

MALHI STONE WORKS **INTERNATIONAL**

SAND EXCAVATION BY USING DREDGER AT ZONE NO. 1-3 (NEW
ZONE) (LEASED AREA 117.937 ACRES)
RIVER CHENAB DISTRICT Gujrat

Vide Mines & Minerals Department letter No
ML/ADMM/Gujrat-Ordinary Sand/River Chanab 1-3 Zone (New
Zone)/1379

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

Prepared By



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EXECUTIVE SUMMARY

Rivers are the most important life supporting system of nature. For centuries, humans have been enjoying the natural benefits provided by rivers. Rivers provides the main sources of water reservoirs in addition to other sources like sand, clay etc for its utilizations of other fundamental development of the society. During the rain and the natural water flow in river much of sand deposits in the river bed, thus may cause undue filling / overburden in river bed. This sand is an essential constituent of construction material required in a range of civil works including house buildings, road/infrastructure network, bridges, dams etc, thus removing of sand from river bed may be healthy for river bed as well as for commercial point. Therefore, Mines and Mineral Depart offers/ grant open auction / lease for surface excavation of sand from river to maintain the surface of river bed which ultimately also cause commercial activities beneficial both for the department in terms of revenue generation as well as construction sector of the country. This simultaneously has introduced sand mining on scientific scale. Particularly in the water flowing areas of rivers, the sand excavation can also be done through dredger. In addition to traditional use of manual or excavator machinery etc for sand excavation, the use of dredger would require submission of Environmental Impact Assessment (EIA) to the Environmental Protection Agency (EPA) Punjab.

- **Title and Location of Proposal**

Project Title: Project of Sand Excavation by Using Sand Dredger by Malhi Stone Works International

Location: Zone No. 1-3 (New Zone) River Chanab, Tehsil & District Gujrat

- **Name of the Proponent**

Nadeem Akhter

Address: PO Railway Road Lundpur, District Gujrat

- **Name of the Organization Preparing Report**



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- **Purpose & Scope of the EIA Study**

The project envisages the excavation of sand as one of the raw material for construction works. In accordance with the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental

Impact Assessment Regulations, 2000, SRO # 339 (1)/2000, the project for sand extraction falls in Schedule-I, Part-D "Mining and Mineral Processing". However, as per new orders any project involving use of dredger should conduct an Environmental Impact Assessment of the project.

This EIA shall also satisfy the regulatory requirements of Mining and Mineral Department, Government of the Punjab. This report has been prepared according to the category defined in Schedule –I of "Pakistan Environmental Protection Agency (review of IEE and EIA) Regulation 2000". As desired under the "Guidelines for the Preparation and Review of Environmental Reports October 1997/2000", the elements of this EIA report address the followings:

- i. Executive or non-technical summary (title and location of the project, name of the proponent, name of the organization preparing the environment report, brief outline of the report, major impacts, recommendations for mitigation and compensation and proposed monitoring).
- ii. Description of the objectives of the proposal.
- iii. Description of the proposal and its alternatives (status of the proposal in the project cycle, description of planning, design and implementation stages, requirements for raw materials, water, energy and equipment).
- iv. Discussion of the proposal and current land use and policies (current land use controls in the context of the Government policies).

• **Brief Description Of Project**

Project Name	Project of Sand Excavation by Using Sand Dredger by Malhi Stone Works International		
Project Location	Zone No. 1-3 (New Zone) River Chanab, Tehsil & District Gujrat		
	Total: 1175.937 ACRES		
Zone 1-3			
Latitude & Longitude	POINTS	EASTING	NORTHING
	A	3314300	928800
	B	3313627	930000
	C	3312520	928933
	D	33113000	928958
	E	3310500	928100

	F	3310896	927533
	G	3312000	928500
	H	3312400	927900
Total Area	1175.937 Acres		

- **Sand Excavation Methodology**

Dredging is an excavation activity or operation usually carried out at least partly underwater, with the purpose of gathering up bottom sediments and disposing of them at a different location. In all situations the operation is undertaken by special floating plant, known as dredger. A dredger is a piece of equipment which can dig, transport and dump a certain amount of underwater laying sand in a certain time. The quantity of sand moved per unit of time is called production.

Portable river sand suction dredger is widely used for sand dredging, mud dredging, port building and deepening, the centrifugal sand pump can produce certain amount of vacuum, the sand and mud is conveying and discharging by pipeline and floater. The working process of this potable river sand suction dredger is as followed. The high pressure sand pump can produce certain amount of vacuum so the underwater sand and mud can be mixed into slurry; the mixing slurry is conveyed through the pipeline to the specified place.

- **Environmental**

The EIA takes into account all necessary aspects of environmental management not only in accordance with the Punjab Environmental Protection Act-2012 (amended act) and rules and regulations made there under including also environmental compliance with the PEQS.

It has taken into consideration likely environmental impacts on the environmental settings around the site and systematically provides solutions/safeguards against any pollution to accrue from the project activity. The most recent and efficient equipment for abatement and prevention of all sorts of pollution be it gaseous emission, PM, noise will be adequately taken care of.

This proposal takes stock of the likely potential environmental impacts from the project activity and describes necessary mitigation measures to be adopted to minimize their adverse impacts. In order to achieve the goals of environmentally sustainable operations of the project, the report especially recommends a comprehensive Environmental Management Plan (EMP), Environmental Monitoring Plan (EMtP) and last but not the least the proposal

recommends training of the staff to implement effectively the recommended EMP.

In short, all environmental aspects in relation to the project have been duly considered and mechanism recommended ensuring environmentally safe practices during operation.

- **Impacts During Operation**

The potential effects of the proposed development during operation can be divided as follows:

- Impacts associated with noise, from the trucks engaged for the load and transportation of the sand
- Impact on the surface water regime (hydrology); if deep excavation is done; by changes to the natural drainage of the landscape within the development area and potential emissions of fine particles (suspended solids).
- Potential release of contaminated effluents into the surface water drainage.
- Impacts of transport, traffic flow

- **Mitigation Measures**

- The contractor will control the dangers of oil spills during operation by maintaining the machinery in specific areas designed for this purpose hence will not be a serious impact as a result of the construction.
- Limit pickup trucks and other small equipment, observe a common sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.
- Water quality monitoring should be carried out at site. Parameters to be monitored at all locations should include the same as prescribed by the PEQS.
- Watering all active construction areas when necessary.
- Safe transportation of construction equipment from the site.

- **Conclusion**

It is concluded that the project should run in an environmentally sustainable order and in full compliance with the Punjab Environmental Protection Act (PEPA) 1997 (amended 2012), rules, regulations and the Punjab Environment Quality Standards (PEQS). The project, therefore, provides the necessary safeguards for the protection of all the elements/segments of environment including in particular human and environmental health.

No sensitive habitat with any particular ecological value was identified in the project area. There are no forests or fish farming activities in the vicinity of the project area.

In conclusion, the EIA of the project shows that by adopting environmental management and mitigation measures, the project will not have any adverse impact on the environment and the surrounding community.

1. INTRODUCTION

This chapter of the Environmental Impact Assessment (EIA) Study Report for sand excavation by using dredgers presents the information relevant to the EIA carried out by Geo Band Works Management. Details of the project title and project proponent, and EIA consultants are discussed below.

1.1. PROJECT TITLE & PROPONENTS

Project Title

Sand Excavation Project to which this EIA relates is by “**Sand Excavation by Using Sand Dredger by Malhi Stone Works International**” Zone No. 1-3 (New Zone) River Chanab, Tehsil & District Gujrat.

1.1.1. Details of Consultants

The proponent has assigned the task of preparing EIA report to M/S **Geo Band Works Management**. The EIA study of the proposed project has been conducted according to Environmental Assessment Procedures, 1997, Review of IEE and EIA Regulation 2000 as prescribed by the Federal Environmental Protection Agency (Pak EPA), Government of Pakistan.

1.1.2. Brief Description of Nature, Size and Location of Project

The project envisages with the establishment of a sand excavation by using sand dredgers at Zone No. 1-3 (New Zone) River Chanab, Tehsil & District Gujrat. The total area of the project is 1175.937 Acres. To plan sand excavation for commercial activity and for the purpose of construction activities, the project is commercial in nature. The area is leased by the project proponent vide Mines and Mineral Department letter No. ML/ADMM/ Gujrat-Ordinary Sand/Bhasar/river Chanab Zone 1-3 (New zone)/1379 dated 07-09-2019.

In accordance with the Punjab Environmental Protection Act 2012 (amended act 2012), the project falls in Schedule–I, which requires the Initial Environmental Examination (IEE) However, as per recent court order any project involving use of dredger should conduct an Environmental Impact Assessment of the project and submit report in Environmental Protection Agency (EPA), Government of the Punjab, Lahore to obtain the environmental approval to make the project as Sustainable Development.

According to the Punjab Environmental Protection Act (PEPA), Section 12 - Initial environmental examination, and environmental impact assessment: “No proponent of a project shall commence construction or operation unless he has filed with the Government Agency or, where the project is likely to cause an adverse environmental effects an environmental impact

assessment, and has obtained from the Government Agency approval in respect thereof.” It is this legal requirement from the Government of Punjab that this Environmental Impact Assessment (EIA) report has been prepared to get Environmental Approval (EA) from the Environmental Protection Department (EPD), Government of Punjab, Lahore.

This EIA report has been prepared according to the category defined in “Pakistan Environmental Protection Agency (review of IEE and EIA) Regulation 2000”.

This report provides detailed basic specific information and facts; including environmental, economic, social, etc., enabling its assessment and justification that the project will meet the requirements of environmentally sustainable practices; during regular excavation stage; as desired under the Punjab Environmental Protection Act, 1997 (amended 2012), the Punjab Environment Quality Standards and the rules and the regulations thereof.

This report is being prepared under the “Guidelines for the Preparation and Review of Environmental Reports October 1997/2000”. Details are available in the individual and respective sections of this report.

1.2. OBJECTIVE OF THE REPORT

1.2.1. Objectives

The main objective of the current study was to identify the potential impacts of the project and to recommend mitigation measures to be followed. The ultimate aim was to establish if the proposed project will be environmentally sound.

1.2.2. Methodology

The following methods were used in undertaking this study:

Literature review

Literature review of reports, documents and other relevant information about the project was conducted. The review also included other literature & data found important.

Site visit

Site visits were made to get a general understanding of the target area and assess the environmental impacts of the project.

Consultations

Consultations were made with stakeholder, district officials, local leaders and other key informants who will be affected by the project.

2. DESCRIPTION OF PROJECT

Rivers are the most important life supporting system of nature. For centuries, humans have been enjoying the natural benefits provided by rivers. Rivers provides the main sources of water reservoirs in addition to other sources like sand, clay etc for its utilizations of other fundamental development of the society. During the rain and the natural water flow in river much of sand deposits in the river bed, thus may cause undue filling / overburden in river bed. This sand is an essential constituent of construction material required in a range of civil works including house buildings, road/infrastructure network, bridges, dams etc, thus removing of sand from river bed may be healthy for river bed as well as for commercial point. Therefore, Mines and Mineral Depart offers/ grant open auction / lease for surface excavation of sand from river to maintain the surface of river bed which ultimately also cause commercial activities beneficial both for the department in terms of revenue generation as well as construction sector of the country. This simultaneously has introduced sand mining on scientific scale. Particularly in the water flowing areas of rivers, the sand excavation can also be done through dredger. In addition to traditional use of manual or excavator machinery etc for sand excavation, the use of dredger would require submission of Environmental Impact Assessment (EIA) to the Environmental Protection Agency (EPA) Punjab.

2.1. TYPE AND CATEGORY OF THE PROJECT

Project of Sand Excavation by Using Sand Dredger by Malhi Stone Works International intends to excavate the sand deposited as overburden lease area at Zone No. 1-3 (New Zone) River Chanab, Tehsil & District Gujrat. The project purpose is the excavation of sand by using dredgers for commercial purposes.

According to the review of the Initial Environmental Examination (IEE)/Environmental Impact Assessment (EIA) Regulation 2000, as prescribed by the Environmental Protection Agency, Government of the Punjab, hence, the project falls schedule-I category D (1) “**Extraction Of Sand**” in the category of the projects requiring Initial Environment Examination (IEE) However, as per new order any project involving use of dredger should conduct an Environmental Impact Assessment of the project.

Therefore, to fulfill the legal requirements of Section-12 of the Punjab Environment Protection Act-2012, the client is required to submit the EIA report in the Environmental Protection Agency, Government of the Punjab, Lahore to obtain the required Environmental Approval (EA).

2.2. OBJECTIVES OF THE PROJECT

The main objective of the project is to provide sand for commercial purposes like construction activities. River Sand for Construction is used as fine aggregate in mortars and concrete. Natural river sand is the most preferred choice as a fine aggregate material.

River sand is a product of natural weathering of rocks over a period of millions of years.

2.3. LAND USE ON THE SITE

The project site is situated in Gujrat district. Land acquired for the proposed mining project is basically river bed. The litho units encountered in the river bed and surrounding area are river born sediments brought and deposited in the flood plains by River. The size of the sediments towards the source host rock is coarse and at the tail end of the river the grain size is reduced to smaller sizes resulted in the formation of clay beds. Soil/Alluvium and sand has been observed in the area.

2.4. ROAD ACCESS

The site is approached via Gujrat Bypass road. The National Highway-5 Road is also passing over the river

2.5. VEGETATION FEATURES OF THE SITE

The proposed site mainly has scarce grasses and shrubs present on site. While the project area flora includes mainly trees or big plants like *Acciamodesta* (kikar), *Acacia modesta* Phulai), *Dalbergiasissoo* (Sheesham) are scattered in small numbers in the area that will not be affected during the proposed mining and extraction.

2.6. COST AND MAGNITUDE OF OPERATION

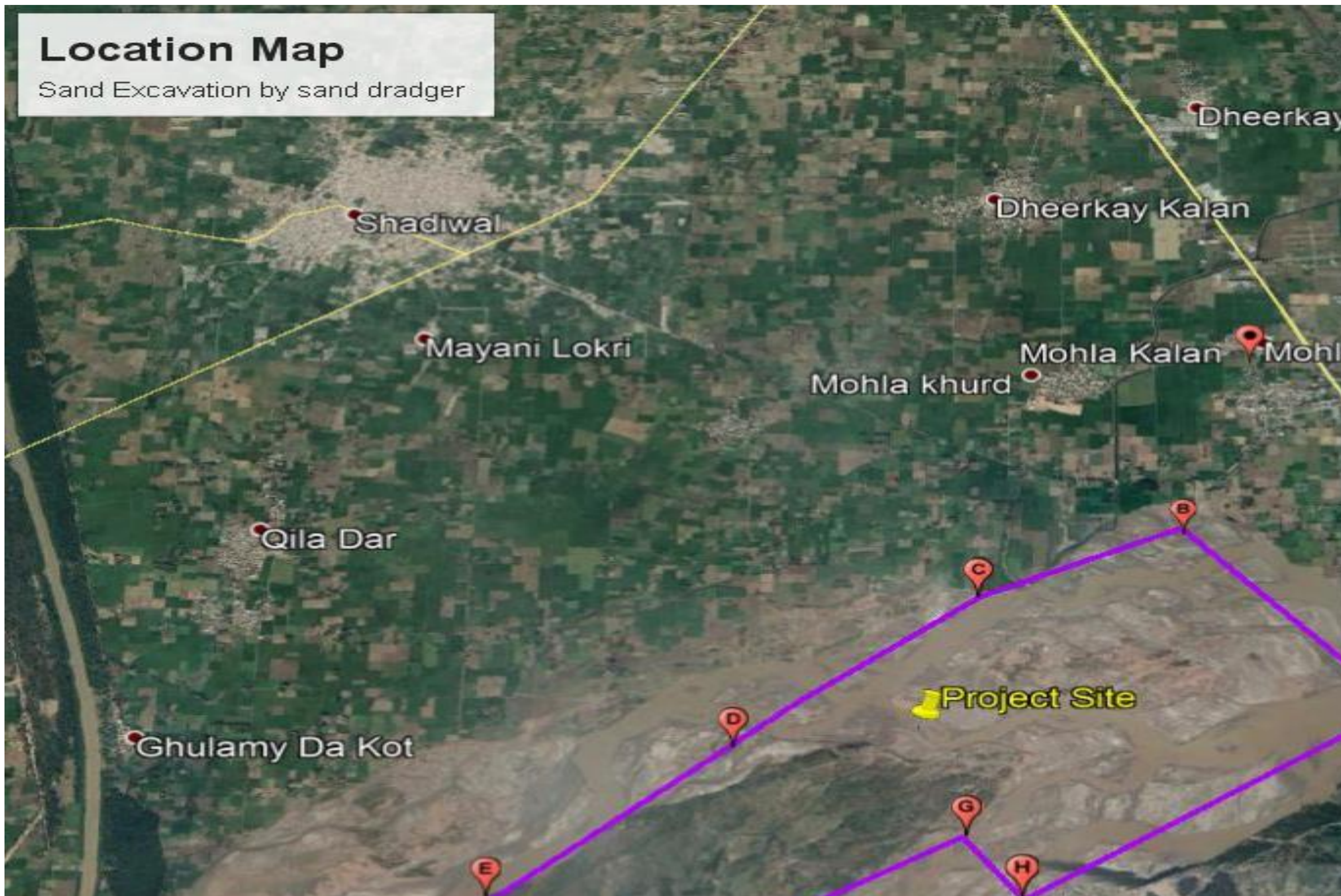
Lease cost of River Chanab Zone No. 1-3 of sand excavation site is 11 million and 05 Lacs PKR rupees. Transportation cost and operation and maintenance of machinery and vehicles are the costly activities involved in the operation phase of the project. Equipment facility will be assured if these operations are carefully managed.

2.7. LOCATION OF PROJECT

The project site is located at Zone No. 1-3 (New Zone) River Chanab, Tehsil & District Gujrat. The project layout map is in **Figure - 2.1.**

Location Map

Sand Excavation by sand dradger



2.8. PROPOSED INFRASTRUCTURE AND BASIC AMENITIES

Proposed Basic Amenities will be provided to workers at the excavation site	Rest room shelter/Tents, first-aid facility, PP temporary structure office and Portable Bio toilets, etc
Power requirement	Only day time extraction operations will be carried out, hence no electricity is required
Nearest source of Water supply & Demand	Daily water demand will be procured through tanker of nearby villages as per demand.
Manpower Requirement	Total employment in the extraction activities will be around 50 people and local villagers will be preferred for skilled and non-skilled jobs.

2.9. DESCRIPTION OF PROJECT

The subject projects involve the excavation of sand deposits by using sand dredgers at Zone No. 1-3 (New Zone) River Chanab, Tehsil & District Gujrat. Total area of the mining activity for sand is 1175.937 Acres.

2.10. SAND EXCAVATION

As per Mines & Mineral Rules, No sand mining shall be done 200 feet upstream and 500 feet down-stream of a structure. Excavation activities will start in the blocks from the upstream to downstream side. This will not obstruct the movement of water, if any, during monsoon period in the river course. Roads in the lease area for the movement of loaded tippers/ trucks will not have slopes more than 1 in 10 feet. Roads will be properly maintained in lease area and water sprinkling will be done for dust suppression. Every block will have its own approach road, which already exist and is well connected to main highways. Light weight excavators will be used for loading of sand in tippers/trucks.

2.11. METHODS OF MINING

Sand mining will be done in two seasons during low flow and high flow respectively.

I. Low Flow Season

Excavators will be used for excavation of the sand during dry season. The excavation will be limited to the river bed only. Sand will be extracted through excavators, loaded in dumpers, trolleys or trucks transported to the local market.



Figure 2.2 Excavator

II. High Flow Season

Dredging is an excavation activity or operation usually carried out at least partly underwater, in shallow seas or fresh water areas with the purpose of gathering up bottom sediments and disposing of them at a different location. In all situations the operation is undertaken by special floating plant, known as dredger. A dredger is a piece of equipment which can dig, transport and dump a certain amount of underwater laying soil in a certain time. The quantity of soil moved per unit of time is called production.

Portable river sand suction dredger is widely used for sand dredging, mud dredging, port building and deepening, the centrifugal sand pump can produce certain amount of vacuum, the sand and mud is conveying and discharging by pipeline and floater. The working process of this potable river sand suction dredger is as followed. The high pressure sand pump can produce certain amount of vacuum so the underwater sand and mud can be mixed into slurry; the mixing slurry is conveyed through the pipeline to the specified place.

➤ Features of river sand suction dredger:

- High efficiency, large output and long distance of pump.
- Very simple and fast assembly and dis-assembly, afloat or onshore, simple operation, easy to control.
- Good economic performance. The digging and delivery of material can be completed one time.
- Highly efficient fuel consumption and minimum overall operational costs
- Good access to all parts, especially the dredge pump wearing parts.

- The dredgers can be made according to the customers' request.
- **Application**
- Dredger is used for cleaning river silt, sand production and mining project.
 - Applied to dredging rivers, lakes and ponds, reclaiming land, cleaning ports and pumping sand.
 - Mainly service for the master dredger and transporter for delivering sand to land
- **Inner structure of the river sand suction dredger**



Figure 2.3 Inner structure of suction dredger

- **Sand Dredger**



Figure 2.4 (a) Portable river sand suction dredger



Figure 2.4 (b) Mini portable sand suction dredger



Figure 2.4 (c) Mini portable sand suction dredger

➤ **Main Specifications**

Dredger hull is made of 6 mm thickness steel plate

Model (inch)	Dredger Size L*W*H(m)	Sand Capacity (m ³ /h)	Max. dig depth (m)	Max. discharge distance (m)
4	4.5*2.0*0.7	25-30	5-6	50-80
6	5.8*2.2*0.75	45-60	6-8	80-100
8	5.8*2.2*1.00	60-80	8-15	100-120
10	5.8*4.2*1.00	80-100	15-20	120-200

2.12. HOURS OF OPERATION

The extraction will operate for 10 to 12 hours per day for 6 days per week.

2.13. COMPARISON OF PROPOSAL OPTIONS

2.13.1. Size

For assessment of the project economic viability, basic parameters including product demand and investment considerations are of major relevance. However, other important considerations also include environment, availability of adequate raw materials for its life-cycle and the basic infrastructure.

2.13.2. Work Force and Work Machinery

The details of the construction staff has been shown below in Table 2.1. The labor will work in one shift of eight (8) hours. The construction machinery which will be utilized for construction is shown in Table 2.2.

Table - 2.1: List of Construction Staff

Sr. No.	Category of Staff	Tentative Number
1	Supervisor	1
2	Foreman	2
3	Skilled Worker	10

Sr. No.	Category of Staff	Tentative Number
4	Semi Skilled Worker	20
5	Machinery Operator	8
6	Admin.	1

Table - 2.2: List of Construction Machinery to be used for Construction

Sr. No.	Type of Machinery	Quantity
1	Excavator	2-4
2	Dumper & Loader	3-6
3	Tractor & Trolley	6-8
4	Water Bowser	2
5	Generator	1
6	Water Pump	2

2.14. RESTORATION/REHABILITATION AT THE END OF PROJECT LIFE

There will be no any matter of rehabilitation as the proposed site is already leased by the project proponent. There will not be any let regarding safety factors as applicable from time to time for such projects on all accounts. Debris or any other wastes resulting from project will be disposed off in environmentally sustainable fashion. During entire excavation period, necessary precautions will be taken to ensure that no damage is done to the basic infrastructures like roads of the area, power transmission lines, private or public property and daily human life as well. Safety measures as desired under the code of demolition will be adopted to avoid any harm to humans, property around, or the environment in the project area. Dust to be generated will be minimized by constant sprinkling of water. After completion; all construction matrix, debris and garbage will be removed off immediately from the site within the minimum possible time under safe conditions. Any minor spill over of these materials will be cleared adequately.

The land, if and where pitted will be adequately leveled. On the whole, the project site and the area in its near vicinity will be made neat and clean.

3. DESCRIPTION OF THE ENVIRONMENT

3.1. INTRODUCTION

Gujrat is a district of Punjab Province in Pakistan. It is an ancient district located in between two famous rivers, the Jhelum and Chenab. Because of its proximity with the rivers the land is good for cultivation with rice and sugar cane as main crops. It is bounded on the northeast by Mirpur, on the northwest by the River Jhelum which separates it from Jhelum District, on the east and southeast by the Chenab River, separating it from the districts of Gujranwala and Sialkot, and on the West by Mandi Bahauddin. District Gujrat is spread over an area of 3,192 square kilometres, and is divided into three tehsils, Gujrat, Kharian, and Sarai Alamgir.



Figure - 3.1: Location Map of Gujrat

3.2. LOCATION

Gujrat; the district where the lease area is situated; is situated on the bank of Chenab River, situated about 120 KM north of Lahore. Prominent nearby locations include Jhelum, Gujranwala, Mandi Bahauddin, Sialkot and Bhimber-Azad Kashmir. The city is surrounded by many villages which supply a significant Labor to the local market.

3.3. GEOGRAPHY

Gujrat is an ancient city of Pakistan located between two famous rivers, Jhelum River and Chenab River. Because of its proximity with the rivers, the land is good for cultivation of rice and sugarcane as main crops.

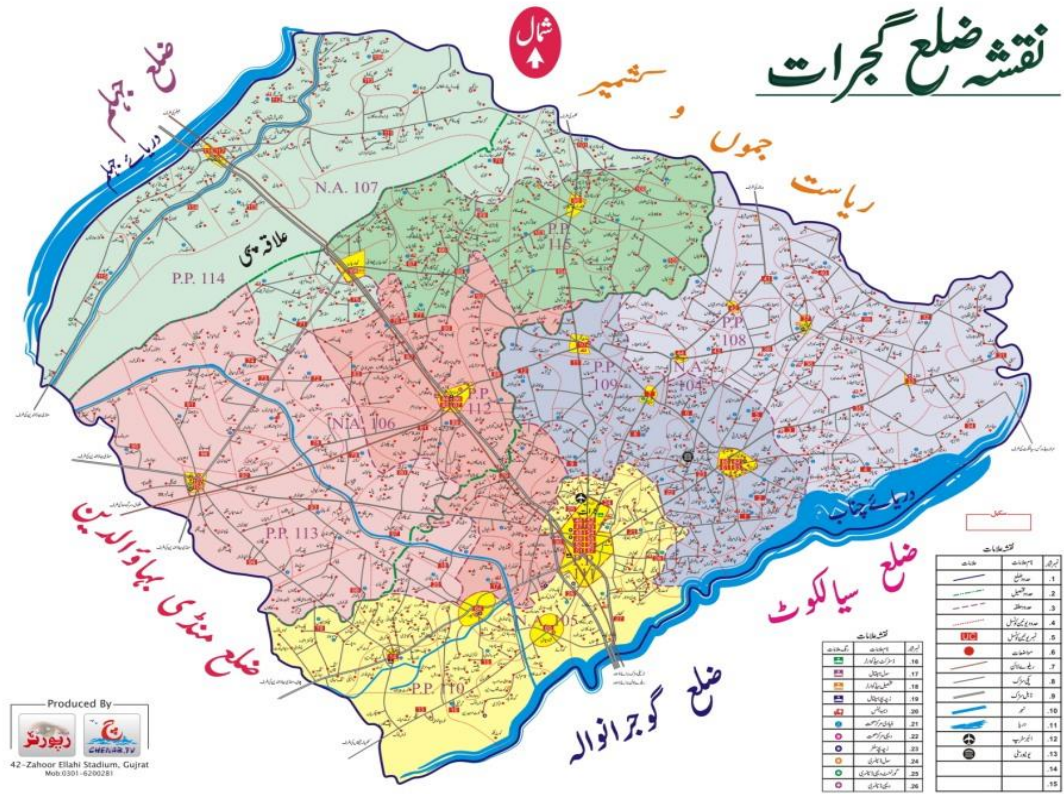


Figure - 3.2: Geographical Map of Gujrat

3.4. ECONOMY/INDUSTRY

Gujrat is also known for its clay with which the locals have, for long, produced quality pottery. The city also produces fine furniture. Over the last few decades, Gujrat has also attained a name in the manufacture and export of Electric Fans. Gujrat is also home to one of the two largest shoe manufacturing companies in Pakistan, namely Service Industries, which runs a large shoe factory in the city. There are about 1,059 cottage level and small to large scale industrial units operating in the district. Rice production and export is another major product of Gujrat. There are many other factories engaged in manufacturing of electrical goods, electric motors and rice cleaning mills. Most are cottage industries, providing employment to a large number of people and accounting, in aggregate, for more than 90 percent of the domestic market. The story of the emergence of the electric fan manufacturing industry in Pakistan started with a few enterprising individuals in the early 1940s, struggled against all odds, and created, without government or foreign help, resulting an efficient industry. There are now over five hundred fan factories in Gujrat, Gujranwala, Lahore and a few other cities. Most of the Fan Industries are in Gujrat.

3.5. EDUCATION

University of Gujrat was established in 2003, just near the Govt College for Girls. The main campus of the University is called Hafiz Hayat Campus. Hafiz Hayat is an ancient legend for the Gujrat city. At the same time there are two more Govt Colleges in the city but to complete the lack of hunger for knowledge there are so many private colleges. These colleges cover some special subjects for each. As the population of the city was increasing day by day so there was great need for Elementary, Middle and High Schools too. As the Govt had not a lot of resources to cover this whole need, so private schools started to born. But having Govt. and Private Institutions in the same city don't mean that the standard of education is low. But a competition can be seen between them which encourage the students as well as the teachers to go beyond the limits of theoratical studies. So students can learn more not just by understanding the material but also by practicing it.

3.6. CULTURE

Gujrat produces low temperature pottery ceramic goods, Hukkas, artistic handicrafts, flower pots, "Changairian" (made from the leaves of palm and date trees), cotton mates and woollen shawls. Sohni Mahiwal is a famous folk tale of the Punjab region. The heroine of the story, named "Sohni" (a Punjabi word, meaning "beautiful"), came from the Gujrat region. She used to meet her lover "Mahinwal" by crossing the Chenab River, sitting on a pitcher. The tale is still told to this day, and is an essential part of Punjabi culture. The anniversary of Kanwan-Wali Sarkar near Karuan wala Gujrat is celebrated with a fair in August every year. He is known as the one of the greatest saints that ever lived. A famous miracle was when water in a well actually turned to milk for a period of time. The well is still there. The locals have a myth that it rains heavily at the time of fair (but actually the rain falls because of monsoon) and "Wengi Wali Sarkar" anniversary in 5 january every year at village Haji Wala near Karianwala Tehsil and District Gujrat.

Major Tribes

The principal tribes of the districts are Gujjars, Jats, , Mughals, Syeds, Rajputs, Kashmiris, Arians and Awans.

The principal Gujjar zClans are:

- Khatana
- Maher
- Mahrana
- Kalo
- Chachi
- Thikria

- Tinday
- Paswal

The principal Jat Clans are:

- Bagril
- Bangial
- Badhan
- Chadhar
- Cheema
- Dhillon
- Dhotar
- Gujjral
- Ghumman
- Gondal Jat
- Heer or Hayer
- Hanjra
- Kang
- Khokhar
- Langrial
- Mangat
- Sahi
- Sarai
- Sipra
- Tarar
- Sandhu
- Sial
- Tatla
- Thathaal
- Virk
- Waraich
- Malhi

3.7. TRANSPORT

The district, with 1,019 kilometres of road, is linked with Gujranwala, Jhelum, and Mandi Bahauddin districts through metalled roads. The main Peshawar - Karachi railway line passes through the city and it is amongst an important railway station of this route. The district is linked with Jhelum, Mandi Bahauddin, Sargodha and Gujranwala districts through Pakistan Railway Network. Daewoo Express has a terminal at GT Road Gujrat, started on May 14, 2004 and connects Gujrat with Lahore. Gujrat airport does not host any commercial flights, and people use the nearby Allama Iqbal International

Airport, Lahore and Sialkot International Airport for domestic and international flights.

3.8. PHYSICAL ENVIRONMENT

Climate

Seasonal climatic conditions must be considered for the design and execution of Project. The climate including air, temperature, precipitation, humidity and evaporation is an influencing factor, affecting the construction of Unit and other engineering structures. However, to determine the overall effect of the climatic stresses, daily and seasonal temperature changes, site altitude, direct solar radiation, and precipitation must be considered.

The city has a moderate climate. During the peak of summer, the daytime temperature shoots up to 45 °C (113 °F), but the hot spells are relatively short due to the proximity of the Azad Kashmir Mountains. During the winter, the minimum temperature may fall below 2 °C (36 °F). The average rainfall at Gujrat is 67 centimeters (26 in).

The Project Area receives rains in all the seasons but monsoon rain is pronounced and constitutes a definite rainy season between the month of July and September. The average rainfall is about 629 millimeters per year. Table 3.1 summarizes month-wise temperature, precipitation, and relative humidity.

Table - 3.1: Average Monthly Temperature, Precipitation and Relative Humidity

Month	Mean Temperature		Precipitation (mm)	Relative Humidity (%)
	Maximum	Minimum		
January	19.8	5.9	23.0	64.6
February	22.0	8.9	28.5	57.6
March	27.1	14.0	41.2	51.1
April	33.9	19.6	19.7	37.9
May	38.6	23.7	22.4	31.9
June	40.4	27.3	36.3	39.8
July	36.1	26.8	202.1	63.3
August	35.0	26.4	163.9	68.8
September	35.0	24.4	61.1	59.6

Month	Mean Temperature		Precipitation (mm)	Relative Humidity (%)
	Maximum	Minimum		
October	32.9	18.2	12.4	53.2
November	27.4	11.6	4.2	61.4
December	21.6	6.8	13.9	67.8
Annual	30.8	17.8	628.7	54.7
Source: Metweb Pakistan, retrieved June 06, 2018				

3.9. WATER

Surface Water

One surface water source in the Project Area includes River Chenab and passes on the east of the project area. The waters of the Chenab start from snow melt from the Bara Lacha Pass, 32°44'N 77°26'E, in the Himachal Pradesh. Chenab River is the only River which flows through the district Gujrat. The total length of the Chenab is approximately 960 kilo metres.

Ground Water

The Project Area is a part of Chaj Doab (area between Ravi Chenab and River Jehlum). The chemical quality of groundwater is: Generally fresh in the area along the rivers: and Brackish/ saline in the central parts of the Doabs. During the last century, a weir controlled irrigation system was superimposed on these areas. Seepage from the canal system and irrigated fields has formed shallow fresh groundwater lenses/layers on top of the saline groundwater zone. Thick clay lenses at varying depth in the area, divide the aquifer in different parts and these impervious clay lenses act as barrier between the shallow poor groundwater quality and deep fresh groundwater quality in the area. One of the reasons of poor groundwater quality at shallow depth in the area is water logging in the past. Whereas, different impervious thick clay layers at depth up to 400 ft separate the shallow aquifer from the fresh groundwater aquifer at depth. Therefore, the groundwater quality in the project area improves with depth. Ground water analysis results were retrieved to ascertain the water quality of the area and given in following table.

Table - 3.2: Groundwater Analysis of Gujrat City Area*

Sr. No.	Parameters	Unit	Year 2016-17		
			Test Result	WHO Guidelines	PEQS
A. Chemical Parameters					
1	pH	-	7.5	6.5 -8.5	6.5-8.5
2	Total Dissolved	mg/l	240	1000	<1000
3	Chloride (Cl)	mg/l	38	250	<250
4	Hardness	mg/l	70	500	<500
5	Nitrates	mg/l	0.24	50	≤50
6	Sodium	mg/l	10	200	-
7	Fluoride (F)	mg/l	0.19	1.5	≤1.5
8	Arsenic (As)	mg/l	N.D	0.01	≤0.05
9	Lead (pb)	mg/l	N.D	0.01	≤0.05
10	Mercury	mg/l	N.D	0.001	≤0.001
11	Iron (Fe)	mg/l	N.D	0.3	-
B. Microbiological Parameters					
1	Total Colony	cfu/ml	Nil	<500 cfu/ml	-
2	Total	No./ml	Nil	0/100 ml	0/100 ml
3	Faecal Coliforms (E.Coli)	No./ml	Nil	0/100 ml	0/100 ml

* EIA Report of Service Industry, Prepared by IEC, Lahore reported in EPA, Punjab, publically available.

The above table shows that all the chemical parameters are well within prescribed limits, also microbiological parameters (Total colony count and Total Coliforms) are well within the permissible limits of WHO and PEQS.

3.10. SEISMOLOGY

The area is not listed in the seismic potential zone. The Project Area is located in Seismic Zone 2B according to building code map of Pakistan

3.12. ECOLOGICAL ENVIRONMENT

3.12.1. Fishery and Aquatic Biology

The nearest natural drain has no fish. There is no fish farming in the area either naturally or commercially.

3.12.2. Flora

Tree species found in the Project Area include Shisham (*DalbergiaSisoo*), Alustonia, Neem (*AzaddrachtaIndica*), Keekar (*Acacia Nilotica*), Bottle Palm and Rubber Plant (*FicusElastica*). However, no fruit trees are found in the Project Area except those planted in nearby villages such as mango (*MangiferaIndicaAnacardiaceae*), guava (*PsidiumGuajava*) and jaman (*SyzyziamJambulenum*). However, the execution of the project does not involve cutting of the trees.

3.12.3. Fauna

Most of the fauna in the Project Area include pets, dogs, cats, squirrels, lizards and nestling birds such as maina, sparrow, quail, parrot, pigeon, crow etc.

3.13. AGRICULTURAL PROFILE:

Wheat, Sugarcane, and Rice (cleaned) are the main crops grown in the district. Besides, Ground Nut, Gram, Guar Seed, Jawar, Bajra, Moong, Mash, Masoor and Oil Seed such as Rape / Sunflower / Mustard are also grown in minor quantities in the district

Table - 3.3: Details of Primary Crops and Livestock

MAIN CROPS (2008-09)					
	Wheat	Rice	Fruits	Vegetables	Fodder
In Tonnes	294	109.3	2427.0	2932.0	436.4
Area (He)	158.2	59.1	441.0	287.0	15.2
Tonne / He	1.85	1.84	5.50	10.21	28.71

Table - 3.4: Land Area and Land Use

LAND USE	AREA (000 Ha)	% of Total Distt Area
Total Geographical Area	985	100
Area Reported	321	32.58
Total Cultivated Area	253	25.68
Area Under Forest	12	1.21
Not Available for Cultivation	46	4.67
Culturable Waste	10	1.01

LAND USE	AREA (000 Ha)	% of Total Distt Area
Current Fallow (C.F)	22	2.23
Net Sown (N.S)	231	23.45
Area Sown more than once (A.S.M.T.O)	90	9.13
Net Cultivated Area (C.F + N.S)	253	—
Net Cropped Area (N.S + A.S.M.T.O)	321	—

Table - 3.5: Major Grains, Fruits & Vegetables

S.NO	CATEGORY	NAMES
A.	GRAINS	Wheat, Rice, Maize.
1.	Oil seeds	Rape Seed, Mustard, Sunflower.
2.	Pulses	Moong, Mash, Moth.
3.	Fodder	Lucern, Jowar, Bajra, Maize.
B.	FRUITS	Mango, Citrus, Guava, Water Melon, Musk Melon.
C.	VEGETABLES	Tomato, Onion, Lady Finder, Tinda, Radish, Cabbage, Cauliflower, Carrot, Potato, Pumpkin, Cauliflower, Brinjal,
D.	OTHER	Chillies, Coriander, Garlic

4. SCREENING OF ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1. GENERAL

Any human activity in any environment produces impact, modifying it to a status which is considered adverse or beneficial according to the damage or improvement it brings about in physical, chemical and biological status of air, water, land including biota and in socio-cultural life styles and economy of the populace it affects. Depending on the nature of activities and existing status, the impacts are assessed for their importance. On the basis of the impact analysis, the mitigating action and future monitoring requirement are focused in the Environmental Management Plan for counting or minimizing adverse impacts.

The following parameters are of significance in the EIA and are being discussed in detail:-

1. Land Environment
2. Water Environment
3. Air Environment
4. Noise Environment
5. Biological Environment
6. Socio-Economic Environment

4.2. LAND ENVIRONMENT

On River Bed: The river mining does not involve any waste. Thus, no waste dumpsites are needed. Main aspects are excavation, loading and transportation activities.

On Agriculture Field: Excavation and conservation of top soil from agriculture land before the commencement of Mining activities may involve some overburden / waste.

Impact Prediction	Mitigation Measures
➤ Obstruction in river flow / course. ➤ Erosion of channel bed and banks. ➤ Increase in channel slope. ➤ Change in channel morphology. ➤ Impact on stream's physical	➤ Extraction of minerals will be started from dip side towards rise at the centre and also laterally in 1.0m slice. Unwanted material or spillage (if any) will not be stacked by the side of the excavation voids created. Excavation will be carried out in a manner so that water flow / course

Impact Prediction	Mitigation Measures
characteristics, such as channel geometry, bed elevation in stream roughness of the bed, flow velocity, discharge capacity, sediment transportation capacity etc ➤ Impact on ecological equilibrium of Riverine regime.	will not be obstructed. ➤ Extraction is to be done leaving safety barrier or offset on both sides and maximum barrier should be on concave side of river preferably the flow channel (excavation void created) should be kept straight so as to help avoid erosion as side cutting or collapsing. ➤ Safety zone or buffer area will be created from the river banks to minimize the instability & erosion and to increase the stability of structures. These safety zones will not be mined out ➤ Quantities will be strictly limited so that sand accumulation rates are sufficient to avoid extended impacts on channel morphology ➤ Extraction will be carried out as per approved Mine Plan in scientific and systematic way. ➤ Sand Extraction will be restricted down to 3.0m below river bed or 1.0m above the ground water table, whichever less. Therefore, the extraction will not intersect the ground water table ➤ The project working will remain confined to river bed only and in no case mining will disturb any surface area outside the river bed which may affect topography or drainage ➤ The extraction from river bed will not have impact on natural drainage of surrounding areas as the excavated sand from river bed is filled with first heavy flow in river during monsoon season.

4.3. WATER ENVIRONMENT

Impact Prediction	Mitigation Measures
➤ Flow pattern might be changed due to river bed extraction. ➤ Project activities depth will be increased, which may result in increase of flow velocity	➤ No diversion is proposed. There will not be any adverse impact on flow pattern, surface hydrology and ground water regime. ➤ Extraction activities will be restricted to 3.0m depth, which will not cause much change in flow pattern of the river ➤ An offset will be left from both sides of river, which will minimize the chances of bank failure
➤ Change in surface water quality and ground water quality	➤ There will be no change in surface water quality as river is seasonal. ➤ Ground water quality will not be affected due to mining activities as it is restricted to 3.0m depth and the water level is 9-15 m below the surface of river bed. ➤ The extraction will not be allowed below the water table ➤ Regular monitoring of water samples will be done as precautionary measures. ➤
➤ Impact on ground water recharge potential as the thickness of the natural filter materials (sediments) is reduce causing less infiltration.	➤ Extraction will be done as per approved Mine Plan and applicable Rules & Regulation, so that there is no damage on ground water recharge potential due to sand extraction.
➤ Waste water discharge.	➤ Portable Bio-toilets will be used; hence no sewage / liquid effluent will be generated and contamination is also not expected due to percolation.

4.4. AIR ENVIRONMENT

Impact Prediction	Mitigation Measures
➤ Release of dust emissions from the excavation operations	➤ Use of best practice management techniques during extraction and loading of raw materials.
➤ Release of combustion emissions from transport associated with transport of materials to and from the site	➤ Use of new, efficient vehicles, driver training to minimize emissions (e.g. prevention of over revving, shut off engines when vehicles not in use), proper maintenance, rationalization of traffic management system to optimize transport efficiency

4.5. NOISE ENVIRONMENT

Impact Prediction	Mitigation Measures
➤ Noise Impact due to project activities.	➤ The noise levels from all sources are periodical and restricted to particular operation. ➤ Periodical monitoring of noise will be done. ➤ No other equipments except the transportation vehicles and excavator for loading will be allowed ➤ Noise generated by these equipments will be intermittent and does not cause much adverse impact ➤ Proper maintenance of all equipments / machines will be carried out which help in reducing noise during operations ➤ Ear muffs will be provided while working on mining equipments.

4.6. BIOLOGICAL ENVIRONMENT

Issues	Potential Primary Impact	Mitigation Measures
Temporary road	➤ Short-term disturbance in habitats of wildlife populations from	➤ Do not cut trees that are larger in diameter than

Issues	Potential Primary Impact	Mitigation Measures
	noise (impacts usually local and short-term)	local regulations permit, or in the absence of regulations, greater than 90 cm.
Infrastructure	➤ Erosion and changes in surface hydrology.	➤ "Minimize the footprint", use existing infrastructure to the extent possible to avoid or reduce clearing.
Drainage	➤ Erosion and changes in surface hydrology, causing short and possible long term changes in local habitats	➤ Take topography, natural drainage and site runoff patterns into account. Ensure adequate drainage away from streams, river and other waterways.
Traffic	➤ Short-term disturbance of habitats from traffic; short-term disturbance of wildlife populations from noise. ➤ Compaction of soils and changes in	➤ Keep traffic to the absolute minimum requirements. ➤ Impose and enforce speed limits and provide driving guidelines for vehicle operators.

Issues	Potential Primary Impact	Mitigation Measures
	surface hydrology. ➤ Hunting of local wildlife.	➤ Treat (water) road surfaces to manage dust. ➤ Allow only authorized employee access to site(s) transportation.

4.7. SOCIO-ECONOMIC ENVIRONMENT

Aspects	Impacts	Mitigation
Habitation	➤ No loss of habitation.	➤ There is no nearby habitation. ➤ All necessary measures are being taken, so that there is no disturbance to the normal life of persons.
Employment Generation	➤ Direct employment. ➤ Indirect employment to about 268 persons. ➤ Improved income expenditure. ➤ Improved micro investments–savings patterns.	➤ Local people will be employed. ➤ Training will be provided to non workers and unskilled workers. ➤ Awareness programme to motivate people for savings and investment.
Health impacts on mental, physical and social well being.	➤ The proposed project will not adversely impact the mental physical and social wellbeing.	➤ Expectations in fair pay, employee care, social responsibility commitments etc. will be timely met. Grievance redressal

Aspects	Impacts	Mitigation
	It will improve the well being of the people and the area	mechanism is made to handle complaints from the study area.

5. ENVIRONMENTAL MANAGEMENT PLAN & MONITORING PLAN

As desired by the matrix/mandate of the officially approved EIA Report guidelines, the Environmental Management Plan (EMP) presented in this section highlights the followings:

- i. Mitigation / Compensation Measures during Development Phase
- ii. Mitigation / Compensation Measures during Operation Phase
- iii. Environmental Monitoring
- iv. Training Needs
- v. Construction Traffic Management Plan

5.1. ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan (EMP) is presented in this section. Mitigation and compensation measures to address the environmental issues during excavation of sand are described in this section.

Mitigation / Compensation Measures during Lease Development Phase

These are presented in **Table - 5.1** below.

Mitigation / Compensation Measures during Operation Phase

These are presented in **Table - 5.2** below.

Table - 5.1: Mitigation Measures during Development Phase/ Excavation Phase

Environmental Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
AIR QUALITY			
Air quality: Dust emissions during development and ground works.	Development of procedures for: ➤ water spraying roads and dusty materials stockpiles ➤ covering vehicles carrying dusty materials on leaving the site to prevent materials being blown from the vehicles ➤ speed limits on unpaved surfaces on site to limit dust.	Dust propagation will be limited to development area and will not influence local community. Workers will be supplied with dust masks.	Minor adverse
GROUND & WATER			
Importation of pollutants already present within the materials to be used for filling and site leveling operations	Ensure that pollutants are not present in materials imported onto the site by appropriate selection of source material.	Potential for importation of pollutants in the material will be minimized through specifications to Contractors and monitoring by project team.	Minor adverse

Environmental Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
Accidental release of fuels, oils, chemicals, hazardous materials, etc., to the ground, especially in the development lay-down area, during delivery to the site.	Appropriate procedures and protocols to be established and monitored for materials delivery and handling to ensure there are no spills.	Potential for accidental release during delivery of materials to the site will be minimized via written procedures and protocols.	Minor adverse
Accidental release of fuels, oils, chemicals, liquid waste, hazardous materials, etc., to the ground, especially in the development lay-down area, during storage.	All storage areas will have appropriate environmental security measures to prevent accidental release to ground.	Potential for accidental release of materials during storage on the site will be minimized.	Minor adverse
Accidental release of fuels, oils, chemicals, hazardous materials, etc., to the ground, especially in the development lay-down area, during transport to the area of use.	Appropriate procedures and protocols to be established and monitored for materials transport and handling whilst on the site.	Potential for accidental release of materials during transport within and handling on the site will be minimized.	Minor adverse
Accidental release of fuels, oils, chemicals, hazardous materials, etc., to the ground, during use, [for example, re-	Appropriate procedures and protocols to be established and monitored for materials handling and use. Where possible, re-fuelling and maintenance areas will include some form	Potential for accidental release of materials during use will be minimized	Minor adverse

Environmental Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
fuelling, maintenance, etc.]	of secondary containment.		
Accidental release of liquid wastes during removal from site.	Appropriate procedures and protocols to be established and monitored for waste materials removal.	Potential for accidental release of waste during removal from the site will be minimized.	Minor adverse
Accidental discharge of sanitary wastewater to ground and groundwater from the workers camp.	Sanitary waste will not be discharged to the ground. Contractors will provide appropriate Sewage Treatment Facilities.	None	Negligible/Nil
Increase of sediment load in natural aquatic receptors resulting from direct run-off disposal.	Minimization of excavations face during development. Temporary drainage grooves and sedimentation ponds for surface run-off collection.	None	Negligible
Groundwater contamination from leakage of polluting substances.	Usage of non-hazardous materials for human health and environmental protection. Storage of potential polluting materials in appropriate areas, including secondary containment. Any contaminated land occurred during	None	Negligible

Environmental Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
	development will be directly removed and disposed of in accordance with local regulations for waste disposal.		
MATERIAL USE & WASTE MANAGEMENT			
Waste generation.	Introduction of waste storage and control procedures. Segregation and recycling of waste by developer into metal components, plastics, glass separately.	Waste for disposal will be disposed of at an approved waste disposal site.	Negligible
Loss of vegetation on site. Clearance.		Vegetation loss cannot be avoided, but clearance with successful restoration, improvement and long term management of the surrounding areas for conservation and productive uses will provide significant compensation.	Negligible

Environmental Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
Destruction of fauna and habitat (mammals, birds, reptiles, amphibians, invertebrates).	Further ecological/fauna survey at appropriate seasons and translocations monitored by the proponent specialist.	Moving fauna to neighboring sites may help short-term survival, but not medium-term if these sites are already occupied. In long term populations may recover on restored sites.	Not significant
Increase in exploitative pressures on habitats neighboring the sites.	Conduct and implement further "Habitat Survey and Management Study", in close consultation with local officials & communities.	With co-operation of officials & local community and project providing alternative source of income, habitats should be improved.	Moderate to substantial beneficial.
Landscape And Visual			
Damage to the landscape character and visual amenity due to introduction of	Sensitive planning of site works and worker's compound. Advanced structure planning. Minimize lighting and night time workings.	Some exposure to alteration of the landscape character	Minor adverse impact.

Environmental Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
incongruous features and activities.		and loss of visual amenity, predominantly due to out-of-site activity.	
Noise & Vibration			
Noise from development activity of new block and link roads.	Good site management; appropriate choice of machinery; methods of working; hours of working; efficient material handling.	A baseline noise study needs to be carried out. But further study may be the need to predict whether there may be noise increases at nearby villages.	Minor adverse
Noise from traffic relating to development using existing roads through local residential areas & cities	Define access routes to the site with the smallest number of properties in proximity to it. Keep vehicle movements to a minimum. Once link roads are completed, all development traffic to/from the site should only use the link roads.	There may be noise increases at residential properties in proximity to the chosen access route, and then from the link road once completed.	Not significant

Environmental Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating

Table - 5.2: Social Impacts during Operational Phase

Social Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
Increased Employment. (Positive Change)	- Measures to maximize local employment. Recommended: - Local recruitment and training. - Prioritization of employment of Project area - Identification of targets of local people to be employed by skill levels.	This depends on skills of the people. Enhanced apprenticeship/training for some local people whose skills could be improved including Recruitment Policy to extend in future to limited sponsorship for workers / local people children.	Major beneficial.
Increased National tax and budget (Positive Change).	Assistance to villagers to formulate projects and strengthen advocacy. Money from improved royalty budget can be used to realize these objectives. Proponent may offer skills training for improved planning & project formulation.	Increased Regional & National Budget and secondary impact on local Communities. Residual impact will depend on effectiveness of allocation process in favour of affected villages. An ineffective process would cause conflict / discontent.	Major beneficial.
Extended and improved	Regulations relating to road side and	Improved opportunities should be	Minor beneficial.

Social Impact	Proposed Mitigation	Residual Impact	Residual Impact Rating
road and implications for local economy (minor/moderate beneficial).	commercial activities to be adhered to by business persons and enforced by Community. Monitoring of health, road safety issue. Curative and preventive action to be taken if issues identified by monitoring.	seen in increased opportunities and wealth of villages. It may be difficult to apportion this only to the new road or cement works given the current increasingly dynamic economic environment.	

5.2. OTHER MITIGATION MEASURES

Mitigation of Human Impacts

Economic Environment

The extraction project could have both positive and negative impacts on the economic environment. Whilst there is significant potential for positive economic benefits of the Project, the extent to which it is likely to lead to economic development and or inflation depends on the Project approach to providing services to its workers (e.g. transport, canteen services, and in-house medical care).

Mitigation: The Company needs to consider the Socio-economic baseline context and consult community leaders and civil society when making economic development agreements.

Employment, Livelihoods and Income Generating Activities

Access to Project Employment is a key priority for local stakeholders. In both development/construction and operational phases there is an opportunity for maximizing positive impacts of the Company on local employment through involving unskilled (and where possible skilled) labour from all Project communities. However, although the generation of employment opportunities resulting from Project activities is expected as a positive impact, there is a risk that conflicts could arise between local inhabitants and new comers or outsiders over such employment opportunities. Furthermore there is high risk that, unless Project employment by the Company and contractors is managed appropriately, nepotism would influence the recruitment procedure, meaning that people without connections would not get access to Project opportunities. Namely employment and other livelihood benefits. This could lead to a moderate risk of social conflict.

Mitigation Measures:

The Company needs to identify the skills that it needs for its development and operations phases that could be provided as part of a community skills development program providing basic vocational training in the communities.

Occupational Safety & Health Measures

Development and operational activities could expose workers to health and safety risks. In particular, the following activities could have negative health impacts: noise and dust; working with heavy equipment (strains and accidents); working in confined spaces (fumes could mean respiratory impacts), heavy lifting, storage, handling and use of dangerous substances

and waste (strains and accident risks), and working under noisy conditions (hearing and stress/psychological impacts). Excavations and transportation of materials may cause further health and safety negative impacts.

Mitigation Measures:

The Company will demonstrate a best practice occupational health scheme, and share plans for the health maintenance and emergency services for their employees so that local health infrastructure capacity is not put under greater strain. An important mitigation is the forming of partnerships of understanding and relationship building with local health care providers.

Company's contractors will adopt strict construction and operation practices with best technology and health and safety training to ensure the safety of its workers.

5.3. ENVIRONMENTAL MONITORING

Ambient Air Quality

An ambient air quality monitoring system and program should be installed at least 2-3 months prior to the start of main development activities.

It is recommended that the monitoring program should cover as a minimum, the chemical parameters under the environmental legal requirement.

Meteorological data should be recorded in parallel to air quality monitoring at the same reference location.

Monitoring parameters and frequency are to be carried out according to the requirement of Pakistan Environment Protection Act, 1997, under Category-A "Guidelines for Self-Monitoring and Reporting by Industry (SMART). Ambient air quality monitoring should be carried out biannually, at least.

Noise

An ambient noise measurement program should be instituted upon commissioning of the project. The monitoring program should consider the noise limits during day-time and night-time at the closest point of public contact.

Assigning responsibility for implementation (by name or position)

In order to ensure implementation and effective operation of the Environmental Management Plan (EMP), it is of utmost importance that responsibilities be fixed to specific persons so that each one of them should

be answerable in case of lapse or mishap. Accordingly, hereunder the same responsibilities have been described:

Table - 5.3: Responsibilities of Management

OFFICIAL CONCERNED	RESPONSIBILITY
Works Manager	i. Ultimate in-charge and responsible for all the operations of Environmental Management Plan (E.M.P) set up. ii. He will be responsible to ensure smooth functioning of the E.M.P system. iii. Daily progress on the state of the environmental status will be reported to him in writing by the Shift Production Foremen. iv. All other E.M.P matters, issues and problems will be reported to him (for rectification) by the Shift Production Foremen. v. He will work as bridge between the Governments concerned authorities and the senior most management of the project. vi. He will be answerable to the higher management in all matters relating to E.M.P. and report at least monthly about the state of the E.M.P. operations.
2- Site Manager	i. He will be responsible to ensure smooth functioning of the entire E.M.P. ii. He will be responsible to rectify any problem regarding

OFFICIAL CONCERNED	RESPONSIBILITY
	environmental matter. iii. He will directly report to the Works Manager. All matters relating to E.M.P. on daily basis

5.4. TRAINING NEEDS

In order to effectively operate the EMP all the staff to be engaged in this activity should be trained extensively.

The person to monitor gaseous emissions, PM and noise levels should be extensively trained to handle his job capably. Training program should include use of monitoring instruments, data generation, processing, interpretation, recording and presentation.

5.5. SOCIAL MANAGEMENT PLAN

5.5.1. Recommendations and Mitigation Measures

(The following recommendations are made preliminary and will be adjusted based on the results of the Social Impact Assessment process.)

Based on the initial benchmark study, the following preliminary recommendations will be further adjusted according to the results of the Social Impact Assessment process to be conducted at a later stage:

- The management of the Project can capitalize on the positive attitude of the people of area towards proposed Project by offering them maximum employment opportunities at the development stage and any stage of operational phase.
- Insufficient and inadequate socio-economic structure of the community of the area also provides ample opportunities to Company management to win sympathies of local people in their favour, by introducing meaningful and manageable plan of community development.
- Aggressive and comprehensive plantation plan can also lessen fear of local people towards environmental issues.
- Sustainable development approach through conservation of natural resources would be the best strategy to compensate negative socio-environmental impacts.

- Social responsible attitude and stewardship of company management towards local people and resources can make project people friendly.
- Prior to action of the Project installation a comprehensive awareness campaign may be launched at masses level to avoid any conflict.
- To avoid any political, ethnic and value conflict, the administration of the plant may win the confidence of local powerful elites, authorities, leaders and interest groups by adopting informal confidence building measures.

5.5.2. Traffic Management Plan

A Construction Traffic Management Plan (CTMP) is necessary to minimize traffic delays, maintain motorist and worker safety, complete roadwork in a timely manner, and maintain access for businesses and residents. It is a mandatory requirement for all roads and highways projects and is defined in several places in the contract specifications of the bid package.

For each if the road projects the contractor will work closely, identify the work areas and activities requiring traffic diversion or safety delays, discuss with local communities and then initiate a traffic control program at each work site.

A typical CTMP addresses the following key issues and processes identified within a construction work zone, defined by the contractor:

- Safety and amenity of road users and the public;
- Site security, site access and signage;
- Project identification, including advertising and site signage;
- Traffic and road user delay and inconvenience management;
- Speed limit signage;
- Traffic transfer (switch) arrangements and procedures;
- Maintenance during construction;
- Traffic and safety management responsibilities;
- Construction staging including detailing the intersection layout and capacities for each and every construction stage;
- Impact of construction traffic on local roads, in particular; and
- Emergency and Incident Response Plans.

The contractor will provide at least two traffic control people at each end of the worksite, supplied with two-way communication and signs or flags. For

larger detours, the contractor will provide signage and diversion barriers such as fences or wooden, metal barriers kept in place during the work.

The schedule and level of traffic control will be matched with the work to be done and the specifications on the contract documents.

The Table below (Table 5.5) lists the traffic related issues to be dealt with by the contractor and the actions needed to prevent or mitigate negative effects. The contractor is expected to know the details of this table and any instructions defined in the contract specifications and any special conditions:

Table - 5.4: Traffic Issues and Mitigation Actions

Issue	Impact	Proposed Prevention/Mitigation Measure
Construction methods may cause disruption to traffic.	Traffic delays causing frustration to drivers.	Consider construction methods at design stage to reflect community needs & reduce delay times, minimizing impact on traffic.
Traffic management inadequate anticipation & communication of issues.	Potential community issues causing dissatisfaction & frustration.	• Determine traffic routes & engage with community to refine details. • Confirm pre-existing conditions. Consider the need for night assessment • Identify any short-term corrective actions.
Severe traffic delays perceived by community as a direct result of the construction activities.	Community dissatisfaction, claims for loss of trade, time delays.	• Establish good public relations from start. • Erect early warning information signs • Early engagement of affected property/business owners to explain process and ascertain needs & potential effects of changed access.
Access for emergency services restricted.	Emergency vehicles & personnel unable to attend to an emergency situation.	Liaise with emergency services at an early stage to establish requirements and measures to be adopted in the vehicle movement plan.

Issue	Impact	Proposed Prevention/Mitigation Measure
Local bus & other commercial operators.	Impact bus routes, commercial operations, and disruption to business causing frustration.	Bus routes to remain unchanged where possible to avoid changes due to construction activities.
Major traffic incidents.	Local traffic disrupted upsetting locals.	• Regular checking of TMP implementation • Have procedures in place for rapid recovery and keep locals informed.
Access to site for deliveries.	Traffic disruption or interference.	• TMP development in conjunction with local administration, police & community. • High-risk locations will need additional & detailed considerations. • Simplification of traffic staging will simplify access arrangements & minimize impacts.
Traffic Speed.	Works in multiple areas may result in intermittent speed changes that may frustrate road users.	• Reduced traffic speeds within construction zone. • Construction zone to be in manageable lengths. • CTMP to consider simplifying traffic staging to avoid construction zone impacting on traffic. •
Pedestrian access.	Potential disruption to progress causing pedestrians to not comply with pedestrian provisions.	Liaise closely with the relevant bodies from an early stage to ensure pedestrian access provisions are adequately addressed, well established and maintained.
Lowering speeds, when it is perceived	Poor public opinion and safety for	• Appropriate design of traffic protection measures,

Issue	Impact	Proposed Prevention/Mitigation Measure
unnecessary.	workers if motorists start ignoring limits.	intersections, alignments etc. to allow consistent speed limits. • Coordination with local communities. •
Too many changed configurations.	Unfamiliarity causing potential confusion of road users that may cause traffic incidents.	• Keep motorists on existing alignment for as long as possible. • Effective use of VMSs for advanced notification & clear direction during any traffic flow adjustments.
Inadequate provisions for breakdowns during construction.	Traffic delay.	Design temporary break down bays. Consider temporary verges where possible during design of traffic staging.
Public or livestock entering work-site or access to site.	Traffic Incident.	• Provide clear delineation and fencing. Educate community work cover requirements. • Channel interests through formally organized tours
Dangerous entry & exits to sites & properties.	Traffic Incident.	Ensure that entries /exits are designed to cater for expected traffic volumes & with respect to sight distances, acceleration & deceleration provision & clear advanced warning signage.
Seasonal traffic variations not allowed for.	High volumes during holidays and weekends.	• Consider seasonal volumes in programming works. • Keep RMS informed and up to date. Be aware of reporting and notification requirements.
Reduced allowable movements.	Traffic delay, confusion to commuters that may lead to an incident.	Implement effective community engagement strategies that will consider businesses, property owner's requirements.
Cyclists demand for	Confusion to	Engagement with locals, cycle

Issue	Impact	Proposed Prevention/Mitigation Measure
better access & routes during construction including safety measures.	pedestrians & cyclists resulting in dangerous movements. Community dissatisfaction	groups & commuters to ensure provision for cyclists is well addressed & notified to the community.
Damage to local roads due to heavy vehicle movements.	Vehicle damage and potential incidents. Poor community and council relationship.	• Allow for heavy vehicle movements in traffic staging and planning ensuring existing, temporary alignment & pavements are suitable during the construction period. • Carry out road dilapidation surveys. • Early repair of damaged roads.
Impact of construction traffic on local side roads.	Increased traffic & damages to the local roads.	• Monitor the road safety on during construction. • Implement measures where reasonable and feasible, in consultation with PIU, should additional road safety issues be identified appropriate road safety

Table - 5.5: Environmental Monitoring Plans

Sr. No.	Particular	Monitoring Plan
1.	Land Environment	• Safety zone of about 45m on each side of the rail/ road bridges and 45m radius around the wells located in the river bed have been earmarked. • 20m offset will be left against the banks to protect from side collapse. • To prevent erosion, moving the road or footpath will be kept away from the river's edge. • Care will be taken to ensure that ponding is not formed in the river bed

Sr. No.	Particular	Monitoring Plan
2	Air Environment	<u>Unpaved Roads</u> • Water sprinkling will be done for dust suppression • Leveling of roads will be done to maintain the uniform speed of the trucks/tippers. <u>Paved Roads</u> • The roads will be maintained. • Regular cleaning will be done to reduce the chances of road dust to become airborne. • Water sprinkling will be done on a fixed stretch of paved road passing through the villages. • Adequate transportation routes will be decided to transport the mineral and will be maintained properly. • Speed breakers will be constructed to restrict the speed of transporting vehicles. However, limiting of vehicular speed will be adopted. <u>Transportation</u> • The vehicles will be maintained to control the air emissions. • The speed of the vehicles will be maintained uniform. • PUC certified vehicles will be used. • The loaded vehicles will be covered with tarpaulin. • Over loading will be avoided.
3.	Noise Environment	• Regular inspection and maintenance of vehicles and equipment will be performed to ensure efficiency and worn parts will be replaced. • Limited numbers of equipments will be used on-site. • The vehicles will be maintained in good condition and overloading will be avoided. • Speed limits will be enforced in relation to road conditions and on-route communities. • Road surfaces will be maintained in good condition to reduce tyre noise and to assure continuous traffic flow to avoid prolonged idling. • Noise monitoring will be conducted on a regular basis to determine compliance with noise criteria.

Sr. No.	Particular	Monitoring Plan
		- Personal protective devices i.e., earmuffs and earplugs will be provided to workers, working in high noise areas. - Periodical medical checkup will be organized for all workers to check any noise related health problems.
4.	Socio-Economic Aspect	- Direct employment to the local people which help to sustain their livelihood. - During the operational phase by the implementation of certain CSR activities indirect employment will also generate. - Improved livelihood. - Training will be provided to the local persons - Awareness programs will be organized.

5.6. ENVIRONMENTAL ACTION PROGRAM

The Project Proponent is quite conscious of its responsibility for maintaining clean and a healthy environment. The management is also keen to modify and make more efficient measures towards suppression of pollution sources. Adequate fund for Pollution Control Measures are provided as a part of overall project financing to ensure the availability of proper treatment facilities. This cost will be spending phase wise along with the growth of project.

5.7. CONCLUSION

Various aspects of project activities were considered and related impacts were evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and fund has been allocated for the same. The EMP is dynamic, flexible and subjected to periodic review. For project where the major environmental impacts are associated, EMP will be under regular review.

Senior Management responsible for the project will conduct a review of EMP and its implementation to ensure that the EMP remains effective and appropriate. Thus, the proper steps will be taken to accomplish all the goals mentioned in the EMP and the project will bring the positive impact in the study area

6. INVOLVEMENT OF STAKEHOLDERS/PUBLIC CONSULTATION

Stakeholder consultation is a means of involving all primary and secondary stakeholders in the project's decision-making process in order to address their concerns, improve project design, and give the project legitimacy. Stakeholder consultation, if conducted in a participatory and objective manner, is a means of enhancing project sustainability. Community input (both of knowledge and values) on socioeconomic and environmental issues can greatly enhance the quality of decision-making. Stakeholder consultation was therefore conducted in the project area not only to satisfy the legal requirements of the EIA process in Punjab province but also to improve and enhance the social and environmental design of the project.

6.1. OBJECTIVES OF STAKEHOLDERS CONSULTATION

The process of public participation and consultation was endorsed in the United Nations Conference on the Environment and Development (UNCED) in 1992 through one of the key documents of the conference named as Agenda 21.

Agenda 21 is a comprehensive strategy for global action on sustainable development and deals with issues regarding human interaction with the environment. It emphasizes the role of public participation in environmental decision-making for the achievement of sustainable development.

A study was carried out with the broad objective to evaluate the impact of the project on the local population through public consultation process. The specific impact assessment aims were:

- Promote better understanding of the project, its objective, and its likely impact
- Identify and address concerns of all interested and affected parties of project area.
- Provide a means to identify and resolve issues before plans are finalized and potentially costly delays development commences, thus avoiding public anger and resentment.
- Encourage transparency and inculcate trust among various stakeholders to promote cooperation and partnership with the communities and local leadership.

6.2. PUNJAB ENVIRONMENTAL PROTECTION ACT 2012 (AMENDED ACT)

Public consultation is mandated under Punjab's environmental law. The Provincial Agency, under Regulation 6 of the IEE-EIA Regulations 2000, has issued a set of guidelines of general applicability and sectoral guidelines

indicating specific assessment requirements. This includes Guidelines for Public Consultation, 1997 (the 'Guidelines'), that are summarized below:

a) Objectives of Public Involvement

To inform stakeholders about the proposed project, to provide an opportunity for those otherwise unrepresented to present their views and values, providing better transparency and accountability in decision making, creating a sense of ownership with the stakeholders.

b) Stakeholders

People who may be directly or indirectly affected by the proposed project will clearly be the focus of public involvement. Those who are directly affected may be project beneficiaries, those likely to be adversely affected, or other stakeholders. The identification of those indirectly affected is more difficult, and to some extent it will be a subjective judgment. For this reason it is good practice to have a very wide definition of who should be involved and to include any person or group who thinks that they have an interest. Sometimes it may be necessary to consult with a representative from a particular interest group. In such cases the choice of representative should be left to the group itself. Consultation should include not only those likely to be affected, positively or negatively, by the outcome of proposed project, but should also include those who can affect the outcome of a proposal.

c) Mechanism

Provide sufficient relevant information in a form that is easily understood by non-experts (without being simplistic or insulting), allow sufficient time for stakeholders to read, discuss, consider the information and its implications and to present their views, responses should be provided to issues and problems raised or comments made by stakeholders, selection of venues and timings of events should encourage maximum attendance.

d) Timing and Frequency

Planning for the public consultation program needs to begin at a very early stage; ideally it should commence at the screening stage of the proposal and continue throughout the EIA process. In particular for present project the consultation was carried for six consecutive days.

e) Consultation Tools

Some specific consultation tools that can be used for conducting consultations include; focus group meetings, needs assessment, semi-structured interviews; community meetings and workshops.

f) Important Considerations

The development of a public involvement program would typically involve consideration of the following issues;

- objectives of the proposal and the study;
- identification of stakeholders;
- identification of appropriate techniques to consult with the stakeholders
- identification of approaches to ensure feedback to involved stakeholders; and
- Mechanisms to ensure stakeholders consideration are taken into account.

6.3. CONSULTATION PROCESS

Primary stakeholders were consulted during informal and formal meetings held in the project area. The consultation process was carried out in the Punjabi and Urdu languages. During these meetings a simple, non-technical, description of the project was given, with an overview of the project's likely human and environmental impact. This was followed by an open discussion allowing participants to voice their concerns and opinions. In addition to providing communities with information on the proposed project, their feedback was documented during the primary stakeholder consultation. The issues and suggestions raised were recorded in field notes for analysis, and interpretation.

By reaching out to a wider segment of the population and using various communication tools such as participatory needs assessment, community consultation meetings, focus group discussions, in-depth interviews, and participatory rural appraisal; present EIA involved the community in active decision-making. This process will continue even after this EIA has been submitted, as well as during future EIAs in which similar tools will be used to create consensus among stakeholders on specific environmental and social issues.

In the Secondary stakeholder consultations were more formal as they involved government representatives and local welfare organizations, NGO's consulted during face-to-face meetings and through telephonic conversations. They were briefed on the EIA process, the project design, and the potential negative and positive impact of the project on the area's environment and communities. It was important not to raise community expectations unnecessarily or unrealistically during the stakeholder consultation meetings in order to avoid undue conflict with community's

leaders or local administrators. The issues recorded in the consultation process were examined, validated, and addressed in the EIA report.

6.3.1. Points Discussed

Following points were discussed during the public consultations:

- Project components, its activities and impacts.
- Needs, priorities and reactions of the affected population regarding the proposed Project.
- Grievances redress procedures.
- Entitlement checklist development for the affectees of the Project.
- Basis for determining the rates of the land, houses, and other infrastructures.
- Compensation framework for the Project affectees.
- Compensation criteria to be followed for the payment to the affectees.
- Role of the affectees in implementation of the project.

6.4. STAKEHOLDER CONSULTATION TECHNIQUE

In recognition of the diversity of views within any community, it is very important to obtain a clear understanding of the different stakeholders and to analyze their capacity and willingness to be involved in some or all of the project and its planning process. It is important to be aware of how different power relations can distort participation. It is also important to examine how community skills, resources, and 'local knowledge' can be applied to improve project design and implementation. All of this can be achieved by careful use of the various tools of Stakeholder Consultation. Therefore, the following participatory techniques were employed during stakeholder consultations:

- Informal meetings with communities.
- Focus Groups with participants in communities.

In the consultation process for EIA, following key stakeholders were consulted:

- Local communities,
- Men
- Women and

Community's elders attended meetings

Meetings with stakeholders consisted of community consultation meetings, focus group discussions, and in-depth interviews with men and limited focus-group discussions with women.

6.4.1. Proponent

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

6.4.2. The Responsible Authority

The proponent will be the responsible authority to take all measures prior to start the project and during operation.

6.4.3. Other Departments and Agencies

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

6.4.4. Environmental Practitioners and Experts

Team of Geo Band Works Management visited the project site, had discussion with stakeholders and consulted with the local people of nearby and other villages to evaluate the project socio-economic impacts. People of the area belong to different professions like mostly belong to 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.

6.4.5. Government Representatives

The consultations were carried out with the local government officials and officials of the following departments:

- Ministry of Health
- Environment Protection Department
- Forestry
- Fisheries

- Irrigation
- Wild Life

The officials of Wildlife and Forest department perceived that the employment opportunities and business development would be the positive impacts on the community and people during the construction phase of the proposed project. Among the perceived negative impacts during construction phase of the project include especially road blockage, dust emissions, noise and nuisance due to heavy traffic. All officials of project study area were in favor of the project. They expect many positive, conducive and constructive impacts on socio-economic life of local community regarding jobs, business opportunity and social structure development. They were in opinion that project would improve area development through development of existing infrastructure etc. The project will also raise their level of awareness, initiate cultural diffusion, activate social mobility and bring social change regarding various aspects of their life.

The officials from Fisheries and Irrigation departments appreciated the proposed activity. They also expressed that the jobs and business opportunities for the local community will be increased due to project activities and that the infrastructure will developed that automatically lead to the development of the project area. They also expressed the concern that most of the unskilled and skill jobs should be provided for the local communities.

6.4.6. Affected and Wider Community

There is no affected community present in the area of proposed project. Consultant's team has consulted with the inhabitants of different villages. The remarks of people are positive regarding the project and people foresee positive impacts like employment opportunities, business, development of the area etc.

7. PROJECT BENEFITS

7.1. GENERAL

The demand of Sand has been rising in Pakistan as a result of rising in construction activities and development of the proposed project aims to fulfill the supply of Sand. Hence, the fine quality of mineral will be used further for development. The sediment in the form of river bed material (RBM) deposited is of critical importance in civil and other infrastructural activities. The proposed project lies on the river bed of Chanab. The quality of Sand is fine and appropriate for the mega infrastructural activities. The demand for Sand is ever growing with the growth of the infrastructure sector in our country. The mineral is used mainly in the construction activities like buildings, bridges etc. The requirement for the mineral is always high in the nearby cities and towns. Therefore, there is always a good demand of the mineral in the domestic market. The local region demand is increasing; hence newer areas for Sand reserves are approached

7.2. EMPLOYEMENT

7.2.1. Direct Employment

During the operational phase, about 17 people will be employed directly. Considering that some of the skilled personnel to be employed for the project will be from outside the area and unskilled/ semiskilled personnel will be from within the study area, the project will add to the well being of the area. In addition to the workforce the indirect employment will also be generated for local persons. It will help in bringing prosperity to the area

7.2.2. Indirect Employment

The project will also provide some indirect employment to the people of nearby area of mine site. Some people will get engaged in some pet shops like tea shop, vehicle repair centre etc. It will also provide some need based opportunity to the local public. The project will provide following indirect employment to the local people:-

- Transportation and warehousing in the region required to transfer the mineral will eventually be needed and therefore trucks and jobs in logistical activities will come up.
- There will be development of externalities for the workers petty shops (tea, repair stations for trucks etc.) as supporting services.
- This would create Indigenous Technologies for sustainable development.

7.3. IMPROVEMENTS IN PHYSICAL AND SOCIAL INFRASTRUCTURE

The proposed project will enhance the socio-economic activities in the adjoining areas.

This will result in following benefits:

- Improvements in physical infrastructure
- Improvements in social Infrastructure.
- Increase in employment potential.
- Contribution to the exchequer.
- Prevention of illegal extraction which will help in sustaining the river and its aesthetic value.

7.3.1. Improvements in Social Infrastructure

There will be some obvious changes in various environmental parameters due to project activity. Increase socio-economic activities, creation of new employment opportunities, infra-structural development, better educational and health facilities.

Socio-Economic:- There will be positive impact in socio-economic area due to increased economic activities, creation of new employment opportunities, infrastructural development and better educational and health facilities.

Employment Potential:- There is a possibility of creation of direct and indirect employment opportunities due to working of this project.

7.3.2. The extraction will contribute to the Exchequer of State and Central Government as per norms

Plantation

The lease area is in the river bed and devoid of any vegetation. Project activities will not cause any harm to riparian vegetation cover as the working will not extend beyond the offset left against the banks. Plantation will be carried out as social forestry programme in villages, school and the areas allocated by the State authorities.

Plantation will be proposed on both sides of the roads as greenbelt to provide cover against dust dissemination. A massive plantation will be done nearby the project area to mitigate the ill-effects of extraction and to improve environment of its surrounding area

Native plants like Neem, Pipal, Khejri, and other local species will be planted. The management will give emphasis on plantation and will also

motivate local persons for plantation during rainy season. This will also increase the consciousness in workers and near-by villagers for greenery

Other benefits

The other tangible benefits includes metrics and improvements demonstrating process and system cost savings, compliant inspections and customer audits, faster product approvals and manufacturing throughput, less rejected material, reduced nonconformance issues, and more efficient continuous improvement and project implementation. Intangible benefits include improved staff morale, quick, more accurate and transparent decision making, increased staff accountability and an enhanced culture of quality throughout the organization.

8. CONCLUSION AND RECOMMENDATIONS

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

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

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

REFERENCES

Listed below are some of the documents, reports and other references consulted during the preparation of this report:

- i. Information and data provided by project proponents;
- ii. Project Pre-feasibility Study Report;
- iii. Technical Design Data related to the project.
- iv. Information gathered through discussions with the project related persons of the project proponent;
- v. Discussion with concerned government officials;
- vi. Punjab Environment Quality Standards for Municipal and Liquid Industrial Effluents, The Ministry of Environment, Government of Punjab vide its Notification, Islamabad, the 5th August, 2016 under SO(G)/EPD/7-26/2013 established standards for Drinking Water Quality
- vii. Punjab Environment Quality Standards for Ambient Air, August 2016;
- viii. Punjab Environment Quality Standards Noise Levels August 2016;
- ix. Punjab Environment Quality Standards for Drinking Water August 2016;;
- x. Pakistan Environmental Protection Act, 1997;
- xi. The Punjab Environmental Protection (Amendment) Act 2011 covers aspects related to:
 - a. the protection, conservation, rehabilitation and improvement of the environment and the prevention, control of pollution and promotion of sustainable development;
 - b. establishing complete regulatory and monitoring bodies, policies, rules, regulations and national environmental quality standards; and
 - c. to ensure enforcement, the act establishes regulating bodies i.e. Punjab Environmental Protection Council (PEPC) and responsible bodies i.e. Punjab Environmental Protection Agency (Punjab EPA) at Provincial level.
- xii. Land Use Policies and Environmental Legal Framework including;
- xiii. Environment related Laws in Pakistan and the Province of Punjab;

- xiv. The Pakistan National Conservation Strategy, Environment and Urban Affairs' Division (presently- Ministry of Environment, Urban Affairs and Wild Life), Government of Pakistan, Islamabad;
- xv. Government of Pakistan, Pakistan Environmental Protection Agency, Policy and Procedures for Filing, Review and Approval of Environmental Assessment, 2000;
- xvi. Environmental Assessment Requirements and Environmental Review Procedures of the Asian Development Bank, 1993;
- xvii. GOOGLE EARTH, maps.
- xviii. Guidelines for Public Consultations - These guidelines cover:
 - Consultation, involvement and participation of Stakeholders
 - Techniques for public consultation (principles, levels of involvements, tools, building trust)
 - Effective public consultation (planning, stages of EIA where consultation is appropriate)
 - Consensus building and dispute resolution.
- xix. Applicable International Environmental and Occupational Safety and Health Laws and Regulations;
- xx. Applicable International Environmental and Occupational Safety and Health Laws and Regulations;
- xxi. National Resettlement Policy (Draft), Government of Pakistan, March 2002.

TERM OF REFERENCES

1. The Consultant is required to carry out an Environment Assessment Study of the Project as required under section 12 of Pakistan Environmental Protection Act 1997/ Punjab Environmental Protection Act 2012.
2. The Study should be comprehensive and should cover all aspects which are envisaged under the relevant national and provincials laws & regulations including but not limited to:
 - Identification and recommendation for suitable solution/treatment/mitigation measures of emissions and effluents such as waste water and sludge etc in accordance with Punjab Environmental Quality Standards (PEQS).
 - Identification and recommendation for suitable solution/treatment/mitigation measures of solvents, oils (tar), hazardous waste, organic compounds, steam, flue gases, particulate matter and chemical compounds harmful for the environment and other substances leading to air, noise, water and soil pollution in accordance with PEQS.
3. The Study should be acceptable to the relevant national and/or provincial authorities (relevant authorities) in Punjab.