the mine operators and staff



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

7.3 Environmental Impacts during Operational Stage

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

7.4 Identification of Potential Environmental Issues

The environmental issues identified during the literature review, site visits and discussion are enumerated in the Table 7-1.

Table 7-1 Environmental Impacts and their Description

Environmental Component	Environmental Issue	Description
Water Resources	Channel Water Quality	Since the Coal does not flow into the channels, quality of water is not affected. Hence, this impact is nil.
	Channel Water Discharge	The mining operation will not interrupt the flow of water into water channels. Hence, the flow of water in the channels will remain unchanged. On account of this finding, this will cause no impact on the channel water flow.
	Groundwater Quality and Level	Coal mining operation will not affect the quantity/level of GW. Pumping is sometimes needed in rainy season. The quality of GW will remain unchanged as there is no introduction of any contaminant into the GW during coal mining.
	River Degradation	The question of river degradation arises in case if any river is present within the close vicinity of the mine. No river is present within the safe distance from the project area. Hence, no river degradation will take place.
	Surface Run-Off	Because of the coal mining operations underground, the surface topography is not being disturbed and hence no obstruction to the surface run-off. Thus, this impact will be insignificant.



	Drainage	The mining area lies on the natural developed crisscross drainage pattern and doesn't disturb its ecology, pattern and flow. Thus, this impact will be nil.
Land Resources	Soil Salinity	The coal mining operations will not add any saline materials into the soil. Thus, there will be no effect on the soil salinity.
	Soil Erosion	The coal mining operations will be carried out underground. The type of coal mining is underground coal mining. As all the mining activities will be operated underground, hence, no impact on soil erosion is observed.
	Land Use Change	The areas where the mining will be done is under no use. Most of proposed coal mining sites are abandoned. So, there won't be any loss or degradation of productive land. Moreover, the coal is being extracted underground making no change on surface. Hence, there will be no impact on land use of the site.
	Land Utility / Productivity	The mineral is being worked underground and after the extraction of the mineable reserves the area will be available for the use of geo tours. Hence, this impact will be positive.
Climate	Micro-climate Changes	After mining of the coal, plantation will help in improving local climatic conditions to some extent. This impact will be positive.
Atmosphere	Dust and Air Emissions	Coal mining operations will be carried out underground. Small quantity of dust will be generated only at underground locations. Dust will not be generated during loading of coal in trucks for its transportation to the markets as coal is in lumpy form. Hence, this impact will be negligible. Some additional measures will be taken to reduce the dust emissions.
	Noise and Vibrations	The sources of noise generation are generators, vehicular movement and drilling & blasting activities. All these operations will be carried out under controlled environment and do not exceed the threshold limit of 80 dBA. Hence, this impact is nil.
Waste Generation	Wastewater	The mining operations incidentally are carried out through such rock structures which do not provide access to water ingress in the mines. The question of effluents therefore doesn't arise. This impact is nil.



	Solid Waste	The solid waste generated at mine site is partially dumped underground in the extracted coal chambers which may act as packing the support system for walls stability. Hence, this impact will be negative.
Flora	Forests / Trees	The project area is devoid of any forest cover. Scant wild species are found. There are no trees except some small size bushes on the project site not worth mentioning. Therefore, there is no question of tree cutting during the operation of the project as well. The forest reserves are at a safer distance from the lease area. Hence, no impact is envisaged.
	Other Terrestrial Vegetation	Insignificant vegetation is growing in the area. Hence, there will be no impact on this parameter.
Fauna	Mammal Communities / Habitat	Only wild mammalian species are found. On extraction of coal underground, these species will rarely migrate to nearby areas. Hence, this impact will be temporary and insignificant.
	Reptile Communities / Habitat	Reptile species will not be migrated and affected due to underground coal mining operations. Hence, these species will remain un-effected. The impact on these species will be negligible.
Social	Population	Population is likely to increase by a national growth rate. Hence, positive impact is envisaged.
	Land Ownership	On completion of mining, the lease area land will be available for geo-tours. Impact will be positive.
	Land Lease	As the mineral resources belong to Provincial Government which will enable the mineral exploitation and adding government revenue. Overall impact is positive.
	Social Cohesion/ Attitude	The project has added interwoven knitwear awareness. The group of people working from the local area will have more social inter-woven cohesion and inter-dependence for economic survival. The impact is positive.
	Food/ Nutrition	There will be positive impact since more resources will be available for the purchase of foodstuff.
	Health	Health of residents of nearby villages and workers will not be affected due to mining operations and activities. This impact is not significant.
	Education	On improvement of income level, people will send their children to educational institutions. Hence, this impact will be positive.



Economic	Income Levels	The project has positive impact on the income levels of the locals. The people of other parts of the country will also benefit from this project.
	Employment	The mining operations employ the locals from the nearby villages. Hence, the job avenues will increase for the locals. This impact is positive.
	Land Value	During the tenure of the mining project life, land value will escalate and may stabilize on post mining operation. Hence this impact is positive.
Institutional	Institutional Activities / Effectiveness	Various governmental and non-governmental offices will become more active due to this activity. There will be positive impact.
Human Use	Cultivation and Livestock	As the area is non-agriculture, hence the livestock will not have greasing ground. This impact is nil.
	Afforestation	Different plant species will be planted within the vicinity of the project area to enhance the environmental conditions of the project area. Hence, this impact will be positive.
	Domestic Water Supply	The project is located well away from the nearby towns/ villages. The project will not affect the quality and quantity of water supply to communities in the surrounding areas. This impact is nil.
	Community Development	The proponent is already on the supportive grid on community welfare program. Hence, this impact will be positive.
Relocation/ Resettlement	Dislocation of Population	The project does not involve any dislocation of the local people. So, there will be no impact.
	Loss of Property and Infrastructure	No movable or immovable property of public and private sectors will be lost during mining operations. Hence, this impact will be nil.
	Resettlement of Affected Communities	There is no requirement of resettling of even a single individual of the community as there will be no loss of property and relocation. Therefore, this impact will be nil.

7.5 Other Potential Issues

The impacts related to acid mine drainage, contamination of soil and groundwater from coal piles, mine worker's health and safety, emergency response plan for mine accidents/ collapse, climate change impacts with corresponding mitigation measures are discussed below.



7.5.1 Acid Mine Drainage

Acid mine drainage, acid and metalliferous drainage (AMD), or acid rock drainage (ARD) is the outflow of acidic water from coal mines. Acid mine drainage (AMD) has been a detrimental by-product of coal mining for many years. At present, acid mine drainage continues to pose a potential problem in some areas, despite improved prediction and prevention techniques. Acid drainage is most susceptible to dissolve heavy metals particularly Iron, Zinc, Copper, Lead Mercury etc. due to its low pH value.

Acid mine drainage only occurs when there is water ingress into coal mines. In present case, there are no chances of water ingress into coal mines and hence no chances for acid mine drainage. Additionally, potential impacts of acid mine drainage are discussed with appropriate mitigation measures below. Noted, that these mitigation measures are not applicable for present case as there are no chances for acid mine drainage.

- **Potential Impacts**

Following are some of the impacts caused due to acid mine drainage.

Surface and Groundwater Quality Contamination

Acid mine drainage may have detrimental effects on surface and groundwater qualities. The heavy metals dissolved in acid mine drainage may leach into the groundwater and make it toxic. Similarly, it can also have adverse impacts on surface water qualities if mixed with it. If acid mine drainage mixed with surface water body, it can lead to severe pH changes. Additionally, heightened acidity reduces the ability of streams to buffer against further chemical changes.

Soil Contamination

Soil can be contaminated if it is exposed to acid mine drainage. The toxic elements present in the acid may dissolved in the soil and change its characteristics. If it passes from an agricultural land, it can reduce its fertility and disturb nutrients level in it. Acid mine drainage may also cause soil erosion which may increase turbidity levels in streams.

Human Health

Acid mine drainage causes serious threat to human health and ecological systems as it contains heavy metal contaminants. The heavy metals are not degradable and accumulate in living organisms causing various diseases and disorders.

Aquatic Life

Low pH of acid mine drainage results in solubility of heavy metals in water and its high concentration causes toxicological effects on aquatic life. Acute exposures of high concentration of metals can kill organisms directly while long term exposure can cause mortality and other effects. Long term exposures can cause stunted growth, lower reproduction rates, deformities and lesions. The accumulation of heavy metals in fish may be transferred to human beings through food chain.



- **Preventive Mitigation Measures**

The coal mining is generally done through underground mining method and as such there is no emission of Sulphur dioxide or other acidic fumes or smoke which may lead to the emergence of acid rain phenomena. The impact of acid rain and its possibility relating to underground coal mining is nil. The water percolating in the mines is through limestone beds which are non-acidic. The metalliferous mines having sulfide ores can have the chances of acidity. In such cases the pumps used are specially galvanized for rotors or screw type pumps are used having impregnation of rubber. In case of muddy mines pulsatory pumps are used which are non-rotating and take care of acidity factor if available. Once the pumping is done, the water stored on the surface tank is mixed with fine dust of calcium carbonate powder to mitigate its acidic factor.

7.5.2 Soil and Groundwater Contamination from Coal Piles

As discussed earlier that coal is not stored at site in the form of coal piles or in some other form. Hence, soil and groundwater will not get contaminated due to coal piles. The shales extracted during the coal extraction will be filled in the goaf area underground while rest if brought up will be covered with a layer of impermeable mud.

7.5.3 Mine Workers Health and Safety

Coal mining deep underground involves a higher safety risk than coal mined in opencast pits due to problems associated with mine ventilation and the potential for mine collapse. However, there are safety risks associated with all forms of coal mining. Mining explosions are a safety risk in underground mining. Methane released from the coal seam and surrounding rock strata during the process of mining can present a high risk of explosion at concentrations in air of 5-15%.

The proponent has not been deemed to have methane gas.

- **Preventive Measures**

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

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

Provision of First Aid Facility

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



Safety Trainings

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

Use of Drugs and Narcotics

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

Provision of Personal Protective Equipment

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

7.5.4 Emergency Response Plan (ERP) for Accidents/Collapse

ERP is prepared for underground coal mines to act in emergency situations. Following are some of the objectives to ERP:

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

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

7.5.5 Climate Change

Coal mining activities doesn't directly contribute in climate change. The mining is done underground and as such no climatic change is expected of it. Mining activities underground, do not release any greenhouse gas into atmosphere which have potential of climate change/ global warming.



7.6 Summary of Potential Impacts

The summary of the positive and the negative impacts observed on the environment by the mining of coal on the project area has been summarized in Table 7-2. The impacts have been given magnitude based on the scaling given below.

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

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

Table 7-2 Environmental Impacts and their Description

Sr. No.	Component	Environmental Issue	Magnitude	
			Positive	Negative
1	Physical Environment			
	Water	Channel Water Quality		0
		Channel Water Discharge.		0
		Groundwater Quality		0
		Groundwater Level		0
		River Degradation		0
		Surface Run-Off		0
		Acid Mine Drainage		0
		Flooding		0
		Drainage		0
	Land	Soil Salinity		0
		Soil Erosion		0
		Land Use Change		0
		Land Utility / Productivity	+2	
	Solid Waste	Land Pollution Breeding of flies and rodents Odor		-2



	Wastewater	Land Pollution Water Pollution		-2
	Climate	Micro-climate Changes		0
		Climate Change		0
	Atmosphere	Dust		0
		Noise		-3
	Sub-Total		+2	-5
2	Biological Environment			
	Flora	Forests /Trees	+2	
		Other Terrestrial Vegetation		0
	Fauna	Mammal Communities /Habitat		0
		Reptile Communities /Habitat		0
	Sub-Total		+2	0
3	Socio-economic Environment			
	Social	Population	+1	
		Land Ownership	+2	
		Land Lease	+3	
		Security		0
		Social Cohesion/ Attitude	+1	
		Food/ Nutrition	+1	
		Health & Safety		-3
		Education	+1	
	Economic	Income Levels	+2	
		Employment	+2	
		Land Value	+2	
	Institutional	Institutional Activities/Effectiveness	+1	
	Human Use	Cultivation	+1	
		Livestock	+2	
		Afforestation	+2	
		Infrastructure	+2	0
		Domestic Water Supply		0



		Community Development	+2	
	Relocation/ Resettlement	Land Lease		0
		Dislocation of Population		0
		Loss of Property		0
		Loss of Infrastructure		0
		Resettlement of Affected		0
	Sub-Total		+25	-2
	Grand Total		+29	-7

The potential environmental impacts resulting during operational phase of the project and their possible mitigation measures are given in Table 7-3.

Table 7-3 Environmental Impacts and their Mitigation Measures in Operation Phase

Environmental Component	Sources & Potential Impacts	Mitigation Measures
Physical Environment		
Noise	- Increased noise levels due to use of heavy machinery such as tractors for transportation of extracted coal. - Disturbance to workers and residents. - Drilling and Blasting	For Drilling and Blasting - All blasting operations will be carried out in compliance with conditions as specified in Coal Mines Regulations, 1926. - The area where blasting is being carried out will be fenced properly. - To avoid noise problems and disturbance to the community, blasting will be carried out at specified days and between specified timings. - Proper monitoring of blasting operations will be carried out by manager or concerned persons. For Noise - Use of PPEs (noise suppression equipment-ear muffers etc.) will be ensured by the workers where noise levels are higher than 85 (dBA). - Mining activities will be ensured at daytime when background noise levels are high. - Vehicles speed limit will be



		maintained to avoid excessive vibrations. Regular maintenance of machinery will be ensured.
Air Quality	- Dust generation due to movement of trucks and vehicles - Drilling and Blasting	- Maintenance of buffers between the site and receptors. - Controlled water sprinkling will be ensured to reduce PM₁₀. - Use of PPEs (face masks etc.) will be ensured by the mine operators and staff. - To prevent air quality, blasting may not be carried out in extreme weather conditions, if practical/possible.
Wastewater	- The mining operations incidentally are carried out through such rock structures which do not provide access to water ingress in the mines. The question of effluents therefore doesn't arise. - The domestic wastewater will be generated from camp offices and labor activities.	The domestic wastewater generated from camp offices should be disposed of as per standards of TMA if applicable.
Solid Waste	- The solid waste generated at mine site is partially dumped underground in the extracted coal chambers as well as packing the support system for walls stability while the remaining rock waste is dumped on hill slopes without disturbing the natural drainage pattern. - Solid waste from camp sites will be produced by labor activities.	- Proper waste management plan will be developed. - The vegetation of the coal waste dumps happens to be a mitigation measure for the coal waste dumps already developed - Littering will be prohibited at the site. - Containers will be emptied before they reach their carrying capacity. - Waste will be stored at site in covered containers.



Acid Mine Drainage	• Damage to aquatic life • Risks to human health • Soil contamination • Surface and groundwater quality contamination	The water percolating in the mines is through limestone beds which are non-acidic. The metalliferous mines having sulfide ores can have the chances of acidity. In such cases the pumps used are specially galvanized for rotors or screw type pumps are used having impregnation of rubber. In case of muddy mines pulsatory pumps are used which are non-rotating and take care of acidity factor if available. Once the pumping is done, the water stored on the surface tank is mixed with fine dust of calcium carbonate powder to mitigate its acidic factor.
Biological Environment		
Flora	• The project area is devoid of any forest cover. There are no trees except some small size bushes on the project site not worth mentioning. Therefore, there is no question of tree cutting during the operation of the project as well.	Nil
Fauna	• Temporary migration of mammals and birds from the area.	• This impact is temporary and no significant mitigation measures are required.
Endangered Species	• There are no endangered species found in the project area, hence this impact will be negligible.	Nil
Socio-economic Environment		
Community Amenity	• Dust and visual amenity • Excessive dust impacts may be harmful for some people, for example, with some experiencing respiratory conditions. • Noise associated with coal mining activities and traffic.	• Adopt and maintain good management practices. • Maintain appropriate buffers between the site and receptors. • If these buffers include vegetative screens, they have the added benefit of providing improvements in visual amenity.



Mine Workers Health and Safety	• Health and safety risks to workers due to explosion underground, formation of sink holes etc. • Damage to worker's health and can cause fatal injuries as well.	• Provision of first aid facility. • Provision of safety trainings to mine workers and staff. • Prohibition for use of drugs and narcotics at coal face underground. • Provision of Personal Protective Equipment to workers and staff working underground near coal face.
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7.7 Potential Environmental Enhancement Measures

Responsibilities of the relevant stakeholders for implementation of the environmental enhanced measures are delineated in the Table 7-4. These measures are subject to the tenure of the lease holder.

Table 7-4 Positive Environmental Enhancement Measures

Positive Impacts	Enhancement Measures	Implementing Agencies
Improving Land Utility	• Optimize use of recovered land. • Consolidation of land • After conclusion of mining activities, geo-tours can be arranged. • Forest Cultivation can also be taken.	• Agricultural Department • Revenue Department • Proponent
Improvement of land activity	• Education of farmers on modern techniques of agriculture. • Use timely inputs for suitable soil conditioners.	• Agricultural Department • Farmers
Improvement of Economic Conditions	• Provision of more jobs to locals with efforts on integration of project products.	• Lease Owner • NGOs
Improvement of institutional performance	• Arrangements of credit facilities for agro based business encourage establishment of NGOs for improvement of socio environmental and literacy condition.	• Agricultural Development Bank/ Schedule Bank/ NGOs/ Education Department



	Persuade schools, banks and other departments to be effective and provide facilities to locals.	
Improvement of agriculture and forestry	- Adopt modern techniques for agro productivity to use optimal inputs. - Plant trees and crops with lesser water requirement	- Agricultural Department - Forest Department - Farmers
Community Development	- Educate and train resident of villages on improvement of local conditions through NGO. - Encourage local participation in social education and health activities and programs.	- NGOs - Locals

7.8 Other Potential Environmental Enhancement Measures

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



8 ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

8.1 Introduction

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

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

8.1.1 Objectives

The objective of the Environmental Management and Monitoring Plan (EMMP) is to address all the major environmental issues and provide framework for the implementation of the proposed mitigation measures during the operational phase of the project. The proper implementation of the EMP will ensure that all the adverse environmental impacts identified in the EIA report are adequately mitigated, either totally prevented or minimized to an acceptable level and required actions to achieve those objectives are successfully adopted by the concerned institutions or regulatory agencies.

The EMMP provides a delivery mechanism to address potential impacts of the project activities, to enhance project benefits and to introduce standards of good practice to be adopted for all project works. The EMMP has been prepared with the objectives of:

- Defining roles and responsibilities of the project Proponent for the implementation of EMMP and identifying areas where these roles and responsibilities can be shared with other parties involved in the execution and monitoring of the project.
- Outlining mitigation measures required for avoiding or minimizing potential impacts assessed in the EIA report.
- Developing a monitoring mechanism and identifying requisite monitoring parameters to confirm effectiveness of the mitigation measures recommended in the EIA report.
- Defining the requirements for communication, documentation, training, monitoring, management, and implementation of the mitigation measures.

8.2 Implementation of EMMP

The implementation of EMMP should be carefully coordinated with the design and operational program of the project. This will ensure the implementation of relevant mitigation measures at the appropriate project stages. It will also ensure that adequate resources are properly allocated to achieve the desired results. This EMMP has been prepared to satisfy the requirement of "IEE and EIA Regulations, 2000".



8.3 Environmental Budget

The environmental budget of the project has been given in Table 8-1.

Table 8-1 Environmental Budget Breakdown

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

8.4 Environment Management Team

Following functionaries will be involved in the implementation of EMMP:

- The project Proponent as owners of the EMMP.
- Project contractor(s) as executors of the EMMP during installation and operational phase of the project.
- Operational & Maintenance (O&M) and the Health, Safety and Environment team of the project as an executor of the EMMP during the installation and operational phase of the project.

Table 8-2: List of Individuals and their Responsibilities

Designation	Responsibilities
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Manager	• Direct operations at the site. • He will act as team lead. • Interact with other executives, mine staff and community residents. • Effectively motivate staff to follow protocols and to work productively. • Look after the Health and Safety Related issues. • Responsible for scheduling staff and ensuring that supplies are stocked. • He will play a direct role in developing business goals for the mine they run, and he will help to produce a business plan to ensure that those goals are met.
Accountant	• Proper management of the funds for the CSR. • Development of fund proposal for environment related expenses. • Ensuring the smooth transaction of funds for environmental related projects/activities. • He will prepare the yearly budget. • Taking minutes in meetings and other administrative duties. • During his shift timings, he will be responsible to look into smooth functioning of the process in environmentally sustainable way. • He will be responsible to rectify any problem regarding environmental matter in collaboration with concerned authorities. • Prepare reports on different events and incidents. • He will report all matters regarding E.M. to the manager.

8.4.1 Responsibilities of Functionaries

- **Responsibilities of Management of Project**

Management of the project will be responsible for the environmental management and supervisory affairs during the project activities. Environmental personnel designated by the management of the project will look after the environmental related issues during the project activities. The responsibilities of environmental personnel are as follows:

- Monitoring progress of the project as per planned schedule of activities.
- Exercising oversight over the implementation of environmental mitigation measures by the contractor.
- Documenting the experience in the implementation of the environmental process.
- Preparing training materials and implementing programs.
- Maintaining interfaces with the other lined departments/ stakeholders and
- Reporting to the management of the project on the status of EMMP implementation.



8.5 Proposed Environmental Management and Monitoring Plan (EMMP)

The Environmental Management and Monitoring Plan (EMMP) will be used as a management and monitoring tool for implementation of the mitigation measures identified in the EIA report.

The EMMP matrix lists down:

- The required mitigation measures recommended in the EIA report.
- The person/organization directly responsible for adhering to or executing the required mitigation measures and monitoring adherence to the mitigation measures.
- The parameters, which will be monitored to ensure compliance with the mitigation measures.
- The timing at which the mitigation or monitoring has to be carried out.
- Budget allocated for management practices (cost of EMMP).
- Project Proponent will hold primary and overall responsibility for ensuring full implementation of the EMMP.

The Environmental Management and Monitoring Plan have been provided for both installation and operational phases of the project below:

8.5.1 EMMP for Installation Phase

The EMMP for installation phase of the project includes following:

- Air quality management & monitoring plan
- Noise management & monitoring plan
- Solid Waste management & monitoring plan
- Health and safety management & monitoring plan

Table 8-3: Air Quality Management & Monitoring Plan for Installation Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Reduce Dust Emissions					
1	Dust Emissions	Monitor speed limits of vehicles operating at project site.	Throughout installation period	Proponent	0/-
		Avoid installation activities in extremely dry weathers.	Throughout installation period	Proponent	0/-
		Sprinkle water at site when necessary, to reduce dust spread.	Throughout installation period	Proponent & Contractor	5,000/-



		Ensure the use of Personal Protective equipment by workers and staff.	Throughout installation period	Proponent & Contractor	5,000/-
Reduce Exhaust Emissions					
2	Exhaust Emissions	Ensure minimization of Vehicle idling time.	Throughout installation period	Proponent & Contractor	0/-
		Alternatively, fueled equipment shall be used where feasible equipment shall be properly tuned and maintained.	Throughout installation period	Proponent & Contractor	0/-
		Give awareness to vehicle drivers and operators to avoid unnecessary racing of vehicle engines at loading/un-loading points. Ensure that vehicles engines must be switched off at these points.	Throughout installation period	Contractor	0/-
Sub-Total					10,000/-

Table 8-4: Noise Management & Monitoring Plan for Installation Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Minimization of Noise and Vibrations					
1	Noise and Vibrations	Aware vehicle and machinery operators to switch off engines of vehicles or machinery not being used to avoid excessive noise and vibrations.	During installation period	Proponent & Contractor	0/-
		Sensitize drivers to avoid gunning of vehicle engines or unnecessary hooting especially when passing through sensitive areas such as churches, mosques, residential areas and schools.	Throughout installation period	Proponent & Contractor	0/-



		Ensure that machinery is kept in good condition to reduce noise generation.	Throughout installation period	Proponent & Contractor	5,000/-
		The noisy installation works will entirely be planned during day time when most of the neighbors will be at work.	Throughout installation period	Proponent & Contractor	0/-
Sub-Total					5,000/-

Table 8-5: Solid Waste Management & Monitoring Plan for Installation Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Minimization of solid waste generation and ensure efficient solid waste management					
1	Increased solid waste generation	Donate recyclable/reusable or residual materials to local community groups, institutions.	During installation period	Proponent	0/-
		Proper waste management plan must be developed.	During installation period	Proponent	0/-
		Waste must be stored at site in covered containers.	During installation period	Proponent	10,000/-
		Containers must be emptied before they reach their carrying capacity.	During installation period	Proponent	0/-
		Littering must be prohibited at the site.	During installation period	Proponent	0/-
		Awareness will be given to the staff and workers about handling of solid waste at site.	During installation period	Proponent	0/-
		Use of an integrated solid waste management system i.e. through a hierarchy of options:	Throughout installation period	Proponent & Contractor	0/-



		• Source reduction • Reuse • Recycling			
		Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of waste generated over time.	Throughout installation period	Proponent & Contractor	0/-
Sub-Total					10,000/-

Table 8-6: Health and Safety Management & Monitoring Plan for Installation Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Minimization of occupational health and safety risks					
1	Health and Safety Impacts	Implement all necessary measures to ensure health and safety of workers and the general public during installation of the project.	Throughout installation period	Proponent	0/-
		Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc. should be made available and personnel must be trained to use the equipment.	Once off	Proponent & Contractor	5,000/-
		Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises.	Continuous	Proponent	5,000/-
2	First Aid	Provision of well stocked first aid box must be ensured within the premises of the project area.	One-off/as per required	Proponent	5,000/-



		Provision must be made for persons to be trained in first aid.	One-off	Proponent	5,000/-
Sub-Total					20,000/-
Grand-Total					45,000/-

8.5.2 EMMP for Operational Phase

The EMMP for operational phase includes following:

- Air quality management & monitoring plan
- Noise management & monitoring plan
- Solid Waste management & monitoring plan
- Health and safety management & monitoring plan

Table 8-7: Air Quality Management & Monitoring Plan for Operational Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Reduce Dust Emissions					
1	Dust Emissions	Monitor speed limits of vehicles operating at mining site.	Throughout operational period	Proponent	0/-
		Avoid operational activities in extremely dry weathers.	Throughout project lifecycle	Proponent	0/-
		Sprinkle water at site when necessary, to reduce dust spread.	Throughout operational period	Proponent & Contractor	5,000/-
		Ensure the use of Personal Protective equipment by workers and staff.	Throughout operational period	Proponent& Contractor	5,000/-
Reduce Exhaust Emissions					
2	Exhaust Emissions	Ensure minimization of Vehicle idling time.	Throughout operational period	Proponent & Contractor	0/-
		Alternatively, fueled equipment shall be used where feasible equipment	Throughout operational period	Proponent & Contractor	0/-



		shall be properly tuned and maintained.			
		Give awareness to vehicle drivers and operators to avoid unnecessary racing of vehicle engines at loading/un-loading points. Ensure that vehicles engines must be switched off at these points.	Throughout operational period	Contractor	0/-
Sub-Total					10,000/-

Table 8-8: Noise Management & Monitoring Plan for Operational Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Minimization of Noise and Vibrations					
1	Noise and Vibrations	Aware vehicle and machinery operators to switch off engines of vehicles or machinery not being used to avoid excessive noise and vibrations.	During operational period	Proponent & Contractor	0/-
		Sensitize drivers to avoid gunning of vehicle engines or unnecessary hooting especially when passing through sensitive areas such as churches, mosques, residential areas and schools.	Throughout operational period	Proponent & Contractor	0/-
		Ensure that machinery is kept in good condition to reduce noise generation.	Throughout operational period	Proponent & Contractor	5,000/-
		The noisy production works will entirely be planned during day time when most of the neighbors will be at work.	Throughout project life	Proponent & Contractor	0/-
Sub-Total					5,000/-



Table 8-9: Solid Waste Management & Monitoring Plan for Operational Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Minimization of solid waste generation and ensure efficient solid waste management					
1	Increased solid waste generation	Donate recyclable/reusable or residual materials to local community groups, institutions.	During operational period	Proponent	0/-
		Proper waste management plan must be developed.	During operational period	Proponent	0/-
		Waste must be stored at site in covered containers.	During operational period	Proponent	5,000/-
		Containers must be emptied before they reach their carrying capacity.	During operational period	Proponent	0/-
		Littering must be prohibited at the site.	During operational period	Proponent	0/-
		Awareness will be given to the staff and workers about handling of solid waste at site.	During operational period	Proponent	0/-
		Use of an integrated solid waste management system i.e. through a hierarchy of options: • Source reduction • Reuse • Recycling	Throughout operational period	Proponent & Contractor	0/-
		Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of waste generated over time.	Throughout operational period	Proponent & Contractor	0/-
Sub-Total					5,000/-



Table 8-10: Health and Safety Management & Monitoring Plan for Operational Phase

Management Plan			Monitoring Plan		Estimated Cost
Sr. No.	Potential Impacts	Management & Monitoring Measures	Timeframe	Responsible Party	(PKR)
Minimization of occupational health and safety risks					
1	Health and Safety Impacts	Implement all necessary measures to ensure health and safety of workers and the general public during operation of the project.	Continuous	Proponent	0/-
		Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc. should be made available and personnel must be trained to use the equipment.	Once off	Proponent & Contractor	10,000/-
		Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises.	Continuous	Proponent	5,000/-
2	First Aid	Provision of well stocked first aid box must be ensured within the premises of the lease area.	One-off/as per required	Proponent	5,000/-
		Provision must be made for persons to be trained in first aid.	One-off	Proponent	10,000/-
Sub-Total					30,000/-
Grand-Total					50,000/-

8.6 Environmental Monitoring and Evaluation

8.6.1 Aim

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



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

8.6.2 Environment, Health & Safety Policies

8.6.3 Environment Policy

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

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

8.6.4 Health & Safety Policy

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

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



- To employ a person as in-charge for planning, training & safety and make him responsible for implementation of safety and health policy.

8.7 Equipment Maintenance Details

8.7.1 Objectives

The maintenance of equipment and machinery used during project activities is carried out to achieve following objectives:

- To avoid environmental pollution including dust issues, exhaust emissions, excessive noise and vibrations etc.
- To avoid any risk to health and safety of the workers including injuries.
- To avoid any hinderance and to ensure smooth operation of project activities.

8.7.2 Measures for Equipment Maintenance

Measures for the maintenance of equipment involve:

- All the machinery and vehicles will be inspected and monitored.
- Always keep a suitable fire extinguisher ready for emergency situations.
- Always keep a first aid box within the premises of the project site.
- Secure unbolted heavy parts or engines if necessary to leave the work.
- Monthly tuning, servicing and cleaning of machinery and vehicles.

8.8 Training Needs

There is requirement of training of the members of Monitoring and Evaluation department of multifarious environmental aspects pertaining to coal production. Training may be arranged at a suitable institution.

8.8.1 Training Schedules

- **Environmental Technical Assistance and Training Plan**

To raise the level of professional and managerial staff, there is a need to upgrade their knowledge in the related areas. The proponent will play a key role in this respect and arrange the trainings.

An environmental and social training and Technical Assistance (TA) program is to be carried out before the implementation of the project. Contractor's environmental awareness and appropriate knowledge of environmental protection is critical to the successful implementation of the EMMP because without appropriate environmental awareness, knowledge and skills required for the implementation of the mitigation measures, it would be difficult for the Contractor(s) workforce to implement effective environmental protection measures.

Proponent will manage the environmental training program. This will organize training courses for contractor staff to train them in specialized areas such as air and noise



pollution monitoring; develop environment operation manuals in consultation with the EPA, Punjab. The training will take place in three phases:

Table 8-11: Training Schedules

Phases	Description
Phase-1	• The workers and labor force will be given basic training on project activities. They will be explained on different possible environmental impacts resulting from the project activities. • The environmental management and monitoring staff will be given basic knowledge of the possible environmental impacts, how to mitigate them and methods of personnel protection. This will take place during the design phase.
Phase-2	• Second phase of training will take place at the start of operational phase. • It will involve a hands-on experience of carrying out the different activities during operational phase, responsibilities of each individual, implementation of mitigation measures, use of personnel protective equipment and an emergency handling and exit drill
Phase-3	• All the staff will be briefed about the implementation of EMMP. • The staff and workers will be provided with suitable and required PPEs.



9 INVOLVEMENT OF STAKEHOLDER'S / PUBLIC CONSULTATION

9.1 Introduction

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

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

9.2 Benefits and Objectives of Stakeholder's Consultation

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

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

An informed public will better understand the tradeoffs between project benefits and disadvantages; be able to contribute meaningfully to the project design; and have greater trust with the project Proponent and support for the project, says the Asian Development Bank. These factors contribute towards improved project implementation sensitized to the human environment of the area. The objectives of stakeholders' consultation are to:

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

9.3 Identification and Classification of Stakeholders

During the field survey, significant efforts were made to identify the possible categories of stakeholders and their stakes. Identification of stakeholders is important for the sustainability of a developmental project and helps to evaluate and envisage the role of stakeholders. The influence or impact of the project on stakeholders can be elaborated in



the form of a matrix and the mitigation measures are proposed accordingly. All the stakeholders had different types of stakes according to their professions.

9.4 Methodology for Consultation

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

Various techniques are used worldwide to carry out the stakeholder consultation that includes discussions, meetings and field visits. A series of scoping sessions and formal focus group discussions were carried out with environmental experts and individuals. The meetings were held at various locations.

9.5 Key Consulted Stakeholders

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

The organizations consulted are as under:

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

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

Responsible Authority

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

Other departments and agencies

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



Environmental Practitioners and Experts Team

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

Affected & Wider Community

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

9.5.1 Summary of Concerns of Consulted Stakeholders

The summary of stakes of consulted stakeholders is given below.

- The activities of the project must be studied in detail to assess all the impacts resulting from the project.
- All the environmental parameters i.e. ambient air quality, noise levels and water quality must be kept within permissible limits of PEQS.
- Project specific mitigation measures must be implemented during project's lifecycle.
- A proper Environmental Management and Monitoring Plan should be prepared to reduce adverse environmental impacts.
- Waste management must be taken into consideration (if generated during project activities).
- Management practices suggested in EMMP for solid waste should be implemented during operation of the project.
- The findings of the EIA report must be incorporated into the design and planning phase of the project.
- The EIA report should be compiled appropriately according to reporting style as suggested in Guidelines/Checklist.
- The project holds a good economic circulation. The advantages of the project seem more than its disadvantages. Therefore, the project should be operational as soon as possible.



List of Individuals Consulted Along with their Written Feedback

No. of individuals=13

Day & Timing= 03-MAY -2023 (1.30 P.M)

Sr.	Names/ Person consulted	CNIC	Concern/Comments
Government Department			
1.	Chief Inspectorate of Mines Punjab	-	Mining activity should follow rules and regulation. No mining activity should be done without submitting environment report to EPA.
2.	DG Mines and Minerals Punjab	-	PPEs should be given to the workers. No Natural reserve will be affected by the project activity. Proper implementation of mitigation should be done. Job Opportunities will be provided to locals.
3.	Representative (Forest Department)	-	The proposed project should not affect any forest or within the vicinity of the forests.
Local Residents			
4.	M. Ahsan	38201-9496400-1	Vegetation issue due to shale removal
5.	Malik Salib M.	38201-1071885-7	Water issues
6.	M. Fiaz	37202-8137814-3	Road Construction
7.	Rasheed khan	38201-0993224-1	Job Opportunity
8.	Abdul Rauf	38201-5145848-1	Job Opportunity
9.	Parveez Khan	38301-2176225-5-	Dust Issues
10.	M. Ali	37202-9013301-7	Job Opportunity
11.	Amjad Iqbal	38201-5715106-1	Road Construction + Job Opportunity



10 CONCLUSIONS AND RECOMMENDATIONS

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

Table 10-1: Conclusions and Recommendations

Conclusions	
General	• The coal extraction is very crucial for meeting increased energy demands on national as well as international level. • All the positive and negative impacts resulting from the coal mining operations have been studied in due detail on environmental settings. All the negative impacts have been given magnitude based on the defined criteria and scoring. • Mitigation measures have been suggested for each negative impact resulting from the coal mining activities.
Physical Environment	• No wastewater will be generated during project activities. The water, if exposed during underground coal mining will be used for drinking purposes. • The type of solid waste produced at the surface will be food waste only. The solid waste produced underground will consist of material excavated for mine space widening. • The food waste at the surface will be disposed of in covered containers to avoid any waste littering. The solid waste underground will be used to fill up the cavities formed due to coal extraction. This will save the transportation cost of solid waste to dispose of at the surface. It will also provide additional support to the mine against subsidence. • Proper mitigations may be adopted in the preliminary design including safe and environmentally friendly disposal of solid waste. • Physical impacts like soil contamination, water contamination, air pollution, high noise level, etc. are of temporary nature. However, during the operational stage by adopting abatement technologies and development of buffer zones and green areas intensity of negative impacts can be minimized. • All the baseline environmental parameters including ambient air and noise are well within the permissible limits of PEQS.



	• There are no human settlements present within the vicinity of the project site. The settlements are away from the coal mines at safer distances. All the sensitive receptors are at a safer distance from the project area.
Biological Environment	• No forest area or wildlife sanctuary exists within the vicinity of the Project Area, which may be affected by the Project. Few reptiles like lizards and snakes will be disturbed by the Project activities and may have to move into nearby areas. This will be a temporary insignificant impact. Anyhow the outskirts blank area is to be covered with green trees so project site will not give barren look.
Socio-economic Environment	• The other social issues like safety of public and workers, security problems, community accessibility issue, women accessibility to fields for their daily routine life etc. will be of temporary nature. • The mining activities will provide additional job opportunities to the community of the area. The project will raise the income levels of the population of the area. • Social cohesion is optimal. • The environmental cost is negligible. • The proponent is committed to ensure eco-friendly, sustainable, safe and sound environment.
Recommendations	
General	• All measures as suggested in EMP should be adopted to minimize adverse impacts. • All appropriate environmental management & monitoring measures detailed in this report, together with any other environment management commitments should be implemented throughout out the entire life of the project. • Environmental Management and Monitoring Plan proposed will be implemented in the true spirit throughout the lifespan of the project. • Regular monitoring and auditing will be taken by the management to ensure the compliance of all the mitigation measures. • Environmental monitoring will be carried out by the company as suggested and communicated by EPA, Punjab.
Physical Environment	• The mining site and the road links should adopt such



	measures and select such machinery and their operations to minimize the dust spread. • Dust suppression machine should be available on each site for wetting of all the materials to avoid effects of dust such as respiratory diseases. • Water contamination, air pollution and high noise levels will be controlled with the use of good engineering practices. • Proper measures will be taken to control the air emission or high noise levels. • Transportation vehicles and equipment must be properly maintained and tuned well.
Biological Environment	• Extensive plantation must be carried out throughout the tenure of lease as an environmental enhancement measure.
Socio-economic Environment	• Periodic monitoring on occupational health and safety must be conducted to avoid workplace hazards. • Proponent will take due care of the local community and its sensitivity towards local customs and traditions. • Safety signs or boards will be placed wherever needed within the premises of the Project site. • Personal Protective Equipment (PPEs) will be provided and ensured that they are used by the workers during working hours. The workers working near the noise generating machines will be strictly required to use ear muffs/ plugs. • Fire extinguishers or firefighting equipment will be provided at well notified points to cope with fire events. • Good housekeeping will be ensured by the management. • First aid medical facility will be provided at the project site.



APPENDICES



Appendices-I: Glossary

Act means the Pakistan Environmental Protection Act, 1997.

Contamination is introduction of impurities in the environment.

Environment means (a) air, water and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities and works; (f) all social and economic conditions affecting community life; and (g) the inter-relationships between any of the factors in sub-clause (a) to (f).

Environmental Assessment a technique and a process by which information about the environmental effects of a project is collected, both by the developer and from other sources, and taken into account by the planning authority in forming their judgments on whether the development should go ahead.

Environmental Management to carry out the developmental activities in sustainable manner.

Impact on Environment means any effect on land, water, air or any other component of the environment, as well as on wildlife harvesting, and includes any effect on the social and cultural environment or on heritage resources.

Mitigation Measures means the measures for the control, reduction or elimination of an adverse impact of a development on the environment, including a restorative measure.

Project Proponent is a person, company, NGO or any agency that sponsors and promotes a project.

Regulations means the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environment Impact Assessment Regulations, 2000.

Pollution means the presence in the environment or the introduction into it, of substances that have harmful or unpleasant effects.

Social Cohesion is defined as the willingness of members of a society to cooperate with each other in order to survive and prosper.

Screening is the first step of IEE/EIA study. It helps in determining whether a project requires an IEE or EIA.

Sensitive Receptors include, but are not limited to, hospitals, schools, daycare facilities, elderly housing and convalescent facilities. These are areas where the occupants are more susceptible to the adverse effects of exposure to toxic chemicals, pesticides, and other pollutants.

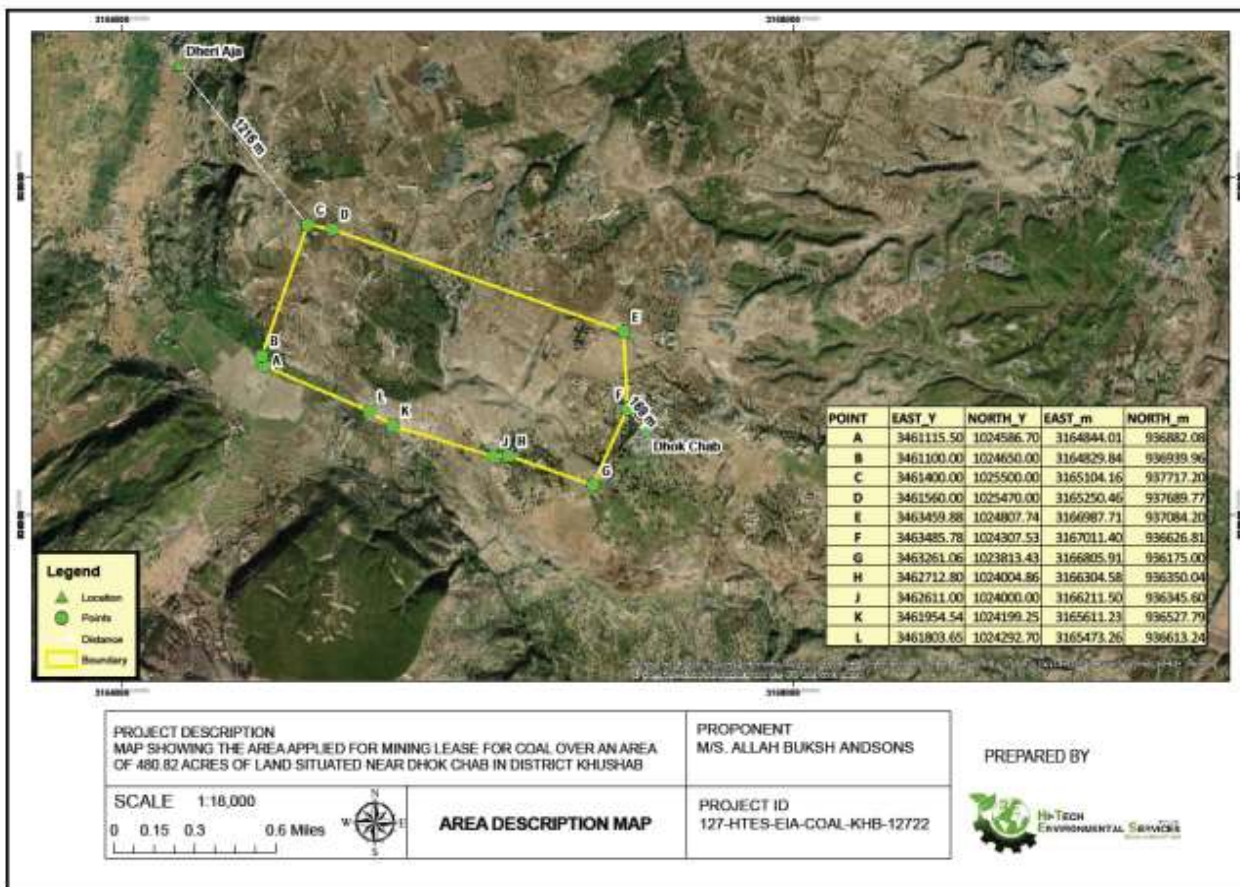
Afforestation is the planting of trees on land which was formerly used for land uses other than forestry is called afforestation.



Coal is a combustible black or brownish-black sedimentary rock, formed as rock strata called coal seams. Coal is mostly carbon with variable amounts of other elements, chiefly hydrogen, sulfur, oxygen, and nitrogen



Appendices-II: Environmental Map







Appendices-III: List of Abbreviations

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



Appendices-IV: References

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



- Punjab Environmental Quality Standards for Noise.
- The Punjab Plantation and Maintenance of Trees Act, 1974.
- The Punjab Wildlife (Protection, Preservation, Conservation and Management) Act and Rules, 1974.



Appendices V: Terms of Reference of Environmental Reports

TERMS OF REFERENCE FOR EIA REPORT

The agreement hereinafter called Agreement, is made between Hi-Tech Environmental Services (Pvt.) Ltd. (Consultancy Firm/Consultant) and M/s M & S Enterprises(Client) to prepare and carry out follow up of Environmental Study Report for obtaining Environmental approval under Section 12 of Punjab Environment Protection Act 1997 (Amended 2012) for proposed project of "Mining Lease For Coal Over An Area Of 588.42 Acres Of Land Situated Near Joggi Tilla In District Jhelum"

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

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

- The client shall provide assistance and access to the information contained in the feasibility study, layout plan and other project relevant documents as and when required by the consultancy firm/consultant for performance of his obligations.
- The client shall provide all available data, maps, reports, etc. about the project including but not limited to layout plan of the project. Client will provide Lab Test Reports from EPA certified lab including noise level monitoring, wastewater analysis and stack emissions report or any report/document/information demanded by the EPA.
- The client will provide to the consultancy firm with the letter of introduction and authorization and other documents as may be needed to enable consultancy firm consultant to perform the service.
- Responsible to pay all the dues of the consultants as per the agreed terms and conditions.
- The consultancy firm/consultant shall carry out the services in accordance with the provisions of the agreement including:
- Shall follow up the EIA Report and other file required with due diligence necessary/required for obtaining its approval from EPA Punjab under the statutory requirements of PEPA 1997 (amended in 2012).
- Shall give the consultancy for the preparation of the detailed Environmental Management & Monitoring Plan for enhancing the environmental conditions during installation and operational phases such as mitigation measures for wastewater, solid waste, stack emissions, plantation, management of surface runoff, mitigation of socially adverse impact, if any.
- Will evaluate all the activities during the installation and operational phases and recommend suggestions/actions to comply with PEQS.
- Will follow up the EIA Report and file documents considering information/documents



provided by the client.

- Shall examine the entire activities and list of the details of activities likely to cause adverse impacts during and after installation phase.
- Shall suggest mitigation measures for all such activities which may cause adverse impacts.

For and Behalf of

Hi-Tech Environmental Services (Pvt.)
Ltd.
(Consultancy Firm/Consultants)

For and Behalf of

M/s M & S Enterprises
(Proponent)



Appendices-VI: Consultant Team

Hi-Tech Environmental Services (Pvt.) Ltd. is a business entity managed by geoscientists and environmental experts. The company has the expertise of highly diversified experience and has completed a total of more than 150 environmental studies across Punjab. The consultant has a range of expertise available in following areas:

- w) Economic Geology
- x) Determination of geological exploratory techniques and mine design
- y) Preparation of feasibility reports, IEE report, EIA reports, Development Schemes & Prospecting Scheme.
- z) Preparation of Environment Management Plans
- aa) Preparation of reports on HRD /Mines Rescue & Recovery.
- bb) Assessment of Impact of mining on environment and mitigating measures.
- cc) Mine surveying & interpretation of boundary disputes.
- dd) Legal opinion on mine regulatory regime.
- ee) Energy fuels and selection of choice fuels for specific energy
- ff) Drilling and blasting for underground and surface mining techniques.
- gg) Safety measures for mines operation.

Contact Details	
Consultant Company	Hi-Tech Environmental Services (Pvt.) Ltd.
Address	26-B, Zahoor Elahi Road,
Representative	Advocate Chaudhry Awais Ahmed
Contact	(+92) 3219443210
e-Mail	consultantshtma@gmail.com info@hitechma.com

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

Sr.	Name	Qualifications & Brief Experience	Roles Assigned
1)	M. Hamza Tariq	Environmental Scientist B.S Hon. Environmental Science	Preparation of Environmental Management Plan (EMP) Preparation of Environmental Monitoring Plan (EMP) Author of EIA Report
2)	Maryam Nazir	Mining Engineer and GIS Expert B.Sc. Mining Engineering	Development of Maps
3)	Ch. Awais Ahmad	LLM (London)	Site Visits Legal Reviews Coordination with Locals
4)	Engr. Harris Naeem	B.Sc. Mining Engineering	Mining Techniques



Appendices-VII: Approvals from other Concerned Departments

Gram : 'INDUSTRY'
Phone : 412287

REGISTERED A.D. 75

No. ~~DMMS/ML-JIM-Coal~~ (117)/2003.
Director General Mines and Minerals,
Punjab (M)
Poonch House, Multan Road,
Dated Lahore the 11-7-2003

To
M/s. Mr. Farhan Nawaz Raja S/O Muhammad Nawaz Khan,
SD House No. 1, Askari Housing Complex,
Gulberg III, Lahore.

Subject-MINING LEASE FOR COAL OVER AN
AREA OF 588.42 ACRES OF LAND SITUATED
NEAR JOGI TILLA DISTT. JHELM

Dear Sir (s),

Tender for Rs. 1, 20,000/-
12 With reference to your application dated 2-3-2003 and in pursuance of
rule 42 of the Punjab Mining Concession Rules, 2002, Competent Authority is
hereby pleased to grant to you a mining lease for coal as
per above subject for a period of 20 (Twenty) years with effect
from the date of issue of this letter over the area of 588.42 acres on
the following terms and conditions:-

(i) That within one month of the date of issue of this letter you will return
one copy of the attached three plans, to this Directorate and another
copy to the Deputy/Assistant Director, Mines & Minerals (Small
Scale Mining) Islamabad after affixing your signature
and rubber stamp thereon in token of your having accepted the same
and retain one copy for your own use and record.

(ii) That you will arrange to demarcate the area in accordance with the
enclosed map containing survey data as given below :-

Survey of Pakistan Map No. 43-II/5.

Point	Eastings (YDS)	Northings (YDS)	Point	Eastings (YDS)	Northings (YDS)
A	54300	56000			
B	52524	56000			
C	53503.79	57156.7			
D	52000	57156.7			
E	52000	58000			
F	53000	58000			
G	53000	57672			
H	54000	57672			
I	54000	57140			
J	54110	57140			
K	54220	57190			
L	54300	57190			
Total area 588.42 acres					

Total area

See the copy of
Dr. Farhan Raja



REGISTERED A.D. 40

NO. ML. JLM, COAL (117)
DIRECTORATE GENERAL OF MINES & MINERALS PUNJAB,
POONCH HOUSE, MULTAN ROAD, LAHORE.
Dated Lahore, the 26-9-2007

To M/s M and S Enterprises,
P-110 DHA,
Lahore,

SUBJECT MINING LEASE FOR COAL OVER AN AREA OF 588.42 ACRES
NEAR JOGI TILLA IN DISTRICT JHELM

Dear Sir,

With reference to your application dated 26.9.2007 for assignment of the mining lease for Coal cited above as subject, the Licensing Authority has been pleased to approve the assignment of the said mining lease with all rights and liabilities thereof in your favour with immediate effect in accordance with the Partnership Deed executed on 7.9.2007 registered with the Registrar of Firm, Lahore vide No. 3454/2006-2007 Dated 7.5.2007 on the terms and conditions as contained in the original allotment letter No. ML. JLM, Coal (117) Dated 11.7.2003 as well as the Punjab Mining Concession Rules, 2002.

You are advised to work in the area strictly in accordance with the approved development scheme and abide by the directions issued by the Licensing Authority under the rules ibid.

The Mining lease is valid upto 11.7.2023

Yours Truly,

o/c (MUHAMMAD ASLAM)
DIRECTOR SMALL MINES
ASSISTANCE/TITLES PUNJAB LHR

1. Mr. Farhan Nawaz Raja, SD House No. 1 Askari Housing Complex,
Gulberg-III, Lahore.

2. The Deputy Director (M&M) Plot No. 5 I/9 Sector Industrial Area,
Islamabad.

Received
As per
13/10/23

o/c (ABDUL MAJEED KHAN SUMBAL)
SUPER INTENDENT
FOR ASSISTANT DIRECTOR SMALL MINES
ASSISTANCE/TITLE PUNJAB LHR



Appendices-VIII: Laboratory Reports of Environmental Analysis











Hi-Tech Environmental Services (Pvt.) Ltd.

Environmental Impact Assessment for M/S M & S Enterprises

Mining Lease for Coal Over an Area of 588.42 Acres of Land Situated Near Jogi Tilla, District Jhelum.

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Appendices-IX Plantation Estimates

The green belt development not only functions as foreground and background landscape features resulting in harmonizing by amalgamating the physical structures of project site with surrounding environment but also helps as pollution sink.

▪ Objectives

It is necessary to develop green belt in and around the project site with suitable plant species to achieve following objectives:

- To combat the air pollution effectively.
- To improve the quality of local as well as regional air.
- To avoid problems of soil erosion, noise and dust etc.

There will be no tree cutting at site due to project operations. Hence, there will be no disturbance to vegetation. In addition, the proponent will do plantation as a potential environmental enhancement measure.

Following plantation plan will be followed during project's lifecycle.

Item	Description
Spacing between two plants	2.0m×2.0m
Total number of saplings planted	100
Species of plants may be planted	Ornamental Plants and Indigenous Species

Noted that the green-belt development will be carried out within and around the premises of the project area or as per planned by the proponent.

• Criteria for Selection of Plants Species

The plant species will be planted based on their ease of availability in the local market and their suitability of growth in the project area.